Site Specific Liability Assessment

Directive PNG031

May 2019

Governing Legislation:

Act: *The Oil and Gas Conservation Act*

Regulation: *The Oil and Gas Conservation Regulations, 2012*

Order: 126/19

Contents

1. Introduction

The purpose of this Directive is to set out the requirements for Site Specific Liability Assessments (SSLA) and is intended to improve the consistency and accuracy of reclamation liability cost estimates submitted to the Ministry of Energy and Resources (ER). This Directive applies to spills and incidents resulting from wells, facilities and flowlines as defined in *The Oil and Gas Conservation Regulations, 2012* (OGCR).

With regard to well and facility sites, the objectives of an SSLA are to estimate the cost to remediate an unassessed problem site and to track liabilities under the Licensee Liability Rating (LLR) program for protection of the Saskatchewan Oil and Gas Orphan Fund (SOGOF). Under the OGCR, reclamation liabilities with respect to flowline spills are associated with a well or facility licence that the flowline is connected to.

SSLAs are based on the results of one or more Environmental Site Assessments (ESA). Acceptable principles and practices for conducting Phase II ESAs are outlined in *Directive PNG033: Phase II Environmental Site Assessment* (Directive PNG033).

SSLAs are conducted by the licensee through a qualified third party professional. The extent of assessment and investigation needed to adequately understand the conditions at a given site depends on the complexity of the situation. The overall intent is to gather enough information and lines of evidence to prepare an accurate cost estimate to remediate the site to applicable regulatory or site specific criteria.

Questions concerning the requirements set out in this Directive should be directed to the ER Service Desk at 1-855-219-9373 or email at ER.servicedesk@gov.sk.ca.

2. Definitions

Acknowledgement of Reclamation (AOR): As defined in *Directive PNG016: Acknowledgement of Reclamation Requirements* (Directive PNG016).

Assessed Problem Site: This is the status of a problem site after an SSLA has been submitted to ER and reviewed.

Delineation: Determining the volume (depth and areal extent) of a contamination plume in soil or groundwater.

Endpoint (Tier 1, 2, or 3): As set out in the *Endpoint Selection Standard.*

Environment: Includes the following:

- Air and the layers of the atmosphere;
- land, including soil, subsoil, sediments, consolidated surficial deposits and rock;
- water;
- organic and inorganic matter and living organisms; and
- interacting natural systems and ecological and climatic interrelationships that include the components listed above.

Exposure pathway: Is the route by which a receptor comes into contact with a contaminant.

Facility: As defined in the OGCR.

Flowline: As defined in the OGCR.

Groundwater: Is water beneath the ground surface.

Licensee Liability Rating (LLR): As defined in *Directive PNG025*.

Oilfield Waste: Includes but is not limited to drilling fluids, waste oil or refuse from tanks or wells.

Potable water aquifer: As defined in the *Endpoint Selection Standard*.

Potential Problem Site: This is the status of a site that presents a potential risk to the SOGOF due to environmental impacts from oil and gas.

Problem Site: A site that presents a risk to the SOGOF due to environmental impacts from oil and gas operations.

Receptors: Are living plants, animals, or humans that may be exposed to a substance.

Reclamation: As defined in the OGCR.

Remediation: Means decontamination, excavating, removing, sequestrating, encapsulating, immobilizing, attenuating, degrading, processing or treating the contaminants in the soil or water in a manner so that, in the opinion of the minister the contaminants no longer pose a threat or risk to human health, public safety, property or the environment.

Rooting Zone: Is the zone below the ground surface extending to a depth of 1.5 metres.

Site: As defined in the OGCR.

Unassessed Problem Site: This is the status assigned to a site where the licensee has been unsuccessful in establishing that the potential problem site status was deemed in error.

Well: As defined in the OGCR.

3. Governing Legislation

The requirements in this Directive are authorized under and supplemented by:

- *The Oil and Gas Conservation Act*
- The OGCR
- Directive PNG016
- Directive PNG025
- Directive PNG033

4. Problem Site Identification and Use of the Site Specific Liability Assessment

Potential problem sites are identified through self-disclosure by the licensee or through an inspection conducted by ER personnel. Inspections may be conducted in the course of normal ER field activities or at the request of the land owner.

ER will notify the licensee of any site identified as a potential problem site and provide an opportunity to respond to the identification prior to formally classifying the site as an unassessed problem site.

If a licensee cannot establish that the potential problem site status was deemed in error, ER will notify the licensee in writing that an SSLA is required within a specified timeframe. Typically, a site is classified as an unassessed problem site if evidence indicates:

- insufficient recovery of spilled or released oilfield waste;
- off-lease damage to soil, vegetation, or a water body;
- a high probability of groundwater contaminate transport or migration; and
- surface reclamation issues, such as an extensive cut and fill.

The reclamation liability recorded in the LLR system for the well or facility site will be increased by four times the normal deemed amount or greater depending on the severity of the issue identified; this amount will stay in effect until an SSLA is submitted and accepted by ER. Dialogue is encouraged between industry and ER throughout the SSLA process to discuss assessment techniques and remediation technologies.

If the estimated cost and recommendations of the SSLA are acceptable to ER, the site will be reclassified as an assessed problem site. The estimated cost of the consultant's recommended option is generally used for LLR purposes provided the option is based on ER-accepted remediation technologies (in some situations, ER may set the reclamation liability at the cost estimated for the rooting zone excavation, or full excavation). The assessed problem site status will remain in effect until reclamation-related progress is made at the site, such as the full or partial removal and/or treatment of impacted media, or if the results of a Site Specific Risk Assessment (SSRA) indicate remediation is not warranted or is only partially necessary. For assessed problem sites, both monthly and licence transfer LLR assessments are conducted using the "assessed" value as determined in the SSLA.

ER and the licensee reserve the right to re-evaluate sites when new information becomes available or if site activities or circumstances change. Examples include:

- changes in the extent or concentration of impacts are identified; and/or
- changes in pathways or receptors are identified and/or changes in site conditions are identified that may change the level of risk to the environment.

5. Third Party Professional Qualifications

Third party professionals must be certified in their respective profession and familiar with applicable federal, provincial and municipal legislation and published guidelines and directives used to evaluate the presence of contamination on a property and to develop reclamation plans.

For the purposes of certifying the work and analysis carried out in the preparation of an SSLA, any of the following credentials are acceptable:

- licensed to engage in the practice of professional engineering/geoscience in Saskatchewan pursuant to *The Engineering and Geoscience Professions Act*;
- licensed to practice agrology in Saskatchewan pursuant to *The Agrologists Act*;
- licensed to practice as a biologist or chemist by profession's legislation of a Canadian province or territory;
- licensed to practice as a forester or forest technologist in Saskatchewan pursuant to *The Forestry Professions Act;*
- certified as an applied science technologist in Saskatchewan with 5 years of direct experience in site assessments pursuant to *The Saskatchewan Applied Science Technologist and Technicians Act;*
- designated by the minister.

6. Certification of Work and Limitations

The third party professional must sign and date the SSLA, and the signatory statement must stipulate that the report was completed in accordance with the specified standard(s) stated herein, and all conditions that materially limit the scope of the assessment or the accuracy of the cost estimate(s) were considered.

SSLA reports are deemed confidential under this Directive.

7. Conditions Affecting Scope and Accuracy

The SSLA report must document and summarize in a distinct section any deviation from the specified assessment standard or conditions that materially limited the scope of the assessment or the accuracy of the cost estimate. This includes the availability of historical information, personnel familiar with the history of the site and site conditions such as snow cover and access to the subsurface.

In most cases, proper planning and procedures can permit the safe accomplishment of SSLA objectives. In situations where safety concerns legitimately restrict the scope of a site assessment, the assessor must document the rationale for the restricted scope of work and

provide sufficient budget contingency to address the remediation costs reasonably expected for the areas not assessed.

If historical site information is lacking or the assessment is otherwise impeded, based on professional judgement an appropriate contingency must be included as a distinct item in the cost estimate.

8. Estimating Costs

In estimating remediation costs, the SSLA must reasonably consider the contaminant's impacts on land, sediment and/or surface and groundwater. SSLA cost estimates for remedial excavations should take into consideration the items indicated in Appendix 1. Estimates must be itemized and clearly show the subtotals for all major tasks. A cost estimate must not apply a net present value for work to be conducted in the future.

Costs associated with well suspension, and/or the abandonment of wells or facilities are beyond the scope of the SSLA and should not be included in the SSLA cost estimate.

8.1 Remediation Plan

A recommended remediation plan to address the contaminant issues is a required component of an SSLA. The remediation plan should describe the remediation approach and the estimated remediation schedule may be requested.

Factors to consider in developing a remediation plan include, but are not limited to:

- contaminants and properties (solubility, density, treatability, reactivity);
- soil types and properties (heterogeneity, permeability, porosity);
- water/aquifer properties (depth, flow rate, groundwater table);
- climate factors (precipitation, snowfall, seasonal net water flow, drought);
- remediation criteria or site specific remediation objectives (site and regional characteristics, contaminant form, fate and transport, and environmental risk);
- contaminant source removal (contaminated soil disposal, backfill availability, and compaction requirements);
- type of remediation system (e.g. bio-cell, drainage tile, vertical wells, horizontal wells);
- dimensions of system (e.g. length of trench, number and depth of wells);
- remediation system installation costs, including system infrastructure (e.g. piping, electrical, buildings);
- estimated operational duration of remediation system;
- water disposal/treatment costs on an annual basis multiplied by duration of treatment predicted;
- operation and monitoring costs;
- remediation system decommissioning/abandonment costs; and
- any other life-cycle costs, such as project management.

The remediation plan must set objectives to meet the applicable remediation criteria. Remediation is to be completed to Tier 1, Tier 2, or Tier 3 endpoints as appropriate. Recommended remediation plans that do not include complete source removal must be

supported by lines of evidence that clearly document the understanding of receptors and exposure pathways. If on-site treatment system is recommended, a site specific treatability study should be conducted for the purposed on-site treatment to demonstrate the treatment's effectiveness for the substances of potential concern and the site specific conditions.

If the qualified third party professional assessing the site recommends an SSRA as the most appropriate course of action, it should be noted in the SSLA and an estimated cost for the SSRA should be provided.

In addition to a recommended remediation option, the SSLA must describe:

- the volume of impacted soil within the rooting zone that is above applicable remediation criteria (or background conditions, where warranted); and
- the volume of impacted soil for complete source removal of all contaminants that would return the site to applicable criteria (or background conditions).

8.2 Soil Remediation Costs

Third party professionals must base their recommended remediation option on methods or approaches that have demonstrated effectiveness in sufficiently removing or treating affected soil so that the site would become eligible for an AOR. The remediation plan employed for cost estimating purposes must not result in residual contamination being left in place that presents **acute** risks to human health or ecological receptors. Where contaminants cannot be excavated, the time and costs to actively remediate residual contamination to meet applicable remediation guidelines must be estimated and supporting documentation provided.

Factors to consider when estimating soil remediation costs include, but are not limited to:

- Delineation of all sides of the plume(s). Accepted geophysical or other tools can be used to reduce the amount of intrusive work required for delineation but confirmation using intrusive soil and groundwater sampling methods is required to validate those findings;
- Topsoil and unaffected subsoil (overburden) volumes requiring handling during remediation must be estimated;
- Transportation and disposal;
- Replacing and compacting backfill (volume required, costs to purchase, transport, replace, and compact, and backfill cost subtotal); and
- Decommissioning costs (groundwater monitoring wells, closure reporting, etc.).

Where on-site treatment of affected soils is recommended, a description of the approach and infrastructure needed, the assessment of site suitability, results of soil treatability testing, and the rationale used to predict duration of treatment must be provided.

On active sites, safety concerns related to underground infrastructure may make complete contaminant plume delineation difficult. Where complete plume delineation is not possible, the assessor must develop an appropriate estimate of potentially impacted media requiring remediation using information from other sources and professional experience.

The remediation plan used to estimate costs in areas where complete plume delineation is not possible must document the considerations taken into account and the assumptions used to estimate costs.

8.3 Groundwater Remediation Costs

Depending on the degree and extent of soil contamination, groundwater may also be impacted and require treatment or removal. Treatment of the impacted soil or groundwater alone may not result in sufficient remediation if residual soil contaminants continue to be reintroduced into groundwater.

Estimates of groundwater remediation costs should be based on a plan that first includes contaminant source removal. When all affected soil is not removed, groundwater remediation costs should consider:

- A plan to remove all accessible soil in excess of the site specific remediation criteria; and
- Operation of an active groundwater remediation system until remediation is complete.

Cost estimates should include the installation and operating costs of groundwater remediation systems and provide the basis for estimating the duration of treatment and monitoring required.

Factors to consider when estimating groundwater remediation costs include, but are not limited to:

- Delineation of all sides of the plume(s);
- Potential risk to an underlying potable water aquifer;
- The volume of groundwater requiring treatment or monitoring; and
- The duration of groundwater treatment or monitoring required.

When planning groundwater remediation, many factors affect the design and operation of even a simple pump and treat system. Thorough assessment of groundwater and aquifer conditions requires that an effective groundwater monitoring system is installed and allowed to stabilize prior to sampling. In addition to characterization of groundwater flow and quality, additional contaminant characterization, including contaminant treatability testing is generally required.

9. Remediation of Active Sites

Remediation of active sites will be at the discretion of ER. In some cases ER will not require licensees to undertake extensive remediation activities at active sites. Examples of exceptions to this are when:

- There is a public health or safety concern;
- There is an **acute** risk to ecological receptors;
- Site remediation will not greatly interfere with infrastructure; or
- There is low risk of an active site contributing to additional impacts in an area where remediation will occur.

Licensees and third party professionals are reminded that if remediation options include leaving a significant volume of impacted soil or groundwater in place for extended periods of time, the

lines of evidence must clearly show, through proper assessment of receptors and exposure pathways that it is safe to do so. In many cases the assessment of exposure pathways does not require a full SSRA.

10. SSLA Review and Notification Process

SSLAs should be submitted electronically to lmb@gov.sk.ca with the following stated in the subject line: *Well or Facility Licence Number - Licensee Name – Site Specific Liability Assessment*. ER will review SSLAs for administrative, technical, financial and regulatory requirements as well as the suitability of the proposed remediation cost. If an SSLA is incomplete, inaccurate, non-compliant, and/or contains inconsistent information, ER will reject the document and will provide details of the issues to allow for corrections before a resubmission is made.

Upon acceptance of an SSLA, ER will send the licensee an assessed problem site (APS) letter via email. The APS letter will provide:

- Confirmation the SSLA is accepted;
- A statement indicating the site classification has changed from unassessed to an assessed problem site;
- The reclamation liability assigned to the site as well as the rationale for the decision; and
- Any conditions that relate to annual monitoring, reporting dates, etc.

11. SSLA Report Requirement

The SSLA report should be a stand-alone separate report from the assessment report(s). Table 1 summarizes the format and minimum content that must be included in an SSLA.

Table 1: Content to include in a Site Specific Liability Assessment Report

Section	Content
Title Page	• Identify report type • Well/facility licence number, UWI and land location • Company contact information
Executive Summary	• Provide a synopsis of the assessment and remedial options considered as well as the recommended approach
Introduction	• Summarize the history of the site and provide context for the problem site designation • Reference any regulatory requirements or directives given by ER • Describe objective and scope of work
Recommended remediation option and cost	• Description of recommended remediation option and cost estimate • Discuss advantages, disadvantages and limitations of the recommended option • Provide a rationale for recommending an SSRA
Excavation Volumes	• Provide an estimate of soil volumes for rooting zone and complete excavation of impacted material greater than applicable criteria or background
Conclusions	• Summarize the pertinent information discussed in the report

Certification of Work	• Provide professional third party sign-off, including:
	  • signature(s)
	  • registration/member number(s) or stamp(s)
	  • date of signing

Limitations	• Identify parties authorized to use information in the report • Provide information of limitations on liability and disclosure
References and Supporting Documents	• Provide applicable citations for methods used • Provide documentation and key exhibits to support findings and conclusions, including published works and guidelines • Reference to the relevant ESA report(s)

12. References

Saskatchewan Ministry of Environment, June 2016. Endpoint Selection Standard

Appendix 1: Example of Items to Include in a Cost Estimate for a Remedial Excavation

Full Remediation	Unit Price	Hours/ Otherwise Specified	Cost
Project Coordination & Management			
Prepare Work Plan	$XXX	YYY	$XXX
Coordination and Project Management			
Client, Regulator and Landowner Consultations and Updates, H&S Obligations, Kick-off Meeting			
Data Acquisition, Management and IT(Lab analyses, GIS and IT)			
Engineering, Design and Technical Analysis			
Final Report			
Field Work (Sample, Monitor, Supervise, Audit, Per Diem, Accommodation, Equipment, Mileage)			
Laboratory			
Laboratory Analysis (Confirmatory Sampling)			
Ground Disturbance			
Ground Disturbance Preparation – Line Locates, etc.			
Site Stripping and/or Top Soil Salvage			
Excavation, Earth Moving, Liner, Segregation, Storage			
Overburden of Salvage Soil Excavation			
Excavation, Earth Moving Liner, Segregation, Storage			
Impacted Soil Excavation, Hauling and Disposal			
Hauling			
Landfill Disposal			
Excavation			
Distance from Site to Landfill			
Average Haul Speed			
Hauling Time Per Load*			
*Sum of Loading, Unloading and Hauling			
Truck payload Capacity			
Backfill			
Topsoil			
Clay (impermeable subsoil backfill)			
Other Fill			
Other Fill			
Hauling			
Place Fill in Lifts, Moisturize, Compaction			
Restoration			
Site Restoration (Topsoil Placement, Contour, Drainage, Amendments, Vegetation)			
Total			**$XXX,XXX.XX**