Right- of-Way Leasing Act
AS 38.35.050

APPLICATION FOR PIPELINE RIGHT-OF-WAY LEASE

1. Date of Application:

July 15, 2011

2. Name and Address of Applicant(s):

Polar LNG, LLC
3408 International Way
Fairbanks, AK 99701

The designated contact for the applicant is:

Doug Smith, Project Director, as agent for Polar LNG, LLC
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PART I
PROPOSED ROUTE

3. Point of Origin:

Flow Station 1, Prudhoe Bay Unit, Alaska
Umiat Meridian Section 6 Township 10N Range 15E

4. Point of Termination:

Polar LNG Pad (formerly Child's Pad), Deadhorse, Alaska
ASLS 76-227 Tract 54
Umiat Meridian Section 17 Township 10N Range 15E

5. Total proposed length:

3.8 miles or 6.1 kilometers

6. Total length proposed to cross state lands:

3.8 miles or 6.1 kilometers (the entire length of the pipeline)

7. Attach a map or plat showing the proposed alignment of the centerline of the pipeline right- of-way and indicate the areas of state upland ownership throughout the length of the proposed right-of-way.

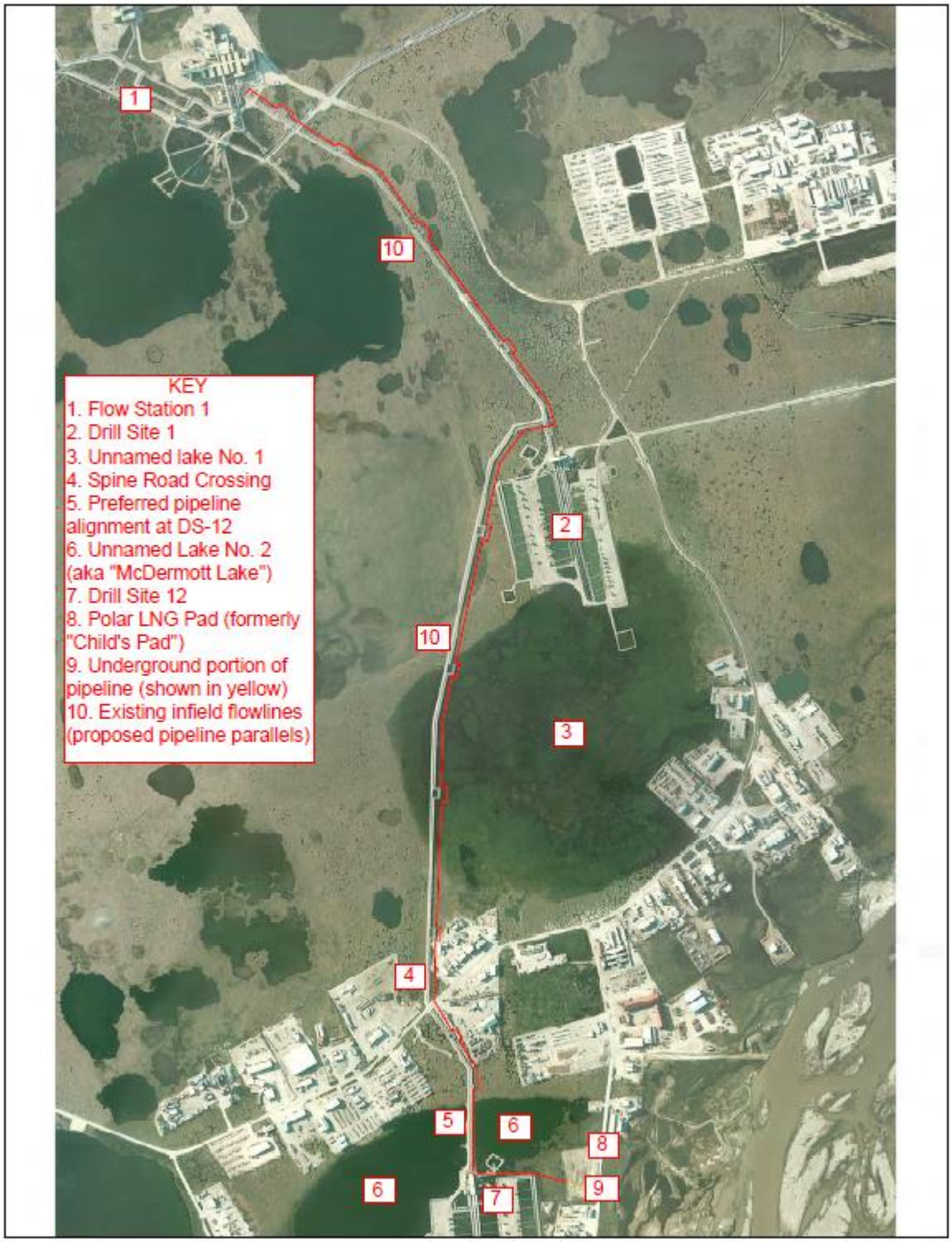
Map attached, see Figure 3 (the entire length of the pipeline right-of-way crosses lands owned by the State of Alaska)

8. Proposed crossings of streams and other bodies of water. (For each crossing indicate the width and depth of the stream or water body.)

The proposed pipeline route crosses two unnamed lakes along the proposed right of way. See Figure 1, Items 3 and 7 for the location of these lakes.

Unnamed Lake No. 1, Item 3 on Figure 1, changes size seasonally. We propose to match the lake crossing design of the existing infield flow lines which the Polar LNG pipeline proposes to parallel.

Unnamed Lake No. 2, Item 7 on Figure 2, locally known as McDermott Lake, crossing via existing maintenance road to Drill Site 12. Use of the existing lake crossing was requested in Polar LNG request to BP Exploration Alaska Request for Letter of Non-Objection dated April 28, 2011.


KEY
1. Flow Station 1
2. Drill Site 1
3. Unnamed lake No. 1
4. Spine Road Crossing
5. Preferred pipeline alignment at DS-12
6. Unnamed Lake No. 2 (aka "McDermott Lake")
7. Drill Site 12
8. Polar LNG Pad (formerly "Child's Pad")
9. Underground portion of pipeline (shown in yellow)
10. Existing infield flowlines (proposed pipeline parallels)
1
10
2
10
3
4
5
6
8
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7
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Figure 1

9. Attach a map or plat showing the proposed alignment of the centerline of the pipeline right-of-way where it crosses the beds of streams or other bodies of water.

See Figures 1 and 2.

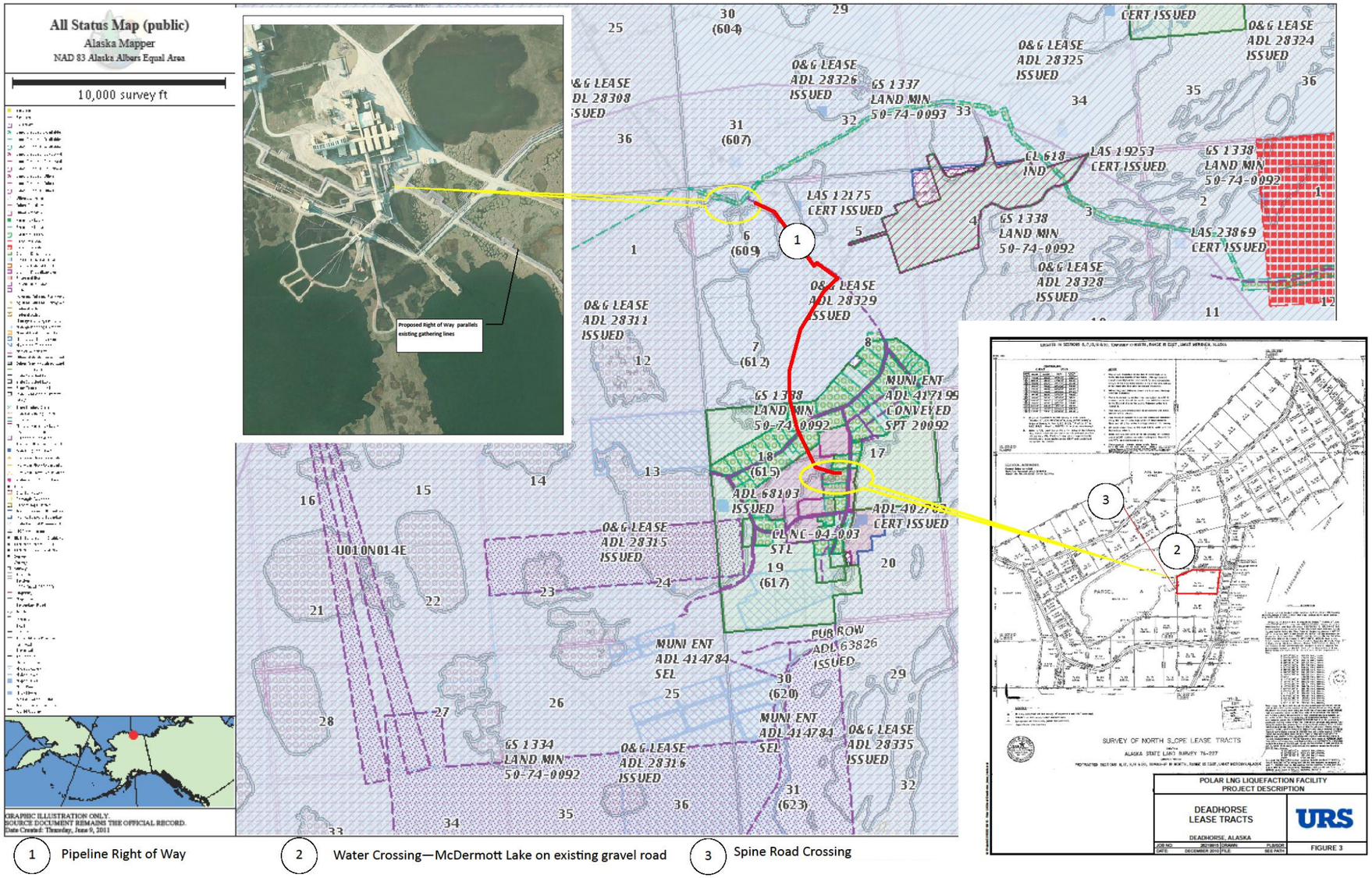

Figure 2

DL-IO-130 (rev. 4/96)

10. Width of the proposed temporary right-of-way required for construction for each segment of the pipeline route on state lands.

The temporary right of way requested will contain an ice road 75 feet wide with 5 each 200 feet x 200 feet ice pads for turnaround and work areas, equally spaced along the route. The final position of the turnaround/work pads will be determined during detailed design and planning during Summer 2011.

11. Size and location of any sites, in addition to the proposed pipeline right-of-way, requested on a temporary basis during construction.

Five each 200 feet x 200 feet ice pads for turnaround and work pads, equally spaced along the pipeline route. Final locations of the turnaround / work pads will be determined during final route survey to be conducted in Summer 2011.

12. Width of the proposed right-of-way required for operating the completed pipeline for each segment of the pipeline route on state lands.

A 30 feet right of way is requested for maintenance and repair of the pipeline. Normal surveillance will be conducted from the existing maintenance road.

13. Size and location of any sites, in addition to the proposed pipeline right-of-way, requested for the operation of the completed pipeline.

No additional sites are requested for the pipeline. A site for the placement of the Pipeline Metering Module at Flow Station 1 is being coordinated with the Prudhoe Bay Unit Operator.

14. Legal description of state lands within the proposed pipeline right-of-way that are reserved or committed to any purpose. (For each tract of such state lands, state the purpose to which it is reserved or committed.)

Existing easement for Prudhoe Bay Unit for infield flow lines from Drill site 12 to Flow Station 1. Existing pipeline corridor in Umiat Meridian Township 10 North Range 14 East. No legal description found. Alaska DNR Case File Type EPF 20100052. See attached map in Figure 2.

Leaseholders of State lands adjacent to the route have been identified as Alaska Frontier Constructors, Inc., lease of ADL-417727; and Halliburton Energy Services, Inc., leasee of

ADL-47660. Alaska Frontier Constructors, Inc. provided a Letter of Non-Objection to construction and operation of the pipeline on June 30, 2011. Halliburton Energy Services, Inc. is responding to a request for a letter of non-objection requested on June 23, 2011. Polar LNG is working with the State Pipeline Coordinator's Office to identify additional 3rd party interest encumbered on State land, and will work with the appropriate landowners to negotiate the necessary land issues.

The State Pipeline Coordinator's Office has requested a title report from the State Realty Services Division that will identify and verify 3rd party interests. Polar LNG will work with SPCO to resolve any 3rd party land issues.

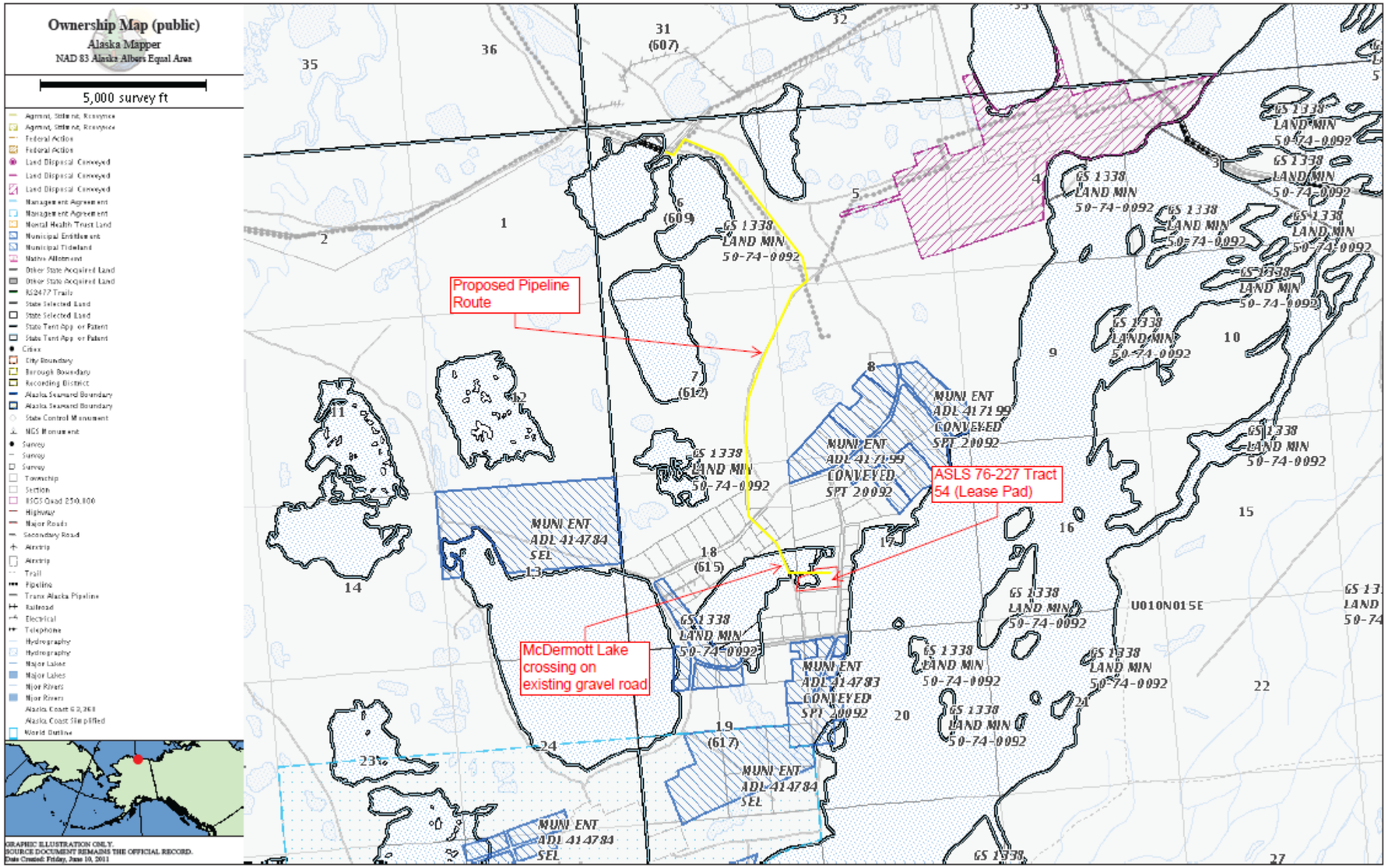
Ownership Map (public)
Alaska Mapper
NAD 83 Alaska Albers Equal Area
5,000 survey ft
Proposed Pipeline Route
ASLS 76-227 Tract 54 (Lease Pad)
McDermott Lake crossing on existing gravel road
MUNI ENT ADL 417199 CONVEYED SPT 20092
MUNI ENT ADL 414784 SEL
MUNI ENT ADL 414783 CONVEYED SPT 20092
GS 1338 LAND MIN 50-74-0092
U010N015E
GRAPHIC ILLUSTRATION ONLY.
SOURCE DOCUMENT REMAINS THE OFFICIAL RECORD.

Figure 3

PART II
PROJECT DESCRIPTION

15. Substance(s) to be transported:

Prudhoe Bay Unit Fuel Gas. Typical composition:

Component	UNTREATED PIPELINE GAS
	Typical mol %
C1 (methane)	80.1
C2 (ethane)	5.25
C3 (propane)	1.65
IC4 (isobutane)	0.11
NC4 (normal butane)	0.17
IC5 (isopentane)	0.02
NC5 (normal pentane)	0.02
C6+ (hexane & heavier)	0.02
CO2 (carbon dioxide)	12.05
N2 (nitrogen)	0.61

16. Size, engineering and design characteristics and amount of each type of pipe to be used:

6 inch NPS API 5L X 65 wall thicknesses expected to be 0.500 inch as determined in detailed design Proposed length approximately 200 ft. This segment will be from tie-in point to custody transfer metering module.

8 inch NPS API 5L X 65 wall thicknesses expected to be 0.500 inch to 0.562 inch as determined in detailed design. Proposed length approximately 22,000 ft.

The process for determining the pipe wall thickness determinations and final routing is described in the Polar LNG Feed Gas Pipeline Design Basis. The State Pipeline Coordinators Office will review the Design Basis prior to its implementation. The pipe wall thickness and pipeline length will be determined during detailed engineering.

17. Size, number and location of pumping, compressing, heating or refrigeration stations:

None. Line will operate at pressure of fuel gas header. Future expansion plans may add a compressor to increase pipeline capacity.

18. Transportation capacity of the proposed pipeline:

36 mmscf per day. Future expansion plans may increase pipeline capacity to 50 mmscf per day.

19. Estimated life of the pipeline:

There are three definitions of "life" to consider in evaluating a pipeline; design life, physical life, and economic life. Design life is the expected physical life of pipeline when operated at the conditions considered in the design. Physical life is the actual working duration of the pipeline, including all maintenance, repairs, and upgrades. Economic life is the duration which the pipeline is planned to meet its intended economic goals. In a study published in 2007 by Norton & Miller, Alyeska Pipeline Service Company defined useful life as the combination of the three above definitions. The study concluded that with appropriate maintenance, the physical life of a pipeline is virtually unlimited.

The pipeline has a planned economic life of 20 years, to match the planned economic life of the natural gas liquefaction facility it feeds.

The pipeline is designed in accordance with codes and standards published by the American Society of Mechanical Engineers and the American Petroleum Institute that provide a minimum useful life of 30 years.

With appropriate maintenance, a pipeline can provide useful service indefinitely.

20. Planned temperature at which each substance will be transported and whether it will be heated or refrigerated to maintain that temperature.

The gas temperature will be the same as the Prudhoe Bay Unit Fuel Gas Header. The typical range is 25°F to 50°F. Polar LNG intends to use the gas at its produced temperature, and has no plans for heating or refrigerating the gas for transportation in the pipeline. If during the detailed design phase, a need for refrigeration or heating is determined, appropriate measures will be taken at that time.

21. The pipeline will be (check as appropriate):

- **Supported over the surface along its entire length__✔__**
- **On the surface along its entire length ____**
- **Partially buried along its entire length ____**

• Completely buried along its entire length ____
• None of the above _(If this is checked, attach a map showing which portions of the pipeline are planned to be over the surface, on the surface, partially buried and wholly buried.)

The pipeline will be supported on VSMs along its entire length, except at the Drill Site Maintenance Road crossing and Spine Road crossing (where it will be contained in a new road crossing sleeve) and at the Polar LNG Pad (where it transitions to a buried pipeline within the existing gravel pad to provide an unobstructed path for equipment movement around the pad site).

22. Describe the methods to be employed for partially or completely burying any portion.

The pipeline will cross the existing maintenance road in two locations and Spine Road in new road crossing sleeves.

Once the pipeline reaches the existing gravel pad it will transition to buried, to provide an unobstructed path for equipment movement around the pad site.

The pipe will be buried with the top of pipe at least 36 inches below the surface, in accordance with 49 CFR 192.327 for Class 2, 3, and 4 locations. The pipe will be buried within the pad, and without disturbance to the underlying tundra. Insulation will be placed as needed to prevent heat transfer to the tundra.

A new road crossing sleeve is planned to be installed at two locations on the existing maintenance road and at Spine Road which will comply with the 36 inch depth requirement of 49 CFR 192. The need for cathodic protection will be determined during detailed design.

23. Describe any bridges, trestles, other structures or berms for the support of the proposed pipeline.

The pipeline will be supported on Vertical Support Members, typical to those in wide use on the North Slope oil fields. The pipeline will install new road crossing sleeves at two locations on the Drill Site 12 maintenance road and a new crossing sleeve at Spine Road.

24. Describe the proposed method for all stream crossings and crossings of other bodies of water.

Portions of the pipeline crossing wetlands will be supported by VSMs. Any required lake or stream crossings will be supported by VSM if technically feasible to do so.

25. Describe the proposed methods for grades, cuts or fills.

No grading is proposed. Each VSM will be installed using typical North Slope construction methods. A hole is augured to an appropriate depth determined in detailed design and the VSM elevation that matches the existing pipelines. The annular space around the pile is backfilled with slurry material which freezes in the permafrost, thus anchoring the pile.

26. Discuss planned facilities for spill or leak prevention and containment.

The pipeline contains Prudhoe Bay Unit Fuel Gas, which is essentially produced natural gas passed through an oil / water separator. The gas does not create spills if there is a pipeline leak.

Pipeline leaks are monitored and detected with a redundant instrumentation system. First, there is a custody transfer meter set as close as practicable to the tie-in point. There is a second meter installed at the terminus of the pipeline. The Plant Control System continuously monitors these two meters and alerts the operator if there is a discrepancy that could indicate a leak. Second, there are pressure measurement transmitters located at the inlet and terminus of the pipeline that are monitored by the Plant Control System. The A drop in pressure could indicate a leak, and the operator is alerted to this condition.

In accordance with 49 CFR 192, the pipeline is regularly patrolled by operators, who are trained to notice visible and audible indications of leaks, and to inspect with gas meters. Additionally, the pipeline will be inspected in accordance with 49 CFR 192, using "smart pigs" to monitor for corrosion and potential weak points that could become leaks if not detected and repaired.

No odorant will be added to the pipeline gas. Although the addition of a mercaptan odorant to natural gas lines is a typical method of providing leak detection, it is not a practical approach for the Polar LNG Feed Gas Pipeline. The odorant is a sulfur based compound that is not compatible with the liquefaction process, so the odorant would need to be stripped from the feed gas stream immediately after introducing it.

27. Proposed access roads, airstrips, heliports, float plane facilities, communication facilities, storage sites for equipment and materials, material sites, and material disposal sites, whether planned for construction, operation or maintenance support:

The pipeline will be constructed adjacent to an existing BP Exploration pipeline and maintenance road between Flow Station 1 and Polar LNG pad in Deadhorse. Construction will be in winter using an ice road. No facilities identified in question 27 are proposed for construction or operation of the pipeline.

Materials will be brought to the site via the Dalton Highway, and the existing road network around Deadhorse and the Prudhoe Bay Unit, including Spine Road and Sag River Road.

28. Size, number, approximate location and planned duration of field camps:

The pipeline will be constructed by contractors with permanent facilities on the North Slope. No temporary construction field camps are required.

29. Size, number and approximate location of housing for personnel operating or maintaining the pipeline:

The proposed new LNG facilities and pipeline will be operated by 3 people per shift, on a 2 shift per day basis.

Permanent operations personnel will be housed in existing camp facilities in the Deadhorse or Prudhoe Bay Unit areas. No new housing facilities will be constructed as part of this project.

30. Size, number and approximate location of health care facilities:

During construction, the construction contractor will provide first response capabilities. The existing clinic in Deadhorse will provide care required beyond first aid. Advanced care will require medevac to Fairbanks or Anchorage.

During operation, Polar LNG operators will provide first response capabilities. The existing clinic in Deadhorse will provide care required beyond first aid. Advanced care will require medevac to Fairbanks or Anchorage.

No new health care facilities will be constructed as part of this project.

31. Approximate number of persons to be employed during construction:

The pipeline work force will be 35 to 40 at peak. Construction is planned for the tundra travel seasons of January to April of 2012, and January to May of 2013.

32. Approximate number of persons to be employed to operate and maintain the pipeline:

Six plant operators and three maintenance technicians 24-hours a day, seven days a week. Personnel will be located at the Polar LNG liquefaction facility, and will patrol and maintain the pipeline.

33. Planned commencement date for construction:

Final design and VSM material procurement will take place from June to December 2011. During the tundra travel season of approximately January 1, 2012 to May 1, 2012, an ice road and up to five 200 x 200 feet ice pads will be constructed adjacent to the pipeline route, and VSM will be placed. Pipe procurement, and fabrication of the metering module

will take place throughout 2012. In the tundra travel season of approximately January 1, 2013 to May 1, 2013, the pipeline will be installed on the VSM. The tie-in will be made to the Prudhoe Bay Unit fuel gas header during 2012 or early 2013, at a convenient time for Fuel Gas Header operations.

34. Estimated construction time:

The construction period is 18 months from January 1, 2012 to close of tundra travel season, approximately May 1, 2013, extending over two winter construction seasons. During the summer of 2011, the pipeline route will be surveyed. If coordination with other Prudhoe Bay Unit Owners is completed in summer 2011, the road crossing sleeves may be installed; otherwise, no summer construction is contemplated.

35. Planned commencement date for operations:

July 1, 2013

36. Estimated cost of materials:

$6,000,000 per contractor estimates

37. Estimated cost of construction and installation:

$5,000,000 per contractor estimates

38. Estimated annual cost for operations and maintenance:

Pipeline O&M costs are $ 1,043,750 per year per Polar LNG tariff calculations.

PART III
AVAILABILITY OF INTERCONNECTIONS, TERMINAL FACILITIES
AND STORAGE FACILITIES

39. Describe how the proposed pipeline will connect with planned field gathering systems, if any.

The pipeline will be tied into the existing Prudhoe Bay Unit Fuel Gas Header at Flow Station 1.

40. Discuss the technical and economic feasibility of providing connections with other field gathering systems at intermediate points along the proposed pipeline.

Polar LNG is purchasing gas from ExxonMobil, one of the Prudhoe Bay Unit Owners. It is possible that ExxonMobil or other PBU Owner would agree to sell gas to another party. There is currently another pipeline operated by Norgasco that takes off from a similar tap at Flow Station 1 and transports gas to Norgasco's distribution grid in Deadhorse.

The Polar pipeline as currently designed is nearly at design capacity based on the available pressure drop from the PBU Fuel Gas Header. Additional users would probably need to add compressors, which would increase the normal working pressure of the Polar pipeline which presently matches the PBU Fuel Gas Header to some higher value.

Polar's pipeline is designed for a Maximum Allowable Operating Pressure of 1440 psig, so it is technically feasible to add compressors to increase flow. The Polar pipeline is designed to carry saturated gas from Flow Station 1. Gas Treatment facilities incorporated in the LNG plant are designed to strip the water from the saturated gas streams and to recycle that water for process use in stripping carbon dioxide and sulfur compounds.

41. Discuss the technical and economic feasibility of providing connections or interchanges with other pipelines at intermediate points along the proposed pipeline.

It is technically possible to add taps to the Polar pipeline along its route, provided that the take-offs did not interfere with existing PBU operations. Any such take-offs would need to be designed to protect the Polar pipeline and the PBU Fuel Gas Header from overpressure or excess flow conditions. The Polar Pipeline is designed to transport saturated gas, so any take-offs from the Polar pipeline would need to be designed to handle saturated gas.

The Polar Pipeline VSM design presently has unused, unallocated space that could be made available to other users for additional pipelines.

42. Describe the location, area and capacity of proposed tank farms or other storage facilities.

There is no gas phase storage planned. Polar LNG plans to receive saturated gas and extract the water at the Deadhorse Liquefaction Facility.

43. Provide locations of and describe any terminal delivery facility of the proposed pipeline.

The pipeline terminates at the Polar LNG Gas Pre-treatment building. The gas is routed through a pipeline meter to monitor line loss, and then into the amine contactor and dehydrator process. The scrubbed, dehydrated gas is then routed to the liquefaction process.

44. Discuss the technical and economic feasibility of providing delivery facilities at intermediate points along the proposed pipeline.

The pipeline is routed through the Prudhoe Bay Unit oil field. There appear to be few potential users for gas along the route. There is a natural gas utility (Norgasco) operating in the Deadhorse area, but has no distribution on the Prudhoe Bay Unit. If Norgasco sought an intermediate tap from the Polar LNG pipeline, it could be provided, if the tap is designed to handle saturated gas, and can protect the PBU Fuel Gas Header and Polar LNG pipeline from overpressure and excess flow conditions.

When the Polar LNG Liquefaction Plant is operating at full capacity, it requires nominally the full capacity of the pipeline at its planned operating pressure. Polar LNG's plan for operating the pipeline is based on using the available delivery pressure from the PBU Fuel Gas Header without additional compression. The inlet to the Polar LNG process requires approximately 500 to 550 psig, and the delivery pressure at the PBU Fuel Gas Header is 600 to 650 psig. The available pressure drop matches the flows required to the Polar LNG Liquefaction Plant. Deliveries to other take-off points would require a new hydraulic study of the take-off point at Flow Station 1 to assure that greater volumes can be provided without adverse impact to the PBU Fuel Gas Header operations; and would likely require the installation of compressors at the head of the pipeline to provide greater pressure and flow; and installation of letdown stations to reduce the pressure back to a level suitable for distribution use. The addition of compressors would need to be coordinated with the PBU Operator, and agreement for the placement and access for operation of the compressors would need to be reached.

The cost analysis of the additional facilities required to increase flow through the pipeline has not yet been developed.

PART IV
SAFEGUARDS FOR PERSONS, PROPERTY, THE PUBLIC,
AND THE ENVIRONMENT

45. Describe your plans to detect and abate any condition possibly arising from the construction, operation, maintenance or termination of all or any part of the proposed pipeline that may cause or threaten to cause a hazard to the safety of workers on the pipeline project.

The Polar LNG Feed Gas Pipeline will be designed, constructed, operated and maintained in full compliance with 49 CFR 192 as administered by the Pipeline and Hazardous Material Safety Administration (PHMSA). All requirements of 49 CFR 192 and its referenced Codes will be adhered to, providing protection to workers from hazards associated with the pipeline.

Polar LNG is developing a Project Quality Assurance Manual that will define how compliance with applicable Codes, Standards, Regulations, Permit Requirements, and design specifications will be achieved.

For contracted work, Polar LNG will require contractors to submit quality management plans for review. The review will ensure that contractors will at a minimum meet Polar LNG requirements. Where a contractor has more stringent quality or inspection requirements than Polar LNG, the contractor will comply with the provisions of its own manual. Similarly, where Polar LNG requirements are more stringent than the contractor's standard, the contractor will be required to comply with the provisions of Polar LNG Quality Assurance Program.

<u>Construction phase:</u>
A compliance plan for construction will be developed with the team of contractors hired for construction. The basis for plan development is that all accidents are avoidable with a goal of Zero Accidents. Contractors shall prepare a Job Hazard Analysis for each item of the Work. The construction plan will include:

- Emergency response plan that specifically address:
  - Construction accidents
  - Injury
  - Fatality
  - Hazardous material spill
  - Fire
  - Confined space
- Environmental Compliance Plan
- Storm Water Pollution Prevention Plan, as required

Operations and Maintenance Phase

Polar LNG will adapt and expand the Fairbanks Natural Gas Standard Operating Procedures Manual to include the specific features of the Polar LNG facilities. An Emergency Response Plan will be prepared that deals with:

- Emergency Shutdowns of Pipeline and Process Plant
- Fire or explosion
- Pipeline rupture
- Emergency at Tie-in at Flow Station 1
- Hazardous material spill
- LNG Spill
- Earthquake
- Severe weather events
- Terrorist threat
- Serious injury or illness
- Fatality
- Communications loss

Copies of permits and operating limitations will be maintained in the Polar LNG Control Room. A compliance matrix will be part of the Standard Operating Procedures established for Polar LNG. The plan will include internal auditing by Polar LNG management, and third party inspection as required.

46. Describe your plans to detect and abate any condition possibly arising from the construction, operation, maintenance or termination of all or any part of the proposed pipeline that may cause or threaten to cause a hazard to the public health and safety.

The Polar LNG Feed Gas Pipeline will be designed, constructed, operated and maintained in full compliance with 49 CFR 192 as administered by the Pipeline and Hazardous Material Safety Administration (PHMSA). All requirements of 49 CFR 192 and its referenced Codes will be adhered to, providing protection to workers from hazards associated with the pipeline.

The primary risk to public health or safety is a pipeline leak or rupture, with the associated release of the fuel gas to atmosphere. The Deadhorse Liquefaction Plant and LNG transportation present risks not associated with the pipeline operation. The hazard to the public is mitigated by the location of the pipeline. Approximately 3 miles of the 3.8 mile pipeline route is within the Prudhoe Bay Unit. The remaining portion, from Spine Road, southeast to the Polar LNG pad is outside of the oil field area. Access is restricted to those authorized by the Prudhoe Bay Unit Operator. The pipeline route passes within 220 yards of two Drill Sites that are not continuously manned, and past two contractor work yards.

There are no continuously occupied facilities within 220 yards of the pipeline route. The risk events are summarized below:

- Pipeline leak – leaks of a small nature that would not be detected by pressure drops or line loss metering. Leak sources include flanges, valves, weld joints, and locally corroded areas. Leaks of this nature would be detected during the routine patrols required under 49 CFR 192.705 (4 ½ month interval at road crossings; 7 ½ month interval at other locations in the Class 3 Areas; 7 ½ month interval at road crossings and 15 month interval in other locations in Class 1 areas) using audible clues to leaking gas, and handheld gas meters. Once the leak is identified, repairs will be made.
- Pipeline rupture – the sudden and complete break of the pressure boundary. This could result from earthquake, or physical damage from a vehicle or equipment collision, or intentional attack. Pipeline ruptures will be detected by the line loss and pressure drop monitoring equipment and emergency shutdown will be initiated either automatically or manually by a plant operator. The emergency shutdown system provides positive closure at each end of the line, leaving a maximum of 250 mcf in the line that could be released as a result of rupture. The rupture may or may not result in a fire. In the event of a fire, the fire would be extinguished by the closing of the ESD valves, cutting off the fuel supply. Explosions in this line are a highly unlikely event, as the explosive range of natural gas is a 5% to 15% mixture with air when confined. Because the gas would be released to atmosphere, it will disperse rapidly through its explosive range, and because it is an above ground line for most of its length, is unlikely to be confined. If the escaping gas from a rupture were ignited, a deflagration (low pressure, subsonic wave accompanied by rapid burning) event may occur, depending on the volume of the gas cloud ignited.

Liquefaction Facility and Transportation Risks

DEADHORSE LNG HAZARDS

1. Liquid leaks under pressure (pipe & pumps leaks)
2. Liquid leaks from tanks (subset of above case – tanks are pressurized at 40 psig working pressure and 85 psig MAOP)
3. Storage tank rollover (not applicable at Deadhorse site due to pressurized tank design)
4. Liquid pools evaporating and forming a vapor cloud
5. Rapid Phase Transition (RPT) explosion from liquid leaks injected into water (unlikely scenario for Deadhorse plant, possible if LNG tanker truck fell into river and ruptured inner and outer shells and discharged 50% or more of volume. Flowing water contributes to rapid dispersion of LNG and prevents formation of large pool for RPT explosion)
6. Boiling Liquid Expanding Vapor Explosion (BLEVE) of LNG or LPG tanks
7. Vapor cloud Explosion

The effects of these hazards are:

1. Radiation burns and structural weakening from flash fire, pool fire or jet fire
2. Overpressure from a partially confined vapor cloud explosion
3. Overpressure from a confined vapor cloud explosion
4. Rapid spreading, evaporation and potential overpressure from an RPT explosion
5. Asphyxiation
6. Cold injuries / freeze burns

LNG Hazards have been demonstrated to occur in the following sequence:

1. Leak
2. Pool formation
3. Vapor dispersion
4. Flash fire back to pool
5. Pool fire

Significant Offsite Consequences – Vapor Cloud Explosion

Experiments in LNG hazards at Sandia National Laboratories in 2009 have confirmed that outdoor vapor cloud explosions (VCE) occur only under partial confinement or in congested regions. Congested regions include areas of the plant with a high density of piping, rotating equipment, stationary equipment and buildings. The areas between the buildings at Deadhorse could present a congested region.

However, a mitigating factor against a possible outdoor VCE is the low reactivity of natural gas. Experiments have been unable to produce credible scenarios for detonation due to the low reactivity of natural gas. Outdoor VCE resulting in deflagration, which is the propagation of combustion at subsonic speed, is a possible, but low probability event.

Enclosed VCE can occur with the buildup of natural gas vapors indoors or inside any enclosed space. The most common occurrence of an enclosed VCE is natural gas leaking inside a building. A VCE is possible in Liquefaction or Gas Treatment Buildings. When the plant is running at maximum capacity, there is approximately 25 mcf of gas phase methane in the process equipment at a pressure of approximately 500 psig and a temperature range of +60 degrees F to -260 degrees F, providing opportunity for gas to collect in the buildings and explosively ignite. This potential hazard is mitigated by use of appropriate piping and equipment design codes; use of appropriate electrical classification in areas subject to gas accumulation; use of gas detectors throughout the process areas; audible and visual enunciators to warn personnel of gas detection; HVAC system that increases air changes to 8 ACH upon gas detection; elevated air intakes to preclude outdoor vapor intrusion to buildings; deflagration vents in the building design.

The natural gas is in vapor phase until it reaches the Cold Box, which is outside of all buildings. The gas in the cold box is two phase. Vapor clouds resulting from a LNG spill are dense due to

the temperatures, and it is highly unlikely that LNG vapors will enter buildings and contribute to an enclosed VCE.

Significant Offsite Consequences- Boiling Liquid Expanding Vapor Explosion

Boiling Liquid Expanding Vapor Explosions (BLEVE) are most often associated with LPG tanks. A recorded BLEVE in a LNG tank has only occurred in a highway tanker in Spain in 2002.

The LPG Tank in the Deadhorse plant design is 30,000 gallon water capacity, and is designed in accordance with ASME BPVC Section VIII division 1 and rated for 250 psig MAOP at 140 deg F, constructed from SA516 Grade 70 head and shell. It is rated for atmospheric external pressure plus the pressure of 2 feet of earth. The LPG Tank at Deadhorse will be mounded in earth as described in NFPA 58A. The earth mounding effectively eliminates the potential for flame impingement, so the likelihood of BLEVE is very low.

A BLEVE could occur in the LNG surge tanks if the tank was at a sufficiently low level that significant vapor space was present and flame impinged on the tank long enough. The occurrence of BLEVE is mitigated by the vacuum jacket insulation on the tank which slow the heat transfer; redundant pressure relief valves; all piping connection on the top tangent, with small bore differential pressure gauge taps on the bottom.; equipment arrangement that minimizes opportunity for a jet fire from other equipment to impinge on the tanks.

A BLEVE could occur in a LNG tanker trailer, but is a highly unlikely event. The one recorded incidence of this occurred in Spain in 2002 as the result of a rollover accident of a 14,000 gallon LNG tanker trailer and diesel powered tractor. A result of the accident was the dislodging of the tank insulation in the vapor space area. A fire started from the diesel fuel tank of the tractor between the tractor cab and tanker. The diesel fire spread and burned for approximately 20 minutes before the BLEVE occurred. There were one fatality and two injuries to personnel approximately 650 feet from the tanker. The explosive power was estimated at 82,680 Btu/cf-hr. The engine block of the tractor was thrown approximately 850 feet. An incident of this type is mitigated by the trailer design used by Polar LNG. The tanker in the incident described used expanded polyurethane foam, which could break off in a large piece, and allow excessive heat penetration. The tanker design used by Polar uses wrapped insulation, covered with a steel shell, which is less likely to break off leaving un-insulated areas. FNG had two tanker rollovers in its history of hauling LNG from Wasilla to Fairbanks since 1998. Neither incident resulted in fire. Tanker design allows for controlled rate of discharge of LNG and vapors in the event of rollover. Tanker design includes rupture disc to prevent catastrophic overpressure and BLEVE.

The Risk Matrix below uses the following terms and classifications for risk values:

RISK ASSESSMENT				
	SEVERITY			
FREQUENCY	CATASTROPHIC	CRITICAL	MARGINAL	NEGLIGIBLE
LIKELY	1A	2A	3A	4A
PROBABLE	1B	2B	3B	3B
OCCASIONAL	1C	2C	3C	4C
REMOTE	1D	2D	3D	4D
IMPROBABLE	1E	2E	3E	4E

RISK CATEGORY
HIGH
SERIOUS
MEDIUM
LOW

NO.	EVENT	CAUSE	RISK	PROBABILITY AND MITIGATION MEASURES
1	Pipeline Leak	Leak at joint or locally corroded area	Severity – Negligible Frequency – Occasional Risk – 4C – Low	Pipeline designed and constructed in accordance with applicable Codes to prevent leaks. Routine patrols and instrument monitoring detect leaks. Routine pigging and maintenance detect problems before leaks develop. Block valves limit volume of gas in line.
2	Pipeline Rupture	Earthquake, physical damage, vehicle or equipment collision, intentional attack	Severity – Critical Frequency – Remote Risk – 2D – Medium	Pipeline designed and constructed in accordance with applicable Codes. Routine maintenance and pigging. Routine patrols and instrument monitoring. ESD valves limit volume of gas in line. Few ignition sources. Ambient conditions usually include winds for rapid dissipation.

NO.	EVENT	CAUSE	RISK	PROBABILITY AND MITIGATION MEASURES
3	BLEVE in LNG Surge Tank	Jet fire from one LNG tank impinges on second tank. Ice and snow on PSV discharges prevent proper venting. Tank overpressures and boils.	Severity – Catastrophic Frequency – improbable Risk – 1E - Medium Personnel injuries or fatalities. Overpressure of buildings on site Pressure wave offsite Large vapor cloud explosion	Low. Spared relief valve design. Heat trace on PSV stacks to prevent ice accumulation. Vacuum bottle tank unlikely to develop jet leak through both shells. Piping connections are at head end of vessel, so pipe breakage is unlikely to result in impingement on adjacent tank.
4	Demethanizer explosion	Brittle failure of vessel results in discharge of ethane/propane rich streams into building and ignition provided by electrical or heat sources in the building.	Severity – Catastrophic Frequency – Improbable Risk – 1E - Medium Personnel injuries or fatalities if in PXU building at time of explosion.	Low. The vessels are constructed for cryogenic service per ASME Code. Materials selected to resist brittle fracture. Ignition sources controlled by electrical classification.

NO.	EVENT	CAUSE	RISK	PROBABILITY AND MITIGATION MEASURES
			Overpressure of buildings on-site Pressure wave off site	
5	BLEVE in LNG Surge Tank	One tank completely fails discharging tank contents into containment. Pool ignites and heats remaining tank, causing a pressure build at a rate faster than redundant PSV can relieve.	Severity – catastrophic Frequency – improbable Risk – 1E - Medium Personnel injuries or fatalities. Overpressure of buildings on site Pressure wave offsite Large vapor cloud explosion	Very low. Double wall construction of tanks mitigates likelihood of flame impingement on the inner tank. Redundant pressure relief devices mitigates excessive pressure build.
6	Cascade Failure: Jet Fire in Cold Box impinges on 2nd Cold Box, resulting in piping or structural failure. Resultant fire impinges on 3rd Cold Box resulting in its structural or pressure boundary failure. Resultant Vapor	Piping failure, heat exchanger failure	Severity – catastrophic Frequency – improbable Risk – 1E - Medium	This event is mitigated by the PSV incorporated in the design; plant control system monitoring of Cold Box temperatures and alarms for temperatures out

NO.	EVENT	CAUSE	RISK	PROBABILITY AND MITIGATION MEASURES
	Cloud Explosion		Outdoor VCE Personnel injuries or fatalities Overpressure to buildings on site	of range; ESD system; amount of potential fuel in the system after ESD closes feed gas (approx 22.2 mcf) [after fire detected and ESD activated, fire could not burn long enough to damage adjacent cold box)
7	Total failure of LNG Surge tank and formation of vapor cloud from pool formed in containment dike and outdoor VCE	Weld failure, material stress, brittle fracture, external damage. Ambient conditions that cause rapid formation of vapor cloud and subsequent ignition	Severity – critical Frequency – remote Risk – 2D - Medium Cold injury and asphyxiation threat to personnel; Overpressure onsite and offsite	This event is mitigated by appropriate electrical classification of tanks and containment area; placement of tanks away from ignition sources

NO.	EVENT	CAUSE	RISK	PROBABILITY AND MITIGATION MEASURES
8	Simultaneous total failure of both LNG tanks overfills capacity of containment dike and large pool forms	Weld failure, material stress, brittle fracture, external damage.	Severity – catastrophic Frequency – Improbable Risk – 1E - Medium Cold injury and asphyxiation threat to personnel; Overpressure onsite and offsite	mitigated by appropriate electrical classification of tanks and containment area; ESD system; fire and gas enunciation panel, warning personnel in yard to shutdown vehicles and ignition sources; gravel pad that minimizes liquid travel
9	Tanker BLEVE in yard	Vehicle accident/rollover/ collision in yard with fire and sufficient damage to insulation to allow excess heat flux	Severity – catastrophic Frequency – improbable Risk – 1E - Medium Large explosion, overpressure onsite and off-site, flying debris off site	Mitigated by tanker design; driver training; guard rails; plant layout; speed limits; on site fire extinguishers

NO.	EVENT	CAUSE	RISK	PROBABILITY AND MITIGATION MEASURES
10	Tanker BLEVE in Deadhorse or on Haul Road	Vehicle accident/rollover/ collision in yard with fire and sufficient damage to insulation to allow excess heat flux	Severity – catastrophic Frequency – improbable Risk –1E - Medium Large explosion, overpressure onsite and off-site, flying debris off site; road closure	Mitigated by tanker design; driver training; guard rails; plant layout; speed limits;

47. Describe your plans to detect and abate any condition possibly arising from the construction, operation, maintenance or termination of all or any part of the proposed pipeline that may cause or threaten to cause serious and irreparable harm or damages to public or private property.

The risk evaluation for the Feed Gas Pipeline, Liquefaction Facility, and Transportation Plan are discussed in Item 46, above.

Polar LNG Standard Operating Procedures will contain an Emergency Response Plan to deal with any risks identified above that are realized.

48. Describe your plans to detect and abate any condition possibly arising from the construction, operation, maintenance or termination of all or any part of the proposed pipeline that may cause or threaten to cause serious and irreparable harm or damages to vegetation or timber.

The primary incidents that could arise are identified in Item 46, and can be classified into

one of the two categories below:

1) Fire that spreads to adjacent vegetation:
    a. A fire resulting from a pipeline leak or rupture will burn above the elevated pipeline, as the natural gas is lighter than air. The vegetation surrounding the fire would be subject to thermal radiation. The exposure is limited to the gas remaining in the pipeline (250 mcf), assuming that the Emergency Shutdown (ESD) valves perform as designed.
    b. Fire at Liquefaction Facility: The Liquefaction Plant is built on a 5.75 acre gravel pad. Thermal radiation studies conducted for the plant siting show that the 1600 Btu/Sq ft-Hr radiation limit is contained at the fence line of the facility.
2) Spills of liquids that could damage vegetation
    a. LNG spill at the Liquefaction Plant. The LNG storage and transfer areas are protected by an earthen dike, sized for 110% of a single tank capacity. It is unlikely that LNG would contact surrounding vegetation. LNG spills from storage are unlikely, given the double wall construction of LNG tanks. In the event that it did, LNG is a non-toxic material that will evaporate leaving no residue if not ignited. If ignited, the resulting pool fire will consume the LNG, also leaving no residue. If ignited, surrounding vegetation would be subject to thermal radiation. The normal firefighting response to a LNG pool fire is to let the fire consume the pool.
    b. Material Chemical spill at the Liquefaction Facility. The Liquefaction plant contains an amine gas treatment process that contains approximately 12,500 gallons of amine solution, and approximately 6,000 gallons of produce water. The LNG plant is designed with a spill containment pan floor, and is located on a 5.75 acre gravel pad. Spills of amine or other process chemicals, lubricants, or diesel fuel are unlikely to travel to vegetated areas. Diesel fuel for the standby generator is contained in a UL 142 design self-diked storage tank. Drums of lubricant are kept in diked areas.
    c. Tanker spill along the highway. This situation is similar to an LNG spill described above. A release is mitigated by the double wall construction of the LNG tankers. A spill resulting from a rollover accident will evaporate if not ignited. A diesel spill from an overturned tanker could impact adjacent vegetation. Polar LNG and Polar LNG uses contracted haulers to transport the LNG tankers, and fuel spill cleanup procedures are developed with the contracted hauler.

49. Describe your plans to detect and abate any condition possibly arising from the construction, operation, maintenance or termination of all or any part of the proposed pipeline that may cause or threaten to cause serious and irreparable harm or damages to fish or other wildlife or to their habitats.

There appear to be no specific threats to fish or wildlife as a result of construction or operations of the pipeline or LNG Liquefaction Plant. McDermott Lake is non-fish bearing and the long-term presence of existing industrial facilities and activities in the general area deter wildlife presence the area. In addition, construction would occur during winter seasons from ice roads and pads, further minimizing the potential for impacts to tundra habitat. The environmental hazards identified are described in Items 45 through 48 above.

Polar LNG will include in its Standard Operating Procedures the requirement to comply with all required Permit Conditions and requirements of the North Slope Borough.

Polar LNG will confer with US Fish and Wildlife Service and Alaska Department of Fish and Game, and if needed, will develop a human-carnivore interaction plan in accordance with Alaska Department of Fish and Game guidelines.

50. Describe your plans for restoring areas of vegetation or timber damaged or harmed directly or indirectly by the construction, operation, maintenance or termination of all or any part of the proposed pipeline.

The pipeline will be constructed from an ice road, in accordance with Alaska Department of Natural Resources approved procedures. This mitigates damage to the underlying tundra. In the event of damage to tundra, it will be repaired as directed by the Alaska DNR.

51. Describe your plans for abating erosion and restoring areas eroded as a direct or indirect result of the construction, operation, maintenance or termination of all or any part of the proposed pipeline.

Erosion is not expected as a result of the construction, operation, maintenance or termination of the proposed pipeline. The pipeline will be constructed from an ice road during the approved tundra travel season, in accordance with Alaska DNR approved procedures, and normal pipeline surveillance will be conducted from the existing maintenance road.

52. Describe your plans for quality control and your procedures for inspection and testing the pipeline, both during and after construction.

The pipeline is designed in accordance with 49 CFR 192. This federal regulation incorporates by reference ASME B31.8 – standard of Gas Transmission and Distribution Piping Systems and API 1104 – Welding of Pipelines and Related Facilities. Quality Control and inspection and testing plans will be developed in full compliance with these codes.

The pipeline will be operated in accordance with 49 CFR 192, including the qualification of operators and pipeline integrity management.

53. Describe your plans to ensure compliance by your contractors and subcontractors with the safeguards and stipulations of the right-of-way1ease, if issued.

Polar LNG is developing a Project Quality Assurance Manual that will define how compliance with applicable Codes, Standards, Regulations, Permit Requirements, and design specifications will be achieved.

For contracted work, Polar LNG will require contractors to submit quality management plans for review. The review will ensure that contractors will at a minimum meet Polar LNG requirements. Where a contractor has more stringent quality or inspection requirements than Polar LNG, the contractor will comply with the provisions of its own manual. Similarly, where Polar LNG requirements are more stringent than the contractor's standard, the contractor will be required to comply with the provisions of Polar LNG Quality Assurance Program.

Qualified contractors will be selected through a pre-qualification program. Only those contractors with complete safety and quality management programs available for review and demonstrated records of safe, responsible, compliant operations will be considered.

Compliance with all permit and right-of-way conditions will be a provision of each construction contract. Contracts will require flow-down provisions to any subcontractors used by contractors.

Each contract will start with a kick-off meeting to ensure that all terms and requirements are understood, and that the contractor has a plan for compliance prior to allowing start of construction.

Polar LNG will have a representative on site during construction to verify compliance.

PART V
SPECIAL SAFEGUARDS FOR NATIVES AND OTHERS
SUBSIDING ON THE BIOTIC RESOURCES OF THE GENERAL AREA
OF THE PROPOSED RIGHT-OF-WAY

54. Describe your plans and procedures to protect the interests of individuals living in the general area of the proposed right-of-way who rely on the fish, wildlife and biotic resources of the area for subsistence purposes.

The pipeline route is though the Prudhoe Bay Unit oil field, in an area that has access restricted by the Prudhoe Bay Unit Operator, and part of the facility is located in Deadhorse, Alaska adjacent to other Prudhoe Bay industrial facilities. It parallels an existing BP Exploration pipeline and maintenance road and will not affect any communities or known subsistence areas.

McDermott Lake is adjacent to the Deadhorse Liquefaction Facility, and State of Alaska Department of Fish and Game surveys determined that it is not a fish bearing body of water.

PART VI
FINANCIAL INFORMATION

55. Describe the probable financing requirements for the proposed pipeline.

Polar LNG, LLC is wholly owned by Pentex Alaska Natural Gas Company, LLC and Pentex will be self-financing the pipeline. Pentex also wholly owns Fairbanks Natural Gas, LLC, and the management team of Fairbanks Natural Gas will operate Polar LNG

Financing will be provided to Pentex through its parent companies. Pentex is 85% owned by Harrington Partners, LP. Harrington, in its majority interest will be providing the capital for the project through funds from operations, or through additional funds raised specifically for the project.

56. Attach an annual financial statement and balance sheet for each applicant, prepared in accordance with generally accepted accounting principles for each of the applicant's three fiscal years immediately preceding the date of this application. The financial statement must be certified by a firm of reputable and independent Certified Public Accountants.

Per AS 38.05.035(a)(8)(D) (Alaska Land Act) we respectfully request that all financial documents related to Fairbanks Natural Gas, LLC and Harrington, LP be held confidential and not be released as public record per USC 552(b)(4).

The financial information provided is for the purpose of demonstrating the financial ability our organization has in funding and the long-term operation of our proposed pipeline project. We consider this information privileged and to be used during the application process only.

PART VII
OTHER INFORMATION

57. Name and address of the proposed general contractor(s) for constructing the pipeline:

Peak Oilfield Service Company
Attn: Eric Franklin
2525 C Street
Anchorage, Alaska 99503

Design Subcontractor:
Michael Baker Jr. Inc.
1400 W. Benson Blvd #200
Anchorage, AK 99503

58. Name and address of the proposed operator of the pipeline:

Polar LNG, LLC
Attn: Doug Smith
3408 International Way
Fairbanks, AK 99701
Office (907) 452-7111
Fax (907) 457-8111
dsmith@fngas.com

59. Other information you believe may aid in the consideration of this application.

Project Description and Pipeline Design Basis Documents are attached for information.

The Polar LNG Project is designed to address the high cost of energy in Interior Alaska. The initial build of the facilities will provide electric utilities with the opportunity to switch to a lower cost, stable priced and cleaner burning fuel to displace oil. The natural gas distribution grid in Fairbanks will be expanded to serve new customers, and will offer a lower cost, stable priced fuel that is not directly indexed to the price of crude oil. Future expansion could make liquefied natural gas available to villages and communities currently relying on heating oil.

APPLICATION FEES ARE AS FOLLOWS:
Less than 50 miles -$500.00
More than 50 miles -$1,000.00