FORM	001-A	Suspension and	Abandonment	Cost	Estimate Report

ERCB Licence Number					
Facility Type ( <i>Directive 056,</i> Table 5.1)					
LSD Location					
Licence Holder					
Facility Name					
	1		Unit		Costs
Demolition Costs Description	Quantities	Units	Costs	Units	(\$)
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			1	1	1
Disposal Fee	_	t		\$/t	
Transportation and Loading Cost		km		\$/km	
Class II Landfill					1
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
Class III Landfill				1	1
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
NORM Disposal			1	1	1
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
AENV Licensed Incineration			1		
Disposal Fee		t		\$/t	
Transportation and Loading Cost		km		\$/km	
Liquids Disposal (from Facility Suspension)		-			
Disposal Fee		m <sup>3</sup>		\$/m <sup>3</sup>	
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)

			Unit		
Project Management	Quantities	Units	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					

Note that there should be material balance between demolition and transportation/disposal, exclusive of disposal of materials associated with suspension (catalyst, chemicals, sludges, etc.).

ERCB Licence Number					
Facility Type ( <i>Guide 56</i> , Table 5.1)					
LSD Location					
Licence Holder					
Facility Name					
	Quantities	Units	Unit Costs	Units	Costs (\$)
On-Site Remediation					
In Situ Soil Remediation		m³		\$/m <sup>3</sup>	
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)		m³		\$/m <sup>3</sup>	
Surface Water		m <sup>3</sup>		\$/m <sup>3</sup>	
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			1		
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	
			1	<b>*</b> /	
Excavation and Loading Cost		t		\$/t	
Disposal Fee		t		\$/t	
		кт		\$/KM	
Other Disposal		4		¢ /4	
Excavation and Loading Cost		t		\$/t © /+	
Disposal Fee		ا لا		۵/۱ ¢/۲۳	
Off-Site Transportation and Disposal Subtotal		KIII		φ/KIII	
Reclamation		ha		¢/h e	
Contauring		ha		\$/na	
Contourning	+	ha		⊅/na ¢/bo	
Poweretation (conding monitoring wood control		ha		ው//18 ድ/৮০	
Revegetation (seeding, monitoring, weed control		na		⊅/na ¢	
Reporting (including reclamation certificate application)				Φ	

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

(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)

ERC	B Licence Number										
Faci	lity Type ( <i>Guide 56</i> , T	able 5.1)									
LSD	Location										
Lice	nce Holder										
Facil	Facility Name										
	Process Area (Location)	Affected Volume <sup>1</sup>	Contaminant Types	Media Characteristics	On-Site Treatment Method	Remediation Timeframe	Treatr	Treatment Cost		Total Operation & Maintenance	
	(general area requiring remediation)		(list main contaminants)	Soil Type, Aquifer Type, Groundwater Depth			Excavation	Treatment System Cost <sup>2</sup>		Unit Cost	
		m <sup>3</sup> or t				(months)	(\$)	(\$)	(\$)	(\$/m <sup>3</sup> )	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
12											
12											
13											
15											
16											
17											
18											
19											
20											
1 J	Affected volume units s	hould be in m <sup>3</sup> f	or water treatment and	d affected mass in tonnes for soi	il treatment. Appl	y bulking factor for	ex situ treatme	nt, as described in L	Directive 001, P	ppendix 2.	
2	Freatment system costs	s should include	cost to construct and/	or implement treatment system,	as well as samp	ling 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 ERCB 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 ERCB 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 ERCB.

General Information		
Licensee		
Plant Location		
ERGB Licence #		
Plant Name		
Initial Construction Year	Complete	
Describe Major Expansion(s) and Year(s)	Complete	Attachment 1
Does licensee own land?		
Maximum * Design Capacities		
Raw Gas Inlet (10 <sup>3</sup> m <sup>3</sup> /d)		
Sulphur Inlet (t/d)		
NGL Products		
Ethane (m <sup>3</sup> /d)		
Propane (m <sup>3</sup> /d)		
Butane (m <sup>3</sup> /d)		
NGL (m <sup>3</sup> /d)		
or NGL Mix		
C5+ design (m <sup>3</sup> /d)		
Other Sales Products (specify)		
Oil Feedstock $(m^3/d)$		
Bitumen Inlet (m <sup>3</sup> /d)		
Diluent Inlet $(m^3/d)$		
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, IT, Turbo Expander)		
Number of Pressure Vessels (any with an ABSA A#)		
List of Tanke, Including Content and Volume	Complete	Attachmont 2
List of Tanks, including Content and Volume	Complete	Attachment 4
Number of Engines over 75 kW	Complete	Allachineni 4
Total Compression (in kW)		
Electrical V/V		
Cas Drivan KW		
Plant Air Photo (most detailed scale available) Major Equipment List and Plot Plan	Complete	Attachment 5
רומות הוויד הטנט (הוטשו טבימובט שטמוב מימוומטוב), ויומוטו בעטוףוויבות בוש מוט דוטו דומו	Complete	
		(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) Number of Sanitary Sewage Lagoons (total containment volume m <sup>3</sup> )	Complete	Attachment 6
ERCB 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	Attachment 7
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	Attachment 8
Area of unlined sulphur base pad that has had block and has not been reclaimed (m <sup>2</sup> )		
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	Attachment 9
Describe all <b>off-site</b> 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	Attachment 10
Describe all <b>on-site</b> completed and ongoing remediation projects (soil, surface water, and groundwater)	Complete	Attachment 11
Provide a geology overview, including overburden	Complete	Attachment 12
Provide a hydrogeology overview for each groundwater-bearing zone	Complete	Attachment 13
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	Attachment 14
Total disturbed area, including roads (hectares)		
Assumed exposure pathways used for cleanup and rationale for choice (optional)	Complete	Attachment 15
Are there any risk-based closure strategies employed in the facility suspension,	Complete	Attachment 16

FORM 001-D Attachments												
Attachment 1	Describe major Description of	<u>expansion(s), ye</u>	ear(s), including	capacity addition	and purpose of	expansion						Year
	Decemption											
Attachment 2	Description of a	any areas contair	ning hazardous i	materials								1
!	Material			Location (indic	ate on separate j	plot plan)						Quantity (t)
Attachment 3	List of tanks, ir	actuding content	and volume									
Attaonment				Τ		Details of						Meets Guide
!	Tank ref. no./	!		Tank	Secondary	failures on	Period of	Year of	Double-	Alarms on 2-ho	55 for new	
ļ!	name	Tank content	UST or AST	capacity (m <sup>3</sup> )	containment	leak test	active service	construction	walled? (Y/N)	level shutdown	tanks	
!		!	<b> </b>							ļ		
!												
!			<u> </u>									
Attachment 4	List of sumps (	total volume m <sup>3</sup> )		-		_		-	-	1		
	Sump ref.								Period of	Year of		
!	no./name	Sump content		Material of con	struction	Sump volume (	(m³)	Liner type	active service	construction	Where does the sump	drain to?
										1		
Attachment 5	Air photo inter	pretation (include	e pit and pond d	etails), equipmen	t list, and plot pl	an						
	Year	Comments	•	<i>i</i>								
	Tour											

Attachment 6	All pits/ponds-	-attach descripti	on for each pond	I: volume (estima	ate where not ava	ailable), age, line	er type, contents,	associated GW is	ssues, and whet	her remediation	is complete	
	Pond ref. no./ name	Pond description	on/contents	Material of construction	Pond volume (m <sup>3</sup> )	Liner(s) material	Period of active service	Year of construction	Surface area of pond	Aerial extent and type of GW Issues (m <sup>2</sup> )	Volume and type of contaminated soil (m <sup>3</sup> )	Current status (active, inactive, or decommis- sioned)
Attachment 7	For each landfi	II (open or close	d): age, liner, cap	acity, contents,	and description	of any groundwa	ter issues	-		•	-	-
	Landfill ref. no./name	Landfill descrip	otion/contents	Material of construction	Type of material and landfill volume (m <sup>3</sup> )	Liner(s) materia	al	Period of active service	Year of construction	Aerial extent and type of groundwater Issues (m <sup>2</sup> )	Volume and type of contaminated soil (m <sup>3</sup> )	Current status (active, inactive, or decommis- sioned)
Attachment 8	Describe all for	ming methods a	nd capacity pres	ent (prill, slate, r	otoform, other)	1					1	
	Type of sulphu	r forming (prill, s	late, rotoform, of	her [specify])		Forming desig	n capacity (t/d)				Years of service	
Attachment 9	Describe any h	igh-volume wast	e production (kg	d) and method a	Ind location of di	sposal (e.g., lime	e sludge)	1				
	Description of waste and Waste source volume (kg/d) Method of disposal			Waste receiver(s) andSpill description (source and type of material)Volume (m³)Date of spill				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 <sup>3</sup> )	Treatment initiation (date)	Years to complete	Remediation method used	Remediation completion date				
Attachment 11	Describe all completed	and ongoing remediatio	on 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 <sup>3</sup> )	Treatment initiation (date)	Years to complete	Remediation method used	Remediation completion date				
Attachment 12	Provide a geology over	view, including overbure	den, and assess contam	inant migration								
Attachment 13	Provide a hydrogeolog	y overview and assess c	contaminant migration fo	r 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	It 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 (technic different from original	al data, assumptions, ar land use, provide evider	nd analysis) for develop nce of stakeholder agree	ment of site-specific ris ement (letters from land	k-based remediation obj owner and/or local mun	ectives. If proposed lan icipality)	d-use classification afte	r remediation is			

## 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 ERCB *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 Environment and Sustainable Resource Development (ESRD) 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 ERCB *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 ERCB *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 ERCB *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