BP EXPLORATION

EXPLORATION PLAN

Liberty #1 Exploration Well
(OCS-Y-1585, OCS-Y-1650)

BP EXPLORATION (ALASKA) INC.
ANCHORAGE, ALASKA

OCTOBER 1996

LIBERTY #1 EXPLORATION WELL
Exploration Plan
(OCS-Y-1585, OCS-Y-1650)

submitted to the
U.S. Minerals Management Service
in accordance with 30 CFR 250.33

October 30, 1996

BP EXPLORATION (ALASKA) INC.
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LIBERTY #1 EXPLORATION PLAN

1. INTRODUCTION

In September, 1996, BP Exploration (Alaska) Inc. (BPXA), acquired several leases during U.S. Minerals Management Service (MMS) Outer Continental Shelf (OCS) Lease Sale 144. During the winter of 1996-1997, BPXA plans to drill the Liberty #1 offshore exploratory well in federal waters (Figure 1). The tophole location will be on OCS-Y-1585; the bottomhole target is in OCS-Y-1650. This well will be drilled from an ice structure located on top of the abandoned gravel Tern Island drill site. Spray ice will be used to create a suitable working surface of the size needed to support the drilling operation. An evaluation program will be performed, and, if necessary, the well will be flow-tested. This exploration program will also include onshore tundra travel, ice road construction (offshore and possibly onshore), an offshore ice airstrip, an offshore ice staging pad, and temporary water sources (Figure 2).

This exploration plan is being submitted to the MMS for review and approval, in accordance with the requirements of 30 CFR 250.33, and recognizing the terms and conditions of OCS Lease Sales 124 and 144. This plan will also support BPXA's permit applications to the State of Alaska and the North Slope Borough for support activities located on State lands and waters. Major components of the plan include:

- a description of the type and sequence of proposed activities
- a detailed description of the drilling unit
- a location description

A series of appendices are included to provide supporting information, including:

- geology data (Proprietary and Confidential; submitted under separate cover)
- a drilling fluids plan
- H_2S information
- use of new or innovative technology
- operational information
- an environmental report
- a discussion of compliance with lease stipulations
- a certification of coastal zone consistency
- a discussion of air emissions
- supporting figures and maps

In addition, the accompanying document entitled "Proprietary and Confidential, BP Exploration (Alaska) Inc., Tern Island Gravel/Ice Island Design Documentation and Verification

Plan, Submitted to MMS For Their Exclusive Use" is also considered proprietary and confidential information by BPXA.

Table 1 provides a cross reference between this document and the requirements of 30 CFR 250.33.

TABLE 1

EXPLORATION PLAN CROSS REFERENCE TO 30 CFR 250.33

30 CFR 250.33 REQUIREMENT	FOUND IN:
250.33 (a) (1)	Section 2
250.33 (a) (2)	Section 3
250.33 (a) (3)	Section 4
250.33 (b) (1)	Appendix 1 - submitted under separate cover
250.33 (b) (2)	Oil Spill Contingency Plan - submitted under separate cover
250.33 (b) (3)	Appendix 7
250.33 (b) (4)	Appendix 2
250.33 (b) (5)	Appendix 3
250.33 (b) (6)	Appendix 4
250.33 (b) (7-9)	Appendix 5
250.33 (b) (10-17)	Appendix 6
250.33 (b) (18)	Appendix 8
250.33 (b) (19)	Appendix 9
250.33 (b) (20)	see cover letter

2. TYPE AND SEQUENCE OF PROPOSED ACTIVITIES

2.1 Location

The proposed gravel/ice drill site will be located at the existing, abandoned gravel Tern Island drilling island constructed by Shell Oil Company in 1982. Specifically, the well will be located:

- 1681feet FWL and 8872 feet FSL of OCS-Y-1585
- Alaska State Plane Zone 3 Coordinates:
  X = 315,087.19
  Y = 5,953,936.16
- Latitude = 70°16'45.0088"N
- Longitude = 147°29'46.3084"W
- UTM Zone 6 Coordinates (converted to feet):
  X = 1,579,089.9'
  Y = 25,580,094.0'

2.2 Proposed Activity Description and Time Table

The project is planned to start between November 15 and December 1, 1996 and have all equipment demobilized from the gravel/ice island no later than April 1, 1997 (see Figure 3). The proposed activities included in this project are described below, and include:

1) ice construction and location preparation activities
2) mobilization of the drilling rig to gravel/ice island
3) drilling the Liberty #1 well
4) evaluating the Liberty #1 well, including on-lease seismic activity
5) flow test the Liberty #1 well
6) plug and abandon the Liberty #1 well
7) demobilize the drilling rig from the gravel/ice island

Ice Construction and Location Preparation (11/15/96 through 1/17/97) : Assuming the tundra is approved for travel and ice conditions allow, BPXA would begin ice construction activities as early as November 15, 1996, but no later than December 1, 1996. Ice construction would consist of:

1) a temporary staging area on grounded sea ice near the shoreline west of the Kadleroshilik River). The camp will house 40-50 personnel in support of the ice construction operation. This camp will then be mobilized to Tern Island immediately following the rig move to the island.

2) a 3 mile sea ice road exiting the Endicott Causeway shoreward of the 500 foot breach, proceeding east around Pt. Brower, then southeast toward the Kadleroshilik River, and then northeast to the Tern Island location (Figure 1). The segments of this ice road adjacent to the coast will primarily be built on grounded sea ice.
3) building spray ice onto the remaining gravel remnant at Tern Island to create an ice/gravel pad of approximately 500' diameter from which drilling and testing operations will be conducted (Figure 4).
4) one 3 mile tundra ice road to provide access to a primary fresh water source consisting of three lakes and another 1.8 mile tundra ice road to provide access to a second primary fresh water source consisting of another tundra lake (Figure 5).
5) an additional 10 mile sea ice road plus 3/4 mile tundra ice road to provide access to a secondary fresh water source (LAS 14042) which is an old gravel mine site located on the east bank of the Shaviovik River (Figure 6).
6) as an alternative, a sea ice road approximately 36 miles long may be constructed along the coast from the staging area to Pt. Thomson, where the Pool #4 Rig is stacked.
7) a 5800 foot long by 75 foot wide grounded sea ice strip to provide an VFR/IFR runway for Otter flights and possible DC-6 and Hercules supply transports (Figure 7); the ice strip will include a non-directional beacon, a weather station with a generator and associated fuel tanks.
8) installing the cellar/structural casing on the remnant gravel portion of the Tern Gravel/Ice Island.

The ungrounded segment of the sea ice road will typically have a traveled surface of approximately 120 feet wide, and will be approximately 6.5 feet thick. The onshore ice roads will have a minimum thickness of 6 inches, and a usable width of about 30 feet.

Mobilize the Drilling Rig to the Gravel/Ice Island (1/18/96 through 1/31/97): Either the Pool #4 Rig or Pool #6 Rig will be mobilized to the Tern Gravel/Ice Island. The rig selection decision will be based solely on economics and rig availability. The Pool #6 Rig is currently stacked in Deadhorse. If selected, it will be mobilized to location utilizing tractor trailer units over the proposed ice road connecting Tern Island with the Endicott Causeway. The Pool #4 Rig is currently stacked 30 miles east of Tern Island on the Pt. Thompson 3 Pad (Figure 1). If selected, it will be mobilized to Tern Island using rollagons over the alternative ice road to Pt. Thomson. In either case, the rig will be prepared for moving during the ice construction activities. A 14-day period is expected for rig mobilization. These "herc" rigs (can be disassembled and transported with a Hercules aircraft) are presently disassembled and stacked, and the first opportunity that MMS will have to conduct the complete inspection (30 CFR 250.51) will be just prior to commencing operations when the rig has been reassembled.

Drilling the Liberty #1 Well (2/1/97 through 3/3/97): Following the rig move and the MMS rig inspection, the Liberty #1 Well will be spudded and drilled as outlined in the Approved Application for Permit to Drill (30 CFR 250.272); application to be submitted on approximately November 15, 1996. The drilling and casing operations are scheduled for 30 days. This timeline is based on the benchmark data from BPXA's nearby Endicott wells drilled from the Satellite Drill Island.

Evaluating the Liberty #1 Well (3/4/97 through 3/11/97): Upon drilling to total depth, an evaluation program is planned, and, depending on the presence of oil could require eight days.

Flow Test the Liberty #1 Reservoir (3/12/97 through 3/21/97): Based on the results of the wireline logging evaluation, the well could be flow tested. This will require testing and hydrocarbon storage vessels on the surface. It is planned to test a single zone; however, if the project is ahead of schedule and it is deemed possible, a second test could be considered. A two-day seismic survey could be conducted as part of this activity. In this case, a recording device would be placed in the well, and a seismic signal will be produced with vibroseis trucks located on a line over the welllbore, approximately 8,000 feet west of Tern Island (Figure 2). In this type of seismic survey, the acoustic source is created by vibrating the sea ice with hydraulically-driven pads mounted beneath trucks. This is a non-intrusive technique, and no explosives, airguns, or other energy sources are used.

Plug and Abandon the Liberty #1 Well (3/22/97 through 3/24/97): Upon receipt of the District Supervisor's approval to abandon (30 CFR 250.111), BPXA will permanently plug and abandon the Liberty #1 Well in accordance with 30 CFR 250.112. Three days are scheduled for the plug and abandonment operations.

Demobilization of Drilling Unit from Tern Gravel/Ice Island (3/25/97 through 3/31/97): Upon abandonment of the Liberty #1 Well, the drilling rig will be demobilized from the Tern Gravel/Ice Island. The gravel/ice island will be inspected, and any soiled ice sections will be trimmed. All signs and reflectors will be removed from the ice road and the project will be abandoned.

3. DESCRIPTION OF DRILLING UNIT, ARTIFICIAL ISLAND, AND DISCUSSION OF DRILLING PROGRAM INCLUDING IMPORTANT SAFETY AND POLLUTION-PREVENTION FEATURES

3.1 Mobile Drilling Unit Description

BPXA is currently considering two rigs for drilling the Liberty #1 well. Both Pool Rig #4 and Pool Rig #6 are nearly identical herc rigs which are owned and operated by Pool Arctic Alaska. Both rigs have drilled numerous exploration wells on the North Slope and BPXA is confident either rig could drill the Liberty #1 well according to project requirements. Rig selection will be based on economics and rig availability.

The Pool Rig #4 is currently on standby contract to BPXA, and has been used by BPXA to drill the Yukon Gold and Sourdough #2 wells in the 1993-94 winter season, and the

Sourdough #3 well in the 1995-96 winter season. BPXA conducted a detailed, in-house audit of this rig in the 1995-96 winter season and put the rig on standby for 12 days to correct and repair all infractions before spudding the Sourdough #3 well. The Sourdough #3 well was drilled with zero lost time associated with the rig.

The Pool Rig #6 has drilled every year since 1990-91 winter season for Unocal and most recently for Arco in the Colville Delta. Pool Arctic Alaska used the 1995-96 Pool Rig #4 Audit as a guide to apply the same repairs to the Pool #6 Rig. All repairs have been applied except for a gas buster modification and addition of grounding straps for the silicon controlled rectifiers (SCR). The Pool #6 Rig performed Arco's 1995-96 exploration project with less than 8 hours downtime associated with the rig.

3.1.1 Major Drilling Equipment

Since Pool Rigs #4 and #6 are sister rigs, the equipment inventory is identical for both rigs:

Drawworks: Oilwell E-2000 2000-HP 1-3/8" Lebus grooved drum 4 forward and 2 reverse gears, Foster 37 AK make-up and 24 AK break-out catheads, rotary table drive assembly with back brake, all air controlled from the driller's console, complete with a Tarmac V-200 hydromatic auxiliary brake with an Avesco Type AA overrunning clutch and an Oil well adjustable water level control tank system. The drawworks is equipped with 2 General Electric 752R single shaft extension DC traction motors.

Drilling Pumps/Discharge Mud Line: Two, Oilwell A-1700-PT- 1700 HP, 7-3/4" bore x 12" stroke x 5000 psi fluid end and discharge manifold system equipped with a Hydril Model K-20, 5000 psi pulsation dampener, Demco 3" 5000 psi maximum safety relief valve and Demco 2": 5000 psi bleed valve back to the suction tanks, Oteco 2" 6000 psi mud gauge and Oilwell 10" suction stabilizer system. Suctions are charged by separate pumps. Gearend equipped with electric driven lube oil pump, filtration, air oil thermostatic controlled oil cooling system. Pistons and liners are flush cooled by an electric driven pump. When a pump is assigned and throttled, the lube, flushing, and suction charging pumps, engage a few moments prior to the pistons. Pumps are driven by two each 20" x 37" sheaves, 8-V-5 bank, 335" V-belt system designed to stroke pumps at a maximum of 120 SPM under full load. Fluid ends are equipped with 6" liners and pistons. Each Pump is equipped with 2 General Electric 752R single shaft extension DC traction motors.

Mast and Substructure: Dreco, Model #M14225 1330 mast with Dreco Model Slingshot elevating substructure system. This assembly is designed in order to set in all floor equipment, stab and raise mast, set in both floor cantilevered doghouses and install 50' high wind walls at a convenient and safe working elevation of 6'6" from ground level. The entire mast floor is then elevated to the drilling level of 29'0" from ground level by means of two large low speed hydraulic winches which are strung up with ten 1-1/8" wire lines to two large A-frame block and tackle systems. The raising system is remote controlled (no personnel ride the floor when raising) similar to large shop cranes. This system of rig up/down does not require cranes

(nor do other parts of the rig) and is therefore a great asset on many remote Alaskan locations. The substructure and mast have the following dimensions and capacities:

• Mast Inside Working Space	142'0"
• Mast Leg Spread	25'0"
• Substructure Vertical Working Space Under Rotary Beams.	24'0"
• Substructure Horizontal Space Between Boxes.	8'0"
• Rig Floor Height for Rig Up/Down.	6'6"
• Rig Floor Height Drilling	29'0"
• Crown Block, Seven 1-3/8" grooves x 60" Sheaves.	583 Tons
• Gross Nominal Capacity	1,300,000 lbs.
• Casing Capacity[1].	900,000 lbs.
• Set Back Capacity[1].	500,000 lbs.
• Wind Load, No Set Back	100 mph
• Wind Load, Rated Set Back	84 mph
• Racking Board Capacity -- 5" Drill Pipe	240 Stands
• Racking Board Capacity -- 8" Drill Collars	12 Stands
• Capacity, 12 Lines Strung	1,000,000 lbs.
• Capacity, 10 Lines Strung	952,000 lbs.
• Capacity, 8 Lines Strung	886,700 lbs.

[1] Simultaneous Loading Condition

Traveling Block: Oilwell A500 500-Ton six 1-3/8" grooved x 60" OD sheaves with heavy duty eye in top in order to hang off while slipping and cutting the drilling line.

Hook (attaches to Traveling Block): Byron Jackson 5500 500-ton, Dynaplex, positive lock for drilling mode and automatic positioner for tripping and running casing mode.

Bails (Elevator): Byron Jackson 240-ton 2-3/4" x 132", matched set, weldless elevator links.

Swivel: Oilwell PC500 500-ton top of goose neck designed with 2-3/8" opening to facilitate Free Point Backoff Shot tool access in the event of stuck pipe.

Rotary Table: Oilwell Model A37-1/2 opening, capacity 650 tons (dead load), both direction locking, also allows clockwise rotating with racket device which automatically locks against counterclockwise rotating. Driven from DW by 2" pitch double oil bath chain. Driving sprocket is 35 tooth, driven sprocket is 26 tooth which provides a nominal 50 RPM in low gear and a nominal 185 RPM in high gear.

Engines (4500 HP): Five Caterpillar D-398 900-HP each, at 1200 RPM (sea level), turbocharged, after cooled, diesel engines. Each unit equipped with: 2-3 kW arctic automatic thermostatically controlled Jacketwater heater systems, combination air starting prelube system, radiator fan louver with automatic thermostatically controlled cooling system (fan driven by crankshaft), 12" exhaust pipe incorporating a spark and low-oil protection. Each unit (including generator) is installed on a common tricycle type Caterpillar suspension system on top of 3 hard

rubber pads which reduce potential misalignment problems and dampen floor vibrations. One Caterpillar diesel 3304, 90 kW generator provides power for cold start ups and during shut down periods.

Generators (4500 HP): Five Kato 700-kW AC 600-volt 1200 RPM non-sparking generators, single bearing (to reduce potential misalignment problems) with automatic overload protection system and automatic thermostatically controlled electric heating elements. The generators are designed to produce 1,000 kva each, 675 kW or a nominal 900-HP each for SCR type service on a continuous basis. The SCR power distribution system is General Electric. Division I explosion proof motors, lights, panels and fixtures are located in all gaseous areas in compliance with API RP500. All other motors, lights, panels and fixtures are either explosion proof (for interchangeability) or Division II vapor proof type.

Drill String Components:

Grade S-135 Drill Pipe: 285 joints or approx. 9000'
Grade E Drill Pipe: 190 joints or approximately. 6000'
Grade G-105 Pup Joints: 5', 10', 15', 20', and 25'
Heavy Weight Drill Pipe: 36 Joints or approx. 1100'
6-1/2" OD x 2-13'16" ID Drill Collars: 12 at 31' each
8" OD x 2-13/16" ID Drill Collars: 12 at 31' each

Mud Processing/Solids Control Equipment: The main drilling fluid system consists of a nominal 1,000 barrels of volume; the complex is covered with insulated houses and tank walk surfaces are covered with recessed galvanized bar grating. All tank floors and all tank walls exposed to arctic weather are insulated. The tank bottoms are sloped for ease of cleaning and are coated with cold tar epoxy to prevent rusting. All sections have built in insulated submerged low pressure mud guns and a swivel type flow back complete shutoff pipe which is adjustable by hand winch system. One 18" x 24" bypass ditch positive style bypass valves and positive style diversion gates in such a manner to direct any fluids to any of the following sections or systems.

- Twin 90 bbl trip tank system, 45 bbls each.
- One sand trap section, 8.5 bbls.
- Desander-Degasser suction section, 200 bbls.
- Desilter-Mudcleaner suction section, 150 bbls.
- Centrifuge/Volume suction section, 230 bbls.
- Volume Section, 150 bbls.
- Twin 280 bbl suction system, 140 bbls. each.

Located adjacent to and made a part of the mud processing system is a 235 bbl Mud/Water storage tank, and also a nominal 160 bbl Waste Fluid Holding Injection tank. The mud check room is located near the shale shaker and is equipped with a Baroid field check kit (viscosity funnel and cup, mud scales, water loss machine, pH papers, sand content) and washup sink that drains to the shaker waste trap. The solids equipment is as follows:

- Shale Shaker: Harrisburg Dual Tandem linear motion shakers.

- Desanders: Two each Demco Model 123 (3-12" cones/unit) rated at nominal flow of 1000 GPM.
- Degasser: Swaco nominal 1000 GPM Capacity.
- Desilter/Mud Cleaner: Brandt double unit combination silt separator (eight 4" cones/unit). When required, the under flow from the cones passes onto fine screens and remaining liquids and the majority of the desired barite pass through the screens and return to the mud system. Undesirable solids are discarded. Each unit is rated at a nominal flow of 400 GPM.
- Centrifuge: Pioneer Mark I rated at approximately 100 GPM, driven by a 50-HP electric hydraulic system. The unit is charged with 2" x 1-1/2" 100 GPM centrifugal pump.
- Mud Agitators: Eight Brandt 5-HP mud agitators with 32" impellers.
- Mud Hoppers: Two Geosource S-800 sidewinder mud mixers, rated at a nominal 1000 GPM.
- Chemical Mixer: PAA-designed 2-bbl capacity agitator tumbler jet style system, charged by a Galigher 2" x 2-1/2" pump. Both are driven by a single 5-HP electric motor.
- Injection Pump: Gardner Denver Model Tee 4" bore x 6" stroke triplex single acting pump dressed with 4" API liners and pistons. Discharge equipped with Demco 2" shear relief valve, 50000 psi mud pressure gauge and 2" 5000 psi Demco valve, manifolding. The pump is driven through an Eaton transmission and chain system (maximum 150 SPM) by a Caterpillar 3304 turbocharged, after cooled diesel engine producing 125-HP at 1800 RPM. The engine is equipped with spark arresting residential muffler and Caterpillar air starter.

3.2. Safety Features

Blowout Preventers and Controls:

Blowout Preventers and Controls

- Surface Hole Diverter System: Hydril MSP 21-1/4" ID, 2000 psi WP annular blowout preventer; Diverter Spool is Universal 21-14" ID x 72" high, 21-1/2" 2000 psi flanged top and bottom width two 10" 150 ANSI flanged side outlets and one 2" 3000 psi NPT female threaded Outlet; Three 16" 300 psi rated knife valves hydraulically operated; 300' of 16" OD ERW line pipe 40.48 ppf 0.365" wall and 16" 300 psi flanges.
- Main Blowout Preventer Stack consists of the following components (Stainless Steel Ring Grooves):
  - Annular BOP: Hydril GK 13-5/8" ID 5000 psi WP with top 13-5/8" 5000 psi stud BX160 connection and bottom 13-5/8" 10,000 psi Cameron Iron Works, Inc.

(CIW) hub No. 15, BX159 connection complete with LATCHED top bonnet connection. Includes a spare neoprene rubber element.

- Gate BOP(s) Four each Hydril hydraulic ram single gate blowout preventer 13-5/8" ID 10,000 psi WP MPL (automatic ram lock) 13-5/8" 10,000 psi WP CIW hub No. 15 with BX159 top x bottom connection and two 4-1/16" ID 10,000 psi flanged BX155 side outlet connections, both side outlets covered with matching target type blind flanges. One of the above is Blind/Shear Rams.
- Drilling Spool: Universal 13-5/8" ID with 13-5/8" 10,000 psi WP CIW hub No. 15 BX159 top connection x bottom connection and one (kill line) 3-1/16" ID 10,000 psi BX154 flange side outlet and one (choke line) 4-1/16" ID 10,000 BX155 flange side outlet.
- Adapter Spool: Universal 13-5/8" with 13-5/8" 10,000 psi WP CIW hub No. 15 BX159 top connection x 13-5/8" 5000 psi flanged bottom connection to mate up with casing spool flange looking up.
- Kill Line, two each CIW Type FCC 3-1/16" ID x 10,000 psi WP BX154 flanged connections, one valve is MANUALLY OPERATED, and one valve is HYDRAULICALLY ACTUATED by a 3,000 psi WP Cylinder and one Lynn International 3-1/16" ID x 10,000 psi WP BX154 flanged check valve. Includes 80' (some are spare) of 2-3/8" OD, schedule 160, 7.46 ppf, A-53B, seamless pipe rated 10,140 psi at a minimum yield, complete with matching weld connections, flanges, studs, nuts and ring gaskets to hook up.
- Choke Line, two each CIW Type FCC 4-1/16" ID x 10,000 psi WP BX155 flanged connections, one valve is MANUALLY OPERATED, and one valve is HYDRAULICALLY ACTUATED by a 3,000 psi WP cylinder. Includes 40' (some are spare) 4-1/2" OD double extra strong (XX-STR) 27.54 ppf, seamless, A-53B, pipe rated 10,140 psi at minimum yield, complete with matching weld connections, flanges, studs nuts, and ring gaskets to hook up from drilling spool to choke assembly.

- Upper Kelly Cock, Lower Kelly Cock, and Drill Pipe Floor Valve each Hydril Kelly Guard 10,000 psi WP.
- Drill String Inside BOP Valve (Spring Loaded), one Flocon inside BOP 10,000 psi WP.
- Choke Manifold Assembly consists of all 10,000 psi WP valves and fittings on WELL CONTROL SIDE and 5,000 psi WP valves and fittings on flow DIVERTER SIDE of choke assembly.
- Poor-boy Degasser Vessel, mounted over shale shaker, shop make of 30" OD 118.65 ppf casing approximately 16' long with four half-inch inlet, 8-5/8"

dropout to shaker equalizer box, 8-5/8" gas vent from the top, 1" sample catch line, 3" HP collar with a (Consolidated Relief Valve company) pressure release valve and 11" x 15" handhold cleanout washout access.

- Blow Out Preventer Control System is NL Koomey Model T30200-3S blowout preventer control unit with 202- gallon volume tank, main energy provided by a 40-HP electric motor driven triplex plunger pump rated at 20.2 GPM at 3000 psi charging twenty eleven-gallon bladder type separator accumulators. Second energy charging system consists of two Model 31-00103 air pumps rated at a combined volume of 11.0 GPM at 1200 psi, or 7.2 GPM at 3000 psi. Above two energy systems BACKED UP by six 220 cu. ft. nitrogen bottles connected to the manifold system. All above system controlled by a Model SU2KB7 S series manifold with seven manual control stations at the unit. One Annular BOP with Pressure regulator control; Five Gate Valves (one is spare); kill line; one choke line (Includes a Model MGBK7EH electrically operated remote control panel located on derrick floor, just behind driller position with two manifold pressure gauges and nine push button controls with lights; one push to operate (fail-safe bypass); one Annular decrease/increase psi regulator control.
- BOP Control Lines, one lot of 1" Armor coated hoses to connect between the control manifold and the BOPE stack.
- BOP Equipment Test Pump, NLB Model 1075E triplex plunger pump rated at 10,000 psi WP at 10 GPM driven by a top mount 75-HP electric motor complete with make up tank, adjustable pressure relief bypass valve system, gauges and four, 50' long 3/8" 10,000 psi WP x 30,000 psi WP x 30,000 psi burst hoses with snap type couplers.

Instrumentation/Communication:

- Crown Block Protector: Stewart & Stevens Model TCB Crown-O-Matic block protector system, air operated.
- Driller's Console: Totco COMMAND 37" stainless steel panel located in front of driller for convenient visibility. Complete with VISUAL instruments such as weight indicator Type 100 with 16" face, string weight sensed from a Type 50-C load cell located in a Hercules, Model 120 wireline deadline anchor, STANDPIPE mud pressure, PUMP RPM, dual digital, MUD VOLUME gain/loss, TRIPTANK level, FLOWLINE percent, ROTARY torque, ROTARY RPM, TONG torque, EZY-TORQ torque and RIG MAIN WATER TANK level. Located inside housing of console is a Totco combination automatic air dryer filtration system. The drilling recorder can also be engaged/disengaged form this console by a remote air control valve during fast

drilling conditions. Note: There is one additional Totco Remote Standpipe Pressure Gauge Located in the Derrickman's Mud Hopper Room.

- Drilling Recorder System: Totco Model DR8WPT (E) RS (2) F 24 hr-hour clock with DEPTH METER COUNTER complete with 8-PENS recording the following information: rate of PENETRATION, hook WEIGHT with trip/connection time, ROTARY torque, ROTARY RPM, STANDPIPE pressure, PUMP #1 SPM, PUMP #2 SPM, and FLOWLINE percent. There is a manual override to engage/disengage clutch on the face of the unit. Includes storage filing cabinet for new and used charts.
- Mud Tank/ Trip Tank Monitoring Recording: Totco PITOMETER Unit L-8 consists of eight vertical pit level sensor floats (0 to 12' adjustable). One float is located in each twin trip tank section. The MUD TANK volume recorders located in the driller's doghouse. There are two (2) pens on the Tip Tank Recorder, each pen with a different colored ink to represent either No. 1 or No. 2 trip tank recordings.
- Gas Monitoring System: Three General monitors VISUAL/ALARM/LIGHTS gas level detector gauges Model 520, located in driller's doghouse, complete with six SENSORS #10000-1, located in the following areas of the rig:
  - Derrick Floor
  - Substructure
  - Shale Shaker House
  - Choke Assembly House
  - Mud Hopper House
  - Mud Pump House
- H_2S Detector: General Monitor Model 2280 4 Channel with Audio/Horn and Visual/Light Alarms and sensors located in the following locations:
  - Derrick Floor
  - Substructure
  - Shale Shaker House
  - Verbal Communications: Twelve Atkinson Dynamics Model AD-27-4 industrial type, rough service, extreme temperature, open-all-stations (everybody can receive at all times; push button to talk) style intercom system. One unit each located in the following areas:
    - ~ Derrickman's board (inside insulated house)
    - ~ Driller's position at drawworks
    - ~ Driller's doghouse, near knowledge box and automatic choke panel
    - ~ Shale shaker house, near shaker and trip tanks
    - ~ Mud mixing hopper house, near remote pump gauge
    - ~ Mud pump room, hear work bench
    - ~ Choke assembly near trip tank pump

~ Generator control room
~ Electric motor control center room
~ Mechanic/Electrician/Welder shop building
~ Company representative camp office
~ Toolpusher's camp office

Fire/First Aid Items:

- Fire Extinguishers On-Site: Thirty each Ansul Model LTK-30-E (30 lb.) No. 14398, all low temperature hand portable fire extinguisher units, charged with all purpose PURPLE K (ABC) powder. All units are mounted in thirty Ansul HD 30 lb. (fast-action boomer lever) brackets, mounted in protected areas, preferably just inside doors at regulation heights. Units are located in the following areas:
  - 10 Rig proper
  - 4 Pipe Shed Complex
  - 4 Mechanical/Electrician/Welder Shop
  - 1 Portable Welding House
  - 6 Camp Proper
  - 2 Camp Utility House Complex
  - 2 Each Water Hauling House
  - 1 Caterpillar 966 Fork Lift
- Included with the Rig are two each Ansul Model IRTLRK-150-C (150 lb.) wheel-mounted fire extinguishers. One unit is located behind a fast-action door located on the end of the BOP accumulator house at the rig. One unit has its own small house with FAST ACTION DOOR and is readily movable by fork lift. This unit is normally spotted near front entrance of camp and /or mechanic/electrician/welder shop.
- Fire Hose Reel: Ten each steam/water fire hose reels with 50' of hose per reel.
- First Aid Kits: Three each, Zee Medical Service Company first-aid cabinets measuring 19" wide x 29' high x 6-1/2" deep. One each located in toolpusher's camp office, driller's doghouse and mechanic/electrician/welder shop.
- First Aid Litters: Two each, MSA, wire mesh type evacuation letter baskets with retaining straps and handles. Includes a warm up blanket with each unit. One litter each located on rig and mechanic/welder/electrician shop.
- Breathing Masks: Eight each MSA Model 401 PN 463831 breathing mask apparatus complete with oxygen tanks, harness, and protective carrying cases. Four normally stored in camp and four in the motorman's room near the generator complex.

Miscellaneous Safety Items:

- Dreco electric adjustable casing stabbing board and safety belt for stabber and PAA-design 4" adjustable casing fill up line.
- Derrickhand's insulated steel warm up house, located at the back of board, equipped inside with an explosion proof electric heater, electric winch system (to facilitate standing back drill collars or retrieving a stand accidentally dropped across mast), and an intercom system to driller's position. Safety belt and pull back ropes are stored in this house in order to be dry and ready for the next trip.
- Derrickman's Geronimo escape system from the board and Dreco derrickman's ladder climbing safety counter balance system all the way to the crown run around landing.
- Substructure is equipped with two each BOPE hydraulic powered 10 ton monorail hoists. Both together will handle 20 tons.
- Two adjustable air powered substructure BOPE working platforms for nippling up, changing rams, etc.
- The driller's console and foot throttle is totally enclosed and pressurized for Class I, Division I Service.
- The pump room is separated from all other rooms and is not considered a potential gaseous area.
- All rig power and control cables incorporate ITT Suprenant Exane with arctic insulation flexible without damage to -60°F below zero. All runs are totally enclosed in solid or flexible conduit wherever practical and possible. PAA Tee support designed heavy duty cable trays are utilized where solid or flexible conduit is impractical and impossible on portable machinery. All cable conduits and trays are laid out and located in a manner to prevent damage during rig moves, rigging up/down, and when operating. Division I explosion proof motors, lights, panels and fixtures are located in all gaseous areas in compliance with API RP500. All other motors, lights, panels and fixtures are either explosion proof (for interchangeability) or Division II vapor proof type.
- The generator control equipment and all main electric distribution systems are located in two insulated houses which are heat-and-cooling atmosphere controlled automatically by two (one is spare) Trane 7-1/2 ton each air conditioner units.

3.3. Pollution Prevention Features

- Alaska Clean Seas will be employed to provide a spill van and spill technician to be on-site 24 hours each day throughout the entire operation.

- All fuel tanks, test tanks, and all liquid chemicals will be placed in timber bermed, herculite lined containment; this secondary containment will be a minimum of 110 percent of the single largest tank or any group of tanks permanently manifolded together.
- PAA-custom-designed combination heated sectional rotating pipe rack and mud drainage system, with Press-Weld 2" x 2" air power diaphragm cellar pump.
- Mud Box: Okeh mud saver bucket with 3-1/2" and 5" OD end seals complete with drain through derrick floor into the flow line.
- Rathole and Mousehole: Kelly set back sock with 20" x 10-3/4" top guide, 10-3/4", 51 ppf casing x 40' long tapered to 2" drain to cellar, (no rat hole drilling required) complete with setback line and sheaves. Mousehole sock of 9-5/8", 47" casing x 28' long tapered to 2" drain to the cellar, complete with coil spring and face palate to facilitate fine alignment of starting treads.
- Cellar will be designed as sealed containment and cellar pump will be used to pump cellar fluids into pit complex for recycle.
- Fuel Tank System/Pumps:
  - Three nominal 500-bbl main storage tanks, each 8' wide x 53'6" long x 8'6" high, double walls and double bottom, heavy oilfield skids, ladders with cleanout manholes in the top. One tank is normally located near the camp generators and two tanks are normally located near the rig.
  - One Fuel transfer house 5' wide x 8' long x 8' high totally insulated, complete with two (one as a back up) Roper HBFW pumps. Includes manifolding, explosion proof light and electric heater, valving, fittings and piping to Contractor's equipment.
  - One Nominal 70 bbl (3000 gallons) rig day tank located and made a part of No. 5 generator house, complete with filtration system, two (one as back up) Jaccuzzi 1" x 1-1/2" electric 1-HP centrifugal pump feeding and/or filling the engine boilers, Tioga heaters, rolling stock, shop heaters and mud system (when required). Includes all valving, fittings, pipe and hoses to Contractor's equipment.

3.4. Gravel/Ice Island Construction and Specifications

BPXA has retained Duane Miller & Associates to design the gravel/ice island in accordance with 30 CFR 250.131(d). Mr. Miller is a Registered Professional Civil Engineer specializing in design of gravel and ice structures. Triplicate copies of the Proprietary and Confidential Gravel/Ice Island Application accompany this Exploration Plan.

BPXA has nominated Beez Hazen of Northern Engineering & Scientific to serve as the Certified Verification Agent (CVA) for the Tern Gravel/Ice Island Construction Project. Mr.

Hazen is a Registered Professional Civil Engineer. The CVA qualification statement as outlined in 30 CFR 250.132 (b) (ii) is being submitted under separate cover. Due to the compressed schedule required to perform this project this year, BPXA requests that the CVA be allowed to perform the design verification at the same time MMS is reviewing the design, under the condition that the design verification is submitted to MMS no later than November 1, 1996.

Tern Island was constructed by Shell Oil Company in 1982. An estimated 384,000 cubic yards of gravel was used for the core and an additional 28,000 cubic yards was used for the gravel bag slope protection system. The pre-construction water depth, as indicated in Shell's permit application to the U.S. Army Corps of Engineers, was 21.5 feet. Shell conducted a three-well drilling program from the Gravel Island and then removed the slope protection in 1990.

Since slope protection was removed six years ago, the island has undergone natural erosion from wave action and storm events. While these natural forces have redistributed gravel, there is still a crescent-shaped gravel remnant extending 12 feet above sea level. BPXA contracted Coastal Frontiers to survey the island remnant during the open water season of 1996. The results of this survey indicate that the water depths surrounding Tern Island are slightly shallower than 21.5 feet Mean Sea Level (MSL) Datum in some areas, particularly on the west side of the island. This shoaling can be attributed to the dispersion of sediment (particularly the finer fractions) from the unprotected island side slopes. Based on the Coastal Frontiers survey, the volume of gravel presently remaining at the original island site is approximately 238,000 cubic yards. Of this quantity, about 7,000 cubic yards lies above MSL.

Even though the island has undergone some erosion, it is expected that the base of gravel remaining just below the MSL is sufficient to support a 525 foot diameter work surface. This work surface will provide adequate support and protection for the planned drilling and testing operations (Figure 4). BPXA plans to ground the sea ice over the 525 foot diameter work surface to the -13 feet deep contour of the abandoned gravel island by applying an additional 13 feet of spray ice. The top 1 foot of spray ice will be saturated with fresh water. The resulting 26 feet of spray and sea ice would be sufficient to support the planned drilling and testing operations. The drilling rig substructure would then be positioned directly on the 13-foot gravel island remnant for maximum support. This should ensure adequate island strength since this is an undisturbed portion of the original Tern Island gravel structure, from which three prior wells were successfully drilled.

Coastal Frontiers has provided BPXA with the data for the original gravel which was used to construct the Tern Island. Also, Coastal Frontiers was involved in the construction and monitoring program for Tern Island. All of this information has been provided to Duane Miller and has been used in the gravel/ice island design.

3.5 Drilling Program Discussion

BPXA is currently designing the well. Current drilling program details are provided in the Proposed Activity Description (Section 2) and the Geological Data (Appendix 1) portions of

the Exploration Plan. Offset drilling data from Shell's Tern Island wells and more recent benchmark data from wells drilled in BPXA's nearby Endicott field are being evaluated. Upon completion of this evaluation and subsequent design work, an Application for Permit to Drill (30 CFR 250.272) will be submitted.

3.5.1 Relief Well Discussion

MMS Alaska OCS Region requires that lessees include provisions for a relief well should a blowout occur. Because Liberty #1 is not a rank wildcat exploration well, the potential for a blowout is well understood, and is negligible. Based on the nearby offset well data and the 3-D seismic interpretation of the prospect, we are confident that the drilling and testing of this well will be quite routine and can be completed in a single ice season from the Tern Gravel/Ice Island. For the reasons stated above and those listed below, BPXA views the risk of a blowout occurring on this well as extremely low.

- The Pool Arctic Alaska crews are Surface Certified in Well Control in accordance with 30 CFR 250 Subpart O.
- The tool pushers, drillers, and many of the crew members have numerous years of experience drilling exploration wells in the arctic environment.
- The BPXA Rig Supervisor, On-Site Drilling Engineer, Lead Drilling Engineer, Drilling Superintendent, and Drilling Fluids Engineer are also Surface Certified in Well Control Training in accordance with 30 CFR 250 Subpart O.
- The well design will be constructed based on reliable offset data from the Shell Tern wells and also recent data from BPXA's Endicott wells, all of which drill the same formations. In fact, the Shell Tern Island #1 well drilled into the same fault block in which the Liberty #1 well will drill.
- Pool Arctic Alaska has upgraded their surface BOP stack which will add a fourth hydraulic ram single gate BOP. This increases well shut-in capability by 33%, and would better enable stripping operations in the unlikely event that a kick were taken off bottom.
- A mud logging unit will be employed for this well which will add a second set of pit level and flowline monitoring equipment besides the Totco system already provided by Pool Arctic Alaska. Also provided with the mud logging unit will be gas monitors to track background, connection, and trip gas. These devices will all aid in early kick detection for rapid shut in and minimization of influx volume.
- BPXA has established formal procedures and guidelines to ensure all well control instances are addressed immediately and adequate resources of both men and equipment are promptly employed to mitigate the occurrence of a loss of well control (blowout).

In the unlikely event a blowout occurs, BPXA would make the required notifications as outlined in the Emergency Management Plan and activate the Arctic Well Control Contingency Plan (copies of these two BPXA Drilling Documents accompany this Exploration Plan). Please note that these documents are proprietary and for MMS use only: BPXA requests that they be returned upon approval of the Exploration Plan. The second yellow tab in the Emergency Management Plan pertains specifically to exploration activities; the entire Arctic Well Control Contingency Plan applies.

Well Control Specialist: BPXA has contracted WELLCALL (The Well Control Alliance between Halliburton Energy Services and IWC Services) to assist BPXA in the intervention and resolution of any well control emergencies. WELLCALL would be notified immediately in the event of any well control situation which has the potential for escalation.

Relief Well Options: The only realistic, viable option for drilling a relief well would be to construct a second gravel island. The water depth is too shallow to allow access for the bottom founded rigs such as the CIDS, Moliqpak, and the SDCC, which were all considered to drill this prospect. Because this well location is located more than 5 miles from the nearest onshore location, a right angle intersection point is dictated. The rig and associated equipment necessary to drill a well of this departure do not exist on the North Slope of Alaska.

Relief Well Location: The selection of the surface location from which to drill a relief well would be based on such factors as weather forecasts, safe distance and direction from the plume, and planned point of intersection of the blowout well to optimize the kill.

Construction of Gravel Island from Which to Drill the Relief Well: 98,000 cubic yards of gravel would be required to construct a gravel island with a 200 foot diameter work surface and a 400 foot diameter base extending 15 feet above mean sea level in 21 feet of water. Goose Island is located 5 miles southeast of Tern Island (Figure 1), and could provide a source of gravel for construction of a gravel island in an optimum location for drilling a relief well for Liberty #1 well on Tern Island. About 140,000 cubic yards of gravel were used to construct Goose Island; even if 20% has been lost to erosion, the remaining 112,000 cubic yards is a sufficient quantity. Goose Island is in approximately 6 feet of water and the 98,000 cubic yards of gravel could be excavated from the center outward toward the edges leaving excess gravel around the perimeter to prevent water from encroaching on the excavation operation. Another 20,000 cubic yards could be used to fill sand bags for slope protection.

Two options are possible for gravel placement. As a first option, if a blowout occurred between mid-February and mid-March, the 6.5-foot thick sea ice road would be used to transport the gravel from Goose Island to the relief island location. Standard techniques would be used to construct the relief island. Fourteen days would be required for this method of placement. During gravel construction, the rig and equipment necessary to drill the relief well would be mobilized from Deadhorse and Prudhoe Bay. The actual deployment of the rig and equipment to the island will depend on weather conditions. If the ice road deteriorates and will not support the 14 day rig move, then BPXA would locate a rig capable of being mobilized by a helicopter for

mobilization to the gravel island. An ice breaker could be used to provide barges for additional storage area adjacent to the island.

As a second option, depending on when the blowout occurred and the condition of the sea ice road, it is possible the gravel required to build the island would have to be transported by tug and barge at the earliest opportunity based on open water, which generally occurs in July. Ice Breakers are available from CanMar out of McKinley Bay in Canada. These ice breakers could be used to establish navigation routes through the deteriorating landfast ice in July. CanMar provides Class IV ice breakers which require 28 foot of draft and can break 8 foot thick ice, and Class II ice breakers which require 13 foot of draft and can break 4 to 5 feet of ice. The rig and equipment would then be barged to the island. Barges could be used to provide additional storage area.

In either case, a series of permits would be required for gravel island construction, including a Section 404/10 permit for placement of fill. Because this would be an emergency situation, it is expected that permit applications would be processed expeditiously, according to Department of Army regulations at 33 CFR Part 325.2 (e)(4).

Relief Well Drilling Rig: During the construction of the gravel island, efforts would be under way to prepare the other Pool Arctic Alaska herc rig (Pool #4 Rig or Pool #6 Rig) for the rig move to the relief well island. There is an existing agreement between Arco and BPXA stating that, in the event a relief well is needed, the operator having the other rig under contract would curtail their operation and release that rig to drill a relief well. A copy of this agreement is included in the Oil Spill Contingency Plan.

Again, based on ice road conditions, it may become necessary to contract a helicopter rig for the drilling of the relief well. BPXA would locate, contract for, and handle all the transporting issues involved while the gravel island was being constructed.

Relief Well Equipment and Mobilization: All the equipment needed to drill the relief well is located in BPXA's drilling stock either on the North Slope or in Fairbanks. This consists of the tubulars, wellhead, BOP's, cement, drilling fluid products, downhole directional tools, bits, fuel, and other items necessary to drill a relief well. The mode of transport for the equipment to the relief well site would be a combination of barge, rollagon, tractor trailer, or helicopter depending upon the condition of the sea ice and the phase of the well kill operation.

Timeline for Relief Well Drilling (3 - 7 Months) :

Mob Gravel Equipment	1 Week
Construct Gravel Island	2 Weeks
Set Conductor/Mob Rig	3 - 4 Weeks
MMS Inspect Rig/Spud	
Drill Relief Well	3 - 6 Weeks
Kill Well and Plug and Abandonment	1 -2 Weeks
Demobilize Rig	2 - 4 Weeks
Breakup Factor	0 - 3 Months
Clean-up Tern Island	Evaluate

3.5.2 Drilling Unit Loss or Disablement

As part of project planning, BPXA evaluated the potential for loss or disablement of the drilling unit, and has incorporated the following precautions to prevent such an occurrence.

Ice Settlement Affects on Drilling Unit: The rig will be placed on the gravel/ice island so that the substructure footprint will be located directly over the 12-foot high remnant of the existing portion of the original Tern Island. The substructure is easily the heaviest of the rig components since it supports the rig floor, derrick, racked back pipe weight, and hook load. Because the gravel/ice island design requires the ice above the sea level to be built up to the 12-foot level of the gravel remnant, the substructure will be on firm ground and will not be subject to ice settlement. The remaining components of the rig will be within the 5-foot deep water contour at their outside edges. These components will also be placed on rig mats to evenly distribute their weight. Based on experience with the Karluk grounded ice island, where the maximum amount of ice settlement was approximately 1 foot in 40 plus feet of ice thickness, these components would be exposed to less than 6 inches on the outside edge (18 feet of ice). This minor amount of settlement is tolerable for these units.

Natural Forces: The rig placement also accounts for the absolute worst case storm event, with the motor complex (power module) and the pit complex being oriented to the west edge of the gravel ice pad. This provides for maximum protection for these units since the west edge of the pad is protected from storm events by the coast to the south and the Sagavanirktok River delta extending out to the west. Considering that the substructure will be placed on the gravel remnant, all major components of the rig will be protected from the forces of nature. While the pipe shed is located on the east side of the island facing the eastward weather exposure, the 26 feet of grounded ice extending out over the eastward edge of the island would serve as a barrier causing any ice plate movement to shear, override grounded ice, and deposit an ice rubble pile along the eastern edge of the island. Therefore, it is highly unlikely that the pipe shed would be susceptible to damage in a severe storm event. The camp is also located to the south edge of the island to provide maximum protection to personnel. All fuel tanks and liquid chemical will be located at least 30 feet away from the edge of the gravel/ice pad. Both the rig and camp have been oriented to align with the N75° wind direction to minimize drifting snow accumulation.

Equipment Failures: The Pool Arctic Alaska #4 and #6 rigs are nearly identical rigs, and an additional rig of this type is operating on the Kenai Peninsula. Thus, Pool has an adequate inventory of parts for these rigs. As described in Section 3.1, both of these rigs are in good working condition, and have recently been audited for potential repair problems. It is therefore doubtful that either rig would experience a major equipment failure, especially since a motor man, electrician, and welder are assigned to the rig full time. The wearing part or parts would most likely be diagnosed enough in advance to allow ordering and shipping of the piece and the installation could be programmed for an opportune time in the well schedule. Because

timing is of the highest priority for this project, in the event of an unanticipated major component failure, that piece would be located and transported to the North Slope as quickly as possible. An alternative option may be to take the part from one of the other Pool rigs if that rig is not contracted out.

4. LIBERTY #1 EXPLORATORY WELL LOCATION

Well location information is shown on Figure 8.

APPENDIX 1: PROPRIETARY AND CONFIDENTIAL INFORMATION

Several documents have been submitted under separate cover in support of this Exploration Plan as BPXA Proprietary and Confidential information. This Appendix provides a summary description of the contents of those documents.

1.1 GEOLOGY DATA

The Liberty # 1 well will test the Liberty Prospect located in Foggy Island Bay, southeast of the Duck Island Unit. Three wells exist in the prospect area (Tern Island #1A, #2A and #3) which provide important data related to the prospect. First, the wells establish the presence of reservoir rocks and trapped hydrocarbons in the vicinity of the Liberty prospect. Second, the wells provide lithologic information of the interval to be drilled from surface to the top of the target reservoir. The wells also help define potential drilling hazards and establish a time-depth relationship to seismic data in the area.

A 3D seismic survey covers the prospect area and was used to map the top of the reservoir and define the prospect limits. The 3D seismic data was also used to create seismic profiles through the proposed bottom hole location of Liberty #1 in several orientations. Geologic cross sections were made through the proposed well location by combining stratigraphic information from the existing wells with the seismic interpretation.

1.2 GRAVEL/ICE ISLAND DESIGN VERIFICATION

This document provides detailed engineering information in support of the proposed gravel/ice island design. The condition of the existing island is discussed, and design criteria for the proposed exploratory well gravel/ice island are identified. The report also includes a design analysis, a description of the proposed construction methodology, and a proposed construction quality assurance/quality control program.

1.3 SHARED SERVICE DRILLING EMERGENCY MANAGEMENT PLAN

This Emergency Management Plan has been prepared by BPXA Shared Services Drilling (SSD) to supply a source of internal emergency response information that is supplemental to an Oil Spill Contingency Plan. It provides:

- a list of field emergency response actions;
- Anchorage office emergency response actions, procedures, and personnel requirements;
- position descriptions, including SSD checklists, incident management team guidelines, and forms;

- standard operating procedures for exploration sites; and
- information on selected well control specialists.

1.4 SHARED SERVICE DRILLING ARCTIC WELL CONTROL CONTINGENCY PLAN

This SSD document provides a working methodology to safely and effectively manage, respond to, and recover from a well control emergency on the North Slope. It provides guidelines for procedures and communications to:

- safeguard human life if primary well control is lost;
- minimize primary well control escalation;
- control the personal safety of those involved with the well control operations, and ensure that control efforts are efficiently and effectively conducted;
- undertake actions which will ensure the extent of damage to the environment, surface facilities, rig, and location are minimized;
- establish a source control unit under the Incident Command System to efficiently and effectively respond to bring the well under control;
- document planning steps to evaluate the most appropriate method for controlling the well;
- document basic procedures and equipment requirements for surface and relief well control techniques;
- ensure that all personnel taking part in the emergency are fully aware and familiar with the roles, responsibilities, and tasks they have been assigned, and are adequately trained;
- minimize logistical and source control problems; and
- document critical equipment and services to minimize mobilization times in an emergency.

APPENDIX 2

LIBERTY #1 EXPLORATION WELL

DRILLING FLUIDS PLAN

Share Service Drilling
Liberty #1 Prospect
NPDES Mud Plan (9/27/96)

This mud plan was developed for drilling the Liberyt #1 prospect to be drilled in the winter of 1996-1997 in the Foggy Island Bay area of the Beaufort Sea off the north slope of Alaska.

I. Type(s) of Mud Proposed for Discharge:

This well will be drilled with a modified generic Mud #2 from the initial spud to the final total depth (TMD). The components of this mud system and their maximum concentrations are listed on Attachment "A" of this mud plan. Both fresh water and/or seawater will be used to maintain this mud system.

2. Well Name: Liberty

3. Well Number: #1

4. NPDES Permit Number: AKG284200

5. Mud Types for Each Well:

Liberty #1 - Modified Generic Mud #2 (see Attachment "A")

6. Details of Mud System: See Attachment "A"

7. Determination of System Toxicity:

To insure drilling mud and cuttings discharges comply with the >30,000 ppm
SSP limitation for operations in the Beaufort Sea, please note the following:

A. As the primary mud plan is to use the additives as outlined on Attachment "A" from spud to TD, the attached mud bioassay (Baroid Bioassay Laboratory BL-0618 (11/12/93) provides certification of that system's overall toxicity at 245,700 ppm SSP which is well above the 30,000 ppm SSP permit limitation. Note all the additives listed in Attachment "A" were tested at maximum concentrations with the exception of the lost circulation materials (KwikSeal/Baroseal (blended flakes, fibers and granules), mica flakes and crushed nut hulls), the zinc carbonate. These products have been authorized for use (due to there lack of influence on resulting mud toxicities) in the previous general permits were not included in the above referenced bioassay. As the permit requires, a monthly bioassay will be run to confirm effluent toxicities.

B. Based upon the calculated toxicity (see Attachment "B"), an EZ Spot-NT/mineral oil pill will be used if a spotting fluid is required on this drilling project. The pill will be recovered when circulated out of the hole per the permit requirements and the residual content will not exceed 2% by volume. In the event a spotting fluid is required, appropriate sampling will be done before and after the spot to confirm effluent toxicities.

8. Procedure for Determining if New Additives May Be Used:

While it will be the intent of this drilling program to use only the products which are included in Attachment "A", if any additional additive is required, the process as outlined on Attachment "C" will be used prior to use of the product.

9. Outline of the Mud Planning Process:

This mud plan has been established based upon standard procedures for previous mud system approval for discharge in state and federal waters offshore Alaska. The mud system toxicity is based upon actual bioassay data, consequently no problems are anticipated in terms of compliance with permit requirements. Also, the product mix in Attachment "A" has been used on several offshore operations so a "comfort" factor has developed in terms of being able to comply with permit limitations for toxicity. This mud plan is meant to tie into the other requirements of the current Arctic general permit which in combination, provide a comprehensive mechanism to insure minimal impact to the receiving waters.

The personnel responsible for the development and implementation of this Mud Plan are:

Mary CocKlan-Vendl			4766
XXXXXXXXXX	BPX	Permitting	907/546-XXXX
Joe Polya	SSD	Drilling Engineer	907/564-5713
John Rose	Baroid	Tech Service Rep.	907/243-8813

Attachment "A"
SSD Liberty #1 Prospect
Modified Generic Mud #2
(9/27/96)

Mud Additives:	Proposed Concentrations (PPB) & Coments
#Bentonite (Aquagel)	50 attapulgiteor sepiolite substitution
#Barite (Baroid)	575
#Lignosulfonate (Q-Broxin)	15 Chrome or Chrome Free (Enviro-Thin)
#Lignite (Carbonox)	10
#Caustic Soda	5 And/Or KOH
#Soda Ash	2 And/Or Sodium Bicarbonate
#Lime	2
#Cellulose Polymer (Drispac/PAC)	5
#Xanthan Gum (Barazan)	3 XC-Polymer/XCD/Xanvis
#Aluminum Stearate	.2
#Baranex (modified lignin)	10
#Soltex (sulfonated asphalt)	6 And/Or Barotrol
#Boreplate (treated gilsonite)	6
#Calcium Carbonate	100
#ConDet (detergent)	.4
#BaraDefoam HP (defoamer)	.75 And/Or SDI
#Desco CF (tannin)	1
#Dextrid NT (starch)	7
#EZ Mud-DP (PHPA)	2
KwikSeal/Baroseal (blended LCM)	50 Total Combined
Mica	45
Nut Hulls	As Required
#Sodium Bromide	2 And/Or potassium bromide
#Torq Trim II	6 (vegetable oil/alcohol blend)
#X-Tend II (bentonite extender)	1 And/Or Benex/Gelex
Zinc Carbonate and Lime	As Needed
#Aldacide-G (25% glutaraldehyde)	.2 Or Equivalent Product(s)
#Barofibre (cellulose fibers)	12 And/Or Liquid Casing
#Polyac (sodium polyacrylate)	2
#Therma-Thin (acrylic copolymer)	4
#PH6	3.0 (citric acid)
#LD8	.06 (defoamer)
#Miltemp	1.8 (polymeric thinner)

- Indicates products used in the actual bioassay.

Notes:
1.) Make-up water to be either fresh water or seawater or a combination of the two.
2.) Other trade name substitutions may occur during the actual work based upon the availability of specific products.
3.) In the event of stuck pipe and the need for a spotting fluid, EZ Spot NT/Envirospot & Mineral Oil <2% v/v (mineral oil spotting fluid) will be used.

Attachment "B"

Mud Plan Toxicity Estimation Program (2/10/94)

I. Definition/Procedure

The inverse of the LC50 for each additive is added to the inverse of the LC50 of the base mud. The inverse of the sum of the inverses then represents the estimated LC50 of the combined mud formulation.

(1/LC50A + 1/LC50B + 1/LC50C + ... = 1/LC50TOT)

II. Toxicity Estimatation

	Component LC50	(1/LC50)	System/Product Identification:
LC50A =	245700	0.000004	Modified Generic Mud #2 (Bl-0618)
LC50B =	160000	0.000006	EZ Spot NT Spotting Fluid
LC50C =			
LC50TOT =	96899	0.000010	

III. Bioassay Details

System/Additive	Ligno. Mud	EZ Spot-NT/Mineral Oil
Laboratory	Baroid	Espey, Huston & Associates, Inc.
Project Number	BL-0618	3428
Date	Nov-93	May-83

(See bioassays for details)

Attachment "C"
SSD "Mud Plan" (Liberty #1 Prospect)
Toxicity Estimations f/New Mud Additives

To insure the drilling mud does not exceed the 30,000 ppm SSP limit for Beaufort Sea discharges when adding a product or products that were not originally planned, this "Mud Plan" will incorporate one of three mechanisms to estimate final mud toxicities as listed below:

1.) Perform a Drilling Fluid Toxicity Test (Petrazzuolo, 1993) on the complete base mud system with all mud additives at maximum concentrations.

2.) Calculate the resulting mud toxicity using the following mathematical formula:

"The inverse of the LC50 for each additive is added to the inverse of the LC50 of the base mud. The inverse of the sum of the inverses then represents the estimated LC50 of the combined mud formulation."

$$(1/LC50A + 1/LC50B + 1/LC50C + \ldots = 1/LC50TOT)$$

This method is demonstrated on attachment "B" which estimates the resulting toxicity for the Modified Generic Mud #2 (Attachment "A") when containing residual mineral oil spotting fluids (EZ Spot-NT and mineral oil).

3.) In some cases, based upon a detailed review of the product and a determination of the relative non-toxic nature of the additive, use of the product may proceed without actual LC50 data. Examples of these products may include lost circulation materials such as wallnut hulls or mica flakes.

BAROID DRILLING FLUIDS, INC.

FLUIDS RESEARCH AND ENGINEERING

BIOASSAY LABORATORY

BL-0618

BIOASSAY TESTING OF TWO ARCO ALASKA, INC. MUD FORMULATIONS

(CUSTOM POTASSIUM MUD AND MODIFIED GENERIC MUD #2 WITH TORQ-TRIM II)

By

G. Vieaux

November 12, 1993

Distribution:

J. Rose

Approved by: _____
G. Vieaux

A. A. Hinds, Vice President
Environmental Services

Jeff Kirsner, Manager
Bioassay Laboratory

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INTRODUCTION

The purpose of these tests was to determine the seawater toxicity of two Arco Alaska, Inc. mud formulations, which were supplied by John Rose of Baroid. Sample 31105-2 was a Modified Generic Mud #2 containing TORQ TRIM®II and the sample 31105-3 was a Custom Potassium Mud .

The muds was prepared by the Baroid Bioassay Laboratory and hot rolled at 150°F for 16 hours before testing. The sample was void of odor and black spots.

Each mud sample was diluted with seawater and the suspended particulate phase (SPP) was tested. Four and five day old Mysidopsis bahia shrimp were used to determine the 96 Hour LC_{50} (lethal concentration where 50% of the mysids die).

SUMMARY OF RESULTS

96 Hour LC_{50}

The 96 Hour LC_{50} for Custom Potassium Mud (Sample No. 31105-3) was 130,400 ppm SPP. The 95% confidence limits were 11.6 to 14.96% SPP.

The 96 Hour LC_{50} for Modified Generic Mud #2 (Sample No. 31105-2) was 245,700 ppm SPP. The 95% confidence limits were 18.8 to 37.0% SPP.

Age of the M. bahia used for the test were 4 and 5 days old.

Sample Condition

The samples were cooled to room temperature after hot rolling prior to preparing the suspended particulate phase.

Reference Toxicant Test

The 96 Hour LC_{50} for the reference toxicant, sodium lauryl sulfate (SLS), test was 14.5 ppm SLS. The 95% confidence limits were 12.9 to 16.1 ppm SLS. A SLS from Sigma Chemical Co. was used Lot No. 82H0749.

METHODS AND MATERIALS

The methods and materials to determine the toxicity of the submitted sample, was performed in accordance with U.S. EPA Protocol (1993).

Artificial Seawater Preparation

The twenty parts/thousand (ppt) artificial seawater used for tests was prepared using deionized water and synthetic sea salt (Hawaiian Marinemix). The artificial seawater was aerated for two weeks before being used.

Test Animals

The Mysidopsis bahia used for tests were cultured at the Baroid Bioassay Laboratory in Houston, Texas. The base stock of animals were obtained from the University of Arizona in 1987. The mysids were grown and tested in seawater maintained at 20°C ± 2°C with a salinity of 20 ± 2 ppt.

Test Animal Selection and Feeding

Test animals of the same age (6 days), size, randomly selected and placed in each 1000 ml of test mixture (20 animals per crystallizing dish). The mysids were fed 48 hour old Artemia nauplii twice daily.

Suspended Particulate Phase (SPP) Preparation

The mud sample was thoroughly stirred at 1000 rpm before preparing the SPP. The SPP of the drilling fluid was prepared by pouring 800 ml of filtered artificial seawater into a 2000 ml Erlenmeyer flask followed by 200 ml of mixed mud and 1000 ml of seawater. This solution (1+9 v/v mixture) was stirred for 5 minutes with a magnetic stirrer. While stirring, the pH was adjusted to 7.8 ± 0.2 with 6N HCL. The mixture was allowed to settle for one hour before the SPP was decanted. At this point, the pH and dissolved oxygen (D.O.) were measured and adjusted. If the D.O. was below 4.9 ppm, the SPP was aerated for five additional minutes.

Test Set-up

One thousand milliliters test solutions were prepared by diluting the 100% SPP with 20 ppt artificial seawater to obtain the required concentrations. The range finding test was made up of five concentrations with only one replicate per concentration. The definitive test was conducted with five concentrations using three replicates per concentration.

Test Room Conditions

The test room was lighted with cool-white fluorescent lights having a 14 hour light and 10 hour dark photo period. Temperature was kept at 20°C ± 2°C. Air was supplied with a commercial oil-free air pump to each test dish using disposable plastic tubes at the rate of 50 to 140 cubic centimeters per minute.

Observations and Measurements

The number of survivors was determined daily, where possible, and at the very least at 0 and 96 hours. The temperature, salinity, dissolved oxygen and pH were measured daily.

Results and Discussion

The 96 Hour LC_{50} for Custom Potassium Mud (Sample No. 31105-3) was 130,400 ppm SPP. The 95% confidence limits were 11.6 to 14.9% SPP.

The 96 Hour LC_{50} for Modified Generic Mud #2 (Sample No. 31105-2) was 245,700 ppm SPP. The 95% confidence limits were 18.8 to 37.0% SPP.

References

U.S Environmental Protection Agency, 1993 Drilling Fluids Toxicity Test, Federal Register, Vol. 58 No. 41, Thursday, March 4, 1993, pages 12507-12509.

U.S. Environmental Protection Agency, 1988 Procedure for Conducting Static, Acute Toxicity Test with Mysids (Mysidopsis bahia) and Drilling Fluids. Oct. 1988, pages 1-6.

Stephan C.E. 1983. Computer program for calculation of LC_{50} values. U.S. Environmental Protection Agency, Duluth, Minnesota.

Probit Program - U.S. EPA, June, 1988, Cincinnati, Ohio.

Standard Methods For the Examination of Water and Wastewater, 1985, 16th Edition, pages 95-97.

Sample No: 31105-3

Test Concentration ppm SPP	Total Number Mysids Exposed	Survived
Control	60	60
32,000	60	54
56,000	60	52
100,000	60	40
180,000	60	36
320,000	60	0

96 Hour LC_{50}, 130,400 ppm SPP Moving Average
95% Confidence limit 11.6 to 14.9% SPP

Mud Formulation	lb/bbl
Bentonite (AQUAGEL)	30.0
Barite (BAROID)	522.0
Chrome-Free Ligno. (ENVIRO-THIN)	6.0
Potassium Chloride	11.9 (18.4 lb/bbl equiv.)
Potassium Hydroxide	2.0
Soda Ash	2.0
Sodium Bicarbonate	2.0
Lime	2.0
Cellulose Polymer (Drispac-SL)	3.0
Xanthan Gum (BARAZAN)	3.0
BARANEX	8.0
Soltex	6.0
BOREPLATE	6.0
Calcium Carbonate	178.5
BARADEFOAM HP	0.75
Desco	1.0
DEXTRID NT	7.0
EZ-MUD DP	2.0
Potassium Bromide	2.0
X-TEND II	0.1
ALDACIDE-G	0.2
BAROFIBER	12.0
POLYAC	2.0
THERMA-THIN	4.0
CARBONOX	10.0
Miltemp	1.8
PH6	3.0
LD8	0.06
Tap Water	0.631 bbl

APPENDIX A

Sample No: 31105-2

Test Concentration ppm SPP	Total Number Mysids Exposed	Survived
Control	60	60
32,000	60	55
56,000	60	51
100,000	60	43
180,000	60	35
320,000	60	26

96 Hour LC_{50}, 245,700 ppm SPP Probit
95% Confidence limit 18.8 to 37.0% SPP

Mud Formulation	lb/bbl
Bentonite (AQUAGEL)	50.0
Barite (BAROID)	575.0
Lignosulfonate (Q-BROXIN)	15.0
Lignite (CARBONOX)	10.0
Sodium Hydroxide	5.0
Soda Ash	2.0
Lime	2.0
Cellulose Polymer (Drispac-SL)	5.0
Xanthan Gum (BARAZAN)	3.0
Aluminum Stearate	0.2
BARANEX	10.0
Soltex	6.0
BOREPLATE	6.0
Calcium Carbonate	100.0
CON DET	0.4
BARADEFOAM HP	0.75
Desco CF	1.0
DEXTRID NT	7.0
EZ-MUD DP	2.0
Sodium Bromide	2.0
TORQ-TRIM II	6.0
X-TEND II	1.0
ALDACIDE-G	0.2
BAROFIBER	12.0
POLYAC	2.0
THERMA-THIN	4.0
PH6	3.0
LD8	0.06
Miltemp	1.8
Tap Water	0.638 bbl

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
32	60	34	56.66667	18.3147
18	60	25	41.66666	12.25304
10	60	17	28.33333	5.328829E-02
5.6	60	9	15	1.542518E-06
3.2	60	5	8.333334	5.191332E-10

THE BINOMIAL TEST SHOWS THAT 10 AND + INFINITY CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.94671 PERCENT.
AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 24.78532

>>>>>>>>RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
1	1.447052	24.78532	0	+ INFINITY

>>>>>>>RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
2	9.159038E-02	1	.994186

SLOPE = 1.562605
95 PERCENT CONFIDENCE LIMITS = 1.0897 AND 2.035511

LC50 = 24.56946
95 PERCENT CONFIDENCE LIMITS = 18.79185 AND 37.03001
LC1 = .7968019
95 PERCENT CONFIDENCE LIMITS = .2365465 AND 1.549709

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
32	60	60	100	8.673617E-17
18	60	24	40	7.750095
10	60	20	33.33334	.6744647
5.6	60	8	13.33333	2.602846E-07
3.2	60	6	10	4.861481E-09

THE BINOMIAL TEST SHOWS THAT 10 AND 32 CAN BE
USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT
CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL
ASSOCIATED WITH THESE LIMITS IS 99.32554 PERCENT.
AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 19.29473

>>>>>>>>RESULTS CALCULATED USING THE MOVING AVERAGE METHOD

SPAN	G	LC50	95 PERCENT CONFIDENCE LIMITS	
4	2.284671E-02	13.04453	11.58982	14.86322

>>>>>>>RESULTS CALCULATED USING THE PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT PROBABILITY
5	1.037748	9.66956	0

A PROBABILITY OF 0 MEANS THAT IT IS LESS THAN 0.001

SINCE THE PROBABILITY IS LESS THAN 0.05, RESULTS CALCULATED
USING THE PROBIT METHOD PROBABLY SHOULD NOT BE USED.

SLOPE = 2.695332
95 PERCENT CONFIDENCE LIMITS =-5.040001E-02 AND 5.441064

LC50 = 13.7753
95 PERCENT CONFIDENCE LIMITS = .9189176 AND + INFINITY
LC1 = 1.887271

APPENDIX B

BAROID BIOASSAY LABORATORY

Product Mod Generic K2 Sample ID 31105-2

Well Name _____ Area _____ Block ____ Depth _____

Start Date & Time 11-8-93 Date Completed 11-12-93

Organisms Mysidopsis bahia Age 3, 4, 5, 6 days old Mud pH ____ Mud Wt. ____ ppg

SPP: Temp. 21 °C, S o/oo 19.9, pH 8.6, DO 5.1, Adjusted pH 7.9

	Control			Percent 3.2			Percent 5.6			Percent 10			Percent 18			Percent 32		
0 Hours	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Survival	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Temp	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Salinity	19.2			19.2			19.3			19.4			19.4	19.4		19.9		
DO	7.8			7.8			7.6			7.6			7.5			7.1		
pH	7.9			7.9			7.9			7.9			7.9			7.8		
24 Hours																		
Temp		20			20			20			20			20			20	
Salinity		19.2			19.2			19.3			19.4			19.4			19.4	
DO		7.8			7.7			7.6			7.5			7.3			6.2	
pH		7.9			7.8			7.9			7.9			7.8			7.8	
48 Hours																		
Temp			20			20			20			20			20			20
Salinity			19.2			19.2			19.3			19.4			19.4			19.4
DO			7.8			7.7			7.7			7.6			7.9			7.1
pH			7.9			7.9			7.9			7.9			7.8			7.8
72 Hours																		
Temp		20			20			20			20			20			20	
Salinity		19.2			19.3			19.3			19.4			19.5			19.5	
DO		7.8			7.8			7.8			7.7			7.5			7.1	
pH		7.9			7.9			7.9			7.9			7.8			7.8	
96 Hours	20	20	20	18	18	19	18	16	17	14	14	15	12	11	12	9	8	9
Temp	20			20			20			20			20			20		
Salinity	19.3			19.4			19.4			19.5			19.6			19.6		
DO	7.9			7.9			7.8			7.7			7.5			7.2		
pH	7.9			7.9			7.9			7.9			7.8			7.8		

NUMBER DEAD 0 5 9 17 25 39

____ Range Finder ____ Full Test ____ Hours Observer(s) _____

Results of LC_{50} 245,700 Probit SPP Preparer _____

95% Confidence Limits 18.0 to 37.0

HGI = 0.5 ml

[redacted]

BAROID BIOASSAY LABORATORY

Product Custom Potassium Mud Sample ID 31105-3

Well Name _____ Area _____ Block ____ Depth _____

Start Date & Time 11-8-93 Date Completed _____

Organisms Mysidopsis bahia Age 3, (4), 5, 6 days old Mud pH ~ Mud Wt. ~ ppg

SPP: Temp. 21 °C, S o/oo 22.5, pH 7.8, DO 7.8, Adjusted pH 7.9

	Control			Percent 3.2			Percent 5.4			Percent 10			Percent 18			Percent 32		
0 Hours	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Survival	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Temp	20			20			20			20			20			20		
Salinity	19.2			19.5			19.6			19.8			19.9			20.1		
DO	7.8			7.8			7.8			7.8			7.8			7.8		
pH	7.8			7.9			7.8			7.8			7.9			7.8		
24 Hours																		
Temp		20			20			20			20			20			20	
Salinity		19.2			19.5			19.6			19.8			19.9			20.1	
DO		7.8			7.8			7.8			7.8			7.7			7.4	
pH		7.9			7.8			7.9			7.9			7.8			7.8	
48 Hours																		
Temp			20			20			20			20			20			20
Salinity			19.2			19.5			19.6			19.8			19.8			20.1
DO			7.8			7.8			7.8			7.8			7.7			7.7
pH			7.9			7.9			7.9			7.9			7.8			7.8
72 Hours																		
Temp		20			20			20			20			20			20	
Salinity		19.2			19.5			19.6			19.8			20.0			20.1	
DO		7.8			7.8			7.8			7.8			7.7			7.5	
pH		7.9			7.9			7.9			7.9			7.8			7.8	
96 Hours	20	20	20	17	18	19	17	17	18	14	14	16	12	13	11	0	0	0
Temp	20			20			20			20			20			20		
Salinity	19.3			19.6			19.7			19.9			20.0			20.2		
DO	7.9			7.9			7.9			7.8			7.7			7.5		
pH	7.9			7.9			7.9			7.9			7.8			7.8		

NUMBER DEAD 0 6 8 20 24 60

_____ Range Finder ✓ Full Test 96 Hours Observer(s) _____

Results of LC_{50} 130,400 Mov. Avg. SPP Preparer _____

95% Confidence Limits 11.6 to 14.9

Shared Service Drilling
Baroid Recommended Mud Program
Liberty #1 Prospect
Foggy Island Bay, Beafort Sea - Alasksa
(DRAFT PROGRAM #1 DATE - 9/25/96)

GENERAL DATA:

Casing Program:

(Drive)	-	200' TMD	-	20" Casing
16"	-	1000' TMD	-	13 3/8" Casing
12 1/4" Hole	-	4500' TMD	-	9 5/8" Casing
8 1/2" Hole	-	15,000' TMD	-	no casing

Directional Information:

KOP	- 1000'
Max Angle	- <45 Degrees
Direction Profile	- Build and Hold
Total Departure	- @8000'

Formation Tops:

Base Permafrost	-	1,400' TVD	
Top West Sak	-		
Top Seabee Shale	-		
Top Tuffs	-		(reduce filtrate)
Top HRZ	-		
Top Put River	-		
Zone 2	-	10,635' TVD	(9.9 ppg Pore Pressure)
Zone 1	-	10,890	
TD	-	11,000' TVD	

Basic Well Plan:

This exploration well will be drilled from an existing gravel island (fortified with ice) offshore in the Beaufort Sea (Foggy Island Bay) and will be drilled with a land type rig with a conventional surface BOP. The basic well design will include a 20" conductor pipe which will be driven to @200'. A 16" hole will then be drilled to @1000' using a seawater or fresh water spud mud where the 13 3/8" surface casing will be run and cemented. From there, a 12 1/4" hole will be drilled to 4000' using a gel/PAC system where the 9 5/8" intermediate casing will be run and cemented. (Note: A portion of the mud from the 17 1/2" hole can be used as the base for this system.) For the 8 1/2" hole to TD at @15,000' (TMD), a new fresh water LSND mud system is proposed.

This will be a direcitonal well (build and hold w/45 degree maximum angle) which should not present any unusual hole cleaning problems. Normal pore pressures are anticipated down to the top of Zone 2 of the Kekiktuk and no major drilling problems (lost circulation, excessive BHT's, acid gasses, etc.) are anticipated. However, there has been some history of "tight" hole conditions from the lower Seabee through the Put River sands. For this interval of the well, a combination of products are recommended to provide improved wellbore stability.

INTERVAL: From Base of 20" Drive Pipe (@200') to 1000' (TMD)

HOLE SIZE: 17 1/2" Hole

CASING SIZE: 13 3/8" Casing

MUD TYPE: Fresh Water or Seawater Spud Mud

MUD PARAMETERS (SWEEPS)

Weight:	8.6-10.0 ppg
Viscosity:	200-300 sec/qt.
pH:	8.5-9.5
Filtrate:	10-20
Max Solids:	<10%

Spud the well with a fresh water bentonite spud mud or a flocculated bentonite/seawater spud mud. If a seawater spud mud is used, please note the following bentonite prehydration procedure:

Bentonite Prehydration Procedure (max. chlorides @5000 ppm):

1. Treat excess hardness out of the fresh water make-up water with soda ash and caustic soda. For treating out the calcium, use 0.0015 pounds per barrel soda ash per ppm calcium. Then adjust the pH of the make-up water to 9.0 with caustic soda.

2. Add 20-30 ppb bentonite and one can of X-Tend II for each five sacks of bentonite to the pretreated make-up water. Allow as much hydration time as possible (15-20 hrs). Provide maximum shear to the bentonite slurry during the prehydration process.

The initial viscosity should be in the 200-300 sec/qt range then adjusted as needed based upon the hole cleaning requirements of the well. For spudding with either fresh water or seawater, mud-up the initial surface system with fresh water and gel to the desired viscosity. If fresh water is to be used for maintenance, treat the system on an as needed basis with additional bentonite for viscosity as required. If the spud mud maintenance is to be done with seawater, "ride" the viscosity hump from the bentonite flocculation in seawater and continually maintain a batch of pre-hydrated bentonite for additional viscosity as required.

Due to fast penetration rates and the large diameter hole, the drilled solids content can increase rapidly if not properly controlled. Make sure all solids control equipment is operating properly to reduce mud dilution requirements. Some controlled drilling may be required. Barazan (XCD)could be used to supplement the viscosity requirements if needed. Maximize pump rates to provide increase annular velocities to reduce mud viscosity requirements.

It is suggested to control the filtration rate with PAC-R treatments (10-15 cc's/30 min). These PAC treatments in conjunction with the prehydrated bentonite additions, should result in reduced seepage and/or sticking problems. Fine Mica or Barofibre should also be considered to reduce seepage losses.

INTERVAL: 1000' to 4500' (TMD)

HOLE SIZE: 12 1/4"

CASING SIZE: 9 5/8"

MUD TYPE: Fresh Water/Seawater Gel-PAC System

MUD PARAMETERS

Weight:	8.8-9.8 ppg
Viscosity:	45-55 Sec/Qt.
PV:	15-20
YP:	15-30
pH:	8.5-9.5
Filtrate:	8-12
Solids:	<10%

Drill the 13 3/8" casing shoe and rat hole with some of the spud mud from the preceding interval routing severe cement contaminate returns for disposal. Then drill ahead in the 12 1/4" hole with a cleaned-up portion of the remaining spud mud treating as required for this interval of the well. Primary focus for this interval of the well should be:

1.) Maintain adequate viscosity for effective hole cleaning using prehydrated bentonite and PAC polymer rheology. Drill out of 13 3/8" shoe with a 45-55 sec/qt funnel viscosity then adjust based upon actual hole cleaning requirements. Xanthan gum can be used to supplement the viscosity requirements on an as needed basis.

2.) Control any excessive rheology which may develop with additional Therm-Thin treatments or Desco-CF treatments on an as needed basis.

3.) Keep pH in the 8.5-9.5 range with Caustic Soda.

4.) Continue the use of PAC polymers for filtration control for improved wellbore stabilization. The reduced API filtrate from the PAC treatment will also improve conditions for the logging activities and reduce the differential sticking potential while running the 9 5/8" casing. Baranex or Carbonox treatments should also be considered if reduced filtrate control is desired.

5.) The mud weight requirements for this interval should run from an unweighted 8.8-9.0 ppg density coming out of the 13 3/8" shoe to a weighted 9.6-9.8 ppg mud by the 12 1/4" TD at 4,000'.

INTERVAL: 4000' to 15,000' (TMD)

HOLE SIZE: 8 1/2"

CASING SIZE: 7"

MUD TYPE: Fresh Water LSND System

MUD PARAMETERS

Weight:	8.6-10.2 ppg
Viscosity:	40-50 sec/qt.
PV:	15-25
YP:	8-15
pH:	8.5-9.5
Filtrate:	8-10 cc/30 min. Initial
	4-6 cc/30 min. Final
Solids:	<6% LGS

Drill the 9 5/8" casing shoe and rat hole with a portion of the mud from the preceding interval, routing returns for disposal. Displace hole and surface mud system with a new fresh water LSND system formulated as follows:

0.10 ppb Caustic Soda (pH 8.5-9.5)
6.00 ppb Prehydrated Aquagel (w/extender)
0.75 ppb PAC-L
0.75 ppb EZ Mud-DP (optional)
0.25 ppb Therma-Thin
0.20 ppb Aldacide-G

Drill ahead keeping the pH 8.5-9.5 with caustic soda and controlling the API filtrate with additions of PAC. Keep the commercial bentonite content in the 6-8 ppb range for good filtration control and wall cake characteristics. Additional PAC's and Baranex treatments will be required for the reduced fluid loss specification for the lower 8 1/2" interval above the "Tuffs" (4-6 cc's). EZ Mud-DP (PHPA) additions in the ..5-1.0 ppb range can be considered for improved wellbore stabilization for this interval of the well. Therma-Thin, a polymer deflocculant, treatments should be initiated early in the 8 1/2" hole to avoid rheological control problems. Desco-CF, a tannin thinner, may also be required for rheological stabilization. Specialty additives for this interval may include sulfonated asphalts (Barotrol) and/or gilsonite (Boreplate) for improved wellbore stabilization and drilling soap (Con Det) for balling problems.

Note also the following comments on the change-over and maintenance of this proposed polymer mud system (assuming bumping the plug on the 9 5/8" cement job with water or watered back spud mud):

1. While nippling up on the 9 5/8" casing, clean the surface pit system thoroughly. This should include pits, lines and solids control equipment.

2. Salvage a certain portion of the spud mud to clean out the 9 5/8" casing and drill out the casing shoe into the 12 1/4" rat hole below the 9 5/8" casing.

3. Mud up and displace with the new fresh water system as outlined below:

   A. Treat the make-up water with soda ash as required to reduce the excess calcium to less than 100 ppm (use approximately .0015 pounds of soda ash per barrel for each ppm calcium) and add 6-8 ppb Aquagel.

   F. Add .75 ppb EZ Mud-DP. (optional)

   G. Add .75 ppb PAC-L.

   H. Add .25 ppb Therma-Thin.

   H. At this point the initial Yield Point should be adjusted upward with additional treatments of Barazan/Xanvis to insure effective hole cleaning in this high angle well. The Yield Point should be run in the 10-15 range for the initial 8 1/2" hole with the LSR-YP in the 5-8 range.

   I. The density of the initial mud-up formulation as outlined to this point will be in the 8.6-8.8 ppg range. If this is considered to be insufficient, weight-up as needed with Baroid (barite).

4. Maintenance:

   *Maintain commercial bentonite concentration at 6-8 ppb.
   *Keep pH 8.5-9.5 with caustic soda.

*Utilize PAC and Baranex/Carbonox treatments to achieve an API filtrate in the 6-8 cc range by the early-8 1/2" hole then to below 6 cc's by the 8 1/2" TD. The HPHT should be in the 12-15 cc range at 200 degrees by the 8 1/2" TD.
*Control excessive rheological treatments on an as needed basis with light treatments of Therma-Thin. As the Therm-Thin looses its effectiveness, initiate treatments of Desco-CF on an as needed basis to control excessive viscosity or gelation problems.
*Additional Yield Point may be achieved as dictated by hole cleaning efforts by additions of Barazan/Xanvis.
*Adjust PHPA concentration based upon hole conditions.
*Treat with Aldacide-G periodically to control bacterial growth.

5. Barotrol (sulfonated asphalt) treatments should be initiated on an as needed basis as a general well bore conditioner or in response to any troublesome hole problems which may develop (@4-6 ppb). Foaming may be a problem with this treatment in this proposed polymer system. Add defoamers as required/allowed (noted conditions of the discharge permit).

6. While this is not planned as a high angle well, hole cleaning efforts should be closely monitored to insure effective results. Use Barazan/Xanvis as required to provide effective LSR viscosity for good hole cleaning. Low viscosity/high viscosity sweeps should be used on an as needed basis to supplement hole cleaning efforts.

7. Regular short trips are suggested to "wipe" the hole.

8. Maximize solids control efforts and maintain sufficient dilution to keep the low gravity solids content less than 6%. Frequent retort analysis should be conducted to insure the accumulation of "fines" does not occur.

9. Weight-up the mud systems as dictated by hole conditions. Do not weight-up prematurely. Weight-up with barite, do not allow weight-up with drilled solids.

10. Disperse the system as required based upon the accumulation of drilled solids, mud weight requirements and temperature. This rheological control should first be accomplished through light deflocculation treatments with Therma-Thin, then moderate dispersion with Desco-CF as required for rheological stabilization.

11. Effective filtration control is a very important part of the mud program to minimize hydration rates and provide improved wellbore stability. PAC/Carbonox/Baranex treatments should be optimized to achieve effective filtrate control to minimize the potential for differential sticking.

APPENDIX 3: H_2S INFORMATION AND PROPOSED PRECAUTIONARY MEASURES

3.1. H_2S CLASSIFICATION OF LEASE AREA — GEOLOGIC INFORMATION RELATED TO H_2S (Proprietary and Confidential)

See Appendix 1.

3.2. H_2S CONTINGENCY PLANNING BASIS

Although there is no evidence of hydrogen sulfide (H_2S) being encountered on any of the offset wells, BPXA cannot completely rule out the possibility of encountering H_2S. Therefore, a Modified H_2S Contingency Plan has been prepared. This plan provides for early detection and suspension of drilling operations before H_2S would be dangerous to personnel or equipment. Further, the plan provides for orderly evacuation of personnel and specific protective equipment for those who may be required to shut-in the well. If H_2S is encountered in unsafe levels, and if it is decided to continue drilling with H_2S present, a modified, more detailed plan will be prepared before drilling is resumed.

The plan is based on the following concerns related to the properties of H_2S:

Definition of Hydrogen Sulfide (H_2S): Hydrogen sulfide (H_2S) is made up of two hydrogen atoms and one sulfur atom, and it is referred to in the oil industry as H_2S, Stink Damp, Sulfurated Hydrogen, Sour Crude, Rotten-Egg Gas, Hydrosulfuric Acid, and Sulfur Hydride. H_2S is a **highly toxic, colorless** (transparent) gas **heavier** than air. (H_2S is **poison** that can paralyze the breathing system and **KILL** you). At low concentrations (small amounts), H_2S has an offensive odor similar to rotten eggs. At slightly higher concentrations (still small amounts), H_2S may have a sick, sweet odor. At high concentrations, no smell can be detected because H_2S **rapidly deadens** the sense of smell by paralysis of the olfactory nerve. Consequently, **THE SENSE OF SMELL CANNOT DETECT H_2S.** H_2S is formed by the decomposition of organic animal and/or vegetable (previously living) materials by bacteria.

Physical Properties of H_2S:

- Deadly, extremely toxic gas
- Colorless (transparent)
- Heavier than air — tends to settle in low areas (Vapor Density = 1.189, Air 1.00)
- Readily dispersed by wind or air currents
- Burns with a blue flame, producing SO_2 which is also a toxic gas

- Odor of rotten eggs only in low concentrations - in high concentrations it rapidly deadens the sense of smell - **do not depend on the sense of smell to detect H_2S**
- Highly corrosive to certain metals
- More deadly than carbon monoxide (CO), and almost as toxic as hydrogen cyanide (HCN) gas
- Flammable and forms explosive mixtures with air and oxygen
- Explosive limits -- 4.3% to 46% by volume air

Toxicity Table for H_2S[1]:

• 0.13 ppm	Minimal perceptible odor
• 4.60 ppm	Easily detectable, moderate odor
• 10 ppm	Beginning eye irritation
• 27.0 ppm	Strong, unpleasant odor, but not intolerable
• 100 ppm	Coughing, eye irritation, loss of sense of smell after 2-5 minutes
• 200-300 ppm	Marked conjunctivitis (eye inflammation) and irritation after one hour of exposure
• 500-700 ppm	Loss of consciousness and possible death in 30 minutes to one hour
• 700-1000 ppm	Rapid unconsciousness, cessation of respiration (stopped or paused breathing) and death
• 1000-2000 ppm	Unconsciousness at once, with early cessation of respiration and death in a few minutes. Death may occur even if individual is removed to fresh air at once

[1] ppm = Parts of gas per million.

3.3 LIBERTY #1 MODIFIED H_2S CONTINGENCY PLAN

3.3.1 Objective

This procedure is provided to:

- ensure safety,
- by providing clear expectations of requirements,
- that sets the standard for all drilling operations.

3.3.2 Equipment

- Eight each MSA Model 401 PN 463831 breathing mask apparatus complete with oxygen tanks (30 minute supply), harness, and protective carrying cases. Three normally stored in camp, three in the motorman's room near the generator complex, and two on the rig floor.
- Gas Monitoring System: Three General monitors VISUAL/ALARM/LIGHTS gas level detector gauges Model 520, located in driller's doghouse, complete with six SENSORS #10000-1, located in the following areas of the rig:
  - Derrick Floor
  - Substructure
  - Shale Shaker House
  - Choke Assembly House
  - Mud Hopper House
  - Mud Pump House
- H_2S Detector: General Monitor Model 2280 4 Channel with Audio/Horn and Visual/Light Alarms and sensors located in the following locations (Rig Contractor and Mud Loggers will each provide sensors for redundancy):
  - Derrick Floor
  - Substructure
  - Shale Shaker House
- Portable H_2S Detector: 2 each Model HMX 3 Gas Detector (H2S, LEL, Oxygen) -- one kept on rig and one kept in Tool Pushers Office.
- Mud Loggers will provide a hand held H_2S parameter detection device (Draeger Pump).
- In the event that H_2S is detected on location, self contained breathing devices and associated equipment will be expedited from Prudhoe through Tool Service to provide protection for all personnel on location.

3.3.3 Procedures

Following are procedures to be implemented as part of the Modified H_2S Contingency Plan:

1.0 All BPXA Shared Service Drilling (SSD) drilling personnel and all contractors working on the Liberty #1 exploration well operations are to have H_2S training. Evidence of training is required at the work site.

2.0 Escorted visitors are not required to have the H_2S training (but the escort must have the training). Un-escorted visitors and temporary workers must have necessary training, rig-site orientation and personal protective equipment (PPE) as stated herein.

3.0 All materials that may be exposed to an H_2S environment are to be designed and constructed to withstand the environmental effects of H_2S (reference API RP 49 requirements).

4.0 For drilling operations in areas where there is a known continuous concentration of H_2S >10 ppm, contingency plans must be prepared and reviewed with all personnel. This plan is to be site specific and is to address personnel, equipment and procedures to ensure a safe working environment (consistent with API RP 49).

5.0 The drilling rig must be equipped with permanently mounted H_2S monitors in areas of probable H_2S concentrations, and alarms (visual and audible). These alarms are to be set to alert at 10 ppm H_2S -- these monitors must be positioned in the following locations: bell nipple, pit room, sub base (cellar area). The mud logging unit is required to provide H_2S monitors (redundancy) at these same locations.

6.0 Personnel are not to enter the well cellar, pits, confined space, or any other confined space unless absolutely necessary. If absolutely necessary, the atmosphere must be tested before each entry. If the H_2S concentration is >10 ppm, entry is not permitted without BPXA supervision approval, and entry is then only allowed utilizing all necessary and approved guidelines for working in H_2S environments (buddy system, supplied breathing air-SCBA, personal monitors, etc.).

7.0 Wind Socks are required at both the east and west sides of the pad and must be well lit. One will be placed on the pipe shed, the shop, and the camp. On winter arctic operations it is generally easy to determine the direction of the wind, based on the direction the steam is blowing off the rig.

8.0 If H_2S is detected at concentration >100 ppm, the Liberty Gravel/Ice pad will be classified as a Designated H_2S Area. The BPXA Rig Representative will be responsible for posting signs at the entrance of the Pad, the entrance of the camp, and the main entrance to the rig from the camp. The BPXA Rig Representative/Tool Pusher will be able to describe the H_2S concentration level on location utilizing the one of the two required hand held H_2S monitors on location.

9.0 Procedures for working within Designated H_2S Areas:

9.1 All personnel are to carry, or have immediate access to a 5-minute emergency escape pack (including visitors) when in areas of restricted egress or where evacuation would require passing through a toxic atmosphere. [Example: derrickman must have one in derrick].

9.2 All personnel working in a Designated H_2S Area are to be clean shaven to the extent that a SCBA face mask seal is effective. Visitors are exempt.

9.3 Personal H_2S monitors shall be worn at all times. Where more than one individual will be working in the same area, at least one H_2S monitor is to be used by the group. Each vehicle entering a designated area is to have a monitor.

9.4 All monitors are to be set to alert at 10 ppm H_2S.

9.5 All monitors (permanent, fixed, personal and portable) are to be calibrated every 30 days.

9.6 A system for check-in/check-out of all personnel (workers and visitors) is required to track locations of personnel within the Designated H_2S area.

9.7 Two evacuation routes must be designated and reviewed with all personnel on the location (workers and visitors). Maps must be posted at various locations for reference (camp, rig floor, etc.).

9.8 Two muster points must be allocated in designated safe areas, in opposing wind directions from a probable source. Weather shelters must be provided at the muster sites. For the Liberty #1 well, the muster points are the Pipe Shed and the Shop.

9.9 The emergency response plan is to be reviewed with all personnel on location (evacuation routes, check-in/out, muster points, wind indicator location, sound of audible alarm, color and type of visual alarm, etc.).

9.10 In the event of an alarm:

- all personnel are to don an emergency breathing apparatus and leave the area, proceeding to one of the pre-designated safe zones (depending on wind direction).
- do not attempt source control (shut valve, etc.) or rescue.
- call for help
- re-enter the area only under instruction from a SSD, BP or Arco supervisor (including rescues). Re-entry personnel must use proper equipment (monitors, SCBA, buddy system, communication system (radio), etc.), and procedures for working in H_2S areas.

9.11 All personnel working in areas with monitored levels of H_2S greater than 10 ppm are to use supplied breathing air (SCBA) and are to use the Buddy System. All other safe H_2S practices are to be followed.

10. In addition to these procedures, all operations (operator and contractor personnel, equipment and procedures are to comply with State (AOGCC, others), Federal (OSHA, others) and API specifications (API RP 49).

11. Exceptions to these procedures are only allowed with approval from the SSD Drilling Superintendent or SSD Drilling Manager.

APPENDIX 4: PROPOSED NEW OR UNUSUAL TECHNOLOGY

BPXA does not plan to use any new or unusual technology on this well. Given the time constraints of the winter ice season and the necessity to have all equipment demobilized from the gravel/ice island by April 1, 1997, the risks associated with experimental or new technology are not acceptable. All technology to be used on this project has been proven on past exploration wells, and/or is currently being used successfully in other BPXA North Slope drilling operations. The use of the combination gravel/ice island is simply the combination of two separate technologies which have each been proven on an individual basis.

APPENDIX 5: OPERATIONAL INFORMATION

5.1. ONSHORE SUPPORT FACILITIES DESCRIPTION

5.1.1. Operations Support

All the raw materials, supplies, equipment, and personnel required to successfully conduct the different components of the Liberty # 1 exploratory program are located either on the North Slope or elsewhere in Alaska. BPXA has an established expediter service and supply warehouse currently located in the Prudhoe Bay Unit. These facilities are supporting the nine rigs currently working for BP/Arco Shared Services Drilling organization on the North Slope, and have also supported all of BPXA's past exploration drilling projects. Personnel operating these facilities are dedicated professionals and provide excellent support to the exploration projects. Likewise, a contractor community is well established in Deadhorse. These contractors provide supply and resupply of the cement, drilling fluid, fuel, bits, all downhole directional equipment, mud logging equipment, etc.

5.1.2. Emergency Support

Necessary medical, fire, spill, and evacuation support infrastructure is located in Prudhoe Bay, Deadhorse, and Endicott. Helicopter, Otter, rollagon, or trucks can be used to transport personnel in need of medical attention. BPXA will employ a Physicians Assistant onsite who will have Advanced Life Support capabilities. Alaska Clean Seas will have a spill van and a environmental technician on hand to provide oversight and assistance in the event of a spill. In the event of a massive spill beyond the rig crews capability to control, the Emergency Response Network will be activated and personnel and equipment from across the North Slope and all Alaska can be accessed if necessary (see Oil Spill Contingency Plan, provided under separate cover).

5.1.3. Travel Frequency and Routes of Support Vehicles

Based on the logistics scenario selected for this project, access to the site will be via rollagon, air craft, tractor trailer, or a combination thereof. Proposed access routes to be used for this project are described in Section 2.2. The frequency of travel will be daily for whatever mode of transportation is selected. The routes are identified on Figure 2.

5.1.4 Project Staffing

Labor requirements will vary during the various stages of the Liberty exploration program. Table 2 lists personnel requirements for each stage.

TABLE 2
PROJECT LABOR REQUIREMENTS

PROJECT ACTIVITY	ESTIMATED NUMBER OF PERSONNEL
ice construction	40-50
rig mobilization	65-70
drilling	60-70
evaluation	50-55
testing	60-65
rig demobilization	65-70
island abandonment	10-15

5.2. WASTE MANAGEMENT

5.2.1. Introduction

BPXA has developed a waste management plan for this exploratory program to ensure compliance with all applicable federal, state, and local requirements. Figure 9 shows the waste management methods that will be used, and Figure 10 is a waste management flow diagram.

A major component of BPXA's waste management plan is offshore discharge of drilling muds and cuttings, domestic wastewater, and sanitary wastewater, as authorized by EPA under the Arctic General NPDES Permit for Oil and Gas Exploration (No. AKG284200). To use this permit, BPXA must submit a Request for Coverage and Authorization to Discharge at least 60 days before the planned discharge. Subsequent submittals will include:

- a description of the discharge site
- the range of water depths in the lease block
- the depth of the discharge
- initial date and duration of operations

Prior to any discharge, BPXA will also prepare a Best Management Practices Plan in accordance with the terms of the General Permit that describes methods to minimize discharges and discharge-related impacts, describes procedures to ensure proper discharge operations, and establishes specific objectives for control of pollutants.

5.2.2. Waste Storage, Treatment, and Disposal

Table 3 lists the types and estimated quantities of wastes generated during the proposed exploratory program.

TABLE 3

ESTIMATED TYPES AND QUANTITIES OF WASTES [1]

WASTE	ESTIMATED QUANTITY	DISPOSAL
Drilling Cuttings [2]	33,550 cubic feet	Discharge to Beaufort Sea in accordance with General Permit. Contingency: temporarily store and haul back to PBU CC2-A.
Drilling Fluids [2]	4,950 barrels	Reuse, discharge to Beaufort Sea in accordance with General Permit. Contingency: annular pumping.
Sanitary and Domestic Liquid Wastes [3]	400,000 gallons	Treat and discharge to Beaufort Sea in accordance with General Permit. Contingency: transport to BOC.
Sewage Plant Sludge	600 cubic feet	Rig Incinerator.
Combustible Solid Wastes	1,000 cubic feet	Incinerate. Contingency: transport to existing Prudhoe Bay area facility.
Non-Combustible Solid Wastes	1,000 cubic feet	Transport back to existing Prudhoe Bay area facility.
Produced Reservoir Fluids	20,000 barrels	Transport back to Endicott Production Facilities.
Used Oils	1,000 gallons	Transport to approved recycle facility in Prudhoe Bay area.

[1] Based on maximum 75 day drilling operation.

[2] Planned 16,000 ft. measured depth well.

[3] Approximately 30 gal/day sewage and 30 gal/day gray water for 70 persons avg.

Drill cuttings and drilling fluids will be discharged to the sea ice under the terms of the general NPDES permit. As a contingency, cuttings may be temporarily stored on the ice pad adjacent to the drilling rig, as shown on Figure 4. The cuttings would be allowed to freeze before being backhauled to the Prudhoe Bay Unit (PBU) CC-2A grinding and injection facility. Discharge of drilling fluids will be minimized by on-site reuse where possible. As an alternative to discharge, drilling fluids would be disposed of down an injection annulus when this becomes available on the well. Produced reservoir fluids will be reinjected downhole or hauled back to the Endicott Production Facility. Used oil will be recycled back to the rig or packaged in drums and hauled to Prudhoe Bay for shipment to an approved recycle facility. No hazardous wastes are expected to be generated as a result of this project. However, if any hazardous wastes are generated, they would be temporarily stored, then transported off-site for disposal in an approved facility.

Sewage from the rig camp and the temporary camp will be processed in an approved treatment unit at the rig camp, and effluent from the unit will be chlorinated. Treated effluent

will be either discharged to the sea ice under the general NPDES permit or hauled from the wellsite by truck to BPXA's Base Operations Center (BOC) waste disposal facility. Sewage sludge, kitchen trash, and non-metallic trash from the rig camp and the temporary camp will be incinerated, and ash from the incinerator and all other garbage will be hauled to the North Slope Borough waste disposal facility as soon as conditions allow. All food and food wastes will be stored inside

BPXA will "roto-trim" the ice pad as needed to facilitate removal of frozen cuttings, to remove any spilled substances, and to remove any dirt that has been bound into the ice surface. Roto-trimming will be kept to the minimum necessary to clean the ice surface. If any contaminated ice is removed, it will be separated in a snow melter. Any solid waste recovered from this melting operation will be handled as illustrated in Figures 9 and 10. The melted water will either be hauled to an approved disposal facility or used in the drilling operations.

APPENDIX 6: ENVIRONMENTAL REPORT

The purpose of this report is to provide the MMS, Alaska Outer Continental Shelf (OCS) Region, and other appropriate federal and state agencies with sufficient information for evaluation of the Liberty #1 Exploration Well project and its compliance with the National Environmental Policy Act (NEPA) and its implementing regulations. Detailed information about the project is included in other sections of this Exploration Plan.

Significant scientific data are available to describe the existing environment and assess any potential impacts resulting from exploration activities at the Liberty prospect. Liberty is located within Beaufort Sea Planning Area for Oil and Gas Lease 144, held in September 1996. As required by NEPA regulations, the MMS has, in cooperation with the U.S. Environmental Protection Agency (EPA) prepared a Final Environmental Impact Statement (EIS) for the Alaska Outer Continental Shelf (OCS) Beaufort Sea Planning Area Oil and Gas Lease Sale 144. As regulated under Sections 301(b), 304, 306, 307, 408, 401, 402, 403, and 501 of the Clean Water Act and the U.S. Coast Guard regulations (33 CFR part 151), the EPA has issued a Final NPDES General Permit for Offshore Oil and Gas Operations on the Outer Continental Shelf (OCS) and State Waters of Alaska: Arctic NPDES General Permit (No. AKG284200). This Environmental Report is prepared to supplement the extensive review already completed during the EIS and the NPDES processes. The Final EIS for the Alaska OCS Beaufort Sea Planning Area Oil and Gas Lease Sale 144 and the Final NPDES General Permit for Offshore Oil and Gas Operations on the OCS and State Waters of Alaska and documents prepared by EPA in support of the Arctic NPDES GP (EPA 1995a and 1995b) are hereby incorporated by reference.

In addition, previous studies have addressed the environmental impacts associated with winter exploration activity at Tern Island. The current proposal (Liberty) would not be expected to result in new or different impacts to the surrounding environment. Site specific environmental information prepared by Shell Oil Company in conjunction with prior exploration activity at this site is hereby incorporated by reference. Finally, an Environmental Impact Statement was prepared for the nearby Endicott Development Project and there are several monitoring reports that describe results of a number of studies in and near Foggy Island Bay. These documents, itemized in the References section of this report, are hereby incorporated by reference.

6.1 DESCRIPTION OF ENVIRONMENT

6.1.1 Geology

Tern Island is an artificial gravel island located in Foggy Island Bay, approximately 32 kilometers (km) (20 miles) east of Prudhoe Bay and 8 km (5 miles) north of the mainland shoreline near the Kadleroshilik River delta (Figure 1). Tern Island was constructed by Shell Oil Company during winter 1981-1982 in water depths of approximately 6.5 meters (m) (21.5 feet)

and approximately equidistant between Point Brower and Tigvariak Island. Tern Island was subsequently abandoned by Shell and has been eroding since slope protection was removed from the island in the early 1990's. A group of transitory, low-lying sand/gravel deposits known as the McClure Islands (Narwhal Island, Jeanette Island and Karluk Island) are located approximately 6.5 km (4 miles) to the north of Tern Island. A site specific survey conducted in 1981(USGS 1981) and a Shallow Hazards Survey conducted by Shell indicate a very flat, soft sea bottom devoid of relief (USGS 1981).

Prior soil borings and surficial sediment surveys (top 1-8 to 2.4 m/top 6 to 8 feet) at Tern Island indicate a layer of Holocene sediments, consisting of fine sand and soft silt and clay, approximately 6 to 8 feet thick with no cobble or boulder habitat present (USGS 1981, WCC 1981). The Holocene sediment layer is underlain by approximately 17 m (55 feet) of Pleistocene marine sandy mud and varying amounts of alluvial deposits of mixed sand and gravel. Soil borings at the location indicate ice-bound permafrost in a zone approximately 8.25-11.55 m (25-35 feet) below the seabed (WCC 1981). Mixed boulders and cobbles are suspected to exist in areas to the southeast and northwest of Tern Island. No near-surface faults, slumps or unstable bottom sediments have been found at the site by BLM/NOAA OCSEAP surveys (USGS 1981).

6.1.2 Meteorology

Tern Island is located in the Arctic climate zone, characterized by cold temperatures, nearly constant wind, and low precipitation. Mean temperatures are approximately 10°F. The maximum recorded temperature in the region is 80°F and the minimum is -68°F. Freezing temperatures are reached for an average of 313 days per year. Mean sky cover varies from 0 to 9.2 tenths; Barter Island reports 0 to 8.6 tenths (WCC 1981). Fog is common from May through September and cloudy weather is common from February through October. Barter Island reports 50 days/year as clear, 68 days/year partly cloudy, and 192 days/year cloudy. The sun remains below the horizon from November 24 to January 17. Annual precipitation averages less than 10 inches and winter snowfall is generally less than 3.5 feet. Winds consistently average 16 km/hour (12.9 mph) with the prevailing distribution is easterly (ENE to NE). From January to April, the prevailing direction is westerly (WCC 1981).

6.1.3 Physical Oceanography

During winter exploration operations at Liberty, the region will be covered by ice. Wave action, storm surge and other open-water occurrences are not discussed in this report because exploration operations will be limited to winter months and ice conditions. Ice cover at Tern Island exists roughly from late September or early October until late June. Winter sea ice on the Beaufort Sea shelf consists of landfast ice (fast ice), drifting pack ice (seasonal pack ice), and a region of pronounced ice ridging and shear line formation (Stamukhi or shear zone) which develops between the pack ice and landfast ice. At Tern Island, ice is generally within the

floating-fast subzone of the landfast ice zone. This area is between the 2m isobath (the bottomfast ice zone) and the 15m isobath, the beginning of the grounded ice zone (WCC 1981). The ice sheet in the project area will grow to a thickness of approximately 2 m by April with breakup expected by June or July. Ice gouging of seabeds and interaction with the highly mobile pack ice leads will typically occur in water depths of 45 to 60 feet and is not expected within the project area. Previous surveys in the region noted under-ice water temperatures of -1.7°C in February, -2.2° C in March, and -2.4° C in April. Average salinity was 33 ppt, ranging from a minimum of 28 ppt to a maximum of 33.7 ppt. Temperature and salinity were uniform with depth. Currents under ice were tidally driven and of very low magnitude. Less than 5 percent of the registered under-ice current speeds exceeded 5.0 cm/sec (0.16 ft/sec) (WCC 1981). Tides in the Beaufort Sea are generally small and are characterized by a mixed semi-diurnal signal with local maximal from 10-30 cm (4-12 inches) in elevation. The tide appears to approach from the north with little phase change from Barrow to Demarcation Point (BPXA 1996).

6.1.4 Flora and Fauna

Tern Island is located within the migratory path and range of a number of marine mammals, and a variety of marine and freshwater fish and invertebrates. However, few species are likely to be present during winter exploration activity.

Whales - Belukha and bowhead whales would not occur in the Tern Island area during winter exploration activity. Fall whale migration through the western Beaufort Sea is in September or October and spring migration occurs through offshore ice leads generally from April 15-June 15. The bowhead whale population in the Beaufort Sea is currently estimated at about 8,000 animals. Bowheads winter in the central and western Bering Sea and summer in the Canadian Beaufort Sea. Based upon annual MMS surveys during the fall migration, bowhead whales would not be expected in the Tern Island area, and would likely remain in water ranging from 20-50 meters depending upon ice conditions (MMS 1996, BPXA 1996). The Bering-Chukchi-Beaufort Sea belukha whale population may exceed 25,000 animals. An estimated 11,500 belukha migrate from the Bering Sea to the eastern Beaufort Sea during April and May (BPXA 1996).

Pinnipeds - Three species of ice seals are found in the Beaufort Sea: ringed, bearded and spotted seals. Estimated populations in the Bering-Chukchi-Beaufort area are: spotted, 250,000; bearded, 300,000, and ringed, 1.5 million (BPXA 1996). Ringed seals, the most abundant of the three seal species are present in the Beaufort Sea, will be encountered infrequently.

Walrus - The Beaufort Sea is on the eastern limit of the range of the Pacific Walrus and they are only seen infrequently in this region. No Pacific walrus would occur in the project area during the ice-covered winter season.

Polar bears -Polar bears are most abundant where seals are common in drifting pack ice or shorefast ice in winter, near the pack-ice edge in summer, and along new ice and leads in the fall. The Alaska polar bear population is estimated at 3,000-5,000 animals, with 1,300-2,500

found in the Beaufort Sea. Polar bears can be expected to be occasional visitors around Tern Island during winter exploration activity. Den locations in the region have been mapped, historically, by the U.S. Fish and Wildlife Service and the National Biological Service. No polar bear dens have been reported on Tern Island and the nearest reported den site is six miles away on the mainland near Tigvariak Island (1992 den). The next closest reported den site is 9 miles away from Tern Island (NSB pers. comm., 1996).

Foxes - Arctic foxes range over large areas in winter and are likely to be present in the project area during operations. If polar bears have recently taken seals in the region, sightings of foxes will likely increase as the foxes will follow bears to scavenge.

Benthic Organisms - Benthic organisms in the project area include sessile species living within the substrate (bivalves, polychaetes) and mobile organisms living on or near the bottom surface sediments (amphipods, isopods, mysids and some polychaetes). Benthic organisms are abundant during the summer but are likely to be limited between September and May. Benthic species diversity increases with water depth, until the shear zone is reached at about 15-25 m, biodiversity then declines due to ice gouging between the landfast ice and the moving polar pack ice (BPXA 1996).

Plankton - Phytoplankton species are abundant in the region but are unlikely to occur between September and April. Ice algae are likely to be present but are not expected to be abundant in the project area (WCC 1981). Zooplankton (e.g., copepods) are not likely to be abundant between September and May.

Fish - The offshore marine environment in the project area includes marine species with no current commercial or subsistence value. Arctic cod are the dominant pelagic fish in the region but earlier surveys show that significant numbers are not present in the project area during the ice-covered months (WCC 1981) as these fish most likely move farther offshore. Three species of marine fish (Bartail snailfish, Pacific sand lance and Capelin) have been associated with the benthic environment in the region but are unlikely to be present due to the absence of boulders and cobbles.

Fourhorn sculpin are abundant in the area during open water but move offshore during winter. Freshwater and anadromous fish (e.g., Arctic cisco, Dolly Varden charr, Broad whitefish, and Least cisco) are present in summer but overwinter in the Colville and Sagavanirktok rivers and in the Mackenzie River system, and therefore are not likely to be present during exploration. Few fish will likely be encountered in the project area due to the absence of boulders and cobbles or similar hard-bottom habitats near Tern Island.

Birds - Although an estimated 10 million birds use the Beaufort Sea area for spring migration/pre-nesting, nesting, molting and brood-rearing, and fall staging/migration (Johnson and Herter 1989), few birds are expected to be present during winter exploration activity. Most of the 240 known aquatic and terrestrial species are migratory, arriving in late May or early June to breed and departing by late September. Few birds (e.g., Gyrfalcon, Snowy Owl and Common Raven) overwinter in the project area. Of these, only ravens are expected to occur at the exploration site during operations.

Threatened or Endangered Species - The only endangered or threatened species listed for the Beaufort Sea area are the Bowhead Whale, the Peregrine Falcon, the Spectacled Eider, and Steller's Eider. These species will not be encountered near the project area during exploration activity in mid -winter.

Environmentally Sensitive Areas - The Boulder Patch is an area in Stefansson Sound with patches of scattered rocks on the sea bottom, ranging in size from pebbles to boulders (Exhibit A). These cobbles and boulders, discovered in the early 1970's by the U.S. Geological Survey, provide the substrate that supports a highly diverse and productive biota, including Arctic kelp and sessile invertebrates (Reimnitz and Ross, 1979). Because of its rarity in a region known for soft sediments, the Boulder Patch was intensively studied as part of the National Oceanic and Atmospheric Administration (NOAA)/Outer Continental Shelf Environmental Assessment Program (NOAA/OCSEAP) in the late 1970's and early 1980's. This significant and unique biological community is located approximately 2.5 km (1.2 miles) west of the proposed site near the Sagavanirktok River delta (BPXA 1996). Significant environmental information has been collected on the location and distribution of this colony (LGL 1992). Based upon the best available data, no confirmed Boulder Patch type of habitat has been identified within 2.5 km (1.5 miles) of Tern Island (Reimnitz and Ross, 1979).

6.1.5 Socioeconomic and Cultural Considerations

Land use in the region has traditionally revolved around subsistence resources. Residents of the villages of Nuiqsut and Kaktovik are the primary subsistence users in the project area. The village of Nuiqsut (pop. 350) is located 70 miles to the west of Tern Island on the Colville River. Kaktovik (pop. 250) is located 94 miles to the east on Barter Island.

Regional subsistence activities include whaling, fishing, waterfowl and seaduck harvests, and hunting for seals, polar bears, and walrus and belukha (both very infrequent). Travel in the region is likely to be by small boat in summer and snowmachine in winter. Residents of both villages have historically used coastal areas near Tern Island, the McClure Islands, Pole Island, and Foggy Island for subsistence activity. Onshore subsistence activity has occurred near the mouths of the Kadleroshilik, Sagavanirktok and Shaviovik rivers (WCC 1981). Hunting for ringed seals and polar bears are the activities most likely to occur in or near the project area.

The only commercial offshore activity in the project area, other than oil and gas exploration, is occasional open water barge traffic between Prudhoe Bay and the Mackenzie River in Canada. Barge travel is limited to regions north of the McClure Islands and does not occur during winter months. There are no existing pipelines or cables in the area and no regular military use of the area exists or is known to be planned. No mariculture or commercial fishing exists or is anticipated in the project area.

Although a significant number of archaeological and cultural/historical sites have been identified in the general North Slope area, there are no cultural/historic sites located within 8 km (5 miles) of Tern Island (Lobdell 1996). The closest archaeological site is the Kadleroshilik

Mound, a large pingo located near the Kadleroshilik River, 4.8 km (3 miles) from the coast of Foggy Island Bay. The 3 mile square site is one of the largest in the Arctic Coastal Plain and it has been recommended for designation as a Natural Landmark. This site was described by early explorers and geologists. The pingo is approximately 20 feet above the surface of the tundra with multiple crests that indicate advanced age and degradation of the ice core.

6.2 IMPACT ASSESSMENT

In general, direct and cumulative impacts on the offshore and onshore environments expected to occur from winter exploration activity at Tern Island will be limited. Some local disturbance of bottom sediments and a temporary increase in turbidity during breakup, and increased potential for certain wildlife encounters are expected as a result of use of the island and drilling cuttings disposal, but general effects to the marine and coastal environment are likely to be minimal (MMS 1996).

Subsistence use of the Tern Island area is likely to be very low given the distance from both villages and current subsistence use focus on Cross Island (BPXA 1996). Bowhead and belukha whales may be present farther offshore during fall migration, but are unlikely inside of the McClure Islands (WCC, 1981, MMS 1996) and will not be present during the winter. Other impacts to subsistence users or subsistence resources are likely to be negligible given the project location and season. Impacts to seals are expected to be highly localized with no population-level impacts (MMS 1996).

Impacts to lower trophic-level organisms (phytoplankton, zooplankton, benthic and epontic communities) and fishes are expected to be negligible to none due to limited presence during winter months. Few fish will likely be encountered in the project area due to the absence of boulders and cobbles or similar hard-bottom habitats and the presence of ice during planned operations (MMS 1996).

Polar bears are likely to be present during operations, but BPXA will have a Polar Bear Interaction Plan and safety training program in place prior to operations to minimize and in many cases avoid interaction between bears and humans. A safety training program will also be in place to educate on-site personnel about arctic foxes and to minimize and avoid interaction between foxes and humans.

Adverse environmental impacts that could occur as a result of exploration activity at this site include an oil spill. However, the probability of a spill from winter exploration activity is very low and advanced well control equipment and procedures will be used for the Liberty prospect. An Oil Spill Contingency Plan has been prepared for this project, and submitted under separate cover. BPXA will use best management practices to reduce potential impacts from all spills. As noted in Section 5.1 of the Exploration Plan, BPXA will "roto trim" the ice pad as needed to facilitate removal of frozen cuttings, to remove any spilled substances, and to remove any dirt that has been bound into the ice surface. Roto-trimming will be kept to a minimum

necessary to clean the ice surface. If any contaminated ice is removed, it will be separated in a snow melter. This practice will prevent contaminated ice from reaching the environment.

Direct environmental impacts resulting from exploration activity at Tern Island will include short-term air emissions created by exploratory activity, drilling discharges to the ice under the General North Slope NPDES permit, and noise related to drilling and possible seismic activities. Short-term air emissions created by exploration drilling should be adequately dispersed by local wind patterns, thereby mitigating any adverse impacts (EPA 1996). Drilling-related noises will be present but are unlikely to affect the few seals and polar bears that may be present in the project area (MMS 1996).

BPXA has applied for a Letter of Authorization from the National Marine Fisheries Service (NMFS) for taking of ringed seals incidental to on-ice seismic activities (copy attached at the end of this Appendix). As described in this letter, the seismic activity will consist of placing a recording device in the well, and producing a seismic signal with vibroseis trucks which will travel on a line over the wellbore approximately 8000 feet west of Tern Island (Figure 2). This survey would last two days. Noise generated from this activity will diminish to below ambient at a distances of 3.5 to 5 km (2.2 to 3.1 mi) from the source, and noise will be present for approximately 60 minutes during any 12-hour period of operation. Based on guidance from NMFS, BPXA has also met with representatives from the villages of Kaktovik and Nuiqsut to discuss any potential concerns related to impacts from drilling noise. These individuals indicated they were not concerned about the proposed drilling operation, and it would not interfere with their subsistence activities (see copy of letter attached at the end of this Appendix).

Under the terms of the Final NPDES General Permit for Offshore Oil and Gas Operations on the Outer Continental Shelf (OCS) and State Waters of Alaska: Arctic NPDES General Permit (GP) (No. AKG284200), drill cuttings and drilling fluids will be discharged to sea ice near Tern Island. Material submitted in support of the Arctic NPDES GP, including the final Ocean Discharge Criteria Evaluation (ODCE) and the Final Biological Evaluation, are hereby incorporated by reference (EPA 1995a and 1995b).

Some short-term effects resulting from NPDES discharges include disturbance of bottom sediments, an increase in local turbidity, elevated concentrations of some mud consitituents (i.e., barium) in the water. However, these effects would only be evident during breakup and would be limited to the initial discharge on the ice surface. The ice in the disposal area will melt in place, limiting deposition of muds and cuttings to a localized area, with only limited impacts to a wider area. Previous studies of the effects of NPDES discharges show no long-term or significant impacts are expected due to the low toxicity of barium sulfate and no adverse effects on the composition of benthic macroinvetebrate communities (ENSR, 1991). In general, projected discharges from all exploration activity in the Beaufort Sea Lease Sale 124 and 144 areas are small compared to the natural sediment load of the Beaufort Sea. EPA has stated that discharges authorized under this GP are not likely to adversely affect any endangered or threatened species nor adversely affect their critical habitat (USGS 1981). Under the terms of the GP, discharges will not occur "within 1000m of the Stefansson Sound Boulder Patch (near the mouth of the

Sagavanirktok River) or between individual units of the Patch where the separation between units is greater than 2000 meters but less than 5000 meters." Under the terms of the GP, discharges during stable ice conditions "shall be to above-ice locations and shall avoid to the maximum extent possible areas of sea ice cracking or major stress fracturing." Environmental monitoring may be conducted to comply with the terms of the GP.

A single ice road will connect Tern Island with the proposed staging area and vehicle traffic will be limited to essential use only and to travel on established roads to the docks, on the ice road to be constructed, or possibly by helicopter. Aircraft travel will be controlled by FAA approved flight paths. Aircraft will avoid Native land areas and comply with flight restrictions imposed by the Beaufort Lease Sale 124 and 144 stipulations regarding sensitive biological areas (MMS 1996). In addition, an 8000-foot long ice road to support seismic exploration using vibroseis trucks will be constructed west of Tern Island. This road has been routed to avoid the Boulder Patch. No impacts are expected from construction or use of this ice road. The road will not be grounded, and is expected to melt in place during break-up in a manner similar to naturally-occurring sea ice. Likewise, the vibroseis seismic activity is non-intrusive and will have no direct impacts on Boulder Patch habitats.

No H_2S was encountered in previous wells at Tern Island, nor in the nearby Endicott field where the stratigraphy is similar to the prospect location (Appendix 3). However, as a safety precaution, H_2S monitors will be available onsite during drilling operations. All on-site personnel will receive safety training.

In addition, specific lease stipulations addressing Protection of Biological Resources, an Orientation Program, Transportation of Hydrocarbons, Industry Site-Specific Bowhead Whale Monitoring program, and Subsistence Whaling and Other Subsistence Activities will be followed to prevent and mitigate environmental impacts (MMS 1996).

No significant cumulative impacts are expected from winter exploration activity at Tern Island. Any cumulative impacts that could result from development of the Liberty prospect will be addressed as part of the NEPA review for that project.

6.3 EXISTING OR PLANNED MONITORING

Air monitoring and any required NPDES monitoring plans will be developed and submitted as part of the notification process for these permits. A polar bear interaction plan that includes self-monitoring will be submitted to the U.S. Fish and Wildlife Service.

6.4 REFERENCES

BP Exploration (Alaska) Inc. (BPXA). Northstar Development Project Conceptual Engineering Report. February 1996.

Distribution of Sea-Floor Boulders in Stefansson Sound, Beaufort Sea, Alaska. Prepared for SOHIO Alaska Petroleum Company by Harding Lawson Associates. March 8, 1985.

ENSR Consulting and Engineering. 1991. Endicott Development Project NPDES Monitoring Program Permit No. AK-003866-1. Final report on sediment quality and benthic macroinvertebrate monitoring, 1990 studies prepared for BP Exploration (Alaska) Inc. and U.S. Environmental Protection Agency, Region 10.

Johnson, S.R. and Herter, D.R. *The Birds of the Beaufort Sea.* Anchorage, Alaska: BP Exploration (Alaska) Inc. 1989.

LGL Ecological Research Associates, Inc. and Kenneth H. Dunton, Ph.D., University of Texas (MSI). *Final Report. Endicott Beaufort Sea Boulder Patch Monitoring Program (1984-1991).* Prepared for BP Exploration (Alaska) Inc. 1992.

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U.S. Department of the Interior, Geological Survey, Conservation Division, Alaska Region. *OCS Environmental Assessment. EA No. AK-81-9.* October 1981.

U.S. Department of the Interior, Minerals Management Service, Alaska OCS Region, in cooperation with the U.S. Environmental Protection Agency, Region 10. *Alaska Outer Continental Shelf Beaufort Sea Planning Area Oil and Gas Lease Sale 144, Final Environmental Impact Statement.* Vol. I and Vol. II. May 1996.

U.S. Department of the Interior, Minerals Management Service. *Outer Continental Shelf Draft Proposed Oil and Gas Leasing Program 1997-2002.* July 1995.

U.S. Environmental Protection Agency. (1995c) *Final NPDES General Permit for Offshore Oil and Gas Operations on the Outer Continental Shelf (OCS) and State Waters of Alaska: Arctic NPDES General Permit (No. AKG284200).* May 1995.

United States Environmental Protection Agency. Region 10. (1995a) *Final Ocean Discharge Criteria Evaluation*, prepared with assistance from Tetra Tech, Inc. February 1995.

United States Environmental Protection Agency. Region 10. (1995b) *Final Biological Evaluation*, prepared with assistance from Tetra Tech, Inc. February 1995.

U.S. Environmental Protection Agency. (1996) *Notice of Application to Construct and Final* Determination, BP Exploration (Alaska) Inc., Beaufort Sea, Alaska. September 16, 1996.

Woodward Clyde Consultants. *Environmental Report for Exploration in the Beaufort Sea Federal/State OCS Lease Sale. Tern Prospect.* Prepared for Shell Oil Company. September 24, 1981.

APPENDIX 7: COMPLIANCE WITH LEASE STIPULATIONS

The proposed exploration program will be conducted from two tracts: the surface hole location will be on tract OCS-Y-1585, which was leased under Sale 124; the bottomhole location is on tract OCS-Y-1650, which was leased under Sale 144. This section describes how BPXA will comply with the stipulations of those two Lease Sales.

7.1 LEASE SALE 124 (OCS-Y-1585)

Stipulation No. 1, Protection of Archaeological Resources

Stipulation Summary: The lessee shall prepare a report to determine the potential existence of any archaeological resources that could be affected by operations, and submit the report to the Regional Supervisor, Field Operations (RS/FO) for review. If evidence suggests that an archaeological resource may be present, the lessee must either locate the site so as not to adversely affect the resource, or demonstrate that the resource does not exist or will not be adversely affected by operations. If the RS/FO determines that an archaeological resource is likely to be present in the lease area and may be adversely affected by operations, the RS/FO will notify the lessee, who may take no action that may adversely affect the resource until the RS/FO has told the lessee how to protect it. If the lessee discovers any archaeological resource while conducting operations, the lessee will report the discovery immediately to the RS/.FO. The lessee shall make every reasonable effort to preserve the archaeological resource until the RS/FO has told the lessee how to protect it.

Planned BPXA Compliance: As discussed in Appendix 6, no impacts to known archaeological resources are expected as a result of this exploration program. In addition, BPXA has requested a determination from the State of Alaska Office of History and Archaeology that onshore ice construction will not adversely affect any historic or cultural resources (copy attached at end of this Appendix).

Stipulation No. 2, Protection of Biological Resources

Stipulation Summary: The RS/FO may require the lessee to conduct biological surveys needed to determine the extent and composition of biological populations and habitats requiring additional protection. As a result of these surveys, the RS/FO may require the lessee to modify the operation and/or establish that operations will not have adverse effects, or that special biological resources do not exist. In addition, the lessee is required to report any area of biological significance discovered during the conduct of any operations on the lease, and make

every effort to preserve and protect the biological resource from damage until the RS/FO provides direction with respect to resource protection.

Planned BPXA Compliance: Offshore drilling activity has been conducted in the past from this location, and no previously unknown special resources are expected to occur in this area. While the drill site is located in the region of the Stefansson Sound Boulder Patch, surveys have not located this habitat type in the vicinity of this drill site. BPXA plans to obtain videotape coverage of discharge locations and surrounding areas to confirm that planned discharges of drilling wastes and wastewater will not affect Boulder Patch habitat (see Section 7).

Stipulation No. 3, Orientation Program

Stipulation Summary: The lessee must develop a proposed orientation program for all personnel involved in the exploration program.

Planned BPXA Compliance: All BPXA and contractor project personnel will receive North Slope Environmental and Cultural Awareness training in the form of BPXA's "Achieving Environmental Excellence" program. Additionally, all personnel will participate in specific training programs for fox and polar bear awareness and safety. The fox component reinforces BPXA policy prohibiting feeding wildlife and identifies overt behavior exhibited by rabid animals. The polar bear component consists of a video on polar bear safety and a briefing on the Polar Bear Interaction Plan developed for the Liberty project. The Polar Bear Interaction Plan contains a site layout plan that minimizes the possibility of polar bear interaction on the ice pads.

Training elements and the Polar Bear Interaction Plan will be submitted to the RS/FO for review and approval prior to beginning operations.

Stipulation No. 4, Transportation of Hydrocarbons

Stipulation Summary: Pipelines are the preferred transportation mode for production.

Planned BPXA Compliance: Not applicable to this exploratory program.

Stipulation No. 5, Industry Site-Specific Bowhead Whale-Monitoring Program

Stipulation Summary: A monitoring program is required for operations conducted during the bowhead whale migration.

Planned BPXA Compliance: Bowhead migration will not occur during this winter exploratory program.

Stipulation No. 6, Subsistence Whaling and Other Subsistence Activities

Stipulation Summary: The lessee must conduct operations in a manner that prevents unreasonable conflicts between industry activities and subsistence activities.

Planned BPXA Compliance: No subsistence whaling activities will be occurring during this winter exploratory program. Subsistence harvests of ringed seal are known in this area, but are uncommon. BPXA has consulted with local villages (Nuiqsut and Kaktovik) regarding the proposed drilling activity.

Stipulation No. 7, Oil Spill Response Preparedness

Stipulation Summary: Lessee must be prepared to respond to oil spills, including training of personnel and conducting drills. Lessee shall submit oil spill contingency plan addressing potential spills, response strategies, response equipment, response times and capability, and drills and training requirements.

Planned BPXA Compliance: An Oil Spill Contingency Plan with the required information has been submitted as part of this Exploration Plan.

Stipulation No. 8, Agreement Between the United States of America and the State of Alaska

Stipulation Summary: An advisory regarding the terms of the subject agreement.

Planned BPXA Compliance: No compliance activity required.

Stipulation No. 9, Agreement Regarding Unitization

Stipulation Summary: An advisory regarding the terms of an agreement between the United States of America and the State of Alaska.

Planned BPXA Compliance: No compliance activity required.

7.2 LEASE SALE 144 (OCS-Y-1650

Stipulation No. 1, Protection of Biological Resources

Stipulation Summary: The RS/FO may require the lessee to conduct biological surveys needed to determine the extent and composition of biological populations and habitats requiring additional protection. As a result of these surveys, the RS/FO may require the lessee to modify the operation and/or establish that operations will not have adverse effects, or that special biological resources do not exist. In addition, the lessee is required to report any area of biological significance discovered during the conduct of any operations on the lease, and make every effort to preserve and protect the biological resource from damage until the RS/FO provides direction with respect to resource protection.

Planned BPXA Compliance: Offshore drilling activity has been conducted in the past from this location, and no previously unknown special resources are expected to occur in this area. While the drill site is located in the region of the Stefansson Sound Boulder Patch, surveys

have not located this habitat type in the vicinity of this drill site. BPXA plans to obtain videotape coverage of discharge locations and surrounding areas to confirm that planned discharges of drilling wastes and wastewater will not affect Boulder Patch habitat (see Section 7).

Stipulation No. 2, Orientation Program

Stipulation Summary: The lessee must develop a proposed orientation program for all personnel involved in the exploration program.

Planned BPXA Compliance: All BPXA and contractor project personnel will receive North Slope Environmental and Cultural Awareness training in the form of BPXA's "Achieving Environmental Excellence" program. Additionally, all personnel will participate in specific training programs for fox and polar bear awareness and safety. The fox component reinforces BPXA policy prohibiting feeding wildlife and identifies overt behavior exhibited by rabid animals. The polar bear component consists of a video on polar bear safety and a briefing on the Polar Bear Interaction Plan developed for the Liberty project. The Polar Bear Interaction Plan contains a site layout plan that minimizes the possibility of polar bear interaction on the ice pads.

Training elements and the Polar Bear Interaction Plan will be submitted to the RS/FO for review and approval prior to beginning operations.

Stipulation No. 3, Transportation of Hydrocarbons

Stipulation Summary: Pipelines are the preferred transportation mode for production.

Planned BPXA Compliance: Not applicable to this exploratory program.

Stipulation No. 4, Industry Site-Specific Bowhead Whale-Monitoring Program

Stipulation Summary: A monitoring program is required for operations conducted during the bowhead whale migration.

Planned BPXA Compliance: Bowhead migration will not occur during this winter exploratory program.

Stipulation No. 5, Subsistence Whaling and Other Subsistence Activities

Stipulation Summary: The lessee must conduct operations in a manner that prevents unreasonable conflicts between industry activities and subsistence activities.

Planned BPXA Compliance: No subsistence whaling activities will be occurring during this winter exploratory program. Subsistence harvests of ringed seal are known in this area, but are uncommon. BPXA has consulted with local villages (Nuiqsut and Kaktovik) regarding the proposed drilling activity.

Stipulation No. 6, Agreement Between the United States of America and the State of Alaska

Stipulation Summary: An advisory regarding the terms of the subject agreement.
Planned BPXA Compliance: No compliance activity required.

Stipulation No. 7, Agreement Regarding Unitization

Stipulation Summary: An advisory regarding the terms of an agreement between the United States of America and the State of Alaska.
Planned BPXA Compliance: No compliance activity required.

APPENDIX 8: CERTIFICATE OF COASTAL ZONE CONSISTENCY

BPXA has submitted the enclosed Coastal Project Questionnaire and Certification Statement to the Office of the Governor, Division of Governmental Coordination.

BP EXPLORATION

BP Exploration (Alaska) Inc.
900 East Benson Boulevard
P.O. Box 196612
Anchorage, Alaska 99519-6612
(907) 561-5111

October 16, 1996

Mr. Glenn Gray
Alaska Division of Governmental Coordination
POB 110030
Juneau, AK 99811-0030

Liberty #1 Exploration Well

Dear Mr. Gray:

BP Exploration (Alaska) Inc. (BPXA) is planning on drilling the Liberty #1 exploration well in the winter of 1996-1997. This well will be drilled in federal waters from the existing Tern Island; an ice pad will be added to the surface of this gravel island as necessary to support the drilling activity. A system of offshore and onshore ice roads, a staging pad, and an airstrip will also be constructed to support the program. Some of these ice structures are located on State of Alaska lands or waters. We plan on initiating ice construction between November 15 and December 1, 1996, and initiating drilling on or about February 2, 1997. The project is scheduled to be completed by April 15, 1997.

A pre-application conference for this project was held on October 11, 1996. Based on our understanding of permitting procedures for this Outer Continental Shelf project, we are forwarding you a coastal project questionnaire today, to meet the certification requirements specified in 15 CFR 930.77.

On or about October 25, we will also submit an application package to the State of Alaska for the following permits required for activites:

- Temporary Water Use Permit Application
- Land Use Permit Application
- Title 16 Fish Habitat Permit Application

BPXA requests that ice road construction to temporary water sources, and use of those sources, be considered a discrete phase of this overall exploratory drilling project, and that these activities be authorized separately under General Concurrence GC-34.

BPXA looks forward to working closely with your agency during the review and approval process for this important project. If you have any questions, or need additional information, please call Karen Wuestenfeld at 564-5490.

Sincerely,

Peter T. Hanley, Permitting Supervisor
Environmental and Regulatory Affairs, Alaska

Attachments

cc w/out attachments :
Jeff Walker, RS/FO, Alaska OCS Region, MMS, Anchorage (as part of Exploration Plan)
Jack Kerin, DMWM, Fairbanks
Al Ott, ADF&G, Anchorage
Nancy Welch, DNR/DOL, Fairbanks

Coastal Project Questionnaire and Certification Statement

Please answer all questions. To avoid a delay in processing, please call the department if you answer "yes" to any of the questions related to that department. Maps and plan drawings must be included with your packet.

An incomplete packet will be returned.

APPLICANT INFORMATION

1. BP Exploration (Alaska) Inc.
Name of Applicant
P.O. Box 196612
Address
Anchorage AK 99519-6612
City State Zip Code
907-564-5202
Daytime Phone
907-564-5020
Fax Number

2. Peter T. Hanley
Agent (or responsible party if other than applicant)
P.O. Box 196612
Address
Anchorage AK 99519-6612 MB 11-6
City State Zip Code
907-564-5202
Daytime Phone
907-564-5020
Fax Number

PROJECT INFORMATION

	Yes	No
1. This activity is a: ☒ new project ☐ modification or addition to an existing project		
If a modification do you currently have any State, federal or local approvals related to this activity?.....	☐	☐

Note: Approval means any form of authorization. If "yes", please list below:

APPROVAL TYPE	APPROVAL NO.	ISSUANCE DATE	EXPIRATION DATE

2. Has this project ever been reviewed by the State of Alaska per the ACMP?.....	☐	☒

Previous State I.D. Number: AK _____ Previous Project Name: _____

PROJECT DESCRIPTION

1. Attach the following: • a detailed description of the project and all associated facilities; • a project timeline for completion of all major activities in the proposal; • a site plan depicting all proposed actions; • other supporting documentation that would facilitate review of the project. Note: If the project is a modification, identify existing facilities as well as proposed activities on the site plan.

Proposed starting date for project: 15 November 96 Proposed ending date for project: 15 April 1997

2. Provide a brief description of your entire project and ALL associated facilities (access roads, caretaker facilities, waste disposal sites, etc.).

Winter offshore exploratory drilling with associated onshore activities. See attached Exploration Plan.

■ PROJECT LOCATION

1. Attach a copy of the topographical map with the project location marked on it.

2. Location of project (include nearest community or name of the land feature or body of water. Identify township, range and section): Beaufort Sea. (see attached Exploration Plan)

   Township _____ Range _____ Section _____ Meridian _____ Latitude/Longitude _____

3. The project is on: ☐ State Land* ☒ Federal Land ☐ Private Land ☐ Municipal Land
   **State land can be uplands, tidelands, or submerged lands to 3 miles offshore. See Question #1 in DNR section.*

4. The project is located in which region (see attached map): ☒ Northern ☐ Southcentral ☐ Southeast ☐ State Pipeline Coordinator's Office

	Yes	No
5. Is the project located in a coastal district? ..... If yes, please contact the district representative listed on the attached sheet.	☒	☐

6. Identify the communities closest to your project location:
   Deadhorse, Kaktovik, Nuiqsut

■ FEDERAL APPROVALS

	Yes	No
1. Is the proposed project on **U.S. Forest Service (USFS)** land or will you need to cross USFS lands for access?	☐	☒
Does the cost of the project exceed $250, 000?.....	☐	☐
If yes, have you applied for a USFS permit or approval?.....	☐	☐
Date of submittal: _____		
2. Is the proposed project on **Bureau of Land Management (BLM)** land or will you need to cross BLM lands for access?	☐	☒
Does the cost of the project exceed $250, 000?.....	☐	☐
If yes, have you applied for a BLM permit or approval?.....	☐	☐
Date of submittal: _____		
3. Will you be constructing a bridge over tidal (ocean) waters, or navigable rivers, streams or lakes?	☐	☒
If yes, have you applied for a **U.S. Coast Guard** permit for a bridge?.....	☐	☐
Date of submittal: _____		
4. Will you be dredging or placing structures or fills in any of the following: tidal (ocean) waters? streams? lakes? wetlands*?	☐	☒
If yes, have you applied for a **U.S. Army Corps of Engineers (COE)** permit?.....	☐	☐
Date of submittal: _____		

(Note: Your application for this activity to the Corps of Engineers also serves as your application to DEC.)

** If you are not certain whether your proposed project is in a wetlands, contact the U.S. Corps of Engineers, Regulatory Branch at (907) 753-2720 for a wetlands determination (outside the Anchorage area call toll free 1-800-478-2712.)*

	Yes	No
5. Have you applied for a **U.S. Environmental Protection Agency** National Pollution Discharge Elimination System (NPDES) permit?	☒	☐
Date of submittal: Request for Coverage under Arctic General Permit filed 16 October 1996		
(Note: For information regarding the need for an NPDES permit, contact EPA at (907) 271-5083.)		
6. Will you have a putrescible waste discharge within 5 miles of any public airport?	☐	☒
If yes, please contact the Airports Division of the **Federal Aviation Administration** at (907) 271-5440.		
7. Does the project include a nonfederal power project affecting any navigable body of water or located on federal land? Or, is utilization of surplus water from any federal government dam proposed?	☐	☒
(Power projects consist of dams, water conduits, reservoirs, powerhouses, and transmission lines.)		
If yes, have you applied for a permit from the **Federal Energy Regulatory Commission (FERC)**?	☐	☐
Date of submittal:		
(Note: For information, contact FERC, Office of Hydropower Licensing, at (202) 208-0200.)		

8. Have you applied for permits from any other federal agency?

AGENCY	APPROVAL TYPE	DATE SUBMITTED
U.S. Minerals Management Service	Exploration Plan	15 October 1996
U.S. Environmental Protection Agency	Part 55 Air Permit	16 February 1996 (rec'd 16 September 1996)

■ DEPARTMENT OF ENVIRONMENTAL CONSERVATION (DEC) APPROVALS

	Yes	No
1. Will a discharge of wastewater from industrial or commercial operations occur?	☒	☐
Will the discharge be connected to an already approved sewer system?	☐	☒
Will the project include a stormwater collection/discharge system?	☐	☐
2. Do you intend to construct, install, modify, or use any part of a wastewater (sewage or greywater) disposal system?	☒	☐
a) If so, will the discharge be 500 gpd or greater?	☒	☐
b) If contructing a domestic wastewater treatment or disposal system, will the system be located within fill material requiring a COE permit?	☐	☒

If you answered yes to a or b, answer the following:

1) How deep is the bottom of the system to the top of the subsurface water table?
   n/a - discharge to sea ice under terms of Arctic General NPDES Permit
2) How far is any part of the wastewater disposal system from the nearest surface water?
   n/a see 2.b)1) above
3) Is the surrounding area inundated with water at any time of the year? ☒ ☐
4) How big is the fill area to be used for the absorption system?
   n/a

(Questions 1 & 2 will be used by DEC to determine whether separation distances are being met; Questions 3 & 4 relate to the required size of the fill if wetlands are involved.)

	Yes	No
3. Do you expect to request a mixing zone for your proposed project? ..... *(If your wastewater discharge will exceed Alaska water quality standards, you may apply for a mixing zone. If so, please contact DEC to discuss information required under 18 AAC 70.032.)*	☐	☒
4. Do you plan to store or dispose of any type of solid waste resulting from this project?..... *(Note: Solid waste means drilling wastes, garbage, refuse, sludge, and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, and agricultural operations, and from community activities.)*	☒	☐
5. Will your project require the application of oil, pesticides, and/or any other broadcast chemicals to the surface of the land and/or the waters of the state?.....	☐	☒
6. a. Will you have a facility that will generate air emissions from processing greater than *five tons per hour* of material?.....	☒	☐
b. Will you have one or more units of fuel burning equipment, including flaring, with a heat input rating of *50 million Btu per hour* or more?.....	☒	☐
c. Will you have a facility containing incinerators with a total charging capacity of *1,000 pounds per hour* or more?.....	☒	☐
d. Will you incinerate sludge?.....	☐	☒
e. Will you have any of the following processes: ..... ☐ Asphalt plant ☐ Coal preparation facility ☐ Petroleum refinery ☐ Portland cement plant ☐ Petroleum Contaminated Soils Cleanup	☐	☒
f. Will your facility use the following equipment? ..... ☒ diesel internal combustion engines? (Total capacity equal to or greater than *1,750 kilowatts* or total rated brake specific horsepower greater than *2,350 bhp*) ☐ gas fired boilers (Total heat input rating of *100 million Btu* per hour) ☐ oil fired boilers (Total heat input rating of *65 million Btu* per hour) ☐ combustion turbines (Total rated power output of *8,000 Hp*)	☒	☐
g. Will your facility burn more than the following per year in stationary equipment? ..... ☐ 1,000,000 gallons of fuel oil ☐ 35,000 tons of coal ☐ 900 million cubic feet of natural gas	☐	☒
h. If you have answered "yes" to any of the above questions (6a-g), have you installed, replaced, or modified any fuel burning or processing equipment since 1977?.....	☐	☒
7. Will you be developing, constructing, installing, or altering a public water system?.....	☐	☒
8. a. Will your project involve the operation of waterborne tank vessels or oil barges that carry crude or non-crude oil as bulk cargo, or the transfer of oil or other petroleum products to or from such a vessel or a pipeline system?.....	☐	☒
b. Will your project require or include onshore or offshore oil facilities with an effective aggregate storage capacity of greater than 5,000 barrels of crude oil or greater than 10,000 barrels of non-crude oil?.....	☐	☒

	Yes	No
c. Will you be operating facilities on the land or water for the exploration or production of hydrocarbons?	☒	☐

If you answered NO to ALL questions in this section, continue to next section. If you answered YES to ANY of these questions, contact the DEC Regional office for information and application forms. Please be advised that all new DEC permits and approvals require a 30-day public notice period.

Based on your discussion with DEC, please complete the following:

APPROVAL TYPE DATE SUBMITTED

_____

_____

9. Does your project qualify for a general permit for wastewater or solid waste?	☒	☐

10. If you answered yes to any questions and are not applying for DEC permits, indicate reason:
☐ _____(DEC contact) told me on _____ that no DEC approvals are required on this project. Reason: _____

☒ Other: Part 55 Air Permit, General NDPES Permit, and MMS OSCP will cover activities on the OCS.

■ DEPARTMENT OF FISH & GAME (DFG) APPROVALS

	Yes	No
1. Will you be working in, or placing anything in, a stream, river or lake? (This includes work in running water or on ice, within the active flood plain, on islands, the face of the banks or the tidelands down to mean low tide.) *(Note: If the proposed project is located within a Federal Emergency Management Agency Zone, a Floodplain Development Permit may be required. Contact the local municipal government for additional information and a flood-plain determination.)*	☒	☐
Name of ☐ stream, ☐ river, or ☐ lake: (see Exploration Plan)	☐	☐
2. Will you do any of the following?	☒	☐

- ☐ Build a dam, river training structure or instream impoundment?
- ☒ Use the water?
- ☒ Pump water out of the stream or lake?
- ☐ Divert or alter the natural stream channel?
- ☐ Block or dam the stream (temporarily or permanently)?
- ☐ Change the water flow or the water channel?
- ☐ Introduce silt, gravel, rock, petroleum products, debris, chemicals, or other organic/inorganic waste of any type into the water?
- ☐ Alter or stabilize the banks?
- ☐ Mine or dig in the beds or banks?
- ☐ Use explosives?
- ☒ Build a bridge (including an ice bridge)?
- ☒ Use the stream as a road (even when frozen), or crossing the stream with tracked or wheeled vehicles, log-dragging or excavation equipment (backhoes, bulldozers, etc.)?
- ☐ Install a culvert or other drainage structure?
- ☐ Construct a wier?
- ☐ Use an in-stream structure not mentioned here?

	Yes	No
3. Is your project located in a designated State Game Refuge, Critical Habitat Area or State Sanctuary?	☐	☒
4. Does your project include the construction/operation of a salmon hatchery?	☐	☒
5. Does your project affect, or is it related to, a previously permitted salmon hatchery?	☐	☒
6. Does your project include the construction of an aquatic farm?	☐	☒

If you answered NO to ALL questions in this section, continue to next section.
If you answered YES to ANY questions under 1-3, contact the Regional DFG Habitat Division Office for information and application forms.
If you answered YES to questions 4-6, contact the DFG at the CFMD division headquarters for information and application forms.

Based on your discussion with DFG, please complete the following:

APPROVAL TYPE	DATE SUBMITTED
Ttile 16 Fish Habitat Permit	25 October 1996

7. If you answered yes to any questions and are not applying for DFG permits, indicate reason:
   ☐ _____(DFG contact) told me on _____ that no DFG approvals are required on this project. Reason: _____
   ☐ Other: _____

■ DEPARTMENT OF NATURAL RESOURCES (DNR) APPROVALS

	Yes	No
1. Is the proposed project on State-owned land or will you need to cross State-owned land for access? ("access" includes temporary access for construction purposes)	☒	☐

Note: In addition to State-owned uplands, the State owns almost all land below the ordinary high water line of navigable streams, rivers and lakes, and below the mean high tide line seaward for three miles.

2. Do you plan to dredge or otherwise excavate/remove materials on State-owned land?	☐	☒

Location of dredging site if other than the project site: _____
Township _____ Range _____ Section _____ Meridian _____

3. Do you plan to place fill or dredged material on State-owned land?	☐	☒

Location of fill disposal site if other than the project site: _____
Township _____ Range _____ Section _____ Meridian _____
Source is on: ☐ State Land ☐ Federal Land ☐ Private Land ☐ Municipal Land

4. Do you plan to use any of the following State-owned resources:	☐	☒

☐ ***Timber***: Will you be harvesting timber? Amount: _____

☐ ***Materials such as rock, sand or gravel, peat, soil, overburden, etc.:*** Yes No

Which material? _____ Amount: _____

Location of source: ☐ Project site ☐ Other, describe: _____

Township _____ Range _____ Section _____ Meridian _____

5. Are you planning to use or divert any fresh water?..... ☒ ☐

AMOUNT (gallons per day):	SOURCE:	INTENDED USE:
1,000,000	see Exploration Plan	ice roads, domestic, drilling

6. Will you be building or altering a dam?..... ☐ ☒

7. Do you plan to drill a geothermal well?..... ☐ ☒

8. At any one site (regardless of land ownership), do you plan to do any of the following?..... ☐ ☒
   - ☐ Mine five or more acres over a year's time?
   - ☐ Mine 50,000 cubic yards or more of materials (rock, sand or gravel, soil, peat, overburden, etc.) over a year's time?
   - ☐ Have a cumulative unreclaimed mined area of five or more acres?

   If you plan to mine less than the acreage/amount stated above and have a cumulative unreclaimed mined area of less than five acres, do you intend to file a voluntary reclamation plan for approval?..... ☐ ☐

9. Will you be exploring for or extracting coal?..... ☐ ☒

10. Will you be drilling for oil/gas?..... ☐ ☒

11. Will you be investigating or removing historical or archaeological resources on State-owned land?..... ☐ ☒

12. Is the proposed project located within a known geophysical hazard area?..... ☐ ☒

13. Is the proposed project located in a unit of the Alaska State Park System?..... ☐ ☒

If you answered NO to ALL questions in this section, continue to certification statement.

If you answered YES to ANY questions in this section, contact DNR for information.

Based on your discussion with DNR, please complete the following:

APPROVAL TYPE	DATE SUBMITTED
Land Use Permit for onshore ice roads	25 October 1996
Temporary Water Use Permit	25 October 1996

14. If you answered yes to any questions and are not applying for DNR permits, indicate reason:

☐ _____ (DNR contact) told me on _____ that no DNR approvals are required on this project. Reason: _____

☐ Other: _____

Please be advised that the CPQ identifies permits subject to a consistency review. You may need additional permits from other agencies or local governments to proceed with your activity.

Certification Statement

The information contained herein is true and complete to the best of my knowledge. I certify that the proposed activity complies with, and will be conducted in a manner consistent with, the Alaska Coastal Management Program.

Signature of Applicant or Agent

October 16, 1996
Date

Note: Federal agencies conducting an activity that will affect the coastal zone are required to submit a federal consistency determination, per 15 CFR 930, Subpart C, rather than this certification statement.

This certification statement will not be complete until all required State and federal authorization requests have been submitted to the appropriate agencies.

■ **To complete your packet, please attach your State permit applications and copies of your federal permit applications to this questionnaire.**

APPENDIX 9: EPA PART 55 AIR PERMIT

On February 16, 1995, BPXA submitted an application to the U.S. Environmental Protection Agency (EPA) for exploratory drilling in the Beaufort Sea OCS area, under the requirements of 40 CFR Part 55 OCS regulations. A permit was issued on September 16, 1996. By issuing the permit, EPA found that national ambient air quality standards would not be exceeded as a result of exploratory drilling on the OCS. A copy of the permit is attached.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Reply To
Attn Of: OAQ-107

SEP 16 1996

Steven Taylor
BP Exploration (Alaska) Inc.
P.O. Box 196612
Anchorage, Alaska 99519-6612

Dear Mr. Taylor: Steve

The Environmental Protection Agency (EPA) Region 10 has evaluated BP Exploration (Alaska), Inc.'s application for an Outer Continental Shelf (OCS) permit to conduct exploratory well drilling in the Beaufort Sea, Alaska. We have determined that the project will meet the requirements of the State of Alaska state implementation plan and Part 55 pursuant to the Clean Air Act Ammendments. Accordingly, on the basis of the complete OCS permit application, EPA hereby grants its approval to BP Exploration (Alaska) Inc. to conduct exploratory drilling subject to the terms and conditions contained in the enclosed permit. Also enclosed is EPA's Final Determination Analysis Document for this project.

Because no comments were received on the draft permit and no substantive changes have been made in the final permit, the permit is effective immediatly unless this final permit decision is challenged by filing a petition for review in accordance with 40 C.F.R. § 124.19

.

Sincerely,

Chuck

Chuck Clarke
Regional Administrator

cc: J. Gottlieb, MMS
A. Bohn, ADEC

Enclosures
Copy of EPA Final Determination Analysis Document
Outer Continental Shelf Permit
Federal Register Notice of Issuance

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
SEATTLE, WASHINGTON 98101

NOTICE OF APPLICATION TO CONSTRUCT AND FINAL DETERMINATION BP EXPLORATION (ALASKA) INC. BEAUFORT SEA, ALASKA

This document presents the final determination by the Environmental Protection Agency (EPA) to approve BP Exploration (Alaska) Inc.'s exploratory drilling project in the Beaufort Sea, Alaska pursuant to federal regulations for the Outer Continental Shelf, 40 CFR Part 55.

BACKGROUND

On February 20, 1996, EPA Region 10 received from BP Exploration (Alaska) Inc. sufficient information to determine the application complete requesting approval to conduct exploratory drilling in the Beaufort Sea, Alaska. EPA reviewed this material and presented its findings in a preliminary determination document which was released for public comment and published in the "Anchorage Daily News" on August , 1996. Affected governmental agencies and the general public were notified of their opportunity to submit written comments and request a public hearing regarding EPA's preliminary determination.

PUBLIC COMMENT

No comments and no requests for a public hearing were received.

FINDINGS

Based on our review of the application and supporting information, EPA finds that the national ambient air quality standards will not be exceeded as a result of this project. In light of these findings, EPA grants approval to conduct exploratory drilling in the Beaufort Sea, Alaska as requested by BP Exploration (Alaska) Incorporated. This approval is subject to the terms and conditions set forth in the letter of approval and OCS permit to BP Exploration (Alaska) Incorporated.

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 10

1200 SIXTH AVENUE

SEATTLE, WASHINGTON 98101

APPLICATION OF:	)	
	)	
BP Exploration (Alaska) Inc.	)	No. OCS X96-01
P.O. BOX 196612	)	APPROVAL OF APPLICATION
Anchorage, Alaska 99519	)	TO CONSTRUCT
	)	

Pursuant to the Agency regulations for the Outer Continental Shelf (OCS) set forth at Title 40, Code of the Federal Regulations, Part 55 and based upon complete information submitted on February 16, 1996 by BP Exploration (Alaska) Inc., the Regional Administrator now finds as follows:

FINDING

1. BP Exploration (Alaska) Inc. (hereafter referred to as BP Exploration) proposes to conduct exploratory oil and gas drilling in the Beaufort Sea, Alaska.

2. An analysis of projected emissions indicates that this project is subject to review for nitrogen oxides (NO_x), particulate matter (PM), sulfur dioxide (SO_2), volatile organic compounds (VOC) and carbon monoxide (CO).

3. The proposed project is located in an area designated as "Class II" under Section 162(b) of the Clean Air Act.

4. Modeling analyses of NO_x, PM, SO_2 and CO have been conducted and demonstrate that while emissions of these pollutants will increase, the OCS source will not cause any violations of the applicable National Ambient Air Quality Standards or PSD increments so long as the exploratory source is operated in accordance with the conditions specified in this permit. The emissions of NO_x, PM, SO_2 and CO will not cause an adverse impact on soils, vegetation or visibility in the area.

5. The emissions of all other pollutants from the proposed oil and gas drilling exploration shall comply with all state of Alaska requirements as stated in the Alaska Administrative Code (AAC), Title 18, Chapter 50, 18 AAC 50.

6. No "Class II" area or an area with a known PSD increment violation will be impacted.

Accordingly, it is hereby determined that, subject to the conditions set forth below, BP Exploration will be permitted to conduct exploratory oil and gas drilling in the Beaufort Sea, Alaska, as described in the permit application submitted on February 16, 1996.

APPROVAL CONDITIONS

7. Emissions of nitrogen oxide (NO_x), particulate matter (PM), sulfur dioxide (SO_2), volatile organic compounds (VOC) and carbon monoxide (CO) shall not exceed the following:

EMISSION LIMITATIONS

Source Category	Number of Sources in Category	Air Pollutant	Allowable Emission Rate [1] (lb/hr)	Allowable Emission Rate [1] (tpy)
Drilling Rig Prime Mover Engines (912 hp)	5	NO_x	21.31	23.02
		CO	5.63	6.08
		SO_2	2.21	2.39
		PM	0.20	0.22
		VOC	0.40	0.43
Drilling Rig Backup Engines (671 hp)	2	NO_x	16.85	8.09
		CO	0.44	0.21
		SO_2	1.63	0.78
		PM	0.89	0.43
		VOC	0.30	0.14
Camp Power Engines (671 hp)	2	NO_x	16.85	18.2
		CO	0.44	0.48
		SO_2	1.63	1.76
		PM	0.89	0.96
		VOC	0.30	0.32
Light Generator Engines (11 hp)	10	NO_x	0.33	0.36
		CO	0.07	0.08
		SO_2	0.02	0.02
		PM	0.02	0.03
		VOC	0.03	0.03
Drilling Rig Boilers (7 MM Btu/hr)	2	NO_x	1.00	1.08
		CO	0.25	0.27
		SO_2	2.13	2.39
		PM	0.10	0.11
		VOC	0.01	0.01
Drilling Rig Heaters (4.2 MM Btu/hr)	3	NO_x	0.60	0.65
		CO	0.15	0.16
		SO_2	1.28	1.38
		PM	0.06	0.06
		VOC	0.006	0.006

Well Test Process Heater (7.8 MM Btu/hr)	1	NO_x CO SO_2 PM VOC	1.11 0.28 2.37 0.11 0.011	0.33 0.08 0.71 0.03 0.003
Camp Incinerator (100 lb/hr waste and 0.6 MM Btu/hr)	1	NO_x CO SO_2 PM VOC	0.34 1.57 1.58 5.01 0.09	0.36 1.69 1.71 5.41 0.09
Snow Melter (8.8 MM Btu/hr)	1	NO_x CO SO_2 PM VOC	1.26 0.31 2.68 0.13 0.013	1.36 0.34 2.89 0.14 0.014
Well Test Flare System (15 MM scf/day)	1	NO_x CO SO_2 PM VOC	42.50 231.25 5.27 16.53 87.50	12.75 69.38 1.58 4.96 26.25
Total Process		NO_x CO SO_2 PM VOC		190.0 105.0 32.9 15.0 29.8

[1] Allowable emission rates apply to each source within the category (except for the Total Process row).

8. BP Exploration shall notify the Environmental Protection Agency (EPA) of any occurrence of any emissions in excess of limits specified in Condition Number 7 above; such notification shall be forwarded to EPA in writing in a timely fashion and in each instance no later than ten (10) calendar days from the date of such occurrence. The notification shall include an estimate of the resultant emissions and narrative report of the cause, duration and steps taken to correct the problem and avoid a recurrence. BP Exploration shall contemporaneously send a copy of

all such reports to the Alaska Department of Environmental Conservation (ADEC).

9. No more than one land-based mobile drilling rig is allowed to emit air pollutants within the modeling domain (Beaufort Sea Project area) as defined in figure 1-1 in the permit application.

10. BP Exploration must maintain a 1500 foot exclusionary safety zone around each drilling unit and must at a minimum take the following reasonable and routine measures to control the boundary of this zone:

(a) Signs prepared in English and Inupiat must be posted and maintained along the perimeter of the 1500 foot exclusionary zone to warn those in the vicinity of the Beaufort Sea drilling area.

(b) BP Exploration must maintain a patrol program to locate, identify and intercept the general public by radio or physical contact to inform the public that they are entering a safety exclusionary zone where ambient air standards may not be maintained.

11. This approval is granted for a five (5) year term. Operation for additional five (5) year terms beyond the initial permit term will require a renewal request to be submitted ninety (90) days prior to the expiration of the OCS permit.

12. As approved and conditioned by this permit any construction, or operation of the proposed OCS unit shall be in accordance with the application which resulted in this permit. Nothing in this permit shall be construed to relieve BP Exploration of its obligations under any state or federal laws including, but not limited to, Sections 303, 328 and 114 of the Clean Air Act.

13. Compliance with emission limitations shall be determined through a program of emission inventory calculations and testing as described below:

a. Compliance Demonstration

(1) Compliance with the fuel sulfur content limitation of 0.30% by weight shall be determined by one of the following methods: (a) obtaining a representative sample of each fuel delivery and analyzing the samples for sulfur content using ASTM D-4294, D-129 or ASTM D-2622; or (b) BP Exploration may obtain a single monthly certification of sulfur content from the fuel supplier based on a monthly test conducted at the fuel supplier's facility, providing that the certification indicates that the sulfur content has been determined by one of the ASTM methods listed above. Certifications for fuel sulfur content shall be sent to EPA within 10 days of the end of each calendar quarter.

(2) At least once during the testing of any individual well, the H_2S content of the gas to the flare shall be tested using Draeger Tube analysis or a similar method.

(3) Opacity shall be determined by using Reference Method 9 and BP Exploration may not reduce visibility through the exhaust effluent by greater than 20% for a total of more than three minutes in any one hour.

b. Monitoring Requirements

(1) Prior to commencing operation, BP Exploration shall install, operate and maintain systems to monitor and record the hours of operation of each air emission source listed in Condition 7. Accurate operator logs shall be maintained to record the

hours of operation or a meter which records the time of equipment operation shall be used.

(2) The total fuel consumed by all fuel combustion equipment located at the exploratory drilling site shall be measured and recorded on either a monthly basis or on a complete exploratory drilling project basis (start to finish of each exploratory drilling operation).

(3) A flowmeter shall be installed in the gas line to the flare to measure the gas flow so that the total gas volume flared over the test period can be determined. The meter shall be accurate to within plus or minus 5%.

(4) A log shall be maintained to record any operating problems which may cause air contaminant emissions to exceed normal rates. The time, duration, cause of the event and actions taken to prevent future occurrences shall be documented in the log.

(5) BP Exploration may submit proposed alternative monitoring procedures to EPA for consideration. EPA must approve any proposed alternative monitoring procedures in writing before they can be used in place of the monitoring requirements listed above.

c. Record Keeping Requirements

(1) All monitoring records and logs required in Condition 13(b) shall be maintained for a period of five years and shall be made available for inspection by EPA, Minerals Management Service (MMS) and the Alaska Department of Environmental Conservation upon request.

14. EPA, MMS and ADEC shall be notified of the commencement of construction date and the start-up date within thirty (30) days of the date of their occurrence.

15. Access to the source by EPA, MMS, ADEC, or authorized representatives/contractors will be permitted upon request for the purpose of compliance assurance inspections. This right of access is in addition to and is not a limitation on the rights of access afforded by any statute, regulation or other law.

9/6/96
DATE

Chuck Clarke
Regional Administrator

U.S. Environmental Protection Agency
Region 10
Notice of Issuance of OCS Permit to
BP Exploration (Alaska) Incorporated
Beaufort Sea, Alaska

Notice is hereby given that on September , 1996, the Environmental Protection Agency issued an outer continental shelf (OCS) permit to BP Exploration (Alaska) Incorporated to conduct exploratory oil well drilling in the Beaufort Sea, Alaska.

The OCS permit has been issued under the outer continental shelf (40 CFR Part 55) regulations, subject to certain conditions specified in the permit. The final permit decision shall become effective 30 days after (date of this notice) unless review is requested under 40 CFR § 124.19. Petition for review of this final OCS permit decision must be filed within 30 days of (date of this notice) in accordance with 40 CFR §124.19.

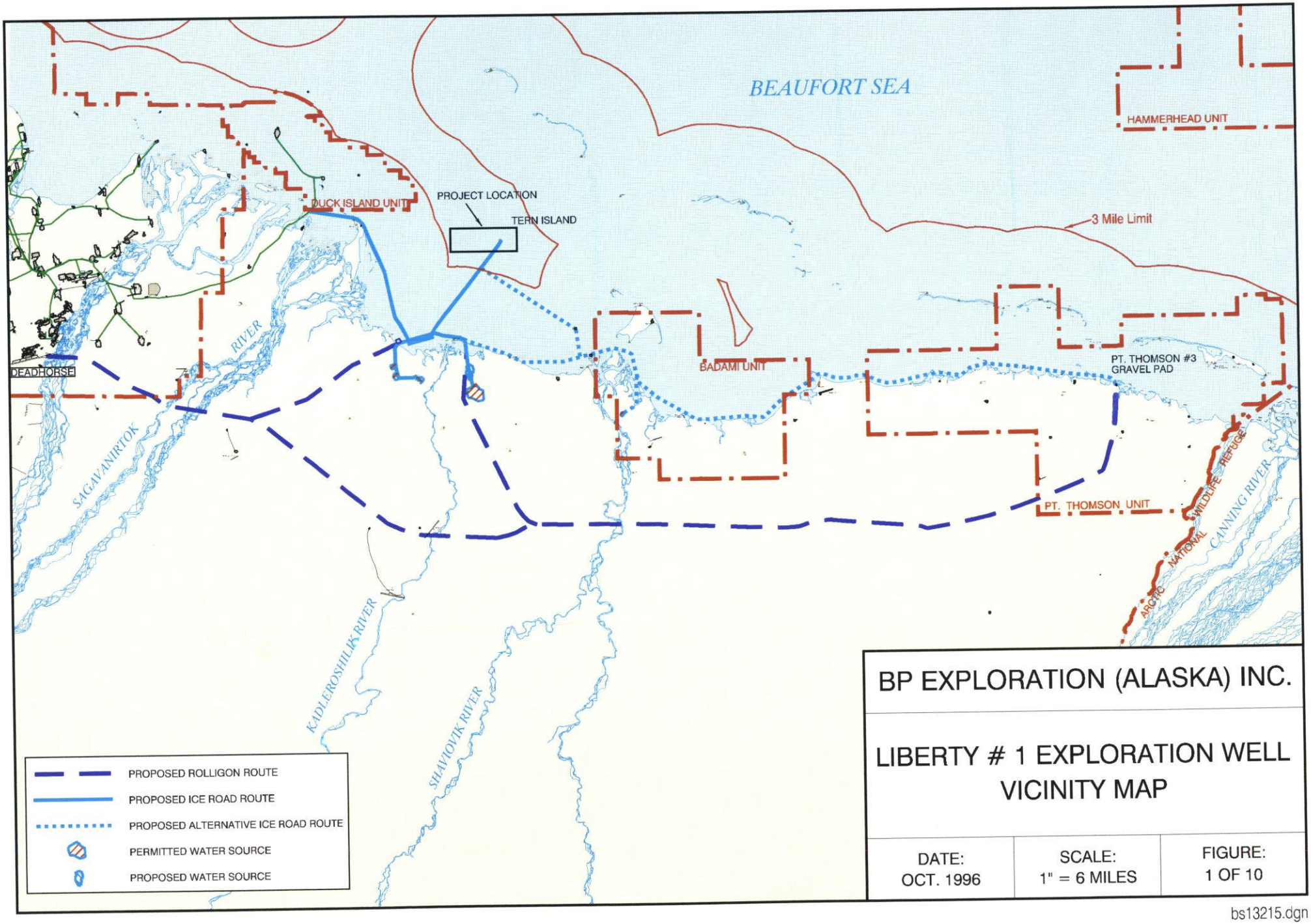
Copies of the OCS permit and administrative record are available for public inspection upon request at the following location:

Environmental Protection Agency, Region 10
1200 Sixth Avenue, M/S OAQ-107
Seattle, Washington 98101

9/6/96
Date

Chuck Clarke
Regional Administrator

Billing Code 6560-50-P

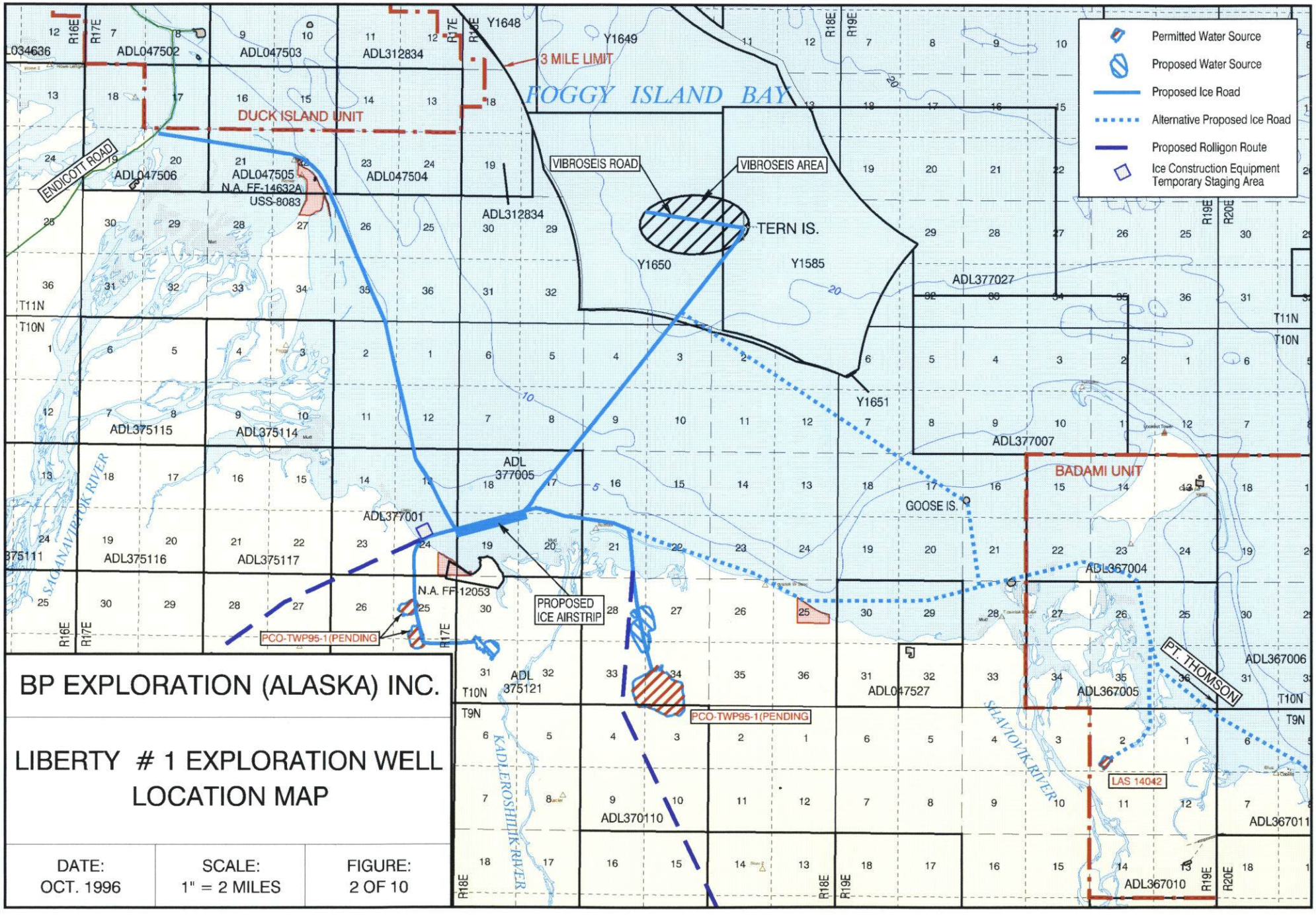


BP EXPLORATION (ALASKA) INC.

LIBERTY # 1 EXPLORATION WELL VICINITY MAP

DATE:	SCALE:	FIGURE:
OCT. 1996	1" = 6 MILES	1 OF 10

bs13215.dgn

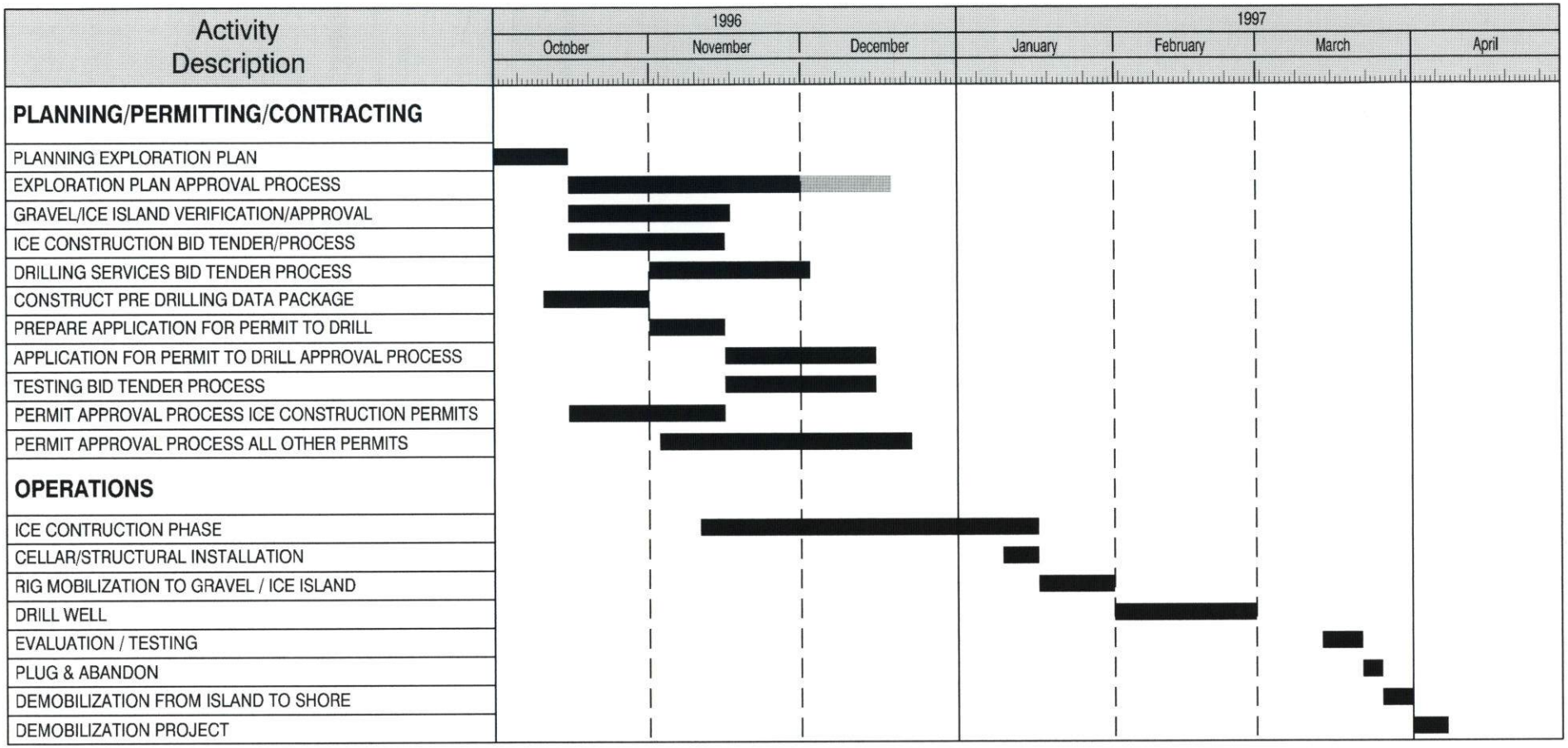


BP EXPLORATION (ALASKA) INC.

LIBERTY # 1 EXPLORATION WELL LOCATION MAP

DATE:	SCALE:	FIGURE:
OCT. 1996	1" = 2 MILES	2 OF 10

bs13207.dgn

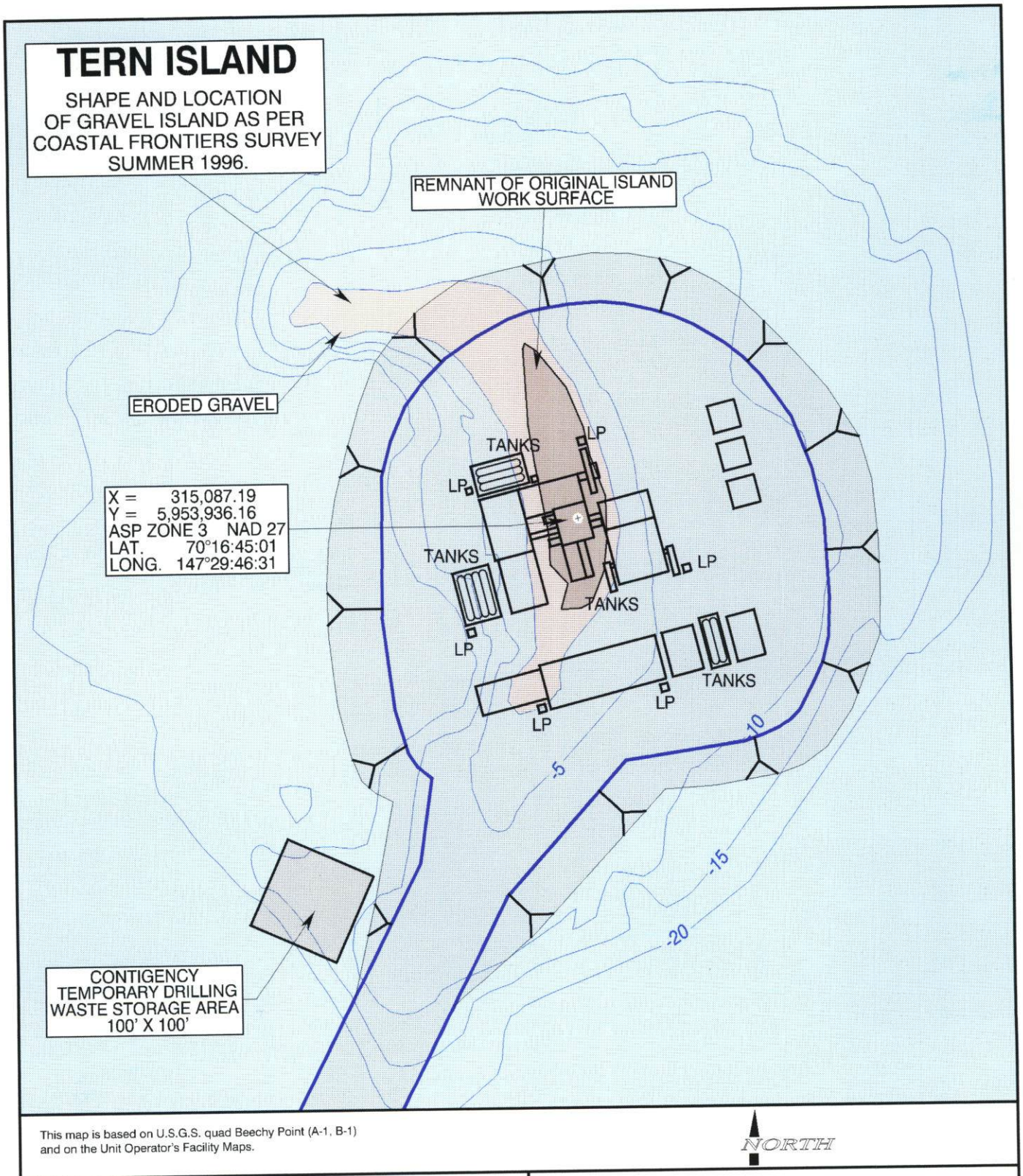


BP EXPLORATION (ALASKA) INC.

LIBERTY # 1 EXPLORATION WELL
PROJECT SCHEDULE

DATE:	SCALE:	FIGURE:
OCT. 1996	N/A	3 OF 10

bs13226.dgn



This map is based on U.S.G.S. quad Beechy Point (A-1, B-1) and on the Unit Operator's Facility Maps.

NORTH

PROPOSED ICE PAD / ROAD

PROPOSED WELL

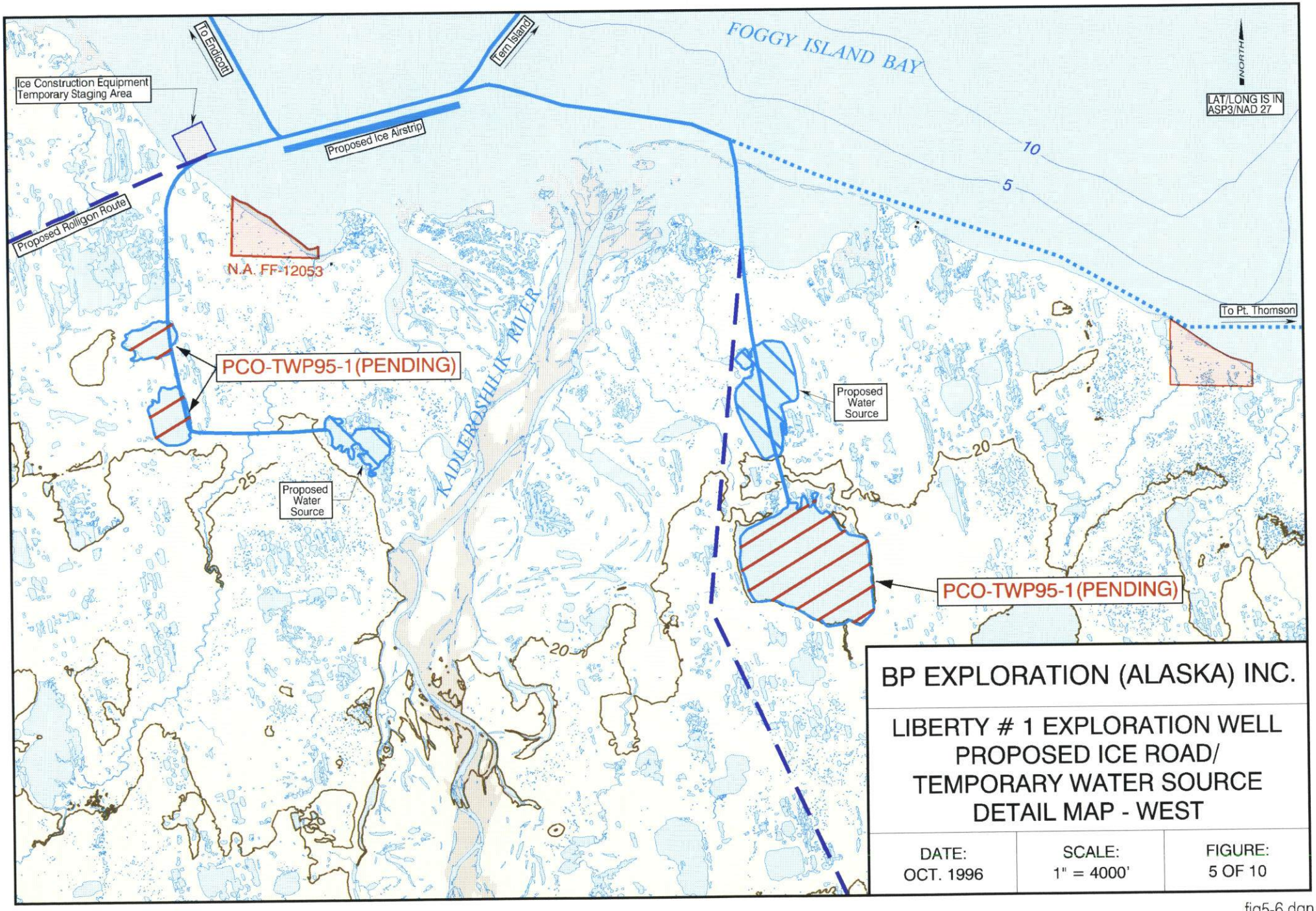
LP LIGHT PLANT

BP EXPLORATION (ALASKA) INC.

LIBERTY # 1 EXPLORATION WELL
TERN ISLAND
PROPOSED ICE PAD DETAIL

DATE:	SCALE:	FIGURE:
OCT. 1996	1" = 150 FEET	4 OF 10

bs13209.dgn

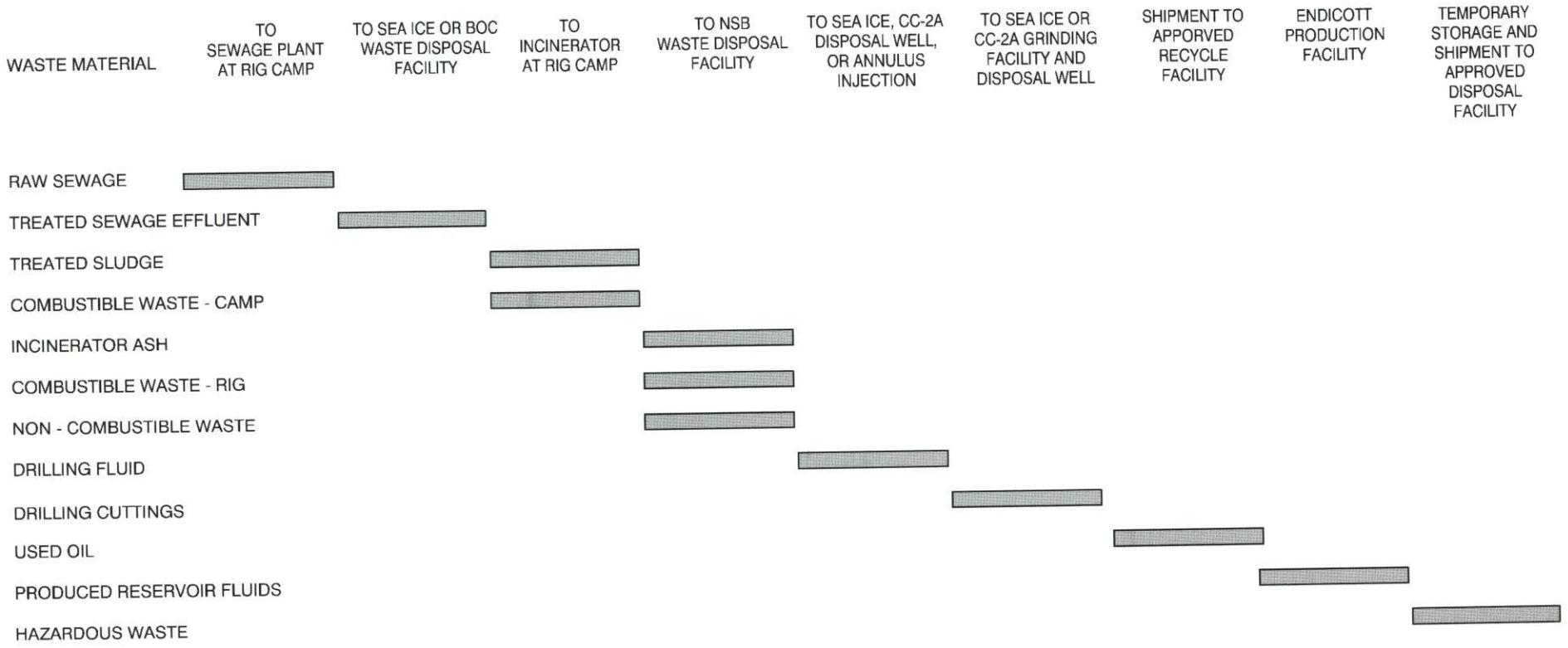


BP EXPLORATION (ALASKA) INC.

LIBERTY # 1 EXPLORATION WELL PROPOSED ICE ROAD/ TEMPORARY WATER SOURCE DETAIL MAP - WEST

DATE:	SCALE:	FIGURE:
OCT. 1996	1" = 4000'	5 OF 10

fig5-6.dgn

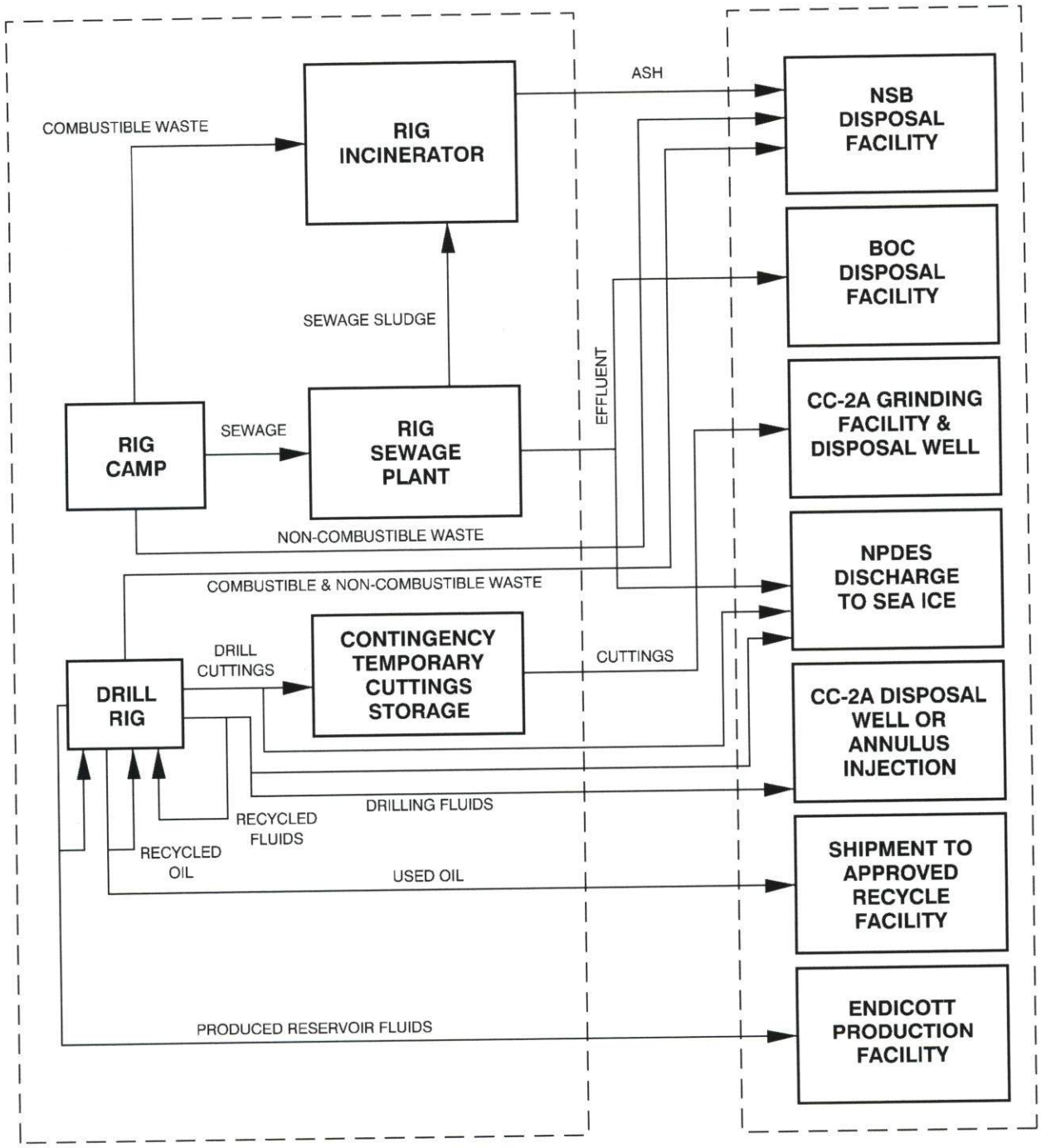


BP EXPLORATION (ALASKA) INC.

LIBERTY # 1 EXPLORATION WELL WASTE MANAGEMENT PLAN

DATE:	SCALE:	FIGURE:
OCT. 1996	NOT TO SCALE	9 OF 10

bs13226.dgn



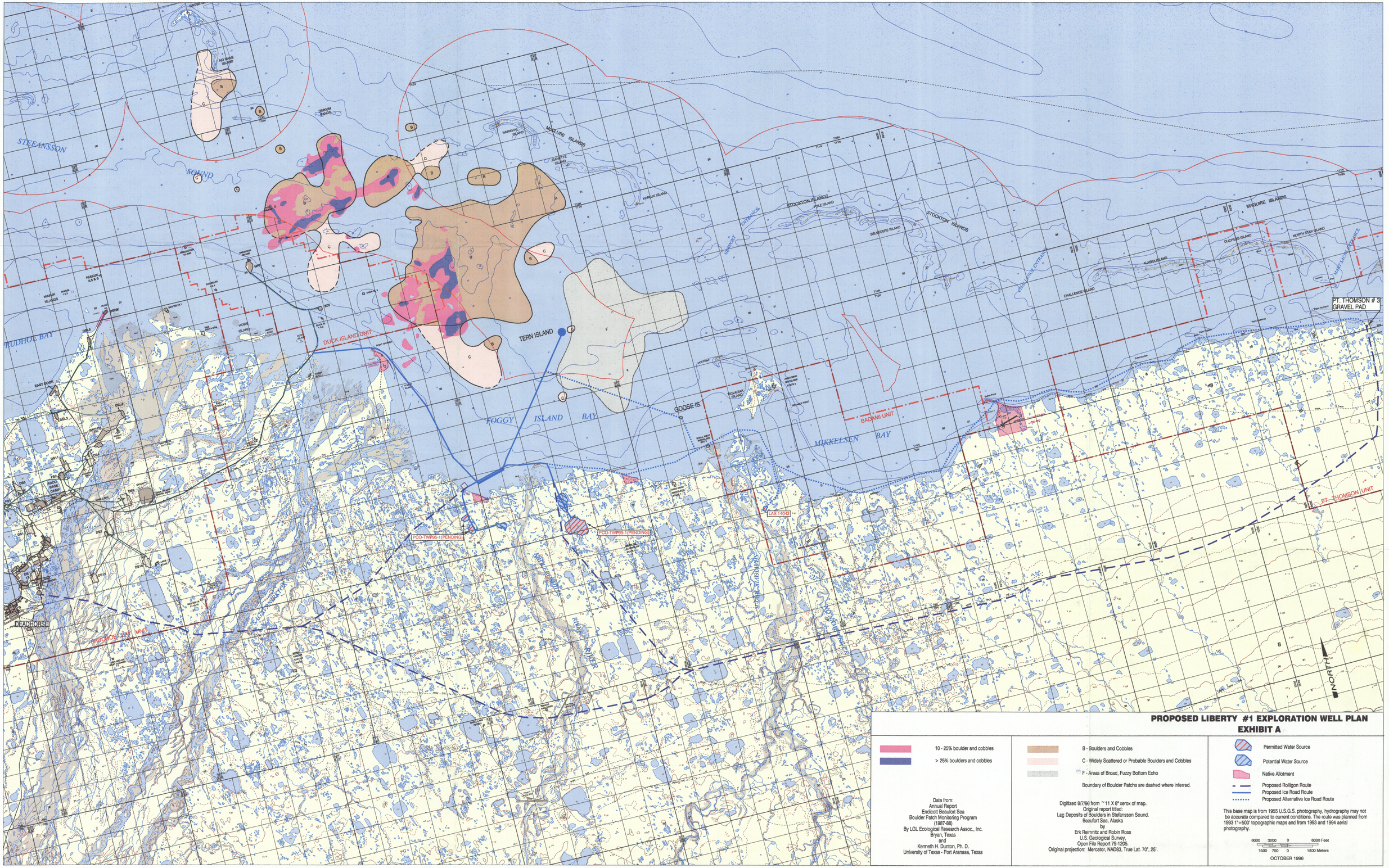
BP EXPLORATION (ALASKA) INC.

LIBERTY # 1 EXPLORATION WELL WASTE MANAGEMENT FLOW DIAGRAM

DATE:	SCALE:	FIGURE:
OCT. 1996	NOT TO SCALE	10 OF 10

bs13226.dgn

PROPOSED LIBERTY # 1 EXPLORATION WELL PLAN - EXHIBIT A



PROPOSED LIBERTY #1 EXPLORATION WELL PLAN
EXHIBIT A

10 - 25% boulder and cobbles

> 25% boulders and cobbles

Data from:
Annual Report
Endicott Beaufort Sea
Boulder Patch Monitoring Program
(1987-88)
By LGL Ecological Research Assoc., Inc.
Bryan, Texas
and
Kenneth H. Dunton, Ph. D.
University of Texas - Port Aransas, Texas

B - Boulders and Cobbles

C - Widely Scattered or Probable Boulders and Cobbles

F - Areas of Broad, Fuzzy Bottom Echo

Boundary of Boulder Patchs are dashed where inferred.

Digitized 8/7/96 from ~ 11 X 8" xerox of map.
Original report titled:
Lag Deposits of Boulders in Stefansson Sound.
Beaufort Sea, Alaska
by
Erk Reimnitz and Robin Ross
U.S. Geological Survey,
Open File Report 79-1205.
Original projection: Mercator, NAD83, True Lat. 70°, 25'.

Permitted Water Source

Potential Water Source

Native Allotment

Proposed Rolligon Route

Proposed Ice Road Route

Proposed Alternative Ice Road Route

This base map is from 1955 U.S.G.S. photography, hydrography may not be accurate compared to current conditions. The route was planned from 1983 1"=500' topographic maps and from 1993 and 1994 aerial photography.

6000 3000 0 6000 Feet
1500 750 0 1500 Meters

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