# INITIAL
# EXPLORATION PLAN

## HARRISON BAY BLOCK 6423 UNIT

### Proposed Drilling of Leases
### OCS-Y-1753, OCS-Y-1754, and OCS-Y-1757

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Submitted by:


Eni US Operating Co. Inc.

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# ACRONYMS & ABBREVIATIONS

| | |
|---|---|
| º | degree(s) |
| ºC | degrees Celsius |
| ºF | degrees Fahrenheit |
| / | per |
| @ | at |
| 2D | two-dimensional |
| 3D | three-dimensional |
| AAC | Alaska Administrative Code |
| AAAQS | Alaska Ambient Air Quality Standards |
| ACMP | Alaska Coastal Management Program |
| ACS | Alaska Clean Seas |
| ADEC | Alaska Department of Environmental Conservation |
| ADF&G | Alaska Department of Fish and Game |
| ADNR | Alaska Department of Natural Resources |
| AES | ASRC Energy Services |
| AEWC | Alaska Eskimo Whaling Commission |
| AOGCC | Alaska Oil and Gas Conservation Commission |
| APD | Application for Permit to Drill |
| APDES | Alaska Pollutant Discharge Elimination System |
| API | American Petroleum Institute |
| APM | Application for Permit to Modify |
| AQCP | Air Quality Control Plan |
| AQIA | Air Quality Impact Analysis |
| ASRC | Arctic Slope Regional Corporation |
| ATV | all-terrain vehicle |
| bbl | barrel(s) – 42 U.S. gallons |
| BMP | Best Management Practices |
| BOEM | Bureau of Ocean Energy Management |
| BOP | blowout preventer |
| BOWFEST | Bowhead Whale Feeding Ecology Study |
| bpd | barrels per day |
| BSEE | Bureau of Safety and Environmental Enforcement |
| BWASP | Bowhead Whale Aerial Survey Project |
| CAA | Clean Air Act |
| CAH | Central Arctic Caribou Herd |
| CDPF | catalytic diesel particulate filters |
| CFR | Code of Federal Regulations |
| CLO | community liaison officer |
| cm | centimeter(s) |
| $CO_2$ | carbon monoxide |

# ACRONYMS & ABBREVIATIONS (CONTINUED)

| | |
|---|---|
| COCP | Critical Operations and Curtailment Plan |
| COTP | Crude Oil Transmission Pipeline |
| cP | centipoise Viscosity |
| Com Center | Communications and Call Centers |
| CZMA | Coastal Zone Management Act |
| dBA | A-weighted decibel(s) |
| DEW | Distant Early Warning |
| DOG | Division of Oil and Gas |
| DPP | development and production plan |
| DPS | Distinct Population Segments |
| E | east |
| EA | Environmental Assessment |
| ea | each |
| EAP | Emergency Action Plan |
| EIA | Environmental Impact Analysis |
| EID | Environmental Information Document |
| EIS | Environmental Impact Assessment |
| Eni | Eni US Operating Co. Inc. |
| EP | Exploration Plan |
| ERD | extended reach drilling |
| EPA | US Environmental Protection Agency |
| ESA | Endangered Species Act |
| FGBNMS | Flower Garden Banks National Marine Sanctuary |
| FONSI | Finding of No Significant Impact |
| FR | Federal Register |
| ft. | foot/feet |
| $Ft^3$ | cubic feet |
| FVF | Formation Volume Factor |
| G&G | Geological and Geophysical |
| gal | gallon(s) |
| GOR | gas-to-oil ratio |
| GP | General Permit |
| $H_2S$ | Hydrogen Sulfide |
| hp | horsepower |
| hr | hour(s) |
| HRZ | High Radioactive Zone |
| HSE | Health, Safety, and Environment |
| ID | inside diameter |
| IHA | Incidental Harassment Authorization |
| IMO | International Maritime Organization |

# ACRONYMS & ABBREVIATIONS (CONTINUED)

| | |
|---|---|
| IMT | Incident Management Team |
| IPR | inflow performance relationship |
| in. | inch(s) |
| k | thousand |
| kg | kilogram(s) |
| km | kilometer(s) |
| kW | kilowatt(s) |
| KSOPI | Kuukpik Subsistence Oversight Panel, Inc. |
| LCU | Lower Cretaceous Unconformity |
| lb | pound(s) |
| LOA | Letter of Authorization |
| LRRS | Long Range Radar Station |
| m | meter(s) |
| m/s | meters per second |
| $m^3$ | cubic meter(s) |
| mi | statute mile(s) |
| $mi^2$ | square mile(s) |
| mph | mile per hour |
| min | minute(s) |
| MASP | maximum anticipated surface pressure |
| MAWP | maximum anticipated wellhead pressure |
| mD | measured depth |
| mm | millimeter(s) |
| MMPA | Maine Mammal Protection Act |
| MMS | Minerals Management Service |
| MOBM | mineral oil-based mud |
| MPH | miles per hour |
| MSCF | thousand standard cubic feet |
| mt | metric ton(s) |
| M/V | Motor vessel |
| N/A | Not applicable |
| NAAQS | National Ambient Air Quality Standards |
| NAD 83 | North American Datum 1983 |
| NE | Northeast |
| NEPA | National Environmental Policy Act |
| NOC | Nikaitchuq Operations Center |
| NOI | Notice of Intent |
| $NO_2$ | Nitrogen Dioxide |
| NOx | Nitrogen oxide |
| NOAA | National Oceanic and Atmospheric Administration |

# ACRONYMS & ABBREVIATIONS (CONTINUED)

| | |
|---|---|
| NPDES | National Pollutant Discharge Elimination System |
| NPR-A | National Petroleum Reserve-Alaska |
| NSB | North Slope Borough |
| NSTC | North Slope Training Cooperative |
| NTG | Net to Gross ratio (dimensionless) |
| NTL | Notice to Lessee |
| NWS | National Weather Service |
| $O_3$ | Ozone |
| OCS | Outer Continental Shelf |
| ODPCP | Oil Discharge Prevention and Contingency Plan (C-Plan) |
| OIM | Offshore Installation Manager |
| OPMP | Office of Project Management and Permitting |
| OPP | Oliktok Production Pad |
| OSFR | Oil Spill Financial Responsibility |
| OSHA | Occupational Safety and Health Administration |
| OSR | Oil Spill Response |
| OSRO | Oil Spill Removal Organization |
| OSRP | Oil Spill Response Plan |
| OSRV | Oil Spill Response Vessel |
| OST | Oil Storage Tanker |
| OSV | Offshore Supply Vessel |
| OWC | Oil Water Contact (ft) |
| OWS | Oil-water separator |
| PIP | pipe-in-pipe |
| PM | particulate matter |
| $PM_{2.5}$ | fine particulate matter, particulate matter less than 2.5 microns |
| $PM_{10}$ | particulate matter less than 10 microns |
| ppb | parts per billion |
| ppm | parts per million |
| PSD | Prevention of Significant Deterioration |
| psi | pounds per square inch |
| psia | pounds per square inch absolute |
| PTD | proposed total depth |
| PVT | pressure volume temperature |
| RKB | rotary kelly bushing |
| rpm | revolutions per minute |
| RS/FO | Regional Supervisor, Field Operations |
| RUSALCA | Russian-American Long-Term Census of the Artic |
| SB | Schrader Bluff |
| scf/bbl | standard cubic feet per barrel |

# ACRONYMS & ABBREVIATIONS (CONTINUED)

| | |
|---|---|
| SCR | selective catalytic reduction |
| SEMS | Safety and Environmental Management System |
| sec | seconds |
| SID | Spy Island Drillsite |
| SIP | State Implementation Plan |
| $SO_2$ | sulfur dioxide |
| SPCC | Spill Prevention Control and Countermeasure |
| State | State of Alaska |
| STB | standard barrels (at standard conditions) |
| stb/d | standard barrels per day |
| STBO | standard barrels of oil |
| TA | temporarily abandon |
| TAPS | Trans Alaska Pipeline System |
| TBD | to be determined |
| TD | total depth |
| TVD | true vertical depth |
| TVDSS | true vertical depth subsea |
| UIC | Underground Injection Control |
| U.S. | United States |
| USACE | U.S. Army Corps of Engineers |
| USFWS | U.S. Fish and Wildlife Service |
| VOC | Volatile organic compounds |
| WBM | water-based mud |
| WCD | Worst Case Discharge |
| WCP | Well Control Plan |
| WIF | Waste Injection Facility |
| WP | working pressure |

# EXPLORATION PLAN CONTENTS

### *(a) Project description, objectives, and schedule for the Exploration Drilling Program*

This proposed Exploration Plan (EP) is for the proposed exploratory drilling of Eni's Nikaitchuq North Project, which consists of four exploration wells, two mainbores and two sidetracks from Eni's existing man-made island, Spy Island Drillsite (SID), on the State of Alaska (State) lease. The proposed exploration wells will begin from the surface of SID and extend subsurface of the ocean floor, ending in federal leases on the Outer Continental Shelf (OCS) of Alaska – Harrison Bay Block 6423 Unit (Leases OCS-Y-1753, OCS-Y-1754, and OCS-Y-1757).

Exploration drilling activities proposed under this EP are scheduled to commence December 10, 2017 and continue into 2019.

| Proposed Activity | Start Date | End Date | No. of Days |
|---|---|---|---|
| Drill Nikaitchuq North (NN01) | 12/10/2017 | 02/13/2018 | 65 |
| NN01 Flow Test | 02/13/2018 | 03/10/2018 | 25 |
| NN01 P&A | 03/10/2018 | 03/25/2018 | 15 |
| Drill NN01 Sidetrack to Lateral & Complete | 03/25/2018 | 04/14/2018 | 20 |
| Perform Flow Test – Suspend | 04/14/2018 | 05/14/2018 | 30 |
| | | | |
| Drill Nikaitchuq North (NN02) | 12/01/2018 | 02/14/2019 | 75 |
| NN02 Flow Test | 02/14/2019 | 03/11/2019 | 25 |
| NN02 P&A | 03/11/2019 | 03/26/2019 | 15 |
| Drill NN02 Sidetrack to Lateral & Complete | 03/26/2019 | 04/21/2019 | 26 |
| Perform Flow Test – Suspend | 04/21/2019 | 05/23/2019 | 32 |

Note: No drilling operations are planned during summer.

OCS Plan Information forms, "Form – BOEM-0137," are included under this section with further activity description.

By letter dated February 27, 2017, the Bureau of Safety and Environmental Enforcement (BSEE) approved the formation of the Harrison Bay Block 6423 Unit, which is comprised of Outer Continental Shelf Leases Y-1703, Y-1704, Y-1705, Y-1751, Y-1752, Y-1753, Y-1754, Y-1756, Y-1757, Y-1771, Y-1772, Y-1779, and Y-1780). The Harrison Bay Block 6423 Unit, although approved on February 27, 2017, became effective on February 24, 2017.

#### *Nikaitchuq Field*

Eni operates the Nikaitchuq oil field in the vicinity of Oliktok Point and Simpson Lagoon. This includes the following facilities:

- Oliktok Production Pad (OPP) – an onshore process and drilling facility at Oliktok Point
- Spy Island Drillsite (SID) – a man-made gravel island located offshore of Oliktok Point
- Nikaitchuq Operations Center (NOC) – an onshore pad for support facilities
- A subsea pipeline bundle from SID to OPP
- An onshore crude oil transmission pipeline (COTP) that ties in to the Kuparuk Pipeline

current Nikaitchuq production is 25,000 barrels per day (bpd) from 70 wellbores drilled from OPP and SID.

### *(b) Location*

SID is a man-made gravel island located approximately three miles offshore of Oliktok Point just south of the natural barrier island, Spy Island, in shallow water (approximately 6 to 8 feet deep). SID supports drilling and production operations in the Nikaitchuq Unit. SID has 36 slots for producers and injectors and slots for two Class I disposal wells.

The current SID wells drilled include:

- 18 production wells (9 dual-laterals)
- 13 injection wells
- 1 Class I disposal well/Waste Injection Facility (WIF)

SID has slope protection to prevent erosion and protect against storm surge and ice. SID's perimeter has a 1:3 slope, with no bench, protected by 4-cubic-foot gravel bags designed for island perimeter protection. Storm surge modeling was used to determine the height of the gravel pad above sea level and the shape and profile of the perimeter.

A description of the general lighting for SID is discussed in the Environmental Impact Analysis (EIA) located in Section O as Appendix O.

Drilling activity for the Nikaitchuq North EP will take place on SID, which is located in State waters. The proposed exploration wells will be installed adjacent to the existing row of producing wells on SID.

A vicinity map is enclosed as ***Figure EP-1***, along with a project area map as ***Figure EP-2***. It shows the location of the activities proposed herein relative to the distance of the proposed activities from the shoreline.

### *(c) Drilling unit description*

Doyon Rig 15 is a mobile oil and gas well drilling facility capable of drilling in extreme arctic conditions. The rig design consists of fully integrated modules capable of drilling on 8-foot well spacing.

Further details of the surface blowout preventer (BOP) components are described in Table EP-1.

**Table EP-1 – Doyon Rig 15 Main Machinery**

| Equipment | Actual Rig Setup | After the Rig Upgrade |
|---|---|---|
| TDS | 63,000 ft/lbs continuous torque @ 100 revolutions per minute (rpm) | 72k ft-lbs continuous torque @ 150 rpm |
| Mud Pump | #3 pumps (#P 160 1600 horsepower [hp] + Skytop Brewster 1600 HP) | Two white star 2200 hp pumps and one 12P – 1600 HP pump |
| Mud Manifold | 5000 pounds per square inch (psi) working pressure (WP) | 7500 psi wp |
| Rig Power Plant | 3 ea. Cat D3516 HD and 1 ea. Cat 3512, total 5,859 kilowatt (kW), hi-line capable | 5 ea 3516, 1 ea 3512 = 9,044 kW |
| Shale Shakers | 2ea – Derrick, model 48, 3ea – Derrick, model 514 | 4 ea Derrick model 514 |
| Iron Roughneck | Varco BJ ST-80 (maximum break-out 85,000 ft lb) | Nov-ST-120 (max make-up torque 117,500 ft lb) |
| Drill Pipe | 5" 17.0# TT525 (40,000)<br>4-1/2" 11.7# XH (23,000') | 6-5/8" 34# TT690 (6,000')<br>5-7/8" 23.4# TT585 (32,000')<br>4-1/2" 16.6# TT435 (23,000') |
| BOP Stack | 13-5/8" 5,000 psi WP<br>Hydril Annular BOP, model GK, 2 each – Hydril single gate, Model MPL, 1 each – Hydril single gate, model MPL | 18-3/8” 5,000 psi WP<br>Cameron 18-3/4" 5K DL annular, 1 each. 18-3/4" 5K TL double rams, 18-3/4" 5K TL single rams |
| Diverter | Maximum Surface Pressure,<br>20-1/4" x 2,000 psi | Cameron 30" NOV Diverter |
| Mast capacity | 1,000,000 lb | No change |
| Set back capacity | 650,000 lb | No change |
| Drawworks | Skytop Brewster, Model NE-12_rated @ 2000 input hp (500 ton) | No change |
| Number of Pits | 10 each with total volume – 1250 barrels (bbl) | No change |

The Doyon Rig 15 is comprised of three modules: the substructure module, the power module, and the shop. Schematics of these modules are included in the Doyon Drilling Spill Prevention Control and Countermeasure (SPCC) Plan, as certified under provisions of 40 CFR Part 112.

The Doyon Drilling SPCC Plan works in conjunction with the operator Oil Discharge Prevention and Contingency Plan (ODPCP). Outlined are provisions including primary containment within the rig and also secondary containment including lined and bermed barriers around all rig components. Provisions are made within this document to address containment and discharge prevention guidelines. Other features address inspection and testing procedures for fluid handling equipment, fluid transfer procedures, and spill response and reporting procedures.

### *(d) Storage Tanks*

The estimated maximum volume of fluids that could be stored on the drilling facility is shown in ***Table*** EP-2 below. Specific notes on these volumes are shown in the Doyon SPCC Plan.

**Table EP-2 – Fluids Stored on Drilling Facility**

| Tank | Total No. of Tanks | Total Tank Volumes for all Tanks (bbl) |
|---|---|---|
| Fuel tank - diesel | 5 | 777 |
| Hydraulic Oil | 12 | 83.5 |
| Lube Oil | 8 | 44.7 |
| Coolant | 7 | 27 |
| Drilling Fluid (mud pits) | 9 | 1360 |

### *(e) Service fee*

A Pay.gov receipt is included in this plan, as required under 30 CFR 550.125, in the amount of $7,346.00 to cover the cost and processing fee for the proposed operations conducted under this plan.

U.S. Department of the Interior
Bureau of Ocean Energy Management

OMB Control Number: 1010-0151
OMB Approval Expires: 12/31/18

# OCS PLAN INFORMATION FORM

## GENERAL INFORMATION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type of OCS Plan: | X | Exploration Plan (EP) | | Development Operations Coordination Document (DOCD) | | | |
| Company Name: Eni US Operating Co. Inc. | | | | BOEM Operator Number: 02782 | | | |
| Address: 1200 Smith Street, Suite 1700 | | | | Contact Person: Brenda Montalvo | | | |
| Houston, Texas 77002 | | | | Phone Number: (713) 393-6259 | | | |
| | | | | Email Address: brenda.montalvo@enipetroleum.com | | | |
| If a service fee is required under 30 CFR 550.125(a) provide the | | | | Amount paid | $7,346 | Receipt No. | 2611SKL9 |

## Project and Worst Case Discharge (WCD) Information

| | | | | |
|---|---|---|---|---|
| Lease: Y1753 | Area: HB | Block: 6423 | Project Name (If Applicable): Nikaitchuq North | |
| Objective(s): ☒Oil | ☐Gas | ☐Sulphur | ☐Salt | Onshore Support Base(s): OPP |
| Platform/Well Name: NN02 ST01 | Total Volume of WCD: 25,957 bbls | | API Gravity: 40 | |
| Distance to Closest Land (Miles): 3.2 | Volume from uncontrolled blowout: 446,535 | | | |

| | | | | |
|---|---|---|---|---|
| Have you previously provided information to verify the calculations and assumptions for your WCD? | | Yes | X | No |
| If so, provide the Control number of the EP or DOCD with which this information was provided | | | | |
| Do you propose to use new or unusual technology to conduct your activities? | | Yes | X | No |
| Do you propose to use a vessel with anchors to install or modify a structure? | | Yes | X | No |
| Do you propose any facility that will serve as a host facility for deepwater subsea development? | | Yes | X | No |

## Description of Proposed Activities Scheduled (Mark all that apply)

| Proposed Activity | Start Date | End Date | No. of Days |
|---|---|---|---|
| Drill Nikaitchuq North (NN01) | 12/10/2017 | 02/13/2018 | 65 |
| NN01 Flow Test | 02/13/2018 | 03/10/2018 | 25 |
| NN01 P&A | 03/10/2018 | 03/25/2018 | 15 |
| Drill NN01 Sidetrack to Lateral & Complete | 03/25/2018 | 04/14/2018 | 20 |
| Perform Flow Test – Suspend | 04/14/2018 | 05/14/2018 | 30 |
| | | | |
| Drill Nikaitchuq North (NN02) | 12/01/2018 | 02/14/2019 | 75 |
| NN02 Flow Test | 02/14/2019 | 03/11/2019 | 25 |
| NN02 P&A | 03/11/2019 | 03/26/2019 | 15 |
| Drill NN02 Sidetrack to Lateral & Complete | 03/26/2019 | 04/21/2019 | 26 |
| Perform Flow Test – Suspend | 04/21/2019 | 05/23/2019 | 32 |
| | | | |

## Description of Drilling Rig

| | | | |
|---|---|---|---|
| | Jackup | | Drillship |
| | Gorilla Jackup | | Platform rig |
| | Semisubmersible | | Submersible |
| | DP Semisubmersible | X | Other (Attach Description) |

Drilling Rig Name (If Known): ***Doyon 15***

## Description of Structure

| | | | |
|---|---|---|---|
| | Caisson | | Tension leg platform |
| | Fixed platform | | Compliant tower |
| | Spar | | Guyed Tower |
| | Floating Production System | X | Other (Attach Description) |

## Description of Lease Term Pipelines

| From (Facility/Area/Block) | To (Facility/Area/Block) | Diameter (Inches) | Length (Feet) |
|---|---|---|---|
| | | | |
| | | | |

## OCS PLAN INFORMATION FORM (CONTINUED)

Include one copy of this page for each proposed well/structure

| Proposed Well/Structure Location | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Well or Structure Name/Number (If renaming well or structure, reference previous name): **NN01** | | | | | Previously reviewed under an approved EP or DOCD? | | YES | X | NO | |
| Is this an existing well or structure? | | YES | X | NO | If this is an existing well or structure, list the Complex ID or API No. | | | | | |
| Do you plan to use a subsea BOP or surface BOP on a floating facility to conduct your proposed activities? | | | | | | | YES | X | NO | |
| **WCD info** | For wells, volume of uncontrolled blowout (Bbls/day): 19,920 BPD | | | | For structures, volume of all storage and pipelines (Bbls): | | API Gravity of fluid: | 40 | | |
| | **Surface Location** | | | | **Bottom-Hole Location (For Wells)** | | **Completion (For multiple completions, enter separate lines)** | | | |
| **Lease No.** | ADL 391283 | | | | | | | | | |
| **Area Name** | ADL 391283 | | | | | | | | | |
| **Block No.** | ADL 391283 | | | | | | | | | |
| **Blockline Departures (in feet)** | N/A | | | | | | | | | |
| | N/A | | | | | | | | | |
| **Lambert X-Y Coordinates** | X = 391,933m<br>UTM Zone 6W | | | | | | | | | |
| | Y = 7,830,619m<br>UTM Zone 6W | | | | | | | | | |
| **Latitude/ Longitude** | Latitude:<br>N 70° 33' 26.51" | | | | | | | | | |
| | Longitude:<br>W 149° 54' 35.66" | | | | | | | | | |
| **Water Depth (Feet):** 0 | | | | | | | | | | |
| **Anchor Radius (if applicable) in feet:** | | | | | NA | | | | | |

| Anchor Locations for Drilling rig or construction Barge (If anchor radius supplied above, not necessary) | | | | | |
|---|---|---|---|---|---|
| **Anchor Name or No.** | **Area** | **Block** | **X Coordinate** | **Y Coordinate** | **Length of Anchor Chain or Seafloor** |
| | | | | | |

## OCS PLAN INFORMATION FORM (CONTINUED)

Include one copy of this page for each proposed well/structure

| Proposed Well/Structure Location | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Well or Structure Name/Number (If renaming well or structure, reference previous name): **NN01 ST01** | | | | | Previously reviewed under an approved EP or DOCD? | | YES | X | NO | |
| Is this an existing well or structure? | | YES | X | NO | If this is an existing well or structure, list the Complex ID or API No. | | | | | |
| Do you plan to use a subsea BOP or surface BOP on a floating facility to conduct your proposed activities? | | | | | | | YES | X | NO | |
| **WCD info** | For wells, volume of uncontrolled blowout (Bbls/day): | | For structures, volume of all storage and pipelines (Bbls): | | API Gravity of fluid: | 40 | | | | |
| | **Surface Location** | | **Bottom-Hole Location (For Wells)** | | **Completion (For multiple completions, enter separate lines)** | | | | | |
| **Lease No.** | ADL 391283 | | | | | | | | | |
| **Area Name** | ADL 391283 | | | | | | | | | |
| **Block No.** | ADL 391283 | | | | | | | | | |
| **Blockline Departures (in feet)** | NA | | | | | | | | | |
| | NA | | | | | | | | | |
| **Lambert X-Y Coordinates** | X = 391,933m utm zn 6W | | | | | | | | | |
| | Y = 7,830,619m utm zn 6W | | | | | | | | | |
| **Latitude/ Longitude** | Latitude: N 70° 33’ 26.51” | | | | | | | | | |
| | Longitude: W 149° 54’ 35.66” | | | | | | | | | |
| **Water Depth (Feet):** 0 | | | | | | | | | | |
| **Anchor Radius (if applicable) in feet:** | | | | | | | | | | |

| Anchor Locations for Drilling rig or construction Barge (If anchor radius supplied above, not necessary) | | | | | |
|---|---|---|---|---|---|
| **Anchor Name or No.** | **Area** | **Block** | **X Coordinate** | **Y Coordinate** | **Length of Anchor Chain or Seafloor** |
| | | | | | |

## OCS PLAN INFORMATION FORM (CONTINUED)

Include one copy of this page for each proposed well/structure

| Proposed Well/Structure Location | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Well or Structure Name/Number (If renaming well or structure, reference previous name): **NN02** | | | | | Previously reviewed under an approved EP or DOCD? | | YES | X | NO |
| Is this an existing well or structure? | | YES | X | NO | If this is an existing well or structure, list the Complex ID or API No. | | | | |
| Do you plan to use a subsea BOP or surface BOP on a floating facility to conduct your proposed activities? | | | | | | | YES | X | NO |

| | | | | |
|---|---|---|---|---|
| **WCD info** | For wells, volume of uncontrolled blowout (Bbls/day): | For structures, volume of all storage and pipelines (Bbls): | API Gravity of fluid: | 40 |

| | **Surface Location** | **Bottom-Hole Location (For Wells)** | **Completion (For multiple completions, enter separate lines)** |
|---|---|---|---|
| **Lease No.** | ADL 391283 | | |
| **Area Name** | ADL 391283 | | |
| **Block No.** | ADL 391283 | | |
| **Blockline Departures (in feet)** | NA | | |
| | NA | | |
| **Lambert X-Y Coordinates** | X = 391,936m utm zn 6W | | |
| | Y = 7,830,620m utm zn 6W | | |
| **Latitude/ Longitude** | Latitude: N 70° 33' 26.53" | | |
| | Longitude: W 149° 54' 35.42" | | |
| **Water Depth (Feet):** 0 | | | |
| **Anchor Radius (if applicable) in feet:** | | | |

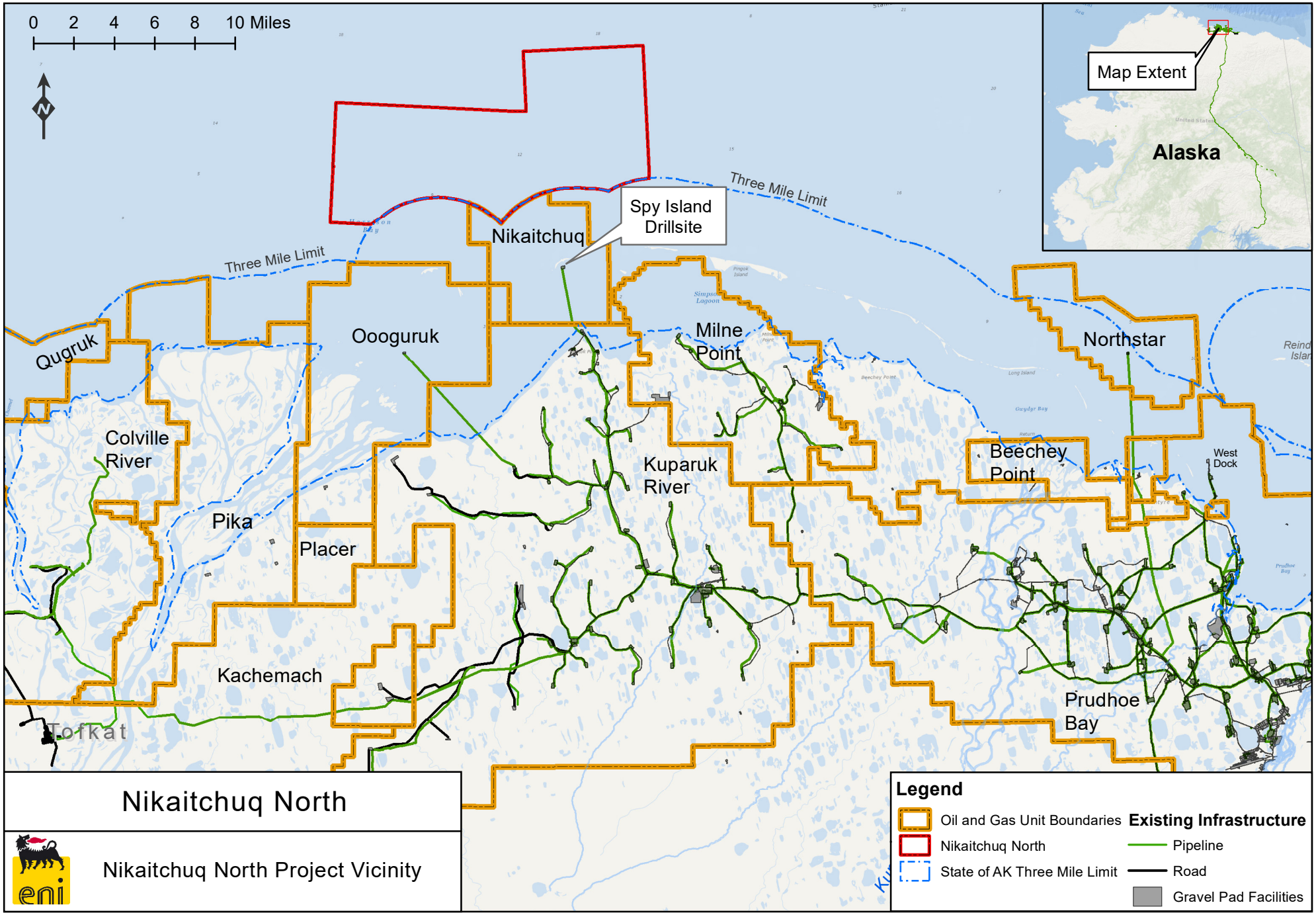
| Anchor Locations for Drilling rig or construction Barge (If anchor radius supplied above, not necessary) | | | | | |
|---|---|---|---|---|---|
| **Anchor Name or No.** | **Area** | **Block** | **X Coordinate** | **Y Coordinate** | **Length of Anchor Chain or Seafloor** |
| | | | | | |

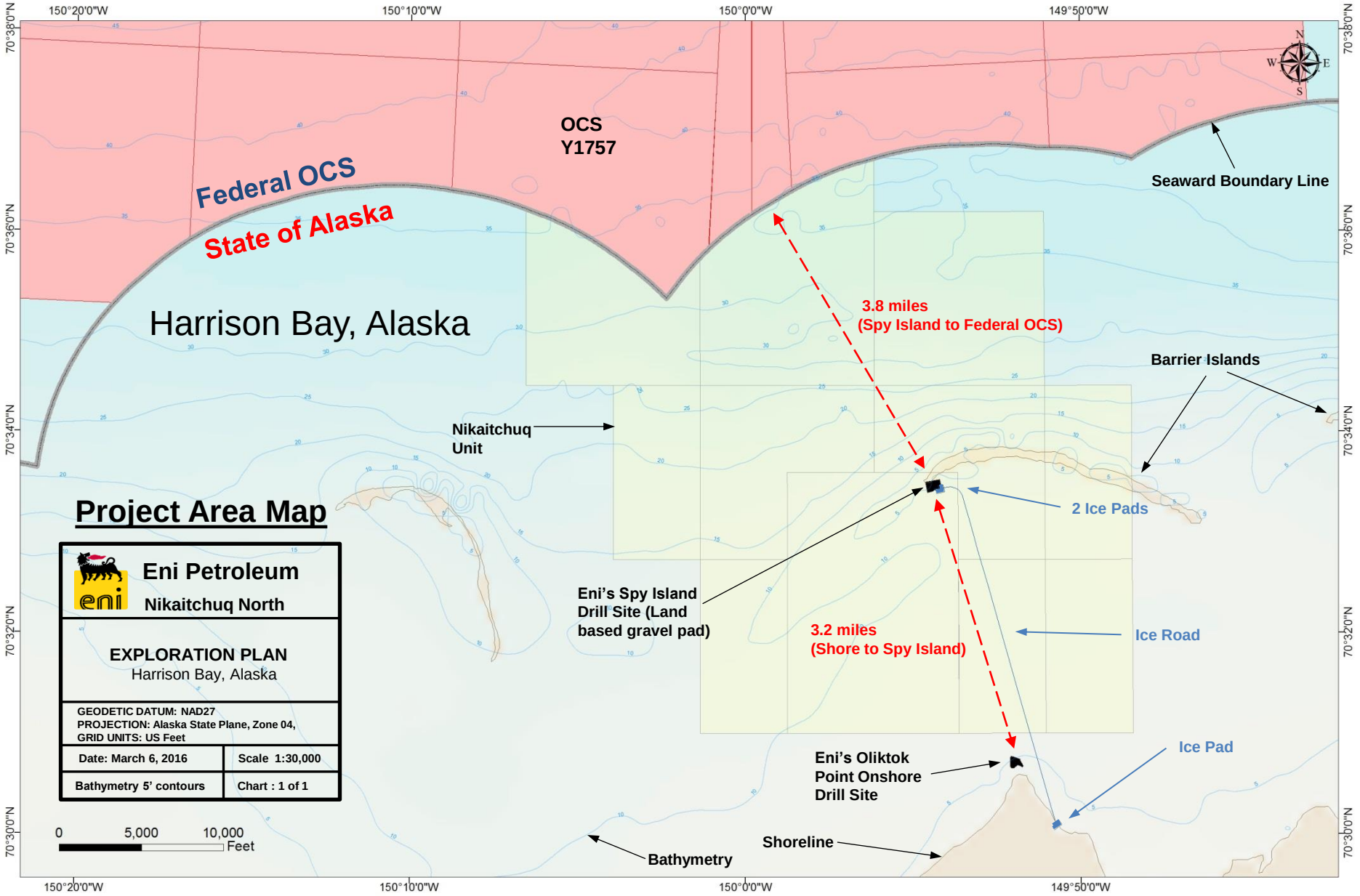
## OCS PLAN INFORMATION FORM (CONTINUED)

Include one copy of this page for each proposed well/structure

| Proposed Well/Structure Location | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Well or Structure Name/Number (If renaming well or structure, reference previous name): **NN02 ST01** | | | | | Previously reviewed under an approved EP or DOCD? | | YES | X | NO | | |
| Is this an existing well or structure? | | YES | X | NO | If this is an existing well or structure, list the Complex ID or API No. | | | | | | |
| Do you plan to use a subsea BOP or surface BOP on a floating facility to conduct your proposed activities? | | | | | | | YES | X | NO | | |
| **WCD info** | For wells, volume of uncontrolled blowout (Bbls/day): 25,957 | | | | For structures, volume of all storage and pipelines (Bbls): | | API Gravity of fluid: | | 40 | | |
| | **Surface Location** | | | | **Bottom-Hole Location (For Wells)** | | **Completion (For multiple completions, enter separate lines)** | | | | |
| **Lease No.** | ADL 391283 | | | | | | | | | | |
| **Area Name** | ADL 391283 | | | | | | | | | | |
| **Block No.** | ADL 391283 | | | | | | | | | | |
| **Blockline Departures (in feet)** | NA | | | | | | | | | | |
| | NA | | | | | | | | | | |
| **Lambert X-Y Coordinates** | X = 391,936m utm zn 6W | | | | | | | | | | |
| | Y = 7,830,620m utm zn 6W | | | | | | | | | | |
| **Latitude/ Longitude** | Latitude: N 70° 33' 26.53" | | | | | | | | | | |
| | Longitude: W 149° 54' 35.42" | | | | | | | | | | |
| **Water Depth (Feet):** 0 | | | | | | | | | | | |
| **Anchor Radius (if applicable) in feet:** | | | | | NA | | | | | | |

| Anchor Locations for Drilling rig or construction Barge (If anchor radius supplied above, not necessary) | | | | | |
|---|---|---|---|---|---|
| **Anchor Name or No.** | **Area** | **Block** | **X Coordinate** | **Y Coordinate** | **Length of Anchor Chain or Seafloor** |
| | | | | | |


0 2 4 6 8 10 Miles
N
Map Extent
Alaska
Three Mile Limit
Three Mile Limit
Spy Island Drillsite
Nikaitchuq
Qugruk
Oooguruk
Milne Point
Northstar
Colville River
Pika
Placer
Kuparuk River
Beechey Point
West Dock
Kachemach
Prudhoe Bay
Tofkat
Nikaitchuq North
Nikaitchuq North Project Vicinity
eni
Legend
Oil and Gas Unit Boundaries
Nikaitchuq North
State of AK Three Mile Limit
Existing Infrastructure
Pipeline
Road
Gravel Pad Facilities


150°20'0"W
150°10'0"W
150°0'0"W
149°50'0"W
70°38'0"N
70°36'0"N
70°34'0"N
70°32'0"N
70°30'0"N
OCS
Y1757
Federal OCS
State of Alaska
Harrison Bay, Alaska
Seaward Boundary Line
3.8 miles
(Spy Island to Federal OCS)
Barrier Islands
Nikaitchuq
Unit
2 Ice Pads
Eni's Spy Island
Drill Site (Land
based gravel pad)
3.2 miles
(Shore to Spy Island)
Ice Road
Ice Pad
Eni's Oliktok
Point Onshore
Drill Site
Shoreline
Bathymetry
Project Area Map
Eni Petroleum
Nikaitchuq North
EXPLORATION PLAN
Harrison Bay, Alaska
GEODETIC DATUM: NAD27
PROJECTION: Alaska State Plane, Zone 04,
GRID UNITS: US Feet
Date: March 6, 2016
Scale 1:30,000
Bathymetry 5' contours
Chart : 1 of 1
0
5,000
10,000
Feet

# *SECTION A GENERAL INFORMATION*

### *(a) Applications and permits*

Table A-1 lists permit and authorization applications that will be submitted to support this EP for the wells to be drilled in the Nikaitchuq North Project.

**Table A-1 – Permit Applications Pending**

| Permits & Authorizations | Agency | Submittal Date | Authorization Date | Document Location |
|---|---|---|---|---|
| Revisions to Air Quality Title V and Minor Permit | Alaska Department of Environmental Conservation (ADEC) | February 2017 | To be determined | Separate cover |
| ODPCP 16-CP-5116 Amendment | ADEC | March 2017 | To be determined | Separate cover |
| Amendment - Oil Spill Response Plan (OSRP) | Bureau of Safety and Environmental Enforcement (BSEE) | March 2017 | To be determined | Separate cover |
| ADNR DOG – Unit Plan of Operations | Alaska Department of Natural Resources (ADNR) Division of Oil and Gas (DOG) | March 2017 | To be determined | Separate cover |
| USFWS Polar Bear Incidental Take LOA amendment | U.S. Fish and Wildlife Service (USFWS) | January 2017 | To be determined | Separate cover |
| NSB Administrative Approval | North Slope Borough (NSB) | March 2017 | To be determined | To be determined |
| Application for Permit to Drill | BSEE | October 2017 | To be determined | To be determined |

### *(b) Drilling fluids*

No intentional discharge is planned. Hole sections circulate using a steel-pit-contained mud system. All cuttings and waste mud are processed/ground and injected into the onsite disposal well.

Please refer to ***Figure A-1,*** *"Waste Estimated to be Generated, Treated and/or Downhole Disposed or Discharged to the Beaufort Sea"* for further information.

### *(c) Chemical products*

Well spuds and 22-inch surface sections will be drilled with WBM formulation developed for SID using best practices and lessons learned from previously completed wells.

Deeper sections will be drilled with a MOBM. The MOBM formulation includes emulsifiers, filtration controllers, wetting agents, and other elements normally utilized to maintain optimal rheological properties.

Detailed information related to the chemical products proposed under this EP is listed in ***Figure A-2*** and is in accordance with CFR 550.213(c).

Materials Safety Data Sheets for drilling fluid chemicals will be provided in the Application for Permit to Drill and will also be available on the drilling unit and on the support vessels used to transport the chemicals.

***(d) New or unusual technology***

Eni does not plan to use any new or unusual technology, as defined under 30 CFR 550.200, for the exploration activities proposed under this EP.

***(e) Bonds, oil spill financial responsibility, and well control statements***

The bond requirements for the activities and facilities proposed in this EP are satisfied by an areawide development bond, furnished and maintained in accordance with 30 CFR 556, Subpart I; and if determined by the Regional Director, provide additional security under 30 CFR 556.901(d).

Eni is of sound financial strength and reliability and has demonstrated oil spill financial responsibility (OSFR) according to 30 CFR 553 for the activities planned in this EP. In accordance with 30 CFR 553.29(a), Eni is insured for $150,000,000. This financial reliability ensures that Eni has the capability to deal with emergency situations such as blowout control, including relief well drilling and kill operations, if such an unlikely event should occur.

Therefore, Oil Spill Financial Responsibility coverage will be obtained under Eni US Operating Co. Inc., BOEM Company Number 02782 for the activities proposed under this Initial Exploration Plan according to 30 CFR Part 553.

***(f) Suspensions of operations***

Eni has plans and mitigation measures in place that accommodate the forced or voluntary suspension of operations during implementation of the proposed exploration drilling program detailed in this EP. These plans and mitigation measures are in reference to suspension of operations as cited under 30 CFR 550.213(f) and are not to be confused with suspension of operations as cited under BSEE regulations at 30 CFR 250.168 through 177. Forced suspension of operations could result from weather, ice conditions, drilling unit mechanical conditions, or downhole conditions, among others. In order to facilitate a possible suspension of operations, Eni will draft several operational plans containing suspension procedures and protocols in accordance with 30 CFR 550.220.

***(g) Blowout scenario***

As described under 30 CFR 254.47(b), a blowout scenario is required for any exploration activity in federal waters. Eni has prepared the following response:

The target of the project well is the J1 sand located at +/- 7,516 feet true vertical depth (TVD). This will be accomplished by drilling an extended-reach well from the existing SID. The initial well will penetrate the J1 at 35 degrees. Depending on the findings of the NN01 well, Eni's plan includes the flexibility to complete and flow test the initial wellbore or abandoning of the open-hole section to immediately drill a

sidetrack for a 600-foot lateral followed by the completion and flow test. The J1 sands have a native reservoir pressure of 3,351 psi.

Eni well control philosophy is based on the double barrier mechanism to contain the wellbore fluids. For purposes of the Blow Out Contingency Plan, a barrier is defined as any physical system or device, hydraulic or mechanical, able to contain fluid and/or pressure within the confines of the well. Eni's policy is to maintain two (2) separate barriers in the well flow path at all times during the execution of well operations. The two barriers are properly weighted drilling mud and the certified and function-tested 18-3/4" BOP stack.

The primary barrier is always in place and active during well operations. The secondary barrier is in place to provide backup to the primary barrier. When required, this secondary barrier, along with the application of proper well control procedures, is used to re-establish primary well control and safe operating conditions. It is considered acceptable for the secondary barrier to be inactive until required (i.e., failure of the primary barrier), provided it is maintained at full efficiency by a regular testing routine.

A number of primary/secondary mechanisms are available to meet the requirements of the various well operations, as provided in the Eni Well Control Policy Manual.

Eni will use surface BOPs rated 5,000 psi. Two activation systems exist to allow rig floor activation or remote activation of the BOPs. A redundant manual system is also available to close the BOP if required.

Eni will shut down operations for any repairs needed on well control devices anytime they are not considered functional and safe. Eni uses Company Representatives with many years of experience in drilling operations. The Company Representatives constantly communicate with the Offshore Installation Manager (OIM) on the rig to ensure the safety of all personnel and equipment. All Company Representatives are trained in well control and maintain well control certificates.

Eni's casing program is designed such that no other hydrocarbon-bearing zones are exposed when drilling the J1 sand. The total depth of the well is intentionally designed to stop above any other potential hydrocarbon zones.

The first penetration of the target interval will include logging and fluid sampling. This hydrocarbon zone will then be completed with a xmas tree installed and flow tested if deemed appropriate, or, as an alternative, will be temporarily abandoned for a sidetrack. The temporary abandonment will be performed placing cement plugs in front of all crossed hydrocarbon zones in the open hole: a sacrificial liner will be run with cement placed inside the liner and in the annulus above the liner top and below the last casing shoe. An open-hole sidetrack would then be drilled with a lateral of approximately 600 feet, and eventually completed and flow tested after the installation of a xmas tree. The same operative sequence of the first well is assumed for the second well, whereas further verification will be eventually implemented based on the drilling/lithological data and information acquired during the execution of the first well. The sidetrack of the second well is currently planned in cased hole to allow for a better management of the lateral trajectory and reduce the dog-leg severities, taking into account the many uncertainties related to the target position at this early stage.

All drilling operations will be accomplished during the 2017-18 and 2018-19 winter seasons.

Eni will maintain adequate weighting material at the SID site in order to "weight-up" the mud system to control any upsets or well control issues. Mud pits are monitored constantly by personnel when operations are ongoing. In addition, automatic alarms are located in the pits and will sound if pits receive abnormal amounts of return fluids to alert of possible flow control problems. Personnel on the rig floor

are trained to monitor the systems and respond immediately if a problem is noted or if alarms sound and will take all necessary steps, including operating the BOPs, to maintain control of the well.

Eni has contracted Wild Well Control, Inc., a worldwide known contractor specialized in well control and emergency interventions, to assess the expected well criticalities and determine a mitigation plan that will be applied to the Well Drilling Program before the well spud.

In the unlikely event of an uncontrolled flow, source control operations would commence with Eni notifying Wild Well Control, Inc. to mobilize the required personnel and equipment resources. Concurrently, the Eni Incident Command System would be initiated. Working together, these teams would fully assess the incident to determine the best way forward. Dynamic and surface well control methods may continue in the interim, but only if approved and safe to do so.

According to the performed assessment of the best available techniques and methods to control a well blowout with the potential of releasing liquid hydrocarbons at surface, it was determined that the most likely interface scenario for a compromised well would be direct containment by capping and killing the well within SID. The direct wellhead intervention containment and capping option would be preferable in any weather condition. Well capping is both compatible with and feasible for use in planned drilling operations, as this technology is applied at surface, with little or no sensitivities to well type or location. Well capping operations have been carried out on both onshore and offshore locations, having historically proven successful in regaining well control within a relatively short duration.

The various pieces of heavy equipment needed for support of well capping operations will be available on the North Slope location on the first day of operations. Mobilization of this equipment to Nikaitchuq in an emergency can be carried out within a matter of hours after requests are submitted. Eni has the global capability of moving specialty personnel and additional equipment to North Slope locations typically within 24 to 48 hours upon declaration of a well control event.

Capping operations can be defined as the placement of a competent pressure control device onto the blown out well under flowing conditions. Once the new control device (i.e., capping stack) is positioned over the well, there must be a means of attaching the device to ensure pressure integrity can be regained.

Capping operations begin with servicing or preparing the wellhead for placement of the new control device (i.e., capping stack). Safe access to the wellhead area must be established first. This process normally begins removing accessible equipment in and around the wellhead. From accessible equipment, teams will initiate more debris clearance. Debris clearance may include use of exothermic torches, remote-operated rakes, and hooks within a water curtain.

The magnitude of the service pressure of the control device (i.e., capping stack) will be expected to withstand the Maximum Anticipated Surface Pressure (MASP) plus externally applied pressure exerted during the dynamic well control procedure (i.e., bullheading). Once determined, this summary pressure (MASP + Applied Pressure) will be multiplied by a safety factor, such as 1.25. The safety factor will be determined by the Well Control Specialists based on wellhead temperatures, equipment damage, fluid stream composition, remoteness of location, etc.

Capping Operation Planning Factors

- Forces exerted on the capping stack as the stack is positioned around and “into” the flowing well
- Best method required to ensure full control of the movement of the capping stack as it enters the flow (turning and swinging prevention)
- Safe operating procedures needed to initiate work around the flowing well while minimizing effects of radiant heat.

- Maintaining optimum bore size (inside diameter [ID]) throughout capping stack, which will allow subsequent well work to be performed
- Optimizing functions within the capping stack for operational redundancy (i.e., multiple outlets, multiple pump tie-in locations, pressure monitors, and sufficient heat-wrapping of key components, etc.)
- Developing optimum placement and attachment method for securing the capping stack to wellhead
- Understanding of pressure and temperature ratings required to control the well throughout all phases of the well control operation
- Forces exerted on the capping stack during the post-capping operation, such as bullheading or snubbing

No one capping technique can be predetermined before blowout conditions exist. Well Control Specialists must select the best capping technique, which will ensure capping success based on knowledge of the mass flow rate, combustible nature of the flow stream, wellbore geometry, and operations to be undertaken in the post-capping phase of the project. Due to the critical nature of well control operations, Well Control Specialists understand they may be given only one chance at successfully capping the well. These Well Control Specialists must weigh time, risk, and chances of success when selecting the appropriate capping technique.

General Techniques Used for Capping Operations

- Capping to an excavated and re-headed wellhead while on fire
- Capping to a flange
- Capping to a stub by installing a wellhead
- Capping by swallowing the stub

Capping to an Excavated and Re-Headed Wellhead While Well is on Fire

The decision process needed to cap a well on fire must emphasize personnel safety and minimize environmental damage. From an environmental viewpoint, leaving a well on fire can reduce the amount of pollution, provided the well is burning efficiently and cleanly. Capping operations may take longer to complete if the well is left on fire throughout the entire operation. If the well is not burning efficiently and cleanly, judgment is needed to determine if less pollution will be caused if the fire is extinguished to allow quicker capping operations.

In all well control interventions, Well Control Specialists strive to find and implement the quickest and safest solution in order to meet requirements for safety, the lowest cost, and uphold environmental responsibility. This is true for all wells, including those that produce hydrogen sulfide ($H_2S$).

Capping operations while the well is burning has become a preferred industry method for wells. This method basically involves installing the capping device without putting out the fire.

Capping the well while it is on fire requires a very methodical and particular approach. As a result, the materials and equipment required cannot be substituted haphazardly. All equipment, materials, and personnel requested for the well control operation will need to be tested and provided regardless of the lead time involved.

This process describes the operational differences, special materials and equipment needed, and a basic sequence of events for capping on-fire well control and is for information purposes only. Wild Well cannot recommend any well control technique or methodology until an assessment is made of a particular well. (See Capping Sequence below for more information)

Capping Sequence

The following is a basic sequence of events that usually are required for capping on-fire operations. All well control events are unique, and this sequence is a guideline only. The exact nature of the blowout will dictate the actual intervention steps required. Wild Well Control, Inc. will provide detailed operational plans for the intervention after the initial assessment of the well is made.

*Step 1: Assess Well*

The well itself and the surrounding location and topography will be surveyed for the operation. The orientation of the ramp will be based on prevailing winds and the layout of the location.

*Step 2: Prepare Location*

The location will need to be cleared from all unexploded ordinance (if it exists). The pollution from the well, if any, will need to be controlled and the location will need to be prepared so that fire water and unburned produced fluids are properly drained away from the site.

*Step 3: Remove Debris*

Well sites can have debris on the site. The location will need to be cleared in the early stages of the intervention to allow personnel and equipment access to the wellhead.

*Step 4: Expose Wellhead*

The wellhead will need to be exposed properly for removal, normally requiring excavating down approximately 3 meters (m) for exposure good quality and straight casing. When the wellhead is completely severed from well casings, the tension on the innermost casing string will be relieved causing it to fall a certain distance. Excavation point should be below the fall distance to ensure that 3m of the innermost casing string is available for the emergency wellhead installation.

*Step 5: Remove Damaged Wellhead*

Once the casing is exposed, it can be cut off with an abrasive jet cutter. This operation may take several cuts depending on the exact nature of the flow from the well.

*Step 6: Prepare New Wellhead*

The wellhead will need to be prepared for installation on the yoke of the hydraulic Athey Wagon. A skirt and guide assembly will also need to be built and installed. Heat resistant wrap will also be needed for the well head to protect it during installation on the well.

*Step 7: Dig Ramps or Corridors*

Digging the ramps for the capping operation may take the longest time of any activity during the well control operation. The depth required is a minimum of 3m around the well. The ramps will also need to be dug to this depth. These ramps are approachways that the hydraulic Athey Wagon will use to access

the well. The hydraulic Athey Wagon and bulldozer must be level during the "backing approach" to avoid adjusting the BOP stack and boom while the capping crew is attempting to install the new wellhead.

*Step 8: Install New Wellhead*

The wellhead installation as previously described, will involve setting the wellhead and slip assembly into place. Using casing clamps, the wellhead will be jacked into its final place using the hydraulic force from the jacking system. Once the wellhead is in place, the seal assembly will be energized manually by tightening the screws on top of the combination slips and seals. Once the slips are energized with an effective seal, the casing stub above the wellhead can then be prepared for capping operations.

*Step 9: Prepare BOP Stack*

With the flow tube and skirt installed on the stack, the BOP stack will be wrapped with heat-resistant material. This preparation work is accomplished off of the critical path in order to minimize the time needed to control the well.

*Step 10: Prepare for Diverting Operations*

A great deal of work may be needed for post-capping diverting operations. It is important that the preparatory work for diverting be accomplished prior to actually capping the well. Diverting pits are usually large-to-handle, high-volume flows and must be dug prior to capping. The location and size of these pits are dependent on the size and type of event and cannot be determined accurately prior to an incident. This minimizes the time to hook up the diverter lines after capping operations are concluded. The well will be left flowing (and burning) through the capping stack while the diverter lines are secured to the capping BOP stack. In order to avoid damage to the rubber goods and seals in the BOP stack, rigging the diverter lines should be done as soon as practicable.

*Step 11: Prepare Casing Stub*

After installing the emergency wellhead, the casing stub above the casing head flange will need to be prepared for capping. The stub will be cut off with a lathe-type cutter to a specified height so that the capping BOP stack will swallow the casing stub properly.

*Step 12: Prepare Hydraulic Athey Wagon*

The hydraulic Athey Wagon will be prepared for capping operations. This will involve hooking up the BOP stack and load-testing the assembly. The blowout bus and the hydraulic lines, power pack, and control panel will be fixed to the blade of the bulldozer. A "dummy" run may be done prior to actual capping operations in order to finalize any dirt work that is required and to make a final check on spacing.

*Step 13: Capping the Well*

Pre-capping operations will involve stringing the snub lines and spotting the hydraulic Athey Wagon with the BOP stack in the ramp. A final check on the diverter line hookup spacing is also required. The bulldozer will back the hydraulic Athey Wagon and BOP stack over the flow. The stack will be lowered and set-down bolted to the wellhead.

*Step 14: Divert the Well*

As previously mentioned, the well should not be shut-in until the downhole condition of the well can be determined. If the well is shut-in and casing damage exists, broaching could occur. Broaching is very

serious, and often the only well control method that remains is an expensive relief well operation. This highlights the need to divert the well.

The final installation of the divert lines will need to be done prior to actually closing the blind rams. Once the well is diverted, it will still be allowed to flow uncontrolled through the diverter system.

*Step 15: Kill Operations*

The kill operations will likely involve the use of a snubbing unit. It will be necessary to fish the tubing from the well and conduct diagnostic operations to determine the downhole condition so that the appropriate kill method can be chosen.

Should an influx occur, the formation types in this area do not tend to bridge over of their own accord. The present calculated release from the wellbore would be 25,957 barrels of oil on day one with a drawdown to 13,531.36 barrels by day 33 and 30,841 MSCF (thousand standard cubic feet) of gas on day one with a drawdown to 16,918.34 MSCF of gas per day by day 33. A capping intervention is expected to take 33 days to bring the well under control.

| Initial Flow Rate per Day | Duration of Blowout | Total Volumes Released based on Nodal Analysis Tool |
|---|---|---|
| Oil – 25,957 bbl | 33 Days | 466,535 bbl |
| Gas – 19,848 CF | 33 Days | 558,305 mcf |

CF = cubic feet Mcf = thousand cubic feet

Eni's primary well control method would be the capping system; however, in the event a relief well is needed, the Nordic Rig #4 will be utilized. The rig will be on standby at Oliktok Point. This rig is capable of drilling the relief well as planned with no constraints or modifications required from its current design. The general specifications for the relief rig are shown in Table A-2. A dynamic killing study performed by Wild Well Control has confirmed that the feasibility of the relief well is within the range of capabilities of the Nordic rig, assuming that the relief well would be drilled from SID or from an adjacent ice pad. The relief well is not considered an extended reach drilling operation because the well can be intersected at a location in the intermediate casing section and dynamically killed from this point. The exploration well directional plans develop the majority of their vertical depth within the first part of the well path. The estimated time to drill the relief wells is approximately 40 days, including the mobilization. Mobilization is simplified due to unique design features, allowing it to be broken down into smaller modules for transportation via ice road. The Nordic rig preparation would be started during the capping system mobilization and intervention to reduce the time required for a possible relief well and prepare for the contingency plan.

Nordic rig #4 would be mobilized on the ice road to the primary location on an ice pad adjacent to the Spy Island Drillsite (SID). A secondary location on SID could also be used pending evaluation of the size and type of incident requiring the relief well. The relief rig will not be mobilized during the shoulder season as no drilling will take place during this period.

- With the planned spud of the first well in December, the unknown hydrocarbon interval will not be reached until the ice road and pads have been established in early February.
- Should the main bore be flow tested, the well would be completed with a xmas tree installed by the end of February.

- Should the sidetrack be drilled from the first well, it would be completed and secured with a xmas tree installed by the end of March, according to the proposed timeline (being the main bore flow test alternative to the sidetrack).
- The same operative sequence of the first well is planned for the second well.

**Table A-2 – General Specifications for the Relief Rig**

| Item | Description |
|---|---|
| Moving System | Self-powered, self-moving when assembled |
| Pulling Capacity | 350 ton |
| Main Generators | 3 - 3512C Cat, 3150 kW continuous power |
| Emergency Generator | 1 - cold-start C-9 275Kw Cat |
| Mast | Triple mast, 800K lb pull, 400K lb setback |
| API | built to API 4F , -45°F |
| Drawworks | 1800 HP AC , 90K lb single line capacity |
| Top Drive | 800 HP Tesco 350T, cont torque 37.5L ft-lb @ 112 RPM |
| BOP Stack | 13-5/8" 5000 psi with double ram and annular |
| Mud Pits | 750 bbl system |
| Solids Control | 2- Mongoose shale shakers |
| Pumps | 2 - 1000 HP Rigmaster six-plex pumps (1500 HP motors) |
| Winterization | 4.2MM BTU heater, 2 - 100HP boilers |

### *(h) Contact information*

| Name | Title | Phone Number | Email |
|---|---|---|---|
| Brenda Montalvo | SEQ Regulatory Manager | (713) 393-6259 | brenda.montalvo@enipetroleum.com |
| Whitney Grande | SEQ Director & Alaska Representative | (907) 865-3352 | whitney.grande@enipetroleum.com |

# Figure A-1. WASTE ESTIMATED TO BE GENERATED, TREATED AND/OR DOWNHOLE DISPOSED OR DISCHARGED TO THE BEAUFORT SEA

Please specify if the amount reported is a total or per well amount and be sure to include appropriate units.

| Projected generated waste | | | Projected ocean discharges | | Projected Downhole Disposal |
|---|---|---|---|---|---|
| **Type of Waste** | **Composition** | **Projected Amount** | **Discharge rate** | **Discharge Method** | **Answer yes or no** |
| *EXAMPLE: Cuttings wetted with synthetic based fluid* | *Cuttings generated while using synthetic based drilling fluid.* | *X bbl/well* | *X bbl/day/well* | *discharge overboard* | |
| Brine | | | N/A | N/A | No |
| Water-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with water-based fluid | | | N/A | N/A | Yes |
| Oil-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with oil-based fluid | | | N/A | N/A | Yes |
| synthetic-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with synthetic-based fluid | | | N/A | N/A | Yes |
| | | | | | |
| *EXAMPLE: Sanitary waste water* | *Sanitary waste from living quarters* | *X bbl/well* | *X bbl/hr/well* | *chlorinate and discharge overboard* | |
| Domestic wastewater treatment plant effluent | *160 Bbls / Day* | | N/A | N/A | Yes |
| Drill NN-01 ( 80 days ) | Domestic wastewater treatment plant effluent | 12,800 | N/A | N/A | Yes |
| Drill NN-01 ST-01 ( 20 days ) | Domestic wastewater treatment plant effluent | 3,200 | N/A | N/A | Yes |
| Drill NN-02 ( 90 days ) | Domestic wastewater treatment plant effluent | 14,400 | N/A | N/A | Yes |
| Drill NN-02 ST-01 ( 26 days ) | Domestic wastewater treatment plant effluent | 4,160 | N/A | N/A | Yes |
| Sanitary wastewater | N/A | N/A | N/A | N/A | N/A |
| Deck Drainage | | | N/A | N/A | N/A |
| Well treatment fluids | | | N/A | N/A | Yes |
| Well completion fluids | | | N/A | N/A | Yes |
| Workover fluids | | | N/A | N/A | Yes |
| Reverse osmosis unit concentrate | *1,600 Bbls / Day* | | N/A | N/A | Yes |
| Drill NN-01 ( 80 days ) | Reverse osmosis unit concentrate | 128,000 | N/A | N/A | Yes |
| Drill NN-01 ST-01 ( 20 days ) | Reverse osmosis unit concentrate | 32,000 | N/A | N/A | Yes |
| Drill NN-02 ( 90 days ) | Reverse osmosis unit concentrate | 144,000 | N/A | N/A | Yes |
| Drill NN-02 ST-01 ( 26 days ) | Reverse osmosis unit concentrate | 41,600 | N/A | N/A | Yes |
| Blowout preventer fluid | | | N/A | N/A | No |
| Boiler Blowdown | | | N/A | N/A | Yes |
| Pit rinse | | | N/A | N/A | Yes |
| Rig wash | | | N/A | N/A | Yes |
| Vac truck/supersucker rinse water | | | N/A | N/A | Yes |
| Hydraulic and lube oils from rig and support equipment maintenance | | | N/A | N/A | No |
| Glycol from rig and support equipment maintenance | | | N/A | N/A | Yes |
| Will you produce hydrocarbons? If yes, fill in the produced water. | | | | | |
| Produced water | | | N/A | N/A | |
| **Please enter individual or general to indicate which type of NPDES permit you will be covered by.** | | | General - APDES | | |
| NOTE: If you do not have a type of waste for the activity being applied for, enter N/A for all columns in a row. | | | NOTE: No discharges to the Beaufort Sea are anticipated | | |

## CHEMICAL PRODUCTS {30 CFR 550.213(c)}

Please provide a brief description, quantities to be stored, storage method, and rates of usage.

| Type of Chemical | Description | Quantity Used | Storage Method | Rates of Usage |
|---|---|---|---|---|
| | | | | |
| **Water Base Mud Products** | | | | |
| pH modifier | Sods Ash ( sodium carbonate ) | 2,428 Lbs | Sack | 202 Lbs / day |
| Viscosifier | M-I Gel ( Silica, crystalline (Cristobalite, quartz, Tridymite) ) | 242,800 Lbs | Bulk | 20,233 Lbs / day |
| Filtration Control | Polypac Supreme UL ( Carboxymethylcellulose (CMC) sodium salt ) | 7,284 Lbs | Sack | 607 Lbs / day |
| Viscosifier (Rheological Modifier) | Flowzan ( Xanthan gum ) | 4,856 Lbs | Sack | 405 Lbs / day |
| **Mineral Oil Base Mud Products** | | | | |
| Mineral Oil | LVT 200 Base Oil ( Petroleum Distillate, hydrotreated light ) | 19,583 Bbls | Bulk | 93 Bbls / day |
| Viscosifier | VG Supreme / TruVis ( Bentonite / Organophillic Clay ) | 58,456 Lbs | Sack | 277 Lbs / day |
| Lime | Lime ( Lime ) | 146,140 Lbs | Sack | 693 Lbs / day |
| Emulsifier | Actimul RD ( Modified tall oil soap ) | 233,824 Lbs | Sack | 1,108 Lbs / day |
| Wetting Agent | VersaWet ( Tall oil fatty acid, Rosin, Tall Oil Pitch ) | 29,228 Lbs | Sack | 139 Lbs / day |
| Viscosifier (Rheological Modifier) | HRP ( Unknown (liquid in 5 gal cans -or - 55 gal drums) ) | 1,735 gal | can drum | 8 gal / day |
| Brine Phase | CaCl2 Brine ( Water Wetting Phase ) | 7,892 Bbls | Bulk | 37 Bbls / day |
| Graded Limestone | SAFECARB 20 ( Seepage Loss ) | 1,315,260 Lbs | Bulk | 6,234 Lbs / day |
| Graded Limestone | SAFECARB40 ( Weighting Agent ) | 1,315,260 Lbs | Bulk | 6,234 Lbs / day |
| Barium Sulphate | Barite ( Weighting Agent ) | 2,075,188 Lbs | Bulk | 9,835 Lbs / day |
| **Cement** | | | | |
| Cement Blend 1 | Arcticset LIGHT III ( Dry Blend Cement- (10.7 ppg / Yield 2.77 cf/sx / Bulk Factor 2.20 cf/cf ) ) | 6,758 cubic Ft | Bulk | 31 cubic Ft / Day |
| Cement Blend 2 | DeepCRETE ( Dry Blend Cement- (12.5 ppg / Yield 1.56 cf/sx / Bulk Factor 1.80 cf/cf ) ) | 1,608 cubic Ft | Bulk | 7 cubic Ft / Day |
| Cement Blend 3 | 15.8ppg UniSLURRY ( Dry Blend Cement- (15.8 ppg / Yield 1.16 cf/sx / Bulk Factor 1.00 cf/cf ) ) | 24,443 cubic Ft | Bulk | 113 cubic Ft / Day |
| **Completion Fluids** | | | | |
| Gelling agent | J-580 ( Carbohydrate Polymer ) | 3,325 lbs | Bulk | 83 Lbs / Day |
| Biocide | M275 ( Diatomaceous earth, calcined, Sodium nitrate, 5-chloro-2-methyl-4-isothiazolin-3-one, 2-Methyl-4-isothiazolin-3-one, Crystalline silica: cristobalite, & Crystalline silica: Quartz -SiO2 ) | 50 lbs | Can / Drum | 1 Lbs / Day |
| Crosslinker | J532 (Borate) | 460 gal | Bulk | 12 Lbs / Day |
| Surfactant | F103 ( Propan-2-ol - 2-butoxyethanol - Oxyalkylated alkylalcohol - Ethoxylated alcohol linear - Aliphatic alcohol ) | 133 gal | Bulk | 3 Lbs / Day |
| Clay stabilizer | L071 ( Polyammine ) | 266 gal | Bulk | 7 Lbs / Day |
| EB-Clean Breaker | J475 ( Diammonium peroxodisulphate & Aliphatic co-polymer ) | 743 lbs | Can / Drum | 19 Lbs / Day |
| Breaker | J218 ( Diammonium peroxidisulphate ) | 204 lbs | Can / Drum | 5 Lbs / Day |
| Proppant | ( Ceranic / Crystaline Silica) | 160,000lbs | Bulk | 4000 Lbs / Day |

**Figure A-2 – Proposed Chemical Products**

# *SECTION B GEOLOGICAL AND GEOPHYSICAL INFORMATION*

***(a) Geological description***

The information for the Nikaitchuq North Exploration Drilling Project in this section contains confidential and proprietary information is not available in this public information copy of this EP.

***(b) Structure contour maps***

The information for the Nikaitchuq North Exploration Drilling Project in this section contains confidential and proprietary information and is not available in this public information copy of this EP.

***(c) Two-dimensional (2D) or three-dimensional (3D) seismic lines***

The information for the Nikaitchuq North Exploration Drilling Project in this section contains confidential and proprietary information and is not available in this public information copy of this EP.

***(d) Geological cross-sections***

The information for the Nikaitchuq North Exploration Drilling Project in this section contains confidential and proprietary information and is not available in this public information copy of this EP.

***(e) Shallow hazards report; (f) Shallow hazards assessment; and (g) High-resolution seismic lines***

The planned NN01 and NN02 wells are to be drilled from a surface location on SID. Due to seismic data acquisition gaps around the island the use of the seismic survey for shallow hazards analysis for these proposed wells is limited. However, 32 development wells have been drilled through this shallow zone from SID around this well location providing hard geologic and drilling control to the area. Separation between the near vertical disposal well SD37 and NN01 and NN02 lies between 25 feet (at wellhead) to 75 feet at the base of the permafrost.

***Conclusions***

No drilling hazards associated with natural gas hydrates, shallow trapped natural gas or oil are anticipated in the drilling of the NN01 or NN02 well. Although minor amounts of gas hydrates are associated with the permafrost layer, these amounts can and will be dealt with by prudent drilling operations and practices. Heavy oil encountered in either the Ugnu and/or Schrader Bluff intervals is not considered to present any drilling risks.

**Table B-1 – SID Wells**

| Well | Type | Borehole | MD | Start | Finish |
|---|---|---|---|---|---|
| SD37-DSP1 | Disposal | Main | 6958 | 09/23/11 | 10/05/11 |
| SI07-SE4 | Injector | Main | 4935 | 05/16/15 | 06/14/15 |
| SI11-FN6 | Injector | Main | 6396 | 01/18/14 | 02/23/14 |
| SI13-FN4 | Injector | Main | 6393 | 11/06/12 | 12/13/12 |
| SI14-N6 | Injector | Main | 4493 | 12/15/13 | 01/18/14 |
| SI17-SE2 | Injector | Main | 4499 | 05/11/14 | 06/05/14 |
| SI19-FN2 | Injector | Main | 6471 | 05/27/13 | 06/30/13 |

**Table B-1 – SID Wells (Continued)**

| Well | Type | Borehole | MD | Start | Finish |
|---|---|---|---|---|---|
| SI20-N4 | Injector | Main | 3898 | 03/23/12 | 05/04/12 |
| SI25-N2 | Injector | Main | 4231 | 07/22/12 | 08/27/12 |
| SI26-NW2 | Injector | Main | 7334 | 11/05/14 | 12/17/14 |
| SI29-S2 | Injector | Main | 5933 | 02/04/12 | 03/23/12 |
| SI32-W2 | Injector | Main | 5585 | 03/05/13 | 05/27/13 |
| SI34-W6 | Injector | Main | 7274 | 02/18/15 | 03/31/15 |
| SI35-W4 | Injector | Main | 6074 | 08/25/13 | 10/01/13 |
| SP01-SE7 | Producer | Main | 5846 | 06/14/15 | 07/08/15 |
| SP01-SE7 L1 | Producer | Lateral | | 07/08/15 | 07/28/15 |
| SP04-SE5 | Producer | Main | 5303 | 03/31/15 | 04/25/15 |
| SP04-SE5 L1 | Producer | Lateral | | 04/25/15 | 05/16/15 |
| SP05-FN7 | Producer | Main | 6302 | 12/13/12 | 01/23/13 |
| SP08-N7 | Producer | Main | 4834 | 10/01/13 | 10/27/13 |
| SP08-N7 L1 | Producer | Lateral | | 10/27/13 | 11/14/13 |
| SP10-FN5 | Producer | Main | 6437 | 08/27/12 | 10/02/12 |
| SP12-SE3 | Producer | Main | 4634 | 06/06/14 | 06/30/14 |
| SP12-SE3 L1 | Producer | Lateral | | 06/30/14 | 07/17/14 |
| SP16-FN3 | Producer | Main | 6431 | 05/04/12 | 06/12/12 |
| SP18-N5 | Producer | Main | 4146 | 10/14/11 | 11/19/11 |
| SP21-NW1 | Producer | Main | 7141 | 09/13/14 | 10/17/14 |
| SP21-NW1 L1 | Producer | Lateral | | 10/17/14 | 11/05/14 |
| SP22-FN1 | Producer | Main | 6684 | 01/24/13 | 03/04/13 |
| SP23-N3 | Producer | Main | 4274 | 01/02/12 | 02/04/12 |
| SP24-SE1 | Producer | Main | 4644 | 02/23/14 | 03/19/14 |
| SP24-SE1 L1 | Producer | Lateral | | 03/19/14 | 04/03/14 |
| SP27-N1 | Producer | Main | 4314 | 11/20/11 | 01/02/12 |
| SP28-NW3 | Producer | Main | 7616 | 08/08/15 | 09/16/15 |
| SP28-NW3 L1 | Producer | Lateral | | 09/16/15 | 10/16/15 |
| SP30-W1 | Producer | Main | 5470 | 10/02/12 | 11/05/12 |
| SP31-W7 | Producer | Main | 6844 | 12/29/14 | 02/01/15 |
| SP31-W7 L1 | Producer | Lateral | | 02/01/15 | 02/18/15 |
| SP33-W3 | Producer | Main | 5957 | 06/13/12 | 07/22/12 |
| SP36-W5 | Producer | Main | 6440 | 06/30/13 | 07/27/13 |
| SP36-W5 L1 | Producer | Lateral | | 07/27/13 | 08/15/13 |

### *(f) Stratigraphic column*

The information for the Nikaitchuq North Exploration Drilling Project in this section contains confidential and proprietary information and is not available in this public information copy of the revised Exploration Plan.

### *(g) Time-versus-depth chart*

The information for the Nikaitchuq North Exploration Drilling Project in this section contains confidential and proprietary information and is not available in this public information copy of the revised Exploration Plan.

### *(h) Geochemical information*

The Colville River, Alpine Oil reservoir was used and oil properties. Alpine oil properties were extracted from the Alaska Oil and Gas Conservation Commission (AOGCC) Pool Statistics for the Colville River Unit, Alpine Oil Pool.

### *(i) Future geological and geophysical (G&G) activities*

The information for the Nikaitchuq North Exploration Drilling Project in this section contains confidential and proprietary information and is not available in this public information copy of the revised Exploration Plan.

# *SECTION C HYDROGEN SULFIDE INFORMATION*

### *(a) Concentration*

The concentration of hydrogen sulfide ($H_2S$) is expected to be zero during the proposed drilling operations under this EP based on information derived from wells listed in the following classification sub-section.

### *(b) Classification*

In accordance with 30 CFR 550.215(b), Eni requests that Harrison Bay Block 6423 be classified by BSEE as $H_2S$ "absent."

All of the planned exploration wells described in this EP will be targeting the Jurassic Kingak interval that has been routinely penetrated in the central North Slope from Alpine field to Milne Point, with no reports of $H_2S$ detection or release while drilling. Additionally, based on publicly available reports, none of the nearby wells listed below encountered $H_2S$, including those that penetrated stratigraphically older Triassic horizons.

| Well | API | MD | TVD | Operator | Formation at TD |
|---|---|---|---|---|---|
| Ivik #1 | 50703204360000 | 6944 | 6943 | Pioneer | Jurassic Kingak |
| Kalubik #1 | 50103201650000 | 8273 | 8273 | Arco | Triassic Ivishak |
| Kalubik #3 | 50103202510000 | 7000 | 6950 | Arco | Jurassic Kingak |
| Kigun #1 | 50629232390100 | 9098 | 9001 | Kerr McGee | Triassic Shublik |
| Nikaitchuq #1 | 50629231930000 | 11024 | 9306 | Kerr McGee | Triassic Ivishak |
| Nikaitchuq #2 | 50629231990000 | 11004 | 9507 | Kerr McGee | Triassic Ivishak |
| Nikaitchuq #3 | 50629232427000 | 9310 | 8891 | Kerr McGee | Triassic Shublik |
| Nikaitchuq #3ST2 | 50629232420100 | 9292 | 8811 | Kerr McGee | Triassic Sag River |
| OCS Y-0338 (Phoenix) #1 | 55231000050000 | 9866 | 9866 | Tenneco | Pre-Mississippian Franklinian |
| ODSDW 01-44 WW | 50703205560000 | 6600 | 6600 | Caelus | Jurassic Nechelik |
| Oooguruk #1 | 50703204370000 | 6827 | 6826 | Pioneer | Jurassic Kingak |
| OP21-WW01 | 50029234380000 | 11037 | 9357 | Eni | Triassic Ivishak |
| OP22-WW03 | 50029234890000 | 10676 | 9521 | Eni | Triassic Kavik |
| OP23-WW02 | 50029234110000 | 12323 | 9549 | Eni | Triassic Kavik |
| OP-26 DSP02 | 50029233940000 | 8384 | 6603 | Eni | Cretaceous HRZ |
| SD-37 DSP01 | 50629234510000 | 6550 | 6550 | Eni | Cretaceous HRZ |
| Thetis Island #1 | 50103201900000 | 8470 | 8459 | Exxon | Triassic Ivishak |
| Tuvaaq State #1 | 50629232390000 | 17630 | 6864 | Kerr McGee | Triassic Ivishak |

Subsequent development drilling for the Cretaceous Schrader Bluff at Nikaitchuq and for the Jurassic Nuiqsut at Oooguruk detected no $H_2S$ while drilling in open-hole conditions. $H_2S$ is not expected in any hole segment in any exploration well planned in Eni's EP.

### *(c) $H_2S$ contingency plan*

Eni is requesting "$H_2S$ absent" classification from BSEE Regional Supervisor in this EP; therefore a contingency plan is not included.

### *(d) Modeling report*

In accordance with 30 CFR 550.215(b), Eni has provided sufficient information to classify the Nikaitchuq North proposed locations as $H_2S$ absent; therefore a modeling report is not submitted under this EP.

# *SECTION D BIOLOGICAL, PHYSICAL AND SOCIOECONOMIC INFORMATION*

***(a) Biological environment reports***

Eni included information on biological resources from a number of existing reports developed for this region in the Environmental Impact Analysis (EIA). In addition, biological data from polar bear sightings and bird strikes collected by Eni were included in the EIA. A list of biological data included in the EIA is provided in Section 7 of the EIA. The EIA is included as Appendix O of this EP.

***(b) Physical environment reports***

Eni included information on the physical environment from a number of existing reports developed for this region in the EIA. In addition, geological and geophysical information has been included as Section B of this EP; this section is proprietary and confidential. Publicly available information about the physical environment is included in the EIA, and a list of physical data is provided in Section 7 of the EIA. The EIA is included as Appendix O of this EP.

***(c) Socioeconomic study reports***

Eni included information on the socioeconomic environment from a number of existing reports developed for this region in the EIA. Additional information about Eni's impact on the socioeconomic environment, such as a list of local vendors used by Eni, is provided in Section 3.18 of the EIA. Information available about the socioeconomic environment is included in the EIA, and a list of socioeconomic data is provided in Section 7 of the EIA. The EIA is included as Appendix O of this EP.

# *SECTION E WASTES AND DISCHARGES INFORMATION*

***(a) Projected wastes and (b) Projected ocean discharges***

No National Pollutant Discharge Elimination System (NPDES) discharges will occur in federal OCS waters. All effluents are disposed of via injection into a permitted Class I Underground Injection Control (UIC) well/WIF on SID. Discharge of domestic wastewater treatment plant (WWTP) effluent under Alaska Pollutant Discharge Elimination System (APDES) permit AK0053767 has been permitted as a contingency option, when routine discharge to its Class I UIC well is not available. Since authorization has been obtained on January 1, 2013, this contingent discharge has not occurred.

Please refer to ***Figure E-1***, *"Waste Estimated to be Generated, Treated and/or Downhole Disposed or Discharged to the Beaufort Sea,"* and ***Figure E-2***, *"Waste and Surplus Estimated to be Transported and/or Disposed of Onshore,"* for further detailed information related to wastes and discharges.

In the event this contingency discharge option is required, Eni will adhere to all permit requirements including adherence to a Best Management Practices (BMP) Plan, and monitoring, recording, and reporting.

***(b) National Pollutant Discharge Elimination System (NPDES) permit***

All discharges from the drilling unit will be made in accordance with the existing permits in place, issued by the State under USEPA Permit AK 1I011-B for Class I Disposal Well(s), which is used for disposal of all Class I non-hazardous materials into the well; NPDES AK-0053767 the Individual Permit for emergency discharge of RO water and domestic and sanitary wastewater at SID, and AKG-33-2000, Eni's General Permit for authorization to discharge under NPDES for discharges of storm water, gravel pit dewatering, and construction dewatering.

***Drilling Fluid Products***

No intentional discharge is planned. Hole sections circulate using a steel-pit-contained mud system. All cuttings and waste mud are processed/ground and injected into the onsite disposal well.

Please refer to ***Figure E-1,*** *"Waste Estimated to be Generated, Treated and/or Downhole Disposed or Discharged to the Beaufort Sea,"* for further information.

***(c) Modeling report***

No discharges are planned for the activities proposed under this EP, therefore a modeling report is not required.

***(d) Cooling Water Intake***

Eni does not propose a cooling water intake structure; therefore, this information is not required.

# Figure E-1. WASTE ESTIMATED TO BE GENERATED, TREATED AND/OR DOWNHOLE DISPOSED OR DISCHARGED TO THE BEAUFORT SEA

Please specify if the amount reported is a total or per well amount and be sure to include appropriate units.

| Projected generated waste | | | Projected ocean discharges | | Projected Downhole Disposal |
|---|---|---|---|---|---|
| **Type of Waste** | **Composition** | **Projected Amount** | **Discharge rate** | **Discharge Method** | **Answer yes or no** |
| *EXAMPLE: Cuttings wetted with synthetic based fluid* | *Cuttings generated while using synthetic based drilling fluid.* | *X bbl/well* | *X bbl/day/well* | *discharge overboard* | |
| Brine | | | N/A | N/A | No |
| Water-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with water-based fluid | | | N/A | N/A | Yes |
| Oil-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with oil-based fluid | | | N/A | N/A | Yes |
| synthetic-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with synthetic-based fluid | | | N/A | N/A | Yes |
| | | | | | |
| *EXAMPLE: Sanitary waste water* | *Sanitary waste from living quarters* | *X bbl/well* | *X bbl/hr/well* | *chlorinate and discharge overboard* | |
| Domestic wastewater treatment plant effluent | *160 Bbls / Day* | | N/A | N/A | Yes |
| Drill NN-01 ( 80 days ) | Domestic wastewater treatment plant effluent | 12,800 | N/A | N/A | Yes |
| Drill NN-01 ST-01 ( 20 days ) | Domestic wastewater treatment plant effluent | 3,200 | N/A | N/A | Yes |
| Drill NN-02 ( 90 days ) | Domestic wastewater treatment plant effluent | 14,400 | N/A | N/A | Yes |
| Drill NN-02 ST-01 ( 26 days ) | Domestic wastewater treatment plant effluent | 4,160 | N/A | N/A | Yes |
| Sanitary wastewater | N/A | N/A | N/A | N/A | N/A |
| Deck Drainage | | | N/A | N/A | N/A |
| Well treatment fluids | | | N/A | N/A | Yes |
| Well completion fluids | | | N/A | N/A | Yes |
| Workover fluids | | | N/A | N/A | Yes |
| Reverse osmosis unit concentrate | *1,600 Bbls / Day* | | N/A | N/A | Yes |
| Drill NN-01 ( 80 days ) | Reverse osmosis unit concentrate | 128,000 | N/A | N/A | Yes |
| Drill NN-01 ST-01 ( 20 days ) | Reverse osmosis unit concentrate | 32,000 | N/A | N/A | Yes |
| Drill NN-02 ( 90 days ) | Reverse osmosis unit concentrate | 144,000 | N/A | N/A | Yes |
| Drill NN-02 ST-01 ( 26 days ) | Reverse osmosis unit concentrate | 41,600 | N/A | N/A | Yes |
| Blowout preventer fluid | | | N/A | N/A | No |
| Boiler Blowdown | | | N/A | N/A | Yes |
| Pit rinse | | | N/A | N/A | Yes |
| Rig wash | | | N/A | N/A | Yes |
| Vac truck/supersucker rinse water | | | N/A | N/A | Yes |
| Hydraulic and lube oils from rig and support equipment maintenance | | | N/A | N/A | No |
| Glycol from rig and support equipment maintenance | | | N/A | N/A | Yes |
| Will you produce hydrocarbons? If yes, fill in the produced water. | | | | | |
| Produced water | | | N/A | N/A | |
| **Please enter individual or general to indicate which type of NPDES permit you will be covered by.** | | | General - APDES | | |
| NOTE: If you do not have a type of waste for the activity being applied for, enter N/A for all columns in a row. | | | NOTE: No discharges to the Beaufort Sea are anticipated | | |

## Figure E-2. WASTE AND SURPLUS ESTIMATED TO BE TRANSPORTED AND/OR DISPOSED OF ONSHORE

please specify whether the amount reported is a total or per well

| | Projected generated waste | | Solid and Liquid Wastes transportation | Waste Disposal | | |
|---|---|---|---|---|---|---|
| **Type of Waste** | **Composition** | | **Transport Method** | **Name/Location of Facility** | **Amount** | **Disposal Method** |
| **Will drilling occur ? If yes, fill in the muds and cuttings.** | | | | | | |
| *EXAMPLE: Synthetic-based drilling fluid or mud* | *internal olefin, ester* | | *Below deck storage tanks on offshore support vessels* | *SID WIF* | *X bbl/well* | *Recycled* |
| **Water-based drilling fluid or mud** | | | Hard-piped to WIF, vac truck, supersucker | SID WIF | | UIC Class I disposal |
| Drill NN-01 | | | | | 1,822 | |
| Drill NN-02 | | | | | 1,822 | |
| **Synthetic-based drilling fluid or mud** | **LVT (mineral oil)** | | Hard-piped to WIF, vac truck, supersucker | SID WIF | | UIC Class I disposal |
| Drill NN-01 | | | | | 2,682 | |
| Drill NN-01 BP-01 | | | | | 255 | |
| Drill NN01-ST01 | | | | | 2,708 | |
| | | | | | | |
| Drill NN-02 | | | | | 2,827 | |
| Drill NN-02 BP-01 | | | | | 570 | |
| Drill NN02-ST01 | | | | | 2,989 | |
| **No Mud with oil/diesel -based fluids** | | | | | | |
| | | | | | | |
| **Cuttings wetted with Water-based fluid** | | | Hard-piped to WIF, vac truck, supersucker | SID WIF | | UIC Class I disposal |
| Drill NN-01 | | | | | 3,034 | |
| Drill NN-02 | | | | | 3,034 | |
| **Cuttings wetted with Synthetic-based fluid** | **LVT (mineral oil)** | | Hard-piped to WIF, vac truck, supersucker | SID WIF | | UIC Class I disposal |
| Drill NN-01 | | | | | 8,064 | |
| Drill NN-01 BP-01 | | | | | 68 | |
| Drill NN01-ST01 | | | | | 495 | |
| | | | | | | |
| Drill NN-02 | | | | | 8,665 | |
| Drill NN-02 BP-01 | | | | | 91 | |
| Drill NN02-ST01 | | | | | 521 | |
| **No (0) Cuttings wetted with oil-based fluids** | | | | | 0 | |
| | | | | | | |
| **Will you produce hydrocarbons? If yes fill in for produced sand. ANSWER = NO** | | | | | | |
| | | | | | | |
| | | | | | | |
| **Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows. ANSWER = NO** | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

# *SECTION F AIR EMISSIONS INFORMATION*

The air emissions associated with the drilling unit that will be generated by the proposed exploration activities will occur on SID. These air emissions are regulated under the jurisdiction of the state of Alaska. An overview of the regulatory framework of air quality for the area of the exploration activities is provided in Section 3.3 of the EIA located in Appendix O under this EP.

***(a) Projected air emissions***

As required under 30 CFR 550.218, Eni is enclosing the projected air emission sheets for the Nikaitchuq project that are provided in this section as ***Tables F-1 through F-6,*** *with* additional vendor data labeled as PERFORMANCE DATA [MHB00342] dated May 11, 2012 and Oil and Gas Performance Data [CBN00256] dated November 21, 2016.

***(b) Emission reduction measures***

Per 30 CFR 550.218(b), no emission reduction measures are proposed for the project.

***(c) Processes, equipment, fuels, and combustibles***

Information related to the processes, equipment, fuels, and combustibles, as required by 30 CFR 550.218(c), is provided in ***Tables F-1 through F-6***.

***(d) Distance to shore***

This project is located in State waters on SID, approximately 3.2 miles from shore and approximately 560 feet from the natural barrier island, Spy Island.

***(e) Non-exempt drilling unit and (f) Modeling report***

Under 30 CFR 550.218(e) and §550.218(f), air emissions that are regulated under BOEM's air quality regulatory program for sources that exist on the OCS that exceed a significance level under 30 CFR 550.303 must provide an air quality modeling report for projects. The sources of air emissions associated with this project are not located on the OCS and are not subject to review under §550.303. Therefore, 30 CFR 550.218(e) and 550.218(f) are not applicable to this project.

The air pollutant emissions associated with the Nikaitchuq Exploration project will be under the jurisdiction of the State air quality rules. However, Eni recognizes that the appropriate air quality information must be provided to BOEM to allow for an adequate determination of potential NEPA impacts for the proposed activities under this EP. Eni provides this information related to air quality modeling in the EIA located in Appendix O of this EP that addresses the requirements under NEPA, per 30 CFR 550.227(b)(2).

**Table F-1a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**Emission Unit Inventory for Existing Units**

| Emission Unit | | | Rating/Size | Maximum Operation or Consumption | Fuel |
|---|---|---|---|---|---|
| ID | Name | Description | | | |
| **Doyon 15 Exploration Drilling Unit** | | | | | |
| 98 | Rig Boiler #1 | Superior Boiler | 4.184 MMBtu/hr | 8,760 hr/yr | Diesel |
| 99 | Rig Boiler #2 | Superior Boiler | 4.184 MMBtu/hr | 8,760 hr/yr | Diesel |
| 100 | Rig Heater #1 | Dick's Air Heater | 3.5 MMBtu/hr | 8,760 hr/yr | Diesel |
| 101 | Rig Heater #2 | Dick's Air Heater | 5.0 MMBtu/hr | 8,760 hr/yr | Diesel |
| 102 | Reciprocating Engine #1 (Non-Road Engine) | Caterpillar 3516 | 2,523 bhp | 8,760 hr/yr | Diesel |
| 103 | Reciprocating Engine #2 (Non-Road Engine) | Caterpillar 3516 | 2,523 bhp | 8,760 hr/yr | Diesel |
| 104 | Reciprocating Engine #3 (Non-Road Engine) | Caterpillar 3516 | 2,523 bhp | 8,760 hr/yr | Diesel |
| 105 | Reciprocating Engine #4 (Non-Road Engine) | Caterpillar 3512 | 1,879 bhp | 8,760 hr/yr | Diesel |
| 117 | Mud Pump #3 (Non-Road Engine) | DEUTZ AG | 63 bhp | 8,760 hr/yr | Diesel |

**Table F-1b Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**Emission Unit Inventory for New Units under Exploration Plan**

| Emission Unit | | | Rating/Size | Maximum Operation or Consumption | Fuel |
|---|---|---|---|---|---|
| ID | Name | Description | | | |
| **Spy Island Drillsite** | | | | | |
| 123 | Well Test Flare | Pilot/Purge & Field Gas | 3 MMscf/day | 360 MMscf/yr [1] | Fuel Gas |
| **Doyon 15 Exploration Drilling Unit** | | | | | |
| 124 | Reciprocating Engine #5 (Non-Road Engine) | Caterpillar 3516B | 2,150 bhp | 8,760 hr/yr | Diesel |
| 125 | Reciprocating Engine #6 (Non-Road Engine) | Caterpillar 3516C | 2,722 bhp | 8,760 hr/yr | Diesel |

Notes:
[1] Well test activities are not projected to last longer than 120 days per 12 month period.

**Table F-2a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$NO_X$ Emissions Calculations for Existing Units**

| Emission Unit | | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|
| ID | Description | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | |
| 98 | Rig Boiler #1 | 20 lb/$10^3$ gal | AP-42, Table 1.3-1 | 4.184 MMBtu/hr | 8,760 hr/yr | 0.70 lb/hr | 3.8 tpy |
| 99 | Rig Boiler #2 | 20 lb/$10^3$ gal | AP-42, Table 1.3-1 | 4.184 MMBtu/hr | 8,760 hr/yr | 0.70 lb/hr | 3.8 tpy |
| 100 | Rig Heater #1 | 20 lb/$10^3$ gal | AP-42, Table 1.3-1 | 3.5 MMBtu/hr | 8,760 hr/yr | 0.58 lb/hr | 3.2 tpy |
| 101 | Rig Heater #2 | 20 lb/$10^3$ gal | AP-42, Table 1.3-1 | 5.0 MMBtu/hr | 8,760 hr/yr | 0.83 lb/hr | 4.6 tpy |
| 102 | Reciprocating Engine #1 (Non-Road Engine) | 30.27 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 30.27 lb/hr | 132.6 tpy |
| 103 | Reciprocating Engine #2 (Non-Road Engine) | 30.27 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 30.27 lb/hr | 132.6 tpy |
| 104 | Reciprocating Engine #3 (Non-Road Engine) | 30.27 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 30.27 lb/hr | 132.6 tpy |
| 105 | Reciprocating Engine #4 (Non-Road Engine) | 20.17 lb/hr | Vendor Data | 1,879 bhp | 8,760 hr/yr | 20.17 lb/hr | 88.3 tpy |
| 117 | Mud Pump #3 (Non-Road Engine) | 0.031 lb/bhp-hr | AP-42, Table 3.3-1 | 63 bhp | 8,760 hr/yr | 1.95 lb/hr | 8.6 tpy |
| | | | | | | | |
| **Total Annual $NO_X$ Emissions for Exising Units on Drilling Unit [2]** | | | | | | | **494.6 tpy** |
| **Emissions Over Project Duration [3]** | | | | | | | **989.3 tons** |

Notes:

[1] Emission Factors:

| | |
|---|---|
| Diesel fuel heat content (Arctic Diesel): | 120,000 Btu/gal |
| Efficiency of heaters: | 80% |

[2] Permit limit of 225 tpy of $NO_X$ exists for stationary equipment under Minor Air Permit No. AQ0923MSS10. Non-road engines are not included towards permit source classification, per 18 AAC 50.100.

[3] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-2b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$NO_X$ Emissions Calculations for New Units under Exploration Plan**

| Emission Unit | | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|
| ID | Description | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Spy Island Drillsite** | | | | | | | |
| 123 | Well Test Flare | 0.068 lb/MMBtu | AP-42, Table 13.5-1 | 3 MMscf/day | 360 MMscf/yr | 9.47 lb/hr | 13.6 tpy |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | |
| 124 | Reciprocating Engine #5 (Non-Road Engine) | 30.27 lb/hr | Vendor Data | 2,150 bhp | 8,760 hr/yr | 30.27 lb/hr | 132.6 tpy |
| 125 | Reciprocating Engine #6 (Non-Road Engine) | 5.99 g/hp-hr | Vendor Data | 2,722 bhp | 8,760 hr/yr | 35.95 lb/hr | 157.4 tpy |
| | | | | | | | |
| **Total Annual $NO_X$ Emissions for New Units on Drilling Unit and Well Test Flare** | | | | | | | **303.7 tpy** |
| **Emissions Over Project Duration [2]** | | | | | | | **607.3 tons** |

Notes:

[1] Emission Factors:

| | |
|---|---|
| Fuel gas heat content (2014 gas analysis): | 1,114 Btu/scf |
| Diesel fuel heat content (Arctic Diesel): | 120,000 Btu/gal |

[2] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-3a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**CO Emissions Calculations for Existing Units**

| Emission Unit | | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|
| ID | Description | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | |
| 98 | Rig Boiler #1 | 5 lb/$10^3$ gal | AP-42, Table 1.3-3 | 4.184 MMBtu/hr | 8,760 hr/yr | 0.17 lb/hr | 1.0 tpy |
| 99 | Rig Boiler #2 | 5 lb/$10^3$ gal | AP-42, Table 1.3-3 | 4.184 MMBtu/hr | 8,760 hr/yr | 0.17 lb/hr | 1.0 tpy |
| 100 | Rig Heater #1 | 5 lb/$10^3$ gal | AP-42, Table 1.3-3 | 3.5 MMBtu/hr | 8,760 hr/yr | 0.15 lb/hr | 0.8 tpy |
| 101 | Rig Heater #2 | 5 lb/$10^3$ gal | AP-42, Table 1.3-3 | 5.0 MMBtu/hr | 8,760 hr/yr | 0.21 lb/hr | 1.1 tpy |
| 102 | Reciprocating Engine #1 (Non-Road Engine) | 22.78 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 22.78 lb/hr | 99.8 tpy |
| 103 | Reciprocating Engine #2 (Non-Road Engine) | 22.78 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 22.78 lb/hr | 99.8 tpy |
| 104 | Reciprocating Engine #3 (Non-Road Engine) | 22.78 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 22.78 lb/hr | 99.8 tpy |
| 105 | Reciprocating Engine #4 (Non-Road Engine) | 5.50E-03 lb/bhp-hr | AP-42, Table 3.4-1 | 1,879 bhp | 8,760 hr/yr | 10.33 lb/hr | 45.3 tpy |
| 117 | Mud Pump #3 (Non-Road Engine) | 6.68E-03 lb/bhp-hr | AP-42, Table 3.3-1 | 63 bhp | 8,760 hr/yr | 0.42 lb/hr | 1.8 tpy |
| | | | | | | | |
| | | | | | | **Total Annual CO Emissions for Exising Units on Drilling Unit [2]** | **346.4 tpy** |
| | | | | | | **Emissions Over Project Duration [3]** | **692.9 tons** |

Notes:

[1] Emission Factors:

Diesel fuel heat content (Arctic Diesel): 120,000 Btu/gal
Efficiency of heaters: 80%

[2] Permit limit of 225 tpy of CO exists for stationary equipment under Minor Air Permit No. AQ0923MSS10. Non-road engines are not included towards permit source classification, per 18 AAC 50.100.

[3] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-3b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**CO Emissions Calculations for New Units under Exploration Plan**

| Emission Unit | | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|
| ID | Description | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Spy Island Drillsite** | | | | | | | |
| 123 | Well Test Flare | 0.31 lb/MMBtu | AP-42, Table 13.5-2 | 3 MMscf/day | 360 MMscf/yr | 0.10 lb/hr | 62.2 tpy |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | |
| 124 | Reciprocating Engine #5 (Non-Road Engine) | 22.78 lb/hr | Vendor Data | 2,150 bhp | 8,760 hr/yr | 22.78 lb/hr | 99.8 tpy |
| 125 | Reciprocating Engine #6 (Non-Road Engine) | 0.48 g/bhp-hr | Vendor Data | 2,722 bhp | 8,760 hr/yr | 2.88 lb/hr | 12.6 tpy |
| | | | | | | | |
| | | | | | | **Total Annual CO Emissions for New Units on Drilling Unit and Well Test Flare [2]** | **174.6 tpy** |
| | | | | | | **Emissions Over Project Duration [3]** | **349.1 tons** |

Notes:

[1] Emission Factors:

Fuel gas heat content (2014 gas analysis): 1,114 Btu/scf
Diesel fuel heat content (Arctic Diesel): 120,000 Btu/gal

[2] Permit limit of 225 tpy of CO exists for stationary equipment under Minor Air Permit No. AQ0923MSS10. Non-road engines are not included towards permit source classification, per 18 AAC 50.100.

[3] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-4a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$PM/PM_{2.5}/PM_{10}$ Emissions Calculations for Existing Units**

| Emission Unit | | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|
| ID | Description | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | |
| 98 | Rig Boiler #1 | 3.3 lb/$10^3$ gal | AP-42, Table 1.3-1 | 4.184 MMBtu/hr | 8,760 hr/yr | 0.14 lb/hr | 0.6 tpy |
| 99 | Rig Boiler #2 | 3.3 lb/$10^3$ gal | AP-42, Table 1.3-1 | 4.184 MMBtu/hr | 8,760 hr/yr | 0.14 lb/hr | 0.6 tpy |
| 100 | Rig Heater #1 | 3.3 lb/$10^3$ gal | AP-42, Table 1.3-1 | 3.5 MMBtu/hr | 8,760 hr/yr | 0.12 lb/hr | 0.5 tpy |
| 101 | Rig Heater #2 | 3.3 lb/$10^3$ gal | AP-42, Table 1.3-1 | 5.0 MMBtu/hr | 8,760 hr/yr | 0.17 lb/hr | 0.8 tpy |
| 102 | Reciprocating Engine #1 (Non-Road Engine) | 0.76 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 0.76 lb/hr | 3.3 tpy |
| 103 | Reciprocating Engine #2 (Non-Road Engine) | 0.76 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 0.76 lb/hr | 3.3 tpy |
| 104 | Reciprocating Engine #3 (Non-Road Engine) | 0.76 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 0.76 lb/hr | 3.3 tpy |
| 105 | Reciprocating Engine #4 (Non-Road Engine) | 0.13 lb/hr | Vendor Data | 1,879 bhp | 8,760 hr/yr | 0.13 lb/hr | 0.6 tpy |
| 117 | Mud Pump #3 (Non-Road Engine) | 2.20E-03 lb/bhp-hr | AP-42, Table 3.3-1 | 63 bhp | 8,760 hr/yr | 0.14 lb/hr | 0.6 tpy |
| | | | | | | | |
| **Total Annual $PM/PM_{2.5}/PM_{10}$ Emissions for Exising Units on Drilling Unit** | | | | | | | **13.7 tpy** |
| **Emissions Over Project Duration [2]** | | | | | | | **27.4 tons** |

Notes:

[1] Emission Factors:

| | |
|---|---|
| Diesel fuel heat content (Arctic Diesel): | 120,000 Btu/gal |
| Efficiency of heaters: | 80% |

[2] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-4b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$PM/PM_{2.5}/PM_{10}$ Emissions Calculations for New Units under Exploration Plan**

| Emission Unit | | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|
| ID | Description | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Spy Island Drillsite** | | | | | | | |
| 123 | Well Test Flare | 40 µg/liter | AP-42, Table 13.5-1 [2] | 3 MMscf/day | 360 MMscf/yr | 3.03 lb/hr | 4.4 tpy |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | |
| 124 | Reciprocating Engine #5 (Non-Road Engine) | 0.76 lb/hr | Vendor Data | 2,150 bhp | 8,760 hr/yr | 0.76 lb/hr | 3.3 tpy |
| 125 | Reciprocating Engine #6 (Non-Road Engine) | 0.1 g/bhp-hr | Vendor Data | 2,722 bhp | 8,760 hr/yr | 0.60 lb/hr | 2.6 tpy |
| | | | | | | | |
| **Total Annual $PM/PM_{2.5}/PM_{10}$ Emissions for New Units on Drilling Unit and Well Test Flare** | | | | | | | **10.3 tpy** |
| **Emissions Over Project Duration [3]** | | | | | | | **20.6 tons** |

Notes:

[1] Emission Factors:

| | |
|---|---|
| Fuel gas heat content (2014 gas analysis): | 1,114 Btu/scf |
| Diesel fuel heat content (Arctic Diesel): | 120,000 Btu/gal |

[2] Assumes lightly smoking flare.

[3] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-5a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**VOC Emissions Calculations for Existing Units**

| Emission Unit | | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|
| ID | Description | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | |
| 98 | Rig Boiler #1 | 0.34 lb/$10^3$ gal | AP-42, Table 1.3-3 | 4.184 MMBtu/hr | 8,760 hr/yr | 0.01 lb/hr | 0.06 tpy |
| 99 | Rig Boiler #2 | 0.34 lb/$10^3$ gal | AP-42, Table 1.3-3 | 4.184 MMBtu/hr | 8,760 hr/yr | 0.01 lb/hr | 0.06 tpy |
| 100 | Rig Heater #1 | 0.34 lb/$10^3$ gal | AP-42, Table 1.3-3 | 3.5 MMBtu/hr | 8,760 hr/yr | 0.01 lb/hr | 0.05 tpy |
| 101 | Rig Heater #2 | 0.34 lb/$10^3$ gal | AP-42, Table 1.3-3 | 5.0 MMBtu/hr | 8,760 hr/yr | 0.02 lb/hr | 0.08 tpy |
| 102 | Reciprocating Engine #1 (Non-Road Engine) | 0.54 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 0.54 lb/hr | 2.4 tpy |
| 103 | Reciprocating Engine #2 (Non-Road Engine) | 0.54 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 0.54 lb/hr | 2.4 tpy |
| 104 | Reciprocating Engine #3 (Non-Road Engine) | 0.54 lb/hr | Vendor Data | 2,523 bhp | 8,760 hr/yr | 0.54 lb/hr | 2.4 tpy |
| 105 | Reciprocating Engine #4 (Non-Road Engine) | 0.39 lb/hr | Vendor Data | 1,879 bhp | 8,760 hr/yr | 0.39 lb/hr | 1.7 tpy |
| 117 | Mud Pump #3 (Non-Road Engine) | 2.47E-03 lb/bhp-hr | AP-42, Table 3.3-1 | 63 bhp | 8,760 hr/yr | 0.16 lb/hr | 0.7 tpy |
| | | | | | | | |
| | | | | | | **Total Annual VOC Emissions for Exising Units on Drilling Unit** | **9.7 tpy** |
| | | | | | | **Emissions Over Project Duration [2]** | **19.5 tons** |

Notes:
[1] Emission Factors:
Diesel fuel heat content (Arctic Diesel): 120,000 Btu/gal
Efficiency of heaters: 80%
[2] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-5b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**VOC Emissions Calculations for New Units under Exploration Plan**

| Emission Unit | | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|
| ID | Description | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Spy Island Drillsite** | | | | | | | |
| 123 | Well Test Flare | 0.66 lb/MMBtu | AP-42, Table 13.5-1 | 3 MMscf/day | 360 MMscf/yr | 91.9 lb/hr | 132.3 tpy |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | |
| 124 | Reciprocating Engine #5 (Non-Road Engine) | 0.54 lb/hr | Vendor Data | 2,150 bhp | 8,760 hr/yr | 0.54 lb/hr | 2.4 tpy |
| 125 | Reciprocating Engine #6 (Non-Road Engine) | 0.36 g/hp-hr | Vendor Data | 2,722 bhp | 8,760 hr/yr | 2.16 lb/hr | 5.0 tpy |
| | | | | | | | |
| | | | | | | **Total Annual VOC Emissions for New Units on Drilling Unit and Well Test Flare** | **139.7 tpy** |
| | | | | | | **Emissions Over Project Duration [2]** | **279.4 tons** |

Notes:
[1] Emission Factors:
Fuel gas heat content (2014 gas analysis): 1,114 Btu/scf
Diesel fuel heat content (Arctic Diesel): 120,000 Btu/gal
Efficiency of heaters: 80%
[2] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-6a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Projec**
**$SO_2$ Emissions Calculations for Existing Units**

| Emission Unit | | Maximum Fuel | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|---|
| ID | Description | Sulfur Content | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | | |
| 98 | Rig Boiler #1 | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 4.184 MMBtu/hr | 8,760 hr/yr | 0.009 lb/hr | 0.04 tpy |
| 99 | Rig Boiler #2 | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 4.184 MMBtu/hr | 8,760 hr/yr | 0.009 lb/hr | 0.04 tpy |
| 100 | Rig Heater #1 | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 3.5 MMBtu/hr | 8,760 hr/yr | 0.007 lb/hr | 0.03 tpy |
| 101 | Rig Heater #2 | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 5.0 MMBtu/hr | 8,760 hr/yr | 0.011 lb/hr | 0.05 tpy |
| 102 | Reciprocating Engine #1 (Non-Road Engine) | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 2,523 bhp | 8,760 hr/yr | 0.03 lb/hr | 0.1 tpy |
| 103 | Reciprocating Engine #2 (Non-Road Engine) | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 2,523 bhp | 8,760 hr/yr | 0.03 lb/hr | 0.1 tpy |
| 104 | Reciprocating Engine #3 (Non-Road Engine) | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 2,523 bhp | 8,760 hr/yr | 0.03 lb/hr | 0.1 tpy |
| 105 | Reciprocating Engine #4 (Non-Road Engine) | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 1,879 bhp | 8,760 hr/yr | 0.02 lb/hr | 0.1 tpy |
| 117 | Mud Pump #3 (Non-Road Engine) | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 63 bhp | 8,760 hr/yr | 0.001 lb/hr | 0.003 tpy |
| | | | | | | | | |
| | | | | | | | **Total Annual $SO_2$ Emissions for Exising Units on Drilling Unit** | **0.7 tpy** |
| | | | | | | | **Emissions Over Project Duration [2]** | **1.3 tons** |

Notes:
[1] Emission Factors:

| | |
|---|---|
| Density of Arctic Diesel: | 6.82 lb/gal |
| Diesel fuel heat content (Arctic Diesel): | 120,000 Btu/gal |
| BSFC from AP-42, October 1996, Section 3.4, Page 3.4-5: | 7,000 Btu/hp-hr |
| Efficiency of heaters: | 80% |
| Diesel Sulfur content (ULSD): | 0.0015 wt pct. S |

[2] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

**Table F-6b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$SO_2$ Emissions Calculations for New Units under Exploration Plan**

| Emission Unit | | Maximum Fuel | Emission Factor | | Maximum | Maximum Operation | Projected Peak | Annual |
|---|---|---|---|---|---|---|---|---|
| ID | Description | Sulfur Content | Rate | Reference | Capacity | or Consumption | Hourly Emissions [1] | Emissions [1] |
| **Spy Island Drillsite** | | | | | | | | |
| 123 | Well Test Flare | 250 ppmv $H_2S$ | 42.1 lb/MMscf | Mass Balance | 3 MMscf/day | 360 MMscf/yr | 5.3 lb/hr | 7.6 tpy |
| **Doyon 15 Exploration Drilling Unit** | | | | | | | | |
| 124 | Reciprocating Engine #5 (Non-Road Engine) | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 2,150 bhp | 8,760 hr/yr | 0.03 lb/hr | 0.1 tpy |
| 125 | Reciprocating Engine #6 (Non-Road Engine) | 15 ppmw S | 2.05E-04 lb/gal | Mass Balance | 2,722 bhp | 8,760 hr/yr | 0.03 lb/hr | 0.1 tpy |
| | | | | | | | | |
| | | | | | | | **Total Annual $SO_2$ Emissions for New Units on Drilling Unit and Well Test Flare** | **7.8 tpy** |
| | | | | | | | **Emissions Over Project Duration [2]** | **15.7 tons** |

Notes:
[1] Emission Factors:

| | |
|---|---|
| Density of Arctic Diesel: | 6.82 lb/gal |
| Diesel fuel heat content (Arctic Diesel): | 120,000 Btu/gal |
| BSFC from AP-42, October 1996, Section 3.4, Page 3.4-5: | 7,000 Btu/hp-hr |
| Fuel gas heat content (2014 gas analysis): | 1,114 Btu/scf |
| Efficiency of heaters: | 80% |
| Fuel gas sulfur content (permit limit): | 250 ppmv |
| Diesel Sulfur content (ULSD): | 0.0015 wt pct. S |

[2] Nikaitchuq Exploration Drilling Project will include intermittent drilling activity and the entire duration is not anticipated to extend beyond 24 months. Emissions for the drilling unit are conservatively based on continuous use.

# *SECTION G OIL SPILL INFORMATION*

In accordance with 30 CFR 254.50, owners or operators of facilities located in State waters seaward of the coastline must submit a spill response plan to BSEE for approval. The owner or operator may choose one of three methods to comply with this requirement: 30 CFR 254.51, 254.52, or 254.53. Eni has selected 30 CFR 254.53, "Submitting a Response Plan Developed Under State Requirements." A cross-reference for additional plan requirements is presented as Table G-1 as an attachment under this section.

Eni will ensure that renewals are submitted according to BSEE renewal timeframe as dictated in 18 AAC 75.460. BSEE has currently indicated that a renewal frequency coinciding with the ODPCP renewal (every five years) is required.

***(a) Oil spill response planning***

Eni has in place an ODPCP approved by the State of Alaska (ADEC Plan #: 16-CP-5116).

Despite the very low likelihood of a large oil spill event, Eni has designed a response program based on a regional capability of responding to a range of spill volumes, from small operational spills up to and including a worst-case discharge (WCD) from an exploration well blowout. Eni's program is developed to fully satisfy federal and state oil spill planning requirements. The federally-approved OSRP and state-approved ODPCP present specific information on the response program that includes a description of personnel and equipment mobilization, the Incident Management Team (IMT) organization, and the strategies and tactics used to implement effective and sustained spill containment and recovery operations.

Eni is committed to conducting safe and environmentally responsible operations in Nikaitchuq. To achieve this goal, oil spill prevention is a priority in all operations. Prevention practices include personnel training programs and strict adherence to procedures and management practices. All project personnel, including employees and contractors, involved in oil spill contingency response would receive discharge prevention and response training as described in the OSRP and ODPCP. Training drills also would be conducted periodically to familiarize personnel with onsite equipment, proper deployment techniques, and maintenance procedures.

***(b) Location of primary oil spill equipment base and staging area***

Alaska Clean Seas (ACS) serves as Eni's primary response action organization for spill response. The ODPCP incorporates by reference, wherever applicable, the ACS Technical Manual, which consists of Volume 1, Tactics Descriptions, and Volume 2, Map Atlas. Volume 1 describes the tactics that can be used in responding to a variety of spill situations. Volume 2 provides maps and a narrative description of resources at risk and key response considerations.

The ODPCP relies, in part, on information provided in the ACS Technical Manual. This Plan references specific tactics descriptions, maps, and incident management information contained in the ACS Technical Manual.

Spill response equipment is available from various sources. A certain amount of equipment is stored on site. Heavy equipment used on site for operational purposes could be used for spill response. ACS maintains an inventory of spill response equipment and has contracts for additional equipment. Equipment of other North Slope operators could be made available to Eni through their Mutual Aid agreements. See Section 3.6 of the ODPCP for more information on available equipment.

Transport options for mobilizing equipment and personnel are summarized in Table 1-5 of the ODPCP. These options vary with the season and weather conditions, and include marine vessels, helicopters, fixed-wing aircraft, road vehicles, hovercraft, and Rolligons. ACS Technical Manual, Volume 1, Tactics L-1, L-3, L-4, and L-6, provide detailed information on transportation and are incorporated here by reference.

Onshore areas of Nikaitchuq are on the North Slope gravel road infrastructure, allowing transport via highway vehicles. During the open water season, SID is accessible via barge, crew boat, and other boats. During most winters, Eni may build an ice road from OPP to SID, allowing access by highway vehicles. When an ice road is constructed, it is usually available for use between early to mid-February to mid to late May. Start and end dates vary from year to year, depending on weather and other factors. During winters when an ice road is not constructed, Eni will give close consideration to accessibility to spill response equipment. Spill response equipment that cannot be transported to SID via available means (e.g., hovercraft or helicopter) will be maintained on site until adequate transportation means are available.

During the times of year when SID is not accessible via either marine vessels or highway vehicles, Eni plans to continue to use a hovercraft to transport personnel, supplies, and equipment to SID.

Transportation times would be unaffected by freeze-up and breakup conditions for modes of transport other than vessels. ACS bay boats can be used to transit in ice up to 4 inches thick during freeze-up, but with some limitations. Other vessels would not be used during this time. During breakup, ACS vessel response is limited to airboats. Other transport options then could be hovercraft and helicopter.

The ice road to SID would be generally unsuitable for surface travel after mid to late May due to melting of the surface of the sea ice and/or potential overflooding from the Colville River breakup. During freeze-up, ice is either unable to support surface traffic or is unstable because of ice movement. Normally, ice will not be sufficiently thick or stable for surface transportation until after mid to late December.

Transportation to SID during the spring breakup (May and June) period would be generally limited to helicopters, hovercraft, airboats, and possibly small-tracked/wheeled all-terrain vehicles (ATVs). ATVs would be less likely to be used during freeze-up due to the possible occurrence of thin ice or patches of open water due to relative instability of ice.

North Slope-based helicopters typically have limited capabilities but could be available relatively rapidly from various Alaska locations in the event of emergencies. If needed, larger, heavy-lift helicopters would likely be mobilized from the Lower 48 states and could require up to a week to arrive on site. General information on availability and capabilities of various Alaska-based helicopters are in the ACS Technical Manual, Volume 1, Tactic L-4.

Washout of the Kuparuk River bridge, which may occur for a few days between mid-May and mid-June, could impact spill response times. Deployment times vary, depending on availability, location, and weather conditions. When the river precludes bridge traffic, Nikaitchuq may rely more on Mutual Aid resources from Kuparuk, and some equipment could be transported to the area via aircraft landing at the Kuparuk airstrip.

Marine vessel access is available from approximately July through September to mid-October. ACS has contracts with the major North Slope marine contractors.

***Name(s) of Spill Removal Organization(s) for Both Equipment and Personnel***

If onsite resources are insufficient for spill response, the IMT will be activated. The Incident Commander will make an initial assessment and, if required, will initiate the call for mobilization/deployment of additional manpower and equipment. Onsite personnel, including the Nikaitchuq-based ACS Technicians, will continue to perform the immediate response activities, to the extent they can do so safely, until additional resources arrive. They will determine safety procedures, notify government agencies and Eni personnel, and proceed with source-control measures, as appropriate. See the response scenarios in Section 1.6 of the ODPCP for descriptions of such actions for various types of spills.

The primary response action contractors for Nikaitchuq are ACS and Witt O'Brien's. Contractual agreements with these organizations are provided in Appendix A. Additional resources can be accessed through contracts maintained by ACS and other organizations. The ACS Technical Manual, Volume 1, Tactics Descriptions, incorporated here by reference, provides information on the following:

- Mutual Aid agreements between North Slope operators (Tactic L-8);
- ACS master service agreements for equipment and services (Tactic L-9); and
- Accessing non-obligated resources from sources such as other oil spill cooperatives, the State, the federal government, and other contingency plan holders in Alaska (Tactic L-10).

The Oil Spill Removal Organizations (OSROs) would lead the spill response efforts in the offshore, nearshore, and shoreline environments. The OSROs' response personnel and oil spill response (OSR) equipment would be maintained on standby while critical exploration drilling operations into liquid hydrocarbon-bearing zones are underway and provide offshore, nearshore, and shoreline response operations in the unlikely event of an actual oil spill incident.

## Table G-1 – Cross-Reference to BSEE Regulations [30 CFR 254.53]

| Citation (30 CFR) | Section Title | Location (Section of State ODPCP or BSEE OSRP) |
|---|---|---|
| 254.53 | Submit a Response Plan Developed Under State Requirements. | BSEE has been provided a copy of Eni's State-approved ODPCP, as well as the periodic modifications. |
| (a) (1) | Be consistent with the requirements of the National Contingency Plan and appropriate Area Contingency Plan(s). | BSEE OSRP and Statement in beginning pages of ODPCP |
| (a) (2) | Identify a qualified individual and require immediate communication between that person and appropriate Federal officials and response personnel if there is a spill. | BSEE OSRP, Section 7<br><br>ODPCP Sections 1.1, 1.2.4 and 3.3; Table 1-3 |
| (a) (3) | Identify any private personnel and equipment necessary to remove, to the maximum extent practicable, a worst-case discharge as defined in 254.47.<br><br>The plan must provide proof of contractual services or other evidence of a contractual agreement with any OSROs or spill management team members who are not employees of the owner or operator. | Personnel: ODPCP Section 3.8<br>Equipment: ODPCP Section 3.6 and Appendix A<br><br>Alaska Clean Seas Statement of Contractual Terms: ODPCP Section 3.8 and Appendix A |
| (a) (4) | Describe the training, equipment, testing, periodic unannounced drills and response actions of personnel at the facility to ensure both the safety of the facility and the mitigation or prevention of a discharge or the substantial threat of a discharge. | ODPCP Section 3.9<br><br>NPREP Reference: BSEE OSRP, Section 8 |
| (a) (5) | Describe the procedures to periodically update and resubmit the Plan for approval of each significant change. | BSEE OSRP, Section 5<br>ODPCP |
| (b) (1) | A list of facilities and leases the Plan covers and a map showing their location. | ODPCP Sections 1.8 and 3.1.1 |
| (b) (2) | A list of the types of oils handled, stored, or transported at the facility. | ODPCP Section 3.1 and Appendix B |
| (b) (3) | Name and address of the State agency to which the Plan was submitted. | ODPCP Forward Material – ADEC approval letter |
| (b) (4) | The date the Plan was submitted to the State. | ODPCP Forward Material – ADEC approval letter |
| (b) (5) | If the Plan received formal approval, the name of the approving organization, the date of approval and the copy of the State agency's approval letter, if issued. | ODPCP Forward Material – ADEC approval letter |
| (b) (6) | Identification of any regulation or standards used in preparing the Plan. | ODPCP Introduction |
| 254.54 | Description of steps taken to prevent spills of oil or mitigate a substantial threat of such a discharge, including applicable industry standards. | ODPCP Section 2 |

***(c) Calculated volume of worst-case discharge scenario***

Comparison of the WCD for the first 24hrs of flow for the two locations. In addition the first 24hrs of a generic (not location specific) vertical completion is added for reference.

| | ***NN02 (1,000ft Hz.)*** ***STB*** | ***NN01 (600ft Hz.)*** ***STB*** | ***Vertical*** ***STB*** |
|---|---|---|---|
| First 24hrs | 25,957 | 19,920 | 3,633 |

***(d) Description of Worst Case Discharge Scenario***

This section summarizes the main finds of the WCD estimation for Eni's Nikaitchuq North exploration well NN01 and for the Nikaitchuq North appraisal well NN02.

The Exploration Plan consists of two potential phases:

- Mainbore (slant section) to reservoir target (with option to flow test)

  and/or
- Horizontal Sidetrack to execute a flow test

Both wells will intersect the main target reservoir up to two times in cascaded contingent sidetrack operations with increasing complexity and appraisal goals. After the main bore is drilled, in case of oil discovery and based on the reservoir properties, the possibility to perform a flow test in the initial wellbore or, alternatively, in a lateral sidetrack, is foreseen.

For the appraisal phases for each well, the horizontal wellbore is deemed of the greatest exposure in terms of a WCD scenario. For assurance this has been confirmed by Nodal Analysis which has been used to benchmark the two wellbore geometries against each other.

The actual WCD calculation is discussed in a successive section (Reservoir Simulation Description – appraisal well NN 02. In this, a reservoir simulation tool was used as the main tool in estimating the WCD as it was deemed relevant to capture the transients associated to a horizontal wellbore. Numerical simulations showed that the rates of the appraisal well NN02 are higher than the exploration well NN01 . Thus, the horizontal completion of the appraisal well NN02 is deemed the largest exposure in terms of WCD and is subject to a more detailed discussion in the simulation section for this WCD.

In terms of potential analogs, Nuiqsut and Alpine have been considered representatives of two extremes. The latter, with better reservoir quality and lighter oil, has been chosen for the WCD case. In particular, the Alpine analog case from Eni's internal geologic model was selected as input to simulation. This model captures known features derived from seismic data, such as mapped horizons, interpreted faults, and seismic trended properties.

### *Summary of Results*

Comparison of the WCD for the first 24 hours of flow for NN01 and NN02. In addition, the first 24 hours of a generic (not location-specific) vertical completion is added as guideline for a near vertical completion exposure

| | NN02 (1,000ft Hz.) STB | NN01 (600ft Hz.) STB | Vertical STB |
|---|---|---|---|
| First 24 hrs | 25,957 | 19,920 | 3,633 |

The table below summarizes potential volume discharge at the end of the first day, day 30, and day 33 when well control would be regained for the appraisal well NN02; the selected WCD scenario:

| Time days | Oil Cumulative STB | Gas Cumulative MSCF |
|---|---|---|
| 1 | 25,957 | 30,841 |
| 30 | 414,155 | 517,188 |
| 33 | 446,535 | 558,305 |
| 40 | 519,445 | 650,324 |

# *SECTION H ALASKA OUTER CONTINENTAL SHELF PLANNING INFORMATION*

***(a) Emergency plans***

Eni has an Emergency Action Plan (EAP) in place that covers the necessary responses for situations in which there is a probable or actual loss of life, extensive injuries, environmental damage, or significant business interruption during the operation of facilities and pipelines within the Eni OPP and SID. The EAP also covers plans to respond to a fire, explosion, personnel evacuation, aircraft, and offshore vehicles (hovercraft only). It covers all operating areas within the main facility and the surrounding pad.

In addition to the comprehensive content of the EAP, a Marine HSE Plan is used as an emergency plan for marine support vessels. The Blowout Contingency Plan and Well Control Manual are used for the loss or disablement of drilling units.

***(b) Critical operations and curtailment procedures***

Section 700 of the EAP specifically outlines procedures for curtailment of operations during critical periods. The scenarios covered include response to a fire or explosion, a major medical emergency, controlling spread of disease, death, an act of terrorism or sabotage and foul weather.

The most common act of curtailment is due to foul weather. The foul weather protocol specifically outlines the decision making process behind limiting operations based on weather scenarios. On SID, this procedure is followed any time transportation to and from the island is compromised.

***(c) Arctic OCS***

Activities being proposed in this EP do not require Eni to submit this information; however, additional information is covered in the Summary Plan.

# *SECTION I ENVIRONMENTAL MONITORING*

***(a) Monitoring systems***

As described under 30 CFR 550.221(a), Eni must provide a description of any existing and planned monitoring systems that are measuring, or will measure, environmental conditions or will provide project-specific data or information on the impacts under Eni's proposed exploration activities.

Monitoring systems are often part of permit requirements or stipulations. Because the operations of the Nikaitchuq North project will not differ substantially from present day operations, monitoring systems are also not expected to change. Eni currently engages in the following monitoring systems:

- Recording and reporting polar bear sightings and actions
- Recording and reporting bird strikes
- Recording and reporting deceased seals
- Monitoring and recording weather observations
- Permit-driven monitoring such as water withdraw, effluent and wastewater disposal, UIC functions, and air emissions

***(b) Incidental takes***

As described under 30 CFR 550.221(b), incidental takes of threatened and endangered species, except as authorized under the MMPA, are not anticipated during exploration activities. Eni currently holds and adheres to two separate USFWS Letters of Authorization (LOAs) addressing incidental take of Polar bear and Pacific walruses (LOA 16-05) and intentional take of polar bear (16-INT-13). Eni has requested an amendment to USFWS LOA 16-05 seeking coverage during exploration and development activities. The current incidental take LOA 16-05 has specifically excluded exploration and development activities.

***(c) Flower Garden Banks National Marine Sanctuary (FGBNMS)***

In accordance with 30 CFR 550.221(c), if an operator proposes to conduct exploration activities within the protective zones of the FGBNMS, a description of the provisions for monitoring the impacts of an oil spill on the environmentally sensitive resources at the FGBNMS is required. However, there is no such sanctuary in the State of Alaska, therefore, this information is not submitted under this EP.

# *SECTION J LEASE STIPULATIONS INFORMATION*

In accordance with 30 CFR 550.222, Eni adheres to lease stipulations for Unit leases OCS-Y-1757 and OCS-Y-1754.

***(a) Stipulation No. 1 Protection of Biological Resources***

If biological populations or habitats that may require additional protection are identified in the lease area by the Regional Supervisor, Field Operations (RS/FO), the RS/FO may require the lessee to conduct biological surveys to determine the extent and composition of such biological populations or habitats. The RS/FO shall give written notification to the lessee of the RS/FO's decision to require such surveys.

Based on any surveys the RS/FO may require of the lessee or on other information available to the RS/FO on special biological resources, the RS/FO may require the lessee to:

1) Relocate the site of operations;
2) Establish, to the satisfaction of the RS/FO on the basis of a site-specific survey, either that such operations will not have a significant adverse effect on the resource identified, or that a special biological resource does not exist;
3) Operate during those periods of time, as established by the RS/FO, that do not adversely affect the biological resources; and/or
4) Modify operations to ensure significant biological populations or habitats deserving protection are not adversely affected.

If any area of biological significance should be discovered during the conduct of any operations on the lease, the lessee shall immediately report such findings to the RS/FO and make every reasonable effort to preserve and protect the biological resource from damage until the RS/FO has given the lessee direction with respect to its protection.

The lessee shall submit all data obtained in the course of biological surveys to the RS/FO with the locational information for drilling or activity. The lessee may take no action that might affect the biological populations or habitats surveyed until the RS/FO provides written directions to the lessee with regard to permissible actions.

***Eni's Proposed Actions:***

The Nikaitchuq North Exploration Drilling Project has been designed to minimize impacts to biological populations and habitats by using existing infrastructure, limit operational windows, following other measures designed to mitigate impacts, and conduct activities in a manner similar to Eni's current practices.

Eni will use existing facilities to the extent practicable, including drilling from SID. In general, no improvements will be required for on-island facilities on SID. The drill rig proposed to be used for the Nikaitchuq North Exploration Drilling Project is Doyon Rig No. 15, which is already located at SID. The existing OPP and NOC facilities will provide logistic support for the Nikaitchuq North Project.

Eni will only conduct drilling operations during the winter as shown in the schedule included in this EP. This will result in mitigation of the following impacts:

- Fewer species of marine mammals are present (e.g., bowhead whales), during drilling into target reservoir zones, reducing the risk of impacts to these species.
- In the unlikely event of an oil spill, response will be easier in winter due to the presence of ice around SID. Response tactics used will be conventional mechanical recovery techniques.

Mitigation measures that Eni has in place to mitigate impacts to wildlife are provided in Section K of this EP and Section 5 of the EIA. These measures include facility infrastructure design, food handling practices, personnel training, and monitoring and deterrence activities outlined in the Eni Polar Bear Interaction Plan.

Eni's proposed Nikaitchuq North activities are very similar to those that Eni has previously carried out as part of the Nikaitchuq Development Project. A comparison between activities for the Nikaitchuq North Project and activities for Nikaitchuq Development Project is presented in Section 2.4 of the Nikaitchuq North Project EIA (Tables 2-6 and 2-7).

***(b) Stipulation No. 2 Orientation Program***

The lessee shall include in any exploration or development and production plans submitted under 30 CFR 250.203 and 250.204 a proposed orientation program for all personnel involved in exploration or development and production activities (including personnel of the lessee's agents, contractors, and subcontractors) for review and approval by the RS/FO. The program shall be designed in sufficient detail to inform individuals working on the project of specific types of environmental, social, and cultural concerns that relate to the sale and adjacent areas. The program shall address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals, and provide guidance on how to avoid disturbance. This guidance will include the production and distribution of information cards on endangered and/or threatened species in the sale area. The program shall be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating. The orientation program shall also include information concerning avoidance of conflicts with subsistence, commercial fishing activities, and pertinent mitigation.

The program shall be attended at least once a year by all personnel involved in onsite exploration or development and production activities (including personnel of the lessee's agents, contractors, and subcontractors) and all supervisory and managerial personnel involved in lease activities of the lessee and its agents, contractors, and subcontractors.

The lessee shall maintain a record of all personnel who attend the program onsite for so long as the site is active, not to exceed five years. This record shall include the name and date(s) of attendance of each attendee.

***Eni's Proposed Actions:***

Training that Eni currently provides meets the requirements of Stipulation 5. Training includes the following:

- Eni is a member of the North Slope Training Cooperative (NSTC) and requires all unescorted employees, contractors, and subcontractors to maintain a current NSTC certification. This certification is obtained by completing an eight-hour course that includes information on North Slope wildlife, the dangers associated with some species, and the importance of not disturbing

animals or their habitat. Personnel are provided with copies of the Alaska Safety Handbook and the North Slope Field Environmental Handbook at NSTC training.

- Eni provides annual refresher training to all onsite employees and contractors on spill prevention and response, avoiding conflicts with subsistence users and wildlife. Information is provided on birds, fish, and marine mammals in the area, including threatened and endangered species. Workers are directed to give wildlife the right-of-way, not approach or harass animals, not disturb habitat, and report any wildlife issues to Security. During times when threatened and endangered species are likely to be in the area, posters with information on these species are posted on the Health, Safety, and Environment (HSE) bulletin boards and in various other high-traffic areas.
- Eni provides annual training to all onsite employees and contractors on the Polar Bear Interaction Plan, which includes information on polar bears, their habitat and behavior, safety issues, bear monitoring program, reporting requirements, and polar bear avoidance and encounter procedures.
- Records of training are maintained in a learning management system database.

As part of the Nikaitchuq North Project, Eni will develop and distribute information cards on endangered and/or threatened species in the project area. Posters with this information may also be developed and posted in common areas.

Current Eni operations are performed on established pads, roads, and pipeline corridors, all of which were cleared for archeological sites prior to construction. The proposed Nikaitchuq North Project would use the same facilities currently used. Off-pad operations are generally limited to spill response training and pipeline inspections and maintenance and are performed in areas near the pads, i.e., in areas with no identified archaeological sites. In the event of an off-pad spill, steps would be taken to protect and avoid archaeological sites.

***(c) Stipulation No. 3 Transportation of Hydrocarbons***

Pipelines will be required **if**:

- Pipeline rights-of-way can be determined and obtained;
- Laying such pipelines is technologically feasible and environmentally preferable; and
- In the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple-use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to recommendations of any advisory groups and federal, state, and local governments and industry.

Following the development of sufficient pipeline capacity, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of an emergency.

Determinations as to emergency conditions and appropriate responses to these conditions will be made by the RS/FO.

***Eni's Proposed Actions:***

The Nikaitchuq North Project is an exploration project and does propose any new pipelines. Stipulation 3 is not applicable.

***(d) Stipulation No. 4 Industry Site-Specific Bowhead Whale-Monitoring Program***

Lessees proposing to conduct exploratory drilling operations, including seismic surveys, during the bowhead whale migration will be required to conduct a site-specific monitoring program approved by the RS/FO; unless, based on the size, timing, duration, and scope of the proposed operations, the RS/FO, in consultation with the NSB and the Alaska Eskimo Whaling Commission (AEWC), determine that a monitoring program is not necessary.

The RS/FO will provide the NSB, AEWC, and the State of Alaska a minimum of 30, but no longer than 60, calendar days to review and comment on a proposed monitoring program prior to approval. The monitoring program must be approved each year before exploratory drilling operations commence.

The monitoring program will be designed to assess when bowhead whales are present in the vicinity of lease operations and the extent of behavioral effects on bowhead whales due to these operations. In designing the program, lessees must consider the potential scope and extent of effects that the type of operation could have on bowhead whales. Experiences relayed by subsistence hunters indicate that, depending on the type of operations, some whales demonstrate avoidance behavior at distances of up to 35 miles. The program must also provide for the following:

- Record and report information on sighting of other marine mammals and the extent of behavioral effects due to operations;
- Invite an AEWC or NSB representative to participate in the monitoring program as an observer;
- Coordinate the monitoring logistics beforehand with the Bowhead Whale Aerial Survey Project (BWASP);
- Submit daily monitoring results to the BWASP;
- Submit a draft report on the results of the monitoring program to the RS/FO within 60 days following the completion of the operation (the RS/FO will distribute this draft report to the AEWC, NSB, State of Alaska, and National Oceanic and Atmospheric Administration Fisheries [NOAA]); and
- Submit a final report on the results of the monitoring program to the RS/FO (the final report will include a discussion of the results of the peer review of the draft report and the RS/FO will distribute this report to the AEWC, NSB, State of Alaska, and NOAA Fisheries).

Lessees will be required to fund an independent peer review of a proposed monitoring plan and a draft report on the results of the monitoring program. This peer review will consist of independent reviewers who have knowledge and experience in statistics, monitoring marine mammal behavior, the type and extent of the proposed operations, and an awareness of traditional knowledge. The peer reviewers will be selected by the RS/FO from experts recommended by NSB, AEWC, industry, NOAA Fisheries, and BOEM. The results of these peer reviews will be provided to the RS/FO for consideration in final approval of the monitoring program and the final report, with copies to the NSB, AEWC, and State of Alaska.

In the event the lessee seeks an LOA or Incidental Harassment Authorization (IHA) for incidental take from the NOAA Fisheries, the monitoring program and review process required under the LOA or IHA may satisfy the requirements of this stipulation.

Lessees must advise the RS/FO when seeking an LOA or IHA in lieu of meeting the requirements of this stipulation, and provide the RS/FO with copies of all pertinent submittals and resulting correspondence. The RS/FO will coordinate with NOAA Fisheries and advise the lessee if the LOA or IHA will meet these requirements.

This stipulation applies to the blocks for the time periods discussed below and will remain in effect until termination or modification by the Department of the Interior, after consultation with NOAA Fisheries and NSB.

***Eni's Proposed Actions:***

Lease Stipulation No. 4 requires lessees proposing to conduct exploratory drilling operations during the bowhead whale migration conduct a site-specific monitoring program, unless, based on the size, timing, duration, and scope of the proposed operations, the RS/FO, in consultation with others determines that a monitoring program is not necessary. Eni's proposed exploration wells in Harrison Bay Block 6423 (Lease OCS-Y-1753), Block 6374 (Lease OCS-Y-1754), and Block 6373 (Lease OCSY-1757) are located within the Central Fall Migration Area of Lease Stipulation No. 4. The Central Fall Migration Area listed time period is September 1 through October 31.

Eni has submitted a request to BOEM to make a determination that a bowhead monitoring program is not necessary. This request is based on the size, timing, duration, and scope of the proposed operations.

Timing and Duration

Eni's proposed drilling activities will not be conducted during bowhead whale migration within the Central Fall Migration Area (September 1 through October 31) as shown in the schedule included in this EP. Drilling will be conducted during the winter drilling season (December through May) when fewer species of marine mammals are present, including bowhead whales, reducing the risk of impacts.

Size and Scope of Proposed Operations

Eni proposes drilling up to four exploratory wells from SID in State waters with two main boreholes and two sidetracks going into federal OCS leases. Drilling will take place from SID, which is located within the barrier islands. Use of the existing gravel island will mitigate the following impacts:

- Eliminate the need for a drilling platform (e.g., temporary island) or transportation of installation of a mobile offshore drilling unit (e.g., jackup rig or drillship) that would result in impacts from transportation, discharges associated with installation, noise, and emissions.
- Reduce underwater noise transmission from drilling activities.
- Use existing facilities, avoiding impacts associated with the transportation of materials and construction of additional facilities.
- Use existing WIFs for waste disposal, eliminating discharge of drilling wastes to land or waters of the Alaskan Arctic.
- The SID location is within the barrier islands in 6 to 8 feet of water, outside of the main fall migration path of the bowhead whale, reducing the potential for impacts to bowhead whales.
- Barging and use of hovercraft and crew boats will utilize routes in shallow water inshore of the barrier islands, outside of the main fall migration path of the bowhead whale, reducing the potential for impacts to bowhead whales.

***(e) Stipulation No. 5 Conflict Avoidance Mechanisms to Protect Subsistence Whaling and Other Subsistence Harvesting Activities***

Exploration and development and production operations shall be conducted in a manner that prevents unreasonable conflicts between the oil and gas industry and subsistence activities, including, but not limited to, bowhead whale subsistence hunting.

Prior to submitting an exploration plan or development and production plan (including associated oil spill contingency plans) to BSEE for activities proposed during the bowhead whale migration period, the lessee shall consult with the directly affected subsistence communities, Barrow, Kaktovik, or Nuiqsut, NSB, and AEWC to discuss potential conflicts with the siting, timing, and methods of proposed operations and safeguards or mitigating measures that could be implemented by the operator to prevent unreasonable conflicts. Through this consultation, the lessee shall make every reasonable effort, including such mechanisms as a conflict avoidance agreement, to assure that exploration, development, and production activities are compatible with whaling and other subsistence hunting activities and will not result in unreasonable interference with subsistence harvests.

A discussion of resolutions reached during this consultation process and plans for continued consultation shall be included in the EP or the development and production plan. In particular, the lessee shall show in the plan how its activities, in combination with other activities in the area, will be scheduled and located to prevent unreasonable conflicts with subsistence activities. Lessees shall also include a discussion of multiple or simultaneous operations, such as ice management and seismic activities, that can be expected to occur during operations in order to more accurately assess the potential for any cumulative effects. Communities, individuals, and other entities involved in consultation shall be identified in the plan. The RS/FO shall send a copy of the EP or development and production plan (including associated oil spill contingency plans) to the directly affected communities and the AEWC at the time they are submitted to allow concurrent review and comment as part of the plan approval process.

In the event no agreement is reached between the parties, the lessee, AEWC, NSB, NOAA Fisheries, or any of the subsistence communities that could be affected directly by the proposed activity, may request that the RS/FO assemble a group consisting of representatives from the subsistence communities, AEWC, NSB, NOAA Fisheries, and the lessee(s) to specifically address the conflict and attempt to resolve the issues before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests. Upon request, the RS/FO will assemble this group if the RS/FO determines such a meeting is warranted and relevant before making a final determination on the adequacy of the measures taken to prevent unreasonable conflicts with subsistence harvests.

The lessee shall notify the RS/FO of all concerns expressed by subsistence hunters during operations and of steps taken to address such concerns. Lease-related use will be restricted when the RS/FO determines it is necessary to prevent unreasonable conflicts with local subsistence hunting activities.

In enforcing this stipulation, the RS/FO will work with other agencies and the public to assure that potential conflicts are identified and efforts are taken to avoid these conflicts.

Subsistence whaling activities occur generally during the following periods:

- ***August to October:*** Kaktovik whalers use the area circumscribed from Anderson Point in Camden Bay to a point 30 kilometers north of Barter Island to Humphrey Point, east of Barter Island. Nuiqsut whalers use an area extending from a line northward of the Nechelik Channel of the Colville River to Flaxman Island, seaward of the Barrier Islands.
- ***September to October:*** Barrow hunters use the area circumscribed by a western boundary extending approximately 15 kilometers west of Barrow, a northern boundary 50 kilometers north of Barrow, then southeastward to a point about 50 kilometers off Cooper Island, with an eastern boundary on the east side of Dease Inlet. Occasional use may extend eastward as far as Cape Halkett.

***Eni's Proposed Actions:***

Eni has a stakeholder engagement process and consults with local government officials, including the NSB and other local stakeholders such as Native corporations, regarding potential impacts from Eni's operations. Eni has consulted with local stakeholders about the Nikaitchuq North Project, including AEWC, Kuukpik Corporation, and Nuiqsut's Mayor. Eni has also introduced the Nikaitchuq North Project to the NSB Planning Director. Further discussion of Eni's stakeholder engagement is provided in Section 6 of the EIA, including a list of local stakeholder consultation meetings (Table 6-2 of the EIA). Eni plans to continue stakeholder consultation throughout this project.

Eni will communicate with subsistence users in the area to ensure that its activities are compatible with whaling and other subsistence activities. One of the major ways this is done is through a Conflict Avoidance Agreement. A Conflict Avoidance Agreement is an agreement between industry participants (typically operators with active operations in the Beaufort and Chukchi seas, or geophysical companies with operations in the Beaufort or Chukchi seas) and the village Whaling Captains' Associations and AEWC. Conflict Avoidance Agreements outline communication measures, avoidance guidelines, and mitigation measures to be followed by industry participants to avoid impacts to the bowhead whale hunt. Eni has signed Conflict Avoidance Agreements since 2011 and anticipates continuing to participate in the Conflict Avoidance Agreement process for the foreseeable future.

As a participant in the Conflict Avoidance Agreement, Eni will abide by Section 2, A(3), "…Vessels shall be operated at speeds necessary to ensure no physical contact with whales occur and to make any other potential conflicts with bowhead whales or whalers unlikely." All Eni captains will give way and let subsistence hunting vessels pass first as necessary per International Regulations for Preventing Collisions at Sea 1972. Eni's vessel speed will be reduced during inclement weather conditions in order to avoid collisions with any marine mammal and or subsistence hunting vessel. Eni recognizes the importance of monitoring our vessel wake in the presence of other vessels and will be mindful to avoid potential interference with subsistence hunting vessels.

Eni operates in a safe and respectful manner in the waters near Oliktok Point and Spy Island, with all efforts to mitigate potential impacts to subsistence hunting vessels during the months of open water season. Eni's vessels will at all times be under the command of experienced and licensed captains that demonstrate respect and courtesy to all mariners, including subsistence hunters. Eni vessel traffic will use regular routes within a narrow corridor between OPP and SID to reduce the affected area, as shown in Figure 2-3 within the EIA located in Appendix O of this EP.

As is Eni's policy, all vessels are certified by the USCG and technically accepted by Eni prior to performing any activities offshore. Eni is also in alignment with the *Global Corporate Marine Manual*, which is published by Eni headquarters in Milan to ensure that all Eni locations operate with acceptable standards. Operations are supervised by a dedicated marine advisor who will ensure that vessels meet Eni specifications, maintenance programs are acceptable, and crew training is current. The marine advisor will also conduct routine vessel inspections.

Eni utilizes a public boat ramp at Oliktok Point that has a beach that is accessible 24 hours per day. Contracted vessels will not be left unattended in a manner that could block subsistence hunters' access to the boat ramp.

Eni currently conducts year-round activities at its onshore facilities at OPP and SID, which require transportation of goods and personnel between OPP and SID. The activities proposed for the Nikaitchuq North Project are consistent with Eni's existing Nikaitchuq Development activities conducted in previous years.

No multiple or simultaneous operations are proposed for this project. Eni is unaware of other activities proposed for Harrison Bay that may, in combination with Eni's proposed activities, result in unreasonable conflicts with subsistence activities.

### *(f) Stipulation No. 6 Pre-Booming Requirements for Fuel Transfers*

Fuel transfers (excluding gasoline transfers) of 100 barrels or more occurring three weeks prior to or during the bowhead whale migration will require pre-booming of the fuel barge(s). The fuel barge must be surrounded by an oil spill containment boom during the entire transfer operation to help reduce any adverse effects from a fuel spill. This stipulation is applicable to the blocks and migration times listed in the stipulation on industry site-specific bowhead whale monitoring. The lessee's oil spill contingency plans must include procedures for the pre-transfer booming of the fuel barge(s).

***Eni's Proposed Actions:***

Eni will not be conducting fuel transfers for this exploration project. Stipulation 6 is not applicable.

### *(g) Stipulation No. 7 Lighting of Lease Structures to Minimize Effects to Spectacled and Steller's Eiders*

In accordance with the Biological Opinion for the Beaufort Sea Lease Sale 186 issued by the USFWS on October 22, 2002, and the USFWS's subsequent amendment of the Incidental Take Statement on September 21, 2004, lessees must adhere to lighting requirements for all exploration or delineation structures so as to minimize the likelihood that migrating spectacled or Steller's eiders will strike these structures.

Lessees are required to implement lighting requirements aimed at minimizing the radiation of light outward from exploration/delineation structures to minimize the likelihood that spectacled or Steller's eiders will strike those structures. These requirements establish a coordinated process for a performance-based objective rather than pre-determined prescriptive requirements.

The performance-based objective is to minimize the radiation of light outward from exploration/delineation structures. Measures to be considered include, but need not be limited to, the following:

- Shading and/or light fixture placement to direct light inward and downward to living and work structures while minimizing light radiating upward and outward;
- Types of lights;
- Adjustment of the number and intensity of lights as needed during specific activities;
- Dark paint colors for selected surfaces;
- Low reflecting finishes or coverings for selected surfaces; and
- Facility or equipment configuration.

Lessees are encouraged to consider other technical, operational, and management approaches to reduce outward light radiation that could be applied to their specific facility and operation.

If further information on bird avoidance measures becomes available that suggests modification to this lighting protocol is warranted under the Endangered Species Act (ESA) to implement the reasonable and prudent measures of the Biological Opinion, BOEM will issue further requirements based on guidance

from the USFWS. Lessees will be required to adhere to such modifications of this protocol. The BOEM will promptly notify lessees of any changes to lighting required under this stipulation.

These requirements apply to all new and existing OCS oil and gas leases issued between 156° W longitude and 146° W longitude for activities conducted between May 1 and October 31. BOEM encourages operators to consider such measures in areas to the east of 146° W longitude because occasional sightings have been made of eiders that are now listed and because such measures could reduce the potential for collisions of other, non-ESA listed migratory birds that are protected under the Migratory Bird Treaty Act.

Nothing in this protocol is intended to reduce personnel safety or prevent compliance with other regulatory requirements (e.g., U.S. Coast Guard or Occupational Safety and Health Administration) for marking or lighting of equipment and work areas.

Lessees are required to report spectacled and/or Steller's eiders injured or killed through collisions with lease structures to the Fairbanks Fish and Wildlife Field Office, Endangered Species Branch, Fairbanks, Alaska at (907) 456-0499. Following the instructions provided at this number is recommended for the proper handling and disposal of the injured or dead bird.

Lessees must provide BOEM with a written statement of measures that will be or that have been taken to meet the objective of this stipulation. Lessees must also include a plan for recording and reporting bird strikes that occur during approved activities to the BOEM. This information must be included with the EP when it is submitted for regulatory review and approval pursuant to 30 CFR 250.203. Lessees are encouraged to discuss their proposed measures in a pre-submittal meeting with the BOEM and USFWS.

***Eni's Proposed Actions:***

A Biological Opinion for the Nikaitchuq Development Project was issued by the USFWS in 2006 to mitigate the risk of bird strikes. Eni has developed procedures to meet these requirements and will continue to follow them as part of the Nikaitchuq North Project. Mitigation measures addressed in the Biological Opinion include reducing reflection, reducing and light loss, use of strobe lighting, and monitoring for bird strike evidence. More information on bird strike mitigation efforts can be found in Section 3.10 of the Nikaitchuq North Project EIA.

# *SECTION K ENVIRONMENTAL MITIGATION MEASURE INFORMATION*

### *(a) Measures taken to avoid, minimize, and mitigate impacts*

The Council on Environmental Quality (40 CR 1508.20), identifies mitigation as:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments

The following mitigation measures were developed to avoid, minimize, or reduce potential environmental impacts of the Nikaitchuq North Exploration Drilling Program.

#### *Lease Stipulations*

Eni acquired the OCS leases from Armstrong Alaska, Inc., which purchased the leases during the Oil and Gas Lease Sale 195. Eni must adhere to the lease stipulations from this lease sale.

#### *Applicant Proposed Mitigation Measures*

Substantial mitigation measures have been incorporated into the Nikaitchuq North Exploration Drilling Project.

- Eni will use extended reach drilling (ERD) to allow drilling from the existing SID, resulting in mitigation of the following impacts:
  - Eliminate the need for a drilling platform (e.g., temporary island) or transportation and installation of a mobile offshore drilling unit (e.g., jackup rig or drillship) that would result in impacts from discharges associated with transportation, installation, noise, and emissions.
  - Reduce underwater noise transmission from drilling activities.
  - Use existing facilities, which avoids impacts associated with the transportation of materials and construction of additional facilities.
  - Use existing WIFs for waste disposal, eliminating discharge of drilling wastes to land or waters of the Alaskan Arctic.
  - The SID location is within the barrier islands, outside of the main fall migration path of the bowhead whale, reducing the potential for impacts to bowhead whales.
  - Barging and use of hovercraft and crew boats will utilize routes in relatively shallow water inshore of the barrier islands, outside of the main fall migration path of the bowhead whale, reducing the potential for impacts to bowhead whales.
- Eni will only conduct drilling operations during the winter as shown in the schedule included in this EP. This will result in mitigation of the following impacts:

  - Fewer species of marine mammals are present (e.g., bowhead whales), during drilling into target reservoir zones, reducing the risk of impacts to these species.
  - Response in event of an oil spill will be easier in winter due to the presence of ice around SID. Response tactics used will be conventional mechanical recovery techniques.

- Eni has existing procedures in place to mitigate impacts to wildlife:
  - Food handling and storage procedures, such as secure storage of food, to avoid attracting wildlife.
  - Waste management procedures including management of putrescible wastes (e.g., use of bear-proof dumpsters) and proper handling and disposal of chemicals and other wastes.
  - Bear cages at all facility exits to allow personnel to monitor for bears prior to exiting facilities.
  - Training personnel on procedures on how to handle human-animal interactions that ensure safety of workers and wildlife.
  - A Polar Bear Interaction Plan that includes monitoring for polar bears, deterrence activities (i.e., hazing), establishing setbacks of one mile from polar bear dens, and reporting of polar bear sightings to USFWS and the Alaska Department of Fish and Game (ADF&G).
  - Facilities at SID were designed and constructed to minimize the potential for bird strikes as per the Biological Opinion for the Nikaitchuq Development Project (see Section 3.10 of the EIA).
- Eni has the following procedures to provide economic and social benefits to NSB residents:
  - Provide contracting opportunities to NSB-based vendors. Local vendors currently under contract with Eni are provided in Section 3.18 of the EIA.
  - Support local (Nuiqsut) community activities. This includes sponsoring the annual Nuiqsut community Christmas party and contributing to Nalukataq (whaling festival) in Utqiaġvik and Nuiqsut.
  - Sponsored a health/job fair in Nuiqsut in 2016.
  - Sponsored educational opportunities in Nuiqsut. This includes sponsoring the Nuiqsut Trapper School participation in SchoolNet, an Eni world-wide program available in all countries where Eni has offices. Participants compete against students in other countries. As part of this program in 2012, eight sixth graders from the Nuiqsut Trapper School visited Italy as part of the SchoolNet program.
- Eni consults and coordinates with subsistence users to mitigate impacts to substance activities:
  - Eni participates in the Conflict Avoidance Agreement negotiation with the AEWC and signs the Conflict Avoidance Agreement to mitigate impacts to subsistence. This is discussed in more detail in Section 6 of the EIA.
  - Eni provides emergency assistance to subsistence hunters in the vicinity of the Eni facilities.
  - In 2009, Eni paid for an expansion of the public dock at Oliktok Point to assist whalers in their travel between Nuiqsut and Cross Island.
  - Eni provides materials as direct support to whaling activities (e.g., diesel fuel).
  - Eni provides funds to the Nuiqsut Whaling Captains' Association to offset expenses of whaling activities.

# *SECTION L SUPPORT VESSELS AND AIRCRAFT INFORMATION*

## *(a) General*

### *Transportation of Freight*

Equipment and materials are generally transported via the road system to Nikaitchuq.

Shipment of large equipment and significant resupply of materials between OPP and SID occurs either during the open water season via barge or during the winter season using the ice road. A 200-ton shallow draft (3-foot) tug and barge is used to transport heavy freight between OPP and SID during the open water season (typically available from July through early October).

During most winters, an ice road between OPP and SID is constructed allowing access by highway vehicles. When an ice road is constructed, it is typically available from early to mid-February to mid to late May. Start and end dates of ice road availability vary from year to year and are dependent on weather and other factors. The driving surface of the ice road is typically 4.25 miles long and 60 feet wide. The ice road is approximately 72 inches (6 feet) thick on floating ice, with a capacity of 250,000 pounds. The ice road is used for crew changes and material transports, when available, during the winter.

In years when an ice road is constructed between OPP and SID, three sea ice pads (one at OPP and two at SID) are typically constructed. The three ice pads total approximately 6 acres in area. The ice pad at OPP is located next to the shoreline, near the onshore ramp, and is used as a pullout to allow personnel traveling to SID to remove dirt from their vehicles before entering the ice road. The two SID ice pads are used as staging areas for equipment and dry materials, and for extra parking.

Transportation will align with the current practice. Equipment and materials will be transported predominately over the existing gravel road system to Oliktok Point for Nikaitchuq operations. Drill pipe will most likely be transported via rail to Fairbanks, then via truck to OPP. From OPP, materials will be transported to SID via barge and/or ice road, depending on the season. Most materials, including pipe, are expected to be mobilized to SID during summer 2017; however, additional materials can be transported via barge during the 2018 open water season or via the ice road when it is open. Demobilization of equipment and materials not necessary for the Nikaitchuq North Project is not anticipated.

Logistics and transportation support activities at SID, including the Nikaitchuq North Project, is provided in Table L-1. Although some equipment and materials may be transported to SID during the 2018 open water season, the amount will not be sufficient to require additional hovercraft or barge trips.

### *Transportation of Personnel*

Personnel typically transit from areas in Alaska and the Lower-48 via commercial aircraft to the Prudhoe Bay/Deadhorse airport, then via ground transportation (bus or truck) to OPP over existing gravel roads. Personnel travel to SID via crew boats (open water season), hovercraft (shoulder season), or vehicle on the ice road (winter season).

A 24-passenger boat with 5,000 pounds of freight capacity is available to provide crew changes and light freight support during the summer open water season. The crew-change boat typically provides trips twice daily.

A 42-person capacity hovercraft is used during the shoulder seasons for crew changes. The hovercraft has a 5.7 metric ton freight capacity to transport small loads. The hovercraft has twin engine design (lift and thrust) and can work in a maximum operational wind speed of 30 knots (40-knot gusts) and a minimum operational temperature of -37 degrees Celsius (°C).

***Transportation of Equipment and Materials***

Transportation will align with the current practice. Equipment and materials will be transported predominately over paved and gravel roads to OPP (Nikaitchuq Development). Drill pipe most likely will be transported via rail to Fairbanks, then via truck to OPP. From OPP, materials will be transported to SID via barge or ice road.

**Table L-1 – Logistics and Transportation Support Including the Nikaitchuq North Exploration Drilling Project (2017 – 2019)**

| | Hovercraft (trips) a | Crew Boat (trips) a | Barge (trips) a |
|---|---|---|---|
| 2017 (estimated) | 1,163 | 614 | 152 |
| 2018 (estimated) | 1,163 | 1,378 | 108 |
| 2019 (estimated) | 862 | 614 | 8 |

Notes: a = All trips are one-way

***(b) Air emissions***

Per 30 CFR 550.224(b), the source, composition, frequency, and duration of air emissions associated with the support vessels, offshore vehicles, and aircrafts used for the project that will operate within 25 miles of the drilling unit must be provided. The support vessel air emissions result from the combustion of diesel-fuel from onboard equipment such as propulsion engines and generator engines. Tables L-2 through L-7 provide a summary of the air emissions for the equipment onboard the crew boat, hovercraft, and tug and barge. No aircraft is anticipated to be used within 25 miles of the drilling unit to support the exploration activities.

***(c) Drilling fluids and chemical products transportation***

Please refer to ***Figure L-1,*** *"Waste Estimated to be Generated, Treated and/or Downhole Disposed or Discharged to the Beaufort Sea"* and the *Chemical Products* as ***Figure L-2*** for further detailed information related to drilling fluids and chemical products transportation.

***(d) Solid and liquid wastes transportation***

All solid and liquid wastes from the drilling unit will be made in accordance with the existing permits in place. Please refer to ***Figure L-3*** *"Waste and Surplus Estimated to be Transported and/or Disposed of Onshore"* for further detailed information related to Wastes.

***Nikaitchuq North Vessel Fuel Tank Capacities***

| Vessel | Type | Fuel | Fuel Tank Capacity (Gallons) |
|---|---|---|---|
| Commander | Crew Boat | ULSD | 1,000 |
| Old Bull | Tug | ULSD | 1,100 |
| Hovercraft | Hovercraft | ULSD | 650 |

### *(e) Vicinity map*

A vicinity map is provided as ***Figure L-4***. It shows the location of the activities proposed herein relative to the distance of the proposed activities from the shoreline and the primary route(s) of the support vessels and aircraft that will be used when traveling between onshore support facilities and SID.

# Figure L-1. WASTE ESTIMATED TO BE GENERATED, TREATED AND/OR DOWNHOLE DISPOSED OR DISCHARGED TO THE BEAUFORT SEA

Please specify if the amount reported is a total or per well amount and be sure to include appropriate units.

| Projected generated waste | | | Projected ocean discharges | | Projected Downhole Disposal |
|---|---|---|---|---|---|
| **Type of Waste** | **Composition** | **Projected Amount** | **Discharge rate** | **Discharge Method** | **Answer yes or no** |
| *EXAMPLE: Cuttings wetted with synthetic based fluid* | *Cuttings generated while using synthetic based drilling fluid.* | *X bbl/well* | *X bbl/day/well* | *discharge overboard* | |
| Brine | | | N/A | N/A | No |
| Water-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with water-based fluid | | | N/A | N/A | Yes |
| Oil-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with oil-based fluid | | | N/A | N/A | Yes |
| synthetic-based drilling fluid | | | N/A | N/A | Yes |
| Cuttings wetted with synthetic-based fluid | | | N/A | N/A | Yes |
| | | | | | |
| *EXAMPLE: Sanitary waste water* | *Sanitary waste from living quarters* | *X bbl/well* | *X bbl/hr/well* | *chlorinate and discharge overboard* | |
| Domestic wastewater treatment plant effluent | *160 Bbls / Day* | | N/A | N/A | Yes |
| Drill NN-01 ( 80 days ) | Domestic wastewater treatment plant effluent | 12,800 | N/A | N/A | Yes |
| Drill NN-01 ST-01 ( 20 days ) | Domestic wastewater treatment plant effluent | 3,200 | N/A | N/A | Yes |
| Drill NN-02 ( 90 days ) | Domestic wastewater treatment plant effluent | 14,400 | N/A | N/A | Yes |
| Drill NN-02 ST-01 ( 26 days ) | Domestic wastewater treatment plant effluent | 4,160 | N/A | N/A | Yes |
| Sanitary wastewater | N/A | N/A | N/A | N/A | N/A |
| Deck Drainage | | | N/A | N/A | N/A |
| Well treatment fluids | | | N/A | N/A | Yes |
| Well completion fluids | | | N/A | N/A | Yes |
| Workover fluids | | | N/A | N/A | Yes |
| Reverse osmosis unit concentrate | *1,600 Bbls / Day* | | N/A | N/A | Yes |
| Drill NN-01 ( 80 days ) | Reverse osmosis unit concentrate | 128,000 | N/A | N/A | Yes |
| Drill NN-01 ST-01 ( 20 days ) | Reverse osmosis unit concentrate | 32,000 | N/A | N/A | Yes |
| Drill NN-02 ( 90 days ) | Reverse osmosis unit concentrate | 144,000 | N/A | N/A | Yes |
| Drill NN-02 ST-01 ( 26 days ) | Reverse osmosis unit concentrate | 41,600 | N/A | N/A | Yes |
| Blowout preventer fluid | | | N/A | N/A | No |
| Boiler Blowdown | | | N/A | N/A | Yes |
| Pit rinse | | | N/A | N/A | Yes |
| Rig wash | | | N/A | N/A | Yes |
| Vac truck/supersucker rinse water | | | N/A | N/A | Yes |
| Hydraulic and lube oils from rig and support equipment maintenance | | | N/A | N/A | No |
| Glycol from rig and support equipment maintenance | | | N/A | N/A | Yes |
| Will you produce hydrocarbons? If yes, fill in the produced water. | | | | | |
| Produced water | | | N/A | N/A | |
| **Please enter individual or general to indicate which type of NPDES permit you will be covered by.** | | | General - APDES | | |
| NOTE: If you do not have a type of waste for the activity being applied for, enter N/A for all columns in a row. | | | NOTE: No discharges to the Beaufort Sea are anticipated | | |

## CHEMICAL PRODUCTS {30 CFR 550.213(c)}

Please provide a brief description, quantities to be stored, storage method, and rates of usage.

| Type of Chemical | Description | Quantity Used | Storage Method | Rates of Usage |
|---|---|---|---|---|
| | | | | |
| **Water Base Mud Products** | | | | |
| pH modifier | Sods Ash ( sodium carbonate ) | 2,428 Lbs | Sack | 202 Lbs / day |
| Viscosifier | M-I Gel ( Silica, crystalline (Cristobalite, quartz, Tridymite) ) | 242,800 Lbs | Bulk | 20,233 Lbs / day |
| Filtration Control | Polypac Supreme UL ( Carboxymethylcellulose (CMC) sodium salt ) | 7,284 Lbs | Sack | 607 Lbs / day |
| Viscosifier (Rheological Modifier) | Flowzan ( Xanthan gum ) | 4,856 Lbs | Sack | 405 Lbs / day |
| **Mineral Oil Base Mud Products** | | | | |
| Mineral Oil | LVT 200 Base Oil ( Petroleum Distillate, hydrotreated light ) | 19,583 Bbls | Bulk | 93 Bbls / day |
| Viscosifier | VG Supreme / TruVis ( Bentonite / Organophillic Clay ) | 58,456 Lbs | Sack | 277 Lbs / day |
| Lime | Lime ( Lime ) | 146,140 Lbs | Sack | 693 Lbs / day |
| Emulsifier | Actimul RD ( Modified tall oil soap ) | 233,824 Lbs | Sack | 1,108 Lbs / day |
| Wetting Agent | VersaWet ( Tall oil fatty acid, Rosin, Tall Oil Pitch ) | 29,228 Lbs | Sack | 139 Lbs / day |
| Viscosifier (Rheological Modifier) | HRP ( Unknown (liquid in 5 gal cans -or - 55 gal drums) ) | 1,735 gal | can drum | 8 gal / day |
| Brine Phase | CaCl2 Brine ( Water Wetting Phase ) | 7,892 Bbls | Bulk | 37 Bbls / day |
| Graded Limestone | SAFECARB 20 ( Seepage Loss ) | 1,315,260 Lbs | Bulk | 6,234 Lbs / day |
| Graded Limestone | SAFECARB40 ( Weighting Agent ) | 1,315,260 Lbs | Bulk | 6,234 Lbs / day |
| Barium Sulphate | Barite ( Weighting Agent ) | 2,075,188 Lbs | Bulk | 9,835 Lbs / day |
| **Cement** | | | | |
| Cement Blend 1 | Arcticset LIGHT III ( Dry Blend Cement- (10.7 ppg / Yield 2.77 cf/sx / Bulk Factor 2.20 cf/cf ) ) | 6,758 cubic Ft | Bulk | 31 cubic Ft / Day |
| Cement Blend 2 | DeepCRETE ( Dry Blend Cement- (12.5 ppg / Yield 1.56 cf/sx / Bulk Factor 1.80 cf/cf ) ) | 1,608 cubic Ft | Bulk | 7 cubic Ft / Day |
| Cement Blend 3 | 15.8ppg UniSLURRY ( Dry Blend Cement- (15.8 ppg / Yield 1.16 cf/sx / Bulk Factor 1.00 cf/cf ) ) | 24,443 cubic Ft | Bulk | 113 cubic Ft / Day |
| **Completion Fluids** | | | | |
| Gelling agent | J-580 ( Carbohydrate Polymer ) | 3,325 lbs | Bulk | 83 Lbs / Day |
| Biocide | M275 ( Diatomaceous earth, calcined, Sodium nitrate, 5-chloro-2-methyl-4-isothiazolin-3-one, 2-Methyl-4-isothiazolin-3-one, Crystalline silica: cristobalite, & Crystalline silica: Quartz -SiO2 ) | 50 lbs | Can / Drum | 1 Lbs / Day |
| Crosslinker | J532 (Borate) | 460 gal | Bulk | 12 Lbs / Day |
| Surfactant | F103 ( Propan-2-ol - 2-butoxyethanol - Oxyalkylated alkylalcohol - Ethoxylated alcohol linear - Aliphatic alcohol ) | 133 gal | Bulk | 3 Lbs / Day |
| Clay stabilizer | L071 ( Polyammine ) | 266 gal | Bulk | 7 Lbs / Day |
| EB-Clean Breaker | J475 ( Diammonium peroxodisulphate & Aliphatic co-polymer ) | 743 lbs | Can / Drum | 19 Lbs / Day |
| Breaker | J218 ( Diammonium peroxidisulphate ) | 204 lbs | Can / Drum | 5 Lbs / Day |
| Proppant | ( Ceranic / Crystaline Silica) | 160,000lbs | Bulk | 4000 Lbs / Day |

**Figure L-2 – Proposed Chemical Products**

## Figure L-3. WASTE AND SURPLUS ESTIMATED TO BE TRANSPORTED AND/OR DISPOSED OF ONSHORE

please specify whether the amount reported is a total or per well

| | Projected generated waste | | Solid and Liquid Wastes transportation | Waste Disposal | | |
|---|---|---|---|---|---|---|
| **Type of Waste** | **Composition** | | **Transport Method** | **Name/Location of Facility** | **Amount** | **Disposal Method** |
| **Will drilling occur ? If yes, fill in the muds and cuttings.** | | | | | | |
| *EXAMPLE: Synthetic-based drilling fluid or mud* | *internal olefin, ester* | | *Below deck storage tanks on offshore support vessels* | *SID WIF* | *X bbl/well* | *Recycled* |
| **Water-based drilling fluid or mud** | | | Hard-piped to WIF, vac truck, supersucker | SID WIF | | UIC Class I disposal |
| Drill NN-01 | | | | | 1,822 | |
| Drill NN-02 | | | | | 1,822 | |
| **Synthetic-based drilling fluid or mud** | **LVT (mineral oil)** | | Hard-piped to WIF, vac truck, supersucker | SID WIF | | UIC Class I disposal |
| Drill NN-01 | | | | | 2,682 | |
| Drill NN-01 BP-01 | | | | | 255 | |
| Drill NN01-ST01 | | | | | 2,708 | |
| | | | | | | |
| Drill NN-02 | | | | | 2,827 | |
| Drill NN-02 BP-01 | | | | | 570 | |
| Drill NN02-ST01 | | | | | 2,989 | |
| **No Mud with oil/diesel -based fluids** | | | | | | |
| | | | | | | |
| **Cuttings wetted with Water-based fluid** | | | Hard-piped to WIF, vac truck, supersucker | SID WIF | | UIC Class I disposal |
| Drill NN-01 | | | | | 3,034 | |
| Drill NN-02 | | | | | 3,034 | |
| **Cuttings wetted with Synthetic-based fluid** | **LVT (mineral oil)** | | Hard-piped to WIF, vac truck, supersucker | SID WIF | | UIC Class I disposal |
| Drill NN-01 | | | | | 8,064 | |
| Drill NN-01 BP-01 | | | | | 68 | |
| Drill NN01-ST01 | | | | | 495 | |
| | | | | | | |
| Drill NN-02 | | | | | 8,665 | |
| Drill NN-02 BP-01 | | | | | 91 | |
| Drill NN02-ST01 | | | | | 521 | |
| **No (0) Cuttings wetted with oil-based fluids** | | | | | 0 | |
| | | | | | | |
| **Will you produce hydrocarbons? If yes fill in for produced sand.** | **ANSWER = NO** | | | | | |
| | | | | | | |
| | | | | | | |
| **Will you have additional wastes that are not permitted for discharge? If yes, fill in the appropriate rows. ANSWER = NO** | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

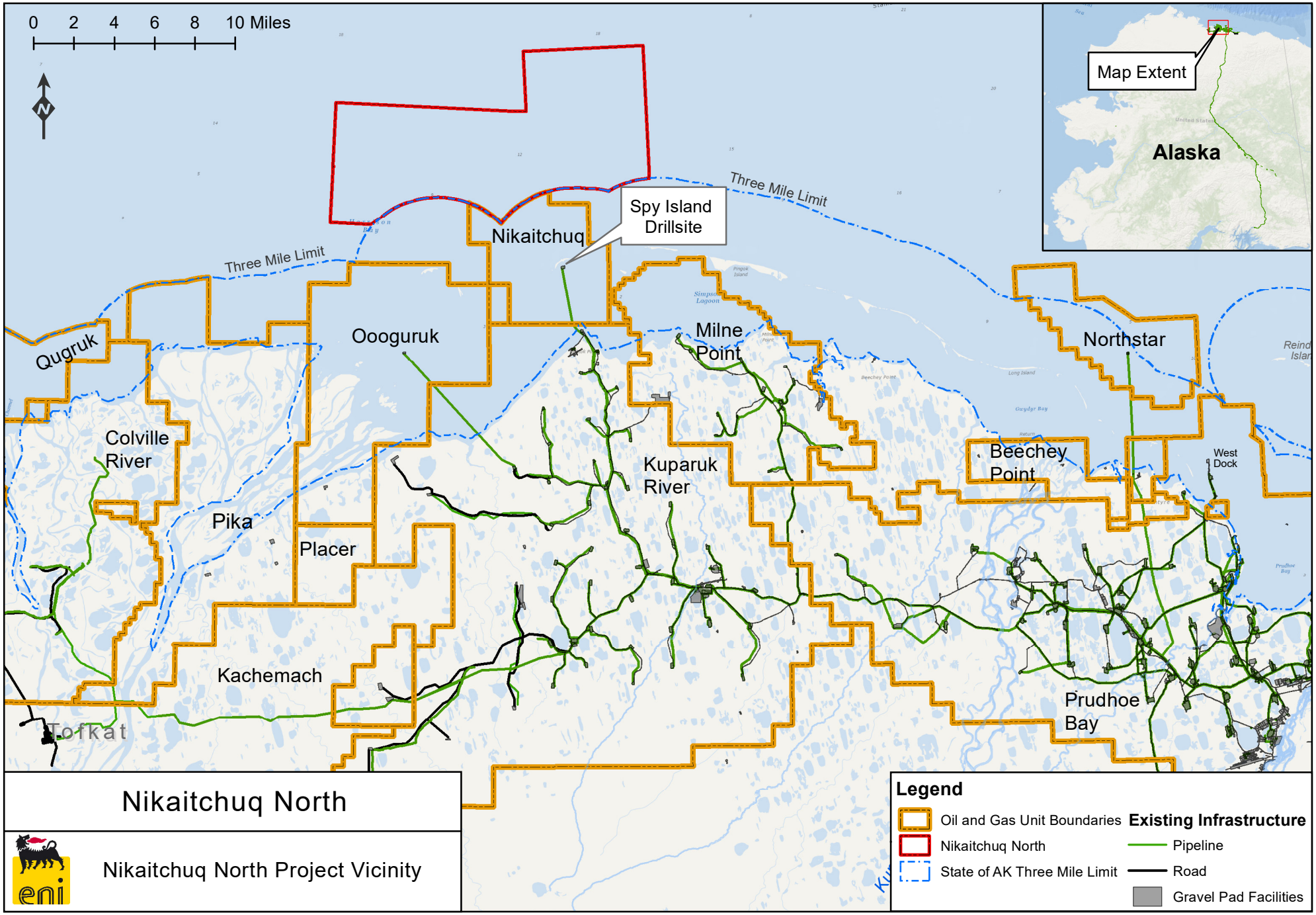

0 2 4 6 8 10 Miles
N
Map Extent
Alaska
Three Mile Limit
Three Mile Limit
Spy Island Drillsite
Nikaitchuq
Qugruk
Oooguruk
Milne Point
Northstar
Colville River
Pika
Placer
Kuparuk River
Beechey Point
West Dock
Kachemach
Prudhoe Bay
Tofkat
Nikaitchuq North
Nikaitchuq North Project Vicinity
eni
Legend
Oil and Gas Unit Boundaries
Nikaitchuq North
State of AK Three Mile Limit
Existing Infrastructure
Pipeline
Road
Gravel Pad Facilities

**Table L-2. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**Emission Unit Inventory for Support Vessels**

| Emission Unit | | Rating/Size | Fuel |
|---|---|---|---|
| **Name** | **Description** | | |
| **Hovercraft** | | | |
| Propulsion Engine | Deutz RF12L | 543 hp | Diesel |
| Propulsion Engine | Deutz RF12L | 543 hp | Diesel |
| Lift Engine | Deutz RF10L | 375 hp | Diesel |
| Lift Engine | Deutz RF10L | 375 hp | Diesel |
| **Crew Boat (Commander)** | | | |
| Propulsion Engine | Caterpillar C9 | 510 hp | Diesel |
| Propulsion Engine | Caterpillar C9 | 510 hp | Diesel |
| **Tug & Barge (Old Bull)** | | | |
| Propulsion Engine | Caterpillar C12 | 385 hp | Diesel |
| Propulsion Engine | Caterpillar C12 | 385 hp | Diesel |

**Table L-3a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Projec**
**$NO_X$ Emissions Calculations for Support Vessels for 2017**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 3.3 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 3.3 tpy |
| Lift Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 2.3 tpy |
| Lift Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 2.3 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 1.2 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 1.2 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 152 trips | 0.9 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 152 trips | 0.9 tpy |
| | | | | | |
| **Total 2017 Annual $NO_X$ Emissions for Support Vessels** | | | | | **15.3 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-3b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$NO_X$ Emissions Calculations for Support Vessels for 2018**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 3.3 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 3.3 tpy |
| Lift Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 2.3 tpy |
| Lift Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 2.3 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 1,378 trips | 2.7 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 1,378 trips | 2.7 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 108 trips | 0.6 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 108 trips | 0.6 tpy |
| | | | | | |
| **Total 2018 Annual $NO_X$ Emissions for Support Vessels** | | | | | **17.8 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-3c. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$NO_X$ Emissions Calculations for Support Vessels for 2019**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 862 trips | 2.4 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 862 trips | 2.4 tpy |
| Lift Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 862 trips | 1.7 tpy |
| Lift Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 862 trips | 1.7 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 1.2 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 1.2 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 8 trips | 0.05 tpy |
| Propulsion Engine | 0.031 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 8 trips | 0.05 tpy |
| | | | | | |
| **Total 2019 Annual $NO_X$ Emissions for Support Vessels** | | | | | **10.7 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-4a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Projec**
**CO Emissions Calculations for Support Vessels for 2017**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.7 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.7 tpy |
| Lift Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.5 tpy |
| Lift Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.5 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.3 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.3 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 152 trips | 0.2 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 152 trips | 0.2 tpy |
| | | | | | |
| **Total 2017 Annual CO Emissions for Support Vessels** | | | | | **3.3 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-4b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**CO Emissions Calculations for Support Vessels for 2018**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.7 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.7 tpy |
| Lift Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.5 tpy |
| Lift Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.5 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 1,378 trips | 0.6 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 1,378 trips | 0.6 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 108 trips | 0.1 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 108 trips | 0.1 tpy |
| | | | | | |
| **Total 2018 Annual CO Emissions for Support Vessels** | | | | | **3.8 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-4c. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**CO Emissions Calculations for Support Vessels for 2019**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 862 trips | 0.5 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 862 trips | 0.5 tpy |
| Lift Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 862 trips | 0.4 tpy |
| Lift Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 862 trips | 0.4 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.3 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.3 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 8 trips | 0.01 tpy |
| Propulsion Engine | 0.00668 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 8 trips | 0.01 tpy |
| | | | | | |
| **Total 2019 Annual CO Emissions for Support Vessels** | | | | | **2.3 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-5a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$PM/PM_{10}/PM_{2.5}$ Emissions Calculations for Support Vessels for 2017**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2,3] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.2 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.2 tpy |
| Lift Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.2 tpy |
| Lift Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.2 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.09 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.09 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 152 trips | 0.06 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 152 trips | 0.06 tpy |
| | | | | | |
| **Total 2017 Annual $PM/PM_{10}/PM_{2.5}$ Emissions for Support Vessels** | | | | | **1.1 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

[3] PM emissions assumed to be $PM_{2.5}$.

**Table L-5b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$PM/PM_{10}/PM_{2.5}$ Emissions Calculations for Support Vessels for 2018**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2,3] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.2 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.2 tpy |
| Lift Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.2 tpy |
| Lift Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.2 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 1,378 trips | 0.2 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 1,378 trips | 0.2 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 108 trips | 0.05 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 108 trips | 0.05 tpy |
| | | | | | |
| **Total 2018 Annual $PM/PM_{10}/PM_{2.5}$ Emissions for Support Vessels** | | | | | **1.3 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

[3] PM emissions assumed to be $PM_{2.5}$.

**Table L-5c. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$PM/PM_{10}/PM_{2.5}$ Emissions Calculations for Support Vessels for 2019**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2,3] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 862 trips | 0.2 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 862 trips | 0.2 tpy |
| Lift Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 862 trips | 0.1 tpy |
| Lift Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 862 trips | 0.1 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.09 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.09 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 8 trips | 0.003 tpy |
| Propulsion Engine | 0.0022 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 8 trips | 0.003 tpy |
| | | | | | |
| **Total 2019 Annual $PM/PM_{10}/PM_{2.5}$ Emissions for Support Vessels** | | | | | **0.8 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

[3] PM emissions assumed to be $PM_{2.5}$.

**Table L-6a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Projec**
**VOC Emissions Calculations for Support Vessels for 2017**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.3 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.3 tpy |
| Lift Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.2 tpy |
| Lift Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.2 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.1 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.1 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 152 trips | 0.07 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 152 trips | 0.07 tpy |
| | | | | | |
| **Total 2017 Annual VOC Emissions for Support Vessels** | | | | | **1.2 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-6b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**VOC Emissions Calculations for Support Vessels for 2018**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.3 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 1,163 trips | 0.3 tpy |
| Lift Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.2 tpy |
| Lift Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 1,163 trips | 0.2 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 1,378 trips | 0.2 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 1,378 trips | 0.2 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 108 trips | 0.05 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 108 trips | 0.05 tpy |
| | | | | | |
| **Total 2018 Annual VOC Emissions for Support Vessels** | | | | | **1.4 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-6c. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**VOC Emissions Calculations for Support Vessels for 2019**

| Description | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| | Rate | Reference | Capacity | Per Year [1] | Emissions [2] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 862 trips | 0.2 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 543 hp | 862 trips | 0.2 tpy |
| Lift Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 862 trips | 0.1 tpy |
| Lift Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 375 hp | 862 trips | 0.1 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.1 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 510 hp | 614 trips | 0.1 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 8 trips | 0.004 tpy |
| Propulsion Engine | 0.00251 lb/hp-hr | Table 3.3-1, AP-42 | 385 hp | 8 trips | 0.004 tpy |
| | | | | | |
| **Total 2019 Annual VOC Emissions for Support Vessels** | | | | | **0.9 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

**Table L-7a. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$SO_2$ Emissions Calculations for Support Vessels for 2017**

| | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| Description | Rate | Reference | Capacity | Per Year [1] | Emissions [2,3] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 543 hp | 1,163 trips | 0.001 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 543 hp | 1,163 trips | 0.001 tpy |
| Lift Engine | 2.05E-04 lb/gal | Mass Balance | 375 hp | 1,163 trips | 0.0009 tpy |
| Lift Engine | 2.05E-04 lb/gal | Mass Balance | 375 hp | 1,163 trips | 0.0009 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 510 hp | 614 trips | 0.0005 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 510 hp | 614 trips | 0.0005 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 385 hp | 152 trips | 0.0003 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 385 hp | 152 trips | 0.0003 tpy |
| | | | | | |
| **Total 2017 Annual $SO_2$ Emissions for Support Vessels** | | | | | **0.006 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

[3] Emission Factors:

| | |
|---|---|
| Diesel Fuel Sulfur Content | 15 ppmw S (ULSD) |
| Fuel Density (Arctic Diesel) | 6.82 lb/gal |
| Fuel Heat Content (Arctic Diesel) | 120,000 Btu/gal |
| Engine Heat Rate | 7,000 Btu/hp-hr |

**Table L-7b. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$SO_2$ Emissions Calculations for Support Vessels for 2018**

| | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| Description | Rate | Reference | Capacity | Per Year [1] | Emissions [2,3] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 543 hp | 1,163 trips | 0.001 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 543 hp | 1,163 trips | 0.001 tpy |
| Lift Engine | 2.05E-04 lb/gal | Mass Balance | 375 hp | 1,163 trips | 0.0009 tpy |
| Lift Engine | 2.05E-04 lb/gal | Mass Balance | 375 hp | 1,163 trips | 0.0009 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 510 hp | 1,378 trips | 0.001 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 510 hp | 1,378 trips | 0.001 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 385 hp | 108 trips | 0.0002 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 385 hp | 108 trips | 0.0002 tpy |
| | | | | | |
| **Total 2018 Annual $SO_2$ Emissions for Support Vessels** | | | | | **0.007 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

[3] Emission Factors:

| | |
|---|---|
| Diesel Fuel Sulfur Content | 15 ppmw S (ULSD) |
| Fuel Density (Arctic Diesel) | 6.82 lb/gal |
| Fuel Heat Content (Arctic Diesel) | 120,000 Btu/gal |
| Engine Heat Rate | 7,000 Btu/hp-hr |

**Table L-7c. Eni US Operating Co. Inc. - Nikaitchuq North Exploration Project**
**$SO_2$ Emissions Calculations for Support Vessels for 2019**

| | Emission Factor | | Maximum | One-Way Trips | Annual |
|---|---|---|---|---|---|
| Description | Rate | Reference | Capacity | Per Year [1] | Emissions [2,3] |
| **Hovercraft** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 543 hp | 862 trips | 0.0009 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 543 hp | 862 trips | 0.0009 tpy |
| Lift Engine | 2.05E-04 lb/gal | Mass Balance | 375 hp | 862 trips | 0.0006 tpy |
| Lift Engine | 2.05E-04 lb/gal | Mass Balance | 375 hp | 862 trips | 0.0006 tpy |
| **Crew Boat (Commander)** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 510 hp | 614 trips | 0.0005 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 510 hp | 614 trips | 0.0005 tpy |
| **Tug & Barge (Old Bull)** | | | | | |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 385 hp | 8 trips | 1.8E-05 tpy |
| Propulsion Engine | 2.05E-04 lb/gal | Mass Balance | 385 hp | 8 trips | 1.8E-05 tpy |
| | | | | | |
| **Total 2019 Annual $SO_2$ Emissions for Support Vessels** | | | | | **0.004 tpy** |

Notes:
[1] One-way number of trips between OPP and SID based on Table L-1.
[2] One-way travel times between OPP and SID:

| | |
|---|---|
| Hovercraft | 20 minutes |
| Crewboat | 15 minutes |
| Tug & Barge | 60 minutes |

[3] Emission Factors:

| | |
|---|---|
| Diesel Fuel Sulfur Content | 15 ppmw S (ULSD) |
| Fuel Density (Arctic Diesel) | 6.82 lb/gal |
| Fuel Heat Content (Arctic Diesel) | 120,000 Btu/gal |
| Engine Heat Rate | 7,000 Btu/hp-hr |

# *SECTION M ONSHORE SUPPORT FACILITIES INFORMATION*

### *(a) General*

OPP is an existing production facility that is located at Oliktok Point on an approximate ten-acre gravel pad. OPP includes the following wells:

- 11 production wells (9 dual-laterals)
- 8 injection wells
- 3 water source wells
- 1 Class I disposal well/WIF

The OPP facility processes three-phase fluids that flow from wells at SID and OPP. The fluids pass from the wells through a fluid separation system and dehydrator. Processed oil is then metered and transported via the COTP to the Kuparuk pipeline. The processing plant is capable of treating 40,000 bpd of crude oil and 120,000 bpd of water.

OPP includes a staging area for freight to be transported to SID, a public dock, designated-area for Eni's barge and tug to park, heated tents for work areas, logistics tools, a tent for hovercraft storage, and a lit wind sock.

Eni's NOC is a seven-acre onshore gravel pad located south of OPP. NOC includes lodging for 206 workers, two warehouses, and logistics facilities. Logistics support includes a logistics office, a lit helipad, a helicopter hanger, Jet A fuel available onsite, and an automated weather observation system. The medical clinic is an acute minor illness/injury clinic staffed full time by a physician's assistant with advanced cardiac life support capabilities and Occupational Safety and Health Administration (OSHA) occupational health testing and monitoring. An ambulance is maintained in a heated staging area. An additional six-acre laydown area is available at a gravel pad owned by the U.S. Air Force next to OPP.

No expansion of existing facilities is proposed for the Nikaitchuq North Project.

### *(b) Air emissions*

Because there is no anticipated increase in activity under the exploration activities proposed in this EP associated with onshore support facilities in comparison to the No Action Alternative, no air emissions are likely to be generated and no information is provided under 30 CFR 550.224(b).

### *(c) Unusual solid and liquid wastes*

Exploration activities proposed under this EP are not expected to generate any unusual solid or liquid wastes by the onshore support facilities.

# *SECTION N COASTAL ZONE MANAGEMENT ACT*

The State of Alaska did not pass legislation required to extend the Alaska Coastal Management Program (ACMP), allowing the ACMP to sunset at 12:01 AM, Alaska Standard Time, on July 1, 2011. Therefore, no Coastal Project Questionnaire and Certification Statement or Other Information are required as part of the Coastal Zone Management Act (CZMA).

# *SECTION O ENVIRONMENTAL IMPACT ANALYSIS*

The EIA is provided as Appendix O.

# Appendix O

# Nikaitchuq North Exploration Drilling Project

# Environmental Impact Analysis

Prepared For:

**Eni US Operating Co. Inc.**

Prepared By:

SLR International Corporation
2700 Gambell Street, Suite 200
Anchorage, AK 99503

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# ACRONYMS

| | |
|---|---|
| °F | degrees Fahrenheit |
| °C | degrees Celsius |
| % | percent |
| AAAQS | Alaska Ambient Air Quality Standards |
| AAC | Alaska Administrative Code |
| ACLS | advanced cardiac life support |
| ACMP | Alaska Coastal Management Program |
| ADEC | Alaska Department of Environmental Conservation |
| ADF&G | Alaska Department of Fish and Game |
| ADNR | Alaska Department of Natural Resources |
| AEWC | Alaska Eskimo Whaling Commission |
| ANCSA | Alaska Native Claim Settlement Act |
| AOGCC | Alaska Oil and Gas Conservation Commission |
| AQCP | air quality control plan |
| AQIA | Air Quality Impact Analysis |
| AS | Alaska Statute |
| ASRC | Arctic Slope Regional Corporation |
| AWOS | Automated Weather Observing System |
| bbl/year | barrels per year |
| BOEM | Bureau of Ocean Energy Management |
| BOP | blowout preventer |
| BOWFEST | Bowhead Whale Feeding Ecological Study |
| bpd | barrels per day |
| BSEE | Bureau of Safety and Environmental Enforcement |
| CAA | Clean Air Act |
| CAH | Central Arctic Caribou Herd |
| CFR | Code of Federal Regulations |
| CO | Carbon Monoxide |
| $CO_2$ | Carbon Dioxide |
| COTP | crude oil transmission pipeline |
| CPAI | ConocoPhillips Alaska, Inc. |
| dB | decibel |
| dBA | A-weighted decibel(s) |

| | |
|---|---|
| DEW | Distant Early Warning |
| DOG | Division of Oil and Gas |
| DPP | Development and Production Plan |
| DPS | distinct population segment |
| EA | Environmental Assessment |
| EFH | Essential Fish Habitat |
| EIA | Environmental Impact Analysis |
| EID | Environmental Information Document |
| EIS | Environmental Impact Statement |
| Eni | Eni US Operating Co. Inc. |
| EP | Exploration Plan |
| EPA | U.S. Environmental Protection Agency |
| ERD | extended reach drilling |
| ESA | Endangered Species Act |
| FONSI | Finding of No Significant Impact |
| $H_2S$ | Hydrogen Sulfide |
| HAK | Hilcorp Alaska, LLC |
| Hz | Hertz |
| Kerr-McGee | Kerr-McGee Oil & Gas Corporation |
| kHz | kilohertz |
| km | kilometer |
| KSOPI | Kuukpikmiut Subsistence Oversight Panel, Inc. |
| LOA | Letter of Authorization |
| LRRS | Long Range Radar Station |
| MOBM | mineral oil-based mud |
| m | meter |
| MARPOL | International Convention for the Prevention of Pollution from Ships |
| mph | miles per hour |
| m/s | meters per second |
| MMPA | Marine Mammal Protection Act |
| NA | not applicable |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| $NO_2$ | Nitrogen Dioxide |

| | |
|---|---|
| NOAA | National Oceanic and Atmospheric Administration |
| NOC | Nikaitchuq Operations Center |
| $NO_X$ | Nitrogen Oxide |
| NPR-A | National Petroleum Reserve-Alaska |
| NSB | North Slope Borough |
| NWS | National Weather Service |
| $O_3$ | Ozone |
| OCS | Outer Continental Shelf |
| ODPCP | Oil Discharge Prevention and Contingency Plan (C-Plan) |
| OPMP | Office of Project Management and Permitting |
| OPP | Oliktok Production Pad |
| OSRP | Oil Spill Response Plan |
| P&A | plugged and abandoned |
| PIP | pipe-in-pipe |
| $PM_{2.5}$ | fine particulate matter, particulate matter 2.5 microns or less |
| $PM_{10}$ | particulate matter 10 microns or less |
| PSD | Prevention of Significant Deterioration |
| RFAI | Request for Additional Information |
| RFF | reasonably foreseeable future |
| RUSALCA | Russian-American Long-Term Census of the Arctic |
| SA | Service Area |
| SEMS | Safety and Environmental Management System |
| SID | Spy Island Drillsite |
| SIP | State Implementation Plan |
| $SO_2$ | Sulfur Dioxide |
| SOA | State of Alaska |
| TAPS | Trans Alaska Pipeline System |
| UIC | Ukpeaġvik Iñupiat Corporation |
| USACE | U.S. Army Corps of Engineers |
| USCG | U.S. Coast Guard |
| USFWS | U.S. Fish and Wildlife Service |
| VOC | volatile organic compounds |
| WBM | water-based mud |
| WCD | worst case discharge |
| WIF | Waste Injection Facility |

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# 1 INTRODUCTION

Eni US Operating Co. Inc. (Eni) is proposing to initiate the Nikaitchuq North Exploration Drilling Project from the existing 11-acre Spy Island Drillsite (SID). SID is a man-made, land-based gravel island, constructed in shallow (6 to 8 feet) coastal waters, approximately three miles north of Oliktok Point, Alaska. SID is 100% owned and operated by Eni and supports the drilling and production from State of Alaska leases in Eni's Nikaitchuq Unit.

Eni's Alaska leasehold interest is as follows:

Eni is the operator and owns a 40% working interests in 15 Outer Continental Shelf (OCS) federal leases in the Beaufort Sea. Eni's partners in the federal leases are Shell Offshore (40%) and Repsol E&P USA, Inc. (20%). Eni is the operator and owns a 100% working interest in 12 State of Alaska leases, which make up the Nikaitchuq Unit.

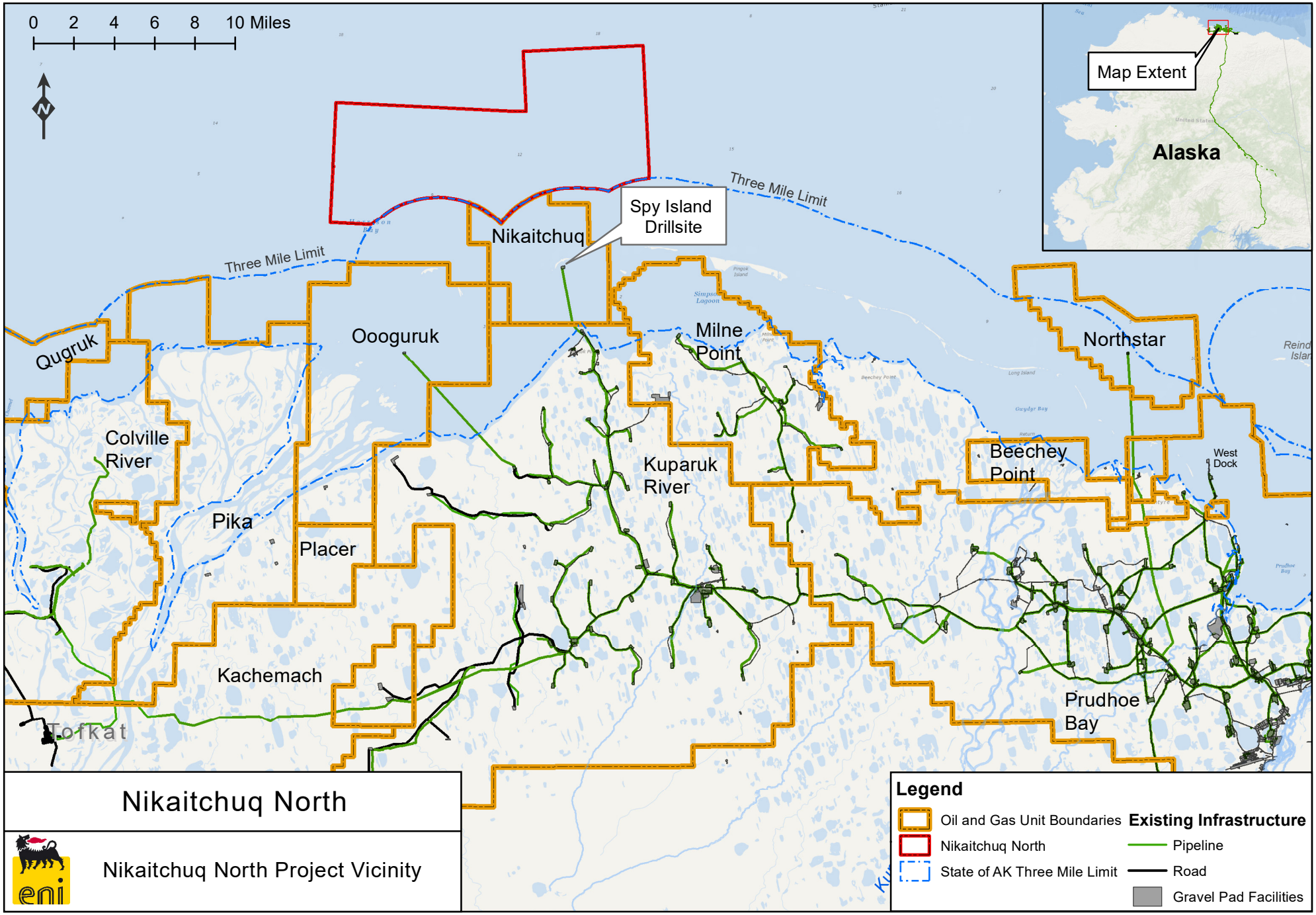
The purpose of the proposed Nikaitchuq North Exploration Drilling Project is for the proposed exploratory drilling of four exploration wellbores from Eni's existing man-made island, Spy Island Drillsite (SID), on the State of Alaska (State) lease. The proposed exploration wellbores will begin from the surface of SID and extend subsurface of the ocean floor, ending in federal leases on the Outer Continental Shelf (OCS) of Alaska – Harrison Bay Block 6423 Unit (Leases OCS-Y-1753, OCS-Y-1754, and OCS-Y-1757).

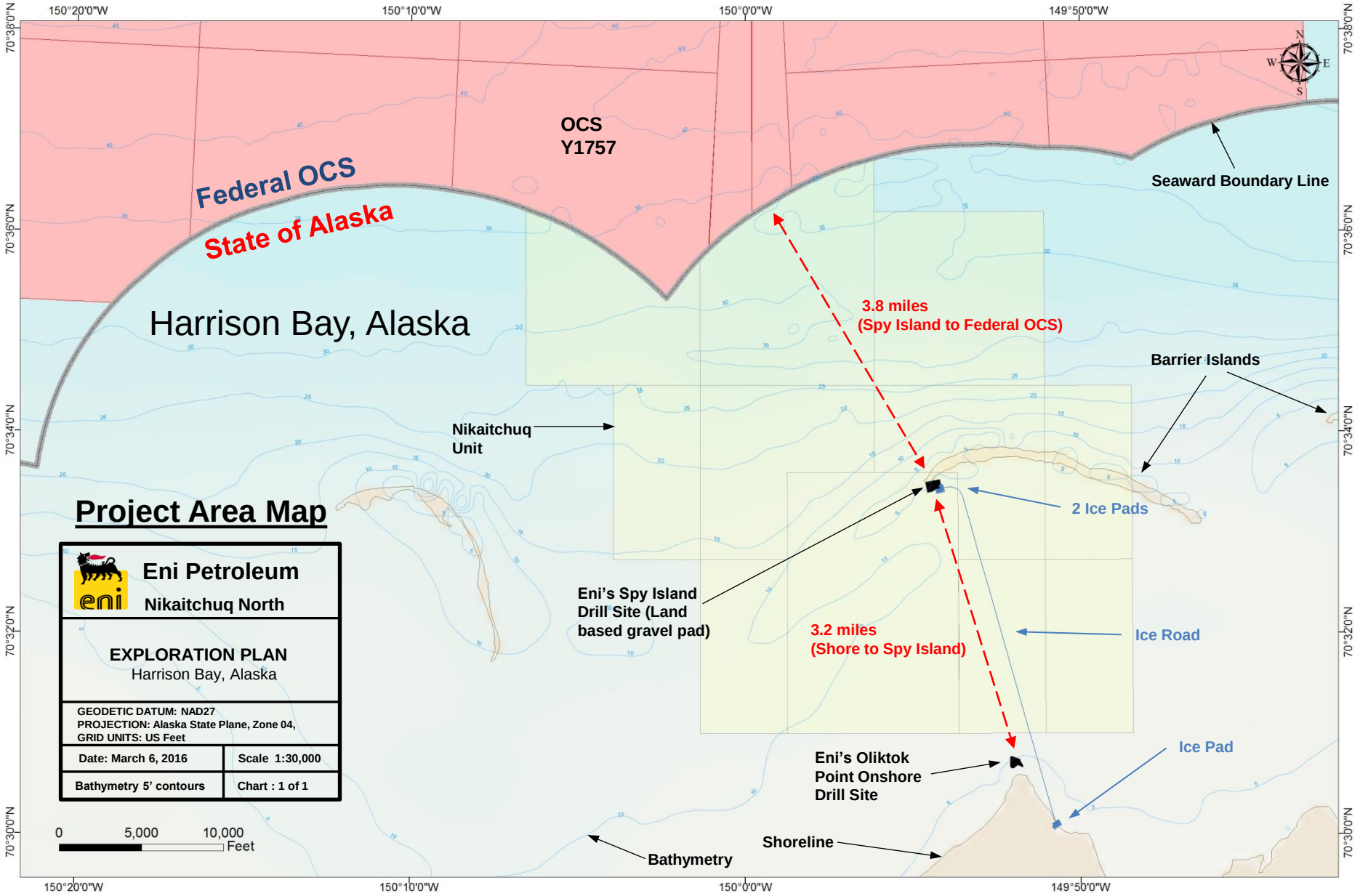
The Exploration Plan (EP) for Eni's Nikaitchuq North Exploration Drilling Project provides a detailed description of the proposed project, including information required under Title 30 of the Code of Federal Regulations (CFR), Part 550, Sections 211 through 228. This Environmental Impact Analysis (EIA) has been prepared pursuant to regulations found at 30 CFR 550.212 and 550.227 to accompany the EP submittal to the U.S. Department of the Interior Bureau of Ocean Energy Management (BOEM).

The EIA documents a project-specific assessment of potential environmental impacts of the proposed exploration drilling activities. It updates and refocuses previous assessments of the Nikaitchuq Development Project and incorporates related information from other state and federal environmental documents. The EIA presents data and findings that will support BOEM in making decisions about authorizing exploration on Eni's existing active oil and gas leases in the Beaufort Sea OCS.

## 1.1 PROJECT LOCATION

The Nikaitchuq Unit is located in State of Alaska waters of Simpson Lagoon off of the Beaufort Sea, just north of Oliktok Point, Alaska. The Nikaitchuq North Exploration Drilling Project is located in federal waters of the OCS, immediately north of the current unit boundary. The project vicinity is shown on Figure 1-1 and the project area is shown on Figure 1-2.


0 2 4 6 8 10 Miles
N
Map Extent
Alaska
Three Mile Limit
Three Mile Limit
Spy Island Drillsite
Nikaitchuq
Qugruk
Oooguruk
Milne Point
Northstar
Colville River
Pika
Placer
Kuparuk River
Beechey Point
West Dock
Kachemach
Prudhoe Bay
Tofkat
Nikaitchuq North
Nikaitchuq North Project Vicinity
eni
Legend
Oil and Gas Unit Boundaries
Nikaitchuq North
State of AK Three Mile Limit
Existing Infrastructure
Pipeline
Road
Gravel Pad Facilities


150°20'0"W
150°10'0"W
150°0'0"W
149°50'0"W
70°38'0"N
70°36'0"N
70°34'0"N
70°32'0"N
70°30'0"N
OCS
Y1757
Federal OCS
State of Alaska
Harrison Bay, Alaska
Seaward Boundary Line
3.8 miles
(Spy Island to Federal OCS)
Barrier Islands
Nikaitchuq
Unit
2 Ice Pads
Eni's Spy Island
Drill Site (Land
based gravel pad)
3.2 miles
(Shore to Spy Island)
Ice Road
Ice Pad
Eni's Oliktok
Point Onshore
Drill Site
Shoreline
Bathymetry
Project Area Map
Eni Petroleum
Nikaitchuq North
EXPLORATION PLAN
Harrison Bay, Alaska
GEODETIC DATUM: NAD27
PROJECTION: Alaska State Plane, Zone 04,
GRID UNITS: US Feet
Date: March 6, 2016
Scale 1:30,000
Bathymetry 5' contours
Chart : 1 of 1
0
5,000
10,000
Feet

## 1.2 HISTORY OF OPERATIONS IN THE AREA

Leases OCS-Y-1753, OCS-Y-1754, and OCS-Y-1757 were purchased on March 30, 2005 in Beaufort Sea Lease Sale 195 by Armstrong Oil & Gas. These three leases were acquired by Armstrong subject to an obligation in favor of Kerr-McGee to earn a 70% interest in these leases under the terms of a Development Agreement dated effective January 1, 2003, by and between Kerr-McGee and Armstrong. Eni subsequently acquired the rights of Armstrong under the leases and the Development Agreement pursuant to our Purchase and Sale Agreement with Armstrong dated effective July 1, 2005. Anadarko Petroleum Corporation, as successor in interest to Kerr-McGee under the Development Agreement subsequently elected not to earn an interest in the leases and Eni maintained its 100% interest.

The Nikaitchuq Development Project was designed to produce oil and gas from the Schrader Bluff and Sag oil and gas formations. The Nikaitchuq Development Project proposal included the construction of one onshore production pad/facility at Oliktok Point and up to three offshore production pads located inside the barrier island/shoal system in the nearshore Beaufort Sea. In 2006, the Nikaitchuq Development Project received authorization from the U.S. Army Corps of Engineers (USACE) for the proposed onshore pad and three offshore pads.

In 2008, Eni began Nikaitchuq Development construction activities, which included an onshore production and processing facility named Oliktok Point Pad (OPP) at Oliktok Point, Alaska and a single man-made gravel island named SID just south of the Spy Island barrier island. Additional facilities include a subsea pipeline bundle from SID to OPP. Eni's production from OPP and SID is transported from Oliktok Point through a 14-mile aboveground transmission pipeline that ties in to ConocoPhillips Alaska, Inc.'s (CPAI) Kuparuk River Unit pipeline for delivery to the Trans Alaska Pipeline System (TAPS).

Nikaitchuq Development construction of OPP was completed in late 2010, with construction activities of SID completed in 2011. First oil from OPP was in January 2011, with production commencing from SID in November 2011. From 2011 through 2015, Eni has drilled a total of 23 wells in State of Alaska leases from OPP; 11 production wells, 8 injection wells, 3 water source wells, and 1 disposal well. From late 2011 through 2015, Eni has drilled a total of 32 wells in State of Alaska leases from SID; 18 production wells, 13 injection wells, and one disposal well. Construction of SID was completed in 2010, with first oil in January 2011. Between 2010 and 2015, Eni drilled a total of 32 wells into State of Alaska leases from SID: 18 production wells, 13 injection wells, and a single disposal well.

## 1.3 PURPOSE OF THIS ENVIRONMENTAL IMPACT ANALYSIS

This EIA has been developed to accompany Eni's EP as required under 30 CFR 550.227. It is intended to provide sufficient information for federal agencies to fulfill their responsibilities under the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 *et seq.*) and other relevant federal laws such as the Endangered Species Act of 1973 (ESA) and the Marine Mammal Protection Act (MMPA). This document addresses the resources, conditions, and activities that could be affected by the Nikaitchuq North Exploration Drilling Project summarized above and described further in Section 2, with additional detail provided in the EP.

### 1.3.1 SUPPORT FOR FEDERAL DECISIONS

In proposing to undertake an action, (e.g., authorized, modify, or deny a permit request), federal agencies are required under NEPA to analyze the reasonably foreseeable probable environmental impacts from a proposed project and reasonable range of alternatives, including a decision to take no action. If more than one federal agency is involved in a related action, a single NEPA document may be developed to meet the requirements of all federal agencies. Typically one agency is designated as the lead agency with other agencies as cooperating agencies. For the Nikaitchuq North Exploration Drilling Project, BOEM is expected to be the lead federal agency.

### 1.3.2 RELATED NEPA ANALYSES

The Council of Environmental Quality regulations for the implementation of NEPA encourages tiering to previous NEPA documents to eliminate repetitive discussions of the same issues and focusing on the actual issues ripe for discussion at each level of environmental review (40 CFR 1508.28 and 40 CFR 1502.20). In addition, agencies are directed to incorporate material by reference, providing a summary of the relevant information.

This EIA tiers to, or references portions of, the following documents:

- Environmental Information Document (EID), Nikaitchuq Development Project, Beaufort Sea, Alaska. (Kerr-McGee 2005)
- Permit Evaluation and Decision Document, Nikaitchuq Development Project. POA-2005-1243. (USACE 2006)
- OCS Oil and Gas Leasing Program: 2012-2017 Final Programmatic Environmental Impact Statement (EIS). (BOEM 2012)
- Effects of Oil and Gas Activities in the Arctic Ocean, Final EIS. (NOAA 2016a)
- Alaska Department of Natural Resources (ADNR), Division of Oil and Gas (DOG). 2009. Beaufort Sea Areawide Oil and Gas Lease Sale, Final Finding of the Director. November 9, 2009. (ADNR 2009)
- USACE Final EIS, Beaufort Sea Oil and Gas Development/Northstar Project. (USACE 1999)
- Liberty Development, Development and Production Plan (DPP), Revision 1, EIA. (HAK 2015)

The EID was prepared by Kerr-McGee (2005) to evaluate the potential impacts associated with the Nikaitchuq Development Project to assist USACE in initiating the NEPA process and identify potential mitigation measures.

USACE (2006) was prepared to evaluate Kerr McGee's Nikaitchuq Development Project and included the Finding of No Significant Impact (FONSI). The project was the development of three artificial gravel islands and production and processing facilities at Oliktok Point within

Simpson Lagoon of the Beaufort Sea. The proposed Nikaitchuq North Exploration Drilling Project would use existing facilities evaluated and authorized under this document.

The *OCS Oil and Gas Leasing Program: 2012-2017 Final Programmatic EIS* (BOEM 2012) was completed to fulfill the NEPA requirements for oil and gas lease sales proposed for 2012 through 2017. BOEM (2012) provides environmental resource information for the area of the Nikaitchuq North project area.

The *Effects of Oil and Gas Activities in the Arctic Ocean, Final EIS* was developed by the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), Office of Protected Resources to describe the effects of offshore oil and gas exploration activities in the Beaufort and Chukchi seas, Alaska. NOAA (2016a) analyzes a range of alternatives to assist NMFS in carrying out their obligations to authorize or permit activities under the MMPA.

The *Beaufort Sea Areawide Oil and Gas Lease Sale, Final Finding of the Director* was published by ADNR, DOG on November 9, 2009 in accordance with Alaska Statute (AS) 38.05.035(e)(1)(A). ADNR (2009) evaluated the resources within the lease sale area, which is within the North Slope Borough (NSB) and adjacent to the communities of Utqiaġvik (formerly named Barrow), Nuiqsut, and Kaktovik. Potential impacts to resources that were evaluated included habitat, fish, wildlife, and land use.

USACE (1999) was prepared to evaluate the impacts associated with the construction of the Northstar artificial gravel island, which would have a self-contained development/production facility and two pipelines to existing onshore facilities to transport crude oil to market. The EIS was prepared to provide federal agencies with information about the consequences of the proposed project, to disclose that information to the public, and to solicit public comment prior to the agencies making decisions on the project. The Northstar Island is located in state waters east of Nikaitchuq, with drilling to both state and federal OCS leases.

The *Liberty DPP EIA* was developed in accordance with 30 CFR 550.261 to provide a project-specific assessment of potential environmental impacts of the proposed Liberty Development Project and associated production activities. The EIA was submitted to BOEM as part of the DPP. Because of similarities in the resources that are potentially impacted by the Liberty Development Project and the Nikaitchuq North Exploration Drilling Project, portions of the Hilcorp Alaska, LLC (HAK) DPP (HAK 2015) were referenced.

### 1.3.3 METHODOLOGY FOR ANALYSIS

Resources that have been addressed thoroughly in existing NEPA documents and for which there are no changes in regulation or resource status are summarized in Section 3 (Affected Environment & Environmental Consequences). Where additional data, particularly site-specific and updated information, is considered, or where there has been a change in status, this information is incorporated into the analysis.

One objective of this EIA is to determine what new information or circumstances exist and to assess the potential environmental impacts that have not been assessed and previously determined to result in a FONSI.

# 2 PROPOSED PROJECT

The Nikaitchuq North Exploration Drilling Project is located in federal OCS water of Harrison Bay and Beechey Point areas of the Beaufort Sea, Alaska. The exploration project is approximately six miles offshore from Eni's SID and approximately ten miles from Oliktok Point.

## 2.1 EXISTING NIKAITCHUQ PROJECT FACILITIES

Eni operates the Nikaitchuq Unit in the vicinity of Oliktok Point and Simpson Lagoon. This includes the following facilities:

- SID – a man-made gravel island located offshore of Oliktok Point (Figure 2-1)
- A subsea pipeline bundle from SID to Oliktok Point
- Nikaitchuq Operations Center (NOC) – an onshore pad for support facilities
- Oliktok Production Pad (OPP) – an onshore processing and drilling facility at Oliktok Point (Figure 2-2)
- Onshore crude oil transmission pipeline (COTP) that ties into the Kuparuk pipeline

Gravel placement for SID and OPP was completed in 2008, the subsea pipeline from SID to OPP was constructed in 2009, and the COTP between OPP and the Kuparuk pipeline was constructed in 2010. Nikaitchuq began producing oil from OPP in early 2011. Production from SID began in November 2011. The current Nikaitchuq production is approximately 25,000 barrels per day (bpd) from 70 wellbores drilled from OPP and SID.

### 2.1.1 SPY ISLAND DRILLSITE

The existing SID is a man-made gravel island located approximately three miles offshore of Oliktok Point, just south of the natural barrier island, Spy Island, in shallow water (approximately 6 to 8 feet deep). The SID layout is provided in Figure 2-1. SID supports drilling and production operations in the Nikaitchuq Unit. SID has 36 slots for producers and injectors and slots for two Class I disposal wells. The current SID wells drilled include:

- 18 production wells (9 dual-laterals)
- 13 injection wells
- 1 Class I disposal well/Waste Injection Facility (WIF)

The island has slope protection to prevent erosion and protect against storm surge and ice. SID's perimeter has a 1:3 slope with no bench, protected by 4 cubic-foot gravel bags designed for island perimeter protection. Storm surge modeling was used to determine the height of the gravel pad above sea level and the shape and profile of the perimeter.

Three-phase flow from the wells is pumped directly to production headers at the wellheads in the containment shelters. Crude oil is stored onsite only during production upsets, protations, smart pigging operations, and metering proving activities.

Chemicals stored at SID include diesel fuel, methanol, drilling mud products, and other chemicals to support drilling activities. An Oil Discharge Prevention and Contingency Plan (ODPCP) was developed for Nikaitchuq Unit operations in accordance with Alaska Department of Environmental Conservation (ADEC) regulations. The most recent renewal of the ODPCP was in September 2016. The ODPCP includes a response action plan in the event of a spill and a prevention plan, which describes prevention, inspections, and maintenance programs.

SID has a 126-bed camp facility, an automated weather observation system, logistics staff, security staff, video surveillance, bear watch with forward-looking infrared technology, a warehouse, and a lighted helipad. The medical facility is an acute minor illness/injury clinic staffed full time by a physician's assistant with advanced cardiac life support (ACLS) capabilities.

SID has navigation lights located on the south side of the island. The lights are kept on year-round.

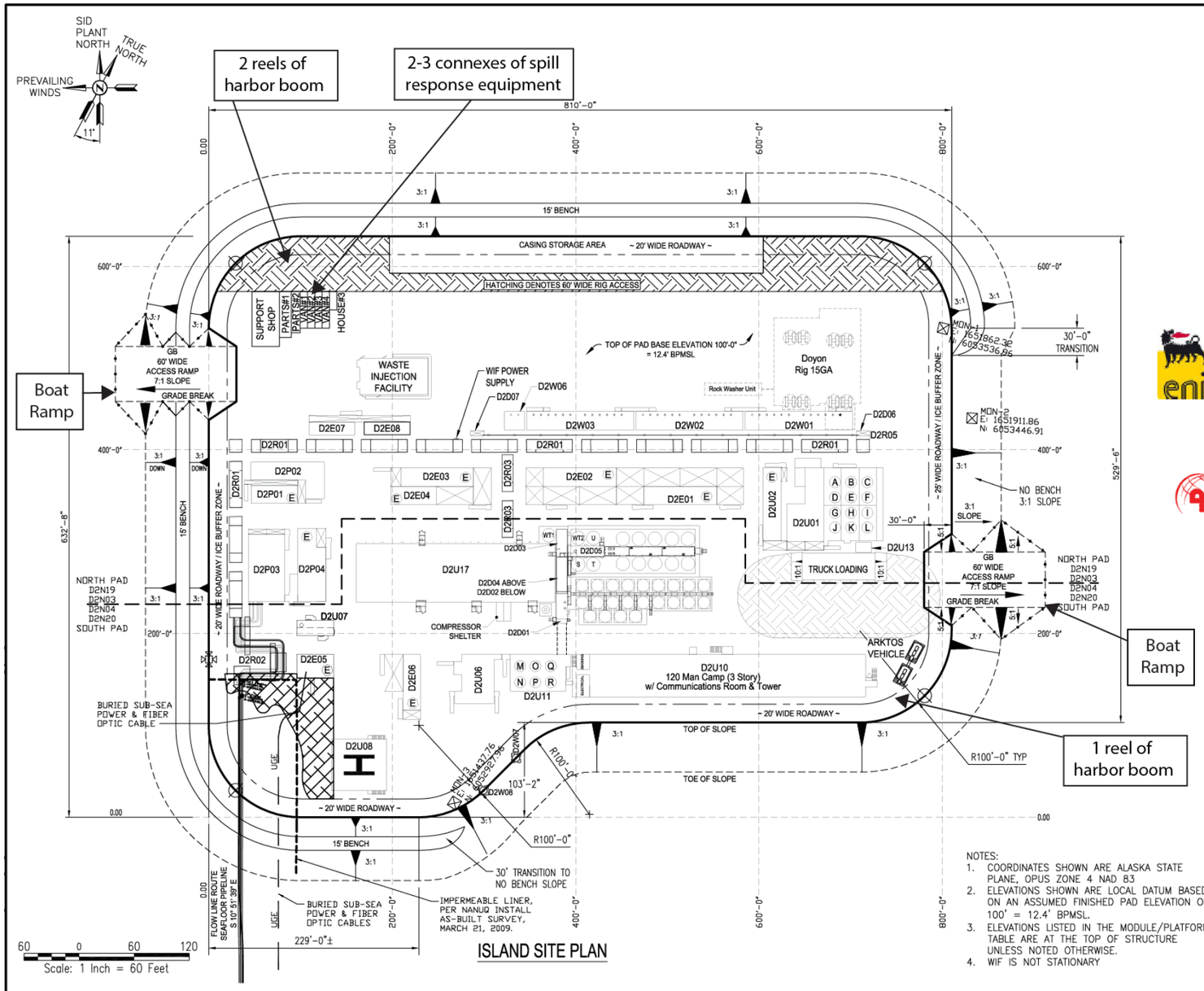
### 2.1.2 PIPELINE SYSTEM

The existing subsea pipeline bundle from SID to OPP is 3.8 miles long and consists of four lines:

- 14-inch pipe-in-pipe (PIP) production flowline to carry three-phase (oil, produced water, and natural gas) from SID to OPP
- 12-inch dilution/injection water line to SID – This pipeline is available for various uses, including reservoir pressure maintenance and adding to the SID production stream to facilitate transport to OPP. The injection water is a combination of produced water and source water from three wells located at OPP.
- 2-inch PIP diesel line to carry diesel fluid to SID
- 6-inch spare line for future use

The 14-inch production pipeline is encased in a 16-inch outer pipe, and the 2-inch diesel line is in a 4.5-inch outer pipe. The pipeline bundle includes a fiber optic communication cable.

After processing, sales oil is transported via the 10-inch COTP to tie-in with the Kuparuk pipeline point approximately 14 miles south. Most of the pipeline is above ground placed on vertical support members. From the Kuparuk tie-in crude oil is transported to TAPS.




| LOUNSBURY CONTROL POINTS – SP | | |
|---|---|---|
| MARK # | NORTH | EAST |
| CP | N–6052903.83 | E–1651305.67 |
| MON–1 | N–6053536.96 | E–1651862.32 |
| MON–2 | N–6053446.91 | E–1651911.86 |
| MON–3 | N–6052927.96 | E–1651437.76 |
| | | |

RECEIVED
Document Control
04.13.11

ISSUED FOR PROJECT USE
April 13 2011
ASRC Energy Services Engineering

| D2-MODULE, PLATFORM & MAJOR EQUIPMENT TABLE | | | |
|---|---|---|---|
| MOD# | DESIGNATION | DIMENSIONS | ASSUMED ELEV. |
| D2D01 | BOILER MODULE (DRILLING PHASE ONLY) | 12'W x 34'L x 12'H | 112' |
| D2D02 | ELECTRICAL MODULE (DRILLING PHASE ONLY) | 12'W x 34'L x 12'H | 112' |
| D2D03 | FIRE PUMP MODULE (DRILLING PHASE ONLY) | 12'W x 30'L x 12'H | 112' |
| D2D04 | HVAC MODULE (DRILLING PHASE ONLY) | 12'W x 40'L x 12'H | 124' |
| D2D05 | WASTE MODULE (DRILLING PHASE ONLY) | 12'W x 40'L x 12'H | 112' |
| D2D06 | VALVE BOX (DRILLING PHASE ONLY) | 5'W x 15'L x 4'H | 104' |
| D2D07 | WIF VALVE BOX (DRILLING PHASE ONLY) | 5'W x 15'L x 4'H | 104' |
| D2E01 | ELECTRICAL CONTROL MODULE (01) | 20'W x 80'L x 14'H | 122' |
| D2E02 | ELECTRICAL CONTROL MODULE (02) | 20'W x 80'L x 14'H | 122' |
| D2E03 | ELECTRICAL CONTROL MODULE (03) | 20'W x 80'L x 14'H | 122' |
| D2E04 | STANDBY GENERATOR MODULE | 20'W x 50'L x 14'H | 122' |
| D2E05 | STEP-DOWN XMFR PLATFORM (SUB SEA POWER CABLE) | 26'W x 40'L | 109' |
| D2E06 | ELECTRICAL CONTROL MODULE (06) | 20'W x 60'L x 14'H | 122' |
| D2E07 | STANDBY GENERATOR #1 (DRILLING PHASE ONLY) | 14'W x 50'L | |
| D2E08 | STANDBY GENERATOR #2 (DRILLING PHASE ONLY) | 14'W x 50'L | |
| D2P01 | METERING MODULE | 20'W x50'L x 14'H | 122' |
| D2P02 | BOOSTER PUMP MODULE | 20'W x 80'L x 14'H | 122' |
| D2P03 | PIG LAUNCHER / RECEIVER MODULE | 40'W x 70'L x 14'H | 143' |
| D2P04 | DILUTION WATER COOLER | 20'W x 80'L,10'W x 60'L | 122' |
| D2R01 | EAST-WEST-PIPERACK | 14'W 'x 880'L | 116' |
| D2R02 | EXPANSION LOOP PIPERACK | TBD | 116' |
| D2R03 | NORTH-SOUTH-PIPERACK DRILLING SUPPORT | 12'W x 110'L | 116' |
| D2R05 | DRILL RIG SUPPORT RACK | 30'W x 400'L x 20'H | 120' |
| D2U01 | CHEMICAL / DIESEL PUMP MODULE & TANK FARM | 40'W x 80'L x 14'H | 122' |
| D2U02 | AIR / N2 SUPPLY MODULE | 20'W x 80'L x 14'H | 122' |
| D2U06 | R.O. WATER - WASTEWATER TREATMENT PLANT | 36'W x 53'L x 26'H | 126' |
| D2U07 | INCINERATOR MODULE | 17'W x 40'L x 10'H | 114' |
| D2U08 | HELICOPTER PAD | 56'W x 60'L x 9'H | 109' |
| D2U10 | 120 MAN CAMP | 331'L x 46'W x 59'H | 159' |
| D2U11 | WATER TANK PLATFORM | 40'W x 60'L | 122' |
| D2U13 | CHEMICAL / DIESEL TRUCK FILL MODULE | 10'W x 16'L x 14'H | 114' |
| D2U17 | DRILLING SUPPORT BUILDING | 64'W x 215'L x 37'H | 137' |
| D2W01 | WELL HOUSE CONTAINMENT SHELTER (01) | 20'W x 115'L x 14'H | 116' |
| D2W02 | WELL HOUSE CONTAINMENT SHELTER (02) | 20'W x 115'L x 14'H | 116' |
| D2W03 | WELL HOUSE CONTAINMENT SHELTER (03) | 20'W x 115'L x 14'H | 116' |
| D2W04 | FUTURE WELL HOUSE CONTAINMENT SHELTER | 20'W x 115'L x 14'H | 116' |
| D2W05 | FUTURE WELL HOUSE CONTAINMENT SHELTER | 20'W x 115'L x 14'H | 116' |
| D2W06 | DISPOSAL WELL SHELTER | 20'W x 22'L x 14'H | 116' |
| D2W07 | RAW WATER WELL SHELTER | | |
| D2W08 | RAW WATER WELL SHELTER | | |

LEGEND

| | |
|---|---|
| UGE | DENOTES UNDERGROUND ELECTRICAL POWER & FIBER OPTIC CABLES |
| (E) | DENOTES ELECTRICAL MODULES AND OR PLATFORMS |
| | DENOTES MODULE |
| | DENOTES FUTURE MODULE |
| | DENOTES PLATFORM |
| | 360 DEGREE LANTERN |
| | FOGHORN |
| | PROPOSED PILE ONLY AREA |
| | TYPICAL PIPERACK |
| | DENOTES TRUCK TURNING RADIUS & RIG ACCESS |

NOTES:
1. COORDINATES SHOWN ARE ALASKA STATE PLANE, OPUS ZONE 4 NAD 83
2. ELEVATIONS SHOWN ARE LOCAL DATUM BASED ON AN ASSUMED FINISHED PAD ELEVATION OF 100' = 12.4' BPMSL.
3. ELEVATIONS LISTED IN THE MODULE/PLATFORM TABLE ARE AT THE TOP OF STRUCTURE UNLESS NOTED OTHERWISE.
4. WIF IS NOT STATIONARY

| D2 - TANK FARM SCHEDULE | | | |
|---|---|---|---|
| TANK# | SERVICE | VOLUME | DIMENSIONS |
| A | DIESEL #1 T-53510 | 750 bbl | 12' DIA. x 38' TALL |
| B | DIESEL #2 T-53520 | 750 bbl | 12' DIA. x 38' TALL |
| C | DIESEL #3 T-53530 | 750 bbl | 12' DIA. x 38' TALL |
| D | BASE OIL #1 (FUTURE CI) T-21510 | 750 bbl | 12' DIA. x 38' TALL |
| E | BASE OIL #2 (FUTURE CI) T-21520 | 750 bbl | 12' DIA. x 38' TALL |
| F | CORROSION INHIBITOR #1 T-19610 | 750 bbl | 12' DIA. x 38' TALL |
| G | SCALE INHIBITOR #1 T-19710 | 400 bbl | 12' DIA. x 20' TALL |
| H | EMULSION BREAKER #1 T-19810 | 750 bbl | 12' DIA. x 38' TALL |
| I | FUTURE | 750 bbl | 12' DIA. x 38' TALL |
| J | BASE OIL DIESEL TRANSFER T-17510 | 200 bbl | 10' DIA. X 14' TALL |
| K | EMULSION BREAKER #2 T-19820 | 750 bbl | 12' DIA. x 38' TALL |
| L | FUTURE | 750 bbl | 12' DIA. x 38' TALL |
| M | POTABLE WATER T-63520 | 750 bbl | 12' DIA. x 38' TALL |
| N | POTABLE WATER T-63510 | 750 bbl | 12' DIA. x 38' TALL |
| O | POTABLE WATER T-63540 | 750 bbl | 12' DIA. x 38' TALL |
| P | POTABLE WATER T-63530 | 750 bbl | 12' DIA. x 38' TALL |
| Q | FUTURE | 750 bbl | 12' DIA. x 38' TALL |
| R | FUTURE | 750 bbl | 12' DIA. x 38' TALL |
| S | DISPOSAL WATER | 1000 bbl | 14'-6" DIA. x 35' TALL |
| T | DISPOSAL WATER | 1000 bbl | 14'-6" DIA. x 35' TALL |
| U | DISPOSAL FLUIDS | 1000 bbl | 14'-6" DIA. x 35' TALL |
| V | FIRE WATER | 1000 bbl | 14'-6" DIA. x 35' TALL |
| W | FIRE WATER | 1000 bbl | 14'-6" DIA. x 35' TALL |

| DWG.No. | TITLE | No. | DATE | DESCRIPTION | DWN. | CHK'D | D. ENG | P. ENG | P. MGR | CLIENT |
|---|---|---|---|---|---|---|---|---|---|---|
| 11216601-005-00-001-B | INTEC Engineering, Proposed Offshore Flowline Route | 8 | 04/11 | RE-ISSUED FOR PROJECT USE PER D2N00 | RJM | MC | SR | CSS | DKO | DKJ |
| C1.0 | EEIS – Site Plan – Drilling Support Complex | 1 | 09/09 | RE-ISSUED FOR PROJECT USE PER D2N00 | JDF | MC | SR | CSS | DKO | DKJ |
| | | 2 | 01/10 | RE-ISSUED FOR PROJECT USE PER D2N00 | JDF | MC | SR | CSS | DKO | DKJ |
| | | 3 | 04/10 | RE-ISSUED FOR PROJECT USE PER D2N00 | JDF | MC | SR | CSS | DKO | DKJ |
| | | 4 | 6/10 | RE-ISSUED FOR PROJECT USE PER EAR-AES-481 | RJM | MC | SR | CSS | DKO | DKJ |
| | | 5 | 8/10 | RE-ISSUED FOR PROJECT USE PER D2N00 | JDF | MC | SR | CSS | DKO | DKJ |
| | | 6 | 12/10 | RE-ISSUED FOR PROJECT USE PER D2N00 | RJM | MC | SR | CSS | DKO | DKJ |
| | | 7 | 1/11 | RE-ISSUED FOR PROJECT USE PER D2N00 | RJM | MC | SR | CSS | DKO | DKJ |
| REFERENCE DRAWINGS | | ISSUES / REVISIONS | | | ENGINEERING APPROVALS | | | | | |

ENGINEERING CONTRACTOR
ASRC Energy Services
CONTRACTOR JOB# E09023

**Figure 2-1**
**Spy Island Drillsite**
**Nikaitchuq North**

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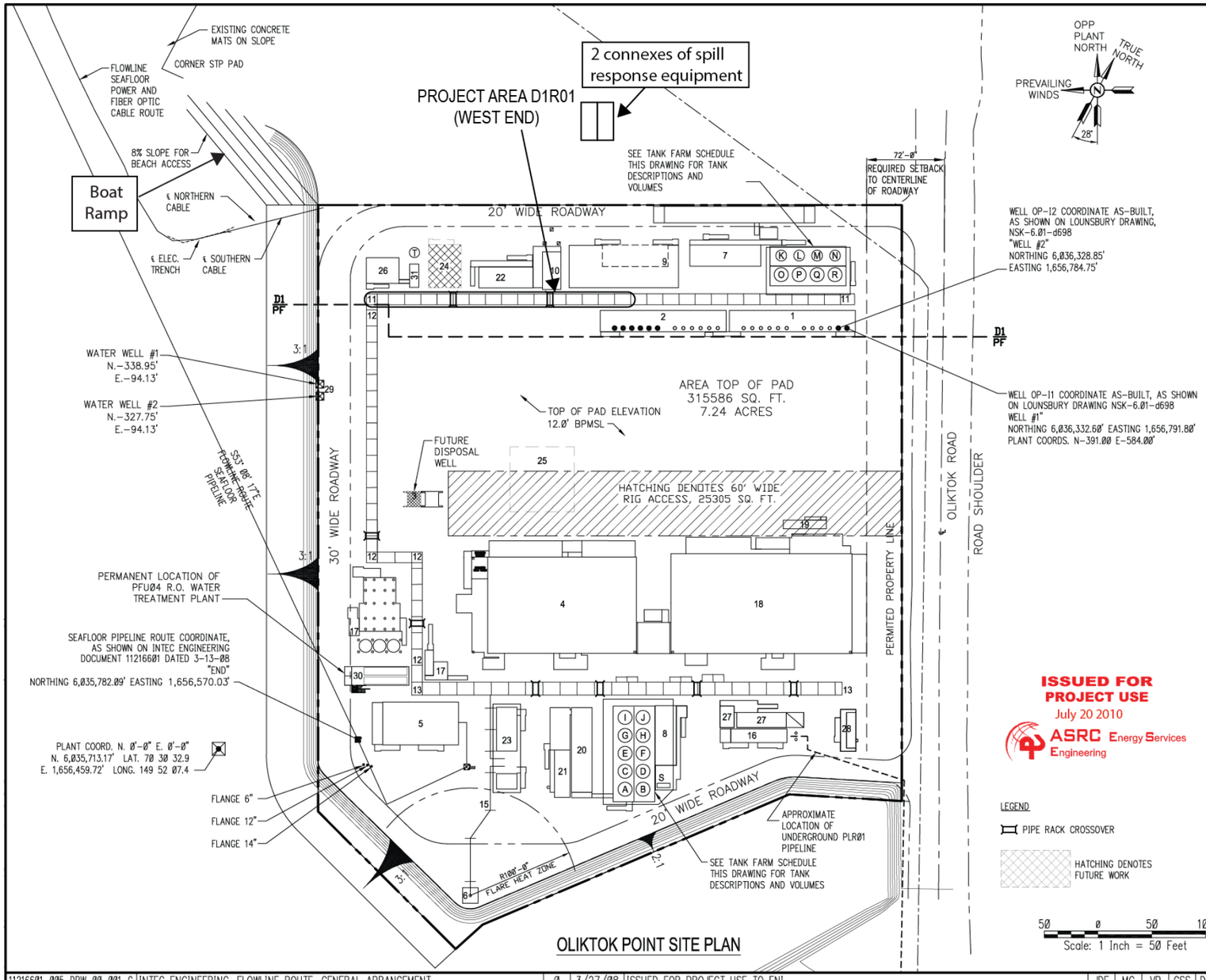



## OLIKTOK POINT SITE PLAN

OPP - MODULE, PLATFORM & MAJOR EQUIPMENT TABLE

| ITEM# | DESIGNATION | DIMENSIONS | BPMSL ELEV | MOD# |
|---|---|---|---|---|
| 1 | WCS SHELTER (PRODUCTION & INJECTION) | 20'W x 117'L x 14'H | 27'-6" | D1W01 |
| 2 | WCS SHELTER (PRODUCTION, INJECTION & SOURCE WATER) | 20'W x 117'L x 14'H | 27'-6" | D1W02 |
| 3 | DISPOSAL WELL SHELTER | 12'W x 14'L x 14'H (2) | 26'-10" | PFW01 |
| 4 | PRODUCTION FACILITY MODULE | 91'-10"W x 152'-7"L x 55'H | 79'-0" | PFP01 |
| 5 | PIG LAUNCHER / RECEIVER MODULE | 40'W x 70'L x 14'H | 33'-4" | PFP02 |
| 6 | FLARE STACK | 17'W x 17'L x 45'H STACK | 15'-4" | PFU03 |
| 7 | CHEMICAL / DIESEL TANK FARM & PUMP MODULE | 20'W x66'L & 37'W x 70'L | 33'-4" | D1U01 |
| 8 | SLOP / DIVERT TANK FARM & PUMP MODULE | 20'W x 80'L & 38'W x 90'L | 33'-4" | PFU02 |
| 9 | ELECTRICAL CONTROL MODULE / TRANSFORMER PLATFORMS | 20'W x 60'L x 14'H | 33'-4" | D1E01 |
| 10 | COMMUNICATIONS TOWER & SHELTER | 10'W x 25'L x 14'H | 33'-4" | D1E04 |
| 11 | PIPE RACK | 10'W x 454'L | 26'-2" | D1R01 |
| 12 | PIPE RACK | 10'W x 387'L | 26'-2" | PFR01 |
| 13 | PIPE RACK | 12'W x 410'L | 41'-6" | PFR02 |
| 14 | PIPE RACK | 5'W x 130'L | | PFR03 |
| 15 | PIPE RACK (FLARE) | 10'W x 160'L | 33'-4" | PFR04 |
| 16 | PIPELINE PIG LAUNCHER MODULE | 12'W x 62'L x 14'H | 33'-4" | PFP05 |
| 17 | GRIND & INJECT MODULE | 40'W x 60'L x 14'H | 46'-6" | PFP03 |
| 18 | UTILITY FACILITY MODULE | 91'-10"W x 167'-5"L x 55'H | 79'-0" | PFU01 |
| 19 | ALYESKA PROVER TRAILER (PORTABLE) | 8'W x 40'L | | TBD |
| 20 | ELECTRICAL MODULE | 20'W x 90'L x 14'H | 33'-4" | PFE01 |
| 21 | STANDBY GENERATOR MODULE | 20'W x 44'L x 14'H | 33'-4" | PFE02 |
| 22 | ESD / METERING MODULE | 20'W x 60'L x 14'H | 33'-4" | D1P01 |
| 23 | FLARE KNOCK OUT DRUM MODULE | 19'-9"W x 75'-11"L x 14'H | 32'-6" | PFU06 |
| 24 | FUTURE INJEC. WATER BOOSTER PUMP MODULE (IF NEEDED) | 30'W x 40' L x 14'H | 33'-4" | D1P02 |
| 25 | FUTURE WATER KNOCK OUT MODULE (IF NEEDED) | 60'W x 60' L x 14'H | 33'-4" | PFP08 |
| 26 | PAD MOUNT STEP UP TRANSFORMER (SUB-SEA CABLE) | 24'W x 30'L | 21'-0" | D1E02 |
| 27 | FUEL GAS CONDITIONING MODULE | 20'W x 60'L x 14'H | 33'-4" | PFU07 |
| 28 | PROCESS HEATER | 14'W x 40'L x 14'H | 33'-4" | PFU08 |
| 29 | WATER WELLS #1 & #2 | | | |
| 30 | PFU04 WATER TREATMENT PLANT (R. O. UNIT) | 17'W x 60'L x 21'H | 40'-0" | |
| 31 | D1U02 LIQUID NITROGEN SKID | 8'W x 21'L | 21'-0" | |

NOTES:
1. COORDINATES SHOWN ARE ALASKA STATE PLANE, OPUS ZONE 4 NAD 83.
2. ELEVATIONS SHOWN ARE BP MEAN SEA LEVEL (BPMSL) UNLESS NOTED OTHERWISE.
3. ELEVATIONS LISTED IN THE MODULE/PLATFORM TABLE ARE THE ACTUAL BPMSL ELEVATIONS AT THE TOP OF STRUCTURE UNLESS NOTED OTHERWISE.
4. ALL DRILLING STORAGE/ SUPPLIES TO BE LOCATED SOUTH OF OLIKTOK POINT PAD.

OPP - ENI TANK FARM SCHEDULE

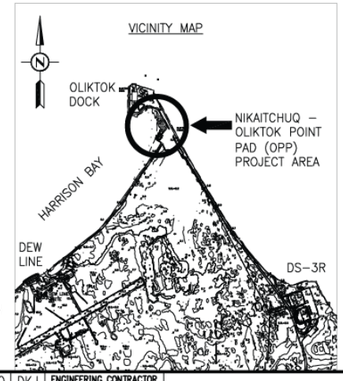
| TANK# | SERVICE | VOLUME | DIMENSIONS |
|---|---|---|---|
| A | SLOP OIL T-17050 | 750 bbl | 12' DIA. x 38' TALL |
| B | SLOP OIL T-17150 | 750 bbl | 12' DIA. x 38' TALL |
| C | SLOP OIL T-17040 | 750 bbl | 12' DIA. x 38' TALL |
| D | SLOP OIL T-17140 | 750 bbl | 12' DIA. x 38' TALL |
| E | SLOP OIL T-17030 | 750 bbl | 12' DIA. x 38' TALL |
| F | SLOP OIL T-17130 | 750 bbl | 12' DIA. x 38' TALL |
| G | SLOP OIL T-17020 | 750 bbl | 12' DIA. x 38' TALL |
| H | SLOP OIL T-17120 | 750 bbl | 12' DIA. x 38' TALL |
| I | SLOP OIL T-17010 | 750 bbl | 12' DIA. x 38' TALL |
| J | SLOP OIL T-17110 | 750 bbl | 12' DIA. x 38' TALL |
| K | BASE OIL T-21010 | 400 bbl | 10' DIA x 30' TALL |
| L | SCALE INHIBITOR T-19310 | 200 bbl | 10' DIA x 14' TALL |
| M | EMULSION BREAKER T-19410 | 200 bbl | 10' DIA x 14' TALL |
| N | ANTI-FOAM T-19510 | 200 bbl | 10' DIA x 14' TALL |
| O | DIESEL T-53030 | 600 bbl | 12' DIA x 30' TALL |
| P | DIESEL T-53020 | 600 bbl | 12' DIA x 30' TALL |
| Q | DIESEL T-53010 | 600 bbl | 12' DIA x 30' TALL |
| R | CORROSION INHIBITOR T-19210 | 600 bbl | 12' DIA x 30' TALL |
| S | CONDENSATE T-17160 | 29 bbl | 4' DIA x 12' LONG |
| T | LIQUID NITROGEN TANK V-52300 | 9000 gal | 9'-6"DIA x 29' TALL |

**ISSUED FOR PROJECT USE**
July 20 2010
ASRC Energy Services Engineering

LEGEND
- PIPE RACK CROSSOVER
- HATCHING DENOTES FUTURE WORK

5Ø ø 5Ø 1ØØ
Scale: 1 Inch = 5Ø Feet

VICINITY MAP

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| DWG.No. | TITLE | No. | DATE | DESCRIPTION | DWN. | CHK'D | D. ENG | P. ENG | P. MGR | CLIENT |
|---|---|---|---|---|---|---|---|---|---|---|
| REFERENCE DRAWINGS | | ISSUES / REVISIONS | | | ENGINEERING APPROVALS | | | | | |
| 11216601-005-DRW-00-001-C | INTEC ENGINEERING, FLOWLINE ROUTE, GENERAL ARRANGEMENT | Ø | 3/27/08 | ISSUED FOR PROJECT USE TO ENI | JDF | MC | VP | CSS | DKO | DKJ |
| | | 1 | 7/9/08 | RE-ISSUED FOR PROJECT USE TO ENI | JDF | MC | SR | CSS | DKO | DKJ |
| | | 2 | 10/07/08 | RE-ISSUED FOR PROJECT USE TO ENI | JDF | MC | SR | CSS | DKO | DKJ |
| | | 3 | 9/09 | RE-ISSUED FOR PROJECT USE TO ENI | JDF | MC | SR | CSS | DKO | DKJ |
| | | 4 | 12/09 | RE-ISSUED FOR PROJECT USE TO ENI | PCL | MC | SR | CSS | DKO | DKJ |
| | | 5 | 7/10 | RE-ISSUED FOR PROJECT USE TO ENI | MC | RJM | SR | CSS | DKO | DKJ |

ENGINEERING CONTRACTOR
ASRC Energy Services
CONTRACTOR JOB# E07037

**Figure 2-2**
**Oliktok Production Pad**
**Nikaitchuq North**

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### 2.1.3 ONSHORE SUPPORT FACILITIES

The existing OPP is located at Oliktok Point on an approximate ten-acre gravel pad. The OPP includes the following wells:

- 11 production wells (9 dual-laterals)
- 8 injection wells
- 3 water source wells
- 1 Class I disposal well/WIF

The OPP facility processes three-phase fluids that flow from wells at SID and OPP. OPP layout is shown in Figure 2-2. The fluids pass from the wells through a fluid separation system and dehydrator. Processed oil is then metered and transported via the COTP to the Kuparuk pipeline. The processing plant is capable of treating 40,000 bpd of crude oil and 120,000 bpd of water.

OPP includes a staging area for freight to be transported to SID, a dock for the SID barge and tug, heated tents and work areas, logistics tools, a tent for hovercraft storage, and a lighted wind sock.

The existing NOC is a seven-acre onshore gravel pad located south of OPP. The NOC includes lodging for 206 individuals, two warehouses, and logistics facilities. Logistics support includes a logistics office, a lighted helipad, a helicopter hanger, Jet A fuel available onsite, and an automated weather observation system. The medical clinic is an acute minor illness/injury clinic staffed full time by a physician's assistant with ACLS capabilities and Occupational Safety and Health Administration occupational health testing and monitoring. An ambulance is maintained in a heated staging area. An additional six-acre laydown area is available at a gravel pad owned by the U.S. Air Force next to OPP.

### 2.1.4 NIKAITCHUQ DEVELOPMENT ACTIVITIES AT SID

Following construction activities, Nikaitchuq began producing oil in early 2011. Production from SID began in November 2011. Drilling at SID occurred between 2011 and 2015, with a total of 18 production wells (with 9 dual-laterals), 13 injection wells, and the WIF. An average of 8 wells were drilled per year, requiring approximately 20,000 barrels per year (bbl/year) of water-based mud (WBM), 56,000 bbl/year of mineral oil-based mud (MOBM) and 150,000 feet of pipe annually. An average of 110 to 115 personnel were located at SID to support the drilling activities.

Drilling activity ceased in 2016, with no wells drilled. As a result, SID personnel were reduced to an average of 30 people on the island at any one time to support existing production. The drill rig was cold-stacked pending authorization of additional drilling activities.

### 2.1.5 SUPPORT ACTIVITIES

Activities to support the drilling, production, and operations are presented below.

Transportation of Freight

Equipment and materials are generally transported via the road system to Nikaitchuq. Shipment of large equipment and significant resupply of materials between OPP and SID occurs either during the open water season via barge or during the winter season using the ice road. A 200-ton shallow draft (3 feet) tug and barge is used to transport heavy freight between OPP and SID during the open water season (typically available from July through early October). Freight transportation to SID via barge (open water season) or wheeled vehicles on the ice road (winter season) are shown in Table 2-1.

**Table 2-1 Transportation between OPP and SID**

| | WINTER | | | | | SPRING | | SUMMER | | | FALL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Transportation Method** | **NOV** | **DEC** | **JAN** | **FEB** | **MAR** | **APR** | **MAY** | **JUN** | **JUL** | **AUG** | **SEP** | **OCT** |
| Hovercraft | ■ | ■ | ■ | | | | ■ | ■ | | | | ■ |
| Crew Boats | | | | | | | | | ■ | ■ | ■ | |
| Barge | | | | | | | | | ■ | ■ | ■ | ■ |
| Ice Road | | | | ■ | ■ | ■ | ■ | | | | | |

Note:
■ = typical use season

During most winters, an ice road between OPP and SID is constructed to provide highway vehicle access. An ice road is typically available beginning from early to mid-February to mid-April. The ice road season varies from year to year and is dependent on field conditions, weather and other factors. The driving surface of the ice road is typically 4.25 miles long and 60 feet wide. The ice road is approximately 72 inches (6 feet) thick on floating ice, with a capacity of 250,000 pounds. The ice road is used for crew changes and material transports when available during the winter.

Typical ice road construction is used for the OPP to SID ice road. The ice road is surveyed and delineators placed along the planned route; holes are drilled along the proposed ice road path and suction pumps installed to pump sea ice on top of the ice to thicken the road surface; ice chips are used to repair cracks and to strengthen ice ramps and areas prone to cracking; and the ice road is capped with fresh water. The ice road is maintained throughout the ice road season.

Transportation of Personnel

Typically, personnel travel from areas in Alaska and the Lower-48 states via commercial aircraft to the Prudhoe Bay/Deadhorse airport, then by ground transportation (bus or truck) to OPP on existing gravel roads. Personnel travel to SID by crew boats (open water season), hovercraft (shoulder season), or wheeled vehicles on an ice road (winter season). The typical transportation methods and season are shown in Table 2-1.

A 24-passenger boat with 5,000 pounds of freight capacity is available to provide crew changes and light freight support during the summer open water season. The crew change boat uses the Oliktok Point public dock and typically provides trips twice a day.

A 42-person capacity hovercraft is used during the shoulder season (October through January and May through June) for crew changes. The hovercraft has a 5.7 metric ton freight capacity to transport small loads. The hovercraft has a twin engine design (lift and thrust) and can work in a maximum operational wind speed of 30 knots (40 knot gusts) and a minimum operational temperature of -37 degrees Celsius (°C).

Table 2-2 presents the transportation support between 2012 and 2016.

**Table 2-2 Logistics and Transportation Support (2012 – 2016)**

| | HOVERCRAFT (TRIPS) [a] | CREW BOAT (TRIPS) [a] | BUS/VAN (TRIPS) [a] | BARGE (TRIPS) [a] |
|---|---|---|---|---|
| 2012 | 1,094 (estimated) | 1,215 | -- | 658 |
| 2013 | 1,162 | 1,286 | 1,549 [b] | 672 |
| 2014 | 1,364 | 1,459 | 1,464 [b] | 765 |
| 2015 | 1,610 | 1,280 | 1,500 [b] | 508 |
| 2016 | 855 | 614 | 1,481 [c] | 8 |

Notes:
a = All trips are one-way
b = Busses with a capacity of 28 passengers were used from 2012 through 2015.
c = Vans with a capacity of 10 passengers were used during 2016; use of vans instead of buses resulted in approximately 17 additional trips per year.

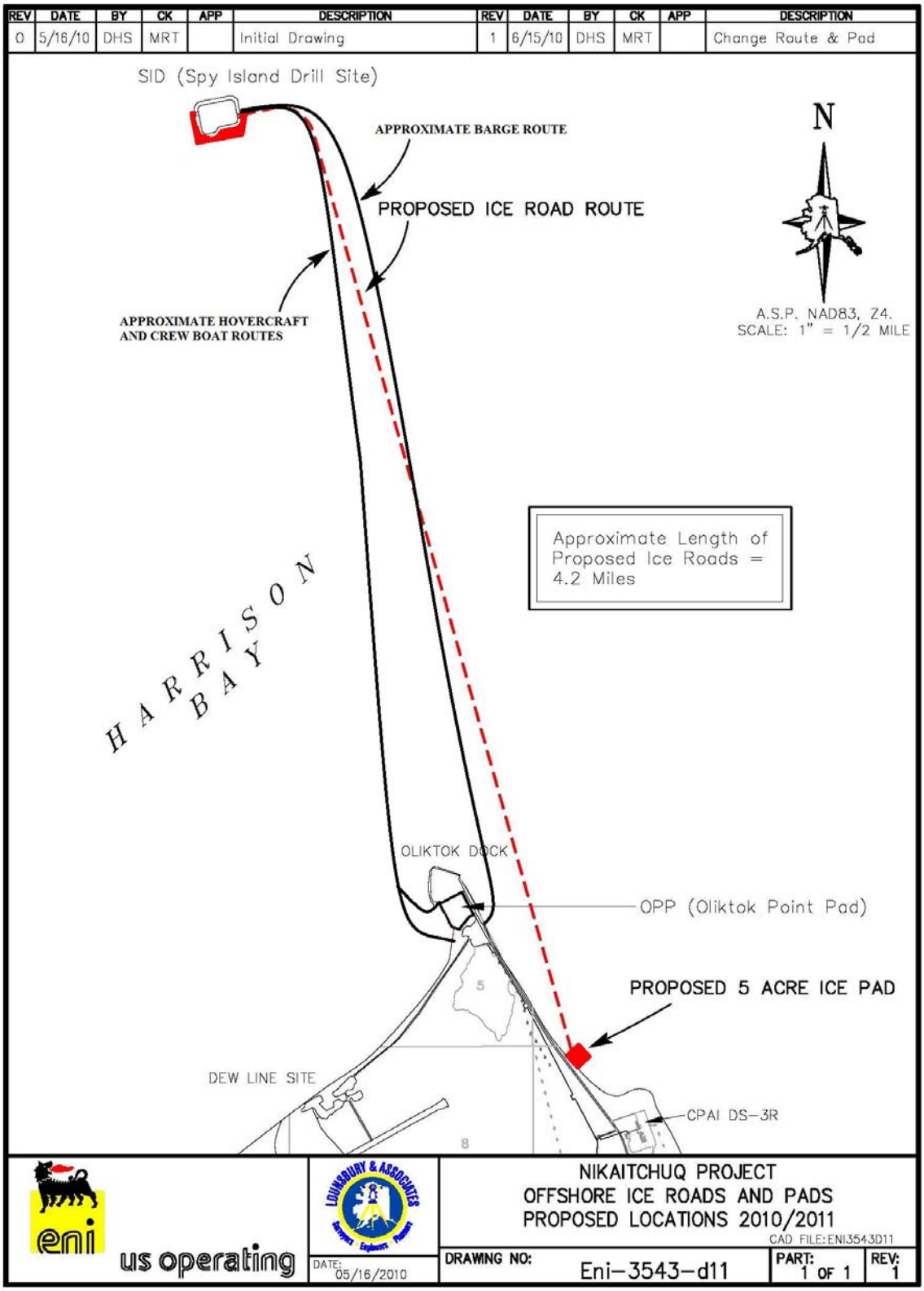
Marine Transportation Routes

Marine vessel transportation (hovercraft, crew boat, and barge) between OPP and SID is required to support Nikaitchuq drilling activities in State of Alaska waters. Construction of the island and associated drilling activities in State of Alaska waters were evaluated by USACE in 2006 in their Permit Evaluation and Decision Document. As part of the permit evaluation and decision process for island construction and drilling, USACE consulted with NMFS under the ESA. As a result of this consultation, mitigation incorporated into the project included use of regular routes and narrow corridors for vessel traffic to reduce the affected area, as shown in Figure 2-3. The water depth between OPP and SID is typically 6 to 8 feet deep.

Emergency Support

Eni does not currently maintain a helicopter to support their activities at SID. In the event of an emergency requiring helicopter support, a helicopter will be obtained. A lighted helipad is located at NOC and a lighted helideck is located at SID. If necessary, an Arktos™ all-terrain machine is staged near the camp at SID and is available for emergency evacuation. The Arktos™ has a 52-person capacity and is operable in all seasons and in most weather conditions. It can handle 34 degrees of slope and is able to maneuver through ice rubble fields and ice/water interface zones.

**Figure 2-3 Vessel Corridor Routes**



Screeding

Annual maintenance screeding is performed at the beginning of open water season (generally July) to maintain sufficient draft at barge landing. Annual screeding relocates sediment from the approaches of the east barge landings at OPP and SID. The screeded sediment is not removed from the water, but is relocated from the immediate areas of the barge landings.

## 2.2 PROPOSED ACTION

Eni proposes drilling up to four exploratory wellbores (two mainbores and two sidetracks). The proposed exploration wells will begin from the surface of SID and extend subsurface of the ocean floor, ending in federal leases on the Outer Continental Shelf (OCS) of Alaska – Harrison Bay Block 6423 Unit (Leases OCS-Y-1753, OCS-Y-1754, and OCS-Y-1757).

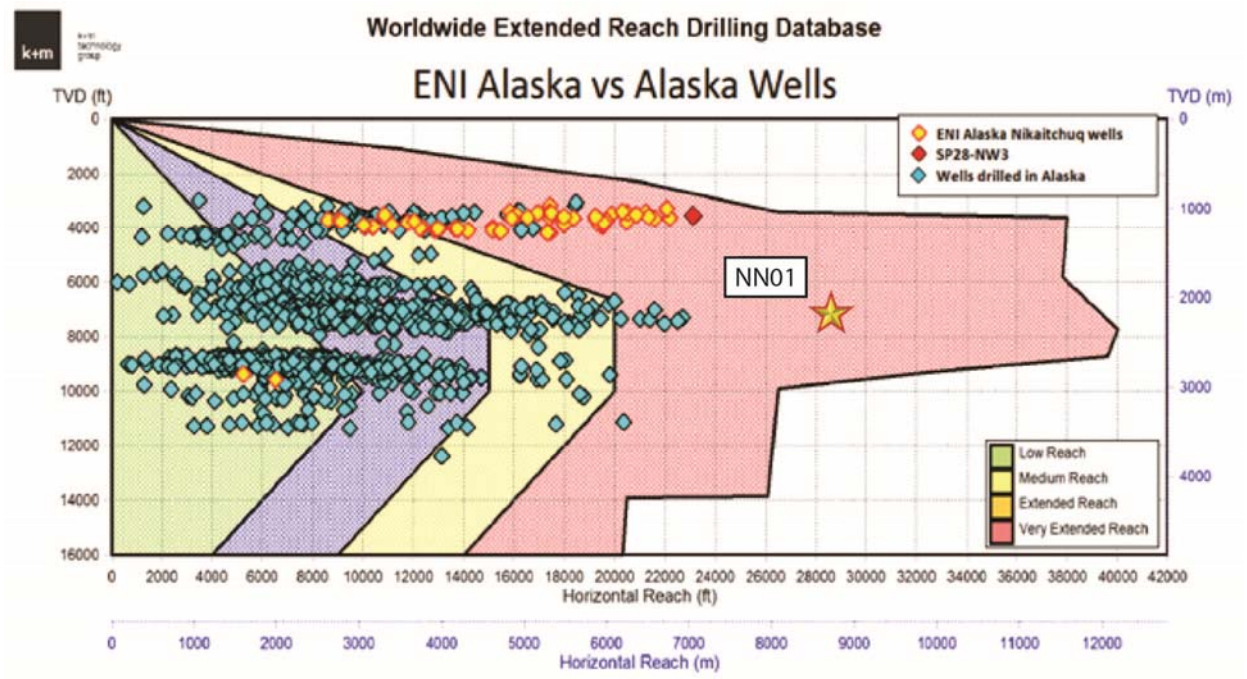
Eni has named this project the Nikaitchuq North Exploration Drilling Project. The exploration wells will reach approximately 5.4 miles northwest as shown in Figure 1-2. Additional details of the proposed exploration drilling project are provided below, with a comprehensive description provided in the EP.

### 2.2.1 DRILLING

Drilling will take place on SID from the existing well row. Two strings of conductor pipe and a wellhouse will be required for the Nikaitchuq North exploration drilling. Exploration wells are expected to be approximately 34,000 feet measured depth and approximately 8,000 feet true vertical depth.

Eni has an extensive history of successful drilling in the vicinity of the proposed project, including over 70 wellbores, sidetracks, plugbacks, and laterals totaling more than 1.1 million feet drilled. The longest well drilled as part of the Nikaitchuq Development Project was approximately 25,000 feet measured depth and the longest horizontal reach was 23,000 feet. Eni has drilled wells with an ERD ratio of up to 6.69, which is currently the highest in Alaska. A comparison of the proposed Nikaitchuq North well NN01 to other ERD wells drilled by Eni is shown in Figure 2-4.

**Figure 2-4 Nikaitchuq North Exploration Well Compared to other Eni ERD Wells**



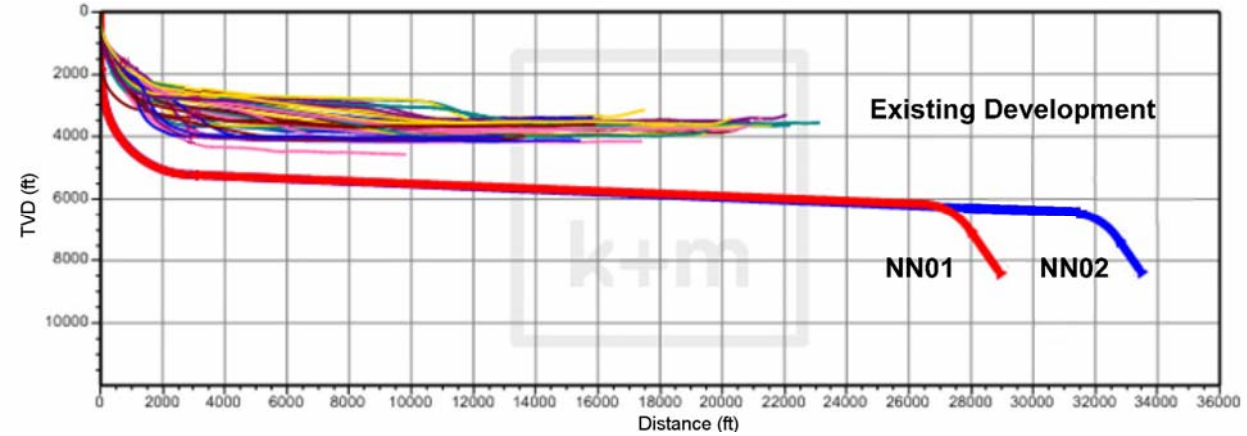

Eni proposes to drill up to four exploration wells, two mainbores and two sidetracks, as part of the Nikaitchuq North Exploration Drilling Project.

Nikaitchuq North exploration well NN01 includes an S-shape wellbore into the targeted reservoir (Figure 2-5). Upon completion of drilling, the well will be logged. Based on the results of the well logs a flow test may be performed. The NN01 main bore will be plugged and abandoned (P&A). If a lateral flow test is required, a lateral sidetrack (second well) will be drilled and completed, and a flow test conducted. Following the flow, the well will be suspended.

Drilling of Nikaitchuq North exploration well NN02 is similar to NN01. NN02 includes an S-shape wellbore into the targeted reservoir (Figure 2-5). Upon completion of drilling, the well will be logged. Based on the results of the well logs a flow test may be performed. The NN02 main bore will be P&A. If a lateral flow test is required, a lateral sidetrack (second well) will be drilled and completed, and a flow test conducted. Following the flow test, the well will be suspended.

Flow tests will include flowback to SID through existing surface test equipment. Flowback fluids will be separated into drilling muds, which will be disposed of at SID's WIF; gas will be flared; and crude will be placed into SID's production line. The amount of crude oil obtained as part of the flowback test is expected to be nominal.

**Figure 2-5 Nikaitchuq North Well Trajectories from Spy Island**




The Nikaitchuq North Exploration Drilling Project would require approximately 9,000 bbl of WBM, 29,000 bbl of MOBM and 68,000 feet of pipe.

Schedule

The Nikaitchuq North Exploration Drilling Project is proposed to begin in December 2017 and continue into 2019. Activities will begin with transportation of equipment and materials to SID between July and October 2017. Drilling will be conducted during the 2017-2018 and 2018-2019 winter seasons as shown in the schedule provided in Table 2-3.

**Table 2-3 Nikaitchuq North Exploration Drilling Project Schedule**

| ACTIVITY | START DATE | END DATE | NUMBER OF DAYS |
|---|---|---|---|
| Drill well: NN01 | 12/10/2017 | 2/13/2018 | 65 |
| NN01 Flow Test | 2/13/2018 | 3/10/2018 | 25 |
| NN01 P&A | 3/10/2018 | 3/25/2018 | 15 |
| Drill NN01 Sidetrack to Lateral & Complete | 3/25/2018 | 4/14/2018 | 20 |
| Perform Flow Test and Suspend NN01 | 4/14/2018 | 5/14/2018 | 30 |

| ACTIVITY | START DATE | END DATE | NUMBER OF DAYS |
|---|---|---|---|
| Drill well: NN02 | 12/1/2018 | 2/14/2019 | 75 |
| NN02 Flow Test | 2/14/2019 | 3/11/2019 | 25 |
| NN02 P&A | 3/11/2019 | 3/26/2019 | 15 |
| Drill NN02 Sidetrack to Lateral & Complete | 3/26/2019 | 4/21/2019 | 26 |
| Perform Flow Test and Suspend NN02 | 4/21/2019 | 5/23/2019 | 32 |

### 2.2.2 ADDITIONAL FACILITIES/ON-ISLAND ACTIVITIES

In general, no improvements will be required for SID's on-island facilities. A drill rig with ERD ability will be required for the Nikaitchuq North Exploration Drilling Project. Doyon Rig No. 15, which was used for Nikaitchuq North development activities, is currently located at SID, and will be used. Some updates to the rig will be required, including adding two additional generators (CAT Model 3516 or similar), upgrading piping, and installing a shaker. The blowout preventer (BOP) will be changed out to a 18¾-inch stake relative to the 12⅝-inch currently in use to adjust for the new casing size.

Proposed Nikaitchuq North activities would require 110 to 115 personnel at SID to support the drilling activities.

### 2.2.3 TRANSPORTATION OF EQUIPMENT AND MATERIALS

Transportation will align with the current practice. Equipment and materials will be transported predominately on the existing gravel road system to Oliktok Point for Nikaitchuq operations. Drill pipe will most likely be transported via rail to Fairbanks, then via truck to OPP. From OPP materials will be transported to SID via barge and/or ice road, depending on the season. Most materials, including pipe, are expected to be mobilized to SID during summer 2017; however, additional materials can be transported via barge during the 2018 open water season or via the ice road when it is open. Demobilization of equipment and materials is not anticipated for the Nikaitchuq North Exploration Drilling Project.

Logistics and transportation support activities at SID, including for the Nikaitchuq North Exploration Drilling Project is provided in Table 2-4. Although some equipment and materials may be transported to SID during the 2018 open water season, the amount will not be sufficient to require additional hovercraft or barge trips. Marine transportation will use the existing marine transportation routes identified in Section 2.1.4.

**Table 2-4 SID Logistics and Transportation Support, including the Nikaitchuq North Exploration Drilling Project (2017 – 2019)**

| | HOVERCRAFT (TRIPS) [a, b] | CREW BOAT (TRIPS) [a, b] | BUS/VAN (TRIPS) [a c] | BARGE (TRIPS) [a, b] |
|---|---|---|---|---|
| 2017 (estimated) | 1,163 | 614 | 1,500 | 152 |
| 2018 (estimated) | 1,163 | 1,378 | 1,500 | 108 |
| 2019 (estimated) | 862 | 614 | 1,500 | 8 |

Notes:
a = All trips are one-way.
b = Hovercraft, crew boat, and barge trips support all activities on SID, including ongoing operations and production.
c = Bus/van trips support activities at OPP, NOC, and SID. Typically two round trips between OPP and Deadhorse are scheduled daily to align with twice daily commercial airline flights to/from Deadhorse.

## 2.3 NO ACTION ALTERNATIVE

If the Nikaitchuq North Exploration Drilling Project is not approved, Eni proposes to drill additional wells and sidetracks in 2018 as part of the ongoing Nikaitchuq Development Project. These activities will be in addition to ongoing operations and production activities at SID. If the Nikaitchuq North Exploration Drilling Project is approved, drilling of these wells will be delayed until a later date.

### 2.3.1 DRILLING

Three new wells (one producer and two injectors) will be drilled into State of Alaska waters. An additional eight sidetracks are proposed from existing wells. Because the reservoir targeted is the Schrader Bluff formation, which does not have the ability to flow to surface without using artificial lift (ADEC 2016a), no seasonal drilling restrictions are expected to apply. Therefore, drilling into this zone will take place year-round.

It is expected that drilling will begin in January 2018 and continue through March 2019. These activities would require approximately 7,500 bbl/year of WBM, 21,000 bbl/year of MOBM, and 54,000 feet of pipe annually; 110 to 115 personnel will be located at SID to support these drilling activities.

Schedule

The No Action Alternative would take place in 2017 through 2019. Activities will begin with transportation of equipment and materials to SID in 2017, and drilling will commence in January 2018, continuing through March 2019.

The No Action Alternative schedule is provided in Table 2-5.

**Table 2-5 No Action Alternative Schedule**

| ACTIVITY | TIMEFRAME |
|---|---|
| Mobilize equipment and materials (via barge) | July – October 2017 |
| Drill wells and sidetracks | January 1, 2018 – March 31, 2019 |

### 2.3.2 ADDITIONAL FACILITIES/ON-ISLAND ACTIVITIES

No improvements will be required for SID's on-island facilities. The Doyon Rig No. 15, which was used for Nikaitchuq development activities and is currently located at SID, will be used. No updates to the rig will be required.

### 2.3.3 TRANSPORTATION OF EQUIPMENT AND MATERIALS

Logistics and transportation support activities proposed under the No Action Alternative are provided in Table 2-6. Marine transportation will use the existing marine transportation routes identified in Section 2.1.4.

**Table 2-6 SID Logistics and Transportation Support Including the No Action Alternative (2017 – 2019)**

| | HOVERCRAFT (TRIPS) [a, b] | CREW BOAT (TRIPS) [a, b] | BUS/VAN (TRIPS) [a, c] | BARGE (TRIPS) [a, b] |
|---|---|---|---|---|
| 2017 (estimated) | 1,034 | 614 | 1,500 | 8 |
| 2018 (estimated) | 1,120 | 1,378 | 1,500 | 432 |
| 2019 (estimated) | 1,034 | 614 | 1,500 | 8 |

Notes
a = All trips are one-way.
b = Hovercraft, crew boat, and barge trips support all activities on SID, including ongoing operations and production.
c = Bus/van trips support activities at OPP, NOC, and SID. Typically two round trips between OPP and Deadhorse are scheduled daily to align with twice daily commercial airline flights to/from Deadhorse.

## 2.4 COMPARISON BETWEEN NIKAITCHUQ NORTH AND NO ACTION ALTERNATIVES

A comparison between the Nikaitchuq North Exploration Drilling Project and the No Action Alternative is provided in Table 2-7.

**Table 2-7 Comparison between Nikaitchuq North Exploration Drilling Project and the No Action Alternative**

| | NIKAITCHUQ NORTH | NO-ACTION ALTERNATIVE | DIFFERENCE BETWEEN NIKAITCHUQ NORTH AND NO-ACTION ALTERNATIVE |
|---|---|---|---|
| Wells | Up to 4 wells in OCS waters | 3 wells into State of Alaska waters<br>8 additional sidetracks from existing wells | Reduced level of effort for Nikaitchuq North over the No Action Alternative. |
| Drilling & Flow Test Schedule | 12/10/17 – 5/14/18<br>12/1/18 – 5/23/19 | 1/1/18 – 3/31/19 | Nikaitchuq North has winter-only drilling and flow tests over two years.<br><br>The No Action Alternative .has year-round drilling over the course of 15 months starting winter 2018 and completing winter 2019. |
| Personnel at SID | 110-115 [a] | 110-115 [a] | Same level of activity for both alternatives. |
| Waste Disposal | WIF Class I Disposal Well | WIF Class I Disposal Well | Same activities for both alternatives. |
| Dredging | Annual maintenance dredging at SID | Annual maintenance dredging at SID | Same activities for both alternatives. |
| Ice Road | Construct ice road between OPP and SID; ice pads at SID | Construct ice road between OPP and SID; ice pads at SID | Same activities for both alternatives. |
| Drill Rig | Doyon Rig No. 15 [b] | Doyon Rig No. 15 | Similar equipment for both alternatives |
| Drilling Fluids | 9,000 bbl WBM<br>29,000 bbl MOBM [c] | 7,500 bbl WBM<br>21,000 bbl MOBM [d] | Nikaitchuq North requires more mud than the No Action Alternative. |
| Pipe Required | 68,000 feet | 54,000 feet [e] | Nikaitchuq North requires more pipe than the No Action Alternative. |

Notes:

a = Between 110 and 115 personnel are staffed at SID during active drilling. Additional personnel are required for activities such as well completions.

b = The Doyon Rig No. 15 will be updated with two additional generators, upgraded piping, and a shaker for the Nikaitchuq North Exploration Drilling Project.

c = Well spud and 22-inch surface sections will be drilled with water-based mud (WBM) formulation. Deeper sections will be drilled with a mineral oil-based mud (MOBM). The MOBM formulation includes emulsifiers, filtration controllers, wetting agents, and other elements normally utilized to maintain optimal rheological properties.

d = Production well drilling uses approximately 2,500 bbl WBM and 7,000 bbl MOBM per well, for a total of approximately 20,000 bbl WBM and 56,000 bbl MOBM per year based upon 8 wells drilled per year.

e = Production well drilling uses approximately 18,000 feet of drill pipe per well, for a total of approximately 150,000 feet per year based on eight wells drilled per year.

Logistics and Transportation Support

A comparison between the logistic and transportation support for the proposed Nikaitchuq North Exploration Drilling Project and No Action Alternative is provided in Table 2-8.

**Table 2-8 Comparison between the Nikaitchuq North Exploration Drilling Project and No Action Alternative Logistics and Transportation Requirements**

| | NIKAITCHUQ NORTH | NO ACTION ALTERNATIVE | DIFFERENCE BETWEEN NIKAITCHUQ NORTH AND NO ACTION ALTERNATIVE |
|---|---|---|---|
| Hovercraft (trips) [a, b] | 1,163 (2017/2018)<br>862 (2019) | 1,034 (2017)<br>1,120 (2018)<br>1,034 (2019) | Same total number of trips for SID activities including the Nikaitchuq North and the No Action Alternative (3,188 trips for both alternatives over 3 years). |
| Crew Boat (trips) [a, b] | 614 (2017)<br>1,378 (2018)<br>614 (2019) | 614 (2017)<br>1,378 (2018)<br>614 (2019) | Same total number of trips for SID activities including the Nikaitchuq North and the No Action Alternative (2,606 trips for both alternatives over 3 years). |
| Bus/Van (trips) [a, c] | 1,500<br>(all 3 years) [d] | 1,500<br>(all 3 years) [e] | Same total number of trips for SID activities including the Nikaitchuq North and the No Action Alternative (4,500 trips for both alternatives over 3 years). |
| Barge (trips) [a, b] | 152 (2017)<br>108 (2018)<br>8 (2019) | 8 (2017)<br>432 (2018)<br>8 (2019) | Reduced barge trips for SID activities including the Nikaitchuq North over the SID activities including the No Action Alternative (268 trips vs. 448 trips over 3 years). |

Notes
a = All trips are one-way.
b = Hovercraft, crew boat, and barge trips support all activities on SID, including ongoing operations and production.
c = Bus/van trips support activities at OPP, NOC, and SID. Typically two round trips between OPP and Deadhorse are scheduled daily to align with twice daily commercial airline flights to/from Deadhorse.

# 3 AFFECTED ENVIRONMENT & ENVIRONMENTAL CONSEQUENCES

## 3.1 INTRODUCTION

This section describes potentially affected physical, biological, and social environments in the proposed project area and potential impacts to these environments associated with the Nikaitchuq North Exploration Drilling Project. Resource descriptions and potential impact analyses are based, in part, on information presented in various documents, including Kerr-McGee (2005), NOAA (2016a), BOEM (2012), and ADNR (2009).

## 3.2 CLIMATE AND METEOROLOGY

Climate and air quality were evaluated across a number of spatial scales for this project. Data were reviewed that represent the project level and the broader regional level. Meteorological data collected at specific geographic sites within the project vicinity are used to represent the climate and meteorology of the specific project area because no meteorological data have been collected at a location within the specific project area for the Nikaitchuq North Exploration Drilling Project. No ambient air data have been collected at a location within the specific project area. Therefore, ambient air data collected at Nuiqsut, Alaska, are used to represent the project location because of the proximity of the station to the Nikaitchuq North project area.

The Nikaitchuq North Exploration Drilling Project is physically located within the Arctic Climate Zone. This climatological zone is characterized by cold temperatures, low precipitation, consistent wind, and frequent winter storms (MMS 2007). Hourly surface meteorological data from the following sources are used to characterize the climate and meteorology of the region for the project.

- NOAA National Weather Service (NWS) Cooperative Observer Program stations located at Umiat and Kuparuk
- NOAA NWS Automated Surface Observing System station located at Utqiaġvik
- NOAA Automated Weather Observing System (AWOS) station located at the Nuiqsut airport

### 3.2.1 AIR TEMPERATURE

Air temperature data observed at the monitoring locations described above are included in Table 3-1. These data include the mean, maximum mean, minimum mean, and monthly extreme surface air temperatures recorded at the stations. As shown, below freezing temperatures (temperatures at or below 32°F or 0°C) were observed for most of the year, and these conditions are observed to occur during any calendar month. Two main seasons exist where the project area is located that are characterized by the following ambient surface temperatures:

- Summer: June through September – mean daily high temperatures above 32°F (0°C)

- Winter: October through May – mean daily high temperatures rarely exceeding 32°F (0°C)

During the winter period, the region, including the adjacent ocean, is primarily covered by snow and ice, which creates a more continental-like climate regime that is similar to adjacent land areas (MMS 2007, Overland 2009).

### 3.2.2 PRECIPITATION

Precipitation data recorded at the four monitoring locations at Umiat, Kuparuk, Utqiaġvik, and Nuiqsut are provided in Table 3-2. These data include average total precipitation, average total snowfall, and mean snow depth. Precipitation observations for Nuiqsut include the liquid equivalent of any frozen precipitation that fell in addition to rain. However, snowfall and snow depth are not recorded at the NWS Nuiqsut AWOS station. Total annual average precipitation for the region ranges from about 2.4 inches for Nuiqsut to approximately 5.2 inches for Umiat. More than three quarters of the total annual precipitation falls during the summer season (June through September). As shown in Table 3-2, snowfall can occur in the area of the project during any month. The greatest average snowfall occurs during October, which may account for approximately 20% to 25% of the annual average total snowfall.

### 3.2.3 WIND

The first full calendar year of wind data were collected at the NWS Nuiqsut AWOS station during 1999. For the 16-year period from 1999 through 2014, the average wind speed observed at Nuiqsut station was 4.6 meters per second (m/s) (10.3 miles per hour [mph]). Table 3-3 provides wind speed class frequencies and shows that the project area experiences wind speeds ranging from 3.6 m/s to 11.1 m/s (8.1 mph to 24.8 mph) for more than half the year.

Figure 3-1 shows an annual wind rose based on data collected at the NWS Nuiqsut AWOS station from 1999 through 2014. The wind rose shows that, on an annual basis, the predominant winds are comprised of onshore wind components from the east-northeast, northeast, and east, and offshore wind components from the south-southwest, southwest, and west-southwest.

Figure 3-2 and Figure 3-3 show wind roses for the winter and summer seasons, respectively, based on the NWS Nuiqsut AWOS station wind data from 1999 through 2014. Figure 3-2 shows that the winter season (October through May) is characterized by predominant onshore wind components from the northeast, east-northeast, and east, and offshore wind components from the south-southwest, southwest, and west-southwest. In contrast, the wind rose in Figure 3-3 shows that, during the summer season, a predominance of onshore winds exists from the east-northeast, northeast, and east, while the offshore wind components from the south-southwest, southwest, and west-southwest are much less significant. This unidirectional onshore wind component experienced in the project area during the summer is caused by a thermal gradient between the relatively warm land and cold sea during the summer months (MMS 2007).

**Table 3-1 Surface Air Temperatures at Alaska North Slope Monitoring Locations**

| Statistical Parameter | Period | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
| ***Umiat*[1,2]** | | | | | | | | | | | | | |
| Mean Daily Mean (°F) | -20.6 | -21.6 | -16.6 | -0.1 | 24.6 | 48.0 | 54.5 | 47.5 | 33.8 | 9.5 | -10.8 | -19.7 | 10.2 |
| Mean Daily Maximum (°F) | -12.6 | -12.8 | -6.5 | 11.5 | 33.4 | 58.7 | 66.7 | 57.9 | 41.8 | 17.6 | -2.7 | -11.4 | 19.4 |
| Mean Daily Minimum (°F) | -28.5 | -30.4 | -26.8 | -11.4 | 15.9 | 37.2 | 42.4 | 37.0 | 25.8 | 1.5 | -18.8 | -27.8 | 0.6 |
| Maximum (°F) | 37 | 37 | 40 | 51 | 73 | 88 | 92 | 90 | 75 | 52 | 43 | 37 | 92 |
| Minimum (°F) | -62 | -66 | -62 | -50 | -22 | 16 | 24 | 5 | 4 | -38 | -56 | -58 | -66 |
| ***Kuparuk*[1,2]** | | | | | | | | | | | | | |
| Mean Daily Mean (°F) | -17.6 | -17.7 | -15.3 | 1.1 | 22.5 | 39.7 | 46.0 | 41.9 | 32.3 | 16.1 | -2.1 | -11.3 | 11.4 |
| Mean Daily Maximum (°F) | -11.4 | -11.2 | -8.3 | 8.6 | 28.1 | 46.8 | 54.2 | 48.5 | 37.2 | 21.3 | 4.3 | -4.9 | 17.8 |
| Mean Daily Minimum (°F) | -23.9 | -24.2 | -22.4 | -6.4 | 16.9 | 32.6 | 37.8 | 35.4 | 27.4 | 11.0 | -8.5 | -17.6 | 5.0 |
| Maximum (°F) | 37 | 39 | 38 | 46 | 67 | 83 | 82 | 82 | 66 | 49 | 39 | 37 | 83 |
| Minimum (°F) | -55 | -58 | -53 | -37 | -21 | 0 | 0 | 0 | 0 | -29 | -44 | -47 | -58 |
| ***Utqiaġvik* [1,2]** | | | | | | | | | | | | | |
| Mean Daily Mean (°F) | -13.8 | -14.1 | -12.6 | 1.9 | 21.3 | 35.9 | 41.2 | 39.6 | 32.6 | 18.8 | 1.4 | -7.7 | 12.0 |
| Mean Daily Maximum (°F) | -7.6 | -8.0 | -6.1 | 8.6 | 25.9 | 40.7 | 47.4 | 44.4 | 36.2 | 23.0 | 7.2 | -1.6 | 17.5 |
| Mean Daily Minimum (°F) | -19.8 | -20.2 | -19.2 | -4.9 | 16.7 | 31.0 | 35.1 | 34.7 | 29.0 | 14.3 | -4.3 | -13.7 | 6.5 |
| Maximum (°F) | 33 | 35 | 34 | 39 | 47 | 72 | 79 | 74 | 62 | 41 | 35 | 32 | 79 |
| Minimum (°F) | -50 | -55 | -46 | -38 | -19 | 12 | 25 | 21 | 3 | -25 | -38 | -49 | -55 |
| ***Nuiqsut*[1,3]** | | | | | | | | | | | | | |
| Mean (°F) | -16.5 | -15.6 | -16.6 | 1.6 | 22.4 | 42.3 | 49.1 | 45.2 | 35.4 | 19.1 | 0.6 | -9.3 | 13.3 |
| Maximum Mean (°F) | -10.3 | -9.2 | -9.8 | 8.9 | 27.5 | 49.8 | 57.2 | 51.9 | 40.4 | 24.0 | 7.3 | -2.8 | 19.8 |
| Minimum Mean (°F) | -23.2 | -22.1 | -23.7 | -5.6 | 17.4 | 35.1 | 41.1 | 38.8 | 30.7 | 14.3 | -6.1 | -15.8 | 6.9 |
| Maximum (°F) | 34 | 34 | 27 | 43 | 66 | 80 | 84 | 84 | 66 | 48 | 36 | 35 | 84 |
| Minimum (°F) | -56 | -56 | -53 | -38 | -22 | 23 | 28 | 26 | 6 | -20 | -43 | -50 | -56 |

[1] Period of record: Umiat (1976 through 2000); Kuparuk (1983 through 2013); Utqiaġvik (1983 through 2013); Nuiqsut (1998 through 2014).
[2] NOAA NWS (NOAA 2015a) Umiat, Kuparuk, and Barrow data obtained from Western Region Climate Center, 2015, Web. 16 February 2015. http://www.wrcc.dri.edu/summary/Climsmak.html.
[3] NOAA NWS (NOAA 2015b) Nuiqsut data obtained from NOAA National Climatic Data Center, 2015, Web. 16 February 2015. http://www.ncdc.noaa.gov/cdo-web/datasets.

**Table 3-2 Precipitation and Snowfall Totals at Alaska North Slope Monitoring Locations**

| Statistical Parameter | Period | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
| ***Umiat***[1,2] | | | | | | | | | | | | | |
| Ave. Total Precip. (in) | 0.37 | 0.28 | 0.16 | 0.22 | 0.06 | 0.70 | 0.75 | 0.98 | 0.44 | 0.73 | 0.36 | 0.30 | 5.24 |
| Ave. Total Snowfall (in) | 4.63 | 2.35 | 2.37 | 1.92 | 1.20 | 0.28 | 0.00 | 0.26 | 2.75 | 9.00 | 5.13 | 3.80 | 33.84 |
| Mean Snow Depth (in) | 14.27 | 15.99 | 17.46 | 17.18 | 9.70 | 0.11 | 0.00 | 0.00 | 0.37 | 5.39 | 10.12 | 12.26 | 8.26 |
| ***Kuparuk***[1,2] | | | | | | | | | | | | | |
| Ave. Total Precip. (in) | 0.12 | 0.16 | 0.08 | 0.17 | 0.10 | 0.31 | 0.87 | 1.00 | 0.49 | 0.36 | 0.17 | 0.15 | 3.93 |
| Ave. Total Snowfall (in) | 2.51 | 2.46 | 2.26 | 2.99 | 1.79 | 0.48 | 0.01 | 0.27 | 2.89 | 7.94 | 4.41 | 3.41 | 31.79 |
| Mean Snow Depth (in) | 8.22 | 8.64 | 9.21 | 9.62 | 5.47 | 0.22 | 0.00 | 0.01 | 0.32 | 3.32 | 5.72 | 7.27 | 5.10 |
| Utqiaġvik[1,2] | | | | | | | | | | | | | |
| Ave. Total Precip. (in) | 0.13 | 0.14 | 0.10 | 0.14 | 0.19 | 0.32 | 0.98 | 1.08 | 0.78 | 0.45 | 0.23 | 0.18 | 4.63 |
| Ave. Total Snowfall (in) | 2.48 | 3.13 | 2.21 | 2.98 | 2.62 | 0.49 | 0.10 | 0.70 | 4.70 | 9.43 | 6.12 | 3.96 | 41.63 |
| Mean Snow Depth (in) | 9.17 | 9.85 | 10.59 | 10.38 | 5.31 | 0.22 | 0.00 | 0.01 | 0.62 | 4.11 | 7.30 | 8.47 | 5.53 |
| ***Nuiqsut***[1,3] | | | | | | | | | | | | | |
| Ave. Total Precip. (in) | 0.07 | 0.01 | 0.01 | 0.16 | 0.18 | 0.22 | 0.73 | 0.61 | 0.31 | 0.03 | 0.03 | 0.12 | 2.41 |
| Ave. Total Snowfall (in) | N/A[4] | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Mean Snow Depth (in) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

1 Period of record: Umiat (1976 through 2000); Kuparuk (1983 through 2013); Utqiaġvik (1983 through 2013); Nuiqsut (1998 through 2014).
2 NOAA NWS (NOAA 2015a) Umiat, Kuparuk, and Barrow data obtained from Western Region Climate Center, 2015, Web. 16 February 2015. http://www.wrcc.dri.edu/summary/Climsmak.html.
3 NOAA NWS (NOAA 2015b) Nuiqsut data obtained from NOAA National Climatic Data Center, 2015, Web. 16 February 2015. http://www.ncdc.noaa.gov/cdo-web/datasets.
4 Not available. Total snowfall and snow depth are not measured at the NOAA NWS AWOS station at Nuiqsut.

**Table 3-3 Wind Class Frequency for Nuiqsut, Alaska**

| Wind Direction | Wind Classes (m/s) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0.5 - 2.1 | 2.1 - 3.6 | 3.6 - 5.7 | 5.7 - 8.8 | 8.8 - 11.1 | ≥11.1 | TOTAL (%)[1] |
| N | 0.380 | 1.381 | 0.898 | 0.134 | 0.005 | 0.000 | 2.57 |
| NNE | 0.495 | 2.285 | 1.992 | 0.592 | 0.005 | 0.001 | 4.94 |
| NE | 0.477 | 3.060 | 5.290 | 4.988 | 1.141 | 0.354 | 14.09 |
| ENE | 0.439 | 2.528 | 4.770 | 6.183 | 2.270 | 1.466 | 16.25 |
| E | 0.332 | 1.559 | 2.603 | 2.834 | 0.943 | 0.737 | 8.29 |
| ESE | 0.265 | 0.893 | 0.730 | 0.363 | 0.037 | 0.009 | 2.11 |
| SE | 0.265 | 0.647 | 0.290 | 0.070 | 0.012 | 0.007 | 1.19 |
| SSE | 0.287 | 0.901 | 0.478 | 0.114 | 0.013 | 0.013 | 1.66 |
| S | 0.419 | 2.233 | 2.002 | 0.553 | 0.026 | 0.009 | 4.82 |
| SSW | 0.435 | 2.339 | 3.098 | 0.875 | 0.067 | 0.021 | 6.29 |
| SW | 0.374 | 1.516 | 1.916 | 1.478 | 0.301 | 0.106 | 5.24 |
| WSW | 0.274 | 1.292 | 1.982 | 2.410 | 0.616 | 0.380 | 6.40 |
| W | 0.278 | 1.155 | 1.595 | 1.292 | 0.297 | 0.222 | 4.45 |
| WNW | 0.264 | 1.052 | 1.063 | 0.510 | 0.067 | 0.020 | 2.74 |
| NW | 0.308 | 1.033 | 0.607 | 0.168 | 0.016 | 0.002 | 1.96 |
| NNW | 0.291 | 0.943 | 0.502 | 0.127 | 0.001 | 0.000 | 1.72 |
| Sub-Total | 5.14 | 22.84 | 27.43 | 20.88 | 5.35 | 3.08 | 84.72 |
| Calms | | | | | | | 7.30 |
| Missing | | | | | | | 7.98 |
| Total | | | | | | | 100.00 |

[1] Wind class values may not add up precisely to subtotals due to rounding.

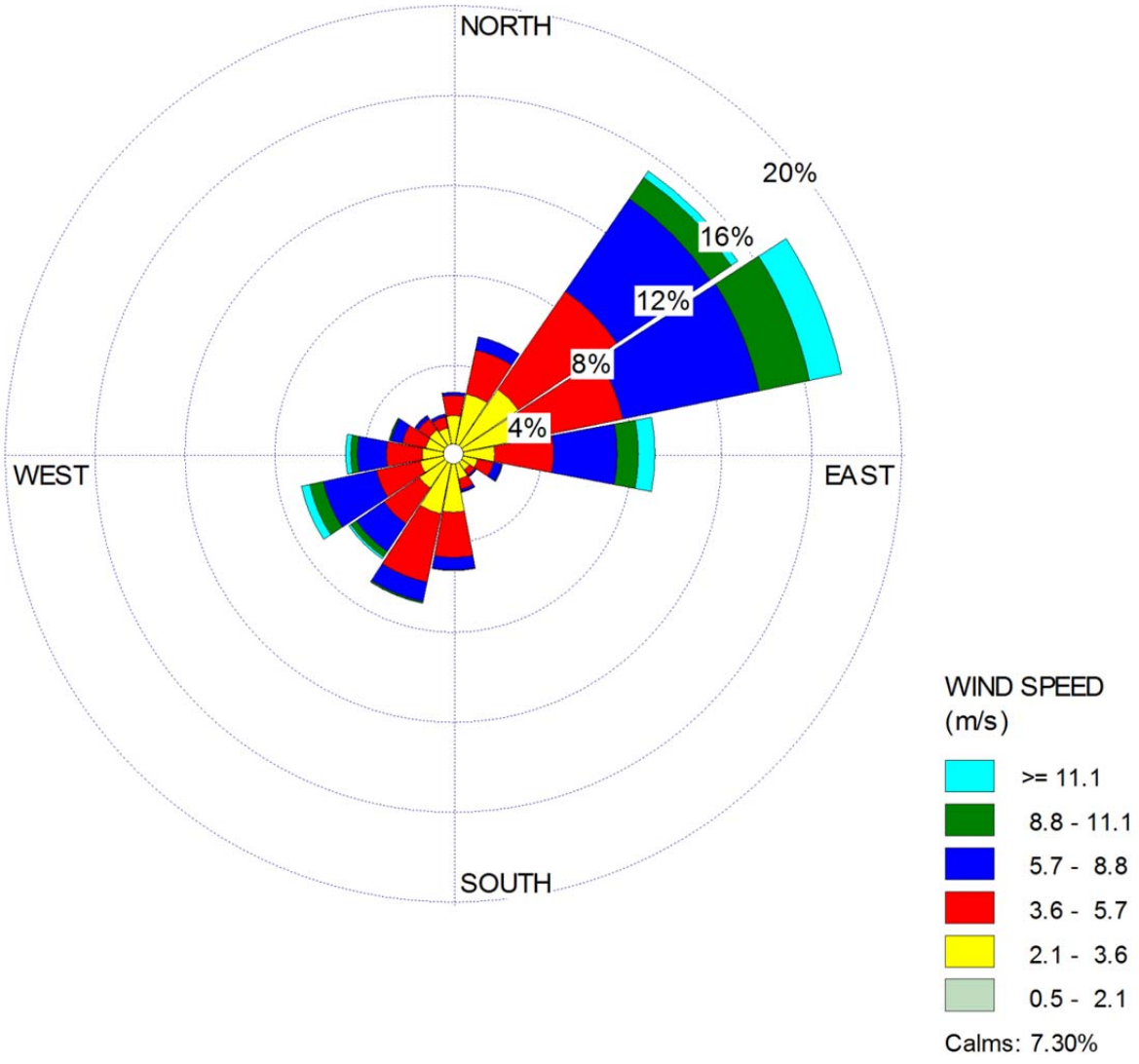



**Figure 3-1 Nuiqsut, Alaska – Annual Wind Rose**

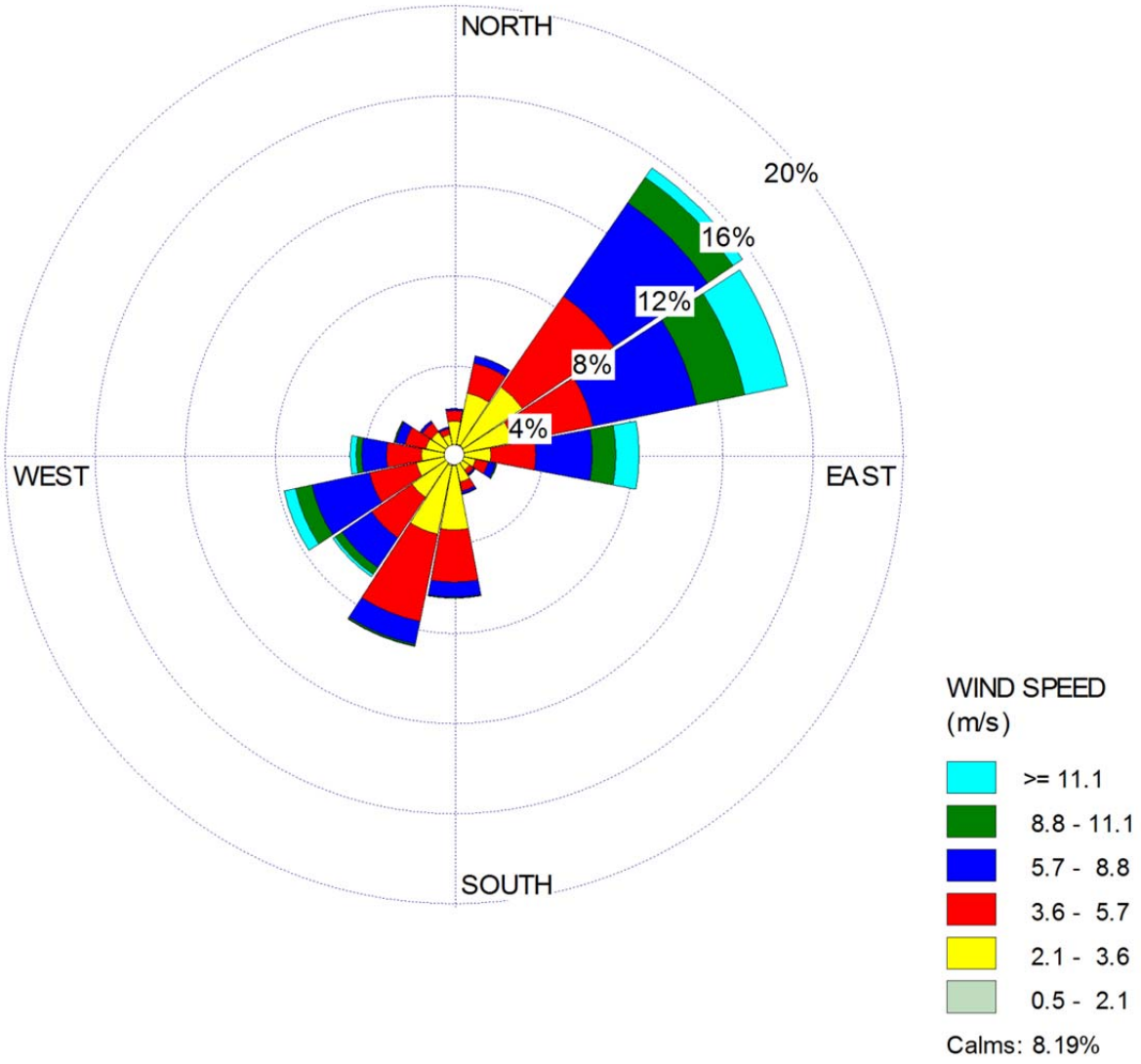



**Figure 3-2 Nuiqsut, Alaska – Winter Season Wind Rose**

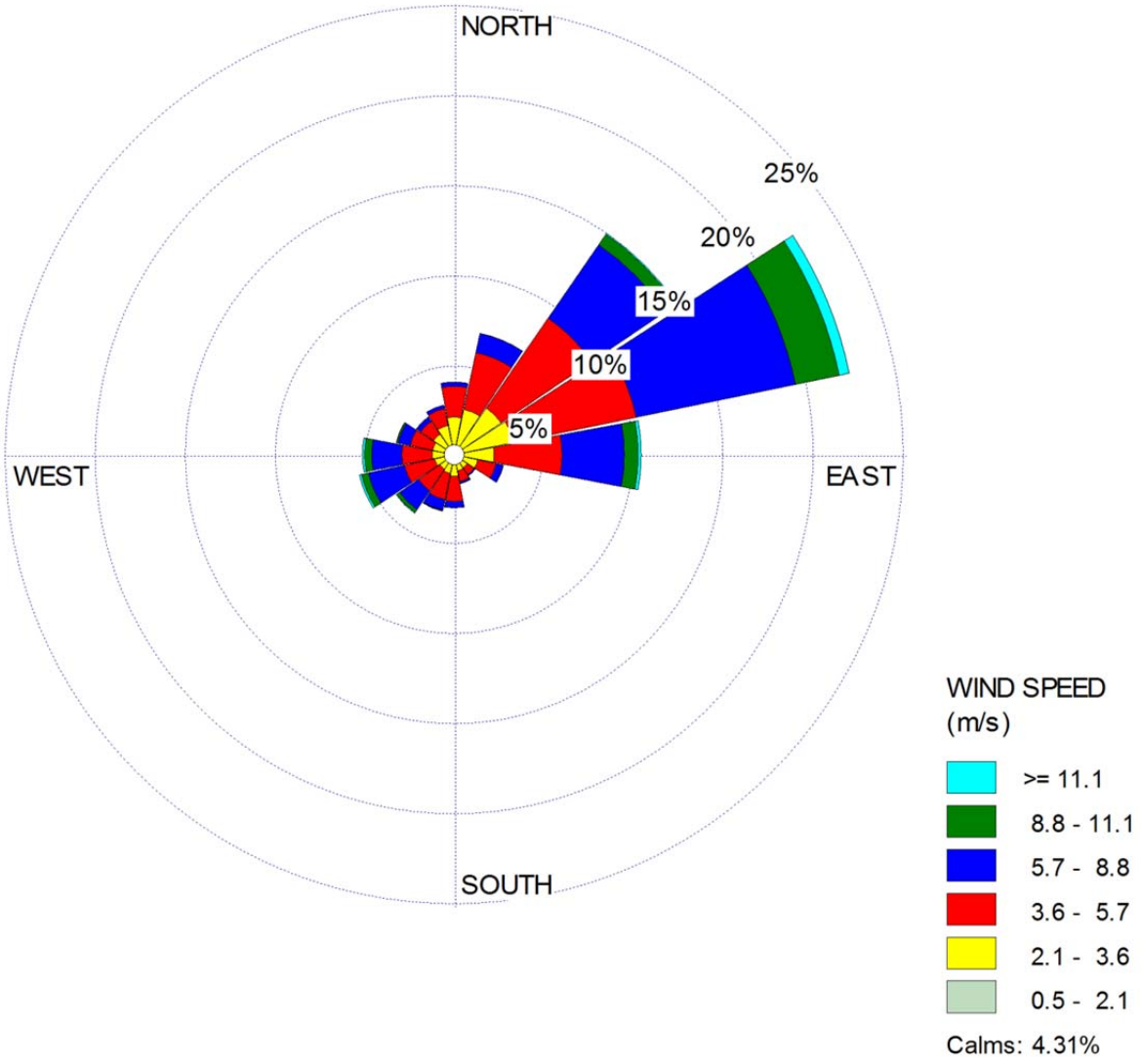



**Figure 3-3 Nuiqsut, Alaska – Summer Season Wind Rose**

### 3.2.4 DAYLIGHT HOURS

Table 3-4 provides a summary of the average hours of daylight per day by month and the standard deviation of the average hours of daylight per day by month for the project area (70° North) latitude. The sun remains below the horizon in the area from late-November through mid-January and above the horizon from mid-May through late-July.

**Table 3-4 Average Hours of Daylight per Day by Month**

| MONTH | JAN | FEB | MAR | APR | MAY | JUNE | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ave. Hours of Daylight per Day | 1.4 | 7.2 | 11.7 | 16.4 | 22.5 | 24.0 | 23.8 | 18.2 | 13.4 | 8.8 | 3.2 | 0.0 |
| Std. Deviation of Monthly Average | 1.7 | 1.3 | 1.3 | 1.4 | 1.8 | 0.0 | 0.5 | 1.7 | 1.3 | 1.4 | 2.1 | 0.0 |

Source: U.S. Navy (U.S. Navy 2015) Department of Astronomical Applications, 2015, Web. 16 February 2015. http://aa.usno.navy.mil/data/index.php.

### 3.2.5 EFFECTS ON CLIMATE AND METEOROLOGY

Effects of the Nikaitchuq North Exploration Drilling Project

Many complex and interrelated variables, including incoming solar radiation, cloud cover, geography, atmospheric circulation patterns, and humidity have an effect on the meteorology in the project area. The effects these variables have on Arctic meteorology are widespread and much greater in magnitude than any direct effects from the project. The only direct effects on meteorology that the Proposed Action may have would be very small in scale. For example, structures associated with the project, such as the drilling rig, will create a turbulent wake under certain wind conditions that may result in turbulent eddies on the leeward sides of the structures. Also, localized ambient temperatures may be slightly affected from heat generated by project buildings and by fuel-fired equipment, such as turbines and heaters. These effects will not persist outside of the project area and any effects on nearby resources will be negligible.

Effects of the No Action Alternative

Impacts associated with the No Action Alternative will be similar to the Proposed Action.

## 3.3 AIR QUALITY

Under the Clean Air Act (CAA) and authority granted by the Environmental Protection Agency (EPA), the State of Alaska implements air quality programs that are designed to carry out the goals of the CAA. ADEC is responsible for administering the state's air programs where they have jurisdiction on state land and on waters within the state seaward boundary extending three nautical miles offshore.

ADEC is responsible for ensuring that regulations are enforced within state boundaries to maintain ambient air quality standards and is the primary agency responsible for implementing the state's Air Quality Control Plan (AQCP). The State of Alaska's AQCP is approved by EPA and is included within the State Implementation Plan (SIP) for Alaska that addresses the

requirements of the CAA. The AQCP, including the SIP, has been adopted by reference into Title 18, Chapter 50 of the Alaska Administrative Code (AAC).

The State of Alaska has adopted the federal National Ambient Air Quality Standards (NAAQS) under the EPA-approved SIP as Alaska Ambient Air Quality Standards (AAAQS) for the six criteria pollutants and established state ambient standards for two other air pollutants, reduced sulfur compounds and ammonia under 18 AAC 50.010. The six EPA NAAQS are called the criteria pollutants and are listed below (EPA 2017):

- Nitrogen Dioxide ($NO_2$)
- Carbon Monoxide (CO)
- Particulate Matter ($PM_{2.5}$ and $PM_{10}$)
- Sulfur Dioxide ($SO_2$)
- Ozone ($O_3$)
- Lead

EPA has identified two types of NAAQS. Primary standards have been set to protect public health, with attention given to protecting sensitive populations such as the elderly, children, or asthmatics. Secondary standards focus on public welfare protection and include items such as reducing visibility impairment and preventing damage to crops, livestock, and vegetation.

The EPA designates geographic areas considered to have air quality as good as or better than the NAAQS as attainment areas. Areas in which air quality does not meet the NAAQS are designated by EPA as nonattainment areas. This project is located in the Alaska North Slope Borough, is included in the Northern Alaska Interstate Air Quality Control Region, is classified as a Class II region, and is in attainment or unclassifiable. The closest non-attainment area is a portion of the Fairbanks and North Pole urban area, which is classified as a nonattainment area under the NAAQS $PM_{2.5}$ standard, located approximately 380 miles south of the project area.

Table 3-5 provides a summary of representative baseline ambient air data for the project area that were collected as part of the CPAI Nuiqsut Ambient Air and Meteorological Monitoring Program from January 1, 2013 through December 31, 2013. Table 3-5 includes a comparison of the data to the current NAAQS and AAAQS. The CPAI Nuiqsut ambient air data are representative of the project location because of the monitoring station proximity to the project area, existing stationary sources in the region that include industrial activities at Prudhoe Bay, Kuparuk, and Alpine, and other emissions generating activities in the community of Nuiqsut, such as electric power generation and mobile sources such as trucks, snow machines, and heavy equipment.

The CAA establishes a number of permitting programs for stationary sources that the State of Alaska implements on behalf of EPA under the state regulations of 18 AAC 50. Per 18 AAC 50.990(105), a stationary source includes those emission units that are more permanently affixed, such as any building, structure, facility, or installation, which emits or may emit a regulated pollutant, except that in limited cases it includes a vessel when it is used for an industrial process. Permits are issued under these programs that are directly implemented by

ADEC and are divided into Title I construction and minor air permits and Title V operating permits.

**Table 3-5 Background Ambient Air Concentrations and National Alaska Ambient Air Quality Standards**

| POLLUTANT | PRIMARY/SECONDARY | AVERAGING PERIOD | MEASURED CONCENTRATION | NAAQS[1] | AAAQS[2] | PERCENT OF MEASURED CONCENTRATION TO NAAQS/AAAQS |
|---|---|---|---|---|---|---|
| $NO_2$ | Primary and Secondary | Annual | 1 ppb | 53 ppb | 53 ppb | 1.9 % |
| | Primary | 1-Hour[3] | 22.6 ppb | 100 ppb | 100 ppb | 22.6 % |
| CO | Primary | 8-Hour[4] | 1 ppm | 9 ppm | 9 ppm | 11.1 % |
| | | 1-Hour[4] | 1 ppm | 35 ppm | 35 ppm | 2.9 % |
| $PM_{10}$ | Primary and Secondary | 24-Hour[5] | 40 μg/m$^3$ | 150 μg/m$^3$ | 150 μg/m$^3$ | 26.7 % |
| $PM_{2.5}$ | Primary | Annual[6] | 1.8 μg/m$^3$ | 12.0 μg/m$^3$ | 15.0 μg/m$^3$ | 15.0 % |
| | Secondary | Annual[6] | | 15.0 μg/m$^3$ | | 12.0% |
| | Primary and Secondary | 24-Hour[7] | 6.1 μg/m$^3$ | 35 μg/m$^3$ | 35 μg/m$^3$ | 17.4 % |
| $SO_2$ | N/A[8] | Annual | 0.1 ppb | N/A[8] | 30 ppb | 0.3 % |
| | N/A[8] | 24-Hour[4] | 0.8 ppb | N/A[8] | 140 ppb | 0.6 % |
| | Secondary | 3-Hour[4] | 1.8 ppb | 500 ppb | 500 ppb | 0.4 % |
| | Primary | 1-Hour[9] | 1.1 ppb | 75 ppb | 75 ppb | 1.5 % |
| $O_3$ | Primary and Secondary | 8-Hour[10] | 0.049 ppm | 0.070 ppm | 0.070 ppm | 70.0 % |

1 National Primary and Secondary Ambient Air Quality Standards, 40 CFR Part 50.
2 State of Alaska Ambient Air Quality Standards, 18 AAC 50.010 (ADEC 2016b).
3 The standard is based on the three-year average of the 98$^{th}$-percentile of the annual distribution of 1-hour daily maximum $NO_2$ concentrations.
4 Not to be exceeded more than once per year.
5 Not to be exceeded more than once per year on average over three years.
6 Annual mean, averaged over three years.
7 The form of this standard is the three-year average of the 98$^{th}$ percentile of annual 24-hour average concentrations.
8 Not applicable. EPA revoked the annual and 24-hour $SO_2$ standards on June 22, 2010 (75 FR 35520, June 22, 2010).
9 The form of this standard is the three-year average of the 99$^{th}$ percentile of the annual distribution of 1-hour daily maximum $SO_2$ concentrations.
10 The form of this standard is the annual fourth-highest daily maximum eight-hour concentration, averaged over three years.

The Title I permit program regulates air emissions associated with construction of new or modified major stationary sources. Under Article 3 of 18 AAC 50, the State of Alaska issues construction permits under the Prevention of Significant Deterioration (PSD) regulations codified in Title 40 CFR Section 52.21. These regulations apply to major new stationary sources or major modifications of existing stationary sources within an attainment or unclassified area. The PSD regulations provide standards that limit the total increase in ambient air pollution levels above established baseline levels for $NO_2$, $PM_{10}$, $PM_{2.5}$, and $SO_2$. These limits are most stringent in Class I areas. The nearest PSD Class I area is Denali National Park, including the Denali Wilderness but excluding the Denali National Preserve, located approximately 450 miles south of the project.

The Title I air permitting program for Alaska also includes a minor source program under 18 AAC 50, Article 5 that is designed to regulate those smaller stationary sources of emissions that are not subject to a Title I major source construction permit.

The State of Alaska Title V air permitting program is designed to standardize air quality permits and the permitting process for major stationary sources of emissions by containing all requirements in one permit document. It requires that the stationary source submit periodic reports identifying the extent to which it has complied with those obligations. Title V operating permits are issued to air pollution sources after the stationary source has begun to operate.

Title I and Title V permits are legally binding documents that include applicable requirements for demonstrating compliance with emission limits and standards. Monitoring, recordkeeping, and reporting provisions are also included within air permits that ensure sources follow the assumptions provided under a permit application and maintain compliance with all applicable elements of the CAA including the NAAQS and AAAQS.

ADEC authorizes the existing source at the Nikaitchuq Development under Minor Air Permit No. AQ0923MSS10 and Operating Permit No. AQ0923TVP01, Revision 2. An Air Quality Impact Analysis (AQIA) for the existing Nikaitchuq Development that describes the air quality dispersion modeling conducted to assess the potential air quality impacts of the existing source was provided under the application for a previous version of the minor air quality permit (Minor Air Permit No. AQ0923MSS07). ADEC ultimately approved the AQIA through a review of the AQIA issued on July 20, 2012 that was provided with issuance of Minor Air Permit No. AQ0923MSS07 (ADEC 2012). This AQIA remains applicable under the current Minor Air Permit No. AQ0923MSS10 for the existing source and demonstrates the existing source is in compliance with applicable NAAQS or AAAQS.

Air emissions from mobile sources associated with maritime operations in support of this project, such as support vessels and offshore vehicles, are not authorized under a Title I or Title V operating air permit. Per 18 AAC 50.990(105), only vessels that are used for an industrial process (e.g., seafood processing or providing power to onshore facilities) are to be included in the air permit. These types of “to and fro” vessel emissions associated with transit result from the combustion of diesel or other liquid fuels from with marine engines or other ancillary equipment. Marine vessel emissions must comply with emission standards and fuel requirements established by EPA (e.g., 40 CFR Part 94 and Part 1042) and the International Convention for the Prevention of Pollution from Ships (MARPOL).

Other air emissions from mobile sources, such as regional aircraft activity, are anticipated to occur to support the transport of work personnel and equipment to and from Deadhorse, Alaska. Similar to other mobile equipment like marine vessels, aircraft emissions are not regulated under a stationary source air quality permit for this project. Aircraft emissions are regulated by EPA through emission standards for new commercial aircraft engines that are equivalent to the standards set by the United Nations International Civil Aviation Organization.

### 3.3.1 ARCTIC HAZE

Research has determined that air quality on the Alaska North Slope can be affected by the long-range transport of pollution, often called “arctic haze,” from sources at middle- and high-latitudes to the Arctic (Radke et al. 1984, Raatz 1984, Barrie and Hoff 1985, Shaw 1995). Arctic haze typically consists of particulate matter comprised of sulfates and black carbon and trace gas pollutants such as ozone (Raatz 1984, Shaw 1995, Wilcox and Cahill 2003, Jacob et al. 2010). The long-range transport of arctic haze most frequently occurs during the winter and spring months (Shaw 1995) but has been observed to occur throughout the year (Colarco et al. 2004, Jacob et al. 2010). For example, boreal fires in Eurasia and North America can be a major source of air pollutants in the arctic atmosphere during the summer months (Colarco et al. 2004). The occurrence of arctic haze generally wanes as summer approaches and more atmospheric mixing and precipitation removes pollutants from the air.

### 3.3.2 VISIBILITY IMPAIRMENT

Another direct effect to air quality that may be caused by air pollutant emissions is reduced visibility. Visibility is reduced when sunlight encounters tiny particles in the air (e.g., dust from roadway traffic) and the clarity and color of the air are reduced. These types of emissions in the Arctic are limited to the summer months from approximately June through September because the ground is consistently covered with snow and ice during the winter.

### 3.3.3 OZONE

Indirect effects to air quality are those effects that do not occur at the same time or place as the direct effects. Air pollutants, such as $O_3$ and secondary $PM_{2.5}$, are not emitted directly from the project but may be created by chemical reactions from project emissions. For example, $O_3$ is formed from chemical reactions between nitrogen oxide ($NO_X$) and volatile organic compounds (VOC) in the presence of sunlight and heat. Secondary $PM_{2.5}$ is formed in the atmosphere by gas-to-particle conversion processes. Precursors generally include $NO_X$, $SO_2$, VOC, and ammonia.

### 3.3.4 EFFECTS ON AIR QUALITY

<u>Effects of the Nikaitchuq North Exploration Drilling Project on Air Quality</u>

Direct effects to air quality are those effects that are caused by the project and occur at the same time and place. For the project, these effects may result from the release of pollutant emissions into the atmosphere that occur as a result of drilling associated with the project. Air

pollutant emissions from these activities are under the jurisdiction of ADEC and EPA, which regulate air quality under the requirements of 18 AAC 50 and 40 CFR Parts 50, 52, 60, and 63, among many other statutes and regulations.

Projects that will have an effect on air quality must meet the primary and secondary NAAQS and the AAAQS. As part of the state air permitting process, ADEC will review the potential effects from air pollutant emissions that will result from a project. ADEC will only issue an air permit for a project after a demonstration of compliance with all applicable ambient air quality standards is made, and the protection of public health and welfare is assured.

The project is anticipated to trigger minor air quality control permit requirements under 18 AAC 50.508(5) and 50.508(6) because the project will require an owner-requested limit and revisions to existing permit terms and conditions to authorize the addition of emission units on the existing permitted drilling rig at the SID. The project is also anticipated to trigger the requirement to conduct an update to the air dispersion modeling completed in 2012 for the minor air permit to demonstrate that the potential emissions from the drilling project will not cause or contribute to an exceedance of any applicable ambient air quality standard.

The modeling effort for the AQIA will include the completion of an emissions inventory for the entire source and near-field dispersion modeling for ambient air quality impacts. Emission sources for the project are comprised of equipment that is typical of other recent oilfield development activities on the Alaska North Slope. The project will include the use of two diesel-fired reciprocating internal combustion engines associated with the drill rig and a temporary flare at SID. Emissions from the project will be short-term and will originate primarily from non-road engines used for drilling the exploration well. The project activities will result in emissions of $NO_X$, $SO_2$, CO, particulate matter, VOC, and greenhouse gases, including carbon dioxide ($CO_2$), methane, and nitrous oxide. All diesel-fired equipment associated with the project will combust ultra-low sulfur diesel.

Eni anticipates the following timeline to receive the revised minor air permit and Title V operating permit that will authorize the air emissions associated with the stationary source for the project. The application to request a revision to the minor air permit and Title V operating permit was submitted to ADEC on February 22, 2017.

- April 30, 2017 – ADEC issues draft minor air permit and Title V operating permit for 30-day public comment.
- May 30, 2017 – End of public comment period.
- June 15, 2017 – Issuance of final minor air permit No. AQ0923MSS011 and issues draft Title V operating permit to EPA for 45-day review.
- July 30, 2017 – ADEC issues final Title V Operating Permit No. AQ0923TVP01, Revision 3.

The Nikaitchuq North Exploration Drilling Project is anticipated to have an insignificant direct and indirect effect on air quality. Because emissions from the project activities are considered construction emissions and will not occur for an extended duration, the effects to regional and local air quality will be short-lived in the environment.

Project activities will have an insignificant effect on visibility because the activities are planned to occur primarily in the winter months and will not involve equipment that will produce large amounts of dust. The production of $O_3$ for the project will also be minimized because the project will occur during the winter months when temperatures remain relatively low and sunshine is limited. The amount of $PM_{2.5}$ precursor emissions for the project will be relatively low and are anticipated to have an insignificant effect on local and regional air quality.

Effects of the No Action Alternative on Air Quality

The air pollutant emissions associated with the No Action Alternative are currently authorized under existing state of Alaska air quality permits, state and federal emission standards, and other applicable air quality regulations.

## 3.4 OCEANOGRAPHY

The project area is located within the Beaufort Sea, which is a semi-enclosed basin with a narrow continental shelf extending 19 to 50 miles from the coast, and extending from the Canadian border west to Point Barrow. The continental shelf of the Beaufort Sea is relatively shallow, with an average water depth of about 121 feet. Bottom depths on the shelf increase gradually to a depth of about 262 feet, then increase rapidly along the shelf break and continental slope to a maximum depth of around 12,467 feet. Numerous narrow and low relief barrier islands lie within 1 to 20 miles of the coast and influence nearshore processes in the Beaufort Sea. (NOAA 2016a)

The shallow continental shelf waters of the Beaufort Sea are subjected to seasonally varying conditions, such as heating, cooling, wind stress, ice formation and melting, and terrestrial freshwater input. Winter ice restricts circulation patterns. Seasonal variations in the temperature and salinity of the continental shelf waters are large. The Beaufort Sea, one of the northernmost seas bordering Alaska, is part of the Arctic Ocean and is linked oceanographically to the Pacific Ocean by the Bering Strait. This conduit draws relatively warm nutrient-rich water into the Arctic Ocean from the Bering Sea. Such physical and chemical gradients influence the productivity and trophic structure of the Beaufort Sea shelf. Freshwater discharge from various rivers and streams along the Beaufort Sea coast create an environment that is estuarine in character, especially in late spring and summer. In addition, coastal erosion and river discharge are responsible for introducing high concentrations of suspended sediment and associated terrestrial organic carbon into the nearshore zone. (NOAA 2016a)

Sea ice generally reaches its maximum extent in March and minimum extent in September. Ice cover consists of drifting pack ice over the middle and outer shelf and landfast ice on the inner shelf. During a brief period in the spring when the river stage increases rapidly as the snow pack melts, river water overfloods the ice and creates a freshwater lens. Currents during the open water period (July to mid-October) correlate with local winds, whereas during the landfast ice period, underlying shelf waters are separated from surface stresses, such as wind. Landfast ice usually starts to form in October and can extend 12 to 25 miles offshore. Stamukhi, or grounded ice, forms along the seaward edge of the landfast ice. It may help protect the inner shelf from forces exerted by pack ice. Nearshore currents are weak when landfast ice is present, and strengthen during the open water period. (NOAA 2016a)

Along-shore winds account for approximately 75% of the along-shore surface current variance and winds accompanying strong storms lead to rapid turnover of Beaufort Sea shelf waters. Prevailing northeasterly winds contribute to onshore and westward flow of sea ice onto the shelf, which promotes upwelling of sub-surface waters along the shelfbreak. Storm surges cause much larger variations in sea level than do astronomical tides. Tidal currents in the Beaufort Sea shelf area are relatively weak. Rates of cross-shore flows are also usually small, but freshwater inputs from numerous rivers in the area are responsible for greater rates of cross-shore flow during the spring. (NOAA 2016a)

The project area is generally located in Simpson Lagoon (Figure 1-2), which is an island-protected lagoon system of the Beaufort Sea. Simpson Lagoon receives freshwater and sediment inputs from the Colville, Kuparuk, Sagavanirktok, and other smaller rivers. Simpson Lagoon is approximately 35 kilometers (km) long and 1 km to 6 km wide, with a maximum depth around 3 meters (m). The lagoon is subject to annual ice cover for approximately eight to nine months a year and much of the lagoon is covered with landfast ice. (Dasher et al. 2016)

Effects of the Nikaitchuq North Exploration Drilling Project on Oceanography

As part of the Nikaitchuq North Exploration Drilling Project, drilling will negligibly increase in the project area during the 2017-2018 winter season and the 2018-2019 winter season. There would be no anticipated impacts to wind patterns, terrestrial freshwater output, or coastal erosion. These impacts are anticipated to be too negligible to measure distinct from existing operations in the project area. It is anticipated there will be negligible impacts to oceanographic resources as a result of the Nikaitchuq North Exploration Drilling Project.

Oceanographic hazards may potentially occur as a result of extreme waves, storm surges, and severe ice conditions. Logistics operations, including vessel traffic in the summer/fall and ice road travel in the late winter, may be hampered or delayed by severe oceanographic conditions. However, proposed activities are consistent with ongoing operations and will utilize current facilities designed to oceanographic standards appropriate for the area, in order to prevent and minimize any impacts to the project.

Ice formation, wind patterns, terrestrial freshwater output, cooling/heating, and coastal erosion would continue naturally in the absence of the Nikaitchuq North Exploration Drilling Project.

Effects of the No Action Alternative on Oceanography

The No Action Alternative will result in a negligible increase drilling in the project area between January 2018 and March 2019. The effects would be similar to those of the Proposed Action Alternative.

## 3.5 GEOLOGY

The onshore portion of the project area is located on the Arctic Coastal Plain, which is within the zone of continuous permafrost and has flat to rolling terrain with many shallow ponds and lakes. The ground surface over most of the flat thaw-lake plain varies by less than 6 feet, except at

pingos which may reach 60 feet, and along banks of the larger streams. Deltas form along the coastline at the mouths of large rivers. (Kerr-McGee 2005)

Active geologic and hydrologic processes contribute to the development and continual modification of both the onshore and offshore physical environments of the project area. These factors, in combination with climatic and oceanographic conditions, have resulted in unique physical characteristics, including a partially relict (having survived from an earlier era) shoreline, onshore and subsea permafrost, and permafrost-related thaw features. (USACE 1999)

The coastline consists of beach bluffs, bays, spits, lagoons, and bars. The project area extends from Oliktok Point into Simpson Lagoon, and Spy Island, a barrier island immediately north the SID. The shallow nearshore area includes low barrier islands composed mostly of sand and gravel; however, some parts are submerged remnants of a once more extensive coastal plain (USACE 1999). Water depths are relatively shallow for a considerable distance offshore between the shore and Spy Island, and water depths are typically between 6 and 9 feet deep. The area is generally flat and devoid of significant seafloor features; however, there may be some variation on the order of 1 to 2 feet as a result of ice gouging. Strudel scour, which can occur at river mouths as a result of overflooding, is not believed to be prevalent in the area (Kerr-McGee 2005).

### 3.5.1 PERMAFROST

Permafrost is defined as ground that remains at a temperature below 32°F over a period of many years. Numerous geophysical surveys and geotechnical investigation boreholes indicate that permafrost is widespread beneath the Beaufort inner shelf; however, it is highly irregular. (USACE 1999, MMS 2003)

The depth to the surface of subsea permafrost and boundary between bonded and unbonded permafrost is highly variable. Depths to bonded permafrost have been shown to be as shallow as less than 30 feet to greater than 98 feet over a distance of less than 7.5 miles (MMS 2003). The existence of subsea permafrost is dependent on several factors, including seawater temperature and salinity, lithology, and the extent of shorefast ice in winter.

Offshore permafrost in the project area consists of either unbonded or ice-bonded frozen ground overlain by an active layer of seasonally thawed sediment. In the offshore environment, unbonded permafrost consists of sediments with temperatures below 32°F that exhibit no interstitial pore ice bonding. In these sediments, the salinity of the seawater within the interstitial pores inhibits ice formation due to the depressed freezing points of the highly saline waters. Seafloor sediment is often unbonded due to this salinity effect. (USACE 1999)

Offshore zones of ice-bonded permafrost are located in Simpson Lagoon in the vicinity of the coastline and near the barrier islands (USACE, 1999). However, preliminary geotechnical information obtained in support of the Nikaitchuq Development Project, including development of OPP and SID, indicated the general absence of offshore permafrost in the project area (Kerr-McGee 2005).

### 3.5.2 SEDIMENTS

Seafloor deposits within the project area generally consist of muddy sand and sandy mud with minor amounts of gravel (Kerr-McGee 2005). The deposits primarily include very stiff, silty clay inshore of the barrier islands, and stiff silts offshore of barrier islands at water depths of about 5 to 10 feet, with scattered gravels and cobbles. The silts are generally highly over-consolidated due primarily to freezing and thawing cycles (USACE 1999).

### 3.5.3 EFFECTS ON GEOLOGY

Effects of the Nikaitchuq North Exploration Drilling Project on Geology

The Nikaitchuq North Exploration Drilling Project would make use of the existing project facilities and would not include development of any new onshore facilities that could impact geological resources. Offshore subsurface formations will potentially be altered by proposed drilling activity associated with exploration for oil and gas, resulting in negligible impacts. Disposal of drilling wastes related to the Nikaitchuq North Exploration Drilling Project will utilize the existing WIF, and therefore will not result in new impacts to subsurface formations.

Shallow gas accumulations have rarely been encountered during exploratory drilling in northern Alaska, and none are known to exist in the Nikaitchuq Development area (Kerr-McGee 2005). Eni has drilled numerous development and water injector wells from SID for its Nikaitchuq field development. These wells have penetrated the permafrost, Ugnu, Schrader Bluff, and Colville sequences. No shallow hazards or hydrogen sulfide ($H_2S$) were encountered. The Nikaitchuq North Exploration Drilling Project will be drilling through the same geologic section; therefore, neither shallow gas nor $H_2S$ is expected to be encountered.

No sediment disturbance is anticipated as part of the Nikaitchuq North Exploration Drilling Project; therefore, no impacts to sediments are anticipated. There may be minor impacts to the permafrost, which are anticipated to be consistent with ongoing operations in the project area.

It is anticipated that there will be limited minor impacts to geological resources as a result of the Nikaitchuq North Exploration Drilling Project. The project area will continue to be modified by natural forces, and it is anticipated that coastal erosion would continue at the current rate in the absence of the project. The barrier islands would also continue to erode or migrate in the absence of the project.

Effects of the No Action Alternative on Geology

The No Action Alternative would make use of the existing project facilities in the same way as the Proposed Action. Offshore subsurface formations potentially will be altered by proposed development drilling activity associated with the No Action Alternative, resulting in negligible impacts. Disposal of drilling wastes will utilize the existing WIF, and therefore will not result in new impacts to subsurface formations.

## 3.6 ACOUSTIC ENVIRONMENT

Several noise studies have been conducted in the nearshore Beaufort Sea by industry, resource agencies, and local government. This section details existing conditions and possible effects of noise on the biological and human environments, utilizing available data from NOAA (2016a), and BOEM (2012, Section 3.6.3). The Nikaitchuq North Exploration Drilling Project is anticipated to be designed to mitigate noise through the design components.

### 3.6.1 AIRBORNE ACOUSTIC ENVIRONMENT

As described in Section 3.1.4.2 of NOAA (2016a), the existing airborne noise environment in the coastal areas of the Beaufort Sea is influenced by sounds from natural and anthropogenic sources. The primary natural source of airborne noise on the offshore, nearshore, and onshore regions is wind, although wildlife can produce considerable sound during specific seasons in certain nearshore and onshore regions. Anthropogenic noise sources in the Beaufort Sea region consist of regular air and vehicular traffic on the roads within the few development areas (such as around Deadhorse). Noise is also produced by the operations of heavy construction and industrial equipment that service the wells, processing facilities, pipelines, camps, etc. Industrial activities occur throughout the region on a year-round basis. Sound levels near oil and gas development sites with equipment are similar to other industrial sites with levels 70 to 90 in A-weighted decibels (dBA). Sound levels farther from equipment are closer to the natural background levels of 45 to 60 dBA.

### 3.6.2 THE UNDERWATER ACOUSTIC ENVIRONMENT

The underwater acoustic environment of the Beaufort Sea is described in Section 3.1.4.2 of NOAA (2016a). Underwater noise is comprised of both natural and anthropogenic sources. It varies temporally (daily, seasonally, annually) depending on weather conditions and the presence of anthropogenic and biological sources. Natural sound sources in the Arctic Ocean include earthquakes, wind, ice, and sounds from several animal species. Atmospheric effects, such as wind, lightning, thunder, and rain at the surface have a significant effect on ambient sound levels. Wind and sea ice contribute greatly to the noise environment in the Beaufort Sea.

Biological sounds from marine mammals are generally less prevalent in the Beaufort Sea region, relative to the Chukchi Sea, as a result of limited numbers of the two most vocal species, walrus and bearded seals. Bowhead whale vocalizations could contribute to the Beaufort Sea acoustic environment during the spring and fall migrations; however, bowhead whale vocalizations in September and October are limited to low frequency moans below approximately 1,000 hertz (Hz). The bowhead whale calling structure evolves from simple calls to complex calls and songs from October to December, but most bowhead whales have already migrated into the Chukchi Sea by this time. (NOAA 2016a)

The Beaufort Sea offshore environment can be divided into three primary acoustic environments: 1) shallow bays bounded by barrier islands; 2) shelf region with water depths from approximately 30 to 800 feet; and 3) basin slope with depths from approximately 3,300 to 9,800 feet. The shallow bays are less conducive to low frequency sound propagation, and this generally reduces both anthropogenic and natural sound levels relative to the deeper Beaufort

Sea environment. However, past oil and gas activities have largely been concentrated in these regions, so anthropogenic noise is more prevalent here. (NOAA 2016a)

The types of vessels that typically produce noise in the Beaufort Sea include barges, skiffs with outboard motors; icebreakers; tourism and scientific research vessels; and vessels associated with oil and gas exploration, development, and production. Vessel traffic in the Beaufort Sea, and associated noise, is presently limited primarily to the open water season between late spring and early autumn. In shallow water, vessels more than six miles away from a receiver generally contribute only to background noise levels, while in deep water, traffic noise up to 2,500 miles away may contribute to background noise levels. Based on recordings collected around the Northstar Island, hovercraft are considerably quieter underwater than similar-sized conventional vessels. (BOEM 2012)

A study documenting sound levels and characteristics from industrial activities on two man-made gravel islands within Simpson Lagoon, Caelus' Oooguruk Drill Site (ODS) and Eni's SID, was performed in August and September 2008 as part of compliance with NSB permit stipulations (Link and Rodrigues 2009). Four acoustic recorders were deployed, one each in relatively shallow water (9 feet) near ODS and SID, a third 4 miles north of ODS, and the fourth placed 0.94 mile north of SID, north of Spy barrier island. Drilling occurred at ODS during the study period (SID was under construction), so the recorder closest to ODS was used to evaluate drilling noise. No evidence of tones associated with a rotating drill string at ODS (spikes in the relevant spectra at frequencies between 1 Hz and 10 Hz) were detected on any of the recorders, including those located closest to ODS. There was evidence of weak tones associated with industrial noise (30 Hz and 60 Hz, respectively) at recorders near ODS and SID. Other than these tones (modest at SID, weak at ODS), sounds from on-drillsite activity were not recorded. There was little evidence of underwater sound propagation from non-vessel and non-seismic activities on ODS or SID.

### 3.6.3 EFFECTS ON AIRBORNE ACOUSTIC ENVIRONMENT

Transportation of materials and equipment will be via truck from Deadhorse to OPP, and personnel will be transported by bus or van between Deadhorse and OPP. Equipment, materials, and personnel will be transported to SID via barge, crew boat, and hovercraft. The number of trips is expected to be similar for both the Nikaitchuq North Exploration Drilling Project and the No Action Alternative, with the exception of barge trips, which will increase under the No Action Alternative. The effects on the airborne acoustic environment for the Proposed Action and the No Action Alternative are expected to be negligible.

### 3.6.4 EFFECTS ON UNDERWATER ACOUSTIC ENVIRONMENT

Based on the results of Link and Rodrigues (2009), underwater noise from drilling from SID as part of the Nikaitchuq North Exploration Drilling Project is expected to be weak within Simpson Lagoon and not detected outside the barrier islands. The primary noise sources expected from the Nikaitchuq North Exploration Drilling Project are associated with the use of marine vessels (barge, crew boat, and hovercraft). Eni vessel traffic (hovercraft, crew boat, and barge) uses regular routes within a narrow corridor between OPP and SID, as shown in Figure 2-3. Vessel traffic associated with the Nikaitchuq North Exploration Drilling Project would be consistent with

existing operations in the project area and similar to that of the No Action Alternative. Impacts to the underwater acoustic environment from the Nikaitchuq North Exploration Drilling Project and the No Action Alternative are expected to be negligible.

### 3.6.5 EFFECTS ON THE HUMAN ENVIRONMENT

Human receptors that are sensitive to noise will be the workers at SID, OPP, and NOC. Activities that may result in noise from the proposed Nikaitchuq North Exploration Drilling Project include limited road traffic between Deadhorse and OPP for personnel changes and materials shipments; equipment operations at OPP; vehicle noise associated with mobilizing personnel, equipment, and materials to SID (e.g., barge, hovercraft, crew boat); and noises associated with drilling activities at SID.

Noise-generating activities are expected to be similar for both the Nikaitchuq North Exploration Drilling Project and the No Action Alternative, and similar to those generated by current Eni activities. Due to the distance between the noise sources and Native allotments and Nuiqsut, no impacts in these areas are expected.

### 3.6.6 NOISE MITIGATION

The Nikaitchuq Development Project incorporated design components to mitigate noise (Kerr-McGee 2005). These include:

- Design review by industrial noise specialist to eliminate or minimize noise emissions as part of the final design process.
- Limit use of internal combustion equipment at the offshore production pads by installing power cables from shore.

## 3.7 WATER QUALITY

Most pollutants occur at low levels in the Arctic Ocean due to limited municipal and industrial activity in the area. The rivers that flow into the Alaskan arctic marine environment remain relatively unpolluted by human activities, but they carry into the marine environment natural loads of suspended sediment particles with trace metals and hydrocarbons. Winds and drifting sea ice may play a role in the long-range redistribution of pollutants in the Arctic Ocean. (BOEM 2012)

Water quality in the nearshore Arctic Ocean (landward of the 130-foot water depth line) may be slightly affected locally by both anthropogenic and natural sources. Most detectable pollutants occur at very low levels in the arctic waters and/or sediments and do not pose an ecological risk to marine organisms (BOEM 2012). The State of Alaska does not identify any Clean Water Act Section 303(d) impaired water bodies within the Arctic region (BOEM 2012, NOAA 2016a).

Suspended sediment concentrations in the Beaufort Sea under summer conditions are usually low, but can be elevated by wind-wave activity in shallow waters closer to shore. Water quality also is affected by natural erosion of organic material along the shorelines. (BOEM 2012)

Water quality in Simpson Lagoon is quite variable seasonally. It is typically a brackish environment during the summer and fall months when there are large freshwater inflows from the Colville and Kuparuk rivers. During the winter, water will be more characteristic of marine waters; in some isolated pockets, water may have elevated salinities as a result of brine drainage during sea ice formation. (Kerr-McGee 2005)

Turbidity values of Simpson Lagoon are expected to be higher and dependent on river discharge and sediment resuspension as a result of wave action. River discharge is the major source of sediment input to the marine environment. Onshore water quality, river flow, and sediment load affect marine water quality in the nearshore region. (Kerr McGee 2005)

Effect of the Nikaitchuq North Exploration Drilling Project on Water Quality

SID is designed to have no marine discharges during operations. All effluents, including drilling muds, are disposed of via injection into the WIF. Discharge of domestic wastewater treatment plant effluent under an Alaska Pollution Discharge Elimination System permit has been authorized as a contingency option, when routine discharge to the WIF is not available. This contingent discharge has not yet occurred. In the event this contingency discharge option is required, Eni will adhere to all permit requirements, including adherence to a Best Management Practices Plan, and monitoring, recording, and reporting requirements.

The Nikaitchuq North Exploration Drilling Project would be consistent with existing operations in the project area and would not result in any disturbance to sediment. Impacts to water quality from the Nikaitchuq North Exploration Drilling Project are expected to be negligible.

Effect of the No Action Alternative on Water Quality

The No Action Alternative would be consistent with existing operations in the project area (e.g., no marine discharges); therefore impacts to water quality are expected to be negligible.

## 3.8 BENTHIC COMMUNITY

Marine waters in the Nikaitchuq North project area include Harrison Bay, Simpson Lagoon, and a portion of the Beaufort Sea offshore of the barrier islands. In general, these waters are shallow, and relatively warm and brackish in summer (Craig et al. 1982). These shallow waters freeze solid in winter. The benthic communities in shallow marine waters of the Nikaitchuq North project area mainly comprise benthic microalgae (microscopic primary producers) and benthic invertebrates (NOAA 2016a). Some deep water substrates that are not regularly scoured by ice may also support macroscopic algae (large seaweeds). The primary benthic microalgae in the Beaufort Sea are diatoms (NOAA 2016a).

Benthic invertebrate communities can be divided into two groups: epifauna and infauna. Epifauna includes organisms that live on the surface of bottom substrate, while infauna includes organisms that live within the sediment matrix. Infauna diversity is low in shallow areas where the bottom substrate freezes solid in winter (e.g., portions of Simpson Lagoon where water depth is less than 6 feet). The primary infaunal organisms of Simpson Lagoon are bivalves and polychaete worms (Craig et al. 1982). Common epifauna in Simpson Lagoon include several

types of crustaceans, such as amphipods, mysids, and isopods. These epifaunal organisms are present seasonally during the open water period (Craig et al. 1982).

In addition to marine benthic communities, planktonic organisms are also present in the Nikaitchuq North project area during the open water season (Craig et al. 1982, NOAA 2016a). Plankton are pelagic organisms that reside in the water column and are transported by water movements because they have insufficient power to swim against currents. The two basic groups of planktonic organisms are phytoplankton and zooplankton (NOAA 2016a). Phytoplankton are the primary producers or plant component of the plankton. In general, zooplankton are animals that feed on phytoplankton and represent the primary consumer component of the plankton. Common zooplankton in Simpson Lagoon include copepods and chaetognaths (Craig et al. 1982).

Effects of the Nikaitchuq North Exploration Drilling Project on the Benthic Community

The Nikaitchuq North Exploration Drilling Project is unlikely to significantly influence benthic communities. Construction activities that could bury or otherwise impact benthic communities are not proposed. Barge, crew boat, and hovercraft activity associated with the Nikaitchuq North Exploration Drilling Project is unlikely to result in appreciable disturbance or harm to benthic or planktonic communities.

Effect of the No Action Alternative on the Benthic Community

Barge, crew boat, and hovercraft activity associated with the No Action Alternative is similar to that of the Nikaitchuq North Exploration Drilling Project and would be consistent with existing operations in the project area. These activities are unlikely to result in appreciable disturbance or harm to benthic or planktonic communities.

## 3.9 MARINE MAMMALS

Fifteen marine mammal species may occur in the Beaufort and Chukchi seas (NOAA 2016a): nine cetaceans, five pinnipeds, and the polar bear (*Ursus maritimus*). Only a portion of the marine mammals in the Beaufort and Chukchi seas are likely to occur in or near the project area. Seven marine mammal species may occur in the project area: bowhead whale (*Balaena mysticetus*), gray whale (*Eschrichtius robustus*), beluga whale (*Delphinapterus leucas*), ringed seal (*Phoca hispida*), spotted seal (*Phoca largha*), bearded seal (*Erignathus barbatus*), and polar bear (HDR 2013). All of these mammals are federally protected under the MMPA. The U.S. Fish and Wildlife Service (USFWS) has jurisdiction over the polar bear, and NMFS has jurisdiction over the other marine mammals in the project area. Eight other marine mammal species do not occur regularly in the area near Simpson Lagoon or Harrison Bay, and are considered to be extralimital to the project area: the harbor porpoise (*Phocoena phocoena*), narwhal (*Monodon monoceros*), killer whale (*Orcinus orca*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), minke whale (*Balaenoptera acutorostrata*), hooded seal (*Cystophora cristata*), and Pacific walrus (*Odobenus rosmarus divergens*). A brief summary of some of the marine mammal species likely to occur in the project area is given below. The bowhead whale is listed as endangered under the ESA. The polar bear and bearded

seal are listed as threatened. Bowhead whales, polar bears, and bearded seals are discussed in Section 3.14.

### 3.9.1 BELUGA WHALE

The beluga is a toothed whale (family Monodontidae) with a circumpolar distribution. Beluga whales mainly occur in seasonally ice-covered water between 50°N and 80°N (LAMA and OASIS 2011), and they are closely associated with open leads and polynyas (LAMA and OASIS 2011). Beluga whales in the project area likely belong to the Beaufort Sea and the Eastern Chukchi Sea stocks (NOAA 2016a). Whales from these stocks winter in the Bering Sea. In spring, these whales migrate north and west through coastal open leads into the eastern Beaufort Sea where they spend their summers (NOAA 2016a). Belugas typically occur seaward of the barrier islands during spring and fall migration. A few beluga whales have been observed migrating in nearshore waters of the central Beaufort Sea during July and August (LAMA and OASIS 2011).

Beluga whales have an estimated auditory bandwidth of 150 Hz to 160 kHz. Belugas are referred to as the “sea canary” due to their diverse repertoire of sounds, including over 50 different call types. (NOAA 2016a)

### 3.9.2 GRAY WHALE

The gray whale is a robust, slow-moving baleen whale recognized by a mottled gray color with numerous light patches scattered along the body and lack a dorsal fin. Adults are 33 to 49 feet long and weigh between 16 and 45 tons (NOAA 2016a). Gray whales migrate over 5,000 to 6,200 miles between breeding lagoons in Mexico and Arctic feeding areas each spring and fall. The northward migration of the eastern North Pacific population usually occurs between mid-February and May. The summer feeding range for eastern North Pacific gray whales extends from California to the high-latitude waters of the Arctic. Most feed in the northern and western Bering and Chukchi seas. The southward migration out of the Chukchi Sea generally occurs between October and December. (NOAA 2016a)

This eastern North Pacific gray whale population has increased over the past several decades, with abundance trends consistent with a population approaching carrying capacity. As a result of the population abundance, the eastern North Pacific gray whale stock was delisted in 1994.

Gray whales are more common in the Chukchi Sea than in the Beaufort Sea. However, sightings of gray whales in the Beaufort Sea have increased over the past several years. Sightings in the Beaufort Sea included a few whales east of Point Barrow and one north of Cross Island near Prudhoe Bay (NOAA 2016a). Some gray whales may occasionally travel near the project area.

Gray whales have an estimated auditory bandwidth of 7 Hz to 22 kHz. They produce broadband signals ranging from 100 Hz to 4 kHz. (NOAA 2016a)

### 3.9.3 RINGED SEAL

Ringed seals have a circumpolar distribution and are the most abundant pinniped in the Beaufort Sea (NOAA 2016a). Migration, feeding, and the reproductive behavior of ringed seals are strongly influenced by ice cover. Most Alaskan ringed seals winter on the seasonal ice of the Chukchi Sea and northern and central Bering Sea, and migrate north with the retreat of sea ice in spring to the northern Chukchi and Beaufort seas (Kerr-McGee 2005). Ringed seals have been observed in or near Simpson Lagoon in past seismic studies (LAMA and OASIS 2011).

Ringed seals are primarily pelagic foragers, typically preying on small schooling fish and crustaceans. Factors most influencing seal densities during May through June in the central Beaufort Sea between Oliktok Point and Kaktovik were water depth, distance to the fast ice edge, and ice deformation. Highest densities of seals were at depths of 16 to 144 feet near the fast ice edge. (NOAA 2016a)

The estimated auditory bandwidth of ringed seals is 75 Hz to 75 kHz in water and 75 Hz to 30 kHz in air. Ringed seals produce at least six types of calls, but they typically produce less noise than other seal species. Seals do not echolocate; however, they can hear low-frequency sounds. (NOAA 2016a)

On December 28, 2012, NOAA Fisheries published a final rule listing the Arctic ringed seals, which occur in U.S. waters off Alaska's coast, as threatened. Critical habitat for the ringed seals proposed by NOAA Fisheries in December 2015 (70 FR 73010) encompasses a large swath of nearshore and OCS waters in the Beaufort Sea, including the project area. On March 11, 2016, the U.S. District Court for the District of Alaska issued a decision vacating the listing of the Arctic ringed seal as threatened. A notice of appeal of the District Court decision was filed on May 3, 2016. At this time, Arctic ringed seals are not listed as a threatened species under the ESA. (NOAA 2016b)

### 3.9.4 SPOTTED SEAL

Spotted seals are true seals of the family Phocidae, and are less ice-dependent than ringed and bearded seals (Kerr-McGee 2005, NOAA 2016a). These seals are closely associated with sea ice from late fall through spring during the birthing, nursing, breeding, and molting periods. Spotted seals are seasonal visitors to the southern Alaskan Beaufort Sea from July through about September, where they spend much of their time in nearshore ice-free waters (NOAA 2016a). Historically, about 400 to 600 seals inhabited the Colville and Sagavanirktok river deltas on an annual basis, but recently only about 20 seals have been observed at any one site (NOAA 2016a).

Spotted seals are likely to be present in or near the project area during portions of the year. However, due to shallow water depths and heavy scour of the sea floor, limited food resources exist in the area. The presence of spotted seals is likely associated with fish runs that occur in the Colville River and its tributaries, which would be concentrated in the river channel (BOEM 2014).

The estimated auditory bandwidth of spotted seals is 75 Hz to 75 kHz in water and 75 Hz to 30 kHz in air. Spotted seals in captivity produced six types of sounds with frequencies ranging from 500 Hz to 3.5 kHz. (NOAA 2016a)

In October 2009, NMFS completed status review of the spotted seal under the ESA, which determined the southern distinct population segment (DPS) of spotted seal (south of 43°) should be listed as a threatened species (74 FR 53683). This does not affect the spotted seals DPS in Beaufort Sea waters.

### 3.9.5 EFFECTS ON MARINE MAMMALS

Effects of the Nikaitchuq North Exploration Drilling Project on Marine Mammals

As discussed in Section 3.6, Link and Rodrigues (2009) found little evidence of underwater sound propagation from non-vessel and non-seismic activities. Noises from industrial sources (30 Hz and 60 Hz) are outside the estimated auditory bandwidth of beluga whale, ringed seals, and spotted seals. In addition, industrial sound is likely to rapidly attenuate in the shallow waters inside the barrier islands (MMS 2002). Although some gray whales may occasionally travel near the project area, noise associated with industrial activities is unlikely to affect them.

Vessel traffic associated with the Nikaitchuq North Exploration Drilling Project would be consistent with existing operations in the project area. Eni vessel traffic (hovercraft, crew boat, and barge) uses regular routes within a narrow corridor between OPP and SID, as shown in Figure 2-3. Due to the shallow water in this area, beluga and gray whales are not expected to be within this corridor. However, ringed seal and spotted seal may be located in this area.

Vessels produce continuous low frequency sounds that are perceptible to marine mammals; however, these noise levels quickly attenuate in the marine environment, so vessel noise should have negligible effects on seals (BOEM 2014). Vessel traffic associated with the Proposed Action is expected to have negligible effects on ringed and spotted seals.

Effect of the No Action Alternative on Marine Mammals

Activities associated with the No Action Alternative, including vessel traffic, are similar to that of the Nikaitchuq North Exploration Drilling Project and would be consistent with existing operations in the project area. The No Action Alternative is expected to have negligible effects on marine mammals.

## 3.10 COASTAL AND MARINE BIRDS

Millions of individual birds from almost 90 different species are likely to occur annually in marine and coastal areas of the Beaufort and Chukchi seas (NOAA 2016a). The large majority of the birds in the project area are seasonal migrants, and only a few species, such as the common raven (*Corvus corax*) and willow ptarmigan (*Lagopus lagopus*), may be year-round residents (Kerr-McGee 2005). Migratory birds typically arrive in the spring (late March to early June), and depart the area in late fall (September to October). Coastal and marine habitats are used by

breeding and post-breeding migratory birds mainly during the brief summer open water season (NOAA 2016a).

The coastal marsh habitat in the vicinity of Oliktok Point is used by brant (*Branta bernicla*) and other waterfowl for brood-rearing and molting during the summer. In August, the coastal marsh immediately south of Oliktok Point may support several hundred brant. (Kerr-McGee 2005)

Mitigation of Bird Strikes at SID

Migratory birds may suffer mortality from collisions with man-made structures, particularly when visibility is impaired by darkness or inclement weather. Lights on structures may increase the risk of collision. Eiders may be particularly impacted by strike risk due to their tendency to fly at low altitudes and fly over water at high speeds (USFWS 2006). Facilities at SID were designed and constructed in accordance with Section 10 – Terms and Conditions of the Biological Opinion for the Nikaitchuq Development Project:

- **Objective 1a. Reduce reflection** – Explore options in paint color and texture surfaces to reduce the reflection of light from structures.

  *How met:* Structures on SID are painted with dark grey, matte finish paint.

- **Objective 1b. Reduce light loss** – Ensure that windows on the east side of buildings are shaded, or light is directed downward, during darkness between August and December.

  *How met:* Eni developed a SID Lighting Plan to identify measures intended to reduce the radiation of light outward from the facilities, thereby reducing the attraction of birds to the light sources and reducing the likelihood of bird strikes.

  The risk of bird collision is largely determined by the timing of activities and location of facilities in relation to the presence of various bird species. The density of birds on the Arctic coastal plain is significantly greater in the summer. The high amount of daylight hours experienced in the area during the summer months reduces the need for lights, increases visibility, and therefore reduces the relative risk of bird strikes.

  Where practical, exterior lighting at SID is directed downward to minimize escaping light. Additionally, most lights are fitted with shading that directs lights to work and traffic areas, preventing light from escaping to areas where light is not needed for safety and operations.

  Following are the various types of exterior lights at SID:

  1. The modules have wall-mounted lights at various locations around their perimeter and at module entrances. These exterior lights were installed during module construction and have 85-watt induction lights, white in color. They have shading and are directed downward to work and traffic areas.

2. During construction the modules also had stanchion lights installed at various locations, mostly for deck and stairway lighting. These lights are 85-watt induction lights, white in color, and have shading.

3. There are approximately 12 floodlights on SID. These 400-watt, high-pressure, sodium lights are placed in areas where additional lighting needs were identified for worker safety. The floodlights are either mounted on modules/structures or on light poles. The floodlights have shading and are directed downward to work and traffic areas.

4. A red flashing light is mounted on top of the drilling rig derrick, in accordance with API Standards.

5. In each of the four corners of SID is a Private Aid to Navigation approved by the U.S. Coast Guard. The navigation aids have white lights (150 watts) that flash at a rate of approximately 60 per minute.

6. There are 16 green lights flush with the deck of the helipad, defining the perimeter of the landing area.

7. There is a blue flashing warning light on the west side of the waste injection well house. The warning light is operated during times of high-pressure injection, the frequency and duration of which vary, as well as during periodic function testing.

8. Amber flashing emergency warning lights are located in several locations on SID. They are operated infrequently, only during emergencies such as gas leaks or fires, as well as during periodic function testing.

9. Up to approximately six portable light plants are used when needed for safety in specific areas during winter.

The upgrades planned for the drilling rig do not include any significant changes to the lighting plan. Any new modules to house additional rig equipment will have exterior wall-mounted lights as described in item 1 above.

Buildings, modules, and structures are painted with low-reflecting finishes, decreasing the ambient reflected light, thus reducing light output beyond SID. The drilling rig and associated modules are painted dark orange; the camp and production modules are gray.

- **Objective 2.** Work with the USFWS to develop a protocol and design for strobe lighting for the east side of the island. This may include considerations such as color and synchronicity. The final design will comply with U.S. Coast Guard (USCG) and Federal Aviation Administration regulations.

  *How met:* Navigation lights are located on the four corners of SID, which are operated 365 days a year, except in the event of mechanical failures or routine preventative maintenance. These lights are white strobe lights and meet USCG requirements.

Additionally, strobe lights are located on the drill rig derrick. These lights are flashing red during night and white during the day.

- **Objective 3.** Monitor the offshore island for bird carcasses resulting from collision with infrastructure.

  *How met:* Eni monitors SID on a daily basis for injured or dead birds and complies with USFWS bird strike reporting protocols. Bird strikes have been rare on SID; there has been an average of less than one bird strike event per year. There have been no spectacled or Steller's eider bird strikes at SID since construction. Most bird strikes have been from long-tailed ducks as shown on Table 3-6.

**Table 3-6 Bird Strikes at SID, 2011 – 2016[a]**

| DISCOVERY DATE | SPECIES | CONDITION | CAUSE OF INJURY/DEATH | LOCATION |
|---|---|---|---|---|
| 9/26/2011 | Long-tailed duck | Injured | Collision-unwitnessed | Under Pipe Rack at D2E03 |
| 9/26/2011 | Long-tailed duck | Dead | Collision-unwitnessed | Under Pipe Rack at D2E03 |
| 9/14/2012 | Long-tailed duck | Dead | Collision-unwitnessed | On grating, SE corner of D2U01 |
| 9/14/2012 | Long-tailed duck | Dead | Collision-unwitnessed | On grating, SE corner of D2U01 |
| 9/14/2012 | Long-tailed duck | Dead | Collision-unwitnessed | On grating, SE corner of D2U01 |
| 9/16/2013 | Long-tailed duck | Dead | Collision with SID Camp-unwitnessed | North corner of East boat ramp |
| 9/16/2013 | Long-tailed duck | Dead | Collision with SID Camp-unwitnessed | North corner of East boat ramp |
| 9/17/2013 | Long-tailed duck | Dead | Collision with SID Camp-unwitnessed | North corner of East boat ramp |
| 9/23/2013 | Long-tailed duck | Dead | Collision with SID Camp-unwitnessed | North corner of East boat ramp |
| 9/27/2016 | Sanderling | Dead | Collision-unwitnessed | SID Pad |
| 9/27/2016 | Sanderling | Dead | Collision-unwitnessed | SID Pad |
| 9/27/2016 | Sanderling | Dead | Collision-unwitnessed | SID Pad |
| 9/27/2016 | Sanderling | Dead | Collision-unwitnessed | SID Pad |
| 10/23/2016 | Common Eider | Dead | Collision-unwitnessed | SID Pad |

Effects of the Nikaitchuq North Exploration Drilling Project on Coastal and Marine Birds

Activities associated with the Nikaitchuq North Exploration Drilling Project, including vessel traffic, are consistent with existing operations in the project area and similar to that of the No Action Alternative. Eni vessel traffic uses regular routes within a narrow corridor between OPP and SID. These activities are unlikely to cause adverse effects to coastal and marine bird populations in the project area. Although vessel traffic could potentially disturb birds in the vicinity of a vessel, these disturbances are expected to be temporary and local.

No increased risk of bird strikes is expected because existing facilities will be used to support the Nikaitchuq North Exploration Drilling Project. Eni will continue to follow the requirements of the Biological Opinion (USFWS 2006) and the SID Lighting Plan to mitigate the risk of bird strikes.

Effect of the No Action Alternative on Coastal and Marine Birds

Activities associated with the No Action Alternative, including vessel traffic, are similar to that of the Nikaitchuq North Exploration Drilling Project and would be consistent with existing operations in the project area. No increase in impacts on birds is expected as a result of the No Action Alternative. Eni will continue to follow the requirements of the Biological Opinion (USFWS 2006) and the SID Lighting Plan to mitigate the risk of bird strikes.

## 3.11 FISH AND SHELLFISH

During the open water season, the relatively shallow and brackish waters of Simpson Lagoon and Harrison Bay support a number of anadromous and marine fishes (Kerr-McGee 2005). Fish usage of nearshore waters varies over the open water season (Craig et al. 1982). During the first signs of spring breakup, anadromous fish disperse out of freshwater rivers into the nearshore coastal waters (NOAA 2016a). Often they move in waves parallel to shore, and each wave may last a few weeks. Some disperse widely from their natal streams, while others do not (NOAA 2016a). Anadromous species typically return to rivers or estuaries in fall to overwinter and/or spawn. Marine species tend to become more abundant in nearshore waters as the open water season progresses. Both anadromous and marine fish feed extensively on invertebrates while in brackish nearshore waters (Craig et al. 1982).

Some of the common anadromous fish in the project area include the Arctic cisco (*Coregonus autumnalis*), least cisco (*Coregonus sardinella*), char (*Salvelinus sp.*), and broad whitefish (*Coregonus nasus*). Common marine species in the area are likely to include Arctic cod (*Boreogadus saida*), fourhorn sculpin (*Myoxocephalus quadricornis*), spotted snailfish (*Liparis callyodon*), and wattled eelpout (*Lycodes palearis*). (Kerr-McGee 2005)

### 3.11.1 ARCTIC CISCO

The Arctic cisco is an anadromous fish species that spawns in freshwater in the summer and overwinters in nearshore marine waters. They are one of the dominant species found in Simpson Lagoon and adjacent coastal waters of the Beaufort Sea during summer. Arctic cisco

tend to stay in warm, brackish nearshore waters, perhaps because they are anadromous. The Arctic cisco life cycle starts in the Mackenzie River, with newly hatched young-of–the-year entering ice-free coastal waters in summer, and being transported by westward coastal winds to rivers along the Beaufort Sea coast, including the Colville River where they overwinter. Juveniles and subadults feed in marine nearshore habitat of the Beaufort Sea during summer, then move up the Colville River for overwintering. Adults migrate back to the Mackenzie River to spawn at seven or eight years old. (ADNR 2009)

### 3.11.2 LEAST CISCO

Least cisco are found in the lakes and streams of the Arctic coast, as well as brackish waters. Populations may be stream-dwelling and migratory, or lake-dwelling and non-migratory. The least cisco is one of the dominant species found in Simpson Lagoon and adjacent coastal waters of the Beaufort Sea during summer. Spawning occurs in late September and early October at water temperatures between 0°F and 3°F. Eggs spend the winter in the gravel, hatching in the early spring. Young-of-the-year move downstream to slower water by mid-June.

Females become sexually mature between 2 and 4 years old; the maximum age for least cisco is probably between 8 and 11 years. Least cisco feed on various types of zooplankton such as small copepods, cladocerans, mysids, and both adults and larvae of various insects. Predators include eagles, hawks, kingfisher, northern pike, inconnu, lake trout, and burbot. Arctic grayling and whitefish eat least cisco eggs during spawning. (ADNR 2009)

### 3.11.3 ARCTIC CHAR

In Alaska, most Arctic char are lake residents. While information about char distribution in the Beaufort Sea area is lacking, it is one of the dominant species found in Simpson Lagoon and adjacent coastal waters of the Beaufort Sea during summer. Dolly Varden and Arctic char are so closely related that it is difficult to distinguish between them. Dolly Varden are found in many rivers and streams throughout Beaufort Sea drainages, and during the summer adults are distributed widely in the nearshore waters of the Beaufort Sea. Dolly Varden are important to North Slope ecosystems because they provide marine-derived nutrients to low productivity aquatic food webs, and they are a source of food for bird and mammal predators. (ADNR 2009)

### 3.11.4 BROAD WHITEFISH

Broad whitefish are found in most rivers draining into the Beaufort Sea. They are anadromous, but while in the ocean, they probably remain close to shore in relatively brackish waters. During the summer, and sometimes into the fall, broad whitefish migrate into rivers where they spawn in September through October, and possibly into November. After spawning, adults move downstream to deep overwintering areas in rivers or estuaries. Eggs hatch in the spring and the young subsequently move downstream. The Ublutuoch River, Fish Creek, Judy Creek, the Colville River, and several deep lakes off of Fish, Judy, and Inigok creeks are used for overwintering. (ADNR 2009)

### 3.11.5 ARCTIC COD

The Arctic cod is one of the most abundant species found in waters of the Beaufort Sea and is one of the dominant species found in Simpson Lagoon and adjacent coastal waters. They are generally found in brackish lagoons, river mouths, and in nearshore marine waters, although they sometimes occur in deeper waters and farther offshore. Arctic cod are short-lived, mature early at age two or three, and may only spawn once, in contrast to most other Arctic fishes that tend to be long-lived. Arctic cod are a critical component of arctic food webs because they feed on planktonic copepods and amphipods, ice-associated amphipods, and epibenthic crustacean and are an important food prey for other fish, seals, beluga whales, narwhals, and seabirds. (ADNR 2009)

### 3.11.6 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Act defines essential fish habitat (EFH) as *"those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity"* (16 U.S.C. 1802). Presently, EFH has been described in the Alaskan Arctic for five species of Pacific salmon, in addition to Arctic cod, saffron cod, and opilio (snow) crab. The EFH for Pacific salmon species has been described and mapped by NMFS. Salmon EFH includes all those freshwater streams, lakes, ponds, wetlands, and other water bodies currently or historically accessible to salmon. Marine EFH for the salmon fisheries in Alaska includes all estuarine and marine areas used by Pacific salmon of Alaska origin, extending from the influence of tidewater and tidally submerged habitats to the limits of the Exclusive Economic Zone. This habitat includes waters of the continental shelf. (NOAA 2016a)

### 3.11.7 EFFECTS ON FISH AND SHELLFISH

Effect of the Nikaitchuq North Exploration Drilling Project on Fish and Shellfish

Vessel traffic associated with the Nikaitchuq North Exploration Drilling Project would be consistent with existing operations in the project area. Vessel traffic is unlikely to cause adverse effects to fish or EFH. Vessel traffic may result in local and temporary disturbance effects on fish, but fish populations in the project area are unlikely to be adversely impacted.

Effects of the No Action Alternative on Fish and Shellfish

Activities associated with the No Action Alternative, including vessel traffic, are similar to that of the Nikaitchuq North Exploration Drilling Project and would be consistent with existing operations in the project area. No increase in impacts on fish or EFH is expected as a result of the No Action Alternative.

## 3.12 TERRESTRIAL VEGETATION AND WETLANDS

The terrestrial vegetation within the project area is limited to that around Oliktok Point. The area is predominately wetlands (Kerr-McGee 2005). The existing OPP and NOC were developed during the original Nikaitchuq Development and are located on gravel pads in this area

(approximately ten acres and seven acres, respectively) (Kerr-McGee 2005). Neither the Proposed Action nor the No Action Alternative will alter terrestrial vegetation.

## 3.13 TERRESTRIAL MAMMALS

Approximately 30 species of terrestrial mammals may be present in the vicinity of the project area, ranging from small mammals, such as voles and lemmings, to large predators and herbivores, such as bears, caribou, and musk oxen (NOAA 2016a). Some species, such as ground squirrels, are common in the Arctic Coastal Plain, while others, such as wolverines (*Gulo gulo*), are only rarely observed. Some of the important terrestrial mammals that may be present in the project area include: caribou (*Rangifer tarandus granti*), Arctic fox (*Vulpes lagopus*), and grizzly (brown) bear (*Ursus arctos*) (Kerr-McGee 2005). These terrestrial mammal species are discussed in greater detail below.

### 3.13.1 CARIBOU

Caribou are abundant across Alaska's North Slope, with ranges extending from the coastal plain south into the Brooks Range. Caribou move throughout the year, utilizing different parts of their annual ranges for calving, insect avoidance, and overwintering. The project area includes terrestrial habitats near Oliktok Point, and is located within the calving range of the Central Arctic Herd (CAH) and on the eastern fringe of the annual range of the Teshekpuk Lake Herd (NOAA 2016a). The CAH is the predominant herd utilizing the project area and therefore the most relevant for this discussion. The CAH calving grounds include coastal areas, which are also utilized in the summer for avoidance of predators and biting insects (NOAA 2016a, BOEMRE 2011). Calving areas are located on the open tundra and are selected based on a preference for rugged terrain (BOEMRE 2011); the area just south of Oliktok Point has been identified as an important calving area for the CAH (AECOM 2010). Migration to calving grounds begins in March, and calving occurs between late April and early June. In the fall, caribou begin to migrate south to their overwintering areas in the Brooks Range and foothills, although a few remain north of the mountains throughout the winter (BOEMRE 2011, NOAA 2016a). Increased road density has been associated with reduced occurrence of CAH caribou in the vicinity of the project area, potentially due to reduced access to preferred habitats for females during the calving period and to insect avoidance areas in general (Kerr-McGee 2005).

### 3.13.2 FOX

Both Arctic foxes and red foxes (*Vulpes vulpes*) are present across the Arctic Coastal Plain. Arctic foxes have historically been the predominant species, although red foxes have reportedly increased and have even begun to displace Arctic foxes in the Prudhoe Bay area in recent years (BLM 2004, Prichard and Macander 2015). Foxes prey on bird eggs and smaller mammals, such as voles and lemmings, and use of sea ice to hunt for marine food sources has been documented in the National Petroleum Reserve – Alaska (NPR-A) area (Pamperin 2008). Fox movement and population levels are influenced by prey availability, including access to human food sources in areas of oilfield development (BLM 2012, Pamperin 2008). Fox dens are typically located in elevated areas, such as pingos, and/or along riverbanks or lake beds (Prichard and Macander 2015). A survey of fox dens on the North Slope to the west of the

project area, near Wainwright, examined a number of characteristics and found that dens occurred more frequently in locations farther from the coast and near rivers; similar to caribou calving areas, a preference for rugged terrain was observed (Prichard and Macander 2015).

### 3.13.3 GRIZZLY BEAR

Grizzly bears are the North Slope's largest terrestrial predator, preying on caribou, foxes, and ground squirrels, in addition to birds, fish, plants, and opportunistic food sources, such as human foods in developed areas. The home range size of grizzly bears is large, resulting in a low density of bears (typically one to five bears per 1,000 square miles) in any given area (BLM 2014, 2012). The bears generally prefer riparian habitats due to the abundance and diversity of food sources and select well-drained areas of moderate to high relief for den locations (BLM 2014). Although dens are more often located farther inland toward the Brooks Range, dens have been recorded closer to the coast, including the Colville River delta (BLM 2014). Coastal areas are more likely to be used for hunting than for denning, which occurs from October through April/May, and grizzly bears are more likely to be present near the project area in the warmer months. In general, grizzly bears are not expected to be common in coastal areas of the North Slope due to the relatively poor habitat quality in these areas (BLM 2012).

### 3.13.4 EFFECT ON TERRESTRIAL MAMMALS

Effect of the Nikaitchuq North Exploration Drilling Project on Terrestrial Mammals

The Nikaitchuq North Exploration Drilling Project would use existing gravel pads (NOC and OPP) as well as SID, the existing man-made gravel island, and would not impact the habitat of terrestrial mammals. Vessel traffic associated with the Nikaitchuq North Exploration Drilling Project would be consistent with existing operations in the project area. Terrestrial vehicle traffic associated with the Nikaitchuq North Exploration Drilling Project would be limited to bus and van traffic using existing roads to transport personnel between Deadhorse and OPP. Bus/van trips associated with the Nikaitchuq North Exploration Drilling Project would be consistent with existing operations in the project area and the same as that of the No Action Alternative. Vehicle traffic associated with the Proposed Action is expected to have negligible effects on terrestrial mammals.

Effects of the No Action Alternative on Terrestrial Mammals

Activities and facilities associated with the No Action Alternative are similar to that of the Nikaitchuq North Exploration Drilling Project and would be consistent with existing operations in the project area. Vehicle traffic associated with the No Action Alternative is expected to have negligible effects on terrestrial mammals.

## 3.14 THREATENED AND ENDANGERED SPECIES

Five species listed as threatened or endangered under the ESA have the potential to be found in the project area: the bowhead whale (*Balaena mysticetus*), listed as endangered; spectacled eiders (*Somateria fischeri*), listed as threatened; Steller's eiders (*Polysticta stelleri*; Alaska breeding population), listed as threatened; bearded seals (*Erignathus barbatus*), listed as threatened; and polar bears (*Ursus maritimus*), listed as threatened. The threatened or endangered species that may be in the project area are discussed in greater detail below.

### 3.14.1 SPECTACLED AND STELLER'S EIDERS

The North Slope, including the project area, is one of two primary breeding grounds for spectacled eiders in Alaska. The eiders arrive in this area in late May to early June and use shallow freshwater or brackish ponds and flooded tundra to nest and feed on small crustaceans, insect larvae, plants/seeds, and mollusks. Female eiders, and later ducklings, reside in this freshwater habitat until about 50 days after the ducklings hatch, then move briefly to marine habitat before migrating to their molting area in Ledyard Bay and then to wintering areas in the Bering Sea. Males leave the breeding grounds earlier than females and most have been observed to move immediately towards the Chukchi Sea, while females typically spend about two weeks in the Beaufort Sea prior to moving west to molting grounds. Nest success varies primarily based on predation and can be quite low. In a survey completed from 2007 to 2010, a relatively low density of spectacled eiders (typically less than 0.2 birds per square kilometer) was observed in areas near the project area (USFWS 2013).

The Arctic Coastal Plain is also the primary breeding ground for Steller's eiders. These eiders occur only infrequently outside of the Utqiaġvik area, where nesting is concentrated. Breeding Steller's eiders have not been observed east of the Colville River since 1998, and only five observations occurred in this area between 1992 and 1998 (USFWS 2013). Steller's eiders are therefore not likely to occur near the project area.

Effect of the Nikaitchuq North Exploration Drilling Project on Spectacled and Steller's Eiders

There is no critical habitat designated near the project area for either spectacled or Steller's eiders (66 FR 9146 and 66 FR 8850, respectively). The potential for impacts to spectacled eiders are most likely to occur during the short period when birds are at sea prior to their migration to molting grounds.

Vessel traffic associated with the Nikaitchuq North Exploration Drilling Project would be consistent with existing operations in the project area and similar to that of the No Action Alternative. The risk of disturbance by vessel traffic is mitigated by Eni's use of regular vessel traffic routes within a narrow corridor between OPP and SID, as shown in Figure 2-3. Vessel traffic associated with the Proposed Action is expected to have negligible effects on spectacled eiders. Because Steller's eiders are not likely to occur near the project area, no effect on Steller's eiders is expected.

The risk of bird strikes (collisions with man-made structures), including those for spectacled or Steller's eiders are mitigated by following the terms and conditions of the Biological Opinion for

the Nikaitchuq Development Project (USFWS 2006) as outlined in Section 3.10. There have been no spectacled or Steller's eider bird strikes at SID since construction as shown in Table 3-6. No additional risk of spectacled or Steller's eider bird strikes are expected as part of the Nikaitchuq North Exploration Drilling Project.

Effect of the No Action Alternative on Spectacled and Steller's Eiders

Activities associated with the No Action Alternative, including vessel traffic and use of man-made structures, are similar to that of the Nikaitchuq North Exploration Drilling Project and would be consistent with existing operations in the project area. The No Action Alternative is expected to have negligible effects on spectacled eiders. Because Steller's eiders are not likely to occur near the project area, no effect on Steller's eiders is expected.

### 3.14.2 POLAR BEAR

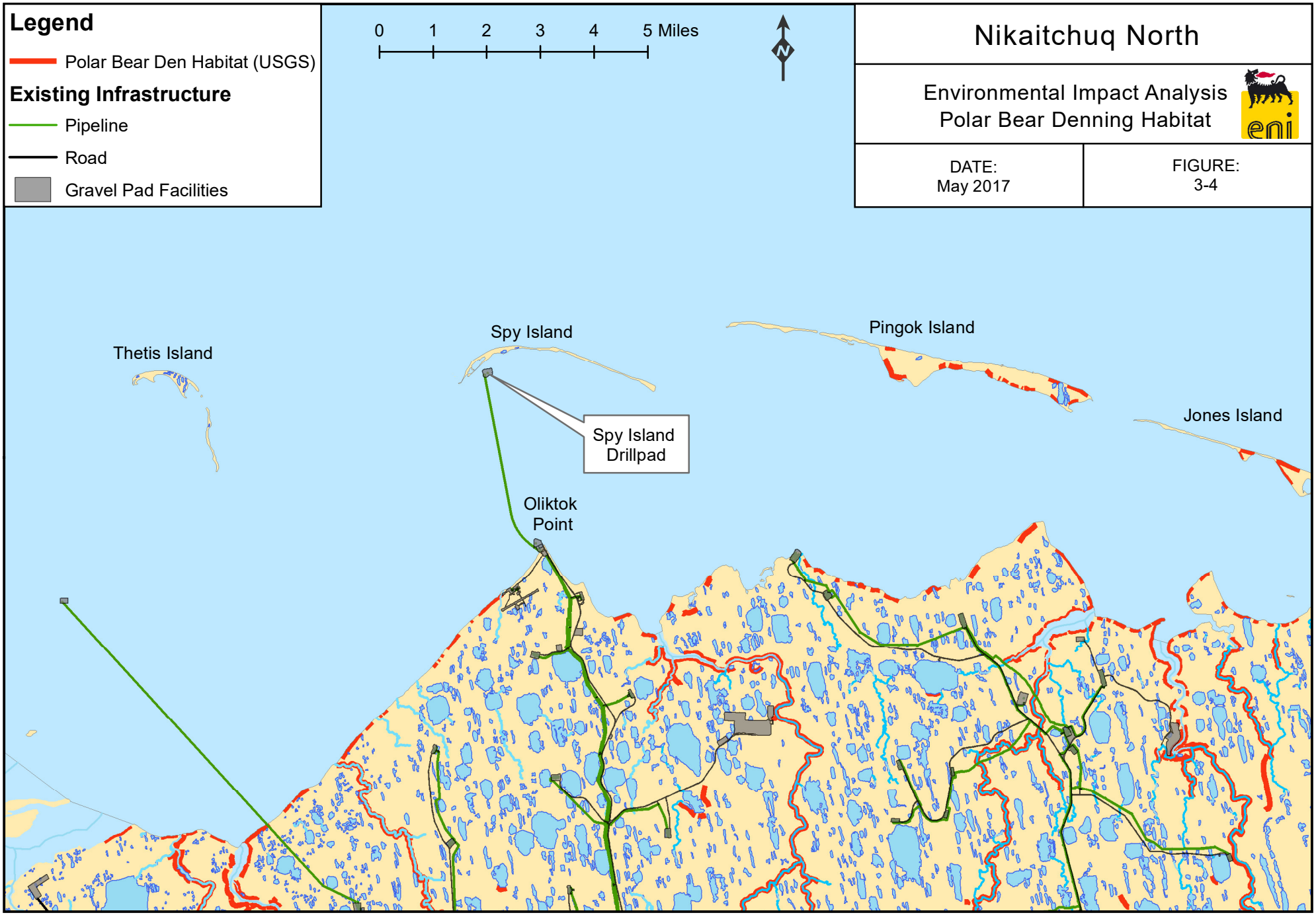
The polar bear has a circumpolar distribution that is strongly influenced by sea ice. Sea ice represents an important habitat for hunting, breeding, travel, and resting (NOAA 2016a). In the spring, shorefast ice is often used by bears for traveling and preying on seal pups. Historically, Alaskan bears were generally not known to spend extended periods of time on land except for land-denning females. However, distribution patterns have changed in recent years, and a number of Alaskan bears are remaining on land or coming ashore during increasingly ice-free summers (NOAA 2016a).

Based on a review of topography in the project area, there is no appropriate polar bear denning habitat near SID as shown on Figure 3-4. However, non-denning polar bears may occasionally travel through the area (Kerr-McGee 2005). Eni obtains an annual Letter of Authorization (LOA) from the USFWS, which authorizes takes (by harassment) of polar bears incidental to oil and gas activities associated with the Nikaitchuq project area, as well as an LOA authorizing the intentional take of small numbers of polar bears by non-lethal harassment (deterrence) under specified conditions. Table 3-7 shows the number of polar bear sightings and hazing incidents at OPP and SID between 2011 and 2016.

**Table 3-7 Polar Bear Sightings and Hazing at OPP and SID, 2011 – 2016[a]**

| YEAR | SIGHTINGS | HAZING INCIDENTS |
|---|---|---|
| 2011 | 33 | 2 |
| 2012 | 35 | 1 |
| 2013 | 38 | 2 |
| 2014 | 51 | 1 |
| 2015 | 24 | 2 |
| 2016 | 98 | 14 |

Notes:
a = Bear observations were recorded through November 24, 2016.


Legend
Polar Bear Den Habitat (USGS)
Existing Infrastructure
Pipeline
Road
Gravel Pad Facilities
0 1 2 3 4 5 Miles
N
Nikaitchuq North
Environmental Impact Analysis
Polar Bear Denning Habitat
eni
DATE:
May 2017
FIGURE:
3-4
Thetis Island
Spy Island
Spy Island
Drillpad
Pingok Island
Jones Island
Oliktok
Point

Effect of the Nikaitchuq North Exploration Drilling Project on Polar Bears

Vessel traffic associated with the Nikaitchuq North Exploration Drilling Project would be consistent with existing operations in the project area and similar to the No Action Alternative. The risk of disturbance by vessel traffic is mitigated by Eni's use of regular vessel traffic routes within a narrow corridor between OPP and SID, as shown in Figure 2-3. It is assumed that vessels could potentially disturb bears transiting in the project area, but these disturbances are expected to be temporary and unlikely to result in appreciable adverse effects to polar bears. Because appropriate denning habitat is not located near OPP or SID, no appreciable risk of impact to denning polar bears is expected.

Effect of the No Action Alternative on Polar Bears

Vessel traffic associated with the No Action Alternative is very similar to the Proposed Action and is expected to have similar effects. Because appropriate denning habitat is not located near OPP or SID, no appreciable risk of impact to denning polar bears is expected from the No Action Alternative.

### 3.14.3 BOWHEAD WHALE

The bowhead whale is an ecologically and culturally important marine mammal in the Alaskan Arctic. Bowheads are migratory and occur seasonally in the Beaufort Sea. In the spring, bowhead whales migrate from their wintering grounds in the Bering Sea to their feeding grounds in the eastern Beaufort Sea travelling parallel to and within 40 km (24.8 mi) of the coast at Utqiaġvik/Barrow (NOAA 2016a, BLM 2012). During the spring migration, many bowhead whales follow somewhat predictable offshore leads and are unlikely to be present in the project area because nearshore habitats are typically ice-covered (BLM 2012). In September to mid-October, bowheads begin their western migration out of the Canadian Beaufort Sea to the Chukchi Sea within 100 km (62 mi) of shore (NOAA 2016a). During fall migration, most individuals migrate west in waters 50 to 650 feet deep and stay seaward of the barrier islands (HAK 2015). Bowhead whales are not expected to be commonly observed in the project area but may be rare visitors of deeper water areas.

Bowhead whales are low-frequency, functional-hearing, baleen whales; based on their vocalizations, bowhead whales should be most sensitive to frequencies between 20 Hz and 5 kHz, with maximum sensitivity between 100 Hz and 500 Hz (NOAA 2016a).

Effect of the Nikaitchuq North Exploration Drilling Project on Bowhead Whales

Most bowhead whales passing near the area during the fall migration travel from about 30 to 70 km (19 to 43 mi) offshore in water depths greater than 20 m (Link and Rodrigues 2009).

As discussed in Section 3.6, Link and Rodrigues (2009) found no evidence of tones associated with drill string rotation when measuring sound characteristics associated with industrial activities from ODS and SID. They also found that there was little evidence of underwater sound propagation from non-vessel and non-seismic activities. Additionally, industrial sound is likely to rapidly attenuate in the shallow waters inside the barrier islands (MMS 2002). Noise associated

with industrial activities is unlikely to affect bowhead whales that may be present near a lagoon entrance because industrial sound is likely to rapidly attenuate in the shallow waters inside the barrier islands.

Vessel traffic associated with the Nikaitchuq North Exploration Drilling Project is consistent with existing operations in the project area. Vessels produce continuous low frequency sounds that are perceptible to marine mammals; however, these noise levels quickly attenuate in the marine environment, so vessel noise should have negligible effects on marine mammals (BOEM 2014). Eni vessel traffic uses regular routes within a narrow corridor between OPP and SID, as shown in Figure 2-3. Due to the shallow water in this area, bowhead whales are not expected to be within this corridor. Vessel traffic associated with the Proposed Action is not expected to affect bowhead whales.

Effect of the No Action Alternative on Bowhead Whales

Drilling activities and vessel traffic associated with the No Action Alternative is very similar to the Proposed Action and are expected to have similar effects. Vessel traffic and underwater noise associated with the No Action Alternative are unlikely to affect bowhead whales.

### 3.14.4 BEARDED SEAL

The bearded seal has a circumpolar distribution and is closely associated with sea ice (NOAA 2016a). Bearded seals use sea ice as a platform for birthing, nursing, resting, and molting. In the Beaufort Sea, bearded seals were most abundant in areas where drifting pack ice interacts with fast ice, and there are open water leads, fractures, and polynyas (NOAA 2016a). The bearded seal migrates following the retreat and advance of the seasonal pack ice across the Chukchi and northern Bering seas. Bearded seals generally move south as the pack ice advances into the Bering Sea in winter and north as the ice edge recedes into the Chukchi and Beaufort seas in the late spring and summer (ADF&G 2017).

Bearded seals use dense to light areas of sea ice for resting and molting (BOEM 2014). Because bearded seals feed benthically, they generally associate with seasonal sea ice over shallow water of less than 200 m (656 feet) (NOAA 2016a). In the Beaufort Sea, bearded seals prefer areas of open ice cover and water depths of 25 to 75 m (82 to 246 feet) (NOAA 2016a). These seals have been commonly observed in the central Beaufort Sea during wildlife surveys (LAMA and OASIS 2011).

The estimated auditory bandwidth of bearded seals is 75 Hz to 75 kHz in water and 75 Hz to 30 kHz in air. Male bearded seals produce four basic call types: trill, moan, sweep, and ascent. The sounds of bearded seals during their breeding season (May) increases the ambient noise level by as much as 20 dB. (NOAA 2016a)

On December 28, 2012, NOAA Fisheries published a final rule listing the Beringia and Okhotsk DPSs as threatened. Beringia bearded seals occur in U.S. waters off Alaska's coast (77 FR 76739). On July 25, 2014, the U.S. District Court for the District of Alaska issued a decision vacating the listing of the Beringia DPS of bearded seals as threatened. NOAA Fisheries has appealed the U.S. District Court's decision to the U.S. Court of Appeals for the Ninth Circuit. In an October 2016 decision, the Ninth Circuit U.S. Court of Appeals reversed the U.S. District

Court's summary judgment in favor of plaintiffs in their action challenging federal officials' decision listing bearded seals under the ESA. At this time, Beringia DPS bearded seals are listed as a threatened species under the ESA.

While bearded seals are likely to be present in or near the project area during portions of the year, the abundance of bearded seals in the project area is expected to be low because habitat quality is relatively poor. For example, during the open water season bearded seals tend to be associated with the ice front, which is typically located a long distance from the project area. Similarly, ice-gouging of the shallow bottom during spring can reduce the abundance of prey for bearded seals, thus reducing the value of shallow-water habitat for seals. (BOEM 2014)

Effect of the Nikaitchuq North Exploration Drilling Project on Bearded Seals

A relatively small number of bearded seals are likely to be exposed to vessels or noise associated with Nikaitchuq North Exploration Drilling Project activities. Activities associated with the Nikaitchuq North Exploration Drilling Project, including vessel traffic, is consistent with existing operations in the project area.

As discussed in Section 3.6, Link and Rodrigues (2009) found no evidence of tones associated with drill string rotation when measuring sound characteristics associated with industrial activities from ODS and SID. There was evidence of weak tones at frequencies associated with machinery (30 Hz and 60 Hz) (Link and Rodrigues 2009), however these tones are outside the estimated auditory bandwidth of bearded seals. Additionally, industrial sound is likely to rapidly attenuate in the shallow waters inside the barrier islands (MMS 2002). Industrial noises associated with the Nikaitchuq North Exploration Drilling Project are not expected to affect bearded seals.

Vessels produce continuous low frequency sounds, frequently around 160 dB, that are perceptible to marine mammals; however, these noise levels quickly attenuate in the marine environment, so vessel noise should have negligible effects on marine mammals (BOEM 2014). Additionally, Eni uses regular vessel traffic routes within a narrow corridor between OPP and SID. Vessel traffic associated with the Proposed Action is expected to have negligible effects on bearded seals.

Effect of the No Action Alternative on Bearded Seals

Vessel traffic associated with the No Action Alternative is very similar the Proposed Action and is expected to have similar effects. Vessel traffic associated with the No Action Alternative is expected to have negligible effects on bearded seals.

## 3.15 SENSITIVE BIOLOGICAL RESOURCES

While sensitive biological resources have been identified in the Beaufort Sea (e.g., Stefansson Sound boulder patch, Arctic National Wildlife Refuge) no sanctuaries, rookeries, or calving grounds are located in the project area. However, the waters of Harrison Bay and Simpson Lagoon are considered EFH. EFH is described in Section 3.11.6.

## 3.16 ARCHAEOLOGICAL RESOURCES

The North Slope of Alaska includes the lands occupied in the twentieth century by the western Inuit. Offshore prehistoric and historic resources are outlined in NOAA 2016a, but are considered difficult to assess. Due to active erosion, many coastal cultural resources have been damaged or destroyed. Of the more than 1,200 archaeological sites that have been recorded in the Alaska Heritage Resource files of the Alaska Office of History and Archaeology, very few are located in the coastal region. (NOAA 2016a)

There are a number of prehistoric and historic archaeological sites known to be near the project area, including Pingo sites (Thetis Mound, Ugnuravik Pingo), but none are considered to be sufficiently close to be adversely affected (USACE 2006). Reconnaissance-level archaeological surveys were performed prior to development associated with the Nikaitchuq project (i.e., OPP, NOC, SID, and the gravel mine site) to identify previously unknown archaeological resources (Kerr-McGee 2005). The closest historic property is the U.S. Air Force Oliktok Point Long Range Radar Station (LRRS) located approximately 0.75 mile west of OPP. This property is eligible to be listed as a historic place under the National Historic Preservation Act as part of the Distant Early Warning (DEW) Line system. The environmental assessment performed for the Nikaitchuq Development Project (USACE 2006) concluded that no historic properties would be impacted by that project.

Effect of the Nikaitchuq North Exploration Drilling Project on Archaeological Resources

The Nikaitchuq North Exploration Drilling Project would make use of the existing project facilities and would not include development of new facilities that could impact archaeological resources. No impacts to archaeological resources are expected from the Nikaitchuq North Exploration Drilling Project.

Effect of the No Action Alternative on Archaeological Resources

The No Action Alternative would make use of the existing project facilities and would not include development of new facilities that could impact archaeological resources. No impacts to archaeological resources are expected from the No Action Alternative.

## 3.17 SOCIAL SYSTEMS

This section discusses the regional and community social systems on the North Slope that could be affected by the proposed exploration drilling in the Beaufort Sea OCS. These include the predominantly Alaska Native communities of Nuiqsut and Utqiaġvik (formerly known as Barrow), as well as the unincorporated community of Deadhorse, which serves primarily to provide oil field support services and transient housing for oilfield workers. The relevant social systems include population, employment, and social structure. There are two populations in the vicinity of the project: local permanent residents, a majority of whom are Iñupiat, and oil and gas industry workers who are temporary residents. This discussion focuses on the permanent residents of Nuiqsut, the closest community to the proposed project.

Social systems in Nuiqsut can be impacted by nearby oil development in a number of ways, including increased employment opportunities and income, tensions related to the permitting process for development, and disruptions to subsistence resources and activities.

The proposed project is located within the NSB. There are three communities along the Beaufort Sea coast that have a potential to be impacted by the proposed Nikaitchuq North Exploration Drilling Project. They are Utqiaġvik and Nuiqsut, both primarily Alaska Native communities, and Deadhorse, an oilfield support complex.

Utqiaġvik approved changing the community's name from Barrow to the traditional Iñupiaq name of Utqiaġvik, meaning "place where snowy owls are hunter," effective December 1, 2016 (SOA 2016). Utqiaġvik is a first-class city about 165 miles west of SID and is the economic, transportation, and administrative center of the NSB (2016). Deadhorse, located near the Prudhoe Bay oilfield, is a large work camp for the oil industry and was extensively developed for oil development. All residents are employees of the oil industry or support companies and work long, consecutive shifts. Prudhoe Bay is the origin of the 800-mile long TAPS (ADCCED 2016).

### 3.17.1 SOCIAL ORGANIZATION AND GOVERNMENT

The NSB is the Alaska's largest borough covering 88,000 square miles of land and 5,900 square miles of water. It is a Home Rule government which allows it to exercise legal governmental power in addition to its powers of taxation, property assessment, education, and planning and zoning. The NSB offers a full range of services including police and fire protection, search and rescue, maintenance of infrastructure, and providing water, wastewater, power, and heat services (NOAA 2016a). The NSB seat of government is Utqiaġvik.

All communities within the NSB, with the exception of Deadhorse, have both municipal governments (e.g., incorporated as cities) and tribal governments recognized by the Bureau of Indian Affairs. Both the Native Village of Barrow and the Native Village of Nuiqsut are represented by traditional councils. In addition, tribal residents of Utqiaġvik are represented by the Inupiat Community of the Arctic Slope. (NOAA 2016a). In addition, the communities of Utqiaġvik and Nuiqsut have city governments that also provide services.

In 1971, the Alaska Native Claims Settlement Act (ANCSA) created Alaska Native corporations. ANCSA conveyed 44 million acres and $962.5 million in compensation to 12 regions and their associated villages. The Alaska Native regional corporation for the North Slope is Arctic Slope Regional Corporation (ASRC). The village corporation for Utqiaġvik is Ukpeaġvik Iñupiat Corporation (UIC); the village corporation for Nuiqsut is Kuukpik Corporation. ASRC, UIC, and Kuukpik Corporation all provide support services to oil and gas exploration and development activities within the NSB.

### 3.17.2 NUIQSUT

The community of Nuiqsut, located approximately 35 miles southwest of SID, is the closest community to the proposed project. As a result, Nuiqsut is the focus of this affected environment discussion. Nuiqsut is an Iñupiat community located on the west bank of the Nigliq Channel of the Colville River. The Colville River spills into Harrison Bay where SID is located. While the

Colville delta has traditionally been a gathering and trading place, the old village of Nuiqsut was abandoned in the 1940s because there was no school. Following the passage of ANCSA, the village was resettled by 27 families in 1973. (ADCCED 2016)

As well as being the closest community to the proposed Nikaitchuq North Exploration Drilling Project, Nuiqsut is the closest village to major oil producing fields of the North Slope (SRB&A 2010).

### 3.17.3 POPULATION AND EMPLOYMENT

The population of Nuiqsut has fluctuated since the village was reestablished. However, between 1993 and 2010, the population remained constant, varying only by one person, from 416 to 415 residents.

Based on the NSB 2010 Economic Profile and Census Report developed for the NSB by Circumpolar Research Associates (NSB 2011), the population of Nuiqsut was 415 in 2010 and comprised 87.7% Iñupiat, 8% Caucasian, and 2.9% other minorities. In 2010, 30.7% of the population was 17 years old or younger, 61.4% was between 16 and 64 years old, and 6.7% was 65 years old or older. The median age was 23 years of age.

The labor force was 236 individuals (based on residents between 16 and 64 years of age, removing those still in school), with unemployment at 29.3%. The majority of employed residents of Nuiqsut work for the NSB (45.8%), the Kuukpik Corporation (19.3%) or the NSB school district (16.3%). (NSB 2011)

Most income in Nuiqsut is from wages and corporation dividends. Median household income and poverty levels are provided in Table 3-8.

**Table 3-8 Average Household Income and Poverty Levels (USCB 2016)**

| AREA | MEDIAN HOUSEHOLD INCOME | PERSONS BELOW POVERTY LEVEL |
|---|---|---|
| State of Alaska | $71,829 | 10.3 % |
| North Slope Borough | $74,609 | 11.5 % |
| Utqiaġvik | $82,976 | 12.3 % |
| Prudhoe Bay/Deadhorse | $94,906 * | 4.2 % |
| Nuiqsut | $85,833 | 3.0 % |

Notes:
* Median household income is not available for Prudhoe Bay/Deadhorse. Information provided is per capita income from ADCCED (2016).

### 3.17.4 EFFECTS ON SOCIAL SYSTEMS

Effect of the Nikaitchuq North Exploration Drilling Project on Social Systems

The Nikaitchuq North Exploration Drilling Project would make use of the existing project facilities and would not include development of new facilities. It would result in drilling activities during the 2017-2018 winter season and the 2018-2019 winter season. This may result in some minor increases in employment or use of support services during this time period. The project does support future development activity in the Nikaitchuq North project area, which may result in additional revenues. However, since the project does not include development of oil and gas resources, the Nikaitchuq North Exploration Drilling Project is unlikely to result in appreciable additional impacts beyond those expected from the No Action Alternative.

Effect of the No Action Alternative on Social Systems

The No Action Alternative would result in drilling in State of Alaska Waters as described in Section 2.3. These activities would make use of the existing project facilities and would not include development of new facilities. It would result in drilling activities between January 2018 and March 2019. The increase in activities may result in some minor increases in employment or use of support services during this time period.

Under the No Action Alternative, future development in the Nikaitchuq North project area is less likely to occur, resulting in a loss of potential for employment.

## 3.18 HUMAN HEALTH

### 3.18.1 HUMAN HEALTH IN THE NORTH SLOPE BOROUGH

In 2012, the NSB, Department of Health and Social Services published a Baseline Community Health Analysis Report (McAninch 2012) to identify community health issues most important to residents. A large majority of residents reported having “good” general health, with reductions in rates of infant mortality, injury deaths, vaccine-preventable illnesses, and rates of self-reported prenatal alcohol use over the last several decades. Based on a combination of health indicators, the North Slope may enjoy a better overall health status than other northern, southwestern, and interior rural Alaskan regions. Despite the persistently high suicide rates in the region, self-reported general mental health in the NSB (among adults) is among the best in the state.

Leading causes of death in the NSB include cancer, heart disease, unintentional injury, chronic lower respiratory disease, and suicide. Self-reported chronic health conditions include arthritis/chronic pain, high blood pressure, high cholesterol, chronic respiratory problems, diabetes, and heart disease. (McAninch 2012)

### 3.18.2 CONCERNS ABOUT OIL INDUSTRY EFFECTS ON HEALTH

Based on a survey of active hunters (SRB&A 2009), human health impacts from the oil and gas industry are related to consequences of an oil spill, air pollution, and threats of contamination to

wildlife, including contamination of subsistence foods. Another concern is development on the North Slope leading to social problems, including higher rates of drug and alcohol abuse.

In response to these concerns, an asthma study was conducted in Nuiqsut (the community closest to oil and gas infrastructure) in 2003. Visits to health professionals in Nuiqsut and a control village were tracked. Asthma accounted for 75% of respiratory illness visits in Nuiqsut and 81% in the control village, representing just over 10% of the population. An additional 3.6% of residents were identified with non-asthma respiratory diseases. Only one age group (10- to 19-year-olds) showed a statistically significant higher rate of asthma visits than the control village. (McAninch 2012)

A study conducted by the Alaska Native Tribal Health Consortium and the University of Alaska Institute for Circumpolar Health Studies investigated air quality and respiratory complaints in Nuiqsut. Levels of particulate matter, carbon monoxide, sulfur dioxide, and nitrogen oxides were measured, and residents were interviewed regarding perceptions of air-quality risk. While results have not been published, according to one of the investigators, the study has found little evidence of significant air quality problems associated with oil development near the village. (McAninch 2012)

### 3.18.3 EFFECTS OF NIKAITCHUQ NORTH ON HUMAN HEALTH

Effect of the Nikaitchuq North Exploration Drilling Project on Human Health

The proposed Nikaitchuq North Exploration Drilling Project is located approximately 35 miles northeast from Nuiqsut. Eni's Nikaitchuq North Exploration Drilling Project will use existing facilities and infrastructure at SID. Exposure to emissions from Eni's Nikaitchuq North Exploration Drilling Project is limited due to distance between Eni's operations and Nuiqsut. Therefore, no impacts to human health are expected from Eni's planned activities.

There is a risk of an oil spill from the Nikaitchuq North Exploration Drilling Project. However, as discussed in Chapter 3.23, this risk is relatively small and is mitigated by drilling only during winter, which allows easier response in event of a spill.

Effect of the Nikaitchuq North Exploration Drilling Project on Human Health

The No Action Alternative is similar to the Nikaitchuq North Exploration Drilling Project in duration of drilling effort and use of existing project facilities. Effects of the No Action Alternative would be similar to the Proposed Action.

## 3.19 ECONOMICS

Oil and gas exploration, development, and production on the North Slope are major contributors to the economy of the State of Alaska, the NSB, and local communities. These activities have created employment, generated contracts for service providers, and provided royalty and tax revenue to local, state, and federal governments (NOAA 2016a). BLM (2012) provides a detailed overview of the economic structure of the NSB and the community of Nuiqsut.

There are currently 12 active businesses licensed by the State of Alaska with a Nuiqsut address: Arctic Slope Supply Hauling; Buddy & Carol's Coffee Shop; Cloud 9 Creations; Kuukpik Corporation; Kuukpik Fuel Pumpstation; Kuukpik Hotel; Kuukpikmiut Subsistence Oversight Panel, Inc.; Next Horizon; Nuiqsut Utilities Cooperative; Qannik & Ullaaq Pop Shop; Utuqqanaaqagvik Senior Housing; and West Wind Rental (ADCCED 2016). The Kuukpik Corporation operates a camp in Nuiqsut; the City of Nuiqsut assesses a 7% bed tax on lodging (NSB 2016).

Nuiqsut is similar to other North Slope villages in that both subsistence activities and cash contribute to the economy. Subsistence includes harvesting and sharing of resources within and outside the village, and bartering of food and services. The cash economy includes earned income, earned dividends, and government payments. While no methods have been developed to quantify the economic value of subsistence activities, some related financial information is available. The NSB Census (NSB 2011) identifies significant expenses associated with obtaining equipment and supplies to support subsistence activities. The median amount spent annually by Nuiqsut households was $5,000; 64% of households spent more than $3,000 and 4% spent over $20,000. Generally, whaling captains incurred the greatest expenses. (NSB 2011)

Effects of Eni's Current Activities on Economics

Eni uses many local vendors to support their existing operations on the North Slope, as provided in Table 3-9. Many of these vendors are Native regional or village corporations (ASRC, Kuukpik Corporation), part of the NSB (NSB Service Area 10), Alaska-based companies (Colville Inc., Peak Oilfield Service Company), or those with a long work history on the North Slope (Bering Marine Corporation). By using local vendors, Eni's activities contribute to the local economy of the NSB.

**Table 3-9 Local Vendors Used by Eni**

| COMPANY | PARENT COMPANY | SUPPORT ACTIVITY |
|---|---|---|
| ASRC Energy Services | ASRC | Camp Maintenance Services for OPP and SID |
| ASRC Energy Services | ASRC | First Call for Small Construction and Fabrication Projects |
| Bering Marine Corporation | Lynden Companies | Hovercraft Pilot Program |
| Colville Inc. | NA | Solid Waste Services, North Slope |
| Kuukpik Arctic Services | Kuukpik Corporation | Catering and Housekeeping Services, NOC and SID |
| Nanuq Inc. | Kuukpik Corporation | Solid Waste Services |
| NSB SA 10 | NA | Purchase of Potable Water |
| NSB SA 10 | NA | Disposal of Sewage Water |
| Peak Oilfield Service Company | NA | Ice Road Construction and Maintenance |

Note:
ASRC – Arctic Slope Regional Corporation
NA – not applicable
NSB – North Slope Borough
OPP – Oliktok Production Pad
SA – Service Area
SID – Spy Island Drillsite

Effects of the Nikaitchuq North Exploration Drilling Project on Economics

The Nikaitchuq North Exploration Drilling Project would make use of the existing project facilities and would not include development of new facilities. The project does support future development activity in the Nikaitchuq North project area, which may result in additional revenues. However, since the project does not include development of oil and gas resources, the Nikaitchuq North Exploration Drilling Project is unlikely to result in appreciable additional economic impacts.

Effect of the Nikaitchuq North Exploration Drilling Project on Economics

The No Action Alternative is similar to the Nikaitchuq North Exploration Drilling Project in duration of drilling effort and use of existing project facilities. Effects of the No Action Alternative would be similar to the Proposed Action.

## 3.20 LAND OWNERSHIP AND LAND USE

### 3.20.1 LAND OWNERSHIP AND INFRASTRUCTURE

Land ownership in the vicinity of the Nikaitchuq North Exploration Drilling Project includes federal and state lands as described in Kerr-McGee (2005). There are several Native allotments in the vicinity of the proposed project, but none in the immediate project area. The land ownership is shown in Figure 3-5. The State of Alaska manages submerged nearshore lands up to 3 nautical miles from the shoreline, including barrier islands, with submerged lands further offshore under management of the federal government.

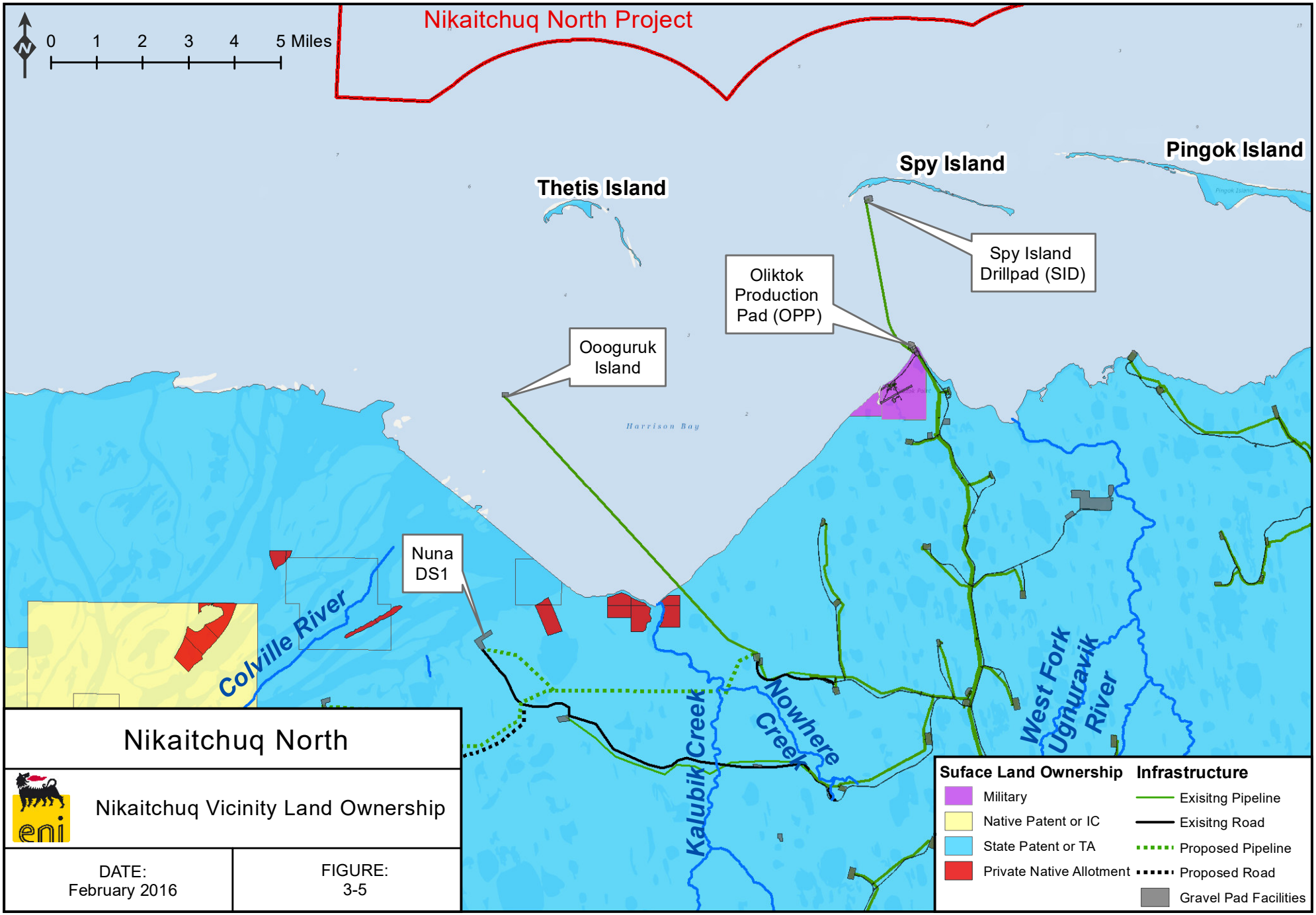
The area in the project vicinity was rezoned from Conservation District to Resource Development as part of the Nikaitchuq Development Project (USACE 2006). Existing infrastructure in the project vicinity includes OPP, SID, Oooguruk Island, Kuparuk River facilities, and existing pipelines for the transportation of crude oil, and gravel roads allowing access to facilities in the area. The Oooguruk Development Project includes a six-acre gravel island in the nearshore waters of Harrison Bay and a subsea flowline bundle connecting to an onshore tie-in pad.

The U.S. Air Force Oliktok Point LRRS is located at Oliktok Point. This is one of several DEW Line radar stations in Alaska. An AN/FPS-0117 radar was installed in summer 1990. The Oliktok Point LLRS is currently active and is part of the North Warning System.

A public dock is located at OPP and is used by the general public and the Nuiqsut whalers traveling between Nuiqsut and Cross Island for the annual bowhead whale hunt.

### 3.20.2 COASTAL AND MARINE USES

The main commercial use of the area around Oliktok Point and Simpson Lagoon is oil resource extraction, processing, and transportation. It is also used by local residents for hunting and gathering of subsistence resources as discussed in Section 3.21. The project vicinity includes several oil and gas units as shown on Figure 1-1 and there are a number of existing development projects (e.g., Nikaitchuq, Oooguruk, Kuparuk, Milne Point), as well as proposed activities (e.g., Nanushuk in the Pika Unit).


Nikaitchuq North Project
0 1 2 3 4 5 Miles
Thetis Island
Spy Island
Pingok Island
Spy Island Drillpad (SID)
Oliktok Production Pad (OPP)
Oooguruk Island
Harrison Bay
Nuna DS1
Colville River
Kalubik Creek
Nowhere Creek
West Fork Ugnuravik River
Nikaitchuq North
Nikaitchuq Vicinity Land Ownership
DATE: February 2016
FIGURE: 3-5
Suface Land Ownership
Military
Native Patent or IC
State Patent or TA
Private Native Allotment
Infrastructure
Exisitng Pipeline
Exisitng Road
Proposed Pipeline
Proposed Road
Gravel Pad Facilities

### 3.20.3 RECREATION AND COMMERCIAL FISHING

The North Slope has a limited tourism sector. The attractions include aurora borealis, unusual location, and Arctic wilderness. Many visitors to the North Slope are adventure travelers seeking wilderness experiences such as camping, float trips, wildlife viewing, sport fishing, and hunting. However, visits to the North Slope are also provided as add-ons to package tours (e.g., Alaska cruise). Cultural heritage tourism, wilderness adventure travel, and ecotourism offer the greatest potential for expanding tourism on the North Slope (ADNR 2009).

Travel to these areas is primarily by air, although bus tours occasionally arrive at Deadhorse via the Dalton Highway. Hikers and river rafters also visit the Arctic National Wildlife Refuge, and other areas using chartered aircraft. An increasing number of cruise ships are entering the Beaufort Sea. (BOEM 2012)

Access to the area of the Nikaitchuq North Exploration Drilling Project is generally limited to oil and gas operations and subsistence use by local residents due to the industrial nature of the area. As a result, there is generally little tourism activity in the project area, although interest in the Arctic and the effects of climate change may make the area more inviting to tourists.

As described in the Liberty EIA (HAK 2015), commercial fishing activities do not occur in the Beaufort Sea due to a moratorium. This moratorium does not apply to the Colville River delta where a fishery has existed since 1964. Historically, commercial fishing generally took place during late June and July for broad and humpback whitefish and October through early December for Arctic and least cisco. However, beginning in 1990, commercial fishing predominantly occurred in October and November for Arctic and least cisco. Set gillnets are used as capture gear, and fishing during fall months occurs under the ice. While all fish are harvested with the intent to sell commercially, some are retained and used for subsistence purposes. No commercial harvest has been reported since 2007 from the Colville River (ADF&G 2015).

### 3.20.4 COASTAL ZONE MANAGEMENT PROGRAM

The Alaska Coastal Management Program (ACMP) expired on July 1, 2011. As a result, Alaska withdrew from the National Coastal Management Program under the Coastal Zone Management Act and does not currently have a coastal management program (76 FR 39857). The original development was determined to be consistent with ACMP (USACE 2006).

### 3.20.5 EFFECTS ON LAND OWNERSHIP AND LAND USE

Both the Nikaitchuq North Exploration Drilling Project and the No Action Alternative would make use of the existing project facilities and would not include development of new facilities. No changes in land use or land ownership are expected as a result.

## 3.21 ENVIRONMENTAL JUSTICE

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations (59 FR 7629), requires each federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

The NSB and potentially affected communities of Utqiaġvik and Nuiqsut are majority Iñupiat populations (65.0% and 87.7%, respectively). In addition, Utqiaġvik has 7.6% Filipino population, 11.7% non-Iñupiat minority, and 16.0% caucasian, resulting in a population that is 84.2% minority. Nuiqsut has 2.9% non-Iñupiat minority and 8% caucasian, resulting in a population that is 92% minority.

Income and poverty levels for the potentially affected communities are presented in Table 3-8. The median household incomes for the relevant North Slope communities and the NSB as a whole is greater than the median household income for the State of Alaska. The poverty levels for the NSB and Utqiaġvik are greater than those of the State of Alaska as a whole.

Effect of the Nikaitchuq North Exploration Drilling Project on Environmental Justice

Based on the distance between the proposed project and local communities (SID is 165 miles from Utqiaġvik and 35 miles Nuiqsut, respectively), the environmental justice impacts are likely to be those effects on subsistence resources and the opportunity to access them (e.g., subsistence hunt), as addressed in Section 3.22.

Effect of the No Action Alternative on Environmental Justice

The No Action Alternative is expected to have similar effects on environmental justice as the Proposed Action. These effects are addressed in Section 3.22.

## 3.22 SUBSISTENCE

### 3.22.1 EXISTING SUBSISTENCE ACTIVITIES

Iñupiaq social organization revolves around the family and wider networks of kinship and friends. Sharing of subsistence resources strengthens these kinship ties. In addition, the relationship of the Iñupiat and their natural environment remains a cornerstone of their cultural identity.

Subsistence hunting, fishing, and gathering play an important role in the lives of Nuiqsut residents: subsistence activities provide food security, and sharing of subsistence resources with others is central to the Inupiat culture (NSB 2015). The Alaska National Interest Lands Conservation Act defines subsistence use as:

> "The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools,

> or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

The village of Nuiqsut is the closest community to the proposed Nikaitchuq North Exploration Drilling Project. The residents of Nuiqsut make the greatest subsistence use of the project area; therefore, the discussion of subsistence focuses on these users. Nuiqsut resident subsistence use ranges over a 34,500-square-mile area (NSB 2015). Based on a survey of over 91 families conducted in 2003 by the NSB, over 91% of Iñupiat families participated in the local subsistence economy. More than two-thirds depended on subsistence foods for more than half of their diet (NSB 2011). Table 3-10 provides the relative portion of subsistence foods harvested during a typical year (July 1, 1994 – June 30, 1995); however, it should be noted that the relative amount of marine mammal harvest is low because no bowhead whales were harvested during the time period reviewed.

**Table 3-10 Subsistence Harvest by Nuiqsut, July 1, 1994 to June 30, 1995 (NSB 1998)**

| CATEGORY | HARVEST IN PERCENT EDIBLE POUNDS |
|---|---|
| Caribou | 58 % |
| Fish | 30 % |
| Moose | 5 % |
| Birds | 5 % |
| Marine Mammals | 2 % |
| Plants | <1 % |

Note: Marine mammal harvest was lower than usual because no bowhead whales were harvested between July 1, 1994 and June 30, 1995.

Nuiqsut residents rely on a variety of subsistence resources throughout the year, including marine mammals (bowhead whales, bearded seal, ringed seal), land mammals (caribou, moose), fish (Arctic cisco, broad whitefish), and birds (geese) (NSB 2015). The type of subsistence activities depends on the season, as shown in Table 3-11.

**Table 3-11 Subsistence Activities by Season**

| | WINTER | | | | | SPRING | | SUMMER | | | FALL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SUBSISTENCE RESOURCE | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT |
| caribou | | | | | | | | | | | | |
| moose | | | | | | | | | | | | |
| wolf, wolverine | | | | | | | | | | | | |
| geese | | | | | | | | | | | | |
| eider | | | | | | | | | | | | |
| seal | | | | | | | | | | | | |
| bowhead whale | | | | | | | | | | | | |
| Arctic cisco | | | | | | | | | | | | |
| Arctic char/Dolly Varden | | | | | | | | | | | | |
| broad whitefish | | | | | | | | | | | | |
| burbot | | | | | | | | | | | | |

Note:
= no harvest activity
= low harvest activity
= medium harvest activity
= high harvest activity

Source: Stephen R. Braund & Associates (SRB&A 2010). *Subsistence Mapping of Nuiqsut, Kaktovik, and Barrow.* MMS OCS Study Number 2009-003. 2010.

Offshore hunting activities occur mainly by boat during the summer and fall. Nuiqsut residents hunt ringed seal, bearded seal, and eider duck in the Colville River area, as well as travel to Cross Island to hunt bowhead whale. Residents travel by boat along local waterways, including the Colville River to hunt moose and caribou, and to harvest fish; they hunt caribou by boat from the ocean when caribou are abundant along the coast during summer. Hunters also travel overland by snowmachine while hunting caribou, wolf, wolverine, and setting nets or jigging for fish. (SRB&A 2010)

In a study of Nuiqsut subsistence users (SRB&A 2010), 33 respondents reported a total of 758 use areas for key subsistence resources over a 10-year period. These respondents reported hunting or harvesting at least one resource over the previous 12 months prior to the interviews. Arctic cisco and geese were the most commonly harvested resources (100% respondents harvesting), followed by caribou (97%), moose (94%), burbot (91%), eiders (85%), and bearded seal (82%). Other resources harvested included Arctic grayling, humpback whitefish, salmon, musk ox, and berries. (SRB&A 2010). Subsistence use areas reported by Nuiqsut respondents extend from Utqiaġvik and Atqasuk in the west, to Kaktovik in the east. However, the highest areas of use for all resources occur in the Colville River delta area, between the mouth of Fish Creek and Thetis Island.

Subsistence activities in the marine waters of Harrison Bay include the bearded seal hunt (typically July through August, but also in June and September), hunting of eiders (June through August), and travel to and from Cross Island to participate in the bowhead whale hunt (August through September).

Hunters from Nuiqsut typically may travel up to 40 miles away from shore to hunt seals when the ice breaks up (end of April, beginning of May). Seal hunting typically includes three to ten boats with one or two hunters in each boat. Hunting is a day-long activity (8-12 hours per day). Seal hunting activities tend to decrease in August as hunters begin to focus on the whale hunt. (SAExploration 2014)

Section 3.16 of the Liberty Development Project EIA (HAK 2015) describes the Nuiqsut whale hunt. Nuiqsut has conducted a fall bowhead whaling hunt since resettlement in 1973. Since Nuiqsut is located inland along the Colville River, they travel approximately 100 miles up the Colville River and across the Beaufort Sea to Cross Island to conduct the whale hunt. The route to Cross Island crosses between OPP and SID (Figure 3.16.2-3, HAK 2015). Cross Island is close to the normal fall whale migration route and is a traditional and historic whaling site. The fall whaling season is typically from late August to September; the end of the whaling season occurs when Nuiqsut's quota is met or when weather conditions become too marginal.

### 3.22.2 CURRENT ENI ACTIVITIES

Eni currently conducts year-round activities at its onshore facilities at OPP and SID, which requires transportation of goods and personnel between OPP and SID. The methods of transportation between June and September are crew boats (for personnel transportation) and barges (for transportation of large goods), as shown in Table 2-2.

Nuiqsut fall whaling typically occurs between late August and September at Cross Island. Nuiqsut whalers travel from Nuiqsut along the Colville River to Harrison Bay, then east to reach Cross Island. The route is typically within the barrier islands, which is a route that crosses between OPP and SID. Crew boats and barges are typically used during the times that subsistence activities occur. However, if the end of the bowhead whale hunt is delayed to late September or into October, and depending on weather conditions, it is possible that the hovercraft could be used at the same time as some subsistence activities.

### 3.22.3 EFFECT ON SUBSISTENCE ACTIVITIES

Effect of the Nikaitchuq North Exploration Drilling Project on Subsistence Activities

Activities associated with the Nikaitchuq North Exploration Drilling Project, including vessel traffic, are consistent with existing operations in the project area. Eni vessel traffic uses regular routes within a narrow corridor between OPP and SID, as shown in Figure 2-3. No impacts to subsistence activities are expected because of the mitigation measures outlined in Section 3.22.4. Eni will follow these mitigation measures, including consultation with subsistence users, to ensure their activities do not conflict with subsistence activities.

Effects of the No Action Alternative on Subsistence Activities

Activities associated with the No Action Alternative are similar to the Nikaitchuq North Exploration Drilling Project and would be consistent with existing operations in the project area. Eni will follow these mitigation measures to ensure that their activities do not conflict with subsistence activities.

### 3.22.4 MITIGATION MEASURES

Several subsistence-related organizations exist in Nuiqsut. The Kuukpikmiut Subsistence Oversight Panel, Inc. (KSOPI) was established in 1996 to provide a method of communication between Nuiqsut residents and industry and to relay concerns to industry regarding impacts on subsistence harvesting activities (BLM 2014). The Nuiqsut Whaling Captains' Association also provides feedback on industry activities that have the potential to conflict with the substance bowhead whale hunt. The Conflict Avoidance Agreement is an annual agreement between the local Whaling Captains' Association, the Alaska Eskimo Whaling Commission (AEWC), and industry participants that outlines communication measures, avoidance guidelines, and mitigation measures to be followed by industry participants to avoid impacts to the bowhead whale hunt.

Eni works with subsistence users in the area to mitigate the chances for conflict by discussing and signing the Conflict Avoidance Agreement. The Conflict Avoidance Agreement is an agreement between industry participants and subsistence bowhead whaling captains to identify, mitigate, and avoid conflicts. The Conflict Avoidance Agreement is discussed in more detail in Section 5.

As a participant in the Conflict Avoidance Agreement, Eni will abide by Section 2, A(3), "…Vessels shall be operated at speeds necessary to ensure no physical contact with whales occur and to make any other potential conflicts with bowhead whales or whalers unlikely." All Eni captains will give way and let subsistence hunting vessels pass first as necessary per International Regulations for Preventing Collisions at Sea 1972. Eni's vessel speed will be reduced during inclement weather conditions in order to avoid collisions with any marine mammal and or subsistence hunting vessel. Eni recognizes the importance of monitoring vessel wake in the presence of other vessels and will be mindful to avoid potential interference with subsistence hunting vessels.

Eni operates in a safe and respectful manner in the waters near Oliktok Point and Spy Island, with all efforts to mitigate potential impacts to subsistence hunting vessels during the months of open water season. Eni's vessels will at all times be under the command of experienced and licensed captains that demonstrate respect and courtesy to all mariners, including subsistence hunters. Eni vessel traffic will use regular routes within a narrow corridor between OPP and SID to reduce the affected area, as shown in Figure 2-3.

Consistent with Eni's policy, all vessels are certified by the USCG and technically accepted by Eni prior to performing any activities offshore. Eni is also in alignment with the *Global Corporate Marine M*anual, which is published by Eni headquarters in Milan to ensure that all Eni locations operate with acceptable standards. Operations are supervised by a dedicated marine advisor who will ensure that vessels meet Eni specifications, maintenance programs are acceptable, and crew training is current. The marine advisor will also conduct routine vessel inspections.

The public boat ramp at Oliktok Point and the beach are accessible 24 hours per day. Eni-contracted vessels will not be left unattended in a manner that could block subsistence hunters' access to the boat ramp.

## 3.23 POTENTIAL IMPACTS OF AN OIL OR HAZARDOUS MATERIAL SPILL

### 3.23.1 SPILL RISK ANALYSIS

An analysis of spill rate occurrence by size indicates that a majority of spills are less than 100 gallons. Table 3-12 summarizes spill occurrence rates by the size of the spill (ADEC 2013). The summary is based on 681 loss-of-integrity spills that occurred between 1995 and 2011, including all North Slope production fields and all regulatory categories.

**Table 3-12 Percentage of Spills Reported by Size from North Slope Oil Operators**

| Size Class (gallons) | ≤ 10 | ≥ 10 – < 100 | ≥ 100 – < 1,000 | ≥ 1,000 - < 10,000 | ≥ 10,000 - < 100,000 | ≥ 100,000 | Total |
|---|---|---|---|---|---|---|---|
| Number | 237 | 211 | 162 | 57 | 12 | 2 | 681 |
| Percent | 34.8% | 31.0% | 23.8% | 8.4% | 1.8% | 0.3% | |

*Source: ADEC 2013*

An analysis of spill rate occurrence by year is complicated by a few outlier events. Overall, the number and volume of loss-of-integrity spill from the North Slope infrastructure has decreased (ADEC 2010, 2013). Similar findings are in Robertson et al. (2013) and BLM (2014), and cover a broader timeframe (over 30 years). The best approach to estimating the frequency of large spills is the simple return rate that predicts between zero and two spills of more than 500 barrels will occur for every one billion barrels of production (Robertson et al. 2013).

Normal Operations Spill Risk

The Nikaitchuq spill history and potential spill sources associated with oil production and drilling activity are detailed in the Nikaitchuq Oil and Gas Production ODPCP (Eni 2016).

Spills during normal operations could result from a wide variety of causes, including hose/line failures, tank overflows, or equipment leaks. Spills of this nature are typically less than 10 gallons and usually involve diesel, hydraulic fluids, or lubricants. Small to moderate spills would most likely be a result of either operator error or mechanical failure.

Operational spills are usually detected visually by onsite personnel as the spill occurs, during routine inspections, or casual observations either immediately or soon after their occurrence. Equipment leaks can go undetected for longer periods, but these spills are normally very small. Onsite personnel report and respond to spills as soon as they are detected.

Drilling-Related Risk

The worst-case discharge (WCD) would likely be a loss of well control event – or blowout.

From 1968 to 2010, there were eight loss of well control events that resulted in an uncontained release of fluids/gas from the well. These eight events occurred during the drilling of over 5,000 wells on the North Slope, reflecting an incident rate of 0.16%. All except one of the incidents were the result of loss of well control within shallow gas zones (AOGCC 2010). None of the blowouts on the North Slope have resulted in injuries or oil spills (AOGCC 2010).

The incident rate in Alaska is consistent with well-related activity in other regions of the United States. For example, in the Gulf of Mexico, the incident rate ranged from 0.15% to 0.6% from 2006 to 2013 (BSEE 2014). The total number of *loss of well control* incidents divided by the sum of new wells and the number of wells reentered for the purpose of reworking or abandonment, produce the incident rate. The Bureau of Safety and Environmental Enforcement (BSEE) defines *loss of well control* as any uncontrolled flow of formation or other fluids (whether the flow reaches the surface or remains underground).

### 3.23.2 SPILL PREVENTION

Eni considers spill prevention an important part of company operations. Employees and contractor personnel are trained in pollution prevention measures applicable to their duties as required by 18 AAC 75.020. These are outlined in the ODPCP and include:

- Personnel hiring procedures, training and certification requirements
- Fuel transfer procedures
- Operating requirements for exploration facilities
- Leak detection, monitoring, and operating requirements for pipelines
- Requirements for construction, inspection, and repair of oil storage tanks
- Secondary containment for tanks and loading areas
- Construction, operations, and maintenance procedures for facility oil piping.

### 3.23.3 WELL CONTROL – WELL CAPPING

The two methods identified for best regaining source control of a surface blowout are well capping and relief well drilling. Eni believes well capping constitutes the best available technology for primary well source control. Historical evidence clearly indicates well capping has greater reliability and application for well blowout control compared to that of relief well drilling. Well capping response times account for an approximate 50% reduction in blowout durations when compared to that of relief well drilling.

Well capping techniques have proven effective in regaining control and reducing the environmental impact of a broad range of damaged, flowing wells. Eni has examined the use of well capping for source control, based on the response planning standard conditions for production drilling as the evaluation case. Inherent in this evaluation were the assumptions that primary and secondary levels of well control have failed and that all dynamic and mechanical attempts to regain primary or secondary well control have been ineffective. The assessment considered best available techniques and methods to control a well blowout with the potential of releasing liquid hydrocarbons at the surface.

Well capping is both compatible with, and feasible for, use in existing and planned Eni drilling operations, because this technology is applied at the surface, with little or no sensitivities to well type or location. Well capping operations have been carried out on both onshore and offshore locations, having historically proven successful in regaining well control within a relatively short

duration. The time required for a well capping operation is typically a fraction of that needed for drilling a relief well.

In the event drilling a relief well is required, the Nordic No. 4 rig, which is located at OPP, will be available. This rig can be mobilized via the ice road to one of the ice pads at SID for drilling.

### 3.23.4 IMPACTS FROM SPILLS

Effect of the Nikaitchuq North Exploration Drilling Project on Impacts from Spills

Very small to medium-sized spills (<100 gallons) would be likely to occur periodically over the project life but would be restricted in geographic extent and would be unlikely to have measureable impacts on natural resources. Large or very large spills would be very unlikely to occur. In the very unlikely event that a large or very large spill were to occur, it could result in major impacts to aquatic life, birds, and marine mammals.

Effects of the No Action Alternative on Impacts from Spills

The No Action Alternative excludes drilling into federal leases, but would include drilling in State leases and continued oil production from SID. Consequently, the risks of spills associated with the No Action Alternative are similar to that of the Nikaitchuq North Exploration Drilling Project. The risk of small to medium-sized spills will still exist due to continuation of the existing oil production operations. Regarding the specific risk of exploration drilling, the probability of a large or very large spill would be the same, but the consequences would vary depending on the specific reservoir being drilled.

# 4 CUMULATIVE EFFECTS

This EIA includes a discussion of potential cumulative impacts from other activities to identify resources, conditions, and activities that are potentially impacted by the proposed exploration activities as per 30 CFR 550.227(c)(2).

Cumulative impacts are defined in 40 CFR 1508.7:

> *"Cumulative impact* is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Due to the limited activities proposed as part of the Nikaitchuq North Exploration Drilling Project, very few resources are expected to experience appreciable impacts as a result of the proposed exploration activities. Only those resources that are potentially impacted are addressed in this section.

## 4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIVITIES

Activities that have occurred or are expected to occur in the project area (Figure 1-2) that have a potential to impact resources, conditions, and activities include subsistence activities, marine vessel traffic, and oil and gas exploration and development activities. For this analysis, projects were determined to be reasonably foreseeable future (RFF) activities if they are in the permitting process (i.e., permit applications have been submitted to the applicable agencies). Therefore, development associated with current exploration projects, including the Nikaitchuq North Exploration Drilling Project, are not included in this discussion.

Oil and Gas Activities

The primary source of industrial activity in the project area is due to oil and gas development. Oil and gas exploration activities have occurred over the past 60 years in the nearshore waters of the Beaufort Sea and Arctic Coastal Plain, but unless they lead to development of a project, they are generally limited in time to a specific seasonal period over the course of one or two years and are limited in geographical extent. (NOAA 2016a)

There are currently 35 oil and gas fields and satellites producing oil on the North Slope and in nearshore waters of the Beaufort Sea, as well as the associated pipeline systems. Existing oil and gas activities in the vicinity of the Nikaitchuq North Exploration Drilling Project include the Nikaitchuq Development Project and the Oooguruk Development Project, both located in Harrison Bay. (NOAA 2016a)

A number of large-scale oil and gas development projects in the Beaufort Sea area and Arctic Coastal Plain have been proposed or are in development as shown in Table 4-1.

**Table 4-1 Past, Present, and Reasonably Foreseeable Future Activities in the Central Beaufort Sea**

| CATEGORY | AREA | PROJECT | ACTIVITIES | TIMING |
|---|---|---|---|---|
| Onshore Oil & Gas Development | NPR-A, Colville River area | CD-5 | Currently producing, overland pipeline, annual onshore ice road | Past, Present |
| Onshore Oil & Gas Development | NPR-A | GMT1, GMT2 | Includes road and overland pipeline. GMT1 under construction. GMT2 in permitting process | Future |
| Onshore Oil & Gas Development | Pikka Unit, Colville River area | Nanushuk Project | Includes central processing facility, gravel pads, road, and overland pipeline. In permitting process | Future |
| Onshore Oil & Gas Development | Kuparuk River Unit | Kuparuk | Currently producing, pipeline and road access from Prudhoe Bay | Past, Present |
| Offshore Oil & Gas Development | Liberty Unit | Liberty Project | Includes offshore gravel island, process, and pipeline. In the permitting process | Future |
| Offshore Oil & Gas Development | Nikaitchuq Unit, Simpson Lagoon | Nikaitchuq Project | Currently producing, gravel island, 3-phase pipeline, onshore processing; additional production well drilling in State of Alaska waters | Past, Present, Future |
| Offshore Oil & Gas Development | Oooguruk Unit, Simpson Lagoon | Oooguruk Project | Currently producing, gravel island, 3-phase pipeline, onshore processing | Past, Present |
| Scientific Research | Beaufort Sea | BOWFEST, RUSALCA, Bowhead whale satellite tagging study, various other studies | Vessel traffic, acoustic surveys, water and benthic sampling | Past, Present, Future |
| Military | Oliktok Point | Oliktok LRRS | DEW Line, active part of the North Warning System | Past, Present, Future |
| Transportation | Beaufort Sea | Transportation of goods to Beaufort Sea villages and to support oil and gas activities. | Marine vessel traffic | Past, Present, Future |
| Subsistence | Beaufort Sea | Bowhead whale hunt, other hunting | Marine vessel traffic | Past, Present, Future |

Notes:
BOWFEST – Bowhead Whale Feeding Ecology Study
DEW – Distant Early Warning
LRRS – Long Range Radar Station
NA – not applicable
RUSALCA – Russian-American Long-Term Census of the Arctic

Marine Vessel Traffic

Marine vessel traffic in the central Beaufort Sea includes transportation associated with oil and gas activities, barges and cargo vessels to supply coastal communities on the North Slope, smaller vessels to support subsistence activities and local transportation along the Beaufort Sea coast, and recreational vessels such as cruise ships. Marine and coastal vessel traffic could contribute to potential cumulative effects through disturbance of marine mammals or impacts to the subsistence harvest. (NOAA 2016a)

Subsistence Activities

Existing subsistence activities are discussed in Section 3.21.1. Subsistence activities in the marine waters of Harrison Bay include the bearded seal hunt, hunting eiders, and travel to Cross Island to participate in the bowhead whale hunt. These activities are expected to continue at approximately the same level in the same area as they currently occur.

## 4.2 POTENTIAL CUMULATIVE IMPACTS

### 4.2.1 AIR QUALITY

The Nikaitchuq North Exploration Drilling Project includes temporary effects on air quality due to emissions from engines on the drill rig and a temporary flare. The project is anticipated to have an insignificant direct and indirect effect on air quality. Emission sources for the project are comprised of equipment that is typical of other recent oilfield development activities on the Alaska North Slope. Because emissions from the project activities will not occur for an extended duration, the cumulative effects to regional and local air quality will be short-lived in the environment.

### 4.2.2 SOCIAL SYSTEMS

The Nikaitchuq North Exploration Drilling Project may result in some minor increases in employment or use of support services from 2017-2019, which, together with past, present, and RFF activities on the North Slope, could impact employment and use of local services. However, no substantial changes in population or employment levels for local communities (i.e., Nuiqsut) are expected.

### 4.2.3 ECONOMICS

The Nikaitchuq North Exploration Drilling Project is unlikely to result in appreciable additional economic impacts. However, the overall cumulative economic impacts from increased development on the North Slope are expected to have benefits at the local and state level.

### 4.2.4 OIL OR HAZARDOUS MATERIAL SPILL

The Nikaitchuq North Exploration Drilling Project has a risk of oil or hazardous material spills during normal operations, typically in amounts of less than 10 gallons. Any spills as a result of the project would add to the number of spills that occur from other past, present, or RFF projects, and increase the potential for spills. However, spill prevention and response can mitigate the potential for a large spill and mitigate impacts.

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# 5 MITIGATION MEASURES

The Council on Environmental Quality (40 CR 1508.20), identifies mitigation as:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action.

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

(e) Compensating for the impact by replacing or providing substitute resources or environments.

The following mitigation measures were developed to avoid, minimize, or reduce potential environmental impacts of the Nikaitchuq North Exploration Drilling Project.

Lease Stipulations

Eni purchased the leases to be accessed during the Nikaitchuq North Exploration Drilling Project during the Oil and Gas Lease Sale 195 and must adhere to the lease stipulations from this lease sale.

Applicant Proposed Mitigation Measures

Substantial mitigation measures have been incorporated into the Nikaitchuq North Exploration Drilling Project.

- Eni will use ERD to allow drilling from the existing SID, resulting in mitigation of the following impacts:
  - Eliminating the need for a drilling platform (e.g., temporary island) or transportation of installation of a mobile offshore drilling unit (e.g., jackup rig or drillship) that would result in impacts from transportation, discharges associated with installation, noise, and emissions.
  - Reducing underwater noise transmission from drilling activities.
  - Using existing facilities, avoiding impacts associated with the transportation of materials and construction of additional facilities.
  - Using existing WIFs for waste disposal, eliminating discharge of drilling wastes to land or waters of the Alaskan Arctic.
  - The SID location is within the barrier islands in 6 to 8 feet of water, outside of the main fall migration path of the bowhead whale, reducing the potential for impacts to bowhead whales.

  - Barging and use of hovercraft and crew boats will utilize routes in shallow water inshore of the barrier islands, outside of the main fall migration path of the bowhead whale, reducing the potential for impacts to bowhead whales.

- Eni will only conduct drilling operations during the winter as shown in the schedule provided as Table 2-3 of this EIA. This will result in mitigation of the following impacts:
  - Fewer species of marine mammals are present (e.g., bowhead whales), during drilling into target reservoir zones, reducing the risk of impacts to these species.
  - Response in event of an oil spill will be easier in winter due to the presence of ice around SID. Response tactics used will be conventional mechanical recovery techniques.

- Eni has existing procedures in place to mitigate impacts to wildlife:
  - Food handling and storage procedures, such as secure storage of food to avoid attracting wildlife.
  - Waste management procedures, including management of putrescible wastes (e.g., use of bear-proof dumpsters) as well as proper handling and disposal of chemicals and other wastes.
  - Bear cages at all facility exits to allow personnel to monitor for bears prior to exiting facilities.
  - Training personnel on procedures on how to handle human-animal interactions that ensure safety of workers and wildlife.
  - A Polar Bear Interaction Plan that includes monitoring for polar bears, deterrence activities (i.e., hazing), establishing setbacks of one mile from polar bear dens, and reporting of polar bear sightings to USFWS and ADF&G.
  - Facilities at SID were designed and constructed to minimize the potential for bird strikes as per the Biological Opinion for the Nikaitchuq Development Project (see Section 3.10).

- Eni has the following procedures to provide economic and social benefits to NSB residents:
  - Provides contracting opportunities to NSB-based vendors. Local vendors currently under contract with Eni are provided in Section 3.19, Economics.
  - Supports local (Nuiqsut) community activities. This includes co-sponsoring the annual Nuiqsut community Christmas party and contributes to Nalukataq (whaling festival) in Utqiaġvik and Nuiqsut.
  - Co-sponsored a health/job fair in Nuiqsut in 2016.
  - Sponsored an educational event in Nuiqsut. This included sponsoring the Nuiqsut Trapper School participation in SchoolNet, an Eni world-wide program that was available in all countries where Eni has offices. Participants compete against students in other countries. As part of this program in 2012, eight sixth graders from the Nuiqsut Trapper School visited Italy for winning that year's SchoolNet program contest.

- Eni consults and coordinates with subsistence users to mitigate impacts to subsistence activities. Subsistence mitigation measures are discussed in more detail in Section 3.22.4:
  - Eni participates in the Conflict Avoidance Agreement discussions with the AEWC and signs the Conflict Avoidance Agreement to help prevent impacts to the local Natives subsistence way of life. A discussion of the Conflict Avoidance Agreement is included in more detail in Section 6, Consultation.
  - Eni operates in a safe and respectful manner in the waters near Oliktok Point and Spy Island with all efforts to mitigate potential impacts to subsistence hunting vessels during the months of open water season.
  - Eni, if needed, provides emergency assistance to subsistence hunters in the vicinity of the Eni facilities.
  - In 2009, Eni funded an expansion of the public dock/jetty at Oliktok Point to assist Nuiqsut fishermen and whalers in their travel between Nuiqsut and Cross Island.
  - Eni provides materials as direct support to whaling activities (e.g., diesel fuel, tools, blankets).
  - Eni, along with other operators, provides funds to the Nuiqsut Whaling Captains' Association to offset expenses (materials, fuel, freight, etc.) for their whaling activities.

# 6 CONSULTATION

Eni has a robust stakeholder engagement process and regularly consults with its stakeholders. As part of the permitting process for the proposed Nikaitchuq North Exploration Drilling Project, Eni has consulted with relevant state and federal agencies regarding the permitting process and information required as shown in Table 6-1. It is expected that additional meetings will be required as part of the agency stakeholder consultation process.

**Table 6-1 Agency Stakeholder Consultation**

| DATE | GROUP | ITEMS DISCUSSED |
|---|---|---|
| April 1, 2016 | ADNR, OPMP | Presented the proposed Nikaitchuq North Exploration Drilling Project to ADNR, OPMP staff |
| April 7, 2016 | BSEE | Discussed unitization of Nikaitchuq North (Harrison Bay Block 6423 Unit). |
| April 8, 2016 | BOEM | Presented the proposed Nikaitchuq North Exploration Drilling Project to BOEM staff. |
| April 14, 2016 | BOEM | Greet and meet regarding Nikaitchuq North. BOEM inquired about seismic data covering Nikaitchuq North. |
| May 10, 2016 | BOEM & BSEE | Introduced BOEM and BSEE personnel to Eni's leadership team. Discussed geological and geophysical exploration efforts and unitization of Nikaitchuq North (Harrison Bay Block 6423 Unit). |
| May 24, 2016 | BSEE | Discussed unitization of Nikaitchuq North (Harrison Bay Block 6423 Unit). |
| June 23, 2016 | BOEM | Discussed the proposed Nikaitchuq North Exploration Drilling Project and the requirements for submittal of an Exploration Plan (EP). |
| June 23, 2016 | BSEE | Submitted unitization application. |
| June 30, 2016 | BSEE | Discussed the proposed Nikaitchuq North Exploration Drilling Project and the OSRP requirements. Also discussed the need for SEMS. |
| August 9, 2016 | BOEM | Met with Director of BOEM, Abigail Ross Hopper, Alaska Regional Director, Dr. James Kendall, and Senior Advisors. Directed them on a tour of Eni's North Slope facilities, including OPP and SID. |
| August 12, 2016 | Office of the Governor (Alaska) | Updated the Chief Oil & Gas Advisor, John Hendrix, and Business Economics Analysts on the proposed Nikaitchuq North Exploration Drilling Project, other Nikaitchuq development activities, and discussed royalty and credit issues. |
| September 9, 2016 | BSEE | Unitization application deemed complete. |
| September 28, 2016 | BOEM | Met to obtain clarification on issues associated with the proposed Nikaitchuq North Exploration Drilling Project EP requirements. |
| October 19, 2016 | AOGCC | Presented the proposed Nikaitchuq North Exploration Drilling Project to AOGCC staff. Discussed required drilling permits. |
| November 3, 2016 | BOEM | Met to obtain additional information regarding the proposed Nikaitchuq North Exploration Drilling Project. Topics discussed included the EIA requirement, the air permit, and WCD. |
| November 14, 2016 | BOEM | Discussed the EP and WCD for the proposed Nikaitchuq North Exploration Drilling Project. |

**Table 6-1 Agency Stakeholder Consultation (Continued)**

| DATE | GROUP | ITEMS DISCUSSED |
|---|---|---|
| November 21, 2016 | BOEM | Discussed the proposed drill rig modification and associated air emissions requirements for the proposed Nikaitchuq North Exploration Drilling Project. |
| November 23, 2016 | ADNR, DOG | Discussed the Plan of Operation for regarding Nikaitchuq North activities. |
| December 12, 2016 | BOEM | Discussed draft EP information with BOEM |
| December 13, 2016 | BOEM | Presentation on Amplitude Variation with Offset (geophysical/seismic information) |
| December 15, 2016 | BSEE | Discussed the suspension of operation. Wild Well Control (Eni contractor) attended on Eni's behalf. |
| January 11, 2017 | BOEM | Presented Nikaitchuq overview and Nikaitchuq North. |
| January 12, 2017 | BOEM | Outlined existing Eni facilities, differences between previous activity, additional activity proposed for State of Alaska waters, and the proposed Nikaitchuq North Exploration Drilling Project. |
| February 6, 2017 | BOEM | Presented Shallow Hazards Assessment overview. |
| February 7, 2017 | BOEM | Introduced J1-A WCD and data to calculate WCD. |
| March 28, 2017 | BOEM | Met with BOEM to go over the Request for Additional Information (RFAI) regarding the EP submittal to make sure that all items were understood. |
| April 3, 2017 | BOEM | Teleconference with BOEM to go over the proprietary RFAI regarding the proprietary EP submittal to make sure that all items were understood. |
| April 11, 2017 | BOEM | Discussed responses to BOEM RFAI. |
| May 11, 2017 | BOEM | Discussed revised drilling schedule. |

Notes:
ADNR = Alaska Department of Natural Resources
AOGCC = Alaska Oil and Gas Conservation Commission
BOEM = Bureau of Ocean Energy Management
BSEE = Bureau of Safety and Environmental Enforcement
DOG = Division of Oil and Gas
EP = Exploration Plan
OPMP = Office of Project Management and Permitting
OPP = Oliktok Production Pad
OSRP = Oil Spill Response Plan
SEMS = Safety and Environmental Management Systems
SID = Spy Island Drillsite
WCD = worst-case discharge

Eni has a robust stakeholder engagement process and regularly consults with local (NSB) government officials, subsistence users' groups, and other local stakeholders regarding potential impacts from Eni's operations and ways that negative impacts can be mitigated. A list of the relevant local stakeholder engagement meetings is provided in Table 6-2. Eni plans to continue stakeholder consultation throughout the permitting and exploration process.

**Table 6-2 Local Stakeholder Consultation**

| DATE | GROUP | LOCATION | ITEMS DISCUSSED |
|---|---|---|---|
| September 15, 2016 | Kuukpik Corporation | Nuiqsut | Presented the proposed Nikaitchuq North Exploration Drilling Project to Kuukpik management which included Isaac Nukapigak, Treasurer for Kuukpik Corporation. |
| November 15, 2016 | NSB Planning Dept. | Utqiaġvik | Presented the proposed Nikaitchuq North Exploration Drilling Project to Director Gordon Brower and other NSB Planning Department staff. |
| December 8, 2016 | AEWC | Anchorage | Presented the proposed Nikaitchuq North Exploration Drilling Project at the AEWC 4th Quarter meeting to the commissioners. |
| December 8, 2016 | Mayor Thomas Napageak, City of Nuiqsut | Anchorage | Presented the proposed Nikaitchuq North Exploration Drilling Project to Mayor Napageak and obtained feedback. |
| February 6-8, 2017 | AEWC | Utqiaġvik | Attended the AEWC Mini-Convention to introduce Eni's Nikaitchuq North Exploration Drilling Project and discuss the 2017 Conflict Avoidance Agreement. |
| June 2017 (proposed) | NSB Planning Commission | Utqiaġvik | Present the proposed Nikaitchuq North Exploration Drilling Project to the NSB Planning Commission at their monthly meeting. |

Notes:
NSB = North Slope Borough
AEWC = Alaska Eskimo Whaling Commission

Conflict Avoidance Agreement

Eni works with subsistence users in the area to mitigate the chances for conflict. One of the major ways this is done is through negotiation and signing of the Conflict Avoidance Agreement. The Conflict Avoidance Agreement is an agreement between industry participants (typically operators actively conducting operations in the Beaufort and Chukchi seas or geophysical companies who have operations in the Beaufort or Chukchi seas), the village Whaling Captains' Associations, and AEWC. The purpose is to provide:

1. Equipment and procedures for communications between subsistence participants and industry participants.

2. Avoidance guidelines and other mitigation measures to be followed by the industry participants working in or transiting the vicinity of active subsistence hunters, in areas where subsistence hunters anticipate hunting, or in areas that are in sufficient proximity to areas expected to be used for subsistence hunting that the planned activities could potentially adversely affect the subsistence bowhead whale hunt through effects on bowhead whales.

3. Measures to be taken in the event of an emergency occurring during the term of the Conflict Avoidance Agreement.

4. Dispute resolution procedures.

Eni has signed the Conflict Avoidance Agreement since 2011 and anticipates continuing to participate in the Conflict Avoidance Agreement process for the foreseeable future.

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# *SECTION P ADMINISTRATIVE INFORMATION*

***(a) Exempted information description***

The following information is considered proprietary and has been removed from the public copies of this EP.

- Bottom-hole locations, TVD, and MD of proposed wells in Form BOEM-0137 "OCS Plan Information Forms" (Plan Contents)
- All of Section B including:
  - Geologic descriptions, surface location, and bathymetry maps
  - Structure contour maps
  - Seismic lines
  - Geologic cross-section maps
  - High resolution seismic lines
  - Stratigraphic columns
  - Time/depth tables
  - Geochemical information
  - Future G&G activities
  - Basis for calculation of WCD