



*Armstrong Energy, LLC*

September 6, 2016

Conor Williamson  
Alaska Department of Natural Resources  
Division of Oil & Gas  
550 W. 7<sup>th</sup> Avenue, Suite 1100  
Anchorage, Alaska 99501

Re: Armstrong Energy, LLC (Armstrong)  
Horseshoe Exploration Plan of Operation  
North Slope, Alaska

Dear Mr. Williamson:

Attached is our Plan of Operations for the Horseshoe Exploration Project that is part of Armstrong's 2016-2017 Winter Drilling Program. As we discussed this morning, I made some changes to correct some minor issues with the official transmittal on August 29, 2016.

Should you have any questions, you can call me at 907-240-5830 or email me at [bbritch@alaska.net](mailto:bbritch@alaska.net).

Sincerely,

Robert P. Britch, PE  
Senior Advisor



# LEASE PLAN OF OPERATIONS APPLICATION

State of Alaska

Department of Natural Resources, Division of Oil & Gas  
 550 W. 7th Ave, Suite 1100, Anchorage, AK 99501-3563

Phone: 907-269-8800 Fax: 907-269-8943

Permitting Email: [dog.permitting@alaska.gov](mailto:dog.permitting@alaska.gov)



SECTION I: APPLICANT INFORMATION	
<b>1. Applicant:</b>  Name: Armstrong Energy, LLC  Mailing Address: 510 L Street, Suite 310  City: Anchorage  State: Alaska                      Zip Code: 99501  Phone: 907-375-6900              Fax: 907-375-6900  Email: Enter Email.	<b>2. Applicant Contact:</b>  First Name: Robert                      Last Name: Britch  Title: Senior Consultant  <i>Is the Mailing Address the same as Applicant's Mailing Address? If "No", please provide information below:</i> <input checked="" type="checkbox"/> Yes  Mailing Address: Enter Mailing Address.  City: Enter City.                      State: Enter State.                      Zip Code: Enter Zip Code.  Phone: 907-240-5830                      Fax: Enter Fax.  Email: bbritch@alaska.net
SECTION II: THIRD PARTY INFORMATION (Fill out this section only if you are applying for the Applicant)	SECTION III: APPLICATION DATE AND NUMBER (FOR OFFICE USE ONLY)
Third Party Company Name: Enter 3rd Party Company Name.  First Name: Enter First Name.              Last Name: Enter Last Name.  Title: Enter Title.  Mailing Address: Enter Mailing Address.  City: Enter City.  State: Enter State.                      Zip Code: Enter Zip Code.  Phone: Enter Phone.              Fax: Enter Fax.  Email: Enter Email.  Describe the affiliation to the Applicant: Describe your affiliation to the Applicant.	Application Date:          Application Number:
SECTION IV: PROJECT INFORMATION	
<b>1. Project Name:</b>	Horseshoe #1 Well
<b>2. Proposed Start Date:</b>	11/1/2016
<b>3. Project Description:</b>	
Describe what and where:	
a. The project includes drilling a well for oil and gas exploration on an ice pad on the North Slope during the 2016-	

2017 winter drilling season. The drilling pad will be connected to all season gravel roads from the vicinity of the Kuparuk River Unit Pad 2P using a 17.5 mile long ice road to the drilling location. The primary objective of the well is to determine the presence of oil and gas resources on an Armstrong lease.

**SECTION V: LAND STATUS**

**1. State Mineral Estate:**

Are supplemental pages for land status included in Appendix C?  Yes  No

Affected ADL: ADL 392048 Date Effective: 12/1/2012 Date Assigned: 11/1/2015

Oil And Gas Lessee(s): Armstrong Energy, LLC

Surface Ownership: State of Alaska

Do you have, or anticipate having an Access Agreement:  Yes  No

Special Use Lands: None

Jointly Managed Lands: None

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Wellbores	Umiat, T8N, R4E, Sec. 15	70deg 02' 47.5"; 159 deg 07' 14.3" NAD 83 See Figures V.1-1, V.1-2 & V.1-3
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: Varies-see next line Date Effective: Varies Date Assigned: Varies

Oil And Gas Lessee(s): Armstrong Energy, LLC (ADL392054, ADL392055, ADL391505, ADL 391506, ADL391507)

Surface Ownership: State of Alaska

Do you have, or anticipate having an Access Agreement:  Yes  No

Special Use Lands: None

Jointly Managed Lands: No

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Ice road	Umiat, T8N, R4E, Sec. 14, 15, 22, 23, 24	See Figures V.1-1, V.1-4 & V.1-5
Ice road	Umiat, T8N, R6E, Sec. 11, 12, 14, 15, 16, 17, 19, 20, 21	See Figures V.1-1, V.1-4 & V.1-5
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: Varies-see next line Date Effective: Varies Date Assigned: Varies

Oil And Gas Lessee(s): Great Bear Petroleum (ADL391507, ADL 391721)

Surface Ownership: State of Alaska

Do you have, or anticipate having an Access Agreement:  Yes  No

Special Use Lands: None

Jointly Managed Lands: No

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Ice road	Umiat, T8N, R5E, Sec 19, 24, 25, 26, 27, 28, 29, 30	See Figures V.1-1, V.1-4 & V.1-5
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: ADL373112 Date Effective: Varies Date Assigned: Varies

Oil And Gas Lessee(s): Conoco Phillips Alaska, Inc (ADL373112 and Kuparuk River Unit)

Surface Ownership: [Click here to enter text.](#)

Do you have, or anticipate having an Access Agreement:  Yes  No

Special Use Lands: None

Jointly Managed Lands: No

Other Considerations: None

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Ice road	Umiat, T8N, R7E, Sec 7	See Figures V.1-1, V.1-4 & V.1-5
Ice road and staging pad	Umiat, T8N, R7E, Sec 8 & 17	See Figures V.1-1, V.1-4, V.1-5 & V.1-6
Click here to enter text.	Click here to enter text.	Click here to enter text.

Affected ADL: Enter ADL. Date Effective: Enter Date. Date Assigned: Enter Date.

Oil And Gas Lessee(s): Click here to enter text.

Surface Ownership: Click here to enter text.

Do you have, or anticipate having an Access Agreement:  Yes  No

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
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Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

## 2. State of Alaska Surface Lands:

Are supplemental pages for land status included in Appendix C?  Yes  No

Oil And Gas Mineral Estate Owner: Click here to enter text.

Access Authorization(s): Click here to enter text.

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
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Click here to enter text.	Click here to enter text.	Click here to enter text.

Oil And Gas Mineral Estate Owner: Click here to enter text.

Access Authorization(s): Click here to enter text.

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations:

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Click here to enter text.	Click here to enter text.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Click here to enter text.

Oil And Gas Mineral Estate Owner: Conoco Phillips Alaska, Inc.

Access Authorization(s): Pending LNO

Special Use Lands: None

Jointly Managed Lands: No

Other Considerations:

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Click here to enter text.	Click here to enter text.	Click here to enter text.

**3. Private Lands:**

Are supplemental pages for land status included in Appendix C?  Yes  No

Oil And Gas Mineral Estate Owner: Click here to enter text.

Surface Ownership And Access Agreement(s): Click here to enter text.

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
Click here to enter text.	Click here to enter text.	Click here to enter text.
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Click here to enter text.	Click here to enter text.	Click here to enter text.

Oil And Gas Mineral Estate Owner: Click here to enter text.

Surface Ownership And Access Agreement(s): Click here to enter text.

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
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Oil And Gas Mineral Estate Owner: Click here to enter text.

Surface Ownership And Access Agreement(s): Click here to enter text.

Special Use Lands: Click here to enter text.

Jointly Managed Lands: Click here to enter text.

Other Considerations: Click here to enter text.

Project Components	Meridian, Township, Range, And Section(s)	GPS Coordinates
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**SECTION VI: BOND INFORMATION**

Bonded Company: Armstrong Energy, LLC

Type: Certificate of Deposit      Number: 3590753      Amount: \$500,000.00

Bonding Company: First Western Trust Bank

Mailing Address: 1900 16th Street, Suite 1200

City: Denver      State: CO      Zip Code: 80202

Phone: 303-531-8100      Fax: 303-531-8180      Email: myfw.com

**SECTION VII: SEQUENCE AND SCHEDULE OF OPERATIONS**

Project Milestone #	Project Milestone	Proposed Start Date	Proposed End Date
1.	Project planning and design	5/1/2016	8/1/2016
2.	Project permitting	6/1/2016	12/1/2016
3.	Ice road and ice pad construction	11/1/2016	1/1/2017
4.	Mobilization of drilling equipment	1/1/2017	1/15/2017
5.	Drilling operations	1/15/2017	4/15/2017
6.	Demobilization of drilling operations and winter site cleanup	4/15/2017	4/30/2017
7.	Summer site cleanup	7/1/2017	9/1/2017
8.	Enter Milestone.	Enter Date.	Enter Date.
9.	Enter Milestone.	Enter Date.	Enter Date.
10.	Enter Milestone.	Enter Date.	Enter Date.

### SECTION VIII: PROJECTED USE REQUIREMENTS

#### 1. Describe the proposed operations, including the location and design, of **Well Sites**:

The exploration well is planned using the All American Oilfield (AAO) Rig #111 (or equivalent). The oil and gas well will be slightly deviated with a true vertical depth of less than 9,000 ft. The planned well design will be similar to that employed in previous exploration wells and in accordance with a Permit to Drill from the Alaska Oil and Gas Conservation Commission (AOGCC). Nearly all downhole aspects of the well are confidential. All operations will be placed on an ice pad as indicated on Figure V.1-2 and V.1-3; the irregular shape of the pad is based on terrain considerations and avoidance of willows which are food sources for local animal species. The pad area is approximately 4.5 acres.

#### 2. Describe the proposed operations, including the location and design, of **Buildings**:

The drilling operations will include a number of temporary buildings and structures located either on the well site or on a ice construction/staging pad located at the start of the ice road to the site. Buildings and structures on the well pad include a drilling rig, maintenance buildings, connexs, and 60-90 man camp building. All buildings and structures are considered temporary and will be hauled to the drilling location and set up; they will be removed at the completion of the drilling operations. The general well site layout is provided on Figure V.1-2. The construction/staging pad is located at the start of the 17.5 mile, 35 ft wide ice road to the well site pad (see Figure V.1-4 and V.1-5). The staging pad will be roughly 200 by 200 ft in size and will have a self contained 30-40 man camp (see Figure V.1-6).

#### 3. Describe the proposed operations, including the location and design, of **Fuel and Hazardous Substances**:

The drilling and production operations require a number of contingency plans in order to comply with State and Federal regulations. Specific details of the facilities, spill risks and potential impacts are provided in the various plans. The largest spill source will be from a well blowout of up to 5,500 bopd (per the ADEC C-Plan) or from the larger fuel oil tanks and crude oil test tanks (typically 500 bbl or less). Other larger tanks would include the main fuel tanks which will be 238 bbl (10,000 gal) or less. Other oil and chemicals will typically be in drums or other smaller containers. Fuel and chemicals will be placed inside secondary containment having a capacity of 110% of the volume of the largest tank plus the volume of annual precipitation. Fuel transferred in accordance with procedures as outlined in the C-Plan. Drip pans will be placed beneath vehicles and equipment when not in use.

#### 4. Describe the proposed operations, including the location and design, of **Solid Waste Sites**:

Up to 2,000 bbl of water based drilling mud and cuttings per well may be generated from the operations. Waste drilling effluents will be stored onsite in accordance with a temporary storage permit from the ADEC until they are processed/disposed of. Most wastes are expected to be hauled offsite to an approved disposal facility elsewhere on the North Slope. Contractual arrangements are being developed with BP and/or Hilcorp to handle these wastes.

#### 5. Describe the proposed operations, including the location and design, of **Water Supplies**:

The proposed activities will require both potable water for camp uses and other water for road construction and drilling operations. Approximately 5,000 gallons per day of potable water will be needed and it will be supplied from existing water supply operations by the North Slope Borough (NSB). Water hauling and storage equipment/tanks will be approved for potable water. Up to 1,000,000 gallons per day of water (or ice chips) may be required for ice road construction. Once construction has been completed less than 100,000 gallons per day of water would be needed for road maintenance. Up to 20,000 gallons per day of water may be required to support drilling operations. Both the water for ice road and drilling operations will be obtained from local lakes with appropriate Temporary Water Use permits from the ADNR and Habitat permits from the ADF&G. Water sources are indicated on Figure V.1-4.

<b>6. Describe the proposed operations, including the location and design, of Utilities:</b>				
The rig operations will be self contained. Power for rigs and camps will be generated using portable generators located on-site. Gray water and other wastes will be hauled offsite for disposal at the NSB facilities. Communications towers and equipment will be provided by GCI.				
<b>7. Describe the proposed operations, including the location and design, of Material Sites:</b>				
All operations use activities on ice roads and pads. Material sites are not required.				
<b>8. Describe the proposed operations, including the location and design, of Roads:</b>				
Roads are all constructed using ice. Main ice road will be 35 ft wide and spur roads to water supplies will be up to 25 ft wide. The ice road locations are indicated on Figure V.1-4 and V.1-5.				
<b>9. Describe the proposed operations, including the location and design, of Airstrips:</b>				
All personnel and supplies are transported to the via surface transportation. New airstrips have not been constructed for the proposed operations				
<b>10. Describe the proposed operations, including the location and design, of All Other Facilities and Equipment:</b>				
Click here to enter text.				
<b>11. If another permit(s) is required for the above described Projected Use Requirements, provide the following information:</b>				
Agency	Permit Type	Permit Number	Application Status	Projected Use Requirement(s)
AOGCC	Application for Permit to Drill	In preparation	In preparation	VIII-1
Alaska Fire Marshall	Fire Permits for camps	Normally comes with camp	Obtain if necessary	VIII-2
ADEC	Oil Discharge Prevention and Contingency Plan (Exploration)	Pending	Plan in renewal by ADEC	VIII-3
USEPA	Spill Prevention Control and Countermeasures Plan	N/A	N/A	VIII-3
ADEC	Temporary drilling waste storage permit	Pending	Processing	VIII-4
ADNR/DMLW	Temporary Water Use	Lake L9006, Lake M1408 & Lake M1411	Pending Transfer by ADNR/DMLW	VIII-5
ADF&G	Habitat permits for water use from fish lakes	To be determined	Transfer completed	VIII-5
ADNR	Temporary Water Use	Lake L9006, Lake M1408 & Lake M1411	Pending Transfer by ADNR/DMLW	VIII-8
ADNR/DMLW	Land Use Permit-Ice Roads	LAS 28269	Pending Transfer by ADNR/DMLW	VIII-1, VIII-8
ADNR/DMLW	Land Use Permit-Summer Studies for Ice Pads and Roads	LAS 28503	Transfer completed by ADNR/DMLW	VIII-1, VIII-8
ADNR/OHA	Archaeological and Cultural Resource Clearance	N/A	Permit Issued and under way	VIII-1, VIII-8
NSB	Development Permits and Administrative Approvals	In Preparation	Pending Submittal	VIII-1, VIII-5, VIII-8
ADEC	MG-1 Minor Air Quality Permit	In Preparation	Pending Submittal	VIII-1
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).

Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	Enter Projected Use Requirement(s).
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Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	
Enter Agency.	Enter Permit Type.	Enter Permit Number.	Enter Application Status.	

**SECTION IX: REHABILITATION PLAN**

**1. Proposed Level of Infrastructure, Facilities and Equipment Removal:**

The proposed operations are temporary and conducted from ice pads and ice roads which will melt during spring breakup. All spills from the operation are reported as require to federal, state and local agencies. Armstrong will remove all visible structures, materials oil spills and debris from the ice pads and roadways prior to spring breakup in May 2017. A followup survey will be conducted in the late summer or fall to remove all survey stakre, monitoring equipment or other debris from the tundra surface. Additional debris observed during these efforts will be cleaned up or removed. The areas of operation are typically inspected by local and/or state inspectors after cleanup.

**2. Description of Restoration and Rehabilitation Activities for Vegetation, Habitat, Impacted Wildlife, and Other Applicable Resources:**

As part of Armstrongs summer or fall survey all areas of tundra damage will be identified and discussed with the land owner (ADNR) to determine appropriate remediation and restoration activities that will be required.

**SECTION X: OPERATING PROCEDURES DESIGNED TO MINIMIZE ADVERSE EFFECTS**

Describe operating procedures designed to prevent or minimize adverse effects on other natural resources and other uses of the Lease area and adjacent areas including:

**Fish and Wildlife Habitats:** Pad and roads to be constructed of ice and to be used only in winter months. Streams crossed in shallow waters that normally freeze to bottom. Willow habitats avoided.

**Historic and Archeological Sites:** Archaeological and cultural resource surveys conducted in June 2016 and coordinated with both ADNR/OHA and NSB.

**Public Use Areas:** Public use of the area is limited during the winter to possible local subsistence activities. Subsistence representatives will be maintained onsite druing the drilling operation to minimize impacts to subsistence activities.

**Other Uses:** The only other use in the general area will be possible activities by other oil & gas companies or geophysical companies...When identified, Aromstrong will contact those companies to discuss and avoid operational problems with concurrent activities.

**SECTION XI: GLOSSARY OF TERMS**

Term #	Term	Term Definition
1.	ADEC	Alaska Department of Enviornmental Conervation
2.	ADNR	Alaska Department of Natural Resources
3.	bbl	barrels
4.	bopd	Barrels of oil per day
5.	DW	Disposal Well
6.	AOGCC	Alaska Oil & Gas Conservation Commission
7.	DMLW	Division of Mining Land and Water
8.	ADF&G	Alaska Department of Fish & Game
9.	FAA	Federal Aviation Administration
10.	ft	Feet (see Appendix C-1 for additional Terms)

**SECTION XII: CONFIDENTIALITY**

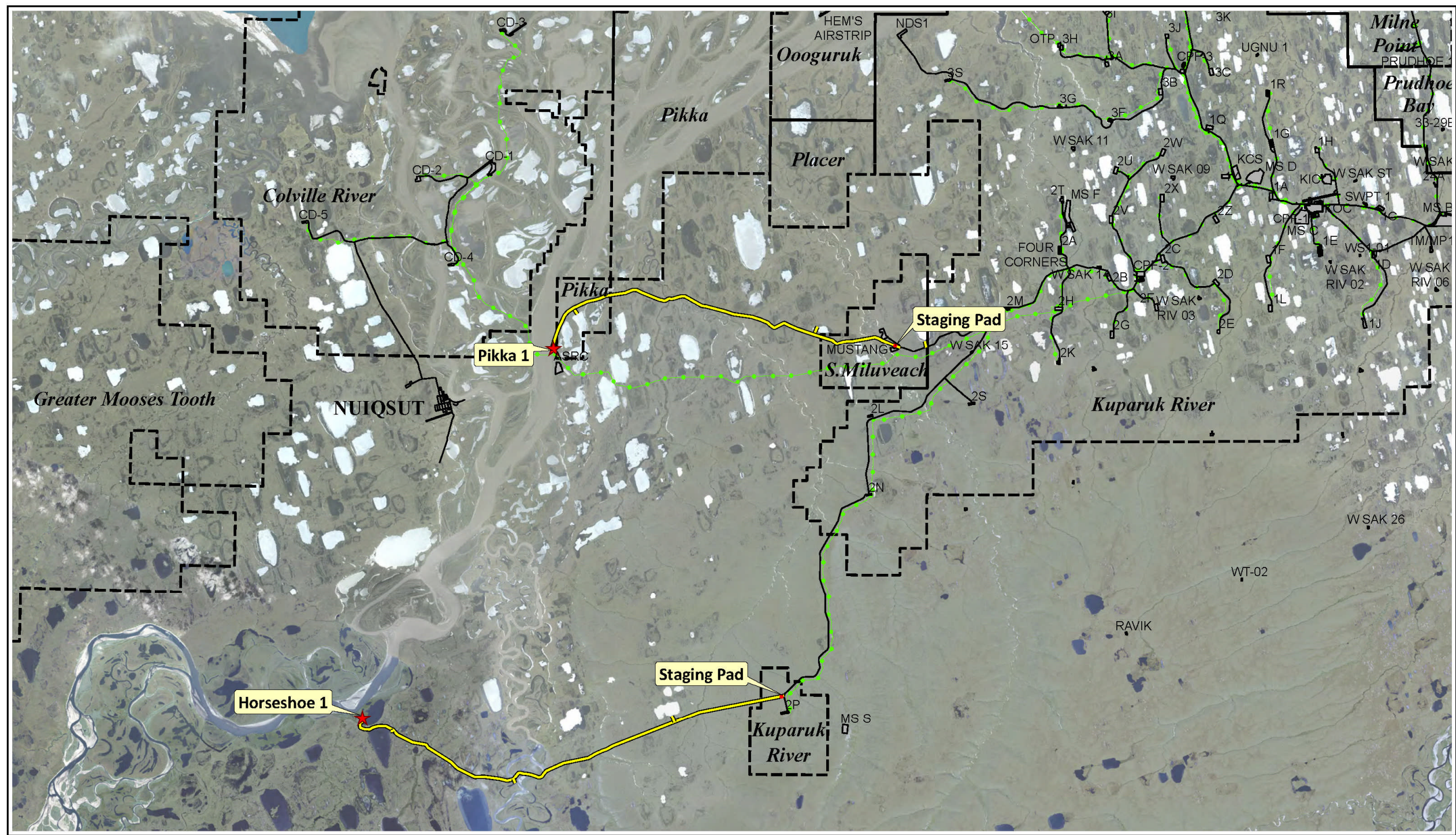
The undersigned hereby requests that each page/section of this application marked confidential be held confidential under AS 38.05.035(a)(8).

**APPLICANT CONTACT:**

Sign here.	Enter Name.	Enter Title.	Enter Date.
_____ Signature	_____ Name	_____ Title	_____ Date



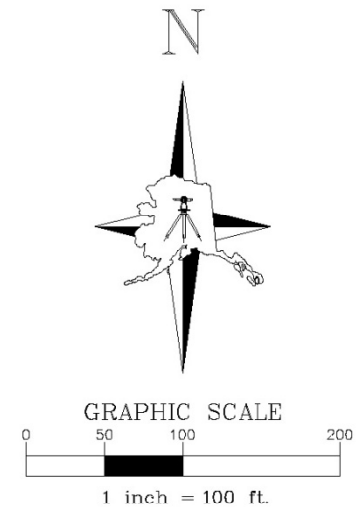
## APPENDIX A. MAPS



	<b>ARMSTRONG ENERGY LLC.</b> 2016-2017 EXPLORATION & APPRAISAL CAMPAIGN			<ul style="list-style-type: none"> <li><span style="color: red;">★</span> PROPOSED 2016-2017 WELLS</li> <li><span style="background-color: red; border: 1px solid black; display: inline-block; width: 15px; height: 10px;"></span> PROPOSED ICE PAD</li> <li><span style="border-bottom: 2px solid yellow; width: 20px; display: inline-block;"></span> AS-STAKED ICE ROAD ROUTE</li> <li><span style="border-bottom: 2px dashed green; width: 20px; display: inline-block;"></span> NS EXISTING PIPELINES</li> <li><span style="border-bottom: 1px solid black; width: 20px; display: inline-block;"></span> NS EXISTING GRAVEL ROADS</li> <li><span style="background-color: gray; border: 1px solid black; width: 15px; height: 10px; display: inline-block;"></span> NS EXISTING FACILITY</li> <li><span style="border: 1px dashed black; width: 15px; height: 10px; display: inline-block;"></span> PRODUCTION UNIT</li> </ul>	<b>Scale:</b> 0 0.5 1 2 Miles 0 1 2 4 Kilometers <small>Coordinate System: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet</small>	
	<b>CAMPAIGN OVERVIEW</b>					
	By: JB	DATE: 8/26/2016	REV: 1.0			

2016-2017\_OS-AS-GEN-M\_campaignOverview

Figure V.1-1. General Area Map

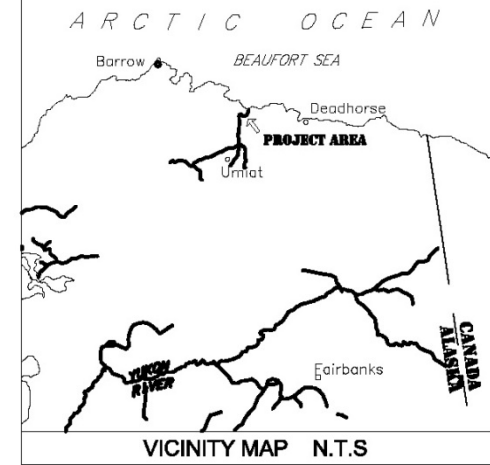
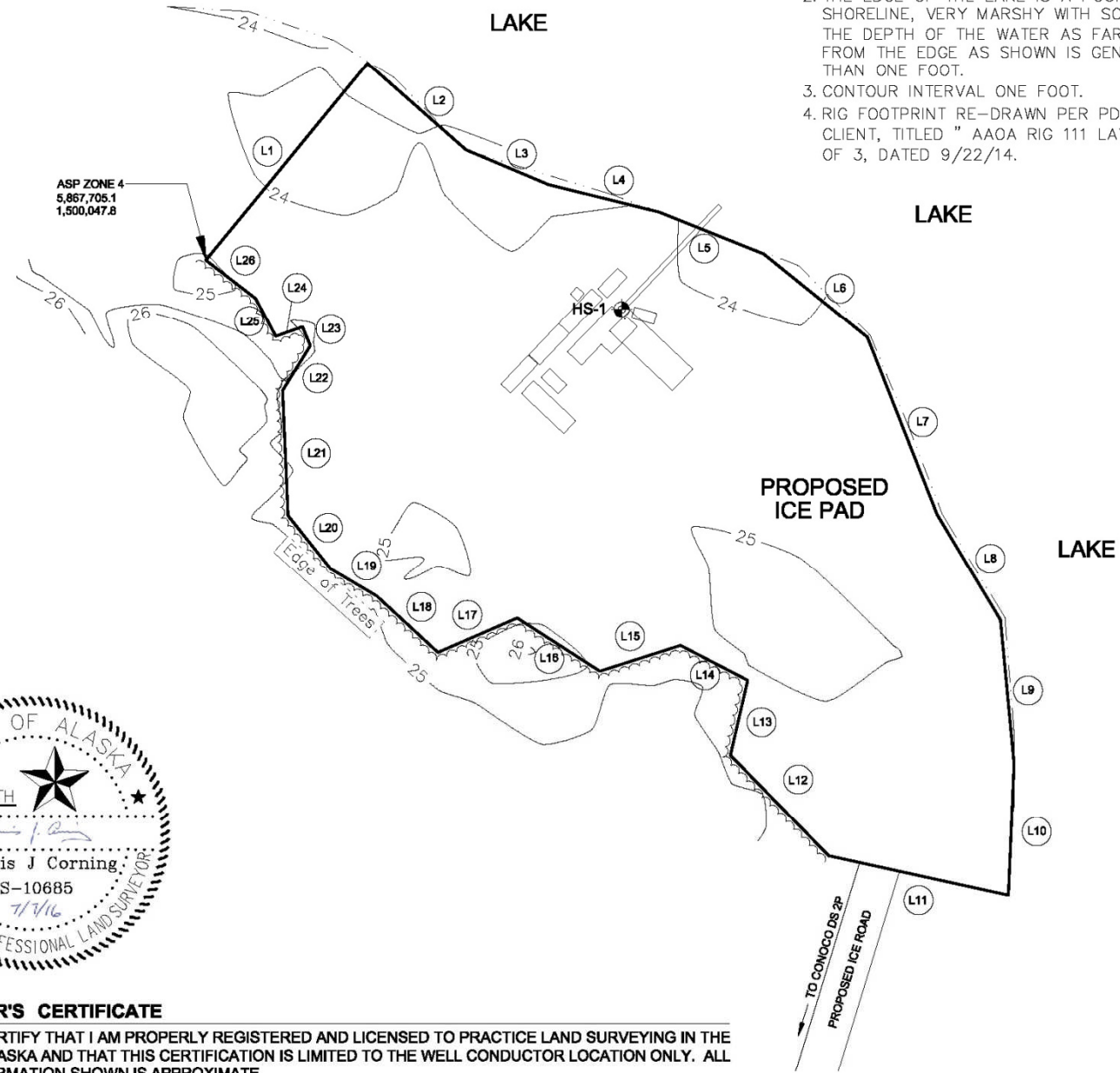


LINE TABLE		
Line #	Direction	Length
L1	N39°22'10"E	187'
L2	S48°36'13"E	96'
L3	S87°10'21"E	86'
L4	S76°08'56"E	84'
L5	S68°09'51"E	82'
L6	S61°04'13"E	98'
L7	S21°25'47"E	140'
L8	S30°52'06"E	91'
L9	S05°25'05"E	108'
L10	S02°24'00"W	97'
L11	N77°38'57"W	138'
L12	N44°01'28"W	104'
L13	N12°58'04"E	56'
L14	N62°24'15"W	56'
L15	S72°08'11"W	62'
L16	N57°10'02"W	72'
L17	S86°33'48"W	63'
L18	N47°12'09"W	61'
L19	N69°17'49"W	39'
L20	N38°31'29"W	50'
L21	N02°31'19"W	92'
L22	N31°45'03"E	38'
L23	N21°51'30"W	15'
L24	S70°33'39"W	21'
L25	N28°01'46"W	32'
L26	N52°13'28"W	46'



**SURVEYOR'S CERTIFICATE**  
 I HEREBY CERTIFY THAT I AM PROPERLY REGISTERED AND LICENSED TO PRACTICE LAND SURVEYING IN THE STATE OF ALASKA AND THAT THIS CERTIFICATION IS LIMITED TO THE WELL CONDUCTOR LOCATION ONLY. ALL OTHER INFORMATION SHOWN IS APPROXIMATE.

- NOTES:**
- ELEVATIONS SHOWN ARE NAVD 88 PER GEOID 2012A DERIVED FROM GPS OBSERVATION.
  - THE EDGE OF THE LAKE IS A POORLY DEFINED SHORELINE, VERY MARSHY WITH SCATTERED GRASS. THE DEPTH OF THE WATER AS FAR AS 20' OUT FROM THE EDGE AS SHOWN IS GENERALLY LESS THAN ONE FOOT.
  - CONTOUR INTERVAL ONE FOOT.
  - RIG FOOTPRINT RE-DRAWN PER PDF RECEIVED FROM CLIENT, TITLED " AAOA RIG 111 LAYOUT", SHEET 2 OF 3, DATED 9/22/14.



**CONDUCTOR AS-STAKED LOCATION**

**NAD83 ASP ZONE 4**  
 LAT=70°02'47.50" N  
 LONG=151°07'14.30" W  
 Y = 5,867,669  
 X = 1,500,353

**NAD27 ASP ZONE 4**  
 LAT=70°02'48.72" N  
 LONG=151°07'03.27" W  
 Y = 5,867,922  
 X = 360,315

**NAD27 UTM ZONE 6 METERS**  
 LAT=70°02'48.72" N  
 LONG=151°07'03.27" W  
 Y = 7,776,221  
 X = 343,277

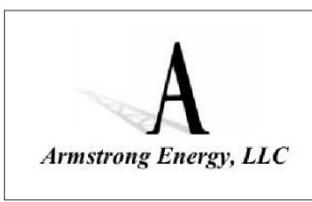
**PRIMARY LOCATION**  
 LOCATED WITHIN PROTRACTED  
 SEC 15, T8N, R4E, U.M.  
 1,438' F.W.L.  
 2,249' F.S.L.

**SURFACE ELEVATION**  
 TOP OF TUNDRA ELEVATION = 23.5'±

1	7-7-16	Remove rig pad, edit ice road text, edit conductor elevation.	CC			
1	7-7-16	Add certification.	CC			
2	7-8-16	Add rig footprint (See Note 4)	CC			
REV	DATE	DESCRIPTION	BY	CHKD	PROJ	APPVD



LEGEND	
	CONDUCTOR SURFACE LOCATION
	LOCATION OF WATER FEATURE
	CONTOUR
	EDGE OF TREES








**HORSESHOE 1**  
 AS-STAKED  
 LOCATED WITHIN  
 SECTION 15, T8N, R4E, U.M.

DATE: 6/28/16      SCALE: 1" = 100'      DRAWN: CC      CHECKED: KWA

DRAWING: 16-030 HS-1 AS-STAKED.DWG      FIGURE 1 OF 1      REV: 1

Figure V.1-2. Survey Plat of Horseshoe #1 Pad.




	<b>ARMSTRONG ENERGY LLC.</b> 2016-2017 EXPLORATION & APPRAISAL CAMPAIGN		 PROPOSED ICE PAD (4.2-Acre)	 ICE ROAD ROUTE (As-Staked)
	<b>HORSESHOE-1 ICE PAD OVERVIEW</b>		 PROPOSED WELL LOCATION	 TENTH-OF-MILE
	By: JB	DATE: 7/2/2016	REV: 1.0	Sheet 1 of 1


Scale:

0 50 100 200  
Feet

0 25 50 100  
Meters

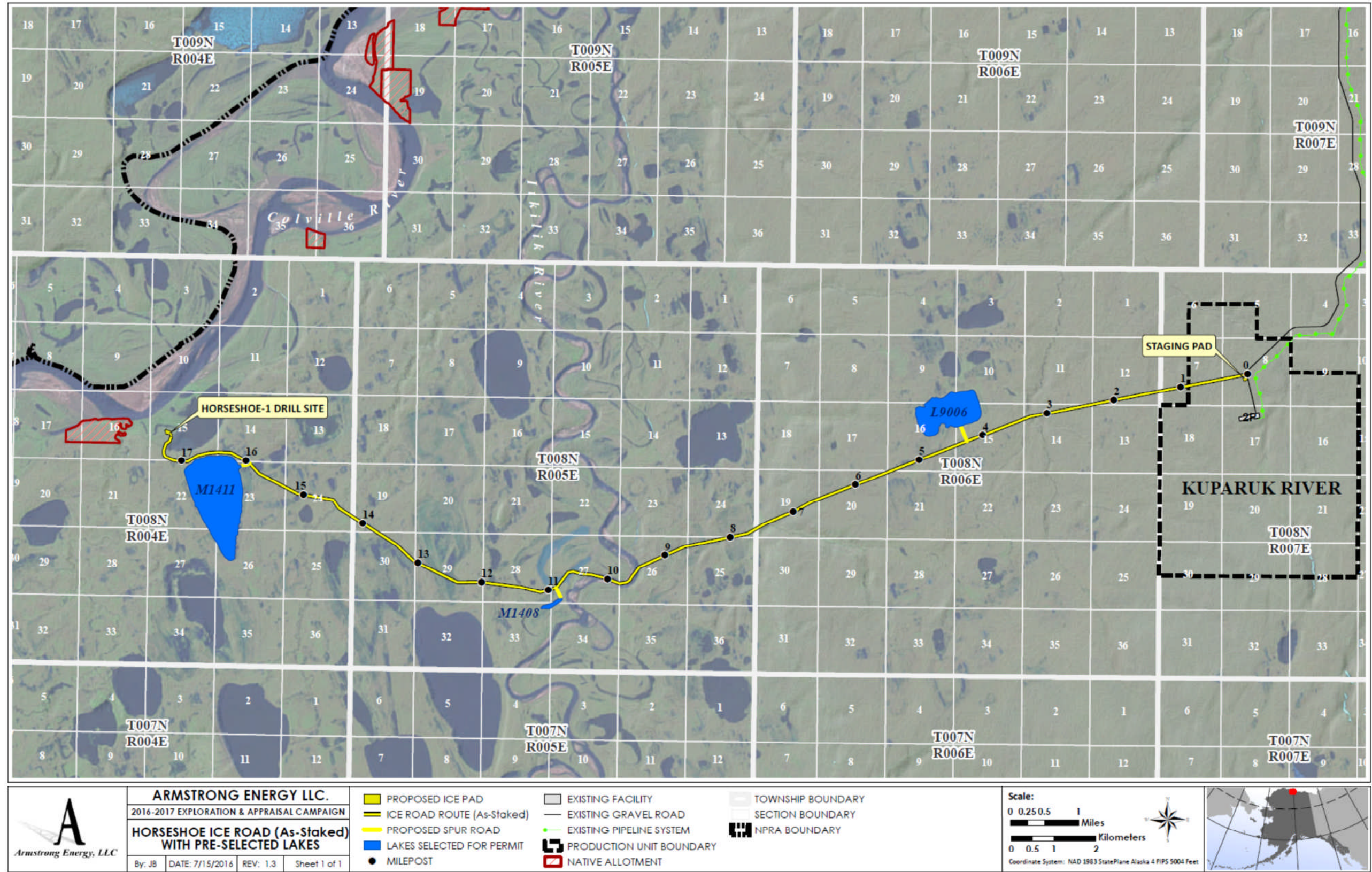
Coordinate System: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet





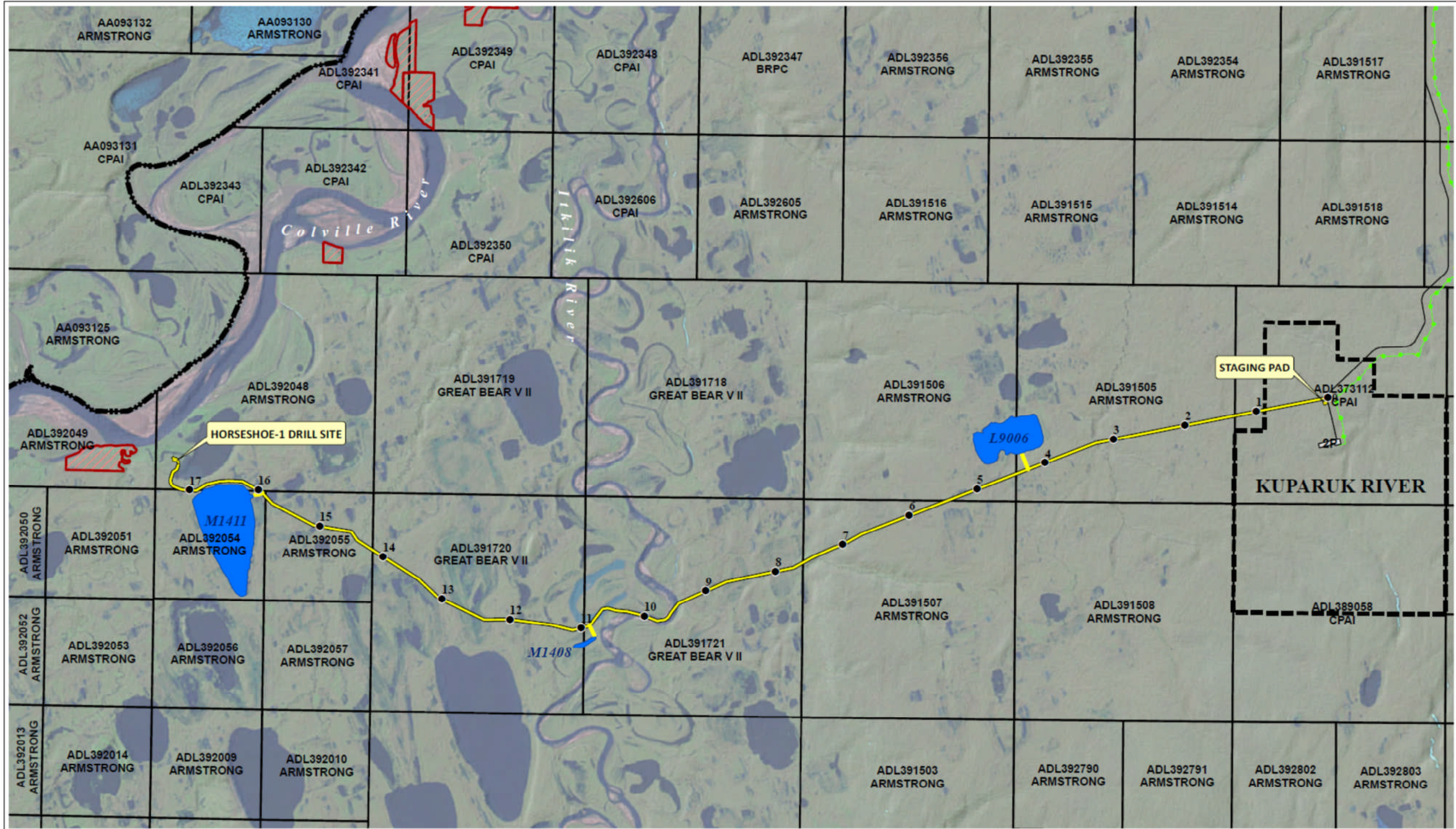
File Name: 2016-2017\_OS-A5-W-M\_H51

Figure V.1-3. Aerial View of Horseshoe #1 Pad and Vicinity



File Name: 2016-2017\_OS-AS-IR-M\_HS\_Overview

Figure V.1-4. Horseshoe Project Area with Section, Township and Range.



<p><b>ARMSTRONG ENERGY LLC.</b> 2016-2017 EXPLORATION &amp; APPRAISAL CAMPAIGN <b>HORSESHOE ICE ROAD (As-Staked) WITH PRE-SELECTED LAKES</b> By: JB   DATE: 7/15/2016   REV: 1.3   Sheet 1 of 1</p>	PROPOSED ICE PAD	MILEPOST	PRODUCTION UNIT BOUNDARY
	ICE ROAD ROUTE (As-Staked)	EXISTING FACILITY	NATIVE ALLOTMENT
	PROPOSED SPUR ROAD	EXISTING GRAVEL ROAD	NPRA BOUNDARY
	LAKES SELECTED FOR PERMIT	EXISTING PIPELINE SYSTEM	LEASE BOUNDARY

Scale:

0 0.25 0.5 1 Miles

0 0.5 1 2 Kilometers

Coordinate System: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

File Name: 2016-2017\_05-AS-IR-M\_HS\_Overview

Figure V.1-5. Horseshoe Project Area Lease Information.

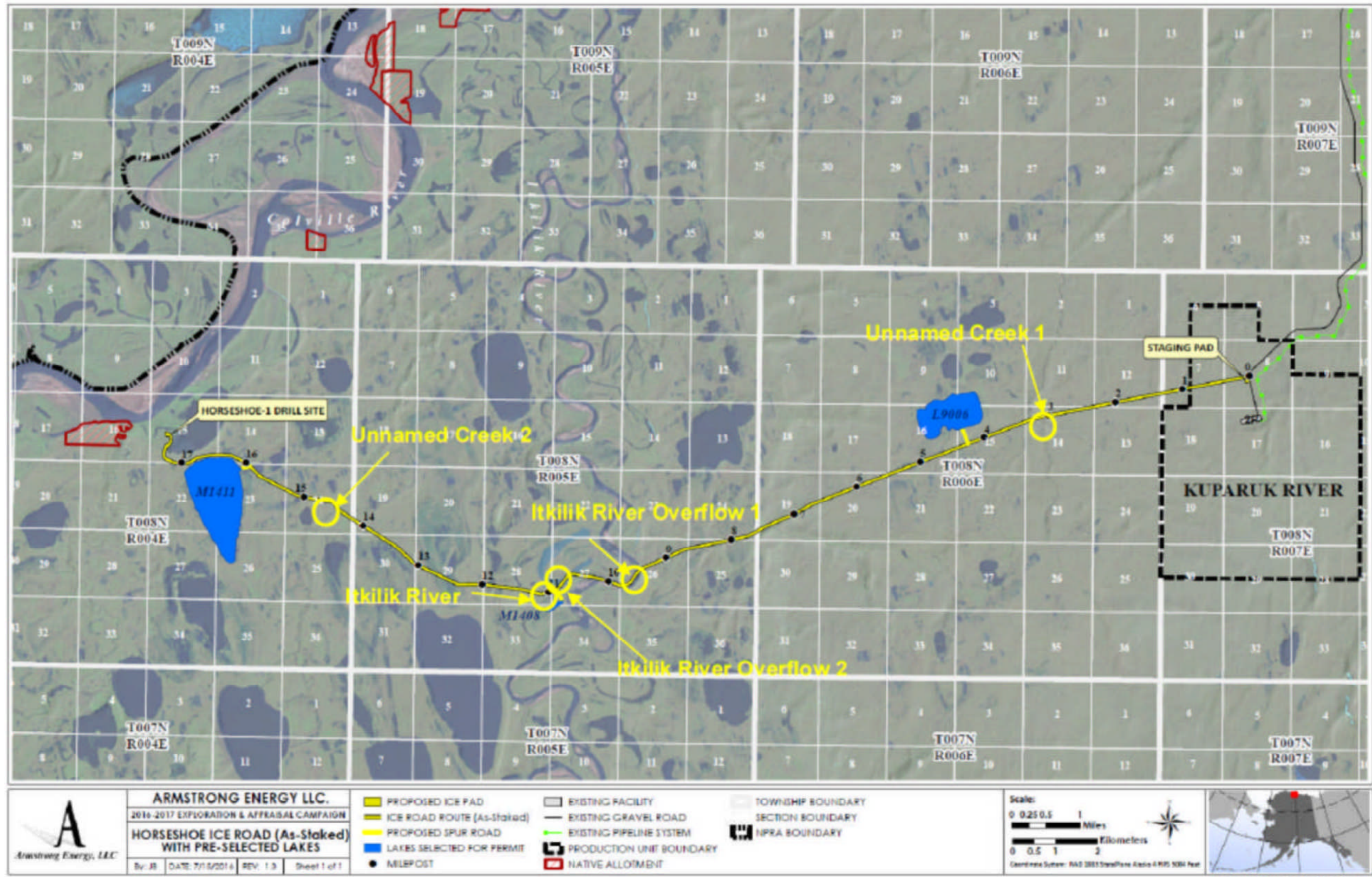


Figure V.1-6. Horseshoe Project with Stream Crossings.



Figure V.1-7. Horseshoe Project Ice Staging Pad.





## **MITIGATION MEASURE ANALYSIS: NORTH SLOPE**

**The following instructions are provided for guidance to adequately complete the Mitigation Measure Analysis form.**

1. The applicant shall respond to each Mitigation Measure, and all subsets of mitigation measures; i.e. A.2.d.i should be addressed and A.2.d.ii, and so forth.
2. The applicant's response shall begin by clearly indicating if the **mitigation measure is satisfied**, an **exception is requested**, or if the mitigation measure is **not applicable**.
3. The applicants' response shall then address how the proposed project clearly satisfies the mitigation measure, meets the intent of the mitigation measure, is not practicable, or is not applicable.
4. The applicant shall verify working 'in consultation with' parties other than Department of Natural Resources (DNR), Division of Oil and Gas (DO&G) by reporting meeting dates and parties present for Mitigation Measures which require consultation with parties other than DNR, DO&G; i.e. Mitigation Measure 1.b.

**Please note that this form, along with the Plan of Operations Application form and the Plan of Operations, must be adequately completed before DNR DO&G will review an application for potential approval.**

NORTH SLOPE	<b>Company Response</b>
<b>A. Mitigation Measures</b>	
<b>1. Facilities and Operations</b>	
<p>a. A plan of operations must be submitted and approved before conducting exploration, development or production activities, and must describe the lessee's efforts to minimize impacts on residential, commercial, and recreational areas, Native allotments and subsistence use areas. At the time of application, lessee must submit a copy of the proposed plan of operations to all surface owners whose property will be entered.</p>	<p>A.1.a. Mitigation measure is satisfied.</p> <p>Armstrong 2016-2017 Winter Exploration Plan of Operations is being submitted with this analysis.</p>
<p>b. Facilities must be designed and operated to minimize sight and sound impacts in areas of high residential, commercial, recreational, and subsistence use and important wildlife habitat. Methods may include providing natural buffers and screening to conceal facilities, sound insulation of facilities, or by using alternative means approved by the Director, in consultation with ADF&amp;G and the NSB.</p>	<p>A.1.b. Mitigation measure is satisfied.</p> <p>The closest proposed drilling activities at the Horseshoe site are 12 miles from Nuiqsut. Armstrong coordinates with local interests including the Kuukpikmiut Subsistence Oversight Panel (KSOP) and the Kuukpik Corporation to ensure that impacts to subsistence users are minimized. Armstrong is obtaining applicable permits from ADNR, ADF&amp;G, ADEC, NSB and other federal, state, and local agencies.</p>
<p>c. To the extent practicable, the siting of facilities will be prohibited within 500 feet of all fish-bearing streams and waterbodies and 1,500 feet from all current surface drinking water sources. Additionally, to the extent practicable, the siting of facilities will be prohibited within one-half mile of the banks of the main channel of the Colville, Canning, Sagavanirktok, Kavik, Shaviovik, Kadleroshilik, Echooka, Ivishak, Kuparuk, Toolik, Anaktuvuk and Chandler Rivers. Facilities may be sited within these buffers if the lessee demonstrates to the satisfaction of the Director, in consultation with ADF&amp;G, that site locations outside these buffers are not practicable or that a location inside the buffer is environmentally preferred. Road, utility, and pipeline crossings must be consolidated and aligned perpendicular or near perpendicular to watercourses.</p>	<p>A.1.c. waiver is requested.</p> <p>The drilling location is within 200 ft of a presumed fish bearing lake immediately north of the site. The lake appears to be within the floodplain of the Colville River and about 1,500 ft from the normal channel boundaries and as such, it would be subject to periodic inundation from the Colville and fish would also be introduced into the lake during these periods.</p> <p>The lake banks appears to be periodically be inundated by spring high</p>

	<p>water (see Figure VIII-1-A).</p> <p>The drilling location is a temporary site that will only be used to drill the temporary well. No use of the site is planned during periods when open water is present either at the lake or on the Colville River.</p>
<p>d. No facilities will be sited within one-half mile of identified Dolly Varden overwintering and/or spawning areas on the Canning, Shaviovik, and Kavik rivers. Notwithstanding the previous sentence, road and pipeline crossings may only be sited within these buffers if the lessee demonstrates to the satisfaction of the Director and ADF&amp;G in the course of obtaining their respective permits, that either (1) the scientific data indicate the proposed crossing is not within an overwintering and/or spawning area; or (2) the proposed road or pipeline crossing will have no significant adverse impact to Dolly Varden overwintering and/or spawning habitat.</p>	<p>A.1.d. Mitigation measure is satisfied.</p> <p>Armstrong's winter exploration activities are located miles away from identified Dolly Varden overwintering and/or spawning areas on the Canning, Shaviovik, and Kavik Rivers.</p>
<p>e. Impacts to important wetlands must be minimized to the satisfaction of the Director, in consultation with ADF&amp;G and ADEC. The Director will consider whether facilities are sited in the least sensitive areas. Further, all activities within wetlands require permission from the US Army Corps of Engineers.</p>	<p>A.1.e. Mitigation measure is satisfied.</p> <p>Armstrong's winter exploration activities are temporary and will take place only during winter. No wetlands impacts are expected.</p>
<p>f. Exploration facilities, including exploration roads and pads, must be temporary and must be constructed of ice unless the Director determines that no practicable alternative exists. Re-use of abandoned gravel structures may be permitted on a case-by-case basis by the Director, after consultation with the director, DMLW, and ADF&amp;G. Approval for use of abandoned structures will depend on the extent and method of restoration needed to return these structures to a usable condition.</p>	<p>A.1.f. Mitigation measure is satisfied.</p> <p>Armstrong's winter exploration activities are temporary and will take place only from ice pads and roads during winter.</p>
<p>g. Pipelines must utilize existing transportation corridors where conditions permit. Pipelines must be designed to facilitate the containment and cleanup of spilled fluids. Where practicable, onshore pipelines must be located on the upslope side of roadways and construction pads, unless the director, DMLW, determines that an alternative site is environmentally acceptable. Wherever possible, onshore pipelines must utilize existing transportation corridors and be buried where soil and geophysical conditions permit. All pipelines, including flow and gathering lines, must be designed, constructed and</p>	<p>A.1.g. Not applicable.</p> <p>No pipelines are proposed as part of the activities.</p>

<p>maintained to assure integrity against climatic conditions, geophysical hazards, corrosion and other hazards as determined on a case-by-case basis.</p>	
<p>h. Pipelines shall be designed and constructed to avoid significant alteration of caribou and other large ungulate movement and migration patterns. At a minimum, above-ground pipelines shall be elevated 7 feet, as measured from the ground to the bottom of the pipe, except where the pipeline intersects a road, pad, or a ramp installed to facilitate wildlife passage. Lessees shall consider increased snow depth in the sale area in relation to pipe elevation to ensure adequate clearance for wildlife. ADNR may, after consultation with ADF&amp;G, require additional measures to mitigate impacts to wildlife movement and migration.</p> <p>i. The state of Alaska discourages the use of continuous-fill causeways. Environmentally preferred alternatives for field development include use of buried pipelines, onshore directional drilling, or elevated structures. Approved causeways must be designed, sited, and constructed to prevent significant changes to nearshore oceanographic circulation patterns and water quality characteristics (e.g., salinity, temperature, suspended sediments) that result in exceedances of water quality criteria, and must maintain free passage of marine and anadromous fish.</p> <p>ii. Causeways and docks shall not be located in river mouths or deltas. Artificial gravel islands and bottom founded structures shall not be located in river mouths or active stream channels on river deltas, except as provided for in (iii).</p> <p>iii. Each proposed structure will be reviewed on a case-by-case basis. Causeways, docks, artificial gravel islands and bottom founded structures may be permitted if the Director, in consultation with ADF&amp;G, ADEC, and the NSB determines that a causeway or other structures are necessary for field development and that no practicable alternatives exist. A monitoring program may be required to address the objectives of water quality and free passage of fish, and mitigation shall be required where significant deviation from objectives occurs.</p>	<p>A.1.h. Not applicable.</p> <p>No pipelines are proposed as part of the activities.</p> <p>A.1.h.i. Not applicable.</p> <p>No continuous-fill causeways are proposed as part of the activities.</p> <p>A.1.h.ii. Not applicable.</p> <p>No causeways or docks are proposed as part of the activities</p> <p>A.1.h.iii. Not applicable.</p> <p>None of these structures are proposed as part of the activities.</p>
<p>i. Dismantlement, Removal and Rehabilitation (DR&amp;R): Upon abandonment of material sites, drilling sites, roads, buildings or other facilities, such facilities must be removed</p>	<p>A.1.i. Mitigation measure is satisfied.</p> <p>The proposed operations are all temporary activities conducted from</p>

<p>and the site rehabilitated to the satisfaction of the Director, unless the Director, in consultation with DMLW, ADF&amp;G, ADEC, NSB, and any non-state surface owner, determines that such removal and rehabilitation is not in the state's interest.</p>	<p>ice pads and roads and all surface facilities will be removed prior to breakup. The well will be plugged and abandoned in accordance with AOGCC regulations. Remaining debris and potentially contaminated materials will be removed and disposed of at an appropriate facility at the time of site closure.</p>
<p>j. Gravel mining sites required for exploration and development activities will be restricted to the minimum necessary to develop the field efficiently and with minimal environmental damage. Where practicable, gravel sites must be designed and constructed to function as water reservoirs for future use. Gravel mine sites required for exploration activities must not be located within an active floodplain of a watercourse unless the director, DMLW, after consultation with ADF&amp;G, determines that there is no practicable alternative, or that a floodplain site would enhance fish and wildlife habitat after mining operations are completed and the site is closed.</p> <p>Mine site development and rehabilitation within floodplains must follow the procedures outlined in McLean, R. F. 1993, North Slope Gravel Pit Performance Guidelines, ADF&amp;G Habitat and Restoration Division Technical Report 93-9, available from ADF&amp;G.</p>	<p>A.1.j. Not applicable.</p> <p>Gravel mining is not proposed as part of the operations.</p>
<p><b>2. Fish and Wildlife Habitat</b></p>	

<p>a. Detonation of explosives within or in proximity to fish-bearing waters must not produce instantaneous pressure changes that exceed 2.7 pounds per square inch in the swim bladder of a fish. Detonation of explosives within or in close proximity to a fish spawning bed during the early stages of egg incubation must not produce a peak particle velocity greater than 0.5 inches per second. Blasting criteria have been developed by ADF&amp;G and are available upon request from ADF&amp;G. The location of known fish-bearing waters within the project area can also be obtained from ADF&amp;G.</p> <p>The lessee will consult with the NSB prior to proposing the use of explosives for seismic surveys. The Director may approve the use of explosives for seismic surveys after consultation with the NSB.</p>	<p>A.2.a. Not applicable.</p> <p>Use of explosives is not part of the proposed operations.</p>
<p>b. Water intake pipes used to remove water from fish-bearing waterbodies must be surrounded by a screened enclosure to prevent fish entrainment and impingement. Screen mesh size shall be no greater than 1 mm (0.04 inches), unless another size has been approved by ADF&amp;G. The maximum water velocity at the surface of the screen enclosure may be no greater than 0.1 foot per second, unless an alternative velocity has been approved by ADF&amp;G.</p>	<p>A.2.b. Mitigation measure is satisfied.</p> <p>Armstrong will obtain Fish Habitat Permits from ADF&amp;G for water withdrawal from fish-bearing water bodies. Armstrong will adhere to water intake stipulations, including screen size and velocity requirements.</p>
<p>c. Removal of snow from fish-bearing rivers, streams and natural lakes shall be subject to prior written approval by ADF&amp;G. Compaction of snow cover overlying fish-bearing waterbodies is prohibited except for approved crossings. If ice thickness is not sufficient to facilitate a crossing, ice or snow bridges may be required.</p>	<p>A.2.c. Mitigation measure is satisfied.</p> <p>All activities in fish-bearing water bodies will be authorized under ADF&amp;G Fish Habitat Permits. Crossings of fish streams will be at approved crossing locations. Where necessary ice or snow bridges will be constructed.</p>
<p>d. Bears:</p> <p>i. Before commencement of any activities, lessees shall consult with ADF&amp;G (907-459-7213) to identify the locations of known brown bear den sites that are occupied in the season of proposed activities. Exploration and production activities must not be conducted within one-half mile of occupied brown bear dens, unless alternative mitigation measures are approved by ADF&amp;G. A lessee who encounters an occupied brown bear</p>	<p>A.2.d. Mitigation measure is satisfied.</p> <p>A.2.d.i. Armstrong will consult with ADF&amp;G and USF&amp;WS to identify locations of known brown bear and polar bear den sites. Prior to construction of ice roads and pads, Armstrong will also conduct a forward looking infrared (FLIR) survey for polar bear den habitat within one mile of proposed project activities including access routes.</p>

<p>den not previously identified by ADF&amp;G must report it to the Division of Wildlife Conservation, ADF&amp;G, within 24 hours. Mobile activities shall avoid such discovered occupied dens by one-half mile unless alternative mitigation measures are approved by the Director, with concurrence from ADF&amp;G. Non-mobile facilities will not be required to relocate.</p> <p>ii. Before commencement of any activities, lessees shall consult with the USFWS (907-786-3800) to identify the locations of known polar bear den sites. Operations must avoid known polar bear dens by 1 mile. A lessee who encounters an occupied polar bear den not previously identified by USFWS must report it to the USFWS within 24 hours and subsequently avoid the new den by 1 mile. If a polar bear should den within an existing development, off-site activities shall be restricted to minimize disturbance.</p> <p>iii. For projects in proximity to areas frequented by bears, lessees are required to prepare and implement a human-bear interaction plan designed to minimize conflicts between bears and humans. The plan should include measures to:</p> <ul style="list-style-type: none"> <li>A. minimize attraction of bears to facility sites;</li> <li>B. organize layout of buildings and work areas to minimize interactions between humans and bears;</li> <li>C. warn personnel of bears near or on facilities and the proper actions to take;</li> <li>D. if authorized, deter bears from the drill site;</li> <li>E. provide contingencies in the event bears do not leave the site;</li> <li>F. discuss proper storage and disposal of materials that may be toxic to bears; and</li> <li>G. provide a systematic record of bears on the site and in the immediate</li> </ul>	<p>A.2.d.ii. if a brown bear den is located within ½ mile of exploration activities, ADF&amp;G will be notified. If a polar bear den is located within one mile, USF&amp;WS will be notified. Armstrong will work with the relevant agency to identify and implement the appropriate mitigation measures.</p> <p>A.2.d.iii. A Letter of Authorization (LOA) for impacts to polar bear will be requested from USF&amp;WS. As part of the LOA application, a human-bear interaction plan will be developed which will indemnify measures to :</p> <ul style="list-style-type: none"> <li>A.2.d.iii.A. minimize attraction of bears to facility sites;</li> <li>A.2.d.iii.B organize layout of buildings and work areas to minimize interactions between humans and bears;</li> <li>A.2.d.iii.C. warn personnel of bears near or on facilities and the proper actions to take;</li> <li>A.2.d.iii.D. deter bears from the drill site and other facilities;</li> <li>A.2.d.iii.E. provide contingencies in the event bears do not leave the site;</li> <li>A.2.d.iii.F. discuss proper storage and disposal of materials that may be toxic to bears; and</li> <li>A.2.d.iii.G. provide a systematic record of bears on the site and in the immediate area.</li> </ul>
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<p>area.</p>	
<p>e. Permanent, staffed facilities must be sited to the extent practicable outside identified brant, white-fronted goose, snow goose, tundra swan, king eider, common eider, Steller's eider, spectacled eider, and yellow-billed loon nesting and brood rearing areas.</p>	<p>A.2.e. Not applicable.           The proposed operations will be temporary and will take place during winter. Other than field studies and cleanup activities, operations will not occur during the summer months when waterfowl may be present.</p>
<p><b>3. Subsistence, Commercial and Sport Harvest Activities</b></p>	

<p>a.</p> <ul style="list-style-type: none"><li>i. Exploration, development and production operations shall be conducted in a manner that prevents unreasonable conflicts between lease-related activities and subsistence activities. Lease-related use will be restricted when the Director determines it is necessary to prevent conflicts with local subsistence, commercial and sport harvest activities. In enforcing this term DO&amp;G will consult with other agencies, the affected local borough(s) and the public to identify and avoid potential conflicts that are brought to the division's attention both in the planning and operational phases of lease-related activities. In order to avoid conflicts with subsistence, commercial and sport harvest activities, restrictions may include alternative site selection, requiring directional drilling, seasonal drilling restrictions, and other technologies deemed appropriate by the Director.</li><li>ii. Prior to submitting a plan of operations for either onshore or offshore activities which have the potential to disrupt subsistence activities, the lessee shall consult with the potentially affected subsistence communities and the NSB (collectively "parties") to discuss the siting, timing, and methods of proposed operations and safeguards or mitigating measures which could be implemented by the operator to prevent unreasonable conflicts. The parties shall also discuss the reasonably foreseeable effect on subsistence activities of any other operations in the area that they know will occur during the lessee's proposed operations. Through this consultation, the lessee shall make reasonable efforts to assure that exploration, development, and production activities are compatible with subsistence hunting and fishing activities and will not result in unreasonable interference with subsistence harvests.</li><li>iii. A discussion of agreements reached or not reached during the consultation process and any plans for continued consultation shall be included in the plan of operations. The lessee shall identify who participated in the consultation and send copies of the plan to participating communities and the NSB when it is submitted to the division.</li></ul>	<p>A.3.a. Mitigation measure is satisfied.</p> <p>A.3.a.i. Armstrong has an ongoing stakeholder engagement program to inform the residents of Nuiqsut, including subsistence users, of proposed activities and to obtain feedback and recommendations on how these activities can be performed and to avoid conflicts with subsistence activities. Armstrong will present the proposed exploration program to the NSB Planning Commission as part of obtaining NSB Development Permits for these activities. A description of the consultation process, including consultation is included in the scope of operations.</p> <p>A.3.a.ii. Armstrong will consult with the potentially affected subsistence communities and the NSB on proposed operations and safeguards or mitigating measures to prevent unreasonable conflicts. When conducting exploration activities on surface lands owned by the local village corporation for Nuiqsut (Kuukpik Corporation), Armstrong will operate under conditions of an agreement with Kuukpik.</p> <p>A.3.a.iii. A Community Liaison is employed by Armstrong to provide updates of planned and ongoing activities to local residents. Subsistence Representatives will be employed by Armstrong during the winter exploration program to insure that activities are conducted in a manner to minimize potential impact to local subsistence activities. Records of all concerns expressed by subsistence hunters during Armstrong operations will be maintained.</p>
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<p>iv. If the parties cannot agree, then any of them may request the Commissioner of DNR or his/her designee to intercede. The commissioner may assemble the parties or take other measures to resolve conflicts among the parties.</p> <p>v. The lessee shall notify the Director of all concerns expressed by subsistence hunters during operations and of steps taken to address such concerns.</p>	<p>A.3.a.iv. Comment noted.</p> <p>A.3.a.v. Comment noted.</p>
<p>b. Traditional and customary access to subsistence areas shall be maintained unless reasonable alternative access is provided to subsistence users. "Reasonable access" is access using means generally available to subsistence users. Lessees will consult the NSB, nearby communities, and native organizations for assistance in identifying and contacting local subsistence users.</p>	<p>A.3.b. Mitigation measure is satisfied.</p> <p>Armstrong is requesting a 100 ft safety buffer zone around ice roads and ice pads. Traditional and customary access to subsistence areas will not be interfered with by Armstrong.</p> <p>Armstrong has an ongoing stakeholder engagement program to inform the residents of Nuiqsut, including subsistence users, of proposed activities and to obtain feedback and recommendations on how these activities can be performed and to avoid conflicts with subsistence activities. Cindy Bailey, Alaska Public Affairs Manager, is employed by Armstrong to provide updates of planned and ongoing activities to local residents and Subsistence Representatives to ensure that activities are conducted in a manner to minimize potential impacts to local subsistence activities.</p>
<p><b>4. Fuel, Hazardous Substances and Waste</b></p>	
<p>a. Secondary containment shall be provided for the storage of fuel or hazardous substances.</p>	<p>A.4.a. Mitigation measure is satisfied.</p> <p>Fuel and hazardous substances will be stored within lined and diked secondary containment that is able to hold 110% or more of the largest tank plus precipitation. Secondary containment is discussed in Armstrong's Oil Discharge Prevention and Contingency Plan (C-Plan,</p>

	in renewal) and Spill Prevention control and Countermeasure Plans
b. Containers with an aggregate storage capacity of greater than 55 gallons which contain fuel or hazardous substances shall not be stored within 100 feet of a waterbody, or within 1,500 feet of a current surface drinking water source.	A.4.b. Mitigation measure is satisfied.  Fuel and hazardous substances will be stored at least 100 ft from any water body. No known surface drinking water sources are in the vicinity of the proposed operations.
c. During equipment storage or maintenance, the site shall be protected from leaking or dripping fuel and hazardous substances by the placement of drip pans or other surface liners designed to catch and hold fluids under the equipment, or by creating an area for storage or maintenance using an impermeable liner or other suitable containment mechanism.	A.4.c. Mitigation measure is satisfied.  Armstrong has adopted the Alaska Safety Handbook, the North Slope Environmental Field Handbook, and the Alaska Waste Disposal and Reuse Guide (Red Book) as guidance for standard operating procedures and best management practices for workplace health, safety and environmental and waste management. Drip pans or liners will be placed under parked vehicles of equipment to capture fluids.
d. During fuel or hazardous substance transfer, secondary containment or a surface liner must be placed under all container or vehicle fuel tank inlet and outlet points, hose connections, and hose ends. Appropriate spill response equipment, sufficient to respond to a spill of up to five gallons, must be on hand during any transfer or handling of fuel or hazardous substances. Trained personnel shall attend transfer operations at all times.	A.4.d. Mitigation measure is satisfied.  Fuel and hazardous substance transfers will be performed in accordance with Armstrong's Fluid Transfer Procedures included in the Armstrong C-Plan and the Fluid Transfer Guidelines in the North Slope Environmental Field Handbook. This plan includes the use of surface liners under all potential spill points. Verification that adequate sorbent are on hand during fuel transfers and ensuring that personnel are properly trained and understand proper procedures for handling flammable and combustible fluids.
e. Vehicle refueling shall not occur within the annual floodplain, except as addressed and approved in the plan of operations. This measure does not apply to water-borne vessels.	A.4.e. Waiver is requested.  The proposed drilling location is located in the Colville River floodplain and refueling in the floodplain cannot be avoided. Refueling within the Colville River floodplain will be limited to the drilling pad and will be

	conducted in accordance with the C-Plan.
f. All independent fuel and hazardous substance containers shall be marked with the contents and the lessee's or contractor's name using paint or a permanent label.	A.4.f. Mitigation measure is satisfied.  All containers with fuel or hazardous substances will be labeled with the contents and lessee's/contractor's name.
g. A fresh water aquifer monitoring well, and quarterly water quality monitoring, is required down gradient of a permanent storage facility, unless alternative acceptable technology is approved by ADEC.	A.4.g. Not applicable.  No permanent storage facilities are proposed as part of this program.
h. Waste from operations must be reduced, reused, or recycled to the maximum extent practicable. Garbage and domestic combustibles must be incinerated whenever possible or disposed of at an approved site in accordance with 18 AAC 60.	A.4.h. Mitigation measure is satisfied.  Waste management activities for the Armstrong winter drilling program will be conducted in general accordance with best environmental practices as described in the North Slope Environmental Field Handbook. Attention will be focused on waste minimization, segregation, reuse, and recycling. Solid burnable waste may be incinerated in location as per 18 AAC 50. All wastes generated as part of operations will be hauled offsite for disposal at an approved facility.
i. New solid waste disposal sites, other than for drilling waste, will not be approved or located on state property during the exploration phase of lease activities. Disposal sites may be provided for drilling waste if the facility complies with 18 AAC 60.	A.4.i. Mitigation measure is satisfied.  No new solid waste disposal sites will be developed as part of Armstrong's winter drilling program. All waste generated as part of operations will be hauled offsite for disposal at an approved facility.
j. The preferred method for disposal of muds and cuttings from oil and gas activities is by underground injection. Drilling mud and cuttings cannot be discharged into lakes, streams, rivers, or important wetlands. On pad temporary cuttings storage will be allowed as necessary to facilitate annular injection and/or backhaul operations. Impermeable lining and diking, or equivalent measures, will be required for reserve pits. Surface discharge of drilling muds and cuttings into reserve pits shall be allowed only	A.4.j. Mitigation measures satisfied.  Waste drilling muds and cuttings will either be hauled to the Prudhoe Bay Unit (PBU) Grind and Inject Facility (or other approved facility) for processing and disposal, or disposed of on-site by annular injection as approved by the AOGCC. Materials disposed of at the PBU Grind and

<p>when the Director, in consultation with ADF&amp;G, determines that alternative disposal methods are not practicable. Injection of non-hazardous oilfield wastes is regulated by AOGCC through its Underground Injection Control (UIC) Program for oil and gas wells. See also Mitigation Measure 8.a.vi.</p>	<p>Inject Facility will be handled in accordance with the terms of the Grind and Inject User Agreement between Repsol and PBU (or other Operator if appropriate). Drilling waste will be transported as it is generated to the extent practicable. Temporary Storage Permits will be obtained from ADEC for temporary storage of drilling waste if necessary. No surface discharge of drilling waste is proposed.</p>
<p>k. Proper disposal of garbage and putrescible waste is essential to minimize attraction of wildlife. The lessee must use the most appropriate and efficient method to achieve this goal. The primary method of garbage and putrescible waste is prompt, on-site incineration in compliance with state of Alaska air quality regulations. The secondary method of disposal is on-site frozen storage in animal-proof containers with backhaul to an approved waste disposal facility. The tertiary method of disposal is on-site non-frozen storage in animal proof containers with backhaul to an approved waste disposal facility. Daily backhauling of non-frozen waste must be achieved unless safety considerations prevent it.</p>	<p>A.4.k. Mitigation measure is satisfied.</p> <p>Solid, non-burnable waste will be deposited in dumpsters located at each site. These containers will be back-hauled to the NSB landfill at Prudhoe Bay. The food waste that could attract wildlife either will be stored in enclosed containers awaiting periodic hauling or such wastes will be hauled each day to an approved disposal center (such as PBU).</p> <p>To reduce the amount of trash that must be back-hauled from the drilling location, solid, burnable waste may be incinerated at the location in accordance with 18 AAC 50 and ash back-hauled to the NSB landfill.</p>
<p><b>5. Access</b></p>	
<p>a. Except for approved off-road travel, exploration activities must be supported only by ice roads, winter trails, existing road systems or air service. Wintertime off-road travel across tundra and wetlands may be approved in areas where snow and frost depths are sufficient to protect the ground surface. Summertime off-road travel across tundra and wetlands may be authorized subject to time periods and vehicle types approved by DMLW. Exceptions may be granted by the director of the DMLW, and the Director, if an emergency condition exists; or, if it is determined, after consulting with ADF&amp;G that travel can be accomplished without damaging vegetation or the ground surface. Exceptions, including the use of gravel, may also be granted on a site specific basis, if it is determined, after consulting with ADF&amp;G and DMLW, that no practicable alternatives exist for constructing an exploration road or pad in the area south of the boundary</p>	<p>A.5.a. Mitigation measure is satisfied.</p> <p>Access to drill sites and camp pads will be via ice roads as detailed in the Plan of Operations and as authorized under LAS 28269. Water for ice road and pad construction will be withdrawn from local lakes and will be permitted under Temporary Water Use Permits (TWUPs) and Fish Habitat Permits as necessary.</p>

described below and depicted in the map below:	
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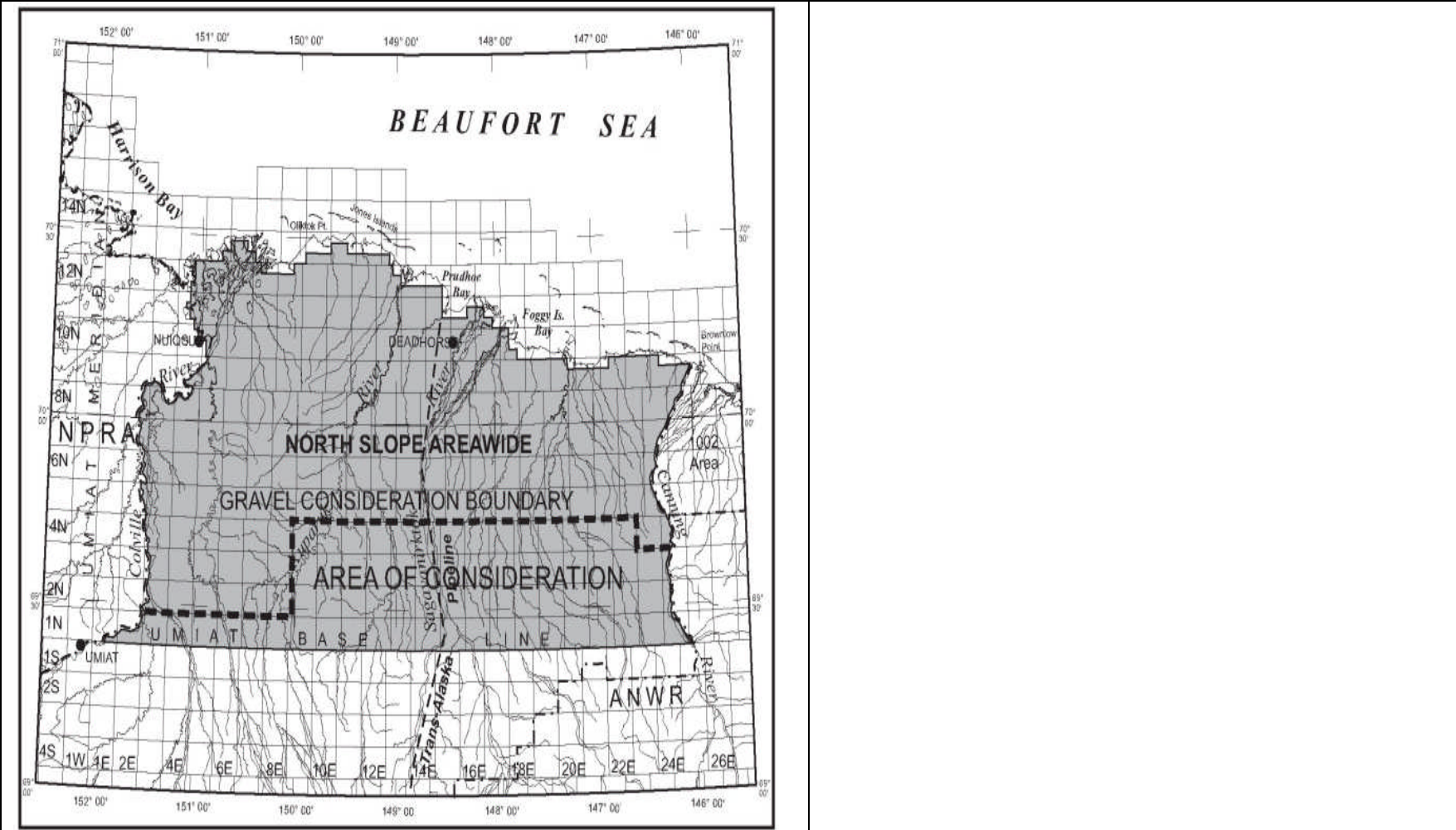


Figure 7.1: Gravel Consideration Boundary

Beginning at the NPR-A boundary, from the northeast corner of T 1N, R 2E,



<p><b>Figure 7.1: Gravel Consideration Boundary</b></p> <p>Beginning at the NPR-A boundary, from the northeast corner of T 1N, R 2E,</p> <ul style="list-style-type: none"> <li>• east to the northwest corner of T 1N, R 9E, then</li> <li>• north to the northwest corner of T 4N, R 9E, then</li> <li>• east to the northwest corner of T 4N, R 23E, then</li> <li>• south to the southwest corner of T 4N, R 23E, and then</li> <li>• east along the top of T 3N to the ANWR boundary.</li> </ul>	
<p>b. Public access to, or use of, the lease area may not be restricted except within the immediate vicinity of drill sites, buildings, and other related facilities. Areas of restricted access must be identified in the plan of operations. Lease facilities and operations shall not be located so as to block access to or along navigable or public waters as defined in AS 38.05.</p>	<p>A.5.b. Mitigation measure is satisfied.</p> <p>Armstrong is requesting a 100 ft safety buffer zone around ice roads and ice pads. Public access to the lease area will not be interfered with by Armstrong. Exploration operations will be located so that access to public waters is not blocked.</p>
<p><b>6. Prehistoric, Historic, and Archeological Sites</b></p>	

<p>a. Prior to the construction or placement of any structure, road, or facility resulting from exploration, development, or production activities, the lessee must conduct an inventory of prehistoric, historic, and archeological sites within the area affected by an activity. The inventory must include consideration of literature provided by the NSB, nearby communities, Native organizations, and local residents; documentation of oral history regarding prehistoric and historic uses of such sites; evidence of consultation with the Alaska Heritage Resources Survey and the National Register of Historic Places; and site surveys. The inventory must also include a detailed analysis of the effects that might result from the activity.</p>	<p>A.6.a. Mitigation measure is satisfied.</p> <p>Archaeological and cultural resource surveys were conducted in the project area to identify any prehistoric, historic, or archaeological sites. As part of the survey, Traditional Land Use Inventory (TLUI) data was obtained from NSB Inupiat Heritage and Language Center (IHLC) and data was obtained from the Alaska Heritage Resources Survey from ADNR, State Historic Preservation Office (SHPO). As part of stakeholder engagement, local residents will be consulted about the presence of historic or cultural resources in the project area.</p> <p>Results of archaeological surveys, including potential impacts, will be submitted to ADNR-SHPO and NSB as part of the exploration drilling program authorization process for the proposed project.</p>
<p>b. The inventory of prehistoric, historic, and archeological sites must be submitted to the Director, and to SHPO who will coordinate with the NSB for review and comment. If a prehistoric, historic, or archeological site or area could be adversely affected by a lease activity, the Director, after consultation with SHPO and the NSB, will direct the lessee as to the course of action to take to avoid or minimize adverse effects.</p>	<p>A.6.b. Mitigation measure is satisfied</p> <p>Results of archaeological surveys, including potential impacts, will be submitted to ADNR-SHPO and NSB as part of the exploration drilling program authorization process for the project.</p>
<p>c. If a site, structure, or object of prehistoric, historic, or archaeological significance is discovered during lease operations, the lessee must report the discovery to the Director as soon as possible. The lessee must make reasonable efforts to preserve and protect the discovered site, structure, or object from damage until the Director, after consultation with the SHPO and the NSB, has directed the lessee as to the course of action to take for its preservation.</p>	<p>A.6.c. Mitigation measure is satisfied.</p> <p>If prehistoric, historic, or archaeological resources are discovered during Armstrong operations, all work in the vicinity of the discovery will cease and ADNR-SHPO and NSB-IHLC will be notified. Measures to mitigate impacts to archeological, historic, and cultural resources identified by the archaeologist, ADNR-SHPO, and NSB-IHLC will be implemented.</p>

<b>7. Local Hire, Communication, and Training</b>	
<p>a. Lessees are encouraged to employ local and Alaska residents and contractors, to the extent they are available and qualified, for work performed in the lease area. Lessees shall submit, as part of the plan of operations, a proposal detailing the means by which the lessee will comply with the measure. The proposal must include a description of the operator's plans for partnering with local communities to recruit, hire and train local and Alaska residents and contractors. The lessee is encouraged, in formulating this proposal, to coordinate with employment and training services offered by the State of Alaska and local communities to train and recruit employees from local communities.</p>	<p>A.7.a. Mitigation measure is satisfied.</p> <p>Armstrong has a program to hire and train residents of the NSB, Nuiqsut, and Alaska Natives. Armstrong works with the Village of Nuiqsut and Kuukpik Corporation to obtain their assistance in determining if qualified personnel, or if local personnel who could be employed for on-the-job training, are available.</p>
<p>b. A plan of operations application must describe the lessee's past and prospective efforts to communicate with local communities and interested local community groups.</p>	<p>A.7.b. Mitigation measure is satisfied.</p> <p>Armstrong has an ongoing stakeholder engagement program to inform the residents of Nuiqsut, including subsistence users, of proposed activities and to obtain feedback and recommendations on how these activities can be performed and to avoid conflicts with subsistence activities. A description of the consultation process, including plans for continued consultation is included in the NSB Development Permit Application Scope of Operations.</p>
<p>c. A plan of operations application must include a training program for all personnel including contractors and subcontractors. The program must be designed to inform each person working on the project of environmental, social, and cultural concerns that relate to that person's job. The program must use methods to ensure that personnel understand and use techniques necessary to preserve geological, archeological, and biological resources. In addition, the program must be designed to help personnel increase their sensitivity and understanding of community values, customs, and lifestyles in areas where they will be operating.</p>	<p>A.7.c. Mitigation measure is satisfied.</p> <p>All personnel will attend North Slope Training Cooperative (NSTC) 8-hour unescorted training. NSTC training will address the following topics: camps and safety orientation, use of personal protective equipment, hazard communication, pipeline awareness, environmental excellence, and hazardous waste awareness. A 30-minute A Cultural Resource and Awareness video presentation ("Balancing the Use – NPRA", CPAI) is required of all workers and authorized visitors to the various Armstrong sites. Armstrong's training program is included in</p>

	Other Uses Section of the Plan of Operations.
<b>8. Definitions</b>	
<p>a. In this document:</p> <p>i. “Facilities” means any structure, equipment, or improvement to the surface, whether temporary or permanent, including, but not limited to, roads, pads, pits, pipelines, power lines, generators, utilities, airstrips, wells, compressors, drill rigs, camps and buildings;</p> <p>ii. “Important wetlands” means those wetlands that are of high value to fish, waterfowl, and shorebirds because of their unique characteristics or scarcity in the region or that have been determined to function at a high level using the hydrogeomorphic approach;</p> <p>iii. “Minimize” means to reduce adverse impacts to the smallest amount, extent, duration, size, or degree reasonable in light of the environmental, social, or economic costs of further reduction;</p> <p>iv. “Plan of operations” means a lease Plan of operations under 11 AAC 83.158 and a unit Plan of operations under 11 AAC 83.346;</p> <p>v. “Practicable” means feasible in light of overall project purposes after considering cost, existing technology, and logistics of compliance with the standard;</p> <p>vi. “Secondary containment” means an impermeable diked area or portable impermeable containment structure capable of containing 110 percent of the volume of the largest independent container plus 12 inches of freeboard. Double walled tanks do not qualify as Secondary Containment unless an exception is granted for a particular tank.</p> <p>vii. “Temporary” means no more than 12 months.</p>	

Appendix C-1 Continuation of Glossary of Terms

Term #	Term	Term Definition
12.	GIS	Geographic information system
13.	Gpd	gallons per day
14.	NSB	North Slope Borough
15.	KSOP	Kuukpikmiut Subsistence Oversight Panel
16.	USEPA	United States Environmental Protection Agency
17.	OHA	Office of History and Archaeology (in ADNR)
18.	USF&WS	United States Fish & Wildlife Service
19.	FLIR	Forward looking infrared
20.	LOA	Letter of Authorization
21.	SAA	Surface Access Agreement
22.	TLUI	Traditional Land Use Inventory
23.	IHLC	Inupiat Heritage and Language Center (NSB)
24.	SHPO	State Historic Preservation Office (ADNR)