

FORM 001-A Suspension and Abandonment Cost Estimate Report

EUB Licence Number					
Facility Type (Guide 56, Table 5.1)					
LSD Location					
Licence Holder					
Facility Name					
Demolition Costs Description	Quantities	Units	Unit Costs	Units	Costs (\$)
Facility Suspension (purge vessels, flow lines)					
Facility Preparation (electrical/instrumental disconnect)					
Concrete Demolition		t		\$/t	
Structural Demolition		t		\$/t	
Building Demolition		t		\$/t	
Equipment Demolition		t		\$/t	
Vessels Demolition		t		\$/t	
Aboveground Piping Demolition		t		\$/t	
Belowground Facilities (piping/tanks) Demolition		t		\$/t	
Asbestos (% of incremental cost or tonnes if available)		% or t		\$/t	
Asbestos - piping insulation		t		\$/t	
Asbestos - building insulation		t		\$/t	
Road/Rail/Airstrip Removal		m		\$/m	
Other Costs (re-route active lines)					
Demolition Subtotal					
Transportation and Disposal					
Class I Landfill					
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
Class II Landfill					
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
Class III Landfill					
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
NORM Disposal					
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
AENV Licensed Incineration					
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
Liquids Disposal (from Facility Suspension)					
Disposal Fee		m ³		\$/m ³	
Transportation and Loading Cost		km		\$/km	
Other Disposal					
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
Scrap Metal Value					
Sorting and Sizing Cost		t		\$/t	
Transportation and Loading Cost		km		\$/km	
Ferrous Material Value		t		\$/t	
Nonferrous Material Value		t		\$/t	
Scrap Metal Net					-
Transportation and Disposal Subtotal					

(continued)

FORM 001-A Suspension and Abandonment Cost Estimate Report (concluded)

Project Management	Quantities	Units	Unit Costs	Units	Costs (\$)
Project Management Services		%		\$	
Project Engineering and Supporting Services					
Site Admin. Costs (supervision, safety, utilities, trailers, taxes, etc.)		%		\$	
Project Management Subtotal					
Contingency		%		\$	
Total Suspension and Abandonment Cost					
<p>Note that there should be material balance between demolition and transportation/disposal, exclusive of disposal of materials associated with suspension (catalyst, chemicals, sludges, etc.).</p>					

FORM 001-B Large Facility Remediation and Reclamation Cost Estimate Report

EUB Licence Number					
Facility Type (Guide 56, Table 5.1)					
LSD Location					
Licence Holder					
Facility Name					
	Quantities	Units	Unit Costs	Units	Costs (\$)
On-Site Remediation					
In Situ Soil Remediation		m ³		\$/m ³	
Ex Situ Soil Remediation					
Land Treatment		t		\$/t	
Biocell/Biopile		t		\$/t	
Thermal (on-site or mobile incineration)		t		\$/t	
Landfill (on-site)		t		\$/t	
Other (specify: _____)		t		\$/t	
Groundwater (installation, monitoring, and remediation)		m ³		\$/m ³	
Surface Water		m ³		\$/m ³	
Backfilling (purchase, hauling, replacement, compaction)		t		t	
Analytical (delineation, confirmatory, waste characterization)					
On-Site Remediation Subtotal					
Off-Site Disposal					
Class I Landfill					
Excavation and Loading Cost		t		\$/t	
Disposal Fee		t		\$/t	
Transportation Cost		km		\$/km	
Class II Landfill					
Excavation and Loading Cost		t		\$/t	
Disposal Fee		t		\$/t	
Transportation Cost		km		\$/km	
Class III Landfill					
Excavation and Loading Cost		t		\$/t	
Disposal Fee		t		\$/t	
Transportation Cost		km		\$/km	
Incineration					
Excavation and Loading Cost		t		\$/t	
Disposal Fee		t		\$/t	
Transportation Cost		km		\$/km	
Other Disposal					
Excavation and Loading Cost		t		\$/t	
Disposal Fee		t		\$/t	
Transportation Cost		km		\$/km	
Off-Site Transportation and Disposal Subtotal					
Reclamation					
Decompaction		ha		\$/ha	
Contouring		ha		\$/ha	
Topsoil (stripping, hauling, screening, all soil replacement)		ha		\$/ha	
Revegetation (seeding, monitoring, weed control)		ha		\$/ha	
Reporting (including reclamation certificate application)				\$	
Reclamation Subtotal					

(continued)

FORM 001-B Large Facility Remediation and Reclamation Cost Estimate Report (concluded)

	Quantities	Units	Unit Costs	Units	Costs
Project Management					
Project Management Services		%		\$	
Project Supporting Services		%		\$	
Site Administrative Costs (supervision, safety, taxes, utilities, trailers, etc.)		%		\$	
Project Management Subtotal					
Contingency		%		\$	
Total Remediation and Reclamation Cost					

FORM 001-C On-Site Reclamation and Remediation Details (for waste treatment only; excludes off-site disposal methods)

EUB Licence Number										
Facility Type (<i>Guide 56</i> , Table 5.1)										
LSD Location										
Licence Holder										
Facility Name										
	Process Area (Location)	Affected Volume ¹	Contaminant Types	Media Characteristics	On-Site Treatment Method	Remediation Timeframe	Treatment Cost		Total Operation & Maintenance	
	(general area requiring remediation)		(list main contaminants)	Soil Type, Aquifer Type, Groundwater Depth			Excavation	Treatment System Cost ²		Unit Cost
		m ³ or t				(months)	(\$)	(\$)	(\$)	(\$/m ³)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
¹ Affected volume units should be in m ³ for water treatment and affected mass in tonnes for soil treatment. Apply bulking factor for ex situ treatment, as described in <i>Directive 001</i> , Appendix 2. ² Treatment system costs should include cost to construct and/or implement treatment system, as well as sampling and analytical costs.										

FORM 001-D Facility Summary

The purpose of this form is to provide summary information on the facility. This information will be used internally by the EUB as part of the process to track liabilities and conduct audits. Complete supporting documentation for information contained in the form and the attachments must be made available to the EUB upon request.

Information must be updated when significant changes occur. Full information must be available prior to the transfer of a property, when a facility is shut down, or upon request by the EUB.

General Information

Licensee
 Plant Location
 EUB Licence #
 Plant Name
 Initial Construction Year
 Describe Major Expansion(s) and Year(s) Complete Attachment 1
 Does licensee own land?

Maximum * Design Capacities

Raw Gas Inlet (10³ m³/d)
 Sulphur Inlet (t/d)
 NGL Products
 Ethane (m³/d)
 Propane (m³/d)
 Butane (m³/d)
 NGL (m³/d)
 or NGL Mix
 C5+ design (m³/d)
 Other Sales Products (specify)
 Oil Feedstock (m³/d)
 Bitumen Inlet (m³/d)
 Diluent Inlet (m³/d)
 Sand Production (t/d)

Waste Products

Has a hazardous materials survey been conducted for the following? If yes, complete attachment 2. If no, explain why. Complete Attachment 2
 Asbestos
 Mercury
 PCBs
 Naturally Occurring Radioactive Materials (NORM)
 List of Amines Used Over Life of Plant (MEA, MDEA, DEA, Sulfolane, DIPA, Sulfinol, other (specify)
 List of Glycols Used Over Life of Plant

Equipment

Liquid Recovery Type (Refrig, Lean Oil, JT, Turbo Expander)
 Number of Pressure Vessels (any with an ABSA A#)
 List of Tanks, Including Content and Volume Complete Attachment 3
 List of Sumps (total volume m³) Complete Attachment 4
 Number of Engines over 75 kW
 Total Compression (in kW)
 Electrical kW
 Gas Driven kW
 Plant Air Photo (most detailed scale available), Major Equipment List and Plot Plan Complete Attachment 5

(continued)

Pits and Ponds (active, inactive, historical and buried)

All Pits/Ponds (attach description for each pond—volume, age, liner type, contents and associated GW issues and whether remediation is complete)	Complete	<i>Attachment 6</i>
Number of Sanitary Sewage Lagoons (total containment volume m ³)		_____
EUB approval number for any oilfield waste landfills on site. Are there any landfills, closed or open/active on site? If yes, complete Attachment 7.	Complete	<i>Attachment 7</i>

Sulphur Processing and Storage

Sulphur forming on site? Type of sulphur recovery process?		
Describe all sulphur forming methods and capacity present (prill, slate, rotoform, other)	Complete	<i>Attachment 8</i>
Area of unlined sulphur base pad that has had block and has not been reclaimed (m ²)		_____
Assumed depth of sulphur impact (m)		_____
Area of lined sulphur base pad that has had block and has not been reclaimed (m ²)		_____
Type of liner on sulphur pad		_____
Type of liner on sulphur block runoff ditch		_____
Contaminated (off-spec) sulphur inventory (t)		_____

Environmental

Describe any high-volume waste production (e.g., kg/d of produced sand, lime sludge, produced water) and method and location of disposal	Complete	<i>Attachment 9</i>
Describe all off-site impacts from the operation of the facility, including those currently outstanding, undergoing treatment, or where remediation and/or reclamation is completed (e.g., sulphur dusting, groundwater plume, spills)	Complete	<i>Attachment 10</i>
Describe all on-site completed and ongoing remediation projects (soil, surface water, and groundwater)	Complete	<i>Attachment 11</i>
Provide a geology overview, including overburden	Complete	<i>Attachment 12</i>
Provide a hydrogeology overview for each groundwater-bearing zone	Complete	<i>Attachment 13</i>
Depth to domestic use aquifer (as applicable)		_____
Number of residents within 1 km from plant		_____
Number of water wells within 1 km radius		_____
Describe water body(s), including cattle dugouts, within 300 m	Complete	<i>Attachment 14</i>
Total disturbed area, including roads (hectares)		_____
Assumed exposure pathways used for cleanup and rationale for choice (optional)	Complete	<i>Attachment 15</i>
Are there any risk-based closure strategies employed in the facility suspension, abandonment, remediation, and reclamation estimate?	Complete	<i>Attachment 16</i>

FORM 001-D Attachments

Attachment 1 Describe major expansion(s), year(s), including capacity addition and purpose of expansion											
	Description of expansion										Year
Attachment 2 Description of any areas containing hazardous materials											
	Material			Location (indicate on separate plot plan)							Quantity (t)
Attachment 3 List of tanks, including content and volume											
	Tank ref. no./ name	Tank content	UST or AST	Tank capacity (m ³)	Secondary containment	Details of failures on leak test	Period of active service	Year of construction	Double-walled? (Y/N)	Alarms on 2-hour facilities or high-level shutdowns	Meets <i>Guide 55</i> for new tanks
Attachment 4 List of sumps (total volume m ³)											
	Sump ref. no./name	Sump content		Material of construction		Sump volume (m ³)		Liner type	Period of active service	Year of construction	Where does the sump drain to?
Attachment 5 Air photo interpretation (include pit and pond details), equipment list, and plot plan											
	Year	Comments									

Attachment 6 All pits/ponds—attach description for each pond: volume (estimate where not available), age, liner type, contents, associated GW issues, and whether remediation is complete											
	Pond ref. no./ name	Pond description/contents	Material of construction	Pond volume (m ³)	Liner(s) material	Period of active service	Year of construction	Surface area of pond	Aerial extent and type of GW Issues (m ²)	Volume and type of contaminated soil (m ³)	Current status (active, inactive, or decommissioned)
Attachment 7 For each landfill (open or closed): age, liner, capacity, contents, and description of any groundwater issues											
	Landfill ref. no./name	Landfill description/contents	Material of construction	Type of material and landfill volume (m ³)	Liner(s) material	Period of active service	Year of construction	Aerial extent and type of groundwater Issues (m ²)	Volume and type of contaminated soil (m ³)	Current status (active, inactive, or decommissioned)	
Attachment 8 Describe all forming methods and capacity present (prill, slate, rotoform, other)											
	Type of sulphur forming (prill, slate, rotoform, other [specify])				Forming design capacity (t/d)				Years of service		
Attachment 9 Describe any high-volume waste production (kg/d) and method and location of disposal (e.g., lime sludge)											
	Description of waste and source	Waste volume (kg/d)	Method of disposal	Waste receiver(s) and location(s)	Spill description (source and type of material)	Volume (m ³)	Date of spill				

Attachment 10 Describe all outstanding and former off-site impacts from the operation of the facility								
	Type of impact and furthest distance from lease (m)	Aerial extent, estimated volume of affected soil, and characterization of GW issues	Remediation method (contaminant type and treatment)	Volume and type of contaminated soil (m ³)	Treatment initiation (date)	Years to complete	Remediation method used	Remediation completion date
Attachment 11 Describe all completed and ongoing remediation projects								
	Remediation Project Area or description	Aerial extent, estimated volume of affected soil, and characterization of GW issues	Remediation method (contaminant type and treatment)	Volume and type of contaminated soil (m ³)	Treatment initiation (date)	Years to complete	Remediation method used	Remediation completion date
Attachment 12 Provide a geology overview, including overburden, and assess contaminant migration								
Attachment 13 Provide a hydrogeology overview and assess contaminant migration for each zone								
	Zone depth from surface (m)	Flow direction	Flow velocity (m/yr)	Hydraulic conductivity (m/s)	Hydraulic gradient (m/m)	Texture of aquifer (fine/medium/coarse)	Containment concentrations	Aerial extent of contamination

Attachment 14	Describe water bodies within 300 m							
	Name and description of water body	Distance to lease boundary (m)						
Attachment 15	Describe assumed exposure pathways used for cleanup and rationale for choice							
Attachment 16	Provide basis (technical data, assumptions, and analysis) for development of site-specific risk-based remediation objectives. If proposed land-use classification after remediation is different from original land use, provide evidence of stakeholder agreement (letters from landowner and/or local municipality)							

FORM 001-E Suspension and Abandonment Acknowledgement Statement for Large Facility Liability Assessments

A liability assessment was prepared for (INSERT LICENSEE) for the (INSERT FACILITY NAME) facility located at (LSD) on (INSERT ASSESSMENT DATE). This declaration states that the assessment was executed in accordance with the following requirements:

Suspension and Abandonment

The estimate of suspension and abandonment cost was based upon a site-specific evaluation of suspension and abandonment needs and completed according to standard engineering practice.

Qualifications of Personnel

The liability assessment was conducted only by appropriately trained and experienced personnel. Where specialized expertise was required, professionals in good standing with their respective accrediting bodies reviewed and certified that work within their scope of practice.

Factors Affecting Scope and Accuracy

In a separate section, the liability assessment report documents the conditions and data deficiencies that materially affect the scope or accuracy of the cost estimates provided. Discrepancies with the specified protocol were noted and, where applicable, a contingency budget was provided to ensure sufficient funds to address potentially significant liabilities that were not adequately evaluated.

Basis for Cost

The cost estimates provided are undiscounted current costs that include all tasks required to complete suspension and abandonment as specified by EUB *Directive 001*.

Closure Statement

As the Lead Assessor, I certify that I am a member in good standing of the professional association indicated below and conducted this work according to applicable codes of ethics and standards of professional practice and as declared above.

Signature of Lead Assessor

Name (please print)

Professional Association
(stamp where applicable)

Date

**FORM 001-F Reclamation and Remediation Acknowledgement Statement for
Large Facility Liability Assessments**

A liability assessment was prepared for (INSERT LICENSEE) for the (INSERT FACILITY NAME) facility located at (LSD) on (INSERT ASSESSMENT DATE). This declaration states that the assessment was executed in accordance with the following requirements:

Phase I Environmental Site Assessment

- The initial environmental site assessment used for the liability assessment meets or exceeds the requirements specified in Alberta Environment (AENV) publication *T/573: Phase 1 Environmental Site Assessment Guideline for Upstream Oil and Gas Sites* (as amended), as well as the supplemental requirements specified in EUB *Directive 001*.

Phase II Environmental Site Assessment

- The subsequent intrusive site assessment(s) used for the liability assessment has (have) sufficiently evaluated all of the issues identified in the initial site assessment in a manner that meets or exceeds *Canadian Standards Association (CSA) Standard Z769-00: Phase II Environmental Site Assessment* (as amended), as well as the supplemental requirements specified in EUB *Directive 001*.

Remediation

- The remediation cost estimate is based on an appropriate remediation plan as specified in *Directive 001*. The remediation techniques used in this liability assessment have been proven to be effective in Alberta conditions and are expected to restore all surface and subsurface affected materials to current Alberta Environment reclamation certification standards.

Reclamation

- The reclamation cost estimate was based upon a site-specific assessment of outstanding surface or land reclamation tasks that will be required to apply for a reclamation certificate.

Qualifications of Personnel

The liability assessment was conducted only by appropriately trained and experienced personnel. Where specialized expertise was required, professionals in good standing with their respective accrediting bodies reviewed and certified that work within their scope of practice.

Factors Affecting Scope and Accuracy

In a separate section, the liability assessment report documents the conditions and data deficiencies that materially affect the scope or accuracy of the cost estimates provided. Discrepancies with the specified protocol were noted and, where applicable, a contingency budget was provided to ensure sufficient funds to address potentially significant liabilities that were not adequately evaluated.

Basis for Cost Estimates

The cost estimates provided are undiscounted current costs that include all tasks required to complete remediation and reclamation as specified by EUB *Directive 001*.

Use of the Report

The liability assessment was prepared for the use of (INSERT LICENSEE NAME), the Alberta Energy and Utilities Board, Alberta Environment, and Sustainable Resource Development.

Closure Statement

As the Lead Assessor, I certify that I am a member in good standing of the professional association indicated below and conducted this work according to applicable codes of ethics and standards of professional practice and as declared above.

Signature of Lead Assessor

Name (please print)

Professional Association
(stamp where applicable)

Date