STATE OF DELAWARE

Guidance for Long-term Stewardship (LTS) under the Hazardous Substance Cleanup Act (HSCA)

FINAL

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Environmental Control (DNREC)
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Remediation Section
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1.0 INTRODUCTION

The purpose of the Long-Term Stewardship (LTS) guidance is the following. First, it identifies some of the major components of LTS. Second, it provides a framework regarding the expectations DNREC has when drafting a LTS Plan. Third, it provides details on the criteria used by DNREC inspectors when performing an LTS inspection. And finally, it details some of the required information when submitting a LTS Report. It is important to note that LTS requirements are site and remedial action specific, and it is not feasible to detail every requirement in this document.

2.0 COMPONENTS OF LTS

Long-term Stewardship includes four main components. These are the use of institutional controls, compliance with operation and maintenance requirements, periodic review and inspection of the remedial action, and long-term monitoring of impacted media. These four components used in conjunction help ensure the continued protectiveness of the remedial action.

2.1 INSTITUTIONAL CONTROLS (IC)

Sites within the LTS program rely on institutional controls. These are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. DNREC-RS recognizes institutional controls that have been recorded in an environmental covenant (EC).

2.2 OPERATION AND MAINTENANCE (O&M)

Operation and Maintenance refers to all activities necessary to ensure the continued function of a remedial action. Activities related to the operation include not just the day-to-day tasks associated with running an existing remedial system but also optimization of a remedial system to improve performance, upgrading remedial system components, worker safety, and documentation. Maintenance would include preventative measures, such as the changing of filters or lubrication of mechanical parts, and corrective measures or repairs.

2.3 PERIODIC REVIEW AND INSPECTION

Just as Sites rely on IC's to ensure the continued protectiveness of the remedy, they also require periodic review and inspection. These inspections take two main forms. The first is the owner/operator inspection. This is the first layer of protection. It includes any and all inspections/file reviews performed by the owner/operator on a regular basis. This should typically include a physical inspection. As with O&M, documentation of the owner/operator inspections are a necessary aspect. The second layer of protection is the DNREC-RS review and inspection. This typically consists of a file review and may include a physical inspection of the property. Details regarding DNREC-RS inspection criteria are included in section 4.3.

2.4 LONG-TERM MONITORING (LTM)

LTM is necessary to ensure the continued protectiveness of a remedial action. It includes any type of sample collection and is usually performed on a reoccurring basis. This provides current data for decision making and serves as a trigger to identify possible failures in the remedial action. Due to the complexity of this topic, details regarding requirements for Long-Term Monitoring are addressed in a separate document.

3.0 LTS PLAN

This section of the guidance includes expectations regarding what is an acceptable LTS plan. It discusses relevant information that should be included in the plan, recommended reporting and self-inspection frequencies, and general documentation to be included with the LTS plan.

3.1 PURPOSE

The purpose of an LTS Plan is to provide the information necessary to properly operate and maintain a remedy in order to meet site remedial objectives and ensure the continued compliance with the remedy. The LTS Plan lists activities, technical guidance, and regulatory requirements to ensure effective operation of the remedy. The LTS Plan should focus on the needs of operating personnel who may not be familiar with the history of the site. The plan should aid in operating the remedy onsite and set the guidelines for inspection and maintenance procedures. The LTS Plan is a living document and should be prepared so that there is a basic understanding of the following:

1. Site As-built condition,
2. Operation of Site and/or Engineered Remedial Systems
3. Inspection and Maintenance of the Site and/or Engineered Remedial Systems
4. Record Keeping and Reporting Requirements
5. Long-Term Monitoring Requirements

Depending on the remedy, LTS requirements can vary greatly from site to site in magnitude and in the type of LTS activities that may be required.

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3.2 INTRODUCTION

3.2.1 Purpose and Scope

This section should provide a short overview of what the LTS Plan will cover and the intended audience. This audience will generally be whoever is tasked with implementing the required LTS activities.

3.2.2 Site Background

A short summary is included in this section regarding the key pieces of information related to the investigation on the site. It should be comparable in content and description to a factsheet. The intent is to provide site personnel with enough information to know what happened at the site and

why the remedial action is in place. The majority of this information is detailed in the Remedial Investigation.

3.2.3 Organization and Responsibilities

This section also defines the roles and responsibilities involved with the implementation of LTS activities. It will provide an organizational chart indicating the names and roles of relevant individuals with regards to the remedial action. It will include at a minimum, the names of the responsible party contact, current HSCA consultant contact, DNREC-RS project manager, DNREC-RS LTS project manager, and principal system design engineer/scientist. Provide current contact information including mailing address, telephone numbers, and email addresses. Include a plan to communicate changes in personnel or responsibilities when the organizational chart is no longer accurate. DNREC-RS recommends updated organizational charts be provided with LTS report submittals if needed.

3.3 REMEDIAL DESIGN AND CONSTRUCTION

Provide a reference to any relevant documents detailing the engineering and institutional controls implemented on the site. Provide a general overview of the criteria that formed the basis of the remedial design as well as a conceptual description of major and LTS applicable design components on the site. Include the contact information of the design engineer, or scientist, if not included in the organization chart.

Reference a final and complete set of as-built drawings, cross-sectional diagrams, and specifications and include these in the appendices to the LTS Plan. The as-built drawings and specifications shall incorporate all variances to the approved remedial design. In addition, include figures documenting any remaining areas of concern which include capped locations, underground storage tanks (USTs) closed in place, geotextile liners, engineered barriers, slurry walls, soil stabilization/adjuncts efforts, etc.

3.4 OPERATION REQUIREMENTS

3.4.1 General

This section should provide an overview of the operations that are necessary for the functioning of the site and site systems to achieve the

remedial objectives. A general description of all operating remedial action system(s) should be provided. Process flow and equipment diagrams, process instrumentation diagrams, and interlock diagrams/descriptions should be provided, if applicable. Provide start-up and shutdown procedures. Other agency's permit requirements and compliance issues should also be discussed.

3.4.2 System Components

This section is to include equipment and/or system layouts complete with functional diagrams, schematics, isometrics, and data to explain the detailed operation and control of each individual piece of equipment and/or system. In general, the following should be provided in detail for each of the major components of the operating system(s):

1. Description and function, including its interrelationship with other functional systems and subsystems,
2. Equipment and material specifications (Vendor/manufacturer data should be provided in the appendices of the LTS Plan),
3. Mechanical and instrumentation overview,
4. Operation instructions/specifications, and
5. Troubleshooting procedures.

Descriptions shall be sufficiently detailed to provide operational personnel with the understanding necessary to adequately perform system operation activities and to correctly interpret the results of these activities. In addition, the control system should be described in detail, including operating instructions. All manufacturer warranties of system components should be listed. Copies of warranties should be included in the appendices of the LTS Plan.

3.5 INSPECTION AND MAINTAINANCE

This section describes the inspection and maintenance details required for the proper care and efficient operation for each of the remedy elements. Inspection and maintenance are necessary to ensure the long-term integrity and success of the remedy. Regular inspections should be performed to evaluate performance and maintenance needs. Verifications pertaining to institutional controls (i.e., deed restrictions, etc.) should also be performed

to confirm that these controls remain in-place and have not been compromised.

An inspection checklist should be developed for use during LTS activities. DNREC-RS has developed a general inspection form for use during state inspections and can be found in **Attachment A**. This form may be used and modified to address site specific requirements. Any inspection form should include the following:

1. Site Name and DE Number
2. Date and Time of the Inspection
3. Name of Inspector
4. Identification of Unsatisfactory Conditions
5. Written Comments on Proposed Corrective Action
6. Compliance/Non-Compliance Designation for the site at time of inspection
7. Photo Documentation.

Regarding written comments on the proposed corrective action, DNREC recommends the following format. First, identify what is unsatisfactory about the item. Second, state what is to be done to correct the item. Third, provide a timeline to correct the action. Timelines greater than 30 days will require DNREC-RS notification and approval.

The nature of general and routine maintenance activities should also be discussed. These activities include the repair, replacement, or rehabilitation of any components of the remedy. An overall inspection and maintenance schedule should be provided that lists inspection and maintenance activities for each of the remedy components. The schedule should also include the frequency at which the activity is to be performed. Inspection frequency will vary depending upon the specifics of the remedy implemented. As a result, more complex remedies or remedies where points of failure are more likely should be inspected at a higher frequency, such as monthly. This would include active vapor mitigations systems and vegetative caps.

3.6 MONITORING REQUIREMENTS

This section details monitoring requirements for the Site. Further guidance regarding Long-Term Monitoring is provided in a separate document.

3.7 RECORDKEEPING AND REPORTING

This section should include minimum requirements on documentation for reporting purposes. In order to provide a record for the site and to aid in state inspections, all LTS activities should be documented. Basic documentation includes, but is not limited to the following:

1. Completed Inspection Forms
2. Completed Corrective Action Summary Forms
3. Analytical Results, and
4. Photographic documentation

An LTS inspection form, see **Section 3.2.4**, will generally be sufficient to capture the necessary information to demonstrate compliance. To supplement the inspection form typically used during inspections, DNREC-RS has included an example of a corrective action summary form as **Attachment B**. This form, or a similar one, should be completed for any corrective action performed on the site to bring the site back into compliance. This may include repairing cracks in asphalt caps, replacing damaged riser pipes, etc. Minor corrective actions detailed in the LTS plan do not require notification to DNREC-RS.

Completion of a corrective action summary form after work is completed is sufficient. As an example, this would include filling in cracks in asphalt caps. All other issues should be reported prior to beginning any corrective work.

This section should also provide an anticipated reporting schedule (annual, quarterly, etc.). The actual reporting frequency for a site will depend on the site remedy and risks associated with the site. Generally, reporting frequency will be conducted on a quarterly, semiannual, or annual basis as specified in the LTS plan. Report submission will follow the timeline schedules in **Table 1** below.

Table 1- Reporting Timeline Schedule

Frequency	Monitoring Time	Reporting Time	Report Due
Quarterly	January 1 – March 31	1Q Year	April 30
	April 1- June 30	2Q Year	July 31
	July 1 – September 30	3Q Year	October 31
	October 1 – December 31	4Q Year	January 31
Semiannual	January 1 – June 30	1H Year	August 31
	July 1 – December 31	2H Year	February 28 or 29
Annual	January 1 – December 31	Annual Year	March 31

Alternate reporting requirements may be considered on a case-by-case basis and should have technical reasons for needing a different reporting schedule.

This section should also detail 5-year Remedy Evaluation Review (RER) requirements. This evaluation is required to confirm that the remedy prescribed in the Final Plan of Remedial Action (FPRA) remains effective at protecting human health and the environment. It is recommended that the LTS consultant and the current owner/operator contact DNREC-RS prior to initiating the 5-year RER. An RER should typically include a joint site visit and a review of the site status. All sites should complete at least one formal review involving DNREC-RS after 5 years. This requirement may be waived by DNREC-RS based on site specific condition.

3.8 APPENDICIES

Appendices to the LTS Plan should include when applicable, the following components:

1. Final Plan of Remedial Action;
2. Remedial Action Construction Completion Reports;
3. As-built Drawings and Specifications;
4. Vendor Data;

5. LTS Inspection Form;
6. LTS Correction Summary Form;
7. Site Maps;
8. Warranty Information;
9. Contaminated Materials Management Plan (CMMP);
10. Training Manuals; and
11. Health and Safety Plan.

4.0 INSPECTIONS AND NONCOMPLIANCE

This section details the general criteria used by DNREC-RS to evaluate LTS on a site. It also provides a short overview of the inspection process and how noncompliance is addressed. DNREC-RS will provide documentation regarding the result of the inspection to the property owner or site contact.

Periodic reviews and remedy evaluations will be performed by DNREC-RS to confirm that the remedy as prescribed in the FPRA remains effective at protecting human health and the environment and, if applicable, to evaluate whether original cleanup levels as established by the FPRA remain protective.

For sites where ongoing remedy operations have not yet achieved the remedial clean-up objectives prescribed in the FPRA, the evaluation would focus on both the effectiveness of the technology implemented, and on specific performance levels established in the FPRA.

4.1 INSPECTION FREQUENCY

All sites not administratively closed that have had a remedy implemented will be evaluated by DNREC-RS. This includes sites requiring any engineering controls or land-use restrictions/controls. DNREC-RS will also review sites which have been issued a “Certificate of Completion of Remedy” which were not administratively closed.

DNREC may inspect sites on an annual basis. Based on continued documented compliance, DNREC may reduce inspection frequency. DNREC inspections may include a physical site inspection, file review, interviews, or any other actions as deemed necessary by DNREC at the time of review. At any time, DNREC may waive this inspection for the year.

4.2 INSPECTION CRITERIA

DNREC-RS has created a generic inspection form for use during state inspections (**Attachment A**). When used, this form will be provided post inspection with a letter documenting the compliance status to the property owner or site contact. Due to the number of Sites participating in the LTS program, DNREC may waive the use of this inspection form and the post inspection letter. The following sections detail inspection criteria used by DNREC in the absence of direction from the site's LTS plan.

4.2.1 SOIL

4.2.1.1 Hardscape

Examples of hardscape include pads, slabs, curbing, patios, walkways, driveways. When inspecting hardscape, DNREC considers the following:

1. What is the overall condition of the hardscape?
2. Where have cap conditions deteriorated to the point of being inefficient?
3. Are there visible potholes, cracks, lifting, settling?
4. Are there loose or missing bricks, pavers, or other pieces?

In addition, DNREC utilizes the University of Wisconsin-Madison, Pavement Surface Evaluation and Rating (PASER) Manual for the inspection of asphalt, concrete, seal coat, and gravel. These documents identify common defects in these materials. It also assists with visually rating pavement conditions.

DNREC generally considers any cracking greater than ½ inch thick to be unacceptable and would require corrective action.

4.2.1.2 Vegetative & Soil

When inspecting soil caps DNREC will typically rely on the PASER Manual. DNREC also considers the following:

1. What is the overall condition of the soil?
2. Are soil areas vegetatively stabilized and do the associated grasses/shrubs/perennials/trees appear in good health?
3. Is there sufficient mulch over landscape fabric to completely obstruct the fabric?

4. Are there any identified wildlife burrows?
5. Have any plants been added that required extensive excavation without prior DNREC notice?
6. Are any mowing requirements being met?
7. Is there surface trash present on the site?
8. Is there any visible erosion (sheet, channel) or visible ruts or tire tracks?
9. Is eroded sediment leaving the property?

Conditions associated with erosion may be referred to the DNREC Sediment and Stormwater Program.

4.2.1.3 Drainage & Storm Water Management

When evaluating storm water management, DNREC generally considers the following. With consideration to surface water flow, DNREC looks to see if offsite storm water is draining onto the site from adjacent properties, whether standing water or intermittent visibly wet areas are present, and whether site storm water is draining into appropriate catch basins or storm water management facilities. With regards to catch basins, DNREC will observe whether the grates are free of debris and whether any inserts are full of sediment. DNREC also considers if onsite swales, dams, and culverts are clear and free of obstructions. This is not all inclusive as DNREC may identify other issues.

4.2.2 GROUNDWATER

4.2.2.1 Groundwater Monitoring Report

The primary concern regarding groundwater monitoring reports with LTS is whether the report was submitted and received prior to a due date. DNREC reviews these reports to evaluate onsite groundwater conditions and make determinations on next steps. As a result, DNREC looks to see if groundwater samples were collected in compliance with appropriate DNREC-RS Standard Operating Procedures (SOPs). Please consult the LTM guidance for details.

4.2.2.2 Monitoring Wells

DNREC will determine if known wells onsite are required to remain as part of the monitoring network. In the event groundwater monitoring has been

discontinued at certain well locations, they should be properly sealed per the 7 DE Admin. Code 7301 *Regulations Governing the Construction and Use of Wells*. For wells that need to remain onsite, DNREC will inspect manhole covers to determine if they are secure and in good repair. Stickup well casings should be in good repair. All wells should be secured with locks.

4.2.3 SURFACE WATER

DNREC does not have general surface water inspection criteria at this time. However, the LTS criteria will be based on the stipulations set forth in the Final Plan of Remedial Action.

4.2.4 SEDIMENT

DNREC does not have general sediment inspection criteria at this time.

4.2.5 VAPOR INTRUSION

4.2.5.1 Vapor Intrusion Systems

Due to the complexity of these systems, DNREC relies on highly site-specific criteria for inspections. This includes monitoring and operational requirements. These requirements can also vary greatly if the system is passive, active, or a hybrid. Common inspection items include a focus on the riser pipes; specifically, whether these pipes are visibly damaged or obstructed. They should be free of debris and not capped. Generally, the roof vent should maintain a 10 feet buffer zone from the point of exhaust to any opening into conditioned spaces within the building.

DNREC also inspects required equipment components for proper operation. Sampling ports should be functional, accessible, and unobstructed. Any equipment used in sampling should be in good working order. These include manometers, PIDs, etc. DNREC reviews LTS reports for proper documentation that equipment was in good working order during inspections performed by responsible parties or operators. Exhaust fans should be operating as required.

Finally, DNREC looks for any indication of a disturbance or modification of the building slab. These types of activities may result in damage to the vapor barrier below. This includes visual inspections, as well as interviews with site personnel and file reviews.

4.2.6 OTHER SYSTEMS

4.2.6.1 Site Security

Some Sites have security requirements regarding the remedy. In these situations, access by the general population needs to be restricted. DNREC considers the following.

First, are required fences or other barriers intact and properly secured? DNREC considers any damage to fences or barriers that could permit access to be unacceptable and would require repair. Next, DNREC looks to identify if there is evidence of unauthorized access to the site. DNREC considers any unauthorized access to be unacceptable and would require corrective actions be taken.

4.2.6.2 Retaining Walls, Bulkheads & Seawalls

DNREC inspects the overall condition of retaining walls and bulkheads and seawalls. Specifically, DNREC is looking for cracks, sags, bulges, missing bricks or blocks, and any vegetative growth.

4.2.6.3 Oil/water systems

DNREC does not have general oil/water system inspection criteria at this time as these are generally regulated under National Pollutant Discharge Elimination System. DNREC's inspections are focused on determining if the system is operating (if required).

4.3 SITE NONCOMPLIANCE

Sites can fall into noncompliance with regards to their LTS obligations for a variety of reasons. If during an inspection it is identified that a site is in noncompliance, documentation will be provided to the property owner or site contact. A site found to be in noncompliance does not always require further action on the part of DNREC. Actions beyond documentation are based upon the severity, frequency, and correction of the noncompliance. Sites where identified issues are resolved within an appropriate timeframe, as determined by DNREC, will generally not require additional enforcement actions.

For sites where noncompliance occurs and is not rectified in an appropriate timeframe, DNREC will take enforcement actions under the regulations governing HSCA.

5.0 REFERENCES

ASTM, 2021. Standard Guide for Development of Long-Term Monitoring Plans for Vapor Mitigation Systems. D8408/D8408M, ASTM International. West Conshohocken, PA. https://www.astm.org

DNREC, 2023. Delaware Erosion and Sediment Control Handbook

DNREC, 2002. Operation and Maintenance Guidance Document for HSCA and VCP Sites. DNREC, 2023. Vapor Intrusion Pathway Guidance.

ITRC. 2020. Vapor Mitigation Guidance. Washington, D.C.: Interstate Technology & Regulatory Council.

Kansas Department of Health and Environment. Environmental Use Control Owner Inspection Form.
https://www.kdhe.ks.gov/DocumentCenter/View/2784/Environmental-Use-Controls-Owner-Inspection-Form-PDF?bidId=

USEPA, 2001. Comprehensive Five-Year Review Guidance. OSWER No. 9355.7-03B-P USEPA, 2006. Long-Term Stewardship Fact Sheet. EPA500-f-05-017.

USEPA, 1991. Structure and components of Five-year Reviews. OSWER No. 9355.7-O2.

Wisconsin Transportation Information Center, 2002. Pavement Surface Evaluation and Rating (PASER) Manual.

ATTACHMENT A

LTS INSPECTION FORM

SITE INFO

DE NUMBER DE-_____ SITE NAME: _____
SITE ADDRESS: _____
LAST INSPECTION: _____ EC DATE: _____
LTS PLAN DATE: _____FPRA DATE: _____ CMMP DATE: _____
RS PROJECT OFFICER: _____
OWNER INFO:_____
CURRENT OWNER: _____
CHANGE IN OWNERSHIP (Y/N): _____ NOTIFIED (Y/N/NA): _____

OWNER INFO

CURRENT OWNER: _____
CHANGE IN OWNERSHIP (Y/N): _____ NOTIFIED (Y/N/NA): _____

CONSULTANT

NAME: CONTACT PERSON:

INSPECTION

DATE: _____LTS PLAN ONSITE (Y/N/NA): _____ ARRIVAL TIME: _____
DEPARTURE TIME: _____INSPECTOR NAME:_____

1) SITE SECURITY (S/U/NA) _____

2) Compliance with Environmental Covenant (S/U/NA) _____

3) CAP COMPLIANCE (S/U/NA) _____
a. Self-Inspection Report Submitted (Y/N) _____
b. Paved Areas (Concrete, Asphalt, etc.) (S/U/NA) _____
c. Building Slab (S/U/NA) _____
d. Hardscaping (Rock, Stone, Paver, etc.) (S/U/NA) _____
e. Vegetation (Grass, etc.) (S/U/NA) _____
f. Erosion (Y/N) _____
g. Mowing Requirements (Y/N) _____
-Acceptable (Y/N) _____
h. Marker Fabric (Geotextile Liner, Witness Layer) Visible (Y/N/NA) _____

4) MONITORING WELLS (S/U/NA) _____

a. Secured (Y/N) _____
b. Condition (S/U) _____
c. Properly Abandoned (Y/N/NA) _____

5) STORMWATER MANAGEMENT/SITE DRAINAGE (S/U/NA) _____
a. Aerator (S/U/NA) _____
b. Riser (S/U/NA) _____
c. Liner (S/U/NA) _____
d. Spillway (S/U/NA) _____
e. Check Dam Clear (S/U/NA) _____
f. Swale (S/U/NA) _____
g. Culvert (S/U/NA) _____
h. Surface/Slope Stability (S/U/NA) _____
i. Catch Basin (S/U/NA) _____

6) VI (S/U/NA) _____
a. Monitoring Report (Y/N/NA) _____
b. Passive or Active System (P/A) _____
-Functional per Spec (S/U/NA) _____
-Manometer (Y/N/NA) _____

7) OTHER REQUIREMENTS (S/U/NA) _____
a. Seawall (S/U/NA) _____
b. Oil separator (S/U/NA) _____
c. Silt Fence (S/U/NA) _____
d. Tree Canopy (S/U/NA) _____
e. Compliance with Site Use Restriction (S/U/NA) _____

SITE COMPLIANCE (Y/N) _____

WRITTEN COMMENTS:

_____
_____
_____
_____
_____
_____
_____

ATTACHMENT B

Long-term Stewardship
Maintenance Summary Report

Identified Noncompliance: Date Identified:	
Date Corrected:	
Actions Taken:	
Additional Actions Required:	
Identified Noncompliance:	
Date Corrected:	
Actions Taken:	
Additional Actions Required:	
Identified Noncompliance:	
Date Corrected:	
Actions Taken:	
Additional Actions Required:	
Identified Noncompliance:	
Date Corrected:	
Actions Taken:	
Additional Actions Required:	
Identified Noncompliance:	
Date Corrected:	
Actions Taken:	
Additional Actions Required:	

Name:_____ Affiliation:_____
Signature:_____ Date:_____