UST SECTION

CORRECTIVE ACTION GUIDELINES

PETROLEUM AND HAZARDOUS SUBSTANCE UST RELEASES

PETROLEUM NON-UST RELEASES

UST Section

North Carolina Department of Environmental Quality

Division of Waste Management

November 16, 2020 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		
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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.(15A NCAC 2T .0103(38)).

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

CA Corrective Action

CA FS Corrective Action Feasibility Study

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

IAR 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

MNA Monitored Natural Attenuation

MRL Minimum Reporting Limit

MSCC Maximum Soil Contaminant Concentration

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

RRD Reasonable Rate Document

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

CORRECTIVE ACTION GUIDELINES FOR RELEASES FROM USTS AND PETROLEUM OTHER SOURCES

1.0 Introduction

1.1 Purpose of the Guidelines

The Underground Storage Tank (UST) Section ***Corrective Action Guidelines*** assists tank owners, tank operators, landowners, and other responsible parties in understanding the process of remediating 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 performing corrective action procedures and tasks to reduce the levels 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 the remediation of releases 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 in any way supersede any requirement of pre-approval.

Emergency actions should be taken as soon as a 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 releases, removing or permanently closing UST systems; and performing initial response and abatement efforts at releases from UST systems.

- If initial release abatement efforts cannot restore the site to pre-release conditions, the assessment described in the ***Assessment Guidelines*** should be considered as the next step.

Electronic versions of all guidelines developed by the UST Section are available for 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 15A NCAC 02N. In addition to petroleum releases, the UST Section is tasked with overseeing remediation of releases from hazardous substance UST systems 40 CFR § 280.60 and §143-215.78 Oil pollution control program. These NC General Statutes state that the Department shall establish an oil pollution control program for the administration of this Article (Article 21A. Oil Pollution and Hazardous Substances Control). The Department may employ and prescribe the duties of employees assigned to this activity.

The Oil Pollution and Hazardous Substance Control Act (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, assessment and 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 and submit a **45-Day Report** and a **Comprehensive Site Assessment (CSA) Report** and to submit and implement a **Corrective Action Plan (CAP)** to address contamination.

The most stringent cleanup levels may apply to non-petroleum releases (even if comingled 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 also responsible for overseeing remediation of these types of releases are provided in **Appendix F**.

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 standard), 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** 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. Some non-regulated non-petroleum UST releases (e.g., hazardous waste UST releases) do not fall under the regulatory authority of the UST Section; **Appendix F** 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 tank, 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 either 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 **15A NCAC 02L .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 State 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*** and/or ***Assessment 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, or 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.

1.2.4 Guidance Pertaining to Hazardous Substance Releases

Title 15A NCAC 02L and **15A NCAC 02N** also describe the required response to a suspected release of a hazardous substance from a UST system. The most stringent cleanup levels apply to non-petroleum releases (even if commingled with a petroleum UST release). Therefore, groundwater contaminated by non-petroleum releases must be cleaned up to the groundwater quality standards in 15A NCAC 02L .0202, and soil must be cleaned up to levels protective of groundwater quality, the soil-to-groundwater MSCCs. However, following **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 in **Appendix F**.

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 from any UST system or from a non-UST source must comply with the release response and abatement requirements defined in **15A NCAC 02L .0404** or **15A NCAC 02L. 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 then provide the ***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 3.8.4 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 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, .0702, .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 will be described more fully in the ***STIRA Guidelines***.

1.4 Review of Assessment Measures

The **Assessment 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. The current Assessment Guidelines 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 **Assessment Guidelines** are available at: https://deq.nc.gov/about/divisions/waste-management/ust/guidance-documents

2.0 Free Product / NAPL Recovery and Reporting

2.1 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***.

2.1.1 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*.

2.1.2 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 ***20Day Report***, or ***Initial Abatement Action Report / Initial Site Assessment Report / 45-Day Report***, described in the *STIRA*

Guidelines, or the ***Limited Site Assessment Report (LSA)***, *or* ***Comprehensive Site Assessment Report (CSA)*** 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.

2.1.3 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.

2.2 NAPL Requirements for Petroleum Releases from Noncommercial USTs

2.2.1 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.*

2.2.2 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.

Please refer to the Assessment Guidelines for information regarding the steps to be taken after initial abatement.

3.0 Corrective Action

Pursuant to **15A NCAC 02L .0407, 15A NCAC 02L .0507 and 15A NCAC 02L .0106**, the responsible party must consider corrective action based on the risk to human health and the environment, technology available to accomplish restoration, the potential for the degradation of contaminants in the environment and the time and costs estimated to achieve groundwater quality restoration.

3.1 Purpose and Scope

The purpose of the CAP is to propose a plan to remediate soil and groundwater contamination, if present. **If the contamination at the site is limited to either soil or groundwater, the CAP should only address the contamination present**. The responsible party must provide the information described in the report format, completing appropriate sections relating to soil contamination, groundwater contamination, and/or free product. The CAP must be organized and all necessary information presented in the report template (See Appendix A).

The regional office incident manager, on review of the *CAP*, may request information additional to that provided in the *CAP* or supplemental to that specified by the report format. The incident manager may deny approval of the *CAP* if any of the elements specified have not been included or have not been adequately addressed. The *CAP* will not be approved until the incident manager determines the plan to be complete. Questions regarding technical aspects of site assessment or corrective action should be directed to the appropriate regional office or central office.

The corrective actions proposed in the *CAP* must be designed to adequately protect human health, ensure safety and protect the environment. Specifically, the *CAP* must consider the following elements:

1. physical and chemical characteristics of the regulated substance,
2. toxicity of the regulated substance,
3. persistence of the regulated substance,
4. potential for migration of the regulated substance,
5. hydrogeological characteristics of the facility and surrounding area,
6. proximity, quality, current and future uses of surface water and groundwater,
7. potential effects of residual contamination on nearby surface water and groundwater, and
8. risk of exposure to organisms.

3.2 Releases of Petroleum from Commercial UST, Non-Commercial USTs, and Non-UST Sources for High and Intermediate Risk Sites

Pursuant to **15A NCAC 02L .0407** and **15A NCAC 02L .0507**, the responsible party must propose actions to cleanup or to mitigate the impact of soil and groundwater contamination from petroleum USTs and petroleum non-UST releases at High or Intermediate risk sites. The responsible party must prepare and submit a *CAP* when the Department determines, on review of the *CSA Report*, that the risk of the site is still High or Intermediate. The responsible party is allowed **90-days** from the date of the notice approving the *CSA Report* to submit a *CAP* that presents and evaluates the proposed corrective actions.

Where State Trust Fund reimbursement is anticipated, please note that the Reasonable Rate Document (RRD) modifies the standard Corrective Action Plan (CAP) scopes and schedules defined in 15A NCAC 02L .0106 into a three-step document as follows:

1. ***Corrective Action Feasibility Study (Task 6.065)*** *evaluating the remedial technology/technologies proposed in the 'Conclusions and Recommendations' section of the Comprehensive Site Assessment (or via a New Technology Cleanup Plan);*

2. ***Corrective Action Design (Task 6.066)*** *applicable where the proposed technology requires a formal engineered design and multi-vendor bid review for fabrication and installation of the treatment system; and*

3. ***Corrective Action Record of Decision (Task 6.067)*** *documenting the proposed remedial schedule and evaluation metrics, with multi-party certification confirming the applicable stakeholders agree with the proposed remedial strategy as presented in all three steps of this revised Corrective Action Plan process.*

Accordingly, the UST Section has drafted additional Corrective Action Plan templates intended to assist the regulated community by outlining the information that is being requested within each of these steps (See Appendix A). Additional information describing the expectations for the all stakeholders in this process (responsible party, consultant, engineer of record, or UST incident management or technical auditing staff) is provided in the introduction to each template. For any given site, recommended amendments to the templates by any member working within the three-step, group process should be discussed openly within the stakeholder group and incorporated, where appropriate due to site-specific conditions and approved/accepted by all members, into the applicable document.

Department-issued Notices of Regulatory Requirement (NORRs) will continue to reference the 15A NCAC 02L .0106 requirements, but will also refer to the opportunity for any State Trust Fund-eligible responsible party to utilize this three-step process to obtain step-wise CAP deadline extensions while retaining reimbursement eligibility under the applicable RRD.

Please note that this approach is required only for UST incident sites that are eligible for, and seeking reimbursement from, the Commercial Leaking Underground Storage Tank Cleanup Fund for the Corrective Action performed onsite. For sites that are ineligible, or where reimbursement for Corrective Action is not anticipated, the Corrective Action Plan format presented in Appendix A should be used.

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 additional information about reimbursement.

For a noncommercial UST release, the responsible party must also follow these requirements if the release is classified by the Department as High risk, based upon information available to the Department and the standards listed in **15A NCAC 02L .0406**. If, prior to the deadline for the *CSA Report* or *CAP*, steps are taken to mitigate the risk and information documenting these steps is provided to the Department, allowing for a reclassification to Low risk under **15A NCAC 02L**

.0407, then no further action may be required of the responsible party for the noncommercial UST release.

3.3 Releases of Petroleum from Commercial UST, Non-Commercial USTs and Non-UST Sources for Low Risk Sites

For Low risk petroleum contaminated sites from Commercial USTs or petroleum non-UST sources, 15A NCAC 02L .0407 and 15A NCAC 02L .0507 require any residual soil contamination above the applicable risk-based MSCCs be addressed before the issuance of a No Further Action determination. For these sites, a Soil Assessment Report (*SAR*) composed of the results of comprehensive soil assessment efforts along with a proposed soil remediation plan, must be prepared and submitted. The responsible party is allowed **90-days** from the date of the notice requesting the *SAR*.

For a noncommercial UST release that is classified as low risk, **15A NCAC 02L .0408** does not require the responsible party to document that soils have been remediated. Therefore, the completion of a *SAR* is not required for a low risk noncommercial UST petroleum release.

3.4 Releases from Hazardous Substance (regulated non-petroleum) UST Sources

Pursuant to **15A NCAC 02N .0700** and **15A NCAC 02L .0106** for *hazardous substance UST* releases and pursuant to **15A NCAC 02L .0106** for other *non-petroleum UST releases*, the responsible party must propose actions to cleanup or to mitigate the impact of soil and groundwater contamination. The responsible party is allowed **90-days** from the date of the notice approving the *CSA Repor*t to submit a *CAP* that presents and evaluates the proposed corrective actions.

Pursuant to 15A NCAC 02L .0106(f), all free product and contaminated soil should have been removed, treated, or controlled during the initial abatement or assessment. However, if soil contamination persists at levels that could leach into groundwater, then soil remediation must be proposed in the CAP.

3.4.1 Releases from Hazardous Substance (regulated non-petroleum) USTs

Pursuant to **15A NCAC 02N .0700** and **15A NCAC 02L .0106**for *regulated non-petroleum (hazardous substance) UST* releases, the responsible party must propose actions to cleanup or to mitigate the impact of soil and groundwater contamination. As the corrective actions for all non-petroleum UST releases are regulated under **15A NCAC 02L .0106**, the responsible party must propose and implement a ***CAP.***

A .0106(j) CAP (below soil to groundwater MSCCs and 2L standards), requires use of the "best available technology for restoration of groundwater quality to the level of the standards. The implementation of a comprehensive ***CAP*** may also include any necessary **15A NCAC 02L .0106** ***CAPs.*** The responsible party must monitor groundwater routinely until it is demonstrated that groundwater contamination has been reduced to the final goals for *No Further Action* status.

Pursuant to **15A NCAC 02L .0106(f)**, all free product and contaminated soil should have been removed, treated, or controlled during the initial abatement or assessment. However, if soil

contamination persists at levels that could leach into groundwater, then soil remediation must be proposed in the CAP.

Department Risk-Based Remediation does not use the UST programs risk-based values, there is a different process for the determination of Department Risk-Based Remediation goals. Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use. In addition to DEQ's Underground Storage Tank, Dry-cleaning Solvent Cleanup Act, and the Pre-Regulatory Land Fill Programs, risk-based remediation can now be considered in all DEQ environmental cleanup programs, except those subject to remediation pursuant to the Coal Ash Management Act of 2014 and the requirements of animal waste management systems. More information can be found on the NCDEQ website at https://deq.nc.gov/permits-regulations/risk-based-remediation.

3.5 Soil Remediation Goals

This section discusses the soil and groundwater remediation goals for releases of petroleum and non-petroleum substances (e.g. hazardous substances) from UST and Non-UST sources.

3.5.1 Soil Remediation Goals for Petroleum Releases

Pursuant to 15A NCAC 02L .0408 and 15A NCAC 02L .0508, soil must be remediated to the applicable MSCCs or as closely thereto as economically or technologically feasible. Special considerations are to be expected in situations where traditional remediation technologies cannot be used or where treatment or removal of contaminated soil will jeopardize the integrity of a substantial structure(s). **Pavement, canopies, decks, patios, or HVAC units are not considered substantial structures.** The soil cleanup requirements apply to the entire unsaturated soil column exclusive of the smear zone. Cleanup within the smear zone may be allowed, if technologically and economically feasible with approval of the incident manager.

If a site is eligible for TF reimbursement, preapproval from the TF must be obtained prior to initiation of cleanup activities.

Final determination of soil contamination must be made by the laboratory analytical methods presented in **Table 6**. MSCCs for some non-petroleum contaminants are listed in **Table 1**. If a contaminant does not have a published MSCC, the responsible party should contact the UST Corrective Action Branch regional office and central office at https://deq.nc.gov/about/divisions/waste-management/ust to request establishment of a cleanup level.

3.5.1.1 Development of Maximum Soil Contaminant Concentrations (See Table 1.)

In accordance with 15A NCAC 02L .0411 and 15A NCAC 02L .0511, there are three categories of risk-based cleanup levels. The Maximum Soil Contaminant Concentrations (MSCCs), have been established: soil to groundwater MSCCs, residential MSCCs, and industrial/commercial MSCCs. The soil to groundwater MSCCs are calculated to be protective of groundwater impacted by contaminants leaching from soil. The residential MSCCs are calculated to be protective of the health of children and adult residents who may be exposed to contaminated soil. The

industrial/commercial MSCCs are calculated to be protective of the health of an adult worker who may be exposed to contaminated soil for a limited period. To develop the residential and industrial/commercial MSCCs, the non-cancer and cancer risk-based ingestion concentrations were determined for each contaminant. The MSCCs represent the lower of the non-cancer and cancer risk-based ingestion concentrations. The equations used by the Department to calculate the soil to groundwater, residential and industrial/commercial MSCCs are provided in Appendix J.

3.5.1.2 Soil Remediation Goals for High and Intermediate Sites (Commercial Petroleum UST and Petroleum Non-UST Sources)

The responsible party must remediate soil contamination to concentration levels that are equal to or less than the lowest of the soil to groundwater MSCC or the residential MSCC at High or Intermediate sites, before the Department can approve No Further Action status.

3.5.1.3 Soil Remediation Goals for Low Risk Sites (Commercial Petroleum UST and Petroleum Non-UST Sources)

The responsible party must remediate soil contamination at Low risk sites to concentrations levels which are equal to or less than the applicable MSCCs, i.e., the residential or industrial/commercial MSCC, before the Department can approve No Further Action status.

3.5.2 Hazardous Substance UST and other Non-Petroleum UST Sources)

The responsible party must remediate soil contamination to concentration levels that are equal to or less than the soil to groundwater MSCC.

3.5.3 Evaluation of Soil Remediation

The effectiveness and progress of soil remediation should be evaluated by soil sampling as scheduled in the ***CAP*** or as directed by the Department and should be reported in routine monitoring reports. The requirements for the reporting of soil remediation monitoring are presented in the Monitoring Report format presented in Appendix A.

3.6 Groundwater Remediation Goals

Groundwater contamination must be remediated, using one or more technologies, to levels that address the risk posed by the release. This may include active remediation with mechanical systems or chemical adjustments, or through the use of natural processes that will eventually degrade and attenuate petroleum contaminants to the applicable cleanup levels for a given site.

3.6.1 Groundwater Remediation Goals for Petroleum Releases

Pursuant to 15A NCAC 2L .0407 and .0507, groundwater must be remediated to the applicable standards or as closely thereto as economically or technologically feasible. Special considerations are to be expected in situations where traditional remediation technologies cannot be used.

3.6.1.1 Groundwater Remediation Goals for High and Intermediate Risk Sites (Commercial Petroleum USTs and Petroleum Non-UST Sources)

The responsible party must remediate groundwater contamination at High risk sites to restore the groundwater quality to concentration levels that are equal to or less than the standards established by **15A NCAC 02L .0202**.

For Intermediate risk sites, the responsible party must restore groundwater quality to alternate concentration levels that are protective of surface water, wellhead protection areas, and deeper Coastal Plain aquifers that are or could be used as a source of drinking water. The responsible party must demonstrate that groundwater has been remediated to alternate levels that are sufficient to prevent a violation of the following standards:

- Surface water standards (including National Criteria per the USEPA) and the criteria contained in **15A NCAC 02B** (*for Class C Waters, the applicable standard is the more stringent of the Freshwater (or Saltwater) or Human Health; and for WS Waters, the applicable standards are the most stringent of the Freshwater, WS, or Human Health standards for a pollutant*);
    - Groundwater contamination within 500 feet of a surface water body that exceeds 10 times the 15A NCAC 2B .0200 surface water standards must be remediated to remain protective of surface water where the risk to the receptor cannot otherwise be eliminated;
- Groundwater quality standards and interim standards contained in **15A NCAC 02L .0202** for locations no closer than one-year travel time upgradient of a well within a designated wellhead protection area; and
- Groundwater quality standards and interim standards contained in **15A NCAC 02L .0202** for a deep Coastal Plain Aquifer that is, or could be, used as a source of drinking water.

If the groundwater will not violate any of the above standards, the responsible party must remediate groundwater contamination to below the Gross Contaminant Levels (GCLs). The GCLs are presented in **Table 2**. And are defined in **15A NCAC 02L .0406** as follows:

- Levels of groundwater contamination for any contaminant except ethylene dibromide, benzene, and 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 standard established in **15A NCAC 02L .0202**, whichever is lower.
- Levels of groundwater contamination for ethylene dibromide and benzene that exceed 1,000 times the federal drinking water standard as presented in **40 CFR 141**.

3.6.2 Groundwater Remediation Goals for Hazardous Substance USTs and other Non-Petroleum USTs

The responsible party must remediate groundwater contamination from Hazardous Substance USTs and other non-petroleum USTs to restore the groundwater quality to concentration levels that are equal to or less than the standards established by **15A NCAC 02L .0202**. The goals of active remediation under Paragraph 15A NCAC 02L **.0106(j)** are also the final cleanup goals that must be attained for the site to be eligible for *No Further Action* (NFA) status.

Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use. Session Law 2015-286 expands the use of risk-based remediation to sites subject to remediation under certain programs or requirements. The DEQ's Underground Storage Tank, Dry-cleaning Solvent Cleanup Act, and the Pre-Regulatory Land Fill Programs have respective, existing risk-based programs. Risk-based remediation can now be considered in all Department environmental cleanup programs, except those subject to remediation pursuant to the Coal Ash Management Act of 2014 and the requirements of animal waste management systems. This program is codified in G.S. 130A – 310.65 through 77.

DEQ Risk-Based Remediation - https://deq.nc.gov/permits-regulations/risk-based-remediation

3.6.3 Evaluation of Groundwater Remediation

The effectiveness and progress of groundwater remediation should be evaluated by groundwater monitoring as scheduled in the ***CAP*** or as directed by the Department and should be reported in routine monitoring reports. The Department requires, at a minimum, four consecutive quarters of data or sufficient data demonstrating consistency during seasonal changes to the water table, following discontinuation of remedial action, which document no contamination above the final cleanup goals have been attained.

Determination of groundwater contamination must be made by the laboratory analytical methods presented in **Table 7**. The requirements for the reporting of groundwater remediation monitoring are presented in the ***Monitoring Report*** format presented in **Appendix A**.

3.7 Vapor Remediation Goals

The responsible party for all UST types and any non-UST petroleum release must take action to mitigate fire, vapor, and explosion hazards posed by vapors or free product which have migrated from the UST system into utility lines, vaults, basements, or other features.

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/).

3.8 Pre-CAP Monitoring

If more than six months elapse between the approval of the *CSA* and implementation of the *CAP*, the Department may direct the responsible party to perform *Pre-CAP* monitoring of groundwater in monitoring wells, water supply wells, surface water, petroleum vapors and/or free product. *Pre-CAP* monitoring may be determined necessary for the following purposes:

- Provide an updated evaluation of risk to water supply well users;
- Provide the status of contaminant plume geometry and extent to facilitate system design;
- Establish the level of contaminant concentrations at a site immediately prior to startup of a remedial system; and

- Provide empirical data on which to evaluate the progress of natural attenuation.

The department will determine the frequency and scope of pre-*CAP* monitoring on a site-specific basis. The responsible party should submit a request for pre-*CAP* monitoring to the department for approval, upon approval perform the monitoring event, and submit a Pre-*CAP Monitoring Report* (which should be prepared using the Monitoring Report format presented in **Appendix A**) to the appropriate regional office by the end of the month following the month of the monitoring event.

3.9 Corrective Action Plans - Step-Wise Corrective Action for Releases from Commercial USTs

The multi-step CAP is required by the State Trust Fund for eligible sites operating under the current Reasonable Rate Document to maintain access to the North Carolina Commercial Leaking Petroleum UST Trust Fund (State Trust Fund). A remedial strategy is required to be included in the Conclusions and Recommendations section of the preceding CSA Report. The comprehensive corrective action plan includes the following standalone documents:

- Feasibility Study,
- Corrective Action Design, and
- Record of Decision (ROD)
- Notice of Residual Petroleum with Land Use Restrictions (G.S. 143B-279.9(b))

See Appendix A for templates.

3.9.1 ***Corrective Action Feasibility Study***

The objective of the Corrective Action Feasibility Study (CA FS) is to provide a robust evaluation of the remedial strategy provided in the CSA, as approved by the Department. The CA FS should include a brief summary of any previous abatement efforts (i.e., soil excavation and/or free product recovery events, etc.) and site conditions along with a more thorough description of any work performed since the completion of the CSA that may help verify the applicability of the recommended remedial alternative. The core of the feasibility is compiled using the results of pilot studies and "rough" cost estimates (within 15% of the actual designed and bid costs) to verify and validate the effectiveness and cost efficiency of a proposed strategy or remedial technology. The evaluated strategy should incorporate two to three years of active remediation to stabilize the contaminant plume and protect nearby at-risk receptors. The goal of the remedial strategy should address the bulk of the secondary source and/or dissolved-phase contaminant plume such that monitored natural attenuation (MNA) may be reasonably projected to achieve risk-based closure standards within approximately ten years following the completion of active remediation. This approach incorporates the requirements of G.S. 143-215.94V(b) to evaluate the likelihood that a receptor will be impacted, allowing a site to be reclassified as 'Low' risk for a stable or receding plume.

For some sites with existing impacted receptors, receptors within the plume footprint, or where the plume cannot be adequately stabilized to allow for risk reclassification to 'Low', additional measures may be required. The feasibility study should be used to further document those needs where the remedial strategy may differ from typical strategies.

3.9.2 ***Corrective Action Design***

The Corrective Action (CA) Design portion of the multi-step CAP is to provide a formal design for the remedial strategy approved by the Department in the preceding Feasibility Study. The CA Design should include a complete remedial system design specification, incorporating pilot test results from the Feasibility Study and all necessary calculations and design drawings.

The CA Design must include the formal individual bid request responses for the fabrication and installation of a turnkey system (and any other standalone State Trust Fund RRD task within the scope of the system implementation, such as the installation of an infiltration gallery, etc.). An estimated schedule for fabrication and installation must be included. Remedial strategies that include relocated or rented systems must include any existing design specifications and supplemental designs and/or bids for the additional efforts associated with incorporating the existing system into the remedial strategy for the site (e.g., modifications, enhancements, transit, etc.).

Any CA Design incorporating engineering practices must be sealed by the professional engineer who developed the remediation system design, as required by 15A NCAC 02L .0103(e).

3.9.3 ***Corrective Action Record of Decision***

The Record of Decision (CA ROD) portion of the multi-step CAP is to provide a formal statement of objectives, schedules, and milestones for the selected remedial strategy and the associated remedial system design that were provided in the preceding approved CA FS and CA Design steps. The CA ROD should clearly define these objectives, schedules and milestones to be used to track the cleanup progress for both the active remediation and natural attenuations phases of the CAP. The CA ROD must include any information necessary to validate the proposed cleanup objectives, schedules and milestones, proof of proper completion of public notice, as required for risk-based cleanup goals. The CA ROD must include a completed signature page for all parties involved in the CA ROD.

This CA ROD differs from other programs as it does not formally bind all parties to the letter of the text under threat of penalties or fines. Instead, this CA ROD represents a statement of agreed upon expectations for site cleanup that are acceptable to the Responsible Party, their primary environmental consultants, the remediation system design engineer, and the Department (as represented by the UST Section Corrective Action and Trust Fund Branches). If, during the course of the implementation of this CAP, the proposed objectives, schedules, and milestones are not being met for any reason (other than negligence or fraud), or if there is any material change to the site or surrounding area that could alter the applicable risk classification for the site, any party to the agreement has the right to request an amendment to the ROD, going forward, without penalty.

3.9.4 Notice of Residual Petroleum with Land Use Restrictions (G.S. 143B-279.9(b))

See Section 8.0 for additional information on the process for completing a Notice of Residual Petroleum, Notice of Contaminated Site (NCS), or Notice of Residual Contamination (NRC) and Land Use Restrictions. See Appendix A for Templates.

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-tankssection/trust-fund-branch/reasonable-rate-documents) for information about reimbursement.

3.10 Corrective Action Plans - Petroleum Releases from Sources other than Commercial USTs

As the corrective actions for all petroleum release from sources other than commercial USTs are regulated under **15A NCAC 02L .0407 and 15A NCAC 02L .0507** the responsible party must propose and implement a comprehensive CAP pursuant to Paragraph .0106, which requires the use of the best available technology for the restoration of groundwater quality to the level of the standards, which include CAPs described in Paragraphs .0106(j), (k), (l), and (m). The responsible party or their representative must submit and implement a comprehensive CAP which proposes to cleanup groundwater contamination to levels equal or less than the standards established in 15A NCAC 2L .0202, for unrestricted use or the risk-based cleanup standards for a low risk site as defined in **15A NCAC 02L .0406**, whichever are applicable, as the final goals for *No Further Action* status. This Plan must also include the Notice of Residual Petroleum with Land Use Restrictions (G.S. 143B-279.9(b)). (See Section 8).

3.11 Corrective Action Plans - Releases from Hazardous Substance USTs

As the corrective actions for unrestricted use standards for hazardous substance USTs are regulated under 15A NCAC 02L .0106, the responsible party must propose and implement a CAP pursuant to Paragraph .0106(j), which requires the use of the best available technology for the restoration of groundwater quality to the level of the standards, except as provided in Paragraphs .0106(k), (l), and (m). The CAP must submit and implement a j-CAP which proposes to use active remediation technology continuously until groundwater contamination is reduced to levels equal or less than the standards established in 15A NCAC 02L .0202.

A request to prepare a risk-based corrective action plan as described in the next paragraph may be submitted. This Plan must also include the Notice of Residual Contamination with Land Use Restrictions. The appropriate rules for unrestricted use standards are presented below:

> ***15A NCAC 02L .0106 (c)*** *Any person conducting or controlling an activity that has not been permitted by the Department and that results in an increase in the concentration of a substance in excess of the standard, other than agricultural operations, shall:*
>
> > *(4) implement an approved corrective action plan for restoration of groundwater quality in accordance with a schedule established by the Secretary. In establishing a schedule, the Secretary shall consider a schedule proposed by the person submitting the plan. A report shall be made to the Health Director of the county or counties in which the contamination occurs in accordance with the requirements of Rule .0114(a) in this Section.*
>
> ***15A NCAC 02L 0106(j)*** *A corrective action plan prepared pursuant to Paragraphs (c), (d), or (e) of this Rule shall be implemented using a remedial technology demonstrated to provide the most effective means, taking into consideration geological and*

hydrogeological conditions at the contaminated site, for restoration of groundwater quality to the level of the standards. Corrective action plans prepared pursuant to Paragraphs (c) or (e) of this Rule may request an exception as provided in Paragraphs (k), (l), (m), (r), and (s) of this Rule.

Department Risk-Based Remediation does not use the UST programs risk-based values, there is a different process for the determination of Department Risk-Based Remediation goals. Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use. In addition to DEQ's Underground Storage Tank, Dry-cleaning Solvent Cleanup Act, and the Pre-Regulatory Land Fill Programs, risk-based remediation can now be considered in all DEQ environmental cleanup programs, except those subject to remediation pursuant to the Coal Ash Management Act of 2014 and the requirements of animal waste management systems. More information can be found on the NCDEQ website at https://deq.nc.gov/permits-regulations/risk-based-remediation.

3.12 Alternative Corrective Action Plans

Alternative ***CAPs*** are allowed pursuant to NCAC 02L .0106. For these cases, the goals of active remediation are not equivalent to the final cleanup goals which must be reached for a site to be eligible for *No Further Action* status. These Plans must also include the Notice of Residual Petroleum with Land Use Restrictions (G.S. 143B-279.9, see Section 8).

3.12.1 Petroleum Releases

The implementation of a comprehensive ***CAP*** may also include any necessary **NCAC 02L .0106 *CAPs.*** Remediation must continue until site-specific cleanup goals are met. The responsible party must monitor groundwater routinely until it is demonstrated that groundwater contamination has been reduced to the applicable final goals for *No Further Action* status. The final goals shall be equal to or less than the standards in **15A NCAC 02L .0202** for unrestricted use or the risk-based cleanup standards for a low risk site as defined in **15A NCAC 02L .0406.**

1. **Goals for a .0106(j) CAP are unrestricted use standards.** For the CAP required pursuant to **15A NCAC 02L .0106(j)**, the goals of active remediation of groundwater are concentration levels that are equal to or less than the standards in **15A NCAC 02L .0202**. The goals of active remediation under Paragraph **.0106(j)** are also the final cleanup goals that must be attained for the site to be eligible for *No Further Action* (NFA) status with unrestricted use.

2. **Goals for a .0106(k) Risk-Based Cleanup Standard CAP.** For a risk-based corrective action (RBCA) plan, groundwater contamination must be cleaned up using remediation technology but only to concentration levels determined to be acceptable at the specific site or levels necessary to allow the site to be designated as low risk under **15A NCAC 02L .0406 or 15A NCAC 02L .0506**. The active remediation goals for a **RBCA CAP** (not to be confused with the final cleanup goals) should be designed such that, once the remediation system is shutdown, the remaining groundwater contamination has the potential to degrade and attenuate naturally to the levels of the standards in 15A NCAC 02L .0202 for unrestricted use or the risk-based cleanup standards for a low risk site as

defined in **15A NCAC 02L .0406,** whichever are applicable as the final goals for *No Further Action* status, within approximately 10 years of the termination of active remediation.

3. **Goals for a .0106(l) Monitored Natural Attenuation (MNA) CAP.** For a ***MNA CAP*** requested by a responsible party pursuant to Paragraph **.0106(l),** groundwater contamination is allowed to degrade and attenuate naturally to either the unrestricted use standards defined in **15A NCAC 02L .0202**, or the risk-based cleanup standards for a low risk site as defined in **15A NCAC 02L .0406 or 15A NCAC 02L .0506,** whichever are applicable as the final goals for *No Further Action* status. ***Please note that for high risk petroleum releases governed by 15A NCAC 02L .0407(c) or 15A NCAC 02L .0507(d), the .0106(l) MNA CAP must be used to the maximum extent possible when the benefits of its use do not increase the risk to the environment and human health.***

4. **Terminating or Modifying Technologies or Goals under a .0106(m) Termination Plan.** The **.0106(m)** termination plan is a request from the responsible party for approval to terminate operation of the remediation technology that is in use at the site. The primary justification for termination is that continuation of this specific remedial action will not result in significant reduction of contaminant concentration levels. If termination is approved, the active remediation system is shutdown, and either an alternate active strategy is implemented or the remaining groundwater contamination is allowed to degrade and attenuate naturally to the levels of the unrestricted use standards in **15A NCAC 02L .0202,** or the risk-based cleanup standards for a low risk site as defined in **15A NCAC 02L .0406 or 15A NCAC 02L .0506,** whichever are applicable as the final goals for *No Further Action* status.

5. **No Further Action Cleanup Goals.** Following the implementation of all **.0106** ***CAPs*** and of the **.0106(m)** termination plan, the responsible party must monitor groundwater routinely until it is demonstrated, and agreed upon by the Department, that groundwater contamination has been reduced to levels equal to or less than the standards in 15A NCAC 02L .0202 for unrestricted use or the risk-based cleanup standards for a low risk site as defined in **15A NCAC 02L .0406,** whichever are applicable, and thus become eligible for *No Further Action* status.

If during implementation, more contaminated soil or NAPL is discovered or the plume migration model is found to be faulty and a receptor to be at risk, then another *CAP*, under **15A NCAC 02L .0106**, using active technology to address the soil or NAPL, will be required. The formula for a ***CAP*** under **15A NCAC 02L .0106(j)**, although strictly described as a plan for implementing active technology from start to finish (with no further action), is interpreted to allow implementation of several different technologies (including excavation) simultaneously or sequentially to the point where each no longer functions to provide further cost-effective or technically-efficient cleanup and also to allow necessary periods of system shutdown to monitor for rebound or attenuation of contaminants.

3.12.2 Hazardous Substance Releases

The implementation of a comprehensive ***CAP*** may also include any necessary **15A NCAC 02L .0106** ***CAPs.*** Remediation must continue until site-specific cleanup goals are met. The responsible party must monitor groundwater routinely until it is demonstrated that groundwater contamination

has been reduced to the applicable final goals for *No Further Action* status. The final goals shall be equal to or less than the standards in 15A NCAC 02L .0202 for unrestricted use or the risk-based cleanup standards developed from the Department Risk-Based Remediation program**.** Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use. (see 3.4.1 of this document). The Department Risk-Based Remediation program does not use the UST programs risk-based values, there is a different process for the determination of Department Risk-Based Remediation goals.

1. **Goals for a .0106(j) CAP are unrestricted use standards.** For the CAP required pursuant to 15A NCAC 02L .0106(j), the goals of active remediation of groundwater are concentration levels that are equal to or less than the standards in **15A NCAC 02L .0202**. The goals of active remediation under Paragraph **.0106(j)** are also the final cleanup goals that must be attained for the site to be eligible for *No Further Action* (NFA) status with unrestricted use.

2. **Goals for a .0106(k) Risk-Based Cleanup Standard CAP.** For a risk-based corrective action (RBCA) plan, groundwater contamination must be cleaned up to risk-based cleanup standards under the Department Risk-Based Remediation program**,** as the final goals for *No Further Action* status.

3. **Goals for a .0106(l) Monitored Natural Attenuation (MNA) CAP.** For a ***MNA CAP*** requested by a responsible party pursuant to Paragraph **.0106(l),** groundwater contamination is allowed to degrade and attenuate naturally to either the unrestricted use standards defined in **15A NCAC 02L .0202**, or the risk-based cleanup standards under the Department Risk-Based Remediation program, whichever are applicable as the final goals for *No Further Action* status.

4. **Terminating or Modifying Technologies or Goals under a .0106(m) Termination Plan.** The **.0106(m)** termination plan is a request from the responsible party for approval to terminate operation of the remediation technology that is in use at the site. The primary justification for termination is that continuation of the specific remedial action will not result in significant reduction of contaminant concentration levels. If termination is approved, the active remediation system is shutdown, and either an alternate active strategy is implemented or the remaining groundwater contamination is allowed to degrade and attenuate naturally to the levels of the unrestricted use standards in **15A NCAC 02L .0202**, or the risk-based cleanup standards from the Department Risk-Based Remediation program**,** whichever are applicable as the final goals for *No Further Action* status.

5. **No Further Action Cleanup Goals.** Following the implementation of all **.0106** ***CAPs*** and of the **.0106(m)** termination plan, the responsible party must monitor groundwater routinely until it can be demonstrate, and agreed upon by the Department, that groundwater contamination has been reduced to levels equal to or less than the standards in 15A NCAC 02L .0202 for unrestricted use or the risk-based cleanup standards from the Department Risk-Based Remediation program**,** whichever are applicable, and thus become eligible for *No Further Action* status.

4.0 Corrective Action Reporting Requirements

The responsible party must provide the information described in the report format presented in **Appendix A**, completing appropriate sections relating to soil contamination, groundwater contamination, and/or free product. The CAP must be organized and all necessary information presented in the format and order stipulated by the report template.

The required elements for all *CAPs* include, but may not be limited to the following items:

- Update of the site history, source determination, land use, and potential receptor information provided in the *CSA Report*. The responsible party must provide a history of the UST systems 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. The location and use and all owners and operators of all current and previous UST and AST systems at the site must be provided. The responsible party must describe all sources of release on the site, including UST and non-UST sources of non-petroleum or petroleum contamination;
- Summarize and update of the assessment information presented in the *CSA* and *Pre-CAP Monitoring Reports*;
- Compare soil and groundwater contaminant concentrations and free product thickness to cleanup goals;
- Provide the purpose and objective of the specific *CAP* (e.g., to remove free product, cleanup soil to the soil-to-groundwater MSCCs, and/or remediate groundwater to below 2L standards);
- Summarize the initial remedial actions taken to date (e.g. excavation at UST closure, free product recovery);
- Provide a comprehensive evaluation of the remedial option(s), each of which may include one or more technologies or processes, concurrently or sequentially, which may also serve for soil remediation.

** Note: a list of approved innovative remedial technologies approved by the UST Section that may be considered eligible for reimbursement by the Commercial Leaking UST Trust Fund is maintained at https://deq.nc.gov/about/divisions/waste-management/ust/trust-fund/innovative-technologies.*

The scope of the option must include all technologies or processes to be utilized, concurrently or sequentially, to clean up all types of contamination at the site. The evaluation of each option must include:

- the nature of the contamination;
- a description of the remediation method or process;
- a discussion of feasibility and effectiveness, based on pilot tests or other relevant parameters;
- the projected costs;
- **a detailed, well-substantiated schedule for all activities from *CAP* approval to attainment of cleanup goals;**
- a description and basis for selection of the remedial option determined to be the most cost-effective and efficient mechanism to treat contamination at a site; and

- the copies of the public notices which are required when a *CAP* proposes remediation by natural attenuation or cleanup of groundwater to alternate standards. (Refer to Section 9.0 for more information.).

4.1 Stepwise Corrective Action Reporting

The Stepwise Corrective Action should include all steps above.

4.2 Corrective Action Reporting other than for Commercial USTs

The *CAP* should provide a comprehensive evaluation of a minimum of three remedial options, each of which may include one or more technologies or processes, concurrently or sequentially, which may also serve for soil remediation. For petroleum releases, *"natural attenuation shall be used to the maximum extent possible, when the benefits of its use do not increase the risk to the environment and human health".* The responsible party must evaluate excavation plus a minimum of two other viable remedial actions as options for remediating groundwater, unless fewer viable options can be determined for the site. For example, an evaluation of remedial options for a site with soil and groundwater contamination might compare the following options:

- Excavation of contaminated soil, followed by two to three years of air sparge to remediate groundwater, followed by ten years of monitored natural attenuation;
- Partial excavation of contaminated soil, followed by two years of air sparge/soil vapor extraction to remediate soil and groundwater, followed by ten years of monitored natural attenuation;
- Excavation of contaminated soil, followed by biological and/or chemical injections to remediate groundwater, followed by ten years of monitored natural attenuation; or
- Monitored natural attenuation of soil and groundwater contamination for up to 12 years. For this option to be viable, the site must meet the requirements for and *l-CAP* pursuant to **15A NCAC 02L .0106(l)**.

** Note: a list of approved innovative remedial technologies approved by the UST Section that may be considered eligible for reimbursement by the Commercial Leaking UST Trust Fund is maintained at https://deq.nc.gov/about/divisions/waste-management/ust/trust-fund/innovative-technologies.*

The scope of each option must include all technologies or processes to be utilized, concurrently or sequentially, to clean up all types of contamination at the site. The evaluation of each option must include:

- the nature of the contamination;
- a description of the remediation method or process;
- a discussion of feasibility and effectiveness, based on pilot tests or other relevant parameters;
- the projected costs;
- **a detailed, well-substantiated schedule for all activities from *CAP* approval to attainment of cleanup goals;**
- a description and basis for selection of the remedial option determined to be the most cost-effective and efficient mechanism to treat contamination at a site; and

- the copies of the required public notices which are required when a *CAP* proposes remediation by natural attenuation or cleanup of groundwater to alternate standards. (Refer to Section 9.0 for more information.).

4.3 Alternate CAPs and CA Termination Plans Reporting Requirements

Additional requirements specific to alternative *CAPs* and the *CA Termination Plan* are described in detail in **15A NCAC 02L .0106(k), (l), and (m)**. For all *CAPs* and the *CA Termination Plan*, the responsible party must demonstrate the following:

- Contaminants have not and will not migrate onto adjacent properties, alternative water supplies are available and/or adjacent property owners give written consent to the termination plan;
- Groundwater contaminants expected to intercept surface water will not violate the surface water quality standards presented in **15A NCAC 02B .0200** and/or the USEPA National Criteria; and
- Public notice requests for the *CAP* and *CA Termination Plan* is provided in accordance with **15A NCAC 02L .0114(b) and (c)**, as further described in Section 9.0.

Pursuant to **15A NCAC 02L .0106(k)**, the responsible party also must demonstrate that:

- all sources of free product and soil contamination have been removed, treated or controlled;
- time and direction of contaminant travel can be predicted with reasonable certainty using predictive calculations and/or modeling (Section 3.6);
- groundwater standards presented in **15A NCAC 02L .0202** will be met at a location no closer than one year predicted travel time upgradient of an existing or foreseeable receptor or at a physical barrier to groundwater migration (Section 3.6);
- groundwater monitoring program will be implemented which can monitor further degradation or attenuation to the standards in **15A NCAC 02L .0202**; and

Pursuant to **15A NCAC 02L .0106(l)**, the responsible party also must demonstrate that:

- all sources of free product and soil contamination have been removed, treated, or controlled.
- the contaminants have the capacity to degrade or attenuate under the site-specific conditions;
- time and direction of contaminant travel can be predicted with reasonable certainty using predictive calculations and/or modeling (Section 3.6);
- contaminant migration will not result in any violation of the groundwater quality standards at any existing or foreseeable receptor;
- that a groundwater monitoring plan will be implemented which can (a) monitor degradation and attenuation of contaminants within and downgradient of the plume and (b) detect contaminants prior to reaching an existing or foreseeable receptor within at least one year's predicted travel time upgradient of the receptor and not greater than the distance the groundwater is predicted to travel within 5 years (Section 3.6); and
- all necessary access agreements needed to monitor groundwater have been or can be obtained.

Pursuant to **15A NCAC 02L .0106(m),** the responsible party must include:

- a discussion of the current *CAP*;
- an evaluation of alternative technologies which could further reduce contaminant levels;
- effects on groundwater users if the remediation implemented according to the current *CAP* were to be terminated;
- a satisfactory demonstration that continuation of active remediation would not result in a significant reduction in the contaminant levels (including showing that the asymptotic slope of the curve of decontamination is less than 1:40);
- a monitoring program which is sufficient to track degradation and attenuation of contaminants at a location of at least one year's predicted travel time upgradient of any existing or foreseeable receptor; and
- a *NRP* or *NCS*, whichever is applicable, with land use restrictions approved by the Department, will be filed in the appropriate county's register of deeds office to indicate that a plan has been approved which does not require active remediation to the standards in **15A NCAC 02L .0202**.

4.4 Public Notice for Corrective Action

In accordance with **15A NCAC 02L .0114(b) and** 15A NCAC 02L .0409(a) and **15A NCAC 02L .0509(a),** a responsible party who submits a corrective action plan which proposes natural attenuation or to cleanup soil and groundwater contamination to a standard other than "unrestricted use" standards must provide public notice. Unrestricted use standards are the groundwater standard or interim standard established in **15A NCAC 02L .0202** and/or the soil standard for residential or soil-to- groundwater MSCC, whichever is lowest. Notification requirements are stated in **15A NCAC 02L .0409** for UST petroleum releases and **15A NCAC 02L .0509** for non-UST petroleum releases.

For the remedies presented in 15A NCAC 02L .0114 (b), 15A NCAC 02L .0409(a) and 15A NCAC 02L. 0509(a), the responsible party must notify the following people:

- the local health director;
- 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;
- all property owners and occupants residing within or contiguous to the area containing contamination; and,
- all property owners and occupants residing within or contiguous to the area where the contamination is expected to migrate.

Public notice must be sent by certified mail. The notice must describe the nature of the selected remedy and the justification for implementing the chosen remedy.

If it proves impractical to provide notice by certified mail to the occupants of apartment buildings, condominiums, office buildings, trailer parks, etc., the responsible party may give notice by posting the public notice in a prominent place where the building occupants are most likely to see it.

Approval of the ***CAP***, ***SAR***, or ***Soil Cleanup Plan*** will be postponed for a period of thirty (30) days so that the Department may consider comments submitted by interested parties. All comments received within this time frame will be considered when approving the ***CAP***, ***SAR***, or ***Soil Cleanup Plan***. A public meeting may be held if the Department finds significant public interest in the proposed activities. Within 30 days of submitting the ***CAP***, ***SAR***, or ***Soil Cleanup Plan***, the responsible party must provide the appropriate regional office with proof of receipt of the public notice or of refusal by the addressee to accept delivery of the notice. If a notice is posted, the responsible party must provide the regional office with a description of the manner in which the notice was posted. Re-notification will be required if subsequent ***CAPs*** or ***CAP*** addendums are submitted that substantially change proposed site actions.

Formats for public notice for corrective action are provided in **Appendix A**.

5.0 Approval and Implementation

To obtain an approved CAP, a responsible party **must**:

- receive approval of any *CAP* prior to implementation of that *CAP;*
- obtain permits and agreements necessary for *CAP* implementation;
- perform and evaluate pilot tests;
- send public notices and submit documentation of return receipts;
- complete a project schedule to include milestones and performance measures; and
- provide a detailed cost analysis.

The incident manager may deny approval of the *CAP* if any of the elements specified have not been included or have not been adequately addressed. The incident manager will not approve the *CAP* until the report is determined to be complete. Questions regarding technical aspects of site assessment or corrective action should be directed to the appropriate regional office or central office.

To facilitate the review of the CAP the template in Appendix A should be followed.

If a major enhancement (i.e., additional recovery wells or blower modification, etc.) is required, then a ***System Enhancement Recommendation Report*** may be required. If the approved CAP is not working effectively and replacement of the existing remedial technology is necessary, then a New Technology Cleanup Plan may be required. Report formats are presented in **Appendix A**.

The responsible party must implement the *CAP* upon approval by the Department in strict accordance with the schedule approved for the selected remedial option.

5.1 Approval and Implementation of Step-Wise Correction Action for Petroleum Commercial UST Sources

For commercial UST incidents at an eligible site operating under the latest version of the RRD, consensus of the proposed remedial strategy by CAB and TF Branches must be reached prior to each step in the corrective action process (see Section 3.8). When soil and groundwater quality has been restored to concentrations levels that are equal to or less than the cleanup, the RP must submit a report documenting that soil and groundwater are cleaned up to appropriate standards and request *No Further Action* (NFA) status as described in Section 9.0.

5.2 Approval and Implementation of Petroleum Non-UST Correction Action

When the CAP has been implemented and soil and groundwater quality has been restored to concentration levels that are equal to or less than the cleanup goals, the responsible party must submit a report documenting that soil and groundwater are cleaned up to appropriate standards and request NFA status as described in Section 9.0.

5.3 Approval and Implementation of Petroleum Non- Commercial UST Correction Action

This section applies to high risk non-commercial UST incidents when eliminating the risk to receptors cannot be achieved (i.e., municipal water is not available and a water supply well cannot be moved to a distance greater than 150 feet for heating oil USTs or when free product is identified within 30 feet of the property boundary not owned by the RP). When the CAP has been implemented and soil and groundwater quality has been restored to concentration levels that are equal to or less than the soil to groundwater MSCCs and/or 2L standards, respectively, the responsible party must submit a report documenting that soil and groundwater are cleaned up and request NFA status as described in Section 9.0.

5.4 Approval and Implementation of Hazardous Substance UST Correction Action

When the CAP has been implemented and soil and groundwater quality has been restored to concentration levels that are equal to or less than the soil to groundwater MSCCs and/or the 2L standards, the responsible party must submit a report documenting that soil and groundwater are cleaned up to the standards and request NFA status as described in Section 9.0.

For a CAP implemented under the Department Risk-Based program soil and groundwater must be cleaned up to standards determined under that program. Department risk-based remediation does not use the UST programs risk-based values, there is a different process for the determination the Department's risk-based remediation goals.

Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use. Session Law 2015-286 expands the use of risk-based remediation to sites subject to remediation under certain programs or requirements. The DEQ's Underground Storage Tank, Dry-cleaning Solvent Cleanup Act, and the Pre-Regulatory Land Fill Programs have respective, existing risk-based programs. Risk-based remediation can now be considered in all Department environmental cleanup programs, except those subject to remediation pursuant to the Coal Ash Management Act of 2014 and the requirements of animal waste management systems. This program is codified in G.S. 130A – 310.65 through 77.

DEQ Risk-Based Remediation - https://deq.nc.gov/permits-regulations/risk-based-remediation

6.0 Evaluation of Soil and Groundwater Remediation

A CAP must include the evaluation of soil and groundwater in order to determine the effectiveness of the remedial technologies and to evaluate whether the system is achieving the proposed milestones.

During the evaluation of the remedial technology(ies) implemented for a CAP under **15A NCAC 02L .0106(j),** the technology(ies) may be temporarily shut down to evaluate potential for rebound and natural attenuation for extended periods without having to comply with all of the requirements of a CAP Termination Plan under **15A NCAC 02L .0106(m).**

6.1 Evaluation of Soil and Groundwater Remediation for Commercial Petroleum UST Sources

The effectiveness of an active remediation system on recovering or reducing soil and/or groundwater contamination should be included in a *Corrective Action Performance Report (CAPR)*. At a minimum the CAPR shall present the following elements, if applicable:

- System design and process;
- Volume and extent of soil treated;
- Extent of groundwater treated during the reporting period and since startup
- Radius of influence or capture zone of the system;
- Rates of contaminant mass removal and calculated total mass removed, tracked from startup to final shutdown;
- Flow rates and pressures for soil vapor extraction/air sparging system, from startup to final shutdown;
- Recovery rates or flow rates and pressures for dual phase extraction, groundwater recovery (i.e., both after stripper and after carbon), from startup to finals shutdown.
- Influent and effluent concentration before and after treatment, respectively, from start up to final shutdown;
- Cleanup project milestones are being met by the system;
- Operation and maintenance information
- Problems and limitations (including access issues, mechanical problems, etc.) and measures taken to resolve them; and
- Evaluation of the effectiveness (comparing total contaminant mass removal rates and the change in mass removal over time.

In addition to the *CAPR*, routine ongoing soil and groundwater monitoring reports are required to evaluate the plume extent and maintain updated site risk determination.

The requirements for the reporting the progress of remediation at the site are presented in the *CAPR* and the *Monitoring Report* formats located in **Appendix A**.

6.2 Evaluation of Soil and Groundwater Remediation from Petroleum Non-UST and Hazardous Substance UST and Petroleum Non-Commercial UST Sources

The effectiveness and progress of soil remediation should be evaluated by soil sampling as scheduled in the *CAP* or as directed by the Department and should be reported in routine monitoring reports. The effectiveness and progress of groundwater remediation should be evaluated by groundwater monitoring as scheduled in the *CAP* or as directed by the Department and should be reported in routine monitoring reports. The requirements for the reporting of soil and groundwater remediation monitoring are presented in the *Monitoring Report* format presented in **Appendix A**.

7.0 Remediation Reporting

7.1 Soil Cleanup Plan (for Low risk petroleum UST releases only)

This plan describes proposed actions to cleanup soil contamination caused by a release. The plan must contain a soil sampling and analysis plan to monitor any remedial activity proposed and a detailed schedule for all remedial activities to be performed until site closure requirements are met. Approved analytical methods for soil assessment are specified in **Table 4**. Submittal of this report is required **within 60 days** of the date of the notice requesting the ***SCP***.

7.2 Monitoring Reports

These reports present periodic sampling and analysis results for groundwater and soil (when applicable). Plume migration, corrective action effectiveness, water table changes, contaminant concentration changes are some of the items that should be addressed in ***Monitoring Reports.*** For the initial monitoring event (pre-CAP), samples should undergo full analyses. For the periodic monitoring which follows, analysis may be limited, with the approval of the Department, to key constituents which are indicative of the progress of remediation and to the risk to human health and the environment. For a final monitoring event, samples again should undergo full analyses (equivalent to a final site closure sample set). Approved analytical methods for periodic soil monitoring are specified in **Tables 4 or 6**. Approved analytical methods for groundwater monitoring are listed in **Tables 5 or 7**. Submittal of this report is required by the end of the month following the month of the monitoring event.

7.3 Corrective Action Performance Report (Petroleum Commercial UST Sources Only)

The ***Corrective Action Performance Report*** (**Appendix A**) focuses on the effectiveness of an active remediation system on recovering or reducing soil and/or ground water contamination. The evaluation requirements for each medium have been tied to contaminant mass calculations relative to baseline estimates.
The Statements and Certification table outlines a series of positive or negative assertions and associated comments to more explicitly define what is being certified.

At a minimum, the CAPR should:

- document the maximum free product thickness (if present);
- compare the maximum free product thickness to the current free product thickness;
- compare the estimated contaminant mass baseline for soil and groundwater to the current contaminant mass and/or cleanup goals (from the most recent monitoring report);
- outline briefly the remedial action plan in use at the site, as well as any prior remedial plan that was used;
- discuss the relative effectiveness of the selected technology at reducing the estimated contaminant mass on site in relation to the projected milestones in the CAP ROD, based on the calculated mass removal rates, both for the reporting period and over time;
- list the receptors that have been impacted or are at imminent risk of impact, and what response (if any) has been made to address that risk; and

- identify recommendations for the remediation system and/or next operation period including any changes to the operation and maintenance plan.

7.4 System Enhancement Recommendation Report

This report, which is used to propose a significant change or major enhancement to an existing remedial technology, must be based on results from periodic monitoring of soil and groundwater contamination and on remediation system monitoring. Approved analytical methods for periodic soil monitoring are specified in **Tables 4 or 6**. Approved analytical methods for groundwater monitoring are listed in **Table 5 or 7**. Submittal date of this report is set by the Department.

7.5 New Technology Cleanup Plan

This plan, which is used to propose replacement of existing remedial technology with a new technology, must be based on results from periodic monitoring of soil and groundwater contamination and on remediation system monitoring. Approved analytical methods for periodic soil monitoring are specified in **Tables 4 or 6**. Approved analytical methods for groundwater monitoring are listed in **Tables 5 or 7**. Submittal date of this plan is set by the Department.

8.0 Notice of Residual Petroleum, Notice of Contaminated Site (NCS)/ Notice of Residual Contamination (NRC) and Land Use Restrictions

UST Section risk based program for Petroleum Releases only

A remedial action plan must include provision for the preparation of either a ***Notice of Residual Petroleum (NRP)*** **North Carolina General Statutes (G.S.) 143B-279.11** or ***Notice of Contaminated Sites (NCS)*** ***G.S.* 143B-279.10**, whichever is applicable, with land use restrictions approved by the Department. The NRP or NCS must be filed in the appropriate county's Register of Deeds office. The notice must indicate that a remedial plan has been approved which does not require remediation to the standards in **15A NCAC 02L .0202**.

Departmental Risk based program

The remedial action plan shall provide for the imposition and recordation of land-use restrictions (*G.S.* 130A-310.69 (b)). The ***Notice of Residual Contamination*** may be filed by the property owner or the person who proposes to remediate the site. **Rules 15A NCAC 02C .0107 (b)(1) and 15A NCAC 02C .0112(a)** must be referenced on the notice in the notes section to restrict future water-supply wells on the property. Reliance on these existing rules and other local land-use controls eliminates the need for neighboring property owners to annually report the maintenance and inspection of LURs, since that requirement only runs with the land-use restriction document.

Non-source properties to which groundwater contamination has, or is predicted to, migrate may rely on state or local land-use controls in lieu of LURs provided they are reiterated on a Notice of Residual Contamination (survey plat) and the following `are true:

1. The property does not contain the source of contamination.
2. There is no associated human health or environmental risk on the property due to vapor intrusion or other contaminated media.
3. Permission for the Notice is obtained from the property owner(s).

8.1 Notice of Residual Petroleum and Land Use Restrictions for Petroleum Releases

North Carolina General Statute (G.S.) 143B-279.9 defines "Unrestricted use standards" for groundwater as the groundwater quality standards and interim standards contained in 15A NCAC 02L .0202, and "unrestricted use standards" for soil as the residential MSCCs established in 15A NCAC 02L .0411 and 15A NCAC 02L .0511.

For a facility with petroleum contamination in excess of unrestricted use standards, North Carolina General Statutes (G.S.) **143B-279.10** and **143B-279.11** require a ***Notice of Contaminated Site* (NCS)** or a ***Notice of Residual Petroleum* (NRP)** with land use restrictions on soil and/or groundwater to be filed with the Register of Deeds in the county where the source site is located as described below.

In the event that the owner of the site fails to submit and file the NRP/NCS required by this section within the time specified, the Secretary may prepare and file the NRP/NCS. The costs thereof may be recovered by the Secretary from any responsible party. In the event that an owner of a site who is not a responsible party submits and files the **NRP/NCS** required by this section, the owner may recover the reasonable costs thereof from any responsible party.

For a petroleum release from a non-UST source, before standards other than unrestricted use standards may be used at the site, the contaminant plume must be documented as stable with either a) no offsite impacts or b) with written, informed consent provided by the owner of each impacted offsite property. The formats for both the informational package and the consent agreement are available at the UST Section website at **https://deq.nc.gov/about/divisions/waste-management/ust/forms**.

8.1.1 Notice of Residual Petroleum

A ***NRP*** must be prepared and filed for a petroleum release from an underground storage tank or a non-UST source either:

1. before a contaminated property is conveyed, or
2. when a responsible party or landowner seeks a ***Notice of No Further Action*** using risk-based cleanup standards.

The ***NRP*** must be prepared in accordance with the instructions and format (See **Appendix I** or the 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, including all contiguous impacted parcels that are or were owned by the responsible party, upon which the land use restrictions will be applied. In addition, the ***NRP*** must identify all other off-site properties (adjacent, adjoining, downgradient, etc.) on which contamination is known to exist at the time the ***NRP*** is prepared, though land use restrictions will not be applied to these third-party owned parcels.

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.

*Please note that, for site that is eligible for reimbursement by the State Trust Fund, reimbursement is limited to the most cost-effective remedial alternative. For a Low risk site where an institutional control such as a **NRP** represents the most cost-effective strategy, reimbursement would be limited to no more than the eligible cost for preparation of the **NRP**. While a responsible party is not required to request a **Notice of No Further Action** using risk-based cleanup standards, reimbursement for continued cleanup may be limited once that cleanup threshold has been reached.*

8.1.2 Notice of Contaminated Sites

For petroleum release from a non-UST source, a ***NCS*** may be prepared and filed in lieu of a ***NRP*** where the land use restrictions defined in **G.S. 143B-279.9(a)** are more appropriate for protecting human health and the environment. The **NCS** allows for land use restrictions that are defined specifically onsite based on a professionally prepared plat designating the area of impact.

The ***NCS*** must be prepared in accordance with the instructions and format provided by the Department (See **Appendix I** or the UST Section web site at

https://deq.nc.gov/about/divisions/waste-management/ust/forms.) The ***NCS*** must contain both a formal plat prepared and certified by a professional land surveyor according to the requirements of G.S. 47-30 and a legal description of the property containing the source of contamination. The plat must include any restriction approved by the Department on the current or future use of the site. In addition, the plat and description must include all contiguous impacted parcels that are or were owned by the responsible party, upon which the land use restrictions will be applied. In addition, the ***NCS*** must identify all other off-site properties (adjacent, adjoining, downgradient, etc.) on which contamination is known to exist at the time the ***NCS*** is prepared, though land use restrictions will not be applied to these third-party owned parcels.

The ***NCS*** must be sent to the appropriate regional office of the UST Section within 180 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 ***NCS*** must then be filed with the Register of Deeds, and a certified copy of the filed ***NCS*** must be submitted to the regional office within 15 days of its return.

8.2 Notice of Residual Contamination and Land Use Restrictions for Non-Petroleum (Hazardous Substances) USTs

Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use. Session Law 2015-286 expands the use of risk-based remediation to sites subject to remediation under certain programs or requirements. The DEQ's Underground Storage Tank, Dry-cleaning Solvent Cleanup Act, and the Pre-Regulatory Land Fill Programs have respective, existing risk-based programs. Risk-based remediation can now be considered in all Department environmental cleanup programs, except those subject to remediation pursuant to the Coal Ash Management Act of 2014 and the requirements of animal waste management systems. This program is codified in G.S. 130A-310.65 through 77.

Department Risk-Based Remediation does not use the UST program's risk-based values. There is a different process for the determination of Department Risk-Based Remediation goals.

> **DEQ Risk-Based Remediation - https://deq.nc.gov/permits-regulations/risk-based-remediation**
>
> (http://www.ncleg.net/Sessions/2015/Bills/House/HTML/H765v6.html)

The NRC and any necessary land use restrictions are allowed for the following statute:

§ 130A-310.69 (b) A person who proposes to conduct remediation pursuant to this Part shall develop and submit a proposed remedial action plan to the Department. A remedial action plan shall provide for the protection of public health, safety, and welfare and the environment. A remedial action plan shall do all of the following:

> (11) Provide for the imposition and recordation of land-use restrictions as provided in N.C.G.S. 143B-279.9, §143B-279.10, §130A-310.3(f), §130A-310.8, §130A-310.35,

§143-215.84(f), and §143-215.85A if the remedial action plan allows contamination in excess of the greater of unrestricted use standards or background standards to remain on any real property or in groundwater that underlies any real property.

The UST Section's Central Office Corrective Action Branch should be contacted for specific guidance related to preparing and filing a ***NRC***, land-use restrictions, or deed recordation. Additional information can also be found on the UST Section website at https://deq.nc.gov/about/divisions/waste-management/ust.

9.0 Site Closure and Reporting

Site closure is the final act of the regulatory process related to a release. Appropriate documentation must be submitted to the Department in support of a petition for site closure. Closure of incident sites may be approved by the appropriate regional office when documentation is provided that indicates that no soil and/or groundwater is contaminated in excess of the appropriate cleanup goals. See the ***Site Closure Report*** **(SCR)** format presented in ***Appendix A***.

NOTE: *If a Division of Water Resources (DWR) permit was issued for the site in relation to the remedial action, the responsible party should request rescission of the permit within thirty days of receiving the* No Further Action *letter. The responsible party should contact the appropriate section of DWR for rescission of National Pollutant Discharge Elimination System (NPDES), Underground Injection Control (UIC), and non-discharge permits. DWR contact information is listed at https://deq.nc.gov/about/divisions/water-resources.*

9.1 High- or Intermediate-Risk Site Closure [15A NCAC 02L .0407 and .0507]

For High and Intermediate risk site petroleum releases, a final report documenting that the soil and groundwater have been remediated to applicable soil and groundwater cleanup levels (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) is required. The report should include a request for a No Further Action determination from the Department. Approved analytical methods for final site closure soil and groundwater samples are specified in Tables 4 and 5, respectively. A ***SCR*** containing the required information will be requested by the Department, if necessary.

9.2 Low-Risk Site Closure [15A NCAC 02L .0408 and .0508]

For Low risk site petroleum releases, a final report documenting that the soil has been remediated to applicable soil cleanup levels (to the residential or the industrial/commercial MSCCs) is required. The report should include a request for a *No Further Action* determination from the Department. Approved analytical methods for final site closure soil and groundwater samples are specified in Tables 4 and 5, respectively. The report must be received by the regional office by the date specified in the SAR schedule **or** within 60 days of the date of the notice requesting the ***Soil Cleanup Report with Site Closure Request (***see ***Appendix A***).

9.3 Site Closure for Non-Petroleum (Hazardous Substance) UST releases

For non-petroleum UST releases remediation to unrestricted use, a final report documenting that the soil and groundwater have been remediated to applicable soil and groundwater cleanup levels (to the **15A NCAC 02L .0411** soil-to-groundwater MSCCs for soil and to the **15A NCAC 02L .0202** groundwater quality standards for groundwater) is required. The report should include a request for a *No Further Action* determination from the Department. Approved analytical methods for final site closure soil and groundwater samples are specified in Tables 6 and 7, respectively. Submittal date of this report is set by the Department. A ***SCR*** containing the required information will be requested by the Department, if necessary.

OR

Session Law 2015-286 allows risk-based remediation as a cleanup option at contaminated sites where the use of remedial actions and land-use controls can reliably ensure that affected properties are safe for their intended use (see 3.4.1 of this document). For this option, the final goals shall be the risk-based cleanup standards developed from the Department Risk-Based Remediation program**.** The Department Risk-Based Remediation program does not use the UST programs risk-based values, there is a different process for the determination of Department Risk-Based Remediation goals. More information can be found on the NCDEQ website at https://deq.nc.gov/permits-regulations/risk-based-remediation.

9.4 Public Notice Requirements for Site Closure

9.4.1 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)** for USTs and **15A NCAC 02L .0509** for non-USTs if the following conditions exist:

- groundwater has not been restored to the standards, or interim standards established under **15A NCAC 02L .0202**; and/or
- soil has not been remediated to the lower of the soil-to-groundwater or the residential Maximum Soil Contaminant Concentration (MSCC)s.

Pursuant to **15A NCAC 02L .0409(b)** and **15A NCAC 02L .0509**, 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:

- the local health director;
- 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;
- all property owners and occupants residing within or contiguous to the area containing contamination; and
- 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 2L 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. A public comment period of 30 days will be allowed from the date of the receipt of proof of public notice. **If proof of public notice is not received by the Department the site closure is not complete and the RP may be subject to enforcement actions.**

10.0 Sampling and Analysis Guidance for Release Response, Assessment and Corrective Action

Appendix D presents guidance on field screening, sampling, and laboratory analysis for the 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. Sample collection and analysis are discussed fully in the ***Guidelines for Sampling***.

11.0 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.

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).** (see **Appendix D**)

12.0 Disposal of Contaminated Soil and Groundwater

Appendix E refers to the management of contaminated soil and groundwater. Management requirements differ depending on the source of the contaminated media.

13.0 References

The following is a list of references that were used in the development of this document, and which may be consulted during the 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

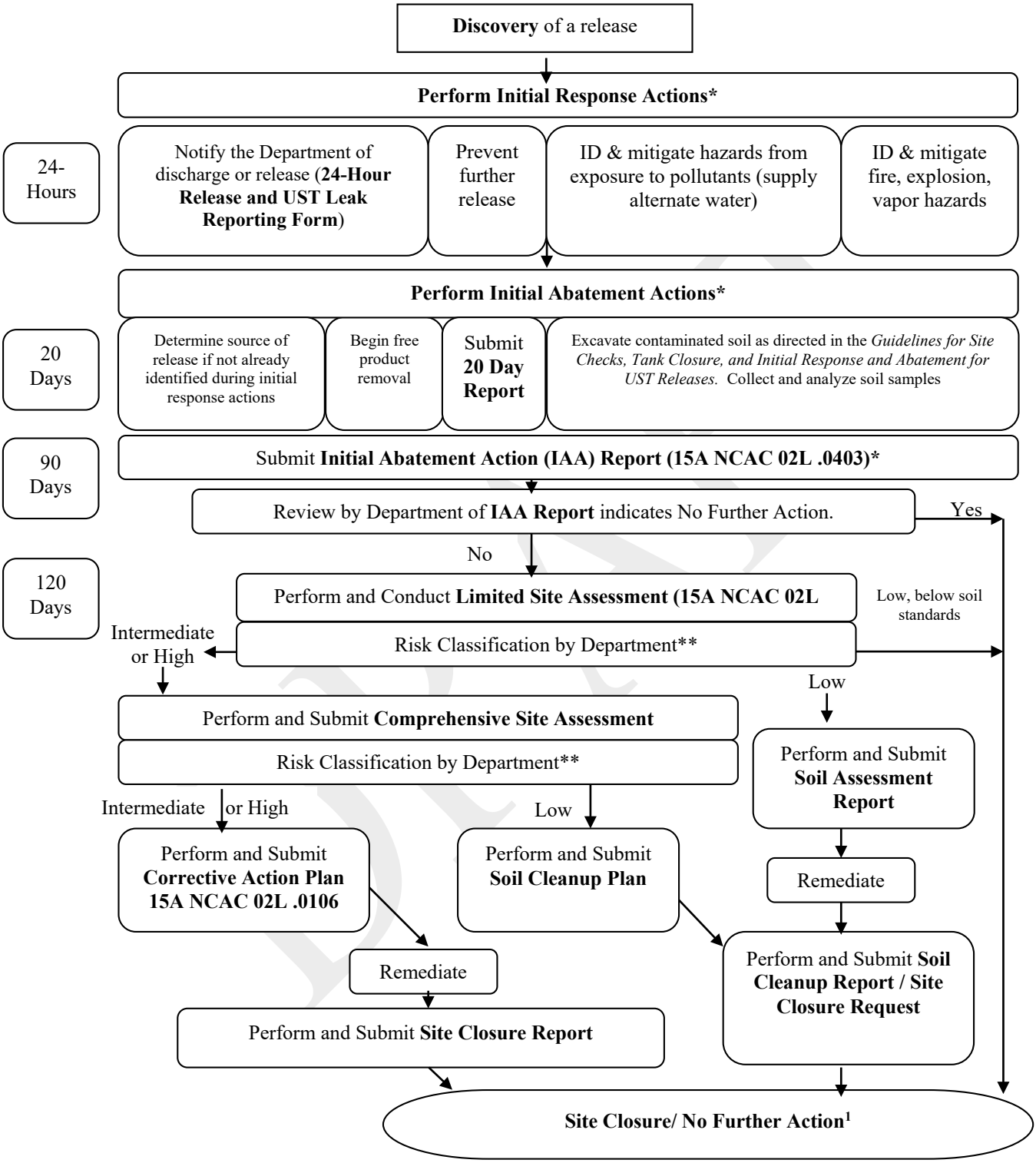
Chapter IX: Monitored Natural Attenuation
https://www.epa.gov/sites/production/files/2014-03/documents/tum_ch9.pdf

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

14.0 Figures

Figure 1 - Flowchart of Requirements for UST Petroleum Releases

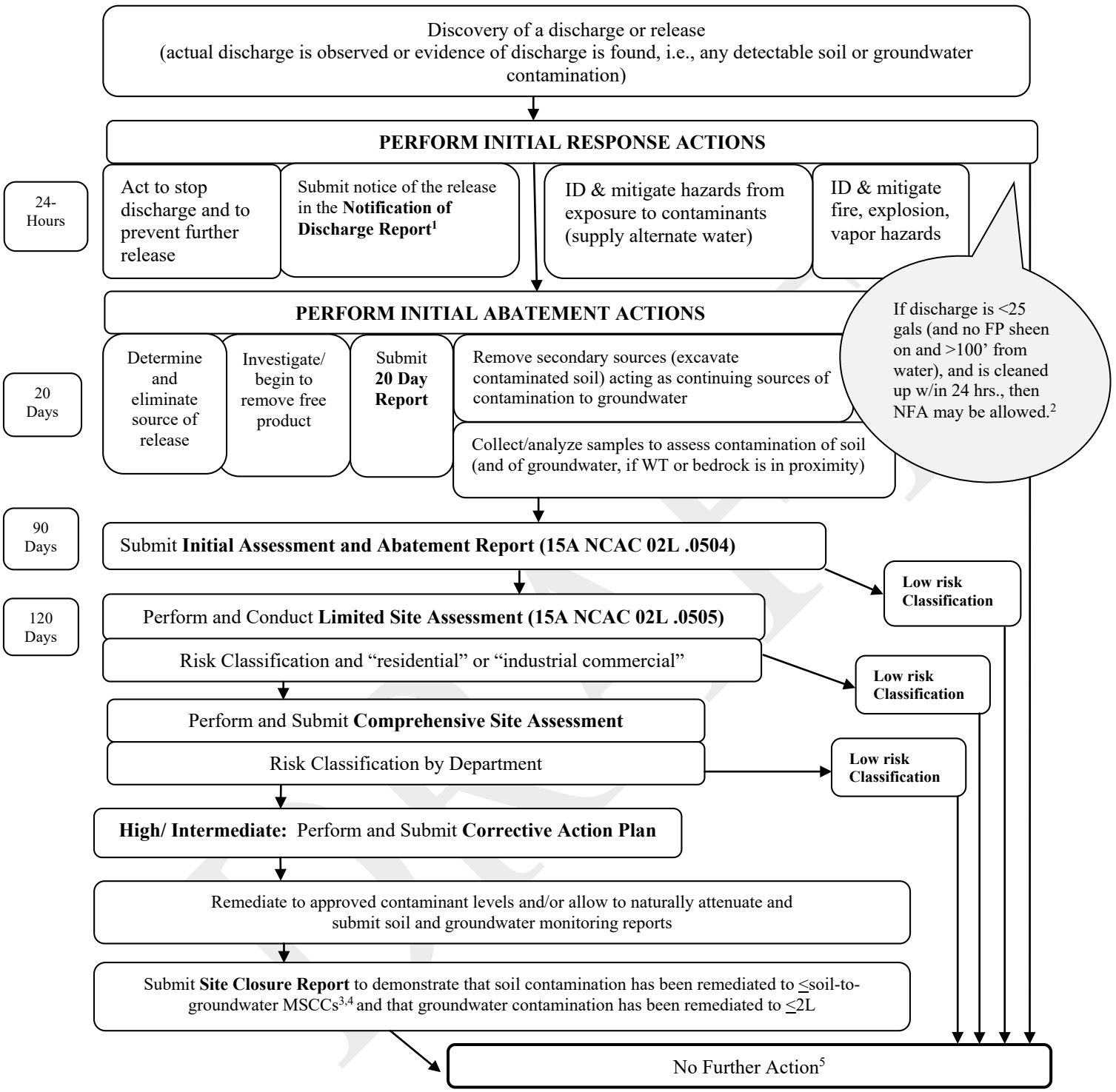
*For guidance on initial actions, see the *Guidelines for Site Checks, Tank Closure, and Initial Response and Abatement for UST Releases*.



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

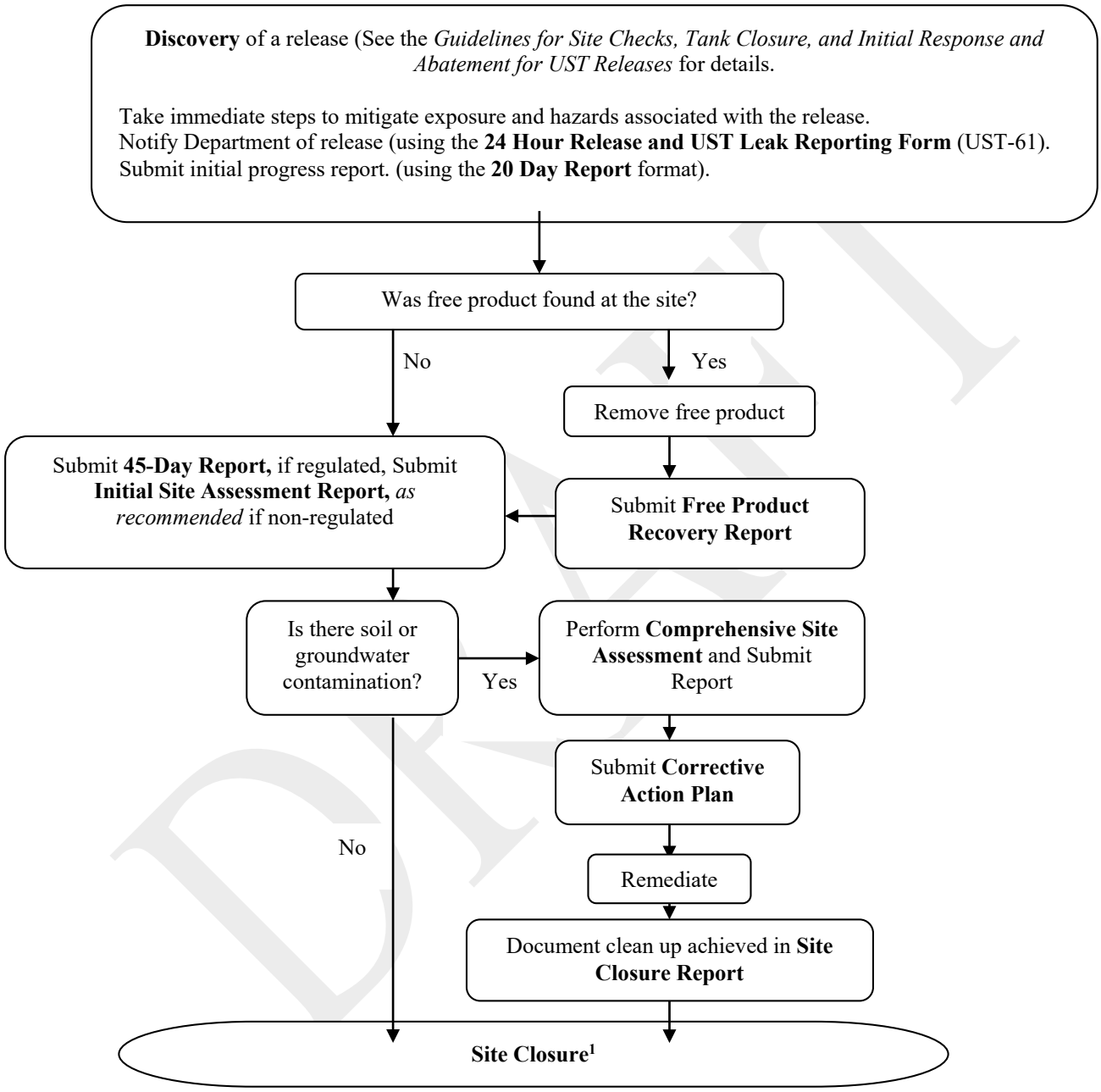
1 - A NFA designation may require land use restrictions (Notice of Residual Petroleum) under risk-based closure

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