

10.0 SCHEDULE TWO - Phase 1 Environmental Site Assessment

☐ Phase 1 ESA not required and NOT submitted with this application

As of June 1, 2011 all Phase 1 ESA information must be entered on the Schedule Two form.
Please check off the appropriate boxes indicating which documents are attached.

- ☒ List of available aerial photographs from Air Photo Distribution
- ☒ Aerial or satellite photographs
- ☒ Site Visit Photos
- ☒ Construction and Operation Sketches
- ☒ AER Professional Declaration Form* – This must be signed for work completed after January 1, 2008.

* This form must be signed for work completed after January 1, 2008. The AER will refuse any reclamation certificate applications that do not strictly adhere ESRD's professional declaration requirements, outlined in Fact Sheet (R&R/10-01).

10.0 PHASE 1 ENVIRONMENTAL SITE ASSESSMENT

10.1 Previously Refused Applications and Cancelled Certificates

Has this site been previously refused or certified and the certificate cancelled?	No
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10.2 Drilling Information

Add	Well name or UWI	Spud Date:	Final Drill Date:	Well Depth: (metres)
Delete	MNK PCOUPÉ 15-3-81-12	05-Jan-2005	13-Jan-2005	1,670

10.2.1 Re-entry of a Well or Site Re-drilled

Is this site a re-entry?	No
Is the site re-drilled?	No

10.2.2 Drilling Waste Disposal Information

Add Mud	Drilling Mud Type	Volume (m ³)	Disposal Method
Delete	Gel chemical	Unknown	Assumed mix-bury-cover
Add Row	Sump Type	Sump location, if remote	Disposal Location(s)
Delete	On-Lease		Assumed onsite

Drilling Waste Compliance Option(s) used and attached to Schedule 3.

- ☐ Option 1
☒ Option 2
☐ Option 3

Has this site been used for drilling waste disposal more than once?	No
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Provide details and location(s):

10.3 Production, Storage, and Environmental Information

10.3.1 Current and/or Historical Information

Describe all historical and/or current infrastructure associated with the location (For example: tanks, pipeline, process skids, access roads etc.)

Access road, production facilities, pipeline

10.3.2 Flare Pits

Were there any associated flare pits during drilling or production?	No
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10.3.3 Storage Tanks

Were there any storage tanks associated with the site?	Unknown
Were any other underground structure, such as pipelines, removed?	No

10.3.4 Fluid Disposal

How was fluid at producing wells, disposal wells, and/or battery sites shipped to/from the location?

- ☐ N/A
 ☒ Piped from the site
 ☐ Trucked from the site
☐ Piped to the site
 ☐ Trucked to the site
 ☐ Disposed of on site

10.3.5 Other Facilities or Infrastructure

Describe any other waste storage, handling, chemical storage, buried pits, landfills, etc
None known

10.3.6 Spills and Releases

Have there been any Spills/Releases/Complaints associated with the site? No

10.3.7 Previous Environmental Site Assessments

List any previous ESA's conducted? ☒ None or unknown

10.4 Phase 1 Environmental Site Assessment Site Visit

Date:		Assessor(s)	No site visit was conducted as part of this assessment.	
Surrounding land use	N:	S:	E:	W:
Topography:				
Vegetation:				
Provide the proximity of receptors to the site. Fill in distances (m) for all that are within 300 metres of the site boundary.				
Residence:	Water well:	Surface waterbody (e.g., dugout, stream river):		
Were equipment or tanks present, or were there visual signs of former facilities?				No
What was observed?				
Were there visual signs of open or potentially buried earthen pits?				No
What was observed?				
Was there evidence of past spills (include cumulative releases, well centre impacts, salt tolerant vegetation, etc.)?				No
What was observed?				
Was any adjacent land affected by operations on the site?				No
What was observed?				
Was any vegetation stress apparent?				No
Details (location, evidence):				
Does the site visit information conflict with specific file or the imagery review Information?				No
If YES, explain				

Wellsite Reclamation Certificate Application Form
2010 Reclamation Criteria for Wellsites and Associated Facilities

Add	Photo Id:	Year	Scale:	Evidence of former infrastructure or areas of potential concern
10.5 Aerial and Satellite Imagery Review				
Aerial or satellite photographs of the site are required. Scales such as 1:5000 or 1:7500 should be used to show detail.				
Producing wells and batteries: one pre-disturbance; one post-disturbance; one photograph for every 2 to 3 year interval while the site was active.				
Dry and abandoned wells: one photograph of the active site, if available, is required. If active site photographs are not available, photographs of the pre and post disturbance are required.				
Sites with above ground facilities and/or spills: photos of the site before, during (if available), and after the spill cleanup or facility removal are required				
Review Date: 19-May-2018			Reviewed by: Darrys Carol	
Add	Photo Id:	Year	Scale:	Evidence of former infrastructure or areas of potential concern
Delete	TRSG0208-446	2002	1:1,900	This is a pre-construction photo. The location is within a field, bordered on the east by a strip of bush. There are no signs of contamination concerns or existing infrastructure.
Delete	AbaData Aerial	Unknown	1:1,900	The lease is accessed from the north. Details are obscure but a teardrop is visible with facilities present, possibly a production shack and methanol tank. There appears to be a flare stack in the southeast quadrant. No contamination concerns are evident.

10.6 Interviews - Phase 1 Environmental Site Assessment			
<i>Provide details of Interviewee's Comments. Request information on previous complaints, former facilities, presence and details of spills, pits, waste storage/handling, and vegetation control, etc</i>			
Private Land: Have you performed a site visit in the presence of the landowner/occupant?			
Public Land: Have you performed a site visit in the presence of the occupant?			
Date of site visit(s)			
Landowner Interviewed: Hutterian Brethren of Silver Valley		Date 23-May-2018	Interviewed By: Darrys Carol
Attempts were made to contact the landowner; however, accurate contact information could not be found. Birch Hills Colony was also contacted but they had no contact information for this colony either.			
Occupant Interview:		Date	Interviewed By:
Operator Interview:		Position:	Date Interviewed By:
Additional Notes/Comments/Information The subject well was drilled in 2005 and produced gas from 2005 to 2015. The archival review and drilling waste disposal assessment uncovered no environmental concerns. Current site conditions have not been determined as a site visit was not included in the assessment, as per the client's request. Based on the information reviewed to date, the likelihood of contamination at this wellsite is low; no further investigation is recommended.			

10.7 Conclusions and Recommendations

10.7.1 Did the Phase 1 ESA indicate that a Phase 2 ESA is required to evaluate the site for contamination?

☐ Yes ☒ No further investigation required

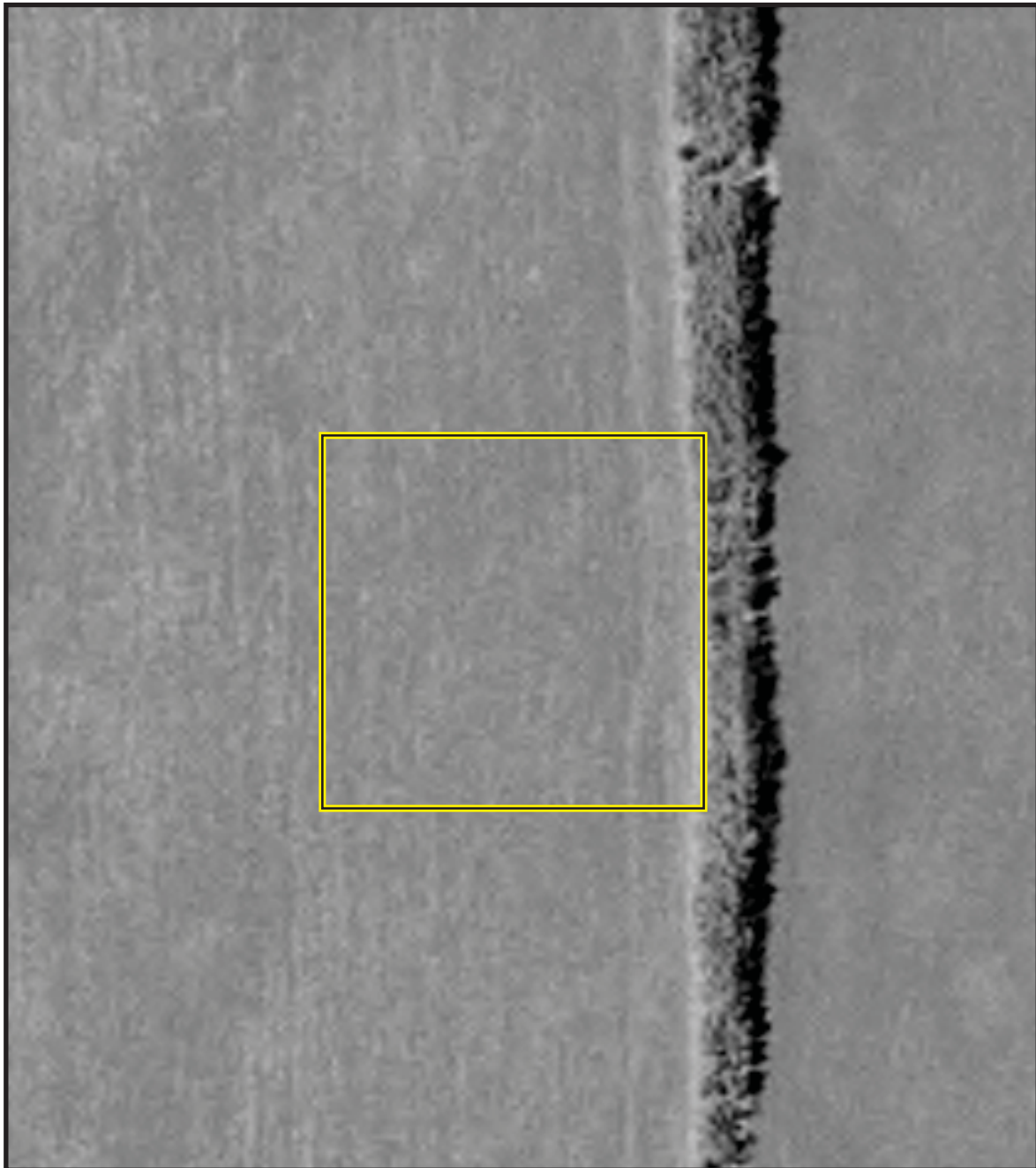
If YES, attach Phase 2 ESA report (see Schedule 4)

APRS Search Results

Legal Description (Sec. Twp. Rge. Meridian): 15 - 3 - 81 - 12 - 6

Project No.	Sub. ID	Coverage (Partial/Complete)	Date	Scale (1:)	Emulsion	Comments
06-082Tr	4	C	2006-00-00	30000	B/W Pan-80	Roll:Trsg-0602; 1,814ppi - photogrammetric
02-120Tr	14	C	2002-10-00	40000	B/W Pan-80	83M,N; Roll:Trsg-0208
01-312	53	C	2001-00-00	30000	B/W Agfa-80	Rolls:AS-5194,5195,5196
98-167Tr 83M	10	C	1998-00-00	60000	B/W	Roll:Trsg-9804
98-167Tr 84D	2	C	1998-00-00	60000	B/W	Roll:Trsg-9804
95-097A	28	C	1995-09-00	40000	B/W Agfa	Rolls: AS-4652,4679,4680
95-158Tr 84D	8	P	1995-05-00	40000	B/W	Roll: Trs-9501
93-183Tr	35	C	1993-04-00	60000	B/W	Roll: FF-93005
92-092	6	C	1992-00-00	40000	B/W Aviphot150	Roll:AS-4298
89-120A	7	C	1989-00-00	30000	B/W 2405	
88-209 83M++	2	C	1988-08-12	40000	B/W Pan-2405	
84-006	16	C	1984-00-00	30000	B/W 2405	
84-102 W6	1	C	1984-00-00	60000	B/W Pan-2405	
F83-009	1	C	1983-09-22	30000	B/W Pan-2405	Roll:AS-2867; into B.C.
E81-253	7	P	1981-10-14	10000	B/W Pan-2405	Roll:AS-2406
80-122	1	C	1980-05-04	60000	B/W PAN-2405	
79-032	15	C	1979-00-00	15000	B/W IR-2424	
79-032 84D	1	P	1979-00-00	15000	B/W IR-2424	
79-032 83M	16	C	1979-00-00	15000	B/W IR-2424	rfi
74-050	1	C	1974-08-04	50000	B/W IR-2424	
71-089	51	C	1971-06-12	31680	B/W Pan-2405	
70-322 83M	15	C	1970-00-00	80000	B/W Pan-2405	Rolls:AS-1111,1112
69-243	6	C	1969-05-07	24000	PAN 2405	Roll:AS-1032
61-83M	15	C	1961-00-00	31680	B/W	Photogrammetric scan- 1,270dpi

51-83M	4	C	1951-00-00	15840	B/W Super XX	Years:1950-1952
49-83M	4	C	1949-00-00	40000	B/W Super XX	Years 49-51; Neg. scans 1270ppi



Scale 1:1,900



SHARP
Environmental ⁽²⁰⁰⁰⁾ LTD.

Manitok Energy Inc.
c/o **Knowledge Energy Inc.**
Aerial Photograph Enlargement
15-03-081-12W6

Date: June 10, 2002

Aerial: TRSG0208-446



Scale 1:1,900

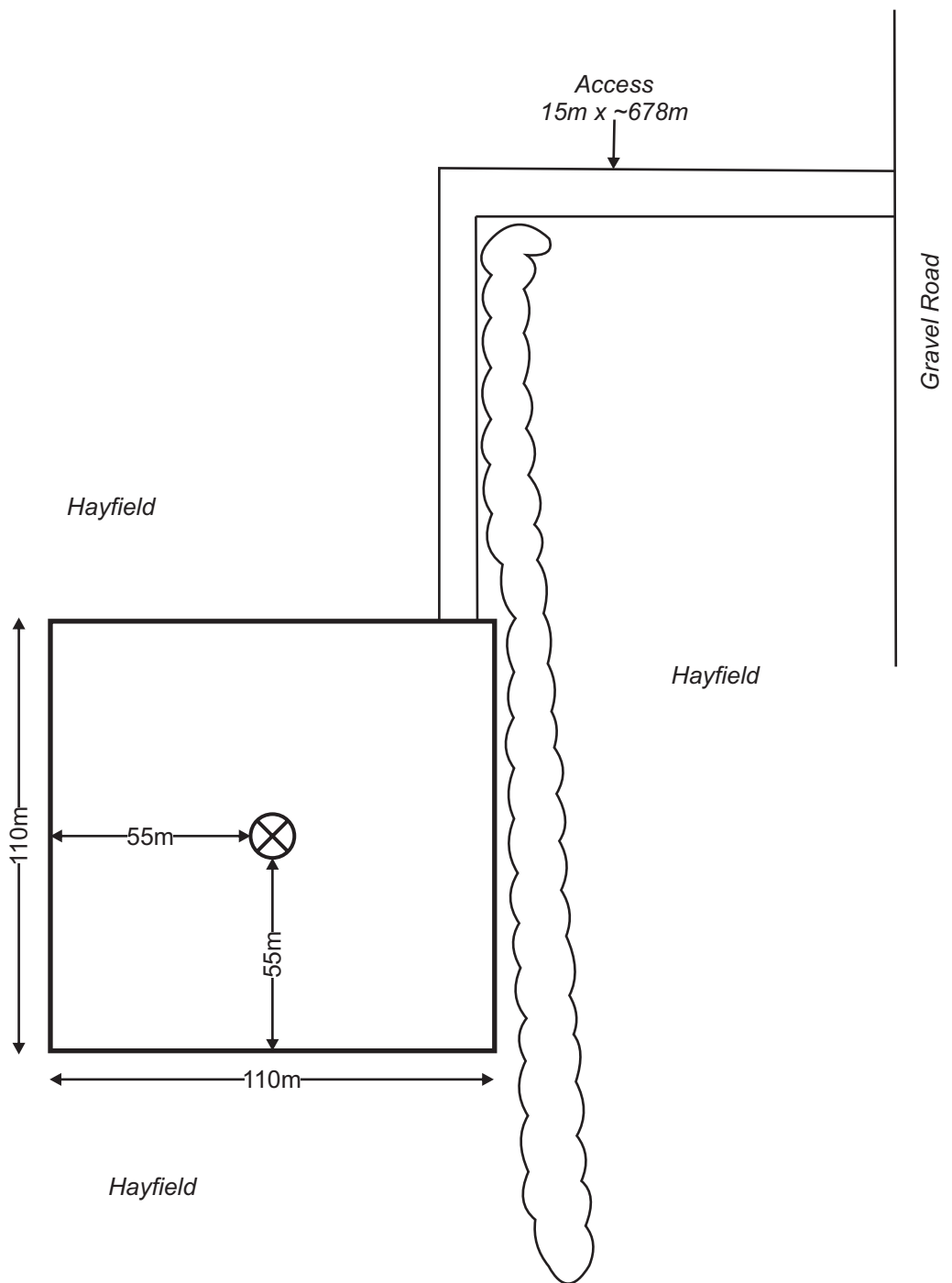


SHARP
Environmental (2000) LTD.

Manitok Energy Inc.
c/o **Knowledge Energy Inc.**
Aerial Photograph Enlargement
15-03-081-12W6

Date: Unknown

Aerial: Abadata



Not To Scale



SHARP
Environmental ⁽²⁰⁰⁰⁾ LTD.

Manitok Energy Inc.
c/o **Knowledge Energy Inc.**
15-03-081-12W6
Construction Sketch
May 14, 2018

Professional Declaration for Reclamation Certificate Applications

Submit one Declaration for each report

- 1 This Declaration is made in conjunction with an application for a reclamation certificate (the "Application") made by
Knowledge Energy Inc. (Applicant)
for the following land(s): 15-03-081-12W6 (insert legal description).
- 2 I am a practicing professional member [Registration/member number] 1405
of the Alberta Institute of Agrologists
which is a regulated professional organization (the "Professional Organization"). I have a minimum of five years verifiable experience in remediation or reclamation relevant to the Competencies Table contained in the Competencies for Remediation and Reclamation Advisory Committee's Recommendations Report (ESRD 2006).
- 3 As a member of the Professional Organization, I have the ability to sign off on work required for reclamation certificate applications as defined by the Alberta Energy Regulator and am authorized by the Applicant to prepare and submit the attached report or document, (the "Professional Report") listed below.
- 4 To the best of my knowledge and the best of my professional ability, recognizing the standard of care expected of a reasonable professional doing this work, it is my professional opinion that all the information contained in the Professional Report is accurate and complete, and contains all the relevant information for the purposes of this Application.
- 5 The results reported in the Professional Report are consistent with all current and applicable Provincial policy, criteria, standards and guidelines for the remediation or reclamation.
- 6 The Professional Report, including all attachments, data and supplemental information, were prepared by me, or under my direct supervision, or was prepared by a third party(ies) and has been reviewed and accepted by me; and was prepared in accordance with an appropriate quality assurance/quality control system that ensured qualified personnel properly gathered and evaluated all the information contained in and underlying the Professional Reports. All the information submitted is, to the best of my knowledge, true, accurate and complete.
- 7 I carry, or my employer: SHARP Environmental (2000) Ltd.
(insert legal name of employer)
carries professional liability insurance (errors and omissions). This insurance will be maintained for the specified liability period, subject to insurance availability.

- 8 I am aware that it is an offence under section 227 of the Environmental Protection and Enhancement Act to provide false, misleading or inaccurate information and that there are significant fines for committing these offences, including the possibility of imprisonment. See below for the relevant sections.

Report Title: Schedule 2 - Phase 1 Environmental Site Assessment

Date: May 23, 2018

Name: Jeff Biegel, P.Ag.

Signature: 

Note: If you wish to sign the form with an electronic signature you are bound with the same force as though you had a fixed signature on paper.

Registration/Member number: 1405

Section 227 of the Environmental Protection and Enhancement Act

Offences s. 227 A person who

- (a) knowingly provides false or misleading information pursuant to a requirement under this Act to provide information,
- (b) provides false or misleading information pursuant to a requirement under this Act to provide information

is guilty of an offence.

Penalties s. 228(1) A person who commits an offence referred to in section 60, 87, 108(1), 109(1) or 227(a), (d), (f) or (h) is liable to

- (a) in the case of an individual, to a fine or not more than \$100 000 or to imprisonment for a period of not more than 2 years or to both fine and imprisonment, or
- (b) in the case of a corporation, to a fine of not more than \$1 000 000.

(2) A person who commits an offence referred to in section 61, 67, 75, 76, 79, 88, 108(2), 109(2) 110(1) or (2), 111, 112, 137, 148, 149, 155, 157, 163, 169, 170, 173, 176, 188, 191, 192, 209, 227(b), (c), (e), (g), or (i) or 251 is liable.

- (a) in the case of an individual, to a fine or not more than \$50 000, or
- (b) in the case of a corporation, to a fine of not more than \$500 000.

11.0 SCHEDULE THREE - Drilling Waste Documentation

Please check off the appropriate boxes indicating which documents are included in this Schedule

- ☐ Not required because well not drilled or application is for other AER facility
- ☐ Guide 50 Notification Form (*Directive 050: Drilling Waste Management*, AER 1996) or form with equivalent information used for reporting under *Guide G-50: Drilling Waste Management* (AER 1993)
- ☒ Assessing Drilling Waste Disposal Areas: Compliance Option Checklist.
- ☒ Assessing Drilling Waste Disposal Areas: Compliance Option Calculations.
- ☒ AER Professional Declaration Form*
- ☐ Other, describe

* This form must be signed for work completed after January 1, 2008. The AER will refuse any reclamation certificate applications that do not strictly adhere to ESRD's professional declaration requirements, outlined in Fact Sheet (R&R/10-01).

Compliance Option 2 Drilling Waste Disposal Assessment Checklist



Compliance Option 2 - Drilling Waste Disposal Assessment Checklist

If any response to the checklist questions leads to a Phase 2 ESA requirement or there is insufficient information to complete the Compliance Option Two Checklist, a Phase 2 ESA must be conducted in accordance with Compliance Option Three.

1. General Disposal and Drilling Fluid Information:

The well licensee should be able to review various sources of information pertaining to the drilling activities on-site. Many information sources, other than the *Notification of Drilling Waste Disposal*, *Drilling Waste Management Disposal Form*, or *Drilling Waste Pipeline Disposal Form* can be reviewed for information relating to the drilling waste disposal and drilling fluid systems. These can include Tour Reports, daily drilling records, well files, and contractor invoices.

1.0	Well Information:	Unique Identifier (UI)	00/15-03-081-12W6
		Spud Date	January 5, 2005 Rig release: Jan. 16, 2005
		Well Depth	1670 metres

1.1 Disposal Method (if known)*: Assumed mix-bury-cover
 * If waste was disposed at an AER or ESRD approved facility, list supporting documentation under Reference Documents.

1.2 Disposal Location (if known)**: Assumed onsite
 ** If checklist indicates that a Phase 2 ESA (Compliance Option Three) is required, it must be undertaken at the disposal location. If the disposal location is unknown, the Phase 2 ESA must be undertaken at the wellsite.

For the purpose of this form: if the disposal method and/or location remains unknown after all available information sources have been checked, the drilling waste disposal location is assumed to be on-site.

	Yes	No
1.3 Were there other drilling waste disposal events on the site (e.g. wellbore re-entry or another well drilled, using fluids containing drilling fluid additives)? If yes, were the disposal areas separate from one another?	<input type="checkbox"/> <input type="checkbox"/> Drilling waste information must be evaluated for each disposal.	<input checked="" type="checkbox"/> <input type="checkbox"/> Drilling waste information must be evaluated by combining the drilling fluid additives and well depths. If drilling waste information is missing or incomplete for one or both wells, a Phase 2 (Compliance Option Three) is required.

	Yes	No
<p>1.4 Was a remote site used?</p> <p>If, Yes, is the remote site included in this reclamation application?</p> <p>If not included, is the remote site a multi-well disposal location?</p>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> In Comments section, indicate which well the remote site will be tied to for the purposes of reclamation	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Single well remote disposal site must be included with reclamation certificate application, unless it already has received a Reclamation Certificate.
<p>1.5 Has the well licensee reviewed the Daily Drilling Records and other available drilling documentation?</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Phase 2 required
<p>1.6 Can it be determined from the available records what type of drilling fluid system was used?</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Phase 2 required
<p>1.7 Were water-based drilling fluids used for all sections (i.e., gel chemical drilling fluid systems)?</p> <p>If No, is there evidence that demonstrates the non-water based wastes were disposed of in a manner consistent with <i>Directive 50</i> (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or <i>Directive 58</i> (i.e., appropriately approved waste management facility)?</p>	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> Phase 2 required
<p>1.8 Is a mud list available?</p> <p>If Yes, can all the additives on the mud list be identified and described?</p> <p>Record the additives and their description (e.g., chrome-free lignosulfonate, aldehyde-based bactericide, etc.) on the attached form.</p>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> Phase 2 required <input type="checkbox"/> Phase 2 required

	Yes	No
<p>2.2 Was the well a horizontal oil well?</p> <p>If Yes, is there evidence that wastes were disposed of in a manner consistent with <i>Directive 50</i> (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or <i>Directive 58</i> (i.e., approved waste management facility)?</p>	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> Phase 2 required
<p>2.3 Was the well drilled using under-balanced techniques?</p> <p>If Yes, is there information/documentation available to demonstrate that the drilling wastes were disposed of in a manner consistent with <i>Directive 50</i> (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or <i>Directive 58</i> (i.e., approved waste management facility)?</p>	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> Phase 2 required
<p>2.4 Was hydrocarbon added to the drilling fluid?</p> <p>If Yes, was the hydrocarbon contaminated drilling waste disposed of in a manner consistent with <i>Directive 50</i> (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or <i>Directive 58</i> (i.e., approved waste management facility)?</p>	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> Phase 2 required

3. Metals (Trace Elements) Management

	Yes	No
<p>3.1 Was the disposal completed before November 1, 2012?</p>	<input checked="" type="checkbox"/> Complete questions 3.2 to 3.5	<input type="checkbox"/> Go to question 3.6
<p>3.2 Was barite added to the drilling fluid?</p> <p>If Yes, did it meet the requirements specified in the attached metal calculation table?</p>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Show calculation on attached form	<input type="checkbox"/> <input type="checkbox"/> Phase 2 required

	Yes	No
<p>3.3 Was zinc carbonate added to the drilling fluid?</p> <p>If Yes, did it meet the requirements specified in the attached metal calculation table?</p>	<input type="checkbox"/> <input type="checkbox"/> Show calculation on attached form	<input checked="" type="checkbox"/> <input type="checkbox"/> Phase 2 required
<p>3.4 Were chrome-based thinners added to the drilling fluid?</p> <p>If Yes, did it meet the requirements specified in the attached metal calculation table?</p>	<input type="checkbox"/> <input type="checkbox"/> Show calculation on attached form	<input checked="" type="checkbox"/> <input type="checkbox"/> Phase 2 required
<p>3.5 Were any other additives used that would have triggered testing for metals under Section 3 or 5 of <i>Directive 50 (1996 version)</i>?</p> <p>If Yes, are waste analytical data and application rates (land treatment, landspreading) or maximum application (mix-bury-cover) available?</p> <p>If above data are available, did the application rate or maximum application meet <i>Directive 50</i> requirements?</p>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> Phase 2 required <input type="checkbox"/> Phase 2 required
<p>3.6 Did metal concentrations in the waste trigger a requirement for post-disposal sampling?</p> <p>If yes, did all post-disposal samples meet the soil metal endpoints specified in Section 3 of <i>Directive 50 (2012 version)</i>?</p>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> Phase 2 required

4. Salinity Management

	Yes	No
4.1 Does the water based drilling waste meet the requirements specified in the attached Salt Calculation Table?	<input checked="" type="checkbox"/> Show calculation on attached form	<input type="checkbox"/> Phase 2 required
4.2 Was a salt zone encountered during drilling? If Yes, is there evidence that demonstrates the drilling wastes were disposed of in a manner consistent with <i>Directive 50</i> (1996 version for disposals before November 1, 2012 or 2012 version for disposals on or after November 1, 2012) or <i>Directive 58</i> (i.e., appropriately approved waste management facility)?	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> Phase 2 required

Mud Additives (Attach additional pages if necessary.)

Product Name	Amount Used (units)	Brief Description of Product
Alcomer	19 sx (15 kg)	Thinner, dispersant
Alkapam	1 sk (25 kg)	Anionic water-soluble polymer - flocculant
Barite	49 sx (40 kg)	Weighting material
Caustic soda	21 sx (22.7 kg)	Sodium hydroxide - alkalinity pH control, calcium reducer
Drilling detergent	4 pails (20 L)	Surfactant
Gel	313 sx (40 kg)	Bentonite - drilling gel, viscosifier
Humalite	22 sx (22.7 kg)	Thinner, dispersant
Hyperdrill	23 sx (25 kg)	Anionic polyacrylamide - flocculant
Lime	1 sk (25 kg)	Calcium hydroxide - pH control
PolyXan	5 sx (25 kg)	Dispersible-grade xanthan gum - viscosifier
Prima Seal	14 sx (40 kg)	Blend of vegetable and polymer fibres - lost circulation material
SAPP	3 sx (22.7 kg)	Sodium acid pyrophosphate - thinner, dispersant
Sawdust	147 sx (11.4 kg)	Lost circulation material
Sodium bicarbonate	10 sx (25 kg)	Calcium remover, pH control
Staflor	18 sx (22.7 kg)	CMC polymer - viscosifier, shale inhibitor
Thin Tex	57 sx (11.34 kg)	Modified lignosulfonate - thinner, dispersant

Reference Documents (List all source documents used in the completion of this checklist. Attach additional pages if necessary. Documents must be supplied to the AER if requested.)

Daily Drilling Reports for 00/15-03-081-12W6
Abacus Datagraphics database
SHARP Environmental (2000) Ltd. Mud Binder
PSAC Historic Mud List

Comments (Please provide any additional comments relevant to the decision process within the checklist. Attach additional pages if necessary.)

Based on the preceding checklist and attached calculations, the waste and its disposal meet current ADWDA (GoA, 2014) criteria. The likelihood of contamination in the disposal area is low; no further investigation of this area is recommended at this time.

Metal Calculations for Compliance Options One and Two

Note: Different default mix ratios are provided depending on whether the well was drilled before or after October 22, 1996. The 1996 version of *Guide 50, Drilling Waste Management*, which was issued by the Energy Resources Conservation Board on this date, increased the minimum mix ratio requirement from 1:1 to 3:1.

Barite:

Directions: Fill in the number of sacks and adjust for sack weight if different than 40 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.22**. If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (40 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre
49	÷	1670	÷	3	=	0.00978

* Sack weight may be adjusted by dividing the number of sacks by 40 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Zinc Carbonate:

Alternative 1:

If waste zinc, mix ratio and waste dry bulk density data are available use the following calculator to estimate post-disposal zinc concentration.

Directions: Enter the total zinc concentration in mg/kg measured in the waste, the Waste Dry Bulk Density in kg/m³, and Mix Ratio in the appropriate cells. The spreadsheet will calculate the post-disposal zinc concentration. This value must be less than or equal to **200 mg/kg**. If the value exceeds this objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Waste Zinc Concentration (mg/kg)		Waste Dry Bulk Density* (kg/m ³)		Mix Ratio**						Post-Disposal Zn Concentration (mg/kg)
	x		÷		÷	1500	+	70	=	#DIV/0!

* Waste Dry Bulk Density = (Waste Specific Gravity – 1) x 1600

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

Alternative 2:

If the above data is not available use the following equation to calculate the number of sacks of zinc carbonate added per meter drilled.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the number of sacks per metre. This value must be less than or equal to **0.00650**. If the value exceeds the objective, a Phase 2 ESA (Compliance Option 3) must be conducted.

Total Number of Sacks (25 kg/sack*)		Well Depth (m)		Mix Ratio**		Sacks per Metre
	÷		÷		=	#DIV/0!

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Enter the number of parts of soil mixed with one part of waste. For example, for a 3:1 mix ratio (3 parts soil to 1 part waste) enter "3". If this value is not known, enter 1 for wells drilled before October 22 1996, or 3 for wells drilled on or after this date.

 = Required Field

Alternative 2

If the volume of drilling waste is not known, use the following calculator to determine the NaOH Equivalent Sacks per metre of well depth. This value must be less than **0.0260** for wells drilled before October 22 1996, or **0.0350** for wells drilled on or after this date. If the value exceeds the target, a Phase 2 ESA (Compliance Option 3) must be conducted.

Directions: Fill in the number of sacks and adjust for sack weight if different than 25 kg. Enter the Well Depth in metres. The spreadsheet will calculate the NaOH Equivalent Sacks per Metre.

Additive	Number of sacks (25 kg/sack*)		NaOH Equivalency Factor		NaOH Equivalent Sacks
Caustic Soda	19.07	X	1.00	=	19.07
Soda Ash		X	0.75	=	0
Sodium Chloride		X	0.68	=	0
Sodium Bicarbonate	10	X	0.95	=	9.5
Sodium Silicate		X	1.37	=	0
Sodium acid pyrophosphate (SAPP)	2.72	X	0.22	=	0.5984
Calcium Chloride		X	0.72	=	0
Calcium Nitrate		X	0.34	=	0
Envirofloc		X	0.41	=	0
Gypsum**		X	0.59	=	0
Lime**	1	X	1.08	=	1.08
** Max = 0.02 x well depth (m)					
Potassium chloride		X	0.54	=	0
Potassium sulphate		X	0.46	=	0
Caustic potash		X	0.71	=	0
Potassium formate		X	0.47	=	0
Potassium silicate		X	0.32	=	0
Potassium nitrate		X	0.40	=	0
Diammonium phosphate		X	0.63	=	0
Ammonium nitrate		X	0.57	=	0
Ammonium sulphate		X	0.61	=	0
Drill Stem Test Returns		X	0.68	=	0
Total NaOH Equivalent Sacks					= 30.2484
Well Depth (m)					÷ 1670
NaOH Equivalent Sacks per Metre					= 0.018112814

* Sack weight may be adjusted by dividing the number of sacks by 25 and multiplying by the actual sack weight in kilograms. This value should be entered as the number of sacks.

** Note: Up to 0.02 sacks of gypsum and lime per metre of well depth should be counted with other salt additives. Because of the limited solubility of gypsum and lime, sacks in excess of this value need not be counted.

 = Required Field

Professional Declaration for Reclamation Certificate Applications

Submit one Declaration for each report

- 1 This Declaration is made in conjunction with an application for a reclamation certificate (the "Application") made by
Knowledge Energy Inc. (Applicant)
for the following land(s): 15-03-081-12W6 (insert legal description).
- 2 I am a practicing professional member [Registration/member number] 1405
of the Alberta Institute of Agrologists
which is a regulated professional organization (the "Professional Organization"). I have a minimum of five years verifiable experience in remediation or reclamation relevant to the Competencies Table contained in the Competencies for Remediation and Reclamation Advisory Committee's Recommendations Report (ESRD 2006).
- 3 As a member of the Professional Organization, I have the ability to sign off on work required for reclamation certificate applications as defined by the Alberta Energy Regulator and am authorized by the Applicant to prepare and submit the attached report or document, (the "Professional Report") listed below.
- 4 To the best of my knowledge and the best of my professional ability, recognizing the standard of care expected of a reasonable professional doing this work, it is my professional opinion that all the information contained in the Professional Report is accurate and complete, and contains all the relevant information for the purposes of this Application.
- 5 The results reported in the Professional Report are consistent with all current and applicable Provincial policy, criteria, standards and guidelines for the remediation or reclamation.
- 6 The Professional Report, including all attachments, data and supplemental information, were prepared by me, or under my direct supervision, or was prepared by a third party(ies) and has been reviewed and accepted by me; and was prepared in accordance with an appropriate quality assurance/quality control system that ensured qualified personnel properly gathered and evaluated all the information contained in and underlying the Professional Reports. All the information submitted is, to the best of my knowledge, true, accurate and complete.
- 7 I carry, or my employer: SHARP Environmental (2000) Ltd.
(insert legal name of employer)
carries professional liability insurance (errors and omissions). This insurance will be maintained for the specified liability period, subject to insurance availability.

- 8 I am aware that it is an offence under section 227 of the Environmental Protection and Enhancement Act to provide false, misleading or inaccurate information and that there are significant fines for committing these offences, including the possibility of imprisonment. See below for the relevant sections.

Report Title: Schedule 3 - Drilling Waste Documentation

Date: May 23, 2018

Name: Jeff Biegel, P.Ag.

Signature: 

Note: If you wish to sign the form with an electronic signature you are bound with the same force as though you had a fixed signature on paper.

Registration/Member number: 1405

Section 227 of the Environmental Protection and Enhancement Act

Offences s. 227 A person who

- (a) knowingly provides false or misleading information pursuant to a requirement under this Act to provide information,
- (b) provides false or misleading information pursuant to a requirement under this Act to provide information

is guilty of an offence.

Penalties s. 228(1) A person who commits an offence referred to in section 60, 87, 108(1), 109(1) or 227(a), (d), (f) or (h) is liable to

- (a) in the case of an individual, to a fine or not more than \$100 000 or to imprisonment for a period of not more than 2 years or to both fine and imprisonment, or
- (b) in the case of a corporation, to a fine of not more than \$1 000 000.

(2) A person who commits an offence referred to in section 61, 67, 75, 76, 79, 88, 108(2), 109(2) 110(1) or (2), 111, 112, 137, 148, 149, 155, 157, 163, 169, 170, 173, 176, 188, 191, 192, 209, 227(b), (c), (e), (g), or (i) or 251 is liable.

- (a) in the case of an individual, to a fine or not more than \$50 000, or
- (b) in the case of a corporation, to a fine of not more than \$500 000.