NATIONAL PETROLEUM RESERVE IN ALASKA

HISTORY
OF
DRILLING OPERATIONS

TUNALIK TEST WELL NO. 1

HUSKY OIL NPR OPERATIONS, INC.
Prepared by: S. L. Hewitt
Edited by: R. G. Brockway

For the

U. S. GEOLOGICAL SURVEY
Office of the National Petroleum Reserve in Alaska
Department of the Interior
JUNE 1983

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TUNALIK TEST WELL NO. 1

INTRODUCTION

Tunalik Test Well No. 1 is located in the National Petroleum Reserve in Alaska (Figure 1). The well is located 2,403 feet from the south line and 1,488 feet from the east line of protracted Section 20, Township 10 North, Range 36 West, Umiat Meridian (Latitude: 70°12'21.453" North; Longitude: 161°04'09.159" West). Alaska State Plane Coordinates are: X = 815,450.76 and Y = 5,925,750.58, Zone 7. Elevations are: Kelly Bushing 110 feet, Pad 85 feet. Drilling related operations were started with rig-up on October 18, 1978, and were terminated on January 7, 1980.

The well was drilled to a total depth of 20,335 feet. True vertical depth was 20,211 feet. The objective of the well was to test a structurally closed anticlinal trap in the Sadlerochit and Lisburne Groups. Secondary interest was in the "Pebble Shale" and Kingak sands.

Husky Oil NPR Operations, Inc. supervised and directed the drilling and support operations as prime contractor to the U. S. Geological Survey, Department of the Interior. Parco, Inc. was the drilling contractor; and Parker Rig 95, a National 130, was used to drill the well.

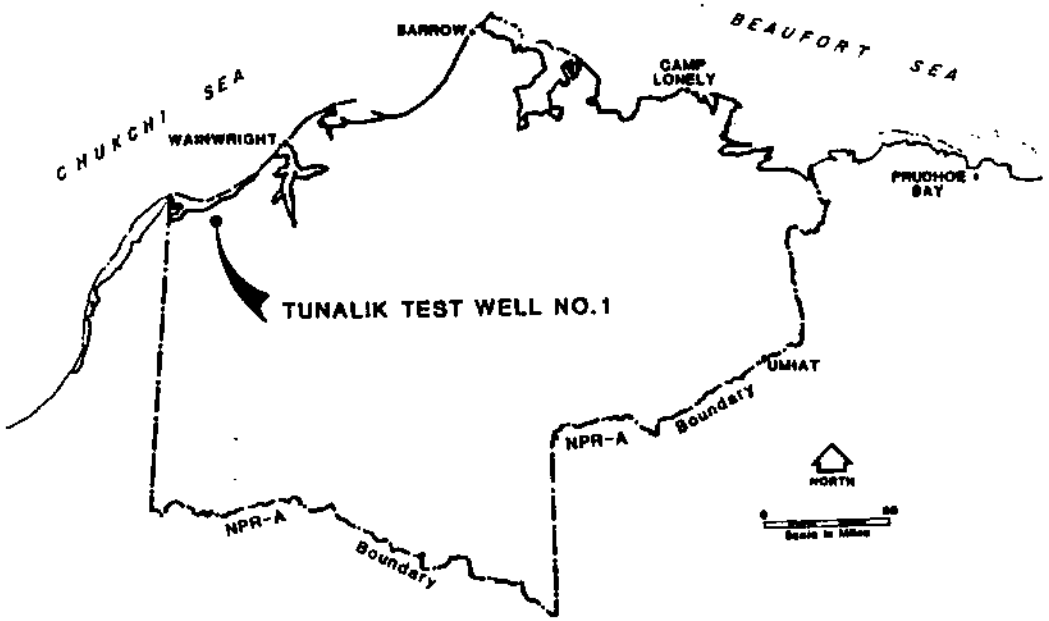

FIGURE 1 - WELL LOCATION MAP - TUNALIK NO. 1

DRILLING SUMMARY

Field operations at Tunalik Test Well No. 1 were started on February 4, 1978, with mobilization of construction crews and equipment required to build the drilling pad and all-season airstrip. Construction work was completed on the drilling pad and the all-weather airstrip on May 2, 1978.

Parco Rig 95 had been stacked at Peard Bay after finishing drilling Kugrua Test Well No. 1 in May 1978. The rig was then transported to Husky Point by Cool Barge in the fall of 1978. The rig move from Husky Point to Tunalik began on October 11, with movement of men to the Tunalik location. A total of 97 loads were hauled by Rolligon in 10 days. The rig move was completed October 20. Rig-up began October 18, 1978. Also, major rig modifications to raise the superstructure to accommodate a 10,000 psi blowout preventer were started. The derrick was raised on November 4, 1978. Rig-up continued, including tie-in and winterization of new equipment. The 42" insulated conductor was cemented at 106' with 450 sacks of Permafrost II cement.

The well was spudded November 10, 1978, at 7:15 a.m. A 17-1/2" hole was drilled to 500'. The hole was logged with the DIL/SP/GR and BHC-Sonic/GR logs. The 17-1/2" hole was opened to 26" and the 26" hole opened to 36" to 513'. Thirteen joints of 30", 196.08 lb., X-42 casing were run with Vetco-type ST connectors and landed at 516' (corrected depth). The 30" casing was cemented with 1,660 sacks of Permafrost II cement at 14.8 ppg. Returns were 14.5 ppg when lost circulation occurred. Cement returns came up outside the cellar around the matting boards. Cement was in place November 13, 1978, at 9:15 a.m. After waiting on cement, a 10-sack top job was run on the 30" casing, and 65 sacks of Permafrost II cement were grouted in around the cellar. A 29-1/2", 500 psi diverter was nippled up on the 30" casing.

The 30" shoe was drilled out and 17-1/2" hole was drilled to 2630'. The hole was logged with the DIL/SP/GR and BHC-Sonic/GR logs. The 17-1/2" hole was opened to 26" to 1107', at which point the 17-1/2" pilot bit was lost from the 26" hole opener. Eight days were spent fishing for the pilot bit, during which time the hole was opened to 26" at 1169'. The fish was finally washed over and recovered. Opening of 17-1/2" hole to 26" continued to 2182'. While tripping, the blocks hit the first girt above the A frame. Damage was evaluated and temporary repairs made. The 17-1/2" hole was opened to 26" from 2182' to 2626'. Repairs to the derrick were completed and the hole conditioned for casing.

Sixty-two joints of 20", 133#, K-55, 8rd ST&C casing were run and landed at 2584'. The hole was conditioned for cementing and the casing was cemented with 5,100 sacks of 14.9 ppg Permafrost II cement. The cement was preceded with 40 barrels water and displaced with two barrels water and 27 barrels mud. The cement was in place December 5, 1978, at 12:00 noon. After waiting on cement for 24 hours, the 20" casing was cut off. The casing was cemented from the top with 150 sacks of Permafrost II cement at 15 ppg through one-inch pipe run to 100'. The cement was in place December 6, 1978, at 8:00 p.m. The base plate and 20" starter head were installed and the weld tested to 750 psi.

The 20" blowout-preventer stack and choke manifold were nippled up and tested to 2,000 psi. The mud system was displaced to a KCL/Polymer system and the casing tested to 1,500 psi. The shoe was drilled and the formation tested to a 0.56 psi per foot equivalent gradient.

A 17-1/2" hole was drilled from 2626' to 8301'. Cores were cut as follows: Core No. 1, 3280' to 3308', recovered 26'; Core No. 2, 3820' to 3830', recovered 9'; Core No. 3, 5552' to 5562', recovered 9.5'; Core No. 4, 6504' to 6514', recovered 7.25'; Core No. 5, 7870' to 7880', recovered 10'. The well kicked while circulating bottoms up on a drilling break from 6096' to 6106'. The mud weight was raised to 10.1 ppg and some gas-cut salt water circulated out. Another gas kick occurred at 8091' and was circulated out without incident. Tight hole below 6514' required short tripping and washing and reaming to bottom to remove fill after trips. Sixty barrels of mud were lost to the hole while working on the blowout-preventer stack at 7641'.

At 8301', the hole was conditioned and Schlumberger wireline logs run as follows: DLL/MSFL/GR/SP; FDC/CNL/GR/CAL; BHC-Sonic/GR; HDT-Dipmeter. Forty-five sidewall cores were shot (recovered 43). Three runs were necessary to get a good FDC/CNL/GR log. The well showed signs of flowing during the logging run, and the mud weight had to be raised to 12.6 ppg.

The 13-3/8" casing was run to 8298' (204 joints, 72#, S-95, BTC). The float collar was at 8212', and FOs were at 5886', 2885', and 1493'. The casing was cemented at the shoe with 2,000 sacks of 15.8 ppg Class "G" cement (1% CFR-2, 0.25% HR-7). The FOs at 5886' and 2885' were opened and circulated. A CBL/VDL/GR/CCL log was run from 8212' to 5200'. The casing was landed with 600,000 pounds and the packoff installed and tested to 2,500 psi. The 13-3/8", 5,000 psi blowout-preventer equipment was nippled up and tested. The FOs at 1493' and 2885' were cycled and tested to 2,500 psi. The second stage of the cementing was completed through the FO at 5886' with 1,950 sacks of 14.2 ppg Class "G" cement (4% Gel, 1% CFR-2, 0.1% HR-7). The FO was closed and tested to 2,500 psi. The third stage of cementing was done through the FO at 2885' with 3,200 sacks of 14.9 ppg Permafrost II cement with 14.6 ppg returns.

At the conclusion of the third stage of cementing, the RTTS packer would not release. A free-point was run and cement found in the drill pipe at 2180'. A 2-3/8" clean-out string was run inside the 4-1/2" drill pipe and cement washed out to the bypass valve at 2849'. A free-point indicated the pipe was stuck two joints above the RTTS, and it was backed off at 2751'. The drill pipe was washed over to 2840' and the RTTS milled over from 2840' to 2855.5'. A fishing string was run, and the RTTS was jarred loose and recovered. A bit was run and cement drilled and cleaned from the casing to 3286'. The bit was run in to the top of the primary cement at 8198'. A casing scraper was then run and worked by the FO at 2885'. The FO was closed and tested to 2,500 psi. The shoe was drilled out and the formation tested to 12.4 ppg equivalent gradient.

A 12-1/4" hole was drilled to 12,549'. Cores cut in this interval were as follows: Core No. 6, from 8782' to 8810', recovered 28'; Core No. 7, from 10,472' to 10,502', recovered 30'; Core No. 8, 10,671' to 10,702', recovered 31'; Core No. 9, from 10,910' to 10,940', recovered 30'; Core

No. 10, 11,672' to 11,694', recovered 22'. While drilling, several drilling breaks with associated gas-cut mud occurred between 8810' and 9180'. The mud was built up to 12.5 ppg (formation tested to 13.5 ppg). From 10,653' to 12,549', continued problems with high torque due to overpressured and sloughing shales were encountered. While reaming back to bottom after a trip at 11,308', the top stabilizer pin twisted off and was successfully fished out of the hole.

At 12,549', a drilling break was encountered to 12,557' and while circulating samples, the well began to flow. This occurred on April 9, 1979, and no further footage was made until June 13, 1979 (66 days) while the well was being brought under control. Details of controlling the well are in the Operations History section of this report and are summarized below.

Standard procedures to control the flow were implemented. They were complicated by lost circulation to weaker zones when mud weight was raised or the annulus back pressured. After several attempts to control the well failed, a barite plug was spotted and displaced on bottom. The plug consisted of 2,073 sacks of barite, 79 sacks Q-Broxin, 10 sacks caustic, and 264 barrels of water. The slurry weight was 20.3 to 21.6 ppg, and it was displaced with 149 barrels of mud. After the plug was in place, problems with gains and losses continued. The top of the plug was tagged at 12,509' (mud weight 15.9 ppg). The mud weight was gradually raised to 16.0 ppg while circulating and a trip made.

When running back into the hole, the top of the barite plug could not be found, and a decision was made to spot a cement plug. The pipe was run in open ended to 12,557', the mud conditioned and the plug spotted as follows: 9 barrels of 17.2 ppg Sam V spacer; 175 sacks Class "G" cement containing 1% CFR-2, 0.2% HR-7; 52 sacks 18.0 ppg Barite. It was followed with one barrel of Sam V spacer and 173 barrels of mud. The top of the plug was at 12,386'. After the plug was in place, control of the well was regained, and the mud was conditioned for logging.

Schlumberger wireline logs were run as follows from 12,386' (Driller's depth) back into the 13-3/8" casing shoe at 8298': DLL/SP/GR; BHC-Sonic/GR; FDC/ CNL/GR/CAL; HDT-Dipmeter; and Velocity Survey. Sidewall cores were shot (45 shot, 13 recovered).

Casing was run to 12,385'. The string consisted of 56 joints of 9-3/4", 59.2#, S-95, BTC casing and 253 joints of 9-5/8", 53.5#, S-95 BTC casing. The float collar was at 12,302', DV at 8798', and FOs at 2999' and 2149'. One hundred sixty barrels of mud were lost while running casing, and an additional 60 lost while attempting to circulate after it was landed.

The casing was cemented in three stages. The first around the shoe consisted of 1,200 sacks of 16.5 ppg Class "G" cement (1% CFR-2, 0.2% HR-7, 0.75% Halad 22-A). The cement was displaced with no returns. The second stage was cemented through the DV at 8798' with 625 sacks of Class "G" cement (1% CFR-2, 0.2% HR-7) and the plug bumped and the DV closed with 2,000 psi. The casing slips were set with 500,000 pounds.

The 13-5/8", 5,000 psi x 11", 10,000 psi tubing head was installed and the flange tested to 5,000 psi. The 13-5/8", 10,000 psi blowout-preventer equipment, the choke manifold, and the kill line were nippled up and tested to 10,000 psi. The casing was cleaned out to 12,306' and a CBL/VDL/GR/CCL log run. The top of the first-stage cement was at 11,150', and the second-stage cement was from 8610' to 9175'. The FO at 2999' was opened and the 13-3/8" x 9-5/8" lap was tested to 750 psi with no leakoff. The third-stage cement was circulated through the FO and consisted of 300 sacks 15.2 ppg Permafrost II cement. The FO was closed and tested to 3,000 psi. The shoe and 10 feet of the cement plug was drilled out to 12,395' and the formation tested to a 17.5 ppg gradient with no leakoff.

Cement was drilled to 12,557' and 8-1/2" hole to 12,567'. The hole remained stable and a core barrel was run. Core No. 11 was cut from 12,567' to 12,597' and 30 feet were recovered. Drilling continued to 12,610' at which time a decision was made to evaluate the gas producing zone at 12,557'. A BHC-Sonic/GR log was run from 12,610' to the 9-5/8" casing shoe. Schlumberger's Repeat Formation Tester was run on a wireline, and the zone 12,543' to 12,585' was tested several times with no success. Later log analysis indicated the zone had been plugged off by barite displaced into the formation (density readings at over 3.0 gm/cc).

Drilling was resumed, and an 8-1/2" hole was drilled to 14,726'. Problems with overpressured formation and lost circulation increased with depth. Mud weights used to control increasing pore pressures were as follows: 17.0 ppg at 14,219'; 17.8 ppg at 14,622'; 18.0 ppg at 14,650'; 18.1 ppg at 14,726'. The high mud weights necessary to control downhole pressure caused mud losses into weaker upper zones and a gain/loss situation occurred. Finally, the well was stabilized with 18.3 ppg mud and conditioned for logs.

After several attempts, the following Schlumberger wireline logs were obtained from 14,726' (Driller's total depth) back into the 9-5/8" shoe at 12,385': DIL/SP/GR; BHC-Sonic/GR; FDC/CNL/GR; HDT-Dipmeter; Velocity Survey.

After logging, the hole was conditioned and a 7-5/8" liner run from 12,029' to 14,719' (63 joints, 39#, S-95, ABC-FL4S). The liner was cemented with 258 sacks of 18.5 ppg Class "G" cement (1% CFR-2, 0.5% Halad 22-A, 0.4% LWL, 35% Silica Flour, 16 lb./sack High Dense III, 0.5% No Foam Powder). It was displaced with 276 barrels of mud at 3.5 to 4 barrels per minute and the plug bumped to 3,000 psi (full returns). After the cement had set, the liner lap was tested to 3,000 psi. Drill-stem test tools were run for a negative-flow lap test and the packer set at 11,958'. The lap tested good. A Sperry-Sun Gyro Directional Survey was run. At this time the 9-5/8" x 13-3/8" annulus was Arctic Packed through the 9-5/8" FO at 2149' back to the surface. At completion of Arctic Packing, the FO was closed and tested to 3,000 psi. A cement-bond log was then run from 14,640' to 12,010', and preparations were made to drill ahead. The shoe was drilled to 14,736' and the formation tested to a 19.2 ppg equivalent gradient with no leakoff.

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A 6-1/4" hole was drilled to 20,335'. Cores cut in the interval 14,726' to 20,335' were as follows: Core No. 12, 14,846' to 14,856', recovered 9'; Core No. 13, 15,408' to 15,438', recovered 30'; Core No. 14, 16,236' to 16,261', recovered 25'; Core No. 15, 16,929' to 16,959', recovered 21'; Core No. 16, 17,134' to 17,149', recovered 11.5'; Core No. 17, 17,255' to 17,286', recovered 28'; Core No. 18, 17,858' to 17,888', recovered 30'.

A major problem below 14,719' (7-5/8" shoe) was tight-hole conditions due to key seating and bottom-hole deviation. Tight hole was encountered on trips at 17,225', 17,745' and 18,108'. While making a short trip after reaching 18,295', the pipe became stuck and was backed off at 17,605'. The fish was jarred loose and recovered, and the hole was logged as a precaution against loss of data should the hole be lost. While logging at 18,295', the FDC/CNL/GR/CAL tool was pulled off the wireline at 15,454', and was successfully fished out of the hole. After logging, problems with tight hole continued on trips between 15,100' and 15,200'. Below 19,361', difficulty was encountered in pulling off bottom to make connections. The drill string began showing the effects of working by the key seat, and a total of 54 joints had to be laid down with thin or belled boxes. On the final log run at 20,335', the BHC-Sonic/GR tool was pulled off the wireline at 15,200', but it was recovered. The Birdwell Velocity Survey tool was stuck at 15,385' and recovery attempts failed. It was left in the hole when the well was abandoned.

In the interval 14,719' to 20,335', two wireline logging runs were made. The interval from 18,295' (Driller's depth) to the 7-5/8" shoe at 14,719' was logged as follows: DIL/SP/GR; FDC/CNL/GR/CAL; BHC-Sonic/GR; Temperature Survey; HDT-Dipmeter; and Velocity Survey. As stated above, the FDC/CNL/GR/CAL tool was lost in the hole and fished out. Also, the Temperature Survey could not be run below 15,150' on two separate attempts; a final attempt reached 15,485'. The final log run, from a total depth of 20,335' back across the base of the former log run to 18,000' was as follows: DIL/SP/GR; BHC-Sonic/GR; and Velocity Survey. As stated above, the BHC-Sonic/GR tool was lost in the hole at 15,200' and recovered. The Velocity Survey tool was pulled off at 15,385', pushed to bottom, and left in the hole.

After logging at 20,335', an evaluation of drilling problems, risk of losing the hole, and objectives to be gained by drilling ahead was made. It was decided to plug and abandon the well. Plug back was as follows: Plug No. 1, 18,462' to 17,696', 120 sacks of 17.0 ppg Class "G" cement in open hole; Plug No. 2, 17,217' to 16,227', 156 sacks of 17.0 ppg Class "G" cement in open hole; Plug No. 3, 15,727' to 14,647', 243 sacks 18.9 ppg Class "G" cement across the 7-5/8" shoe; 7-5/8" EZ drill retainer set at 14,000'; Plug No. 4, 12,206' to 11,230', 200 sacks of 17.0 ppg Class "G" cement in 9-5/8" casing; 9-5/8" E-Z drill retainer at 11,200'; Plug No. 5, 2065' to 1825', 100 sacks of 14.9 ppg Permafrost cement on 9-5/8" E-Z drill retainer set at 2065'. The 9-5/8" annulus above 1800' was displaced to diesel to allow future temperature measurements by U. S. Geological Survey personnel.

The blowout-preventer equipment was nippled down, the abandonment head nippled up, and the rig released on January 7, 1980, at 6:00 a.m.

Detailed drilling information, in the form of bit records, mud summary, time analysis, and casing and cementing reports, is included in the body of the report.

Form 9-331 C
(May 1963)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved.
Budget Bureau No. 42-R1425.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

RECEIVED
ANCHORAGE DIST. OFFICE
MAY 31 1978
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

NOTICE OF INTENT TO DRILL, DEEPEN, OR PLUG BACK

1a. TYPE OF WORK: DRILL [X] DEEPEN [ ] PLUG BACK [ ]

b. TYPE OF WELL: OIL WELL [X] GAS WELL [ ] OTHER — SINGLE ZONE [ ] MULTIPLE ZONE [ ]

2. NAME OF OPERATOR: National Petroleum Reserve in Alaska through Husky Oil NPR Operations, Inc.

3. ADDRESS OF OPERATOR: 2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.*)
At surface: 2403' FSL; 1488' FEL
At proposed prod. zone: Straight Hole

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*: 39 miles southwest of Wainwright, Alaska

5. LEASE DESIGNATION AND SERIAL NO.: N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: N/A

7. UNIT AGREEMENT NAME: N/A

8. FARM OR LEASE NAME: National Petroleum Reserve in AK

9. WELL NO.: Tunalik Test Well No. 1

10. FIELD AND POOL, OR WILDCAT: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH: North Slope — 13. STATE: Alaska

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any): 38,016'

16. NO. OF ACRES IN LEASE: 23,680,000

17. NO. OF ACRES ASSIGNED TO THIS WELL: N/A

18. DISTANCE FROM PROPOSED LOCATION* TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.: 187,970'

19. PROPOSED DEPTH: 19,980' MD

20. ROTARY OR CABLE TOOLS: Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.): 80' GL, 85' Pad, 110' KB

22. APPROX. DATE WORK WILL START*: October 15, 1978

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
60"	42" Conductor	330.43#	± 110' KB	SEE
36"	30"	196.08# (X-42)	± 500' KB	DRILLING
26"	20"	133# (K-55)	± 2600' KB	PROGRAM
17 1/2"	13 3/8"	72# (S-95)	± 9000' KB	FOR
12 1/4"	9 3/4"	59.2# (S-95)		DETAILS
	9 5/8"	53.5# (S-95)	± 14900' KB	AND
8 1/2"	7 5/8" Liner	39# (S-95)	± 17650' KB	AMOUNTS
6 1/4"	5 1/2" Liner	23# (S-95)	To TD	

SEE DRILLING PROGRAM FOR DETAILED DRILLING PLAN

BOP Program:

From ± 500' to ± 2600':
29 1/2", 500 psi Annular Diverter
From ± 2600' to ± 9000':
20", 2000 psi, SRRA w/3000 psi Choke Manifold
From ± 9000' to ± 14,900':
13 5/8", 5000 psi, SRRA w/5000 psi Choke Manifold
From ± 14,900' to TD:
11", 10,000 psi, SRS-RRA w/10,000 psi Choke Manifold

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depths. Give blowout preventer program, if any.

24.

SIGNED: Max V Brewer — TITLE: Chief of Operations — DATE: 26 May 1978

(This space for Federal or State office use)

CONFORMS WITH PERTINENT PROVISIONS 30 CFR 221

APPROVED BY: Robert E. Hoff — TITLE: DISTRICT SUPERVISOR — DATE: 11/9/78

CONDITIONS OF CONCURRENCE ATTACHED

*See Instructions On Reverse Side

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well [X] gas well [ ] other

2. NAME OF OPERATOR: National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR: 2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Straight hole.

5. LEASE: N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: N/A

7. UNIT AGREEMENT NAME: N/A

8. FARM OR LEASE NAME: National Petroleum Reserve in Alaska

9. WELL NO.: Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME: Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH: North Slope 13. STATE: Alaska

14. API NO.:

15. ELEVATIONS (SHOW DF, KDB, AND WD): 80' GL; 85' Pad; 110' KB

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	[ ]		[ ]
FRACTURE TREAT	[ ]		[ ]
SHOOT OR ACIDIZE	[ ]		[ ]
REPAIR WELL	[ ]		[ ]
PULL OR ALTER CASING	[ ]		[ ]
MULTIPLE COMPLETE	[ ]		[ ]
CHANGE ZONES	[ ]		[ ]
ABANDON*	[ ]		[ ]
(other) Subsequent Report of Spud			

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

This well spudded November 10, 1978, at 7:15 AM. Hole size at spud: 17 1/2".

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED J. Max Brewer TITLE Chief of Operations DATE 22 November 78

(This space for Federal or State office use)

TITLE _____ DATE _____

Conforms with pertinent provisions of 30 CFR 221.

*See Instructions on Reverse Side

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Straight Hole

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH: North Slope | 13. STATE: Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
80' GL; 85' Pad; 110' KB

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

(other) Subsequent Notice of Running and Cementing 30" Shallow Surface Casing

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

On November 13-14, 1978, 13 joints of 30", 196.08#, X-42 casing with Vetco "ST" connectors were run and landed with the 30" float shoe at 516' KB. TD of the 36" hole was 516'. The casing was cemented with 1660 sacks of Halliburton Permafrost cement using the duplex method. The slurry weight was 14.8 ppg. Had 14.5 ppg cement returns to surface when circulation was lost. CIP at 9:15 PM, 11/13/78. Ran top job on 30" casing with 10 sacks of Permafrost cement. Nippled up 29 1/2", 500 psi Hydril and tested to 250 psi OK.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 22 November 78

(This space for Federal or State office use)

TITLE _____ DATE _____

Conforms with pertinent provisions of 30 CFR 221.

*See Instructions on Reverse Side

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well [X] gas well [ ] other Wildcat
2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)
3. ADDRESS OF OPERATOR 2525 C Street, Suite 400, Anchorage, AK 99503
4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
   AT SURFACE: 2403' FSL; 1488' FEL
   AT TOP PROD. INTERVAL:
   AT TOTAL DEPTH:

5. LEASE N/A
6. IF INDIAN, ALLOTTEE OR TRIBE NAME: N/A
7. UNIT AGREEMENT NAME N/A
8. FARM OR LEASE NAME National Petroleum Reserve in Alaska
9. WELL NO. Tunalik Test Well No. 1
10. FIELD OR WILDCAT NAME Wildcat
11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA Sec 20, T10N, R36W, UM
12. COUNTY OR PARISH North Slope
13. STATE Alaska
14. API NO.
15. ELEVATIONS (SHOW DF, KDB, AND WD) Est 80' GL; 85' Pad; 110' KB

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	[ ]		[ ]
FRACTURE TREAT	[ ]		[ ]
SHOOT OR ACIDIZE	[ ]		[ ]
REPAIR WELL	[ ]		[ ]
PULL OR ALTER CASING	[ ]		[ ]
MULTIPLE COMPLETE	[ ]		[ ]
CHANGE ZONES	[ ]		[ ]
ABANDON*	[ ]		[ ]

(other) Subsequent Report of Running and Cementing 20" Surface Casing

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

A 17 1/2" hole was drilled to 2630' and logged. Opened hole to 26" to 2626'. Ran 62 joints of 20", 133#, K-55, 8rd casing. Landed with float shoe at 2584' and duplex float collar at 2539'. Installed centralizers 10 feet above shoe, first collar above shoe, first collar above float collar, and on every other collar through the fifteenth joint (total of 9 centralizers). Cemented with 5100 sacks of Permafrost II cement at 14.9 ppg slurry weight. Had 14.9 ppg slurry weight in returns. Good returns throughout job. Cement in place at 12:00 Noon, 12/5/78. Ran 100 feet of 1" pipe down 30" X 20" annulus. Mixed and pumped 150 sacks Permafrost II cement. Cement in place at 8:00 PM, 12/6/78. Installed National NSB 20", 3000 psi landing flange and tested weld to 750 psi. Nippled up 20", 3000 psi BOP stack, choke manifold, and kill line. Tested rams to 2000 psi and Hydril to 1500 psi. Tested choke manifold to 2000 psi. Tested 20" casing to 1500 psi. Drilled out float collar and float shoe. Tested formation to .56 psi/ft gradient with no observed leak off.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 15 December 78

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

APPROVED BY [illegible] TITLE DISTRICT SUPERVISOR ACTING DATE December 19, 1978

*See Instructions on Reverse Side

17

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH:

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH North Slope | 13. STATE Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Notice of Intent to Change Plans			

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

The drilling program submitted and approved with the Notice of Intent to Drill called for setting 13 3/8" casing at ± 9000'. Conditions encountered while drilling indicate the need to set 13 3/8" at ± 8300'. Plans have been changed to accommodate drilling and hole conditions. It is now intended to set 13 3/8" casing at ± 8300'. The casing will be cemented as planned, with appropriate adjustments to placement of stage tools and cement volumes.

This change of plan was discussed with Mr. Jim Weber, and verbal concurrence received on January 23, 1978.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED J. May S. Bonner TITLE Chief of Operations DATE 2 February 79

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

APPROVED BY James Weber TITLE DISTRICT SUPERVISOR ACTING DATE 2/6/79

*See Instructions on Reverse Side

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Revised 7/14/83

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other Wildcat
2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)
3. ADDRESS OF OPERATOR 2525 C Street, Suite 400, Anchorage, AK 99503
4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
   AT SURFACE: 2403' FSL; 1488' FEL
   AT TOP PROD. INTERVAL:
   AT TOTAL DEPTH: Straight hole.
5. LEASE N/A
6. IF INDIAN, ALLOTTEE OR TRIBE NAME N/A
7. UNIT AGREEMENT NAME N/A
8. FARM OR LEASE NAME National Petroleum Reserve in Alaska
9. WELL NO. Tunalik Test Well No. 1
10. FIELD OR WILDCAT NAME Wildcat
11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA Sec 20, T10N, R36W, UM
12. COUNTY OR PARISH North Slope
13. STATE Alaska
14. API NO.
15. ELEVATIONS (SHOW DF, KDB, AND WD) 80' GL; 85' Pad; 110' KB

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

(other) Subsequent Notice of Running and Cementing 13 3/8" Casing

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

A 17 1/2" hole was drilled to 8301' and logged. After logging, the hole was conditioned for casing. Ran 204 joints of 13 3/8", 72#, S-95, BTC casing; shoe @ 8298' float collar @ 8212', FO_1 at 5886', FO_2 at 2885', FO_3 at 1493'. Centralizers were installed per drilling program (total of 35 centralizers). Total weight of string 475,000 lbs. Conditioned mud for cementing. Cemented first stage with 2000 sacks of Class "G" cement w/1% CFR-2 and 0.25%HR7 @ 15.8 ppg. Preceded cement with 20 bbls of water containing 1% Cla-Sta and followed cement with 2 bbls of water. Had full returns during job. CIP at 1:00 AM, 1/31/79. Opened FO_1 @ 5886' and conditioned mud. Closed FO_1, pulled up to FO_2 @ 2885', opened and conditioned mud. Closed FO_2 and POH. Ran CBL/VDL/GR log. Found top of good cement bond at 7,300'. Adjusted landing tension for buckling criteria and landed 13 3/8" casing w/600,000#. Nippled down 20" BOPE and installed packoff assembly. Tested packoff and flange to 2500 psi

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED _____ TITLE Chief of Operation DATE _____

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

APPROVED BY _____ TITLE _____ DATE _____

*See Instructions on Reverse Side

OK. Nippled up 13 5/8", 5000 psi BOPE. Tested rams to 5000 psi, Hydril to 2500 psi, choke manifold and kill lines to 5000 psi OK. Tripped in with shifting assembly. Tested FO_3 to 2500 psi OK. RIH to FO_2, opened, circulated bottoms up, closed and tested to 2500 psi. RIH to FO_1 @ 5886', opened FO and conditioned annulus for cementing. Cemented second stage through FO_1 with 1950 sacks of Class "G" cement w/1% CFR2 and .1% HR7 and 4% Gel @ 14.2 ppg. Preceded cement with 20 bbls of water containing 1% Cla-Sta and followed cement with 5 bbls of water. Had full returns during job. CIP at 8:00 AM, 2/4/79. Closed FO_1 and reversed out 3 bbls cement; tested FO_1 to 2500 psi OK. POH to FO_2 at 2885', opened FO_2, circulated and conditioned mud for cementing. Cemented third stage from FO_2 at 2885' to surface with 3200 sacks of permafrost cement at 14.9 ppg with 14.6 ppg returns. Preceded cement with 20 bbls of water and followed cement with 2 bbls of water. Had full returns during job. CIP at 1:00 AM, 2/5/79. RTTS would not release to close FO. Washover and milling operations were successful in releasing the RTTS, and it was removed from the well on 2/5/79. A casing scraper was worked by FO_2. Howco closing fingers were run and closed the FO on 2/17/79. Tested FO_2 to 2500 psi OK. Cleaned out cement to float collar. Tested casing to 2500 psi OK. Drilled out float collar and shoe and formation to 8311'. Tested formation to 12.4 ppg equivalent. Drilling ahead, 12 1/4" hole.

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ONSHORE DIST. OFFICE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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APR 5 1979
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Straight Hole

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T1ON, R16W, UM

12. COUNTY OR PARISH 13. STATE
North Slope, Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
80' GL; 85' Pad; 110' KB

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Change Plans - 10,000 psi BOPE			

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

The approved drilling program for this well anticipated the use of an 11", 10,000 psi SRSRRA BOP stack while drilling below the 9 5/8" casing point at ± 14,900'. Due to the equipment being available, it is now intended to use a 13 5/8", 10,000 psi SRSRRA BOP stack while drilling below 9 5/8" casing.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 4 April 79

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Robert E. Lloyd DISTRICT SUPERVISOR DATE 4/5/79

*See Instructions on Reverse Side

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ONSHORE DIST. OFFICE

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH:

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH 13. STATE
North Slope Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
80' GL; 85' Pad; 110' KB

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Set Barite Plug			

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

While drilling on 4/8/79, a drilling break was encountered from 12,549' to 12,557'. The pump was shut down and the well checked for flow with negative results. The decision was made to circulate bottoms up and check samples. While circulating, the well began to flow; but on shut in showed 0 psi on the drill pipe. Conventional well control procedures have not been effective and have been complicated by lost returns into zones open to the wellbore.

In order to control the higher pressure zone from 12,549' to 12,557', a barite plug mixed at 21 ppg and 2000' in length will be spotted from 12,557' to ± 10,557'. Drill pipe will be stripped out through the Hydril above the plug. The plug will be allowed to settle and form a seal through and above the high pressure zone. Conventional well control procedures will be used to condition the well above the plug slurry.

Continued on attached.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max V. Brewer TITLE Chief of Operations DATE 9 May 79

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Robert E. Lee DISTRICT SUPERVISOR DATE 5/11/79

*See Instructions on Reverse Side

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Sundry Notices and Reports on Wells
Tunalik Test Well No. 1
Notice of Intent to Set Barite Plug

After conditioning, pipe will be staged in to the top of the settled plug.

Additional procedures will be developed as required.

This procedure was discussed with and verbal concurrence received from Mr. Bob Goff on 4/25/79.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MAY 25 1979
CONSERVATION DIVISI
U. S. GEOLOGICAL SUR
ANCHORAGE, ALASK

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R35W, UM

12. COUNTY OR PARISH 13. STATE
North Slope Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
Pad 85'; KB 110'

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Notice of Intent to Change Plans			

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

The drilling program submitted with the Notice of Intent to Drill called for setting 9 5/8", 9 3/4" casing at ± 14,900'. Conditions encountered while drilling called for setting a Barite plug from 12,557' to 12,509'. It is now planned to set a cement plug from ± 12,509' to ± 12,300'. It is planned to set 9 5/8", 9 3/4" casing at ± 12,300'. ± 2300 feet of 9 3/4" casing will be run on bottom. The DV stage tool will be placed at ± 10,000'. However, positioning of DV tool will depend upon log data to enhance the cement fill up behind pipe. The FOs to be at ± 3000' and ± 2150'. Casing will be cemented as planned with appropriate adjustments of volumes.

A copy of the new procedure is attached.

Subsurface Safety Valve: Manu. and Type _____ Set @: _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 22 May 79

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Robert E. Hyatt TITLE DISTRICT SUPERVISOR DATE 5/25/79

*See Instructions on Reverse Side

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TUNALIK TEST WELL NO. 1
9 5/8" CASING PROCEDURE

1. 12 1/4" hole drilled to 12,557'. Barite plug 12,557' back to 12,509'. Circulate and condition hole until stable.

2. Spot a Class "G" plug from ± 12,509' to 12,300'. Volume 300 sacks Class "G", containing 1% CFR-2 and .2% HR-7. Mix weight 17.0 ppg. Mix water 3.88 gal/sk, yield 1.0 ft 3/sk. 25% excess over theoretical included. Batch mix 10 bbl 16.5 ppg SAM V spacer. Pump 9 bbls spacer, mix and pump cement. Pump 1 bbl spacer behind cement. Displace with mud, using cement unit for a balanced plug. POH.

3. WOC 12 hours.

4. Run in hole. Tag plug. Polish to ± 12,300'. Circulate and condition mud for logs. Run open hole logs as set out in the logging program and as directed by the Wellsite Geologist.

5. Trip in and condition the hole for casing. Coordinate the running and cementing of casing with the Anchorage Drilling staff, as changes in cementing and landing practices are dependent on drilling and hole conditions. Install 9 5/8" rams in BOP. Pull wear bushing. Run 9 3/4" and 9 5/8" casing as follows:

   a. Howco float shoe (9 5/8" Buttress).

   b. Two joints 9 3/4", 59.2#, S-95 with 9 5/8" Buttress T&C.

   c. Howco float collar (9 5/8" Buttress) with Howco bypass baffle installed.

   d. One joint 9 3/4", 59.2#, S-95 with 9 5/8" Buttress T&C.

   e. Howco shut off baffle.

   f. 9 3/4", 59.2#, S-95 with 9 5/8" Buttress T&C to ± 10,000'.

   g. Howco DV cementer at ± 10,000'. Positioning of DV cementer is dependent upon log data to enhance cement fill up behind pipe. (9 5/8" Buttress)

   h. 9 5/8", 53.5#, S-95 Buttress T&C casing to ± 3000'.

   i. Howco FO cementer at ± 3000' (9 5/8" Buttress).

   j. 9 5/8", 53.5#, S-95 Buttress T&C casing to ± 2150'.

   k. Howco FO cementer at ± 2150' (9 5/8" Buttress).

   l. 9 5/8", 53.5#, S-95 Buttress T&C casing to surface.

   A significant amount of the 9 5/8", 53.5# casing has an OD as much as 1/8" larger than 9 5/8". This is beyond the tolerance built into

the 9 5/8" casing slips. Caliper the OD on the casing and find at least 5 joints of 9 5/8" OD to run last for correct operation of the casing slips.

Run one centralizer on a 9 3/4" stop ring 10 feet above the shoe, on collars 1, 3, 4, and every other collar through no. 28. Run two centralizers above and below the DV and each FO. Run one centralizer on every fifth collar from the top FO to surface. This will require 32 centralizers and one 9 3/4" stop ring. Thread lock the bottom three connections and the DV collar. Use API modified Arctic grade thread compound on all other casing connections. Break circulation at the 13 3/8" shoe and every 2000' to TD.

6. Hook up cementing manifold and condition as required for cementing.

7. Cement the 9 5/8" first stage with Class "G" cement at a density of at least 1/2 ppg higher than mud weight. Cement available contains 1% CFR-2, 0.75% Halaid 22-A, 0.2% HR-7. If mixed at 15.8 ppg, yield 1.15, 5 gals water per sack. If mixed at 17.0 ppg, yield 1.0, 3.88 gals water per sack. Calculate the volume from the FDC/CNL/caliper log to bring cement top $\pm$ 300' above DV. Precede the cement with a weighted preflush. Composition and volume to be determined from pilot testing. Drop the bypass plug, mix and pump cement, drop the shut off plug. Displace with mud, using RIG pumps.

8. Bump the plug to 3000 psi. Do not over displace the calculated volume to bump the plug by more than 25 barrels. Release the pressure and check the floats. (Overage includes 15 bbls compression plus 10 bbls shoe joint safety factor.)

9. Drop the DV opening bomb. After bomb is seated, pressure up to open DV. Opening pressure should be 1100 to 1500 psi.

10. Circulate and condition through DV. Report any cement returns while circulating. Wait on cement 8 hours.

11. Cement the 9 5/8" second stage with Class "G" cement mixed as above. Precede cement with weighted spacer as above. Cement available contains 1% CFR-2 and 0.2% HR-7. If mixed at 15.8 ppg, yield 1.15 and 5 gals water per sack. If mixed at 17.0 ppg, yield 1.0 and 3.88 gals water per sack. Calculate the volume from the FDC/CNL/Caliper log to bring cement top to $\pm$ 300' above 13 3/8" shoe plus 15% excess. Drop the closing plug and displace with mud, using rig pumps. A final pressure of 1500 psi more than final displacement pressure will be required to close the sleeve. Hold pressure for 10 minutes after closing sleeve. Release pressure and check that the DV is closed. Wait on cement 24 hours.

12. Prepare to land casing. Pick up and hang off the BOP stack. Flush the slip bowl and install the casing slips. The as cemented casing load should be 502,700#. Land casing as directed by Anchorage Drilling Department. DO not use mandrel type casing hanger. Nipple down 13 5/8", 5000 psi BOP.

Tunalik Test Well No. 1
9 5/8" Casing Procedure

13. Install the packing supports and pack off. Install the 13 5/8", 5000 psi X 13 5/8", 10,000# adapter. Test the pack off and flange to 5000 psi.

14. Nipple up the 13 5/8", 10,000 psi BOP stack. Test BOP rams, choke manifold and kill lines to 10,000 psi. Test the Hydril to 5000 psi. Run the wear bushing. Be sure flare lines are clear and dry. Keep choke manifold full of 60/40 glycol and water.

15. Pick up 8 1/2" bit and drilling assembly. Strap into DV collar. Close pipe rams and test to 3000 psi with 9 5/8" X 13 3/8" annulus open. Drill out DV collar. Strap into float collar. Test casing to 3000 psi with pipe rams closed and 9 5/8" X 13 3/8" annulus open. Circulate and condition mud. POH.

16. Run a CBL/VDL/GR/CCL log from float shoe up into 9 5/8" X 13 3/8" casing lap. Use log to determine quality and height of cement in lap. If no cement in lap or no bond, the FO cementer at ± 3000' will be used to circulate cement into 9 5/8" X 13 3/8" casing annulus as per attached supplemental procedure.

17. Pick up FO shifting assembly as follows:

    a. FO cementer closing fingers.

    b. 9 5/8", 53.5# RTTS packer. (Be sure volume tube is in place.)

    c. 1 joint drill pipe.

    d. FO cementer opening fingers.

    e. Drill pipe to surface.

18. Trip in to FO at ± 2150'. Open and close FO. Set RTTS ± 50' below FO and close the pipe rams. Test the FO to 3000 psi through kill line. During this test, be sure that the 9 5/8" X 13 3/8" annulus and drill pipe are open. Check for leaks. Release pressure and open pipe rams. Unset packer, pick up and open FO. Position closing fingers ± 6 feet above FO and set the RTTS. Circulate and condition the 9 5/8" X 13 3/8" annulus.

19. If cement job through FO at 3000' not required, proceed with Arctic Pack procedure. NOTE: Arctic Pack slurry weight might need to be adjusted.

PROCEDURE FOR CEMENTING THROUGH FO AT ± 3000'

1. Pick up FO shifting assembly as follows:

   a. FO cementer closing fingers.

   b. 9 5/8", 53.5# RTTS packer. (Be sure volume tube is in place.)

   c. 1 joint drill pipe.

   d. FO cementer opening fingers.

   e. Drill pipe to surface.

2. RIH to ± 2000'. Close Hydril and open 9 5/8" X 13 3/8" annulus. Pressure the casing to 500 psi to check that FOs are closed. Release pressure and open the Hydril. Open the upper FO at ± 2150'. Close the Hydril and circulate the 9 5/8" X 13 3/8" annulus. Open Hydril and close the FO. Set the RTTS below FO and close the pipe rams. Test the FO to 3000 psi. During the test, be sure that the 9 5/8" X 13 3/8" annulus and drill pipe are open. Check for leaks. Release pressure and open pipe rams. Unseat packer and RIH to lower FO at ± 3000'.

3. Open the FO with 9 5/8" X 13 3/8" annulus open. Close the Hydril and circulate the 9 5/8" X 13 3/8" annulus and condition mud. Open Hydril and close the FO. Set the RTTS below the FO. Close the pipe rams and test the FO to 3000 psi. During the test, be sure the 9 5/8" X 13 3/8" annulus and drill pipe are open. Check for leaks. Release pressure and open pipe rams. Unset packer and reopen the lower FO. Position closing fingers ± 6 feet above the FO and set the RTTS.

4. Pump a weighted pill of appreciable volume to balance the annulus hydrostatic to equal present mud weight after water and cement in annulus.

5. Pump 5 bbls water. Mix and pump 200 sacks Permafrost cement at 14.9 ppg. Displace with mud. Leave ± 2 bbls cement in drill pipe. Close Hydril. Unseat RTTS. Close FO. Position RTTS ± 10' below FO. Reverse out excess cement. (Be sure to keep opening fingers above FO.)

6. Set RTTS ± 10' below FO. Close pipe rams and test FO to 3000 psi. Be sure drill pipe and 9 5/8" X 13 3/8" annulus are open. Watch for leaks.

7. Release RTTS. Pull up to ± 2250'. Wait on cement 12 hours. Open upper FO at ± 2150'. Condition to Arctic Pack.

ORIGINAL

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

JUN 11 1979
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH: North Slope
13. STATE: Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
Pad 85'; KB 110'

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Notice of Intent to Change Plans			

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

An evaluation of the necessity to Arctic Pack the 9 5/8" X 13 3/8" annulus from ± 2100' to surface has been made. At the present time, no necessity to Pack exists and no advantage will be gained to Pack at the present time. Should a necessity to Arctic Pack arise at the 7 5/8" liner job, upon suspension, or extended testing of the well, then the annulus will be Arctic Packed.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 8 June 79

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

APPROVED BY [illegible] TITLE DISTRICT SUPERVISOR ACTING DATE 7/23/79

*See Instructions on Reverse Side

79

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH North Slope | 13. STATE Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
GR = 80'; Pad = 85'; KB = 110'

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Subsequent Report of Running and Cementing 9 5/8" Casing			

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

RIH to 12,511' with BHA and 16.0 ppg mud. Condition on choke. POH. RIH with open ended DP to 12,557'. Circulate and condition mud. Pump 9 bbls Sam V spacer at 17.2 ppg. Mix and pump 175 sacks Class "G" cement with 1% CFR-2. 0.2% HR-7, and 52 sacks Barite. Mixed at 18.0 ppg. Pump one bbl Sam V spacer at 17.2 ppg and displaced with 173 bbls mud. CIP 5/28/79 at 5:15 PM. Pulled 5 stands and one single. Circulated 12 hours through 3" flow line with 16 ppg in, 15.9 ppg mud out, DP 800 psi; casing 80 psi. POH. RIH with BHA. Tag cement. Plug firm at 12,386'. Circulate and condition to log. Logged with GR/SP/DLL, GR/BHCS/TTI, GR/FDC/CNL/CAL, HDT Dipmeter, Velocity Survey, and Sidewall Cores. Make conditioning trip for running 9 5/8", 9 3/4" casing. Ran 56 joints 9 3/4", 59.2#, S-95 Buttress casing and 253 joints 9 5/8", 53.5#, S-95 Buttress casing. Float shoe 12,385'. Float collar 12,302'. Shut off baffle 12,265', DV cementer 8,798', FOs at 2999' and 2149'. Lost 160 bbls

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Bowser TITLE Chief of Operations DATE 20 June 79

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

APPROVED James Weber DISTRICT SUPERVISOR DATE 6/22/79
ACTING

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ONSHORE DIST. OFFICE
JUN 22 1979
CONSERVATION DIVISION
U. S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

*See Instructions on Reverse Side

mud filling annulus. Lost 60 bbls filling 9 5/8" casing, attempting to establish circulation. First stage cement job: 10 bbls 16.5 ppg Sam V spacer. Bypass plug, mix and pump 1200 sacks Class "G" cement with 1% CFR-2, 0.75% Halaid 22, 0.2% HR-7 at 16.5 ppg. Dropped shut off plug. Displaced with 230 bbls H_2O and 660 bbls mud, 16.0 ppg to 15.2 ppg. Did not bump plug. Final pressure: 1570 psi. Five-minute shut in, 1210 psi. Floats held. CIP 6/5/79 at 6:00 PM. Dropped opening plug. Open DV with 1350 psi. Pump pressure: 500 psi with no returns. Pumped 10 bbls Sam V spacer at 16.5 ppg. Mixed and pumped 625 sacks Class "G" cement with 1% CFR-2, 0.2% HR-7 at 16.5 ppg. Dropped closing plug. Displaced with 620 bbls mud. Final pump pressure: 400 psi. Bumped plug to 2000 psi. CIP 6/5/79 at 8:30 AM. Ports closed. No returns during either cement job. As-cemented hook load: 460,000#. Hung casing with 500,000# tension. Nipple down 5000 psi stack. Installed support packing and spool. Test packoff and flange to 5000 psi. Nipple up 10,000 psi BOP stack and choke manifold. Test rams, choke manifold to 10,000 psi, Hydril to 5000 psi. Pick up BHA. Drill out DV, tagged cement at 11,158'. Drilled cement to 12,306'. Test casing to 3000 psi. Ran CBL/VDL/CCL/GR Log. Top of first stage cement: 11,150'; second stage: 8610' to 9175'. Opened lower FO at 2999'. Test 13 3/8" shoe to 17.5 ppg. Circulate 300 sacks Permafrost cement at 15.2 ppg into 9 5/8" X 13 3/8" annulus. Opened FO at 2149' and circulated annulus. Picked up 8 1/2" bit. Drilled 12,306' to 12,308'. Test casing to 3,000 psi. Drilled out shoe and 10 feet of formation. Test to 19.1 ppg equivalent gradient; 1980 psi surface. After 15 minutes: 1900 psi on the surface. Drilling ahead on cement plug.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R16W, UM

12. COUNTY OR PARISH: North Slope
13. STATE: Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB AND WD)
GR = 80'; Pad = 85'; KB = 110'

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Notice of Intent to Change Plans			

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

The drilling program submitted and approved with the Notice of Intent to Drill called for setting 7 5/8" casing at ± 17,650'. Conditions encountered while drilling indicate the need to set 7 5/8" casing at ± 14,700'. It is now intended to set 7 5/8" casing at ± 14,700'. The casing will be cemented as planned, with appropriate adjustments to cement volumes.

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AUG 1 1979

CONSERVATION DIVISION
U. S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 27 July 79

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Wm James Webber DISTRICT SUPERVISOR ACTING DATE 8/1/79

*See Instructions on Reverse Side

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Revised 7/14/83

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well [X] gas well [ ] other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL, 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH: North Slope | 13. STATE: Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	[ ]		[ ]
FRACTURE TREAT	[ ]		[ ]
SHOOT OR ACIDIZE	[ ]		[ ]
REPAIR WELL	[ ]		[ ]
PULL OR ALTER CASING	[ ]		[ ]
MULTIPLE COMPLETE	[ ]		[ ]
CHANGE ZONES	[ ]		[ ]
ABANDON*	[ ]		[ ]

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

(other) Subsequent Notice of Running and Cementing 7 5/8" Liner

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

An 8 1/2" hole was drilled to 14,726' and logged with the DIL/GR/SP, FDC/CNL/GR/CAL, BHCS/GR/TTI, Dipmeter, and Velocity Survey. Ran 63 joints (2690.13') of 7 5/8" casing to 14,719.24'. Top of liner at 12,029'. Dropped ball and sheared seat at 2900 psi. Circulated and conditioned hole. Mixed 12 bbls of SAM V spacer at 18.5 ppg. Cemented with 258 sacks of Class "G" cement with 1% CFR-2, 0.5% Halad 22-A, .4% LWL, 35% silica flour, sixteen #/sack of High Dense III and 0.5% No Foam Powder with a slurry weight of 18.5 ppg. Displaced with 276 bbls mud at 3 1/2 to 4 BPM. Bumped plug with 3000 psi. CIP 8/3/79 at 11:00 AM. Had full returns throughout the whole job. Waited on cement. Tested liner lap to 3000 psi. OK. Tested BOPE to 10,000 psi. OK. Picked up Howco DST test tools. Ran a negative flow lap test to 2500 psi differential. Good test. Ran a CBL/VDL/GR from 12,010' to 14,640' with satisfactory results. Drilled landing collar and cement from 14,629' to 14,726' Drilled 10' of formation to 14,736'. Tested formation to 19.2 ppg equivalent gradient No observed leak off. Drilling ahead.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED _____ TITLE Chief of Operations DATE _____

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

TITLE DISTRICT SUPERVISOR DATE _____

*See Instructions on Reverse Side

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DEC 6 1978
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Straight hole.

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH: North Slope
13. STATE: Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
80' GL; 85' Pad; 110' KB

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Request for Variance -- Test Pressure Annular BOP			

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Item 11.a.(1) of the Conditions for Drilling Approval for this well requires that annular type BOP shall be pressure tested to 70% of the rated working pressure. Variance to test annular type BOP to 50% of rated working pressure is requested.

Testing wear to annular sealing elements from applied test pressure and required hydraulic pressure at 70% is rapid and costly. The useful life, and thus the operational reliability, of the sealing element decreases in proportion to the frequency and magnitude of applied test pressure and required hydraulic closing pressure to which it is subjected.

Testing to 50% of rated working pressure has in the past proved satisfactory, reliable, and an accepted practice.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 5 December 78

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Robert E. Lee TITLE DISTRICT SUPERVISOR DATE 12/7/78

*See Instructions on Reverse Side

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M. OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH: North Slope
13. STATE: Alaska

14. API NO.

15. ELEVATIONS (SHOW DF KDB, AND WD)
GR = 80'; Pad = 85'; KB = 110'

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Request for Variance - Test of Annular BOP			

RECEIVED
ONSHORE DIST. OFFICE
SEP 5 1979
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

The packing element on the 10,000#, 13 3/8" Cameron Type D annular type BOP will not retract wide enough to retrieve the wear bushing to allow the BOP to be tested to specifications. The system was flushed externally and internally with no results. Cameron's serviceman is being flown in to make the necessary repairs.

The packing elements will close; therefore, a variance is requested to continue drilling.

This was discussed with the USGS Conservation Division on 8/15/79.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 4 Sept 1979

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Bonny A Boudreau DISTRICT SUPERVISOR DATE Sept 5, 1979

*See Instructions on Reverse Side

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9-331-C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T1ON, R36W, UM

12. COUNTY OR PARISH: North Slope
13. STATE: Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
GR - 80'; Pad - 85'; KB - 110'

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☐
(other) Notice of Intent to Change Plans			

(NOTE: Report results of multiple completion or zone change on Form 9-330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

The original Notice of Intent to Drill indicated the proposed TVD to be 19,980'. Due to thickening geologic sequences, the objective TVD is expected to be deeper. The operator plans to continue drilling. It is expected that final TVD will be at or near 21,500'. Verbal notification to Mr. Jim Weber was given 12/12/79.

RECEIVED
ONSHORE DIST. OFFICE

DEC 19 1979

CONSERVATION DIVISION
U. S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 17 December 79

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

APPROVED BY James Weber ACTING DISTRICT SUPERVISOR DATE 12/12/79

*See Instructions on Reverse Side

36

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH: North Slope
13. STATE: Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
GR = 80'; Pad = 85'; KB = 110'

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☒		☐
(other)			

RECEIVED
ONSHORE DIST. OFFICE
JAN 16 1980
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

This is a confirming notice to abandon Tunalik Test Well No. 1. The plan was discussed with Mr. Jim Webber on 12/21/79. This well was drilled to 20,335' and logged. An earlier set of logs at 18,295' were also used in the evaluation and decision to abandon the well. The abandonment procedure is attached.

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED [signature] TITLE Chief of Operations DATE 15 January 80

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

[signature] DISTRICT SUPERVISOR DATE 1-31-80

*See Instructions on Reverse Side

TUNALIK TEST WELL NO. 1
ABANDONMENT PROCEDURE

1. Trip in with open ended drill pipe to ± 18,450'.

2. Condition mud to a uniform weight and viscosity for plugging.

3. Spot Plug No. 1, a 120-sack Class "G" plug, with 40% Silicia Flour, 0.6% Halad 22A, 1% CFR-2, 2.2% HR 12, 1.1% HR 20, mixed @ 17ppg. Mix water 4.77 gal/sack, yield 1.35 ft^3/sack. This is a 750' plug (top ± 17,700') in 6 1/4" hole. Spot a balanced plug with 5 bbls water ahead and 1 bbl water behind the cement.

4. Pull up to ± 17,200'. Condition mud at least one hole volume.

5. Spot Plug No. 2, a 156-sack, Class "G" plug, with 40% Silicia Flour, 0.6% Halad 22A, 1% CFR-2, 2.2% HR 12, 1.1% HR 20, mixed @ 17 ppg. Mix water 4.77 gal/sack, yield 1.35 ft^3/sack. This is a 990' plug (top ± 16,210') in 6 1/4" hole. Spot a balanced plug with 5 bbls water ahead and 1 bbl water behind cement.

6. Pull up to ± 15,700' and condition mud at least one hole volume.

7. Spot Plug No. 3, a 243-sack Class "G" plug, with 1% CFR-2, 0.5% Halad 22A, 35% Silicia Flour, 27% High Dense III, mixed @ 18.9 ppg. Mix water 4.09 gallon/sack, yield 1.33 ft^3/sack. This is ± 980' of 6 1/4" hole and ± 100' in 7 5/8" liner. Spot a balanced plug with 10 bbls water ahead and 2 bbls water behind cement.

8. Pull up to ± 14,250'. Condition at least one hole volume.

9. Trip out and pick up a 6 1/4" bit and 7 5/8", 39# scraper. Clean out to ± 14,100'. Circulate bottoms up. Trip out and pick up Howco E-Z Drill 7 5/8", 39# retainer on DP. Trip in and set retainer @ ± 14,000'.

10. Pull up to ± 12,200'. Condition mud.

11. Spot Plug No. 4, a 200 sack Class "G" plug, with 1% CFR-2, 0.2% HR-7, 0.75% Halad 22A, mixed at 17.0 ppg. Mix water 3.5 gal/sack, yield 1.0 ft^3/sack. This is 175' in 7 5/8" casing and 400' in 8 1/2" casing (top ± 11,625'). Spot a balanced plug with 10 bbls water ahead and 1 bbl water behind cement.

12. Pull up to ± 11,500'. Condition mud at least one hole volume.

13. Trip out and pick up 8 1/2" bit and 9 5/8", 53.5# scraper. Clean out to ± 11,250'. Circulate bottoms up and until conditioned.

14. Trip out and pick up Howco EZ Drill 9 5/8", 53.5# retainer on DP. Trip in and set retainer @ ± 11,200'.

15. Trip out, laying down 3 1/2" DP and 4 3/4" DCs and excess 4 1/2" DP. Pick up Howco 9 5/8", 53.5# E-Z Drill retainer on 4 1/2" DP. Trip in to ± 2100' (above FO at 2149') and set retainer. Pull out of retainer.

16. Reverse mud to water.

17. Spot Plug No. 5, a 100-sack Permafrost Cement plug, mixed at 14.9 ppg. Mix water 3.5 gal/sack, yield 0.95 ft^3/sack. This is a 240' plug in 9 5/8" casing. Spot a balanced plug. Displace with water.

18. Pull up to ± 1850'. Reverse out drill pipe.

19. Reverse out water with diesel. The approximate volume of 1850' of 9 5/8" casing with 4 1/2" DP in place is approximately 120 bbls. Trip out, laying down DP. DO NOT fill casing to surface. Leave ± 25' of 9 5/8" casing empty.

20. Nipple down BOP stack.

21. Rig up 4" line pipe and 11", 10,000 psi head cover and dry hole marker. Set the 4" pipe ± 10' below the surface. Put a flared wire line entry guide on the bottom of the 4".

22. Clean mud pits and release rig. Rig down for movement to Awuna Test Well No. 1. Clean location.

Information for wellhead marker:

USGS - ONPRA
Tunalik Test Well No. 1
2403' FSL, 1488' FEL
SE 1/4, SEC 20, T10N, R36W, UM

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use Form 9–331–C for such proposals.)

1. oil well ☒ gas well ☐ other

2. NAME OF OPERATOR National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR
2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (REPORT LOCATION CLEARLY. See space 17 below.)
AT SURFACE: 2403' FSL; 1488' FEL
AT TOP PROD. INTERVAL:
AT TOTAL DEPTH: Same

5. LEASE
N/A

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
N/A

7. UNIT AGREEMENT NAME
N/A

8. FARM OR LEASE NAME National Petroleum Reserve in Alaska

9. WELL NO.
Tunalik Test Well No. 1

10. FIELD OR WILDCAT NAME
Wildcat

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 20, T10N, R36W, UM

12. COUNTY OR PARISH North Slope | 13. STATE Alaska

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
GR 80'; Pad 85'; KB 110'

16. CHECK APPROPRIATE BOX TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

NOTICE OF INTENT TO:		SUBSEQUENT REPORT OF:	
TEST WATER SHUT-OFF	☐		☐
FRACTURE TREAT	☐		☐
SHOOT OR ACIDIZE	☐		☐
REPAIR WELL	☐		☐
PULL OR ALTER CASING	☐		☐
MULTIPLE COMPLETE	☐		☐
CHANGE ZONES	☐		☐
ABANDON*	☐		☒
(other)			

RECEIVED
ONSHORE DIST. OFFICE
JAN 16 1980
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

(NOTE: Report results of multiple completion or zone change on Form 9–330.)

17. DESCRIBE PROPOSED OR COMPLETED OPERATIONS (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent to this work.)*

Trip in with open ended drill pipe to 18,462'. Condition mud to a uniform weight and viscosity for plugging. Spot Plug No. 1, a 120-sack Class "G" plug, with 40% Silicia Flour, 0.6% Halad 22A, 1% CFR-2. 2.2% HR 12, 1.1% HR 20, mixed at 17 ppg. Mix water 4.77 gal/sack, yield 1.35 ft^3/sack. This is a 750' plug (top 17,696') in 6 1/4" hole. Spot a balanced plug with 5 bbls water ahead and 1 bbl water behind the cement. CIP 11:30 PM, 12/29/79. Pull up to 17,217'. Condition mud. Start Plug No. 2. Trouble getting cement. Reverse DP and start over. Spot Plug No. 2, a 156-sack, Class "G" plug, with 40% Silicia Flour, 0.6% Halad 22A, 1% CFR-2, 2.2% HR 12, 1.1% HR 20, mixed at 17 ppg. Mix water 4.77 gal/sack, yield 1.35 ft^3/sack. This is a 990' plug (top 16,227') in 6 1/4" hole. Spot a balanced plug with 5 bbls water ahead and 1 bbl water behind cement. CIP 8:00 AM, 12/30/79. Pull up to 15,727' and condition mud. Spot Plug No. 3, a 243-sack Class "G" plug, with 1% CFR-2, 0.5% Halad 22A, 35% Silicia Flour, 27% High Dense III, mixed at 18.9

Subsurface Safety Valve: Manu. and Type _____ Set @ _____ Ft.

18. I hereby certify that the foregoing is true and correct

SIGNED Max Brewer TITLE Chief of Operations DATE 16 January 80

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Barry A Bowlin DISTRICT SUPERVISOR DATE 1-31-80

*See Instructions on Reverse Side

ppg. Mix water 4.09 gallon/sack, yield 1.33 ft^3/sack. This is ± 980' of 6 1/4" hole and ± 100' in 7 5/8" liner. Spot a balanced plug with 10 bbls water ahead and 2 bbls water behind cement. Top of plug 14,647'. CIP at 2:00 PM, 12/30/79. Pull up to 14,170'. Condition mud. Trip out and pick up a 6 1/4" bit and 7 5/8", 39# scraper. Clean out to 14,076'. Circulate bottoms up. Trip out and pick up Howco E-Z Drill 7 5/8", 39# retainer on DP. Trip in and set retainer at 14,000'. Pull up to 12,206'. Condition mud. Spot Plug No. 4, a 200 sack Class "G" plug, with 1% CFR-2, 0.2% HR-7, 0.75% Halad 22A, mixed at 17.0 ppg. Mix water 3.5 gal/sack, yield 1.0 ft^3/sack. This is 175' in 7 5/8" casing and 400' in 8 1/2" casing (top 11,230'). Spot a balanced plug with 10 bbls water ahead and 1 bbl water behind cement. CIP at 1:30 AM, 1/1/80. Pull up to 11,500'. Condition mud. Trip out and pick up 8 1/2" bit and 9 5/8", 53.5# scraper. Clean out to 11,276'. Circulate bottoms up until conditioned. Trip out and pick up Howco EZ Drill 9 5/8", 53.5# retainer on DP. Trip in and set retainer 11,200'. Trip out, laying down 3 1/2" DP and 4 3/4" DCs and excess 4 1/2" DP. Pick up Howco 9 5/8", 53.5# E-Z Drill retainer on 4 1/2" DP. Trip in to 2065' (above FO at 2149') and set retainer. Pull out of retainer. Reverse mud to water. Spot Plug No. 5, a 100-sack Permafrost Cement plug, mixed at 14.9 ppg. Mix water 3.5 gal/sack, yield 0.95 ft^3/sack. This is a 240' plug in 9 5/8" casing. Spot a balanced plug. Displace with water. Top at 1825'. CIP at 12:30 PM, 1/3/80. Pull up to 1800'. Reverse out drill pipe. Reverse out water with diesel. Trip out, laying down DP. Nipple down BOP stack. Rig up 4" line pipe and 11", 10,000 psi head cover and dry hole marker. Set the 4" pipe ± 10' below the surface. Put a flared wire line entry guide on the bottom of the 4". Clean mud pits and release rig at 6:00 AM, 1/7/80. Rig down for movement to Awuna Test Well No. 1. Clean location.

Revised 7/14/83

Form 7-330 (Rev. 1-68)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (other instructions on reverse side)

Form approved. Budget Bureau No. 42-R355.5.

WELL COMPLETION OR RECOMPLETION REPORT AND LOG*

1a. TYPE OF WELL: OIL WELL [X] GAS WELL [ ] DRY [X] Other Wildcat

b. TYPE OF COMPLETION: NEW WELL [ ] WORK OVER [ ] DEEP-EN [ ] PLUG BACK [ ] DIFF. RESVR. [ ] Other

2. NAME OF OPERATOR: National Petroleum Reserve in Alaska (through Husky Oil NPR Operations, Inc.)

3. ADDRESS OF OPERATOR: 2525 C Street, Suite 400, Anchorage, AK 99503

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements)*
At surface 2403' FSL; 1488' FEL
At top prod. interval reported below
At total depth 2647' FSL; 2146' FEL

5. LEASE DESIGNATION AND SERIAL NO.: N/A
6. IF INDIAN, ALLOTTEE OR TRIBE NAME: N/A
7. UNIT AGREEMENT NAME: N/A
8. FARM OR LEASE NAME: National Petroleum Reserve in AK
9. WELL NO.: Tunalik Test Well No. 1
10. FIELD AND POOL, OR WILDCAT: Wildcat
11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec 20, T10N, R36W, UM
12. COUNTY OR PARISH: North Slope
13. STATE: Alaska

14. PERMIT NO.: N/A
DATE ISSUED: N/A

15. DATE SPUDDED	16. DATE T.D. REACHED	17. DATE COMPL. (Ready to prod.)	18. ELEVATIONS (DF, RKB, RT, GR, ETC.)*	19. ELEV. CASINGHEAD
11/10/78	12/21/79	N/A	Pad 85'; KB 110'	

20. TOTAL DEPTH, MD & TVD	21. PLUG, BACK T.D., MD & TVD	22. IF MULTIPLE COMPL., HOW MANY*	23. INTERVALS DRILLED BY	ROTARY TOOLS	CABLE TOOLS
20,211.10 TVD 20,335' MD	1800'	N/A	→	All	None

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*
N/A

25. WAS DIRECTIONAL SURVEY MADE: Yes

26. TYPE ELECTRIC AND OTHER LOGS RUN
DIL/SP, BHC-Sonic/GR, FDC/CNL/GR, HRD, Velocity Survey, Temperature Survey

27. WAS WELL CORED: Yes

28. CASING RECORD (Report all strings set in well)

CASING SIZE	WEIGHT, LB./FT.	DEPTH SET (MD)	HOLE SIZE	CEMENTING RECORD	AMOUNT PULLED
42"	330.41	106'	60"	450 Sks Permafrost	None
30"	196.08(X-47)	516'	36"	1660 Sks Permafrost	None
20"	133 (K-55)	2,584'	26"	5100 Sks Permafrost	None
13 3/8"	72 (S-95)	8,298'	17 1/2"	3950 Cl "G"/3200 Permafrost	None
9 5/8"	53.5/59.2 (S-95)	12,385'	12 1/4"	1825 Cl "G"/300 Permafrost	None

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
7 5/8"	12,029'	14,719'	258	

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)
N/A		

31. PERFORATION RECORD (Interval, size and number)
N/A

32. ACID, SHOT, FRACTURE, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
N/A	

33.* PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)	WELL STATUS (Producing or shut-in)
N/A		

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.)
N/A

TEST WITNESSED BY

35. LIST OF ATTACHMENTS
Sperry Sun Survey Tabulation; Wellbore Schematic

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records

SIGNED _____ TITLE Chief of Operations DATE _____

*(See Instructions and Spaces for Additional Data on Reverse Side)

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4/

INSTRUCTIONS

General: This form is designed for submitting a complete and correct well completion report and log on all types of lands and leases to either a Federal agency or a State agency, or both, pursuant to applicable Federal and/or State laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from, the local Federal and/or State office. See instructions on items 22 and 24, and 33, below regarding separate reports for separate completions.

If not filed prior to the time this summary record is submitted, copies of all currently available logs (drillers, geologists, sample and core analysis, all types electric, etc.), formation and pressure tests, and directional surveys, should be attached hereto, to the extent required by applicable Federal and/or State laws and regulations. All attachments should be listed on this form, see item 35.

Item 4: If there are no applicable State requirements, locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local State or Federal office for specific instructions.

Item 18: Indicate which elevation is used as reference (where not otherwise shown) for depth measurements given in other spaces on this form and in any attachments.

Items 22 and 24: If this well is completed for separate production from more than one interval zone (multiple completion), so state in item 22, and in item 24 show the producing interval, or intervals, top(s), bottom(s) and name(s) (if any) for only the interval reported in item 33. Submit a separate report (page) on this form, adequately identified, for each additional interval to be separately produced, showing the additional data pertinent to such interval.

Item 29: "Sacks Cement": Attached supplemental records for this well should show the details of any multiple stage cementing and the location of the cementing tool.

Item 33: Submit a separate completion report on this form for each interval to be separately produced. (See instruction for items 22 and 24 above.)

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37. SUMMARY OF POROUS ZONES: SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF; CORED INTERVALS; AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES, AND RECOVERIES				38. GEOLOGIC MARKERS		
FORMATION	TOP	BOTTOM	DESCRIPTION, CONTENTS, ETC.	NAME	DIL/BKB TOP MEAS. DEPTH	TRUE VERT. DEPTH
POROSITY ZONES						
Lower Cretaceous	12,516'	12,568'	Silty Sandstone with gas show, log porosity averages 10-12% with maximum estimated porosity of approximately 24%. Zone depleted and damaged during killing operations.	Torok GR/"Pebble Shale" Kuparuk/"Pebble Shale"sandstone Base "Pebble Shale" sandstone Kingak Fm Sag River Shublik Sadlerochit Gp Kavik Sh Echooka Fm Lisburne Group Volcanics Lisburne Group TOTAL DEPTH	6,243' ? 10,632' 10,902' 11,460' 13,378' 14,263' 14,520' 14,819' 15,560' 16,890 17,100' 17,570' 18,353' 20,335'	Straight Hole
DRILL STEM TESTS None						
CORED INTERVALS See Attached						

Revised 7/14/83

U.S. GOVERNMENT PRINTING OFFICE: 1983 O 683636

Revised 7/14/83

Well Completion Report
National Petroleum Reserve in Alaska
Tunalik Test Well No. 1

CORE NO.	FORMATION	INTERVAL	RECOVERED	DESCRIPTION
1	Cretaceous	3280-3308'	26.0'	Sh; Sltst and Ss; no indication of hydrocarbons.
2	Cretaceous	3820-3830'	9.0'	Sh; no indication of hydrocarbons.
3	Cretaceous	5552-5562'	9.5'	Sh and Ss; no indication of hydrocarbons.
4	Torok	6504-6514'	7.25'	Sh and Sltst; no indication of hydrocarbons.
5	Torok	7870-7880'	10.0'	Sh; no indication of hydrocarbons.
6	Torok	8782-8810'	28.0'	Sh with irregular Ss; no porosity, no indication of hydrocarbons.
7	Torok	10,472-10,502'	30.0'	Sh; no indication of hydrocarbons.
8	GR/"Pebble Shale"	10,671-10,702'	31.0'	Sh; organic. No indication of hydrocarbons.
9	Kuparuk Ss equivalent	10,910-10,940'	30.0'	Ss; hard, no porosity, no hydrocarbons.
10	L. Lower Cretaceous	11,672-11,694.5	22.5'	Sh with very thin Ss, no indication of hydrocarbons.
11	L. Lower Cretaceous	12,567-12,597'	30.0'	Sh; with thin Ss, no porosity, no indication of hydrocarbons.
12	Sadlerochit Group	14,846-14,856'	9.0'	Sh; with Slst stringers. No indication of hydrocarbons.
13	Sadlerochit Group	15,408-15,438'	30.0'	Sh; silty. No indication of hydrocarbons.
14	Kavik Sh	16,236-16,261'	25.0'	Sh; with thin Sltst laminations.

Revised 7/14/83

15	Echooka Fm	16,929-16,959'	21.0'	Sltst; hard, siliceous, no porosity. No indication of hydrocarbons.
16	Lisburne Group	17,134-17,149'	11.5'	Ls; very fine crystalline, very slight to no porosity. No indication of hydrocarbons.
17	Lisburne Group	17,255-17,286'	28.0'	Sh; very siliceous, grades to orthoquartzite. No indication of hydrocarbons.
18	Volcanics	17,858-17,888'	30.0'	Probable Andesite Flow, very fine crystalline with calcite-filled vesicles. No indication of hydrocarbons.

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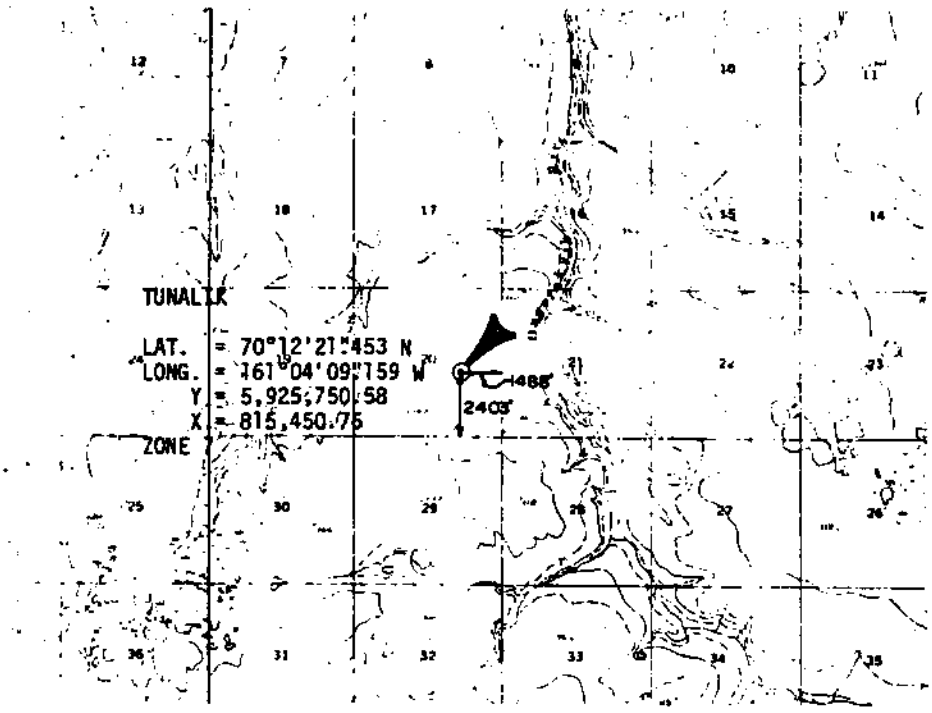


CERTIFICATE OF SURVEYOR

I hereby certify that I am properly registered and licensed to practice land surveying in the State of Alaska and that this plat represents a location survey made by me or under my supervision, and that all dimensions and other details are correct.

August 17, 1977

0 1/2 1 2

SCALE IN MILES

AS STAKED

TUNALIK

LOCATED IN

SE1/4 PROTRACTED SEC. 20 T10 N, R86 W, UMIAT MERIDIAN, AK

Surveyed for

HUSKY OIL

N. P. R. OPERATIONS INC.

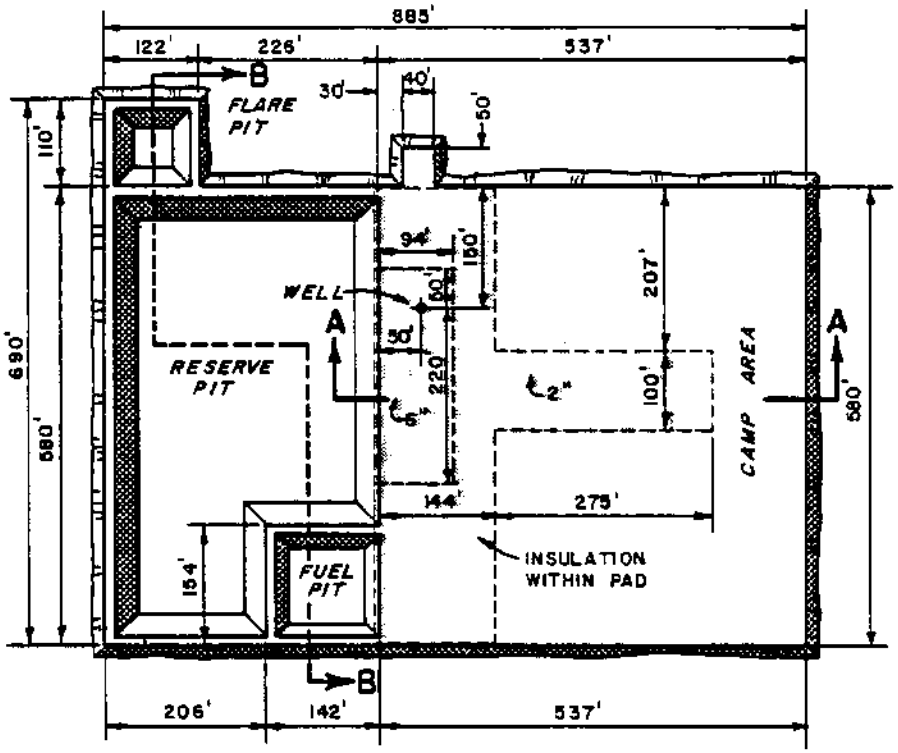
Surveyed by

Bell, Herring and Associates

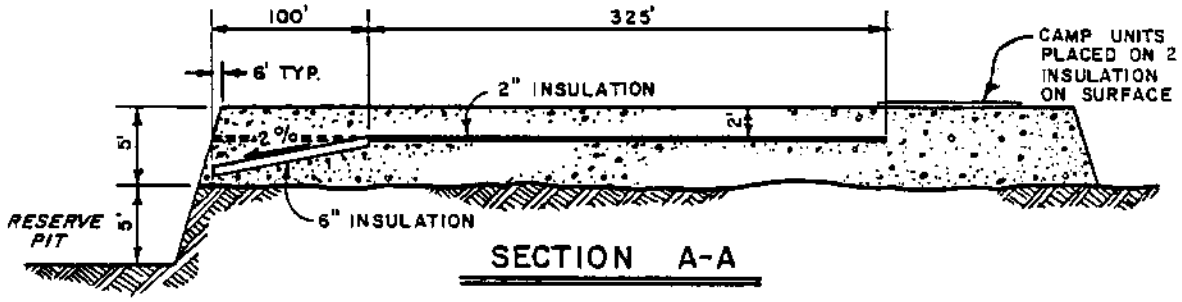
ENGINEERS AND LAND SURVEYORS

801 West Fireweed, Suite 102

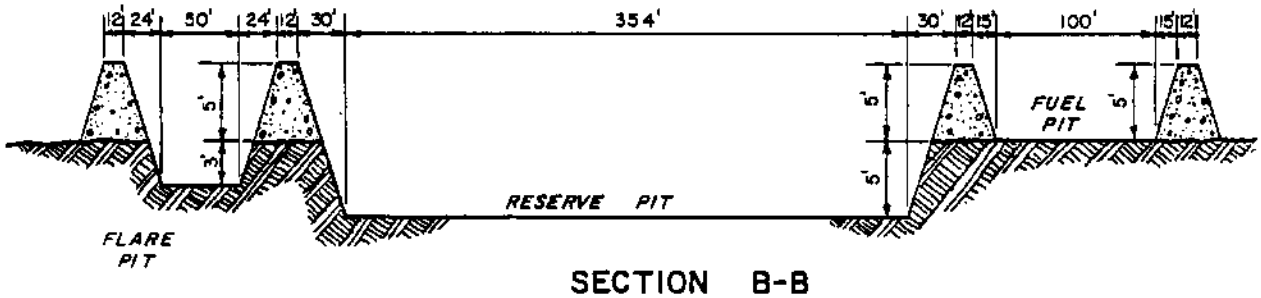
ANCHORAGE, ALASKA 99503



PLAN VIEW



SECTION A-A



SECTION B-B

TUNALIK DRILLSITE

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OPERATIONS HISTORY

DATE AND FOOTAGE DRILLED AS OF 6:00 A.M.	ACTIVITY
11/9/78	Rig-up 95 percent complete. Set 42-inch conductor at 106'. Finished rigging up floor. Checked out all surface equipment; installed rotary guard; mixed spud mud. Picked up bottom-hole assembly; circulated and checked pumps. B&G unit ready to log. Tuboscoped 27 subs, all lift nipples, and 23 joints of Heavy Wate drill pipe.
11/10/78	Rig-up 99 percent complete. Repaired mud tank. Installed line guide and shaker screens. Prepared to spud.
11/11/78 420'	Total Depth: 500'; Mud Weight: 9.2; Viscosity: 100. Completed rig-up operations. Spudded well November 10, 1978, at 7:15 a.m. Drilled to 500'; made minor rig repairs. Conditioned hole for logs; tripped out for logs. Rigged up and ran DIL/SP, and BHC-Sonic/GR.
11/12/78 13'	TD: 513'; MW: 9.3; Vis: 80. Finished logging. Picked up 26" hole opener and opened 17-1/2" hole to 26" to 513'. Tripped out; removed rotary table; stripped over rotary table. Opened 26" hole to 36" at 130'.
11/13/78 0'	TD: 513'; MW: 10.2; Vis: 80. Changed shaker screens. Opened hole to 36" to 513'. Circulated and conditioned mud. Made short trip to shoe; conditioned hole for casing. Tripped out.
11/14/78 0'	TD: 513'; MW: 9.8; Vis: 37. Removed rotary and set in false floor. Rigged up to run 30" casing; ran 13 joints (511 feet) of 30", 196.08#, X-42, Vetco ST Squnch joint casing. Tripped in with drill pipe and stinger. Circulated and conditioned for cementing. Cemented with 30 barrels of water ahead and 1,660 sacks Permafrost cement at 14.8 ppg. Had 14.5 ppg returns when circulation was lost. Fluid returns came up around matting boards. Displaced drill pipe with water. Cement in place at 9:15 p.m. Tripped out with drill pipe. Drained nipple and washed out flow line. Waited on cement eight hours. Cut off 30" casing; casing moved down the hole four feet. Prepared to weld on base flange.

11/15/78 0'	TD: 516' (depth correction). Conditioned mud. Waited on cement. Ran top job on 30" casing with ten sacks Permafrost cement. Grouted 65 sacks Permafrost cement around cellar. Waited on cement. Nippled up on 30". Corrected depth and casing-setting depth.
11/16/78 49'	TD: 565'; MW: 9.8; Vis: 37. Finished nippling up 30". Changed out shaker screens. Tested Hydril to 250 psi. Rigged up diverter lines. Tripped in with drilling assembly. Drilled ahead.
11/17/78 969'	TD: 1534'; MW: 10.1; Vis: 33. Drilled to 1024'; surveyed. Drilled to 1534'; surveyed.
11/18/78 408'	TD: 1942'; MW: 10.1; Vis: 34. Drilled to 1814'. Circulated; surveyed; tripped out. Laid down 18 joints of drill pipe. Serviced rig; repaired draw works. Tripped in; washed 30 feet; had five feet of fill. Drilled ahead.
11/19/78 533'	TD: 2475'; MW: 9.9; Vis: 37. Serviced rig and repaired pump. Drilled to 2309'; surveyed. Drilled ahead.
11/20/78 155'	TD: 2630'; MW: 9.9; Vis: 45. Drilled to 2500'; surveyed and tripped for bit. Tripped in; washed 30 feet to bottom. Drilled to 2630'; conditioned hole. Short tripped and conditioned hole for logs. Tripped out. Rigged up and ran DIL/SP, BHC-Sonic/GR logs. Rigged down logging unit
11/21/78 0'	TD: 2630'; MW: 9.8; Vis: 40. Tripped in with 26" hole opener; opened hole from 17-1/2" to 26". Lost pump pressure; checked pumps. Tripped out; lost 17-1/2" pilot bit. Tripped in with bit sub, 7-5/8" regular thread. Fished; tripped out.
11/22/78 0'	TD: 2630'; MW: 9.5; Vis: 38. Tripped in; attempted to screw onto bit. Tripped out; built 16" basket and welded onto sub. Tripped in with basket; attempted to straighten up bit. Tripped out; tripped in with stabilized bit sub. Fished for bit; tripped out. Changed to slick bottom-hole assembly. Tripped in; fished for bit.
11/23/78 0'	TD: 2630'; MW: 9.8; Vis: 37. Attempted to screw onto fish with slick bit sub assembly. Washed fish down hole to 1160'. Tripped in with 16" shoe. Attempted to straighten fish. Tripped in with impression block; block showed half-moon mark two inches from outside edge. Tripped in with 16" shoe

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with kick pad, without stabilizer. Attempted to straighten fish. Lost 3" x 8" piece of material off bottom of 16" casing. Tripped in with cup lip bit sub; attempted to screw onto fish. Tripped out with cup lip bit sub.

11/24/78
0'

TD: 2630'; MW: 9.7; Vis: 37. Tripped in with 17-1/2" bit with cones cut off. Attempted to work fish loose; shanks were worn on outside edge. Tripped with skirt on bottom of 17-1/2" bit with cones removed. Attempted to straighten fish; tripped out; bottom of skirt was flared out. Tripped in with impression block. Tripped out; impression of shank on bit.

11/25/78
0'

TD: 2630'; MW: 9.7; Vis: 37. Tripped in with 26" hole opener. Opened 17-1/2" hole to 26" from 1107' to 1157'. Tripped in with 26" bit. Opened 17-1/2" hole to 26" from 1157' to 1160'. Top of fish at 1160'. Tripped out; made up 24" rotary shoe. Tripped in; washed over fish three feet from 1160' to 1163'.

11/26/78
0'

TD: 2630'; MW: 9.8; Vis: 41. Tripped out with 24" washover shoe. Fabricated a 24" junk basket; tripped in with junk basket; attempted to work over fish. Tripped out; recovered wall cake and cavings in basket. Fingers on basket were bent one-fourth closed over face of 24". Lost two fingers, 2" x 15". Tripped with 17-1/2" bit. Washed 1160' to 1165'. Tripped out; made up 20" rotary shoe. Tripped in and attempted to wash over fish at 1165'. Tripped out; shoe worn out in tooth area. Tripped in with 26" bit to 1165'.

11/27/78
0'

TD: 2630'; MW: 9.7; Vis: 40. Circulated and conditioned hole. Tripped out. Tripped in with 24" rotary shoe; washed from 1165' to 1172'. Pulled out of hole. Tripped in with 24" rotary shoe with spring catcher welded inside to 1172'; no recovery. Fabricated rotary shoe.

11/28/78
0'

TD: 2630'; MW: 9.6; Vis: 51. Dressed 24" rotary shoe. Tripped in; washed 1165' to 1169'. Tripped out; shoe had been cutting on junk. Redressed shoe; tripped in; washed over fish at 1169'.

11/29/78
0'

TD: 2630'; MW: 9.7; Vis: 40. Washed over fish to 1172'. Tripped out; recovered fish. Tripped in with 17-1/2" bit and bottom-hole assembly; bridge at 1190'. Washed 1190' to 1326'. Tripped in to 2630';

	conditioned hole. Picked up 26" hole opener and changed bottom-hole assembly. Tripped in; cut drilling line. Opened hole to 26 inches.
11/30/78 0'	TD: 2630'; MW: 9.8; Vis: 41. Opened 17-1/2" hole to 26", 1319' to 1877'. Tripped to dress hole opener.
12/1/78 0'	TD: 2630'; MW: 9.8; Vis: 38. Tripped in; opened hole to 26". Kelly bushing pin broke; repaired. Lost 500 psi pump pressure; tripped out. Found split box on 4-1/2" drill pipe. Picked up Heavy Wate drill pipe. Tripped in to 1835'; opened hole to 2182'.
12/2/78 0'	TD: 2630'; MW: 10.1; Vis: 41. Tripped out; dressed cutters; tripped in. Blocks hit first girt above A frame; checked for damage. Tripped in; opened 17-1/2" hole to 26", 2182' to 2446'.
12/3/78 0'	TD: 2630'; MW: 10.2; Vis: 42. Opened 17-1/2" hole to 26" to 2495'. Tripped in steel-line measure. Hole opener balled up; changed cutters. Tripped in; opened hole to 2626'. Circulated and conditioned.
12/4/78 0'	TD: 2630'; MW: 10.2; Vis: 38. Tripped out to 30" shoe. Repaired derrick. Tripped in to 2626'; had three feet of fill. Conditioned hole for casing. Tripped out; rigged up to run casing. Made up 20" shoe, one joint of 20" casing, and float collar. Began running 20" casing.
12/5/78 0'	TD: 2630'; MW: 10.2; Vis: 38. Ran 62 joints of 20", 133#, K-55, 8rd, ST&C casing. Float shoe at 2584'; float collar at 2530'; centralizers as per program. Rigged down casing. Ran equipment and tripped in with stab-in tool.
12/6/78 0'	TD: 2630'; MW: 10.2 ; Vis: 38. Finished trip with stab-in tool on drill pipe. Stabbed in float collar at 2539'. Circulated 900 barrels to clean hole. Cemented with 40 barrels of water ahead of 5,100 sacks Permafrost II cement. Slurry in: 14.9 ppg; final returned slurry: 14.9 ppg. Cement in place 12/5/78 at 12:00 noon. Cleaned cellar, pits, and annulus. Waited on cement.
12/7/78 0'	TD: 2630'; MW: 8.9; Vis: 44. Waited on cement 24 hours. Slacked off 20" casing; cut 20" casing and 30" flange. Ran one-inch pipe to 100'. Mixed and pumped 150 sacks Permafrost cement at 15 ppg.

	Cement in place 12/6/78 at 8:00 p.m. Cut 20-inch; installed base plate and National head.
12/8/78 0'	TD: 2630'; MW: 8.6; Vis: 36. Welded on National head and base plate. Tested head to 750 psi. Nippled up; cemented bottom of cellar. Tested Hydril to 1,500 psi. Tested rams and choke manifold to 2,000 psi.
12/9/78 0'	TD: 2630'; MW: 8.7; Vis: 38. Set wear bushing. Picked up bottom-hole assembly and tripped in with 17-1/2" bit. Steel-line measure. Top of cement at 2536'. Displaced mud to salt/polymer system. Drilled cement to 2539'; tested casing to 1,500 psi. Drilled hard cement to shoe at 2584'; drilled out shoe and cement to 2596'. Cleaned out to 2626'; drilled on junk.
12/10/78 26'	TD: 2656'; MW: 8.7; Vis: 60. Tested formation with 0.560 psi/ft. gradient; no leakoff. Drilled to 2651'. Bit locked; tripped out. Had junk iron in cones. Leveled derrick. Ran 12-1/4" Globe junk basket. Cut junk-basket core, 2651' to 2654'. Tripped out; recovered formation; no junk. Picked up bit and monel drill collar; tripped in. Drilled ahead.
12/11/78 165'	TD: 2821'; MW: 8.8; Vis: 115. Drilled ahead.
12/12/78 196'	TD: 3017'; MW: 8.7; Vis: 41. Drilled to 2827'. Tripped out; picked up new bottom-hole assembly. Tripped in; drilled ahead.
12/13/78 263'	TD: 3280'; MW: 8.9; Vis: 57. Drilled ahead.
12/14/78 60'	TD: 3340'; MW: 8.9; Vis: 52. Drilled to 3280'. Tripped for core barrel. Tripped in; cut Core No. 1, 3280' to 3308'. Recovered 26-foot core. Tripped in; reamed 3280' to 3308'. Drilled ahead.
12/15/78 446'	TD: 3786'; MW: 9.5; Vis: 59. Drilled ahead.
12/16/78 44'	TD: 3830'; MW: 9.5; Vis: 47. Drilled to 3820'. Tripped out; tight at 3630' and 3601'. Laid down 22 joints of drill pipe and changed out three stabilizers. Tested blowout-preventer equipment. Picked up core barrel, bottom-hole assembly, and 22 joints of drill pipe with hard band. Tripped in. Cut Core No. 2, 3820' to 3830'.

12/17/78 228'	TD: 4058'; MW: 9.4; Vis: 45. Tripped out with core. Recovered nine feet. Reamed 3820' to 3830'. Drilled ahead.
12/18/78 162'	TD: 4220'; MW: 9.5; Vis: 58. Drilled to 4112'; circulated on drilling break. Drilled to 4220'; surveyed and tripped for bit. Tight hole at 3775' and 3625'. Laid down 20 joints of drill pipe and changed bottom-hole assembly. Picked up 19 joints of drill pipe. Tripped in; reamed tight hole at 3860'.
12/19/78 240'	TD: 4460'; MW: 9.6; Vis: 57. Drilled to 4235'; circulated. Drilled to 4397'; circulated. Drilled ahead.
12/20/78 141'	TD: 4601'; MW: 9.5; Vis: 55. Drilled to 4590'; tripped out. Tight at 3860', 3575', and 3100'. Tripped in; reamed bridges at 4565' and 4590'. Drilled ahead.
12/21/78 289'	TD: 4890'; MW: 9.7; Vis: 40. Drilled ahead.
12/22/78 165'	TD: 5055'; MW: 9.7; Vis: 43. Drilled to 4953'; tripped for bit. Drilled to 5044'; circulated. Drilled ahead.
12/23/78 255'	TD: 5310'; MW: 9.5; Vis: 39. Drilled to 5152'; made short trip. Drilled; repaired rig. Checked for flow at 5280'. Drilled to 5290'; circulated. Drilled ahead.
12/24/78 80'	TD: 5390'; MW: 9.5; Vis: 37. Drilled to 5321'; tripped out. Tested blowout-preventer equipment; repaired draw-works shifter. Tripped in to shoe. Replaced right-angle drive chain. Tripped in; washed 20 feet to bottom. Drilled ahead.
12/25/78 162'	TD: 5552'; MW: 9.5; Vis: 40. Drilled and made repairs to rotary chain. Repaired draw-works oiler pump. Made short trip at 5495'. Drilled to 5552'; conditioned hole for core barrel. Tripped for core barrel.
12/26/78 97'	TD: 5649'; MW: 9.4; Vis: 36. Tripped in with core barrel. Washed 30 feet to bottom. Cut Core No. 3, 5552' to 5562'. Tripped out; recovered 9-1/2 feet of core. Tripped in; reamed core hole. Drilled ahead.

12/27/78 121'	TD: 5770'; MW: 9.4; Vis: 36. Made six-stand short trip. Drilled to 5770'; lost 200 psi pump pressure. Tripped out; found hole in Heavy Wate drill pipe. Tripped in. Washed and reamed 5730' to 5770'.
12/28/78 217'	TD: 5987'; MW: 9.3; Vis: 38. Drilled; repaired rotary chain. Drilled ahead.
12/29/78 119'	TD: 6106'; MW: 9.5; Vis: 41. Drilled to 6040'; tripped for bit. Washed 20 feet to bottom. Drilled to 6092'. Repaired pump clutch. Drilled to 6096'; had drilling break, 6096' to 6106'. Checked for flow; no flow. Circulated out drilling break. Well kicked with bottoms up; shut in well. Had 125 psi on SIDPP.
12/30/78 136'	TD: 6242'; MW: 10.1; Vis: 39. Circulated out kick; raised mud weight to 9.8 ppg. Drilled 6106' to 6116'; circulated bottoms up. Drilled ahead.
12/31/78 63'	TD: 6305'; MW: 10.0; Vis: 40. Drilled to 6268'. Tripped out; tested blowout-preventer equipment. Tripped in; washed 20 feet to bottom. Drilled ahead.
1/1/79 147'	TD: 6452'; MW: 10.0; Vis: 39. Drilled to 6452'; lost 125 psi pump pressure. Checked pumps; surveyed and tripped out. Found washout box and pin 30 stands out. Tripped in.
1/2/79 62'	TD: 6514'; MW: 10.0; Vis: 39. Drilled to 6504'; tripped out. Tripped in with core barrel. Cut Core No. 4, 6504' to 6514'. Recovered 7-1/4 foot core.
1/3/79 107'	TD: 6621'; MW: 10; Vis: 39. Laid down core barrel; changed bottom-hole assembly. Tripped in; washed 40 feet to bottom. Reamed core hole; checked rig for level. Drilled ahead.
1/4/79 83'	TD: 6704'; MW: 10; Vis: 41. Drilled and repaired rotary chain. Had drilling break, 6683' to 6688'. Checked for flow; no flow. Tripped for bit. Washed and reamed to bottom; had six feet of fill. Drilled ahead.
1/5/79 145'	TD: 6849'; MW: 10.1; Vis: 42. Drilled ahead.
1/6/79 57'	TD: 6906'; MW: 10.1; Vis: 40. Drilled to 6858'; tripped out. Tested blowout-preventer equipment; tripped in. Drilled ahead.
1/7/79 132'	TD: 7038'; MW: 10.1; Vis: 39. Drilled ahead.

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1/8/79 82'	TD: 7120'; MW: 10.1; Vis: 43. Drilled to 7045'. Tripped for bit. Repaired oil leak in compound. Tripped in; drilled to 7120'. Made short trip.
1/9/79 105'	TD: 7225'; MW: 10.2; Vis: 42. Short tripped 15 stands. Drilled; repaired pump and draw works. Drilled ahead.
1/10/79 56'	TD: 7281'; MW: 10.3; Vis: 45. Drilled to 7225'. Tripped for bit. Drilled 7225' to 7281'; drilled ahead.
1/11/79 111'	TD: 7392'; MW: 10.3; Vis: 47. Drilled ahead.
1/12/79 44'	TD: 7436'; MW: 10.3; Vis: 44. Drilled to 7395'; tripped for bit. Changed out jars and shock sub. Drilled to 7436'; lost pump pressure. Tripped out; found bit jet missing. Changed bit; tripped in.
1/13/79 77'	TD: 7513'; MW: 10.4; Vis: 48. Ran in hole; changed gauges on iron roughneck. Reamed and washed 12 feet of fill. Drilled; serviced rig; drilled. Leveled rig; drilled ahead.
1/14/79 117'	TD: 7630'; MW: 10.5; Vis: 52. Drilled; short tripped 18 stands. Reamed and washed 30 feet with three feet of fill. Drilled; repaired master clutch; changed wash pipe. Drilled ahead.
1/15/79 11'	TD: 7641'; MW: 10.5; Vis : 47. Drilled to 7641'; tripped out. Attempted to test blowout-preventer equipment; test plug leaked. Attempted to pull test plug.
1/16/79 0'	TD: 7641'; MW: 10.5; Vis: 47. Cut test plug out of Braden head. Nippled up and checked blowout preventer; installed wear bushing. Picked up and changed bottom-hole assembly; tripped in, steel-line measured.
1/17/79 112'	TD: 7753'; MW: 10.6; Vis: 51. Ran in hole; steel-line measure correction +6.72 feet. Reamed 70 feet to bottom with 25 feet of fill. Drilled; serviced rig; drilled. Short tripped 18 stands at 7737'. Drilled ahead.
1/18/79 117'	TD: 7870'; MW: 10.6+; Vis: 52. Drilled to 7870'. Surveyed. Tripped out for core barrel.

1/19/79 10'	TD: 7880'; MW: 10.7; Vis: 52. Finished trip out; picked up core barrel. Tripped in to shoe; cut 96 feet of drilling line. Serviced rig. Tripped in; circulated. Cut Core No. 5, 7870' to 7880'. Tripped out; laid down core. Recovered 10 feet. Laid down core barrel. Tested blowout-preventer equipment; repaired air line to draw works. Tripped in.
1/20/79 155'	TD: 8035'; MW: 10.7; Vis: 45. Reamed core hole, 7870' to 7880'. Drilled; serviced rig; drilled. Checked for flow at 7910', 7950', and 8110'. Made short trip.
1/21/79 100'	TD: 8135'; MW: 11.3; Vis: 55. Drilled ahead. Background gas increased 1,200 to 1,600 units. Had 3,000 units at bottoms up. Serviced rig. Drilled; increased mud weight, 10.8 to 11 ppg. Had gas kick at 8091'. Mud cut to 10.1 ppg, with 3,000 units gas. No shut-in pressure. Circulated and raised mud weight to 11.1+ ppg. Gas stabilized with 1,500 units background gas. Drilled with two-foot drilling break at 8096' to 8098'. Increased mud weight to 11.3 ppg. Drilled ahead.
1/22/79 16'	TD: 8151'; MW: 11.5; Vis: 58. Drilled to 8138'; surveyed; pulled out of hole. Serviced rig; changed bit. Ran in hole; washed 20 feet of fill to bottom. Circulated bottoms up. Drilled one-half hour; circulated through choke and gas buster. Drilled ahead.
1/23/79 98'	TD: 8249'; MW: 11.7; Vis: 49. Drilled ahead; serviced rig. Drilled ahead.
1/24/79 52'	TD: 8301'; MW: 12.3; Vis: 65. Drilled; checked gas detector. Serviced rig; drilled ahead. Circulated and conditioned mud. Final mud check: 12.3 ppg out. Background gas: 500 units. Made wiper trip to shoe.
1/25/79 0'	TD: 8301'; MW: 12.4; Vis: 55. Circulated bottoms up; surveyed; serviced rig. Pulled out of hole; steel-line measured; no correction. Rigged up Schlumberger unit; logging measure: 8302'. Ran MSFL/DLL/GR/SP, and GR/BHC-Sonic.
1/26/79 0'	TD: 8301'; MW: 12.6; Vis: 55. Ran FDC/CNL/GR/CAL; tool failed. Ran BHC-Sonic 8294' to 2581'. Started in hole with Dipmeter; well started bubbling. Rigged down logging tools; ran in hole with bit and bottom-hole assembly. Circulated bottoms up; shut well in. Slowed gas-cut mud. Put on choke and gas buster; circulated out kick.

56

1/27/79
0'

TD: 8301'; MW: 12.6; Vis: 55. Circulated and conditioned mud. Mud weight: 12.6 ppg in; 12.5 ppg out. Carried 225 units of gas. Pulled out of hole; rigged up logging unit. Reran FDC/CNL/GR/Cal. Ran Dipmeter, 8300' to 2584'. Shot 45 sidewall cores.

1/28/79
0'

TD: 8301'; MW: 12.7; Vis: 55. Completed sidewall cores, recovered 43 of 45. Ran in hole; circulated; pulled out of hole to shoe. Strung 12 lines; ran in hole; circulated to run casing.

1/29/79
0'

TD: 8301'; MW: 12.7; Vis: 60. Circulated; pulled out of hole to Heavy Wate drill pipe. Serviced rig; repaired brakes. Pulled out of hole; laid down stabilizers. Pulled wear bushing; changed rams. Rigged up to run casing. Made up casing shoe and float collar. Began running 13-3/8" casing.

1/30/79
0'

TD: 8301'; MW: 12.7; Vis: 50. Completed running 13-3/8" casing. Ran total of 204 joints. Shoe at 8298'; float collar at 8212'; FOs at 5886', 2885', and 1493'. Weight of casing string: 475,000 pounds. Circulated 13-3/8" casing.

1/31/79
0'

TD: 8301'; MW: 12.5; Vis: 50. Made up shifting assembly. Tripped in and tagged float collar at 8212'. Made up circulating head and stabbed into float collar. Circulated bottoms up. Cemented Stage No. 1 with 2,000 sacks Class "G" containing 1% CFR-2 and 2.5% HR-7; 15.8 ppg slurry. Slurry volume: 410 barrels. Preceded cement with 20 barrels water containing 1% Cla-Sta. Displaced with two barrels water and 107 barrels mud. Cement in place at 1:00 a.m. Final pressure: 450 psi at 2 BPM. Picked up 14 stands to FO at 5886'. Opened FO and set RTTS; closed bypass. Circulated 4-1/2 BPM at 450 psi. Circulated out contaminated mud in 20 minutes at 1,200 strokes. Had contamination for two hours. Conditioned hole.

2/1/79
0'

TD: 8301'; MW: 12.4; Vis: 48. Conditioned mud through FO at 5886'; closed FO. Opened middle FO at 2885'; opened FO. Conditioned mud; closed FO. Tripped out and laid down shifting assembly. Rigged up to log. Ran CBL/VDL/GR/CCL.

2/2/79
0'

TD: 8301; MW: 12.4; Vis: 48. Log showed good cement bond to 7300'; top of cement at 6900'. Nippled down blowout-preventer equipment and hung off. Picked up casing to 600,000 pounds with 15"

stretch. Set casing slips with 600,000 pounds. Rough cut 13-3/8" casing; dressed stub and installed packoff and 20" x 13-3/8" casing spool. Tested packoff to 2,500 psi. Nippled down blowout-preventer equipment.

2/3/79
0'

TD: 8301'; MW: 12.4; Vis: 48. Installed 20", 2,000 psi x 13-5/8", 5,000 psi casing spool and three drilling spools with choke and kill lines six inches above top of cellar. Installed ram blowout preventer and annular blowout preventer with 16-inch drilling nipple and strip-o-matic. Made up test plug and prepared to test blowout-preventer equipment.

2/4/79
0'

TD: 8301'; MW: 12.1; Vis: 46. Nippled up and tested blowout-preventer equipment; installed wear bushing. Picked up Howco shifting assembly. Steel-line measured to top FO at 1493'; shifted and tested to 2,500 psi. Steel-line measured to FO at 2885'; shifted and tested to 2,500 psi. Steel-line measured to 5886'. Opened FO and broke circulation. Closed FO and tested to 2,500 psi; opened FO and conditioned mud. Had 900 units gas on bottoms up. Conditioned mud; mixed 20 barrels of water with 1% by volume Cla-Sta; mixed second-stage cement job.

2/5/79
0'

TD: 8301'; MW: 12.1; Vis: 46. Cemented with 1,950 sacks Class "G" with 4% Gel, 1% CFR-2, and 0.1% HR-7; slurry weight: 14.2 ppg. Cement in place at 8:00 a.m. Closed FO; reversed out three barrels cement; tested FO to 2,500 psi. Pulled out of hole to middle FO at 2885'. Opened FO; circulated and conditioned mud. Had cement contamination; dumped 50 barrels of mud. Had contaminated mud with bottoms up second time, indicating cement coming up hole. Circulated and waited on cement until 11:00 p.m. Mixed and pumped 3,200 sacks Permafrost cement, 14.9 ppg with 14.6 ppg returns. Displaced cement; left three barrels in drill pipe. Cement in place at 1:00 a.m. Attempted to release RTTS to close FO; tool would not move down hole; released tool and picked up 20-foot tool set. Attempted to release tool.

2/6/79
0'

TD: 8301'; MW: 11.4; Vis: 39. Attempted to free 13-3/8" RTTS tool; would not come free. Opened FO at 2885'; bled pressure off 4-1/2" drill pipe. Rigged up and ran Dia-Log inside drill pipe. Tool took weight at 2040'; worked down to 2180'. Pulled out of hole with tool. Rigged up to run 2-7/8" tubing inside 4-1/2" drill pipe.

58

2/7/79
0'

TD: 8301'; MW: 11.1; Vis: 37. Rigged up to pick up 2-3/8" tubing to wash out inside of 4-1/2" drill pipe. Rigged up Dia-Log; ran in hole; free to 2180'. Pulled out of hole; ran in hole with string shot. Backed off at 2160'; circulated and conditioned mud. Pulled out of hole with drill pipe. Changed out casing over-shot to 3" sub. Ran in hole; screwed into drill pipe. Inspected and measured 2-3/8" tubing. Ran in hole with 2-3/8", three-blade mill to 1525'; circulated; ran in hole. Washed to 2080'.

2/8/79
0'

TD: 8301'; MW: 10.5; Vis: 32. Cleaned cement out of drill pipe with 2-3/8" tubing to bypass valve at 2849'. Washed 2080' to 2540'; drilled 2540' to 2849'. Circulated; laid down tubing.

2/9/79
0'

TD: 8301'; MW: 10.6; Vis: 33. Finished laying down 2-3/8" tubing. Ran Dia-Log free-point indicator. First joint up from RTTS was stuck; second joint up partly stuck; third joint up was free. Backed off three joints drill pipe up from RTTS at 2751'. Circulated and conditioned to balance mud. Pulled out of hole; laid down three joints of Heavy Wate drill pipe. Picked up Tri State 12-1/8" washover shoe and four joints of 10-3/4" washover pipe. Ran in hole to 2485'; washed from 2485' to 2630'. Washed soft to firm cement, 2630' to 2715.

2/10/79
0'

TD: 8301'; MW: 11.1; Vis: 46. Washed firm cement from 2715' to 2751', top of 5" Heavy Wate. Washed and milled 2751' to 2777'. Sides of tool joints and wear pads cut by mill; stopped cutting on second tool joint. Pulled out of hole; changed shoe; ran in hole. Washed and milled 2777' to 2780'.

2/11/79
0'

TD: 8301'; MW: 11; Vis: 45. Washed over 5" Heavy Wate drill pipe from 2780' to 2845'; FO fingers at 2840'. Tripped out; picked up 12-1/4" diamond washover shoe and one foot of 11-3/4" wash pipe. Ran in hole; worked over top of fish; washed to 2845'; milled 2845' to 2850'.

2/12/79
0'

TD: 8301'; MW: 11; Vis: 42. Milled over RTTS from 2850' to 2854'. Tripped out to inspect milling shoe; changed out same. Tripped in. Milled on RTTS, 2854' to 2855'.

2/13/79
0'

TD: 8301'; MW: 10.9; Vis: 40. Milled over RTTS, 2855' to 2855.5'. Pulled out of hole; laid down washover shoe. Pulled wear bushing; tested blowout preventers. Installed wear bushing; ran in hole.

2/14/79 0'	TD: 8301' MW: 10.8; Vis: 43. Ran in hole with washover shoe; milled over RTTS tools.
2/15/79 0'	TD: 8301'; MW: 10.8; Vis: 43. Milled over RTTS. Washed over string while torquing up. Pulled out of hole; picked up overshot with 10-5/8" jars, bumper jars, and accelerator jars. Ran in hole; worked over fish with overshot. Jarred fish loose; pulled out of hole. One finger gone on FO closing tool; five pieces on top held down slips. Laid down fish and fishing tools. Picked up 12-1/4" bit; ran in hole; bridge at 2858'.
2/16/79 0'	TD: 8301'; MW: 11.3; Vis: 48. Drilled cement, 2861' to 2900'; had soft cement 2900' to 2950' and light stringer, 2950' to 2975'. Circulated; ran in hole to 3077'; drilled 3077' to 3093'. Ran in hole to 3273'. Drilled bridge, 3275' to 3286'; ran in hole to 5900'; broke circulation. Ran in hole; top of cement at 8198'. Drilled 8198' to 8199'; circulated and conditioned mud. Dumped 400 barrels spoiled mud; cleaned pits and built volume. Pulled out of hole; recovered seven pounds of junk. Made up 12-1/4" circulating junk basket.
2/17/79 0'	TD: 8301'; MW: 11.4; Vis: 38. Tripped in with reverse basket to 8199'. Dropped ball; failed to circulate. Tripped out wet; recovered ball. Made up 13-3/8" casing scraper to 2885'; worked by FO. Pulled out of hole; picked up Howco closing fingers. Tripped in; checked FO at 1493'. Closed FO at 2885'. Pulled out of hole; picked up RTTS and closing fingers. Tripped in to 2885'; prepared to test FO.
2/18/79 0'	TD: 8301'; MW: 11.4; Vis: 48. Tested FO to 2,500 psi. Tripped in with reverse basket. Cut three-foot cement junk core, 8199' to 8202'. Pulled out of hole; recovered core; no junk. Tripped in to 8202'; tested casing to 2,500 psi. Drilled cement, 8202' to 8212'; retested casing to 2,500 psi. Drilled float collar and cement to 8298'; drilled on shoe.
2/19/79 84'	TD: 8385'; MW: 11.3; Vis: 44. Drilled shoe and conditioned mud. Drilled to 8311'. Tested formation to 12.4 ppg equivalent; mud weight OK. Drilled to 8385'. Pulled out of hole; steel-line measured; magnafluxed bottom-hole assembly.
2/20/79 100'	TD: 8485'; MW: 11.3; Vis: 48. Pulled out of hole; inspected bottom-hole assembly. Made three-foot steel-line measured correction. Found four bad drill collars, one sub, and one stabilizer. Tested

	blowout-preventer equipment; changed rubber on pipe rams. Ran in hole; washed 60 feet to bottom. Drilled ahead.
2/21/79 227'	TD: 8712'; MW: 11.4; Vis: 44. Drilled; serviced rig; drilled ahead.
2/22/79 88'	TD: 8800'; MW: 11.4; Vis: 55. Drilled; serviced rig. Drilled to 8782'; circulated bottoms up; surveyed. Pulled out of hole to pick up core barrel; ran in hole.
2/23/79 77'	TD: 8877'; MW: 11.5; Vis: 45. Cut Core No. 6, 8782' to 8810'. Pulled out of hole; recovered 28-foot core. Ran in hole with bottom-hole assembly; cut drilling line. Ran in hole; reamed core hole. Drilled; circulated out drilling break, 8842' to 8852'. Drilled ahead.
2/24/79 170'	TD: 9047'; MW: 12; Vis: 45. Drilled; circulated sample at 8948'. Drilling break, 8883' to 8892'; 800 units of gas-cut mud, 11.5 to 10.9 ppg. Drilling break, 8929' to 8941'; 14 units of gas-cut mud, 11.8 to 10.8 ppg. Drilling break, 8976' to 8980'; 700 units of gas-cut mud, 12 to 11.8 ppg.
2/25/79 133'	TD: 9180'; MW: 12.5; Vis: 47. Drilled; serviced rig; drilled; surveyed. Pulled out of hole.
2/26/79 132'	TD: 9312'; MW: 12.5; Vis: 57. Ran in with bottom-hole assembly; ran leak-off test to 13.5 ppg. Ran in hole; worked on clutch; serviced rig; ran in hole. Drilled 9180' to 9298'. Drilled ahead.
2/27/79 179'	TD: 9491'; MW: 12.5; Vis: 45. Drilled; serviced rig; drilled; surveyed. Pulled out of hole; tested blowout preventers.
2/28/79 166'	TD: 9657'; MW: 12.7; Vis: 47. Ran in hole; serviced rig; drilled ahead.
3/1/79 175'	TD: 9832'; MW: 12.7; Vis: 45. Drilled 9657' to 9821'; serviced rig. Packed swivel; drilled ahead.
3/2/79 106'	TD: 9938'; MW: 12.7; Vis: 48. Drilled to 9840'; tripped for bit. Tripped in; reamed 50 feet to bottom. Drilled ahead.
3/3/79 130'	TD: 10,068'; MW: 12.7; Vis: 60. Drilled from 9938' to 10,068'; surveyed; tripped for bit.

3/4/79 150'	TD: 10,218'; MW: 12.5; Vis: 56. Tripped in with bit. Reamed 50 feet to bottom; drilled ahead.
3/5/79 98'	TD: 10,316'; MW: 12.7; Vis: 49. Drilled to 10,228'; circulated and conditioned mud. Checked for flow; drilled to 10,260;. Repaired goose-neck union on swivel. Drilled to 10,316'; tripped out.
3/6/79 124'	TD: 10,440'; MW: 12.7; Vis: 53. Serviced rig; drilled to 10,440'.
3/7/79 32'	TD: 10,472'; MW: 12.5; Vis: 48. Drilled to 10,472'; changed pumps and surface equipment. Pulled out of hole, looking for washout. Laid down two drill collars; tested blowout-preventer equipment. Picked up core barrel; changed out jars and shock sub; inspected bottom-hole assembly. Ran in hole with core barrel.
3/8/79 30'	TD: 10,502'; MW: 13; Vis: 40. Ran in hole with core barrel. Cut Core No. 7, 10,472' to 10,502'. Circulated and conditioned mud; gas to 1,900 units; mud cut to 11.8 ppg. Pulled out of hole; laid down core. Recovered 30-foot core. Ran in hole.
3/9/79 100'	TD: 10,602'; MW: 13; Vis: 45. Ran in hole; reamed rat hole. Drilled to 10,602'; serviced rig.
3/10/79 50'	TD: 10,652'; MW: 13.0; Vis: 42. Drilled to 10,614'; tripped for bit. Tested formation to 14.58 ppg equivalent mud weight. Reamed 50 feet to bottom; drilled ahead.
3/11/79 33'	TD: 10,685'; MW: 13; Vis: 45. Drilled to 10,653'; washed and reamed to reduce torque. Drilled to 10,685'; prepared to core.
3/12/79 17'	TD: 10,702'; MW: 13; Vis: 45. Cut Core No. 8, 10,671' to 10,702'. Pulled out of hole; recovered 31-foot core. Serviced rig; picked up 8" drill collars; ran in hole to shoe. Changed out traveling blocks.
3/13/79 53'	TD: 10,755'; MW: 13; Vis: 45. Ran in hole; reamed 8-1/2" rat hole to 10,702'. Serviced rig; drilled ahead.
3/14/79 114'	TD: 10,869'; MW: 13; Vis: 48. Drilled; serviced rig; drilled.
3/15/79 41'	TD: 10,910'; MW: 13; Vis: 48. Drilled; circulated drilling break, 10,905' to 10,910'; surveyed. Pulled out of hole to core; tested

	blowout-preventer equipment; picked up core barrel. Ran in hole with bottom-hole assembly; cut drilling line. Ran in hole; circulated; dropped ball.
3/16/79 31'	TD: 10,941'; MW: 13; Vis: 48. Cut Core No. 9, 10,910' to 10,940'; pulled out of hole. Recovered 30-foot core. Secured rig; ran in hole; reamed core hole. Drilled ahead.
3/17/79 14'	TD: 10,955'; MW: 13; Vis: 48. Drilled to 10,955'; had torque problem. Picked up to ream; would not ream below 10,946'. Tripped for bit. Tripped in; hit bridge, 10,835' to 10,890'. Reamed 10,890' to 10,941'.
3/18/79 38'	TD: 10,993'; MW: 13.1; Vis: 50. Reamed 10,941' to 10,955'. Pulled out of hole; recovered bit bearings in junk basket with two jammed in bit. Ran in hole to shoe; cut 96 feet off drilling line. Drilled ahead.
3/19/79 85'	TD: 11,078'; MW: 13.2; Vis: 48. Drilled; serviced rig; surveyed. Pulled out of hole; changed bit, shock sub, and stabilizer blades.
3/20/79 3'	TD: 11,081'; MW: 13.2; Vis: 47. Changed blades on two stabilizers. Repaired iron roughneck. Ran in hole to 8250'; changed traveling blocks; circulated; repaired rotary clutch. Ran in hole; reamed 10,955' to 11,078'. Drilled ahead.
3/21/79 61'	TD: 11,142'; MW: 13.2; Vis: 45. Drilled; serviced rig. Drilled; surveyed.
3/22/79 75'	TD: 11,217'; MW: 13.2; Vis: 46. Pulled out of hole; changed bits. Ran in hole; reamed, 11,040' to 11,142'. Drilled ahead.
3/23/79 34'	TD: 11,251'; MW: 13.2; Vis: 56. Drilled; serviced rig. Drilled; surveyed; pulled out of hole. Tested blowout-preventer equipment. Ran in hole to shoe; cut drilling line; ran in hole. Washed and reamed at 11,176'.
3/24/79 57'	TD: 11,308'; MW: 13.3; Vis: 45. Washed and reamed 11,176' to 11,251'. Drilled; changed weight indicator; serviced rig; surveyed. Pulled out of hole; changed bit; picked up roller reamer; ran in hole.
3/25/79 0'	TD: 11,308'; MW: 13.3; Vis: 52. Ran in hole to 11,242'; washed and reamed to 11,280'; twisted off. Pulled out of hole; pin broke on top stabilizer. Made

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	up 10-5/8" overshot with 8" grapple and control. Ran in hole; fished at 11,180'. Pulled out of hole; recovered fish. Inspected bottom-hole assembly.
3/26/79 26'	TD: 11,334'; MW: 13.2; Vis: 47. Inspected bottom-hole assembly. Ran in hole to shoe; cut drilling line. Ran in hole to 11,079'; washed and reamed 11,079' to 11,308'. Drilled ahead.
3/27/79 100'	TD: 11,434'; MW: 13.2; Vis: 47. Drilled; serviced rig; drilled.
3/28/79 50'	TD: 11,484'; MW: 13.2; Vis: 46. Drilled to 11,460'; circulated bottoms up. Pulled out of hole; changed bits and bottom-hole assembly. Ran in hole; washed and reamed 60 feet to bottom. Drilled ahead.
3/29/79 135'	TD: 11,619'; MW: 13.2; Vis: 48. Drilled; serviced rig; drilled ahead.
3/30/79 59'	TD: 11,678'; MW: 13.2; Vis: 49. Drilled; serviced rig. Drilled; circulated; surveyed. Pulled out of hole; picked up 60' core barrel. Ran in hole; circulated; dropped ball. Prepared to core.
3/31/79 16'	TD: 11,694'; MW: 13.3; Vis: 46. Cut Core No. 10, 11,672' to 11,694'. Core barrel jammed. Pulled out of hole; laid down core. Recovered 22 feet. Tested blowout-preventer equipment; picked up bit and new roller reamer. Ran in hole to shoe; cut drilling line. Ran in hole; reamed from 11,580' to 11,672'. Reamed core hole.
4/1/79 44'	TD: 11,738'; MW: 13.3; Vis: 43. Drilled; tripped for bit; drilled ahead.
4/2/79 120'	TD: 11,858'; MW: 13.4; Vis: 54. Drilled; serviced rig. Drilled; repaired rig; drilled ahead.
4/3/79 133'	TD: 11,991'; MW: 13.3; Vis: 51. Drilled; serviced rig; drilled ahead.
4/4/79 84'	TD: 12,075'; MW: 13.3; Vis: 50. Drilled; serviced rig. Drilled; surveyed. Pulled out of hole; changed out roller reamer.
4/5/79 120'	TD: 12,195'; MW: 13.4; Vis: 55. Ran in hole; broke circulation at 8150'. Drilled; serviced rig. Drilled ahead.
4/6/79 122'	TD: 12,317'; MW: 13.5; Vis: 49. Drilled, serviced rig. Drilled.

4/7/79 111'	TD: 12,428'; MW: 13.5; Vis: 49. Drilled; serviced rig. Drilled; short tripped 10 stands.
4/8/79 112'	TD: 12,540'; MW: 13.5; Vis: 44. Finished short trip; changed shaker screens. Drilled; serviced rig; drilled ahead.
4/9/79 17'	TD: 12,557'; MW: 14.5; Vis: 50. Drilled to 12,557'. Checked for flow. Started circulating bottoms up; had gain in flow half way from bottoms up. Shut well in. Had 100 psi on casing; 0 psi on drill pipe. Circulated through choke; raised mud weight to 14.5 ppg.
4/10/79 0'	TD: 12,557'; MW: 15; Vis: 50. Finished pumping 14.5 ppg mud through choke; pumped total of 19,000 strokes. Shut well in; 480 psi on casing, 0 psi on drill pipe. Opened fill-up line; watched for flow through drill pipe; well started to flow. Shut in drill pipe after 10 minutes; 50 psi on drill pipe. Increased mud weight to 14.8; pumped, holding 1,200 psi on drill pipe. Started losing mud. Dropped pressure to 1,180 psi on drill pipe. Pumped 20,000 strokes; returns were 14.7 ppg. Casing pressure dropped to 300 psi while pumping. Shut well in. Drill-pipe pressure: 180 psi; casing pressure: 400 psi. Lost 100 barrels of mud; increased mud weight to 15 ppg. Pumped at 31 SPM, holding 850 psi on drill pipe and 480 psi on casing. Total of 10,800 strokes pumped.
4/11/79 0'	TD: 12,557'; MW: 15.1; Vis: 52. Pumped 15 ppg mud through choke at 31 strokes per minute. Total of 18,000 strokes pumped. Shut well in. Drill-pipe pressure: 0 psi; casing pressure: 600 psi, increased to 700 psi in one hour. Started to pump dry gas at surface. Bled gas to burn pit. Pumped 15 ppg mud at 30 strokes per minute. Tried to keep 850 to 880 psi on drill pipe. Pumped 20,000 strokes; mud 15.0 ppg in, 15 ppg out. Shut well in. Drill-pipe pressure: 0 psi; casing pressure: 600 psi. Built mud volume and 15.1 ppg mud weight in pits. Changed liners in pump to five-inch; worked on charge pumps. Pumped 15.1 ppg mud through choke.
4/12/79 0'	TD: 12,557'; MW: 15.2; Vis: 55. Circulated 15.1 ppg mud through choke at 48 SPM; held 800 psi on drill pipe for 35,000 strokes. Initial casing pressure: 800 psi; went down to 430 psi. Lost approximately 25 barrels of mud. Shut well in for one hour to repair choke lines. Casing pressure: 390 psi; built to 590 psi. Bled off dry gas; pressure dropped to 190 psi.

Circulated 15.2 ppg mud; 800 psi on drill pipe. Pumped 10 barrels to displace dry gas. Maximum casing pressure: 630 psi; 26,000 strokes. Minimum casing pressure: 400 psi; 22,000 strokes. No mud loss.

4/13/79
0'

TD: 12,557'; MW: 15.2; Vis: 54. Increased drill-pipe pressure to 900 psi, casing pressure to 500 psi. Circulated total of 25,000 strokes at 48 strokes per minute. Casing pressure averaged 400 to 450 psi. Mud weight in: 15.2; mud weight out: 14.6 to 14.7 ppg. No mud loss. Increased drill-pipe pressure to 1,000 psi; increased casing pressure to 450 psi. Circulated total of 25,000 strokes. Maximum pressure on casing: 490 psi; averaged 440 psi; final: 415 psi. Mud: 15.2 ppg in; 14.6 ppg out. No loss. Increased drill-pipe pressure to 1,100 psi, casing pressure 520 psi, pumped 300 strokes. Formation broke down. Lost 20 barrels. Drill-pipe pressure 800 psi, casing pressure 290 psi with partial returns. Hole in premix tank; back off on choke, 720 psi on drill pipe, 300 psi on casing with full returns, 15.2 ppg in, 15.1 ppg out. Total mud loss 200 barrels, 16,567 strokes.

4/14/79
0'

TD: 12,557'; MW: 15.2; Vis: 55. Attempted to bring drill pipe to 800 psi, with casing pressure at 420 psi. Would not hold. Reduced drill-pipe pressure to 650 psi; maximum circulation on casing: 400 psi; minimum: 190 psi. Mud weight in: 15.2 ppg; mud weight out: 15.1 to 14.4 ppg. Lost 60 barrels mud on circulation. Increased drill-pipe pressure to 720 psi; casing pressure: 300 psi (maximum 420). Mud weight in: 15.2 ppg; mud weight out: 13.5 to 14.9 ppg. Held 710 psi on drill pipe; casing: 310 psi. Mud weight out: 14.6 ppg; no mud loss.

4/15/79
0'

TD: 12,557'; MW: 15.3; Vis: 55. Finished circulating out at 48 SPM. Drill-pipe pressure: 720 psi; casing pressure: 300 to 310 psi. Mud weight in: 15.2 ppg; mud weight out: 14 ppg at choke; 14.7 ppg behind degasser. No mud loss at 28,000 strokes; increased pump strokes to 55 SPM. Maintained drill-pipe pressure of 1,020 to 1,040 psi. Casing started at 300 psi; finished at 210 psi. Mud weight in: 15.3 ppg; at choke: 14.2 ppg; behind degasser: 14.7 ppg. Lost 21 barrels of mud after 28,000 strokes. Recirculated drill-pipe pressure: 1,020 to 1,040 psi; casing pressure: 210 psi. Mud at choke: 14.6 ppg; behind degasser: 14.9 ppg. Five barrels mud lost on circulation. Total 28,000 strokes. Maintained choke one-half open on circulation. Started new circulation; 5,000 strokes pumped.

66

4/16/79
0'

TD: 12,557'; MW: 15.4; Vis: 56. First circulation: 55 SPM; drill pipe: 1,040 psi; casing: 220 psi. Mud weight in: 15.3 ppg; mud weight out at choke: 14.6 ppg; at degasser: 14.9 ppg. Pumped 28,000 strokes with five barrels mud lost. Second circulation: mud weight in: 15.4 ppg; drill-pipe pressure: 1,040 psi; casing started at 240 psi; maximum: 300 psi; minimum 130 psi. Lost 20 barrels mud. Mud weight out at choke: 14.6 ppg; at degasser: 15.4 ppg. Pumped 28,000 strokes. Third circulation: drill-pipe pressure: 1,040 psi; casing: 140 psi; maximum: 220 psi; minimum: 130 psi. Mud weight in: 15.4 ppg; mud weight out at choke: 14.9 ppg; at degasser: 15 ppg. No mud loss with 29,000 strokes.

4/17/79
0'

TD: 12,557'; MW: 15.6; Vis: 56. Increased mud weight to 15.5 ppg. Circulated, maintained drill-pipe pressure at 1,040 psi; casing pressure: 240 psi maximum; 130 psi minimum. Mud weight at choke: 14.5 to 14.8 ppg. Pumped 28,000 strokes with choke half open. Recirculated. Drill-pipe pressure: 1,060 psi; casing pressure: 190 psi maximum; 130 psi minimum. Mud weight in: 15.6 ppg; at choke: 14.6 to 14.7 ppg; choke three-fourths open. No mud loss.

4/18/79
0'

TD: 12,557'; MW: 15.6; Vis: 58. Circulated out with 55 strokes; drill-pipe pressure: 1,050 psi; casing pressure: 120 psi. Mud weight in: 15.6 ppg; mud weight out: 15 ppg behind degasser. Recirculated; increased drill-pipe pressure to 1,070 psi; casing pressure started at 130 psi and increased to 210 psi during circulation. No change in mud weight. Shut well in one-half hour; casing pressure built from 240 to 290 psi. Attempted new circulation rate; shut well in for one hour and checked pumps. Casing pressure: 140 to 240 psi. Attempted new circulation rate; shut well in for one hour and checked pumps. Casing pressure: 140 to 240 psi; started circulator at 38 strokes. Drill-pipe pressure: 620 psi; casing pressure: 150 psi. Maximum pressure on drill pipe: 740 psi; casing pressure: 260 psi. Started losing mud. Pumped with 24 strokes. Drill-pipe pressure: 300 psi; casing pressure: 60 psi; total mud loss: 200 barrels.

4/19/79
0'

TD: 12,557'; MW: 15.6; Vis: 55. Opened Hydril; worked pipe; no drag. Circulated for 15 minutes; closed Hydril and put mud through choke. Circulated with 55 strokes; 690 psi on drill pipe; 110 to 180 psi on casing. Pumped 28,000 strokes; opened choke. Increased strokes to 60 psi. Drill-pipe pressure: 880

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psi; casing pressure: 110 to 150 psi. Mud weight out: 14.7 ppg; took pit gain of 38 barrels. Put mud back through. Pumped 55 strokes; drill-pipe pressure: 660 psi; casing pressure: 180 psi. Mud weight in: 15.6 ppg; behind degasser: 14.6 ppg.

4/20/79
0'

TD: 12,557'; MW: 15.6; Vis: 54. Put No. 2 pump on well with five-inch liners. Checked over Pump No. 1. Established circulation rate with 5,000 strokes. Drill-pipe pressure increased 910 psi to 1,000 psi. Casing pressure decreased from 250 psi to 150 psi at 65 strokes per minute. Mud weight returns increased 14.6 to 15.4 ppg, taking mud loss. Decreased pump to 38 strokes per minute. Casing pressure: 40 psi; drill-pipe pressure: 300 psi. Opened Hydril; lost returns. Pumped 45 barrels for total of 125 barrels of water in annulus; stabilized for one hour. Well started to flow. Pumped 20 barrels per hour; had 33 barrels per hour returns. Started heading up. Put well on choke; started pumping at 40 SPM. Drill-pipe pressure: 110 psi; casing pressure: 620 psi with 23,000 strokes pumped.

4/21/79
0'

TD: 12,557'; MW: 15.4; Vis: 48. Checked surface equipment. Shut well in at 280 psi. Built 10 psi every 10 minutes; bled off to 280 psi; established circulation rate with 15.2 ppg mud. Pumped 590 psi on drill pipe; pressure increased to 900 psi on drill pipe. Continued to circulate with No. 2 pump. Drill-pipe pressure at 12:00 noon: 920 psi; casing pressure: 320 psi. Drill-pipe pressure at 8:00 p.m. 1,130 psi; casing pressure: 520 psi. Mud weight in: 15.2 ppg; mud weight behind degasser: 14.9 ppg; mud weight at choke: 13 ppg. Drill-pipe pressure at 10:00 p.m.: 1,140 psi; pressure on casing: 490 psi. Increased mud weight to 15.4 ppg; circulated 15.4 ppg mud. Starting pressure on drill pipe: 1,140 psi; pressure on casing: 480 psi. Reduced drill-pipe pressure to 1,000 psi for 2,500 strokes; casing pressure dropped to 440 psi. Held drill-pipe pressure at 1,000 psi; casing pressure lowered to 310 psi with 23,500 strokes. Mud weight in: 15.4 ppg; mud weight at choke: 14.2 ppg; mud weight at degasser: 15.2 ppg.

4/22/79
0'

TD: 12,557'; MW: 15.4; Vis: 50. Maintained 1,000 psi on drill pipe; casing pressure: 310 psi. Lost No. 2 pump at 8:00 a.m. Shut well in 11 minutes. Casing pressure: 375 to 390 psi. Started circulating with No. 1 pump. Drill-pipe pressure: 1,070 psi; casing pressure: 390 psi. Drill-pipe pressure: 1,040 psi; casing pressure: 300 psi. Lost six barrels per hour. Switched to No. 2 pump at 12:00 noon.

Drill-pipe pressure: 1,030 psi; casing pressure: 310 psi. Mud weight in: 15.4 ppg; mud weight behind degasser: 15.3 ppg; mud weight at choke: 14.6 ppg. Drill-pipe pressure: 980 to 1,000 psi. Formation took fluid if casing pressure exceeded 310 psi. Lost 194 barrels of mud in 24 hours. Installed adjustable choke and standby panel for super choke.

4/23/79
0'

TD: 12,557'; MW: 15.4; Vis: 50. Circulated 57 SPM with 15.4 ppg mud. Maintained drill-pipe pressure at 1,000 psi. Had 15.2 ppg returned behind degasser, 14.5 to 14.7 ppg at choke. Casing pressure: 300 to 200 psi. Increased drill-pipe pressure to 1,040 psi; casing pressure: 290 to 330 psi. Mud weight in: 15.4 ppg; mud weight behind degasser: 15.3 ppg; mud weight in choke: 14.4 ppg. Lost 11 barrels of mud in 24 hours. Background gas: 1,000 to 1,150 units.

4/24/79
0'

TD: 12,557'; MW: 15.4; Vis: 55. Stopped circulating at 7:45 a.m.; opened choke; bled off casing pressure for 12 minutes. Filled annulus with 25 barrels mud; pumped 480 strokes to fill drill pipe; circulated 620 barrels of mud; gained 35 barrels of mud in pit. Put well on choke; circulated out drill pipe. Minimum pressure: 600 psi; maximum pressure: 920 psi; casing pressure: 450 psi. Closed well in to repair pumps and gauges; shut in 30 minutes. Casing pressure increased 140 psi to 230 psi. Circulated; lost 341 barrels of mud in 24 hours. Circulated drill pipe with 700 psi; casing with 240 psi. Mud weight in: 15.4 ppg; mud weight out at degasser: 15.2 ppg; mud weight out at choke: 14.4 ppg.

4/25/79
0'

TD: 12,557'; MW: 15.4; Vis: 50. Circulated 15.4 ppg mud. Increased drill-pipe pressure from 700 to 830 psi with maximum casing pressure of 340 psi. Lost mud at 10-17 BPH. Reduced drill-pipe pressure to 710 psi, casing pressure 160-190 psi, mud loss 15-20 barrels per hour. Reduced drill-pipe pressure to reduce mud loss. Drill-pipe pressure: 570 psi; casing pressure: 120 psi. Began increasing drill-pipe pressure with hole taking mud. Took pit gain; increased backpressure to control pit gain. Drill-pipe pressure: 680 psi; casing pressure: 290 psi. Circulated out gas bubble.

4/26/79
0'

TD: 12,557'; MW: 15.4; Vis: 80. Circulated through choke with 15.4 ppg mud at 56 SPM. Slowly increased drill-pipe pressure to 830 psi; hole started taking mud at 8 BPH. Reduced casing pressure and loss reduced. Circulated with 800 psi on drill pipe and 200 psi on casing. Total mud loss in 24 hours: 75 barrels. Rigged up to spot barite plug.

4/27/79
0'

TD: 12,557'; MW: 15.4; Vis: 50. Circulated through choke with 15.4 ppg in, 14.9 to 15.1 ppg out. Drill-pipe pressure increased to 1,010 psi. Started to lose mud at 20 BPH; reduced drill-pipe pressure to reduce loss. Circulated with 920 psi on drill pipe, 160 psi on casing. Set back kelly; picked up one joint of drill pipe with head pin. Rigged up lines to pump barite plug. Blew 2,073 sacks barite into Howco bulk tanks. Mixed 79 sacks Q-Broxin and 10 sacks caustic into extra tank with 264 barrels H_2O to mix barite plug. Lost 136 barrels mud in the last 24 hours.

4/28/79
0'

TD: 12,557'; MW: 15.2; Vis: 55. Mixed and pumped 50 sacks barite to reserve pit for equipment check. Slurry weight: 20.5 ppg. Mixed 2,073 sacks barite at 20.3-21.6 ppg; displaced with 149 barrels mud. Plug in place at 9:30 a.m. Pulled out of hole four stands with Hydril closed. Opened Hydril; pulled seven stands. Total of 11 stands and one single out. Hole became tight. Picked up kelly; waited on barite plug to settle. Watched well; no flow. At 12:00 noon, washed and worked four joints out with kelly. Took 27-barrel pit gain while circulating through choke. Lost returns; opened Hydril. Pumped 31 barrels H_2O into annulus to fill hole. Pumped total of 61 barrels to keep hole full. At 9:30 p.m. had slight flow. At 10:30 p.m. had flow of 2 BPH. At 12:00 midnight, had flow of 3 BPH. Shut well in; kept casing bleed off to 110 psi. At 4:00 a.m., circulated through choke at 31 SPM; had 480 psi on drill pipe, 80 psi on casing. At 5:30 a.m., opened Hydril. At 6:00 a.m., circulated 15.2 ppg in, 15.4 ppg out with bag open. Circulated with no loss or gain.

4/29/79
0'

TD: 12,557'; MW: 15.3; Vis: 55. Circulated through choke, opened Hydril when gas returns decreased. Circulated with Hydril open. At 8:00 p.m., gas-cut mud went to 8 ppg; closed Hydril. Opened Hydril at 10:00 p.m. and increased rate to 50 SPM. Drill-pipe pressure: 980 psi. Began adding aluminum stearate for foam. At 4:00 a.m. circulated 50 SPM; 15.3 ppg in, 13.0 ppg out. No gain or loss with drill-pipe pressure at 1,210 psi. At 5:00 a.m., 15.3 ppg in, 14.7 ppg out with 3,000 units gas. At 5:30 a.m., 15.3 ppg in, 14.9 ppg out with 3,200 units gas. At 6:00 a.m., 15.4 ppg in, 14.9 ppg out. Total losses last 24 hours: 43 barrels. Pipe free; worked pipe while circulating with bit at 11,413'.

4/30/79
0'

TD: 12,557'; MW: 15.4; Vis: 58. Circulated with Hydril open at 50 SPM; 1,230 psi on drill pipe.

Increased mud weight to 15.4 ppg. Losses increased; cut mud weight to 15.3 ppg. Increased pump rate at 8:00 a.m. to 60 SPM; had 1,800 psi on drill pipe at 2,250 units of gas. At 11:00 a.m.: 70 SPM, 2,360 psi, 3,050 units of gas. At 6:30 p.m.: 77 SPM, 2,740 psi, 2,400 units gas. At 7:30 p.m.: 79 SPM, 2,800 psi, 2,250 units of gas. Washed and reamed to 11,508'; circulated bottoms up; ran in hole four stands; no fill. Bit at 11,882'. Circulated at 79 SPM, 2,930 psi. Started losing mud; reduced to 76 SPM. Rotated to 11,922'; circulated bottoms up, with 2,550 to 2,900 units of gas. At 1:30 a.m. ran in hole three stands; no fill; bit at 12,163'. Circulated and rotated to 12,203'; hole clean. Circulated at 78 SPM, 2,900 psi, 2,300 units gas; no loss or gain. Mud weight increased slowly to 15.4 ppg out. At 5:00 a.m. ran in hole three stands; no fill. Bit at 12,443'; circulated and rotated. Bit started to take weight at 12,499'. At 6:00 a.m. began slowly washing away. Lost 64 barrels of mud during last 24 hours.

5/1/79
0'

TD: 12,557'; MW: 15.1; Vis: 56. Washed to 12,509', top of plug. Circulated bottoms up; lost complete returns. Pulled out of hole 14 stands; filled annulus with water (27 barrels). After four hours, circulated through tight spots, laying down singles. Pulled out of hole two stands; could not circulate. Worked pipe, with bit at 10,821'. Well started to flow slowly. Returns 13.5 ppg; increased to 15.1 ppg at shaker. Pumped at 30 SPM; 700 psi drill-pipe pressure at 5:00 a.m. Pumped 25,000 strokes; had gained 15 barrels. Mud in: 15.2; mud out: 15.2; stopped pump. Well flowed slowly. Shut in with 0 psi on casing; 0 psi on drill pipe. Opened Hydril, gained 11 barrels in 15 minutes. Circulated through choke with 110 psi on casing. At 5:30 a.m. had six barrels gain in 10 minutes. Total gain: 43 barrels. At 6:00 a.m. increased back pressure to 180 psi; circulated through choke. Bit at 10,821'.

5/2/79
0'

TD: 12,557'; MW: 15.2; Vis: 55. Circulated through choke.

TIME	DP	CSG	SPM	MW (IN)	MW (OUT)	CHOKE
0630	1180	280	37	15.2	15.2	111
1030	1095	260	40	15.4	14.2	103
1430	1090	255	39	15.2	15.0	112
2000	1150	305	41	15.1	15.0	100
0230	1100	200	41	15.2	14.9	75
0600	1155	250	40	15.2	14.9	75

5/3/79
0'

TD: 12,557'; MW: 15.4; Vis: 60. Circulated with choke open at 45 SPM; drill-pipe pressure: 1,460-1,480 psi; casing averaging 150 psi. Total gain during circulation: 40 barrels. Shut in for one hour; drill-pipe pressure: 0 psi; casing pressure: 150 psi, built to 315 psi in one hour. Bled off casing to 135 psi; gained three barrels. Circulated; held back-pressure with choke at 45 SPM. Attempted to regulate by holding volume. At end of circulation, drill-pipe pressure: 1,540 psi; casing pressure: 285 psi. Circulated while opening choke and increasing pump rate. Pumped at 65 SPM; drill-pipe pressure: 1,620 psi; casing pressure: 205 psi, with five to six barrels per hour loss. Total gain 53 barrels last 24 hours. Appeared to be regaining lost fluid, gas cut.

5/4/79
0'

TD: 12,557'; MW: 15.2; Vis: 60. Opened Hydril; attempted to circulate through flow line. Gas kicked mud out of hole at surface. Closed Hydril. Circulated through choke; increased pump rate and opened choke until full open. Drill-pipe pressure: 1,790 psi; casing pressure: 190 psi. Showed small gain in pits. Opened three-inch straight through on manifold and closed choke. Drill-pipe pressure: 1,770 psi; casing pressure 170 psi. Had small gain. Reduced mud weight, 15.4 ppg to 15.2 ppg. At 6:00 a.m. drill-pipe pressure: 1,740 psi; casing pressure: 180 psi at 50 SPM. Gained 34 barrels last 24 hours.

5/5/79
0'

TD: 12,557'; MW: 15.2; Vis: 58. Circulated through open choke. Adjusted pumps to compensate for pit gain of gas-cut mud. Gained 58 barrels last 24 hours.

SPM	DP	CSG	GAIN/LOSS
53	2140	180	1-2 BPH Loss
47	1640	150-160	5-6 BPH Gain
48	1620	150	BPH Gain

5/6/79
0'

TD: 12,557'; MW: 15.2; Vis: 58. Adjusted pump rate to control gain. Had total gain of 108 barrels last 24 hours.

SPM	DP	CSG	GAIN (BBLS/HR)
50	1620	170	+5
55	1945	200	-2 1/2
51	1700	185	+2
45	1180	160	+1 to +5

5/7/79
0'

TD: 12,557'; MW: 15.2; Vis: 52. Circulated through full open choke at 11:00 p.m. Opened three-inch and closed choke. Gained 58 barrels in 24 hours.

SPM	DP	CSG	CHOKE
45	1430	160	
42	1320	160	15.2 in; 14.3 to 14.4 out
55	2400	220	
60	2280	100	Three-inch flow line
60	2330	110	15.2 in; 14.0 to 14.3 out

5/8/79
0'

TD: 12,557'; MW: 15.2; Vis: 52.

SPM	DP	CSG	CHOKE
60	2360	90	Circ thru 3" w/choke closed
60	2400	100	Circ thru 3" w/choke closed
58	2340	100	Circ thru 3" w/choke closed
58	2320	110	Circ thru 3" w/choke closed
56	2190	105	Circ thru 3" and open choke
56	2220	100	Circ thru 3" and open choke
56	2200	100	Circ thru 3" and open choke

3:00 p.m. Shut-in one hour, casing pressure from 110 to 240 psi, drill pipe from 100 to 120(?) psi, closed 3" line, started circulating through 3/4" open choke with 40 psi at 56 strokes per minute, drill-pipe pressure 2,240 psi, casing pressure 280 psi.

6:00 p.m. Choke fully open, drill-pipe pressure 2,280 psi, casing pressure 275 psi.

5/9/79
0'

TD: 12,557'; MW: 15.3; Vis: 44. Circulated through choke at 56 SPM; had 12.2 ppg mud returns. Stopped pump; let well flow one minute; shut in well. Opened fill-up line. Casing pressure built from 200 to 300 psi in 45 minutes; had very small stream from drill pipe. Circulated and built mud weight to 15.3 ppg through open choke. Opened three-inch; circulated. Opened Hydril; gas kicked over bell nipple from surface expansion. Closed Hydril; circulated through three-inch and full open choke at 6:00 a.m. SPM: 39; drill-pipe pressure: 920 psi; casing pressure: 95 psi. Gained five barrels. Gained 107 barrels last 24 hours.

5/10/79
0'

TD: 12,557'; MW: 15.3; Vis: 45. Circulated 15.3 ppg mud through three-inch and full-open choke at 34 SPM. Well showed gain for 1,000 to 2,000 strokes, then showed loss indicating gas heading. Drill-pipe pressure: 820 psi; maximum 880 psi, minimum 650 psi.

73

Casing pressure: 70 psi; maximum 90 psi, minimum 60 psi. Mud weight in: 15.3 ppg; mud weight out: 14.3 ppg. Had 124-barrel gain last 24 hours. Third circulation since last attempting to open Hydril.

5/11/79
0'

TD: 12,557'; MW: 15.3; Vis: 46. Made circulation with 60 SPM; 15.3 ppg mud. Lost 17-1/2 barrels mud. Drill-pipe minimum pressure: 2,660 psi, maximum pressure: 2,810 psi. Casing pressure 100 to 190 psi. Shut down well; bled down in 20 minutes. Filled annulus; opened Hydril; pumped three barrels mud. Caught up with circulation; circulated with 2,000 strokes at 34 SPM; took 45-barrel gain. Put well on three-inch and open choke. Lost gain and well stabilized. Made two circulations with 60 strokes per minute. Drill-pipe pressure: 2,890 psi; casing pressure: 95 psi. Shut three-inch and made circulation through open choke at 62 SPM. Drill-pipe pressure: 3,180 psi; casing pressure: 235 psi; fell off to 170 psi. Lost 27 barrels of mud; mud in: 15.3 ppg; mud out: 14.1 to 14.2 ppg. Opened Hydril; circulated through fill-up line. Lost 121 barrels of mud in 24 hours.

5/12/79
0'

TD: 12,557'; MW: 15.6; Vis: 48. Closed Hydril.

MW (IN)	SPM	DP (PSI)	CSG (PSI)
15.4	55	2260	80
15.5	55(?)	2390	100
15.5	34	660 to 670	60 to 80
15.6	65	3080	150
15.6(?)	46	1590	80

Closed three-inch line on choke manifold. Circulated 15.6 ppg mud on choke; held 150 psi back pressure. Drill-pipe pressure: 1,610 psi; 46 SPM. Lost three to five barrels mud per 1,000 strokes. Mud: 14.4 ppg out. Gained 34 barrels mud in past 24 hours.

5/13/79
0'

TD: 12,557'; MW: 15.6; Vis: 44. Circulated 15.6 ppg mud at 46 SPM. Maintained casing pressure at 160 psi. Drill-pipe pressure increased 1,560 to 1,880 psi. Recirculation maintained drill-pipe pressure at 1,980 psi at 9,000 strokes; pressure increased to 2,150 psi. Finished circulation; drill-pipe pressure at 2,180 psi; casing pressure at 90 psi. Mud weight: 13.7 ppg out. Recirculation maintained drill-pipe pressure at 2,420 psi with 15,000 strokes pumped. Started taking gain in pits. Closed choke to 1/2" to stabilize gain. Casing pressure increased to 280 psi; lost one barrel mud on circulating. Recirculated; maintained drill-pipe pressure at 2,480 psi with 14,000 strokes.

24

Casing pressure: 360 to 380 psi. Mud weight in: 15.6 ppg; returned at 13.7 to 14.1 ppg. Lost 110 barrels mud in past 24 hours.

5/14/79
0'

TD: 12,557'; MW: 15.7; Vis: 44. Circulated with 46 SPM. Drill-pipe pressure at 2,480 psi; casing pressure at 310 psi; one circulation. Mud out: 13.2 ppg. Recirculated at 46 SPM. Decreased 50 psi every 2,000 strokes on drill pipe until choke was fully open. Drill-pipe pressure: 2,320 psi; casing pressure: 115 psi; mud out: 13 ppg. Recirculated at 56 SPM on three-inch line. Blew pop-off valve; well stopped flowing. Filled annulus; opened Hydril; filled annulus. Well started flowing after one hour. Lost 27 barrels. Closed Hydril; circulated at 56 SPM on three-inch line. Took 30-barrel gain. Closed three-inch; put on full open choke. Drill-pipe pressure: 2,470 psi; casing pressure: 165 psi; mud out: 13.4 ppg. Had 45-barrel gain last 24 hours.

5/15/79
0'

TD: 12,557'; MW: 15.7; Vis: 45. Circulated 15.7 ppg mud through open choke and three-inch with 56 SPM. Drill-pipe pressure: 2,380 psi; casing pressure: 60 psi. Opened Hydril; circulated and rotated 10,821' to 10,914'. Gained 60 barrels of mud with 8,500 strokes. Closed Hydril, circulated bottoms up through three-inch. Lost 18 barrels mud. Opened Hydril; reamed 10,914' to 11,200'. Gained 32 barrels mud. Mud weight out: 14.2 to 14.5 ppg. Gained 128 barrels of mud last 24 hours.

5/16/79
0'

TD: 12,557'; MW: 15.7; Vis: 45. Broke down 13 stands from derrick in mouse hole; circulated and rotated 11,200' to 12,463'. Well started making heads. Picked up to 12,443'. Shut well in on three-inch; made two circulations at 58 SPM. Drill-pipe pressure: 2,040 psi; casing pressure: 110 psi to 180 psi. Opened Hydril, attempted to circulate; well made heads. Circulated through three-inch for 7,000 strokes while taking off flow line. Closed well in at 5:00 a.m. Installed rotating head with 100 psi on casing.

5/17/79
0'

TD: 12,557'; MW: 15.8; Vis: 45. Finished installing rotating head. Casing pressure built from 100 to 200 psi in two hours. Bled to 100 psi; pumped five barrels of mud in annulus. Casing pressure built to 160 psi in one and three-fourths hours. Put well on three-inch; made complete circulation. Casing pressure: 120 psi to 90 psi. Bottoms up mud: 12.8 to 13 ppg. Shut in two hours; replaced choke line.

Casing pressure built to 200 psi. Recirculated at 52 SPM on three-inch. Drill-pipe pressure: 2,080 psi. Casing pressure: 120 psi to 80 psi. Mud weight out: 13.5 to 13.7 ppg. Lost 51 barrels of mud in last 24 hours.

5/18/79
0'

TD: 12,557'; MW: 15.9; Vis: 45. Increased mud weight to 15.9 ppg. Circulated on three-inch casing; 70 psi decreased to 65 psi at 17,000 strokes. Drill-pipe pressure: 2,190 psi at 53 SPM. Mud weight out: 13.5 to 13.8 ppg. Opened Hydril; pumped 8,000 strokes at 60 SPM. Drill-pipe pressure: 2,790 psi; increased to 3,000 psi; SPM: 64. Pumped for two circulations. Mud weight out: 13.5 to 13.8 ppg. Mud weight increased to 14.5 ppg. Pumped 9,000 strokes. Lost 86 barrels of mud. Shut down; gas broke out. Filled back side with 12 barrels of water. Pumped 20 barrels of mud with no returns. Filled annulus with five barrels of water. Lost 105 barrels of mud last 24 hours.

5/19/79
0'

TD: 12,557'; MW: 15.9; Vis: 45. Pulled out of hole to 11,415'. Attempted to circulate. Pulled out of hole to 10,386'. Attempted to circulate. Pulled out of hole to 8196'; regained circulation for 400 strokes. Let pipe set five hours; regained circulation. Made two circulations; gained 146 barrels of mud. Put well on three-inch and opened choke. Drill-pipe pressure: 1,300 psi at 51 SPM; casing pressure: 120 psi. Mud weight in: 15.9 ppg; mud weight out: 13.4 to 13.9 ppg.

5/20/79
0'

TD: 12,557'; MW: 19.5; Vis: 43. Ran in hole to 10,389'; circulated bottoms up. Ran in hole to 11,507'; circulated 4,000 strokes. Ran in hole to 12,443'; made three circulations with 15.9 ppg mud. Mud, first circulation: 14.3 to 14.6 ppg; 2,600 units gas. Mud, second circulation: 13.7 to 14.5 ppg; 2,250 units gas. Mud, third circulation: 14.1 to 14.5 ppg; 1,700 units gas.

5/21/79
0'

TD: 12,557'; MW: 16.0; Vis: 44. Shut down pump; no flow. Pulled out of hole to shoe; no flow. Pulled out of hole to 4000'; no flow. Pulled out of hole; stood back two stands of drill collars with bottom-hole assembly. Made up bit, no jets. Ran in hole to 8200'. Circulated bottoms up; broke circulation at 10,448', 2,000 strokes. Ran in hole to 12,432'. Circulated bottoms up with 15.9 ppg mud. Put on three-inch with 2,000 strokes pumped. Circulated and added lost-circulation material. Casing pressure: 270 psi; drill-pipe pressure: 1,900 psi at 81 SPM. Mud weight in: 15.9 ppg; mud weight out: 13.5 ppg to 14.1 ppg; gas: 3,000+ units maximum.

5/22/79
0'

TD: 12,557'; MW: 15.9; Vis: 46. Circulated 16 ppg mud on three-inch casing; pressure dropped from 100 to 60 psi. Put well on flow line; lost 220 barrels mud while regaining circulation; hole stayed full. Cleaned pit and built volume. Let well set for eight hours. Pumped 600 strokes with partial returns; built mud volume to 720 barrels in system. Broke circulation; kelly plugged or rotary hose collapsed.

5/23/79
0'

TD: 12,557'; MW: 16; Vis: 44. Established circulation. Drill-pipe pressure: 540 psi with bottoms up. Mud weight in: 15.9 ppg to 16 ppg. Returns: 14.7 ppg to 15.5 ppg. Recirculated, increasing rate to 80 SPM. Mud weight out: 14.4 ppg to 14.6 ppg with 8.3 ppg at bottoms up. Recirculated 16 ppg in until returns were up to 14.7 ppg. Made short trip to shoe. Circulated bottoms up at shoe. Returns: 15.1 ppg to 14.7 ppg. Tripped in from shoe. Mud loss last 24 hours: 142 barrels; gain: 142 barrels.

5/24/79
0'

TD: 12,557'; MW: 16; Vis: 48. Ran in hole to 12,443'. Attempted to circulate. Pulled out of hole to 8233'. Shut down circulation six hours. Circulated at 26 SPM, 500 psi on drill pipe. Increased pump rate to 52 SPM. Drill-pipe pressure: 500 psi. Increased pump rate to 52 SPM. Drill-pipe pressure: 800 psi. Circulated 10,000 strokes in 4-1/2 hours. Mud weight in: 16 ppg, mud weight out: 14.3 ppg; 2,250 units of gas. Switched pumps. Circulated 3-1/2 hours at 700 psi at 74 SPM. Background gas: 1,900 units with five-barrel gain. Ran in hole to 10,448'. Circulated 30 SPM with 500 psi on drill pipe. Increased SPM to 42 at 400 psi. No mud loss.

5/25/79
0'

TD: 12,557'; MW: 16.0; Vis: 48. Completed circulating bottoms up at 10,448'; mud weight in: 16 ppg; mud weight out: 15.2 ppg; 2,000 units gas. Ran in hole to 11,444'; circulated bottoms up. Mud weight in: 16 ppg; mud weight out: 15 ppg; 2,100 units gas. Circulated through fill-up line; mud cut from 16 ppg to 15.8 ppg; 1,600 units gas. Closed Hydril. Annulus pressure to 50 psi in 10 minutes. Opened Hydril; ran in hole to 12,443'. Repaired mud pumps. Broke circulation; tagged bridge in hole at 12,458'. Pulled back to 12,442'. Circulated.

5/26/79
0'

TD: 12,557'; MW: 16; Vis: 49. Circulated at 12,442' for 3-1/2 hours; 16 ppg in; 13.1 ppg out; 2,200 units gas. Washed out bridge, 12,458 to 12,509'. Washed two feet to 12,511'. Picked up off

bottom. Circulated bottoms up; mud cut to 7.5 ppg out, one and one-half hours after washing bridge. Mud cut due to aeration; 1,900 units gas. Switched to No. 2 mud pump; pumped three circulations.

CIRC	VOLUME	SPM	MW (IN)	MW (OUT)	PRESSURE	GAS
1	1825	74-85	15.9	10.4	960	2400
2	1825	85	16.0	14.5	1000	2200
3	1825	85	16.0	14.7	1100	230

5/27/79
0'

TD: 12,557'; MW: 16; Vis: 48. Completed four circulations with bit at 12,443'. Mud weight: 16 ppg in; 14.6 ppg out; 270 units gas. Pulled 46 stands of drill pipe. Shut down for one hour; checked suction line on pumps. Found that line was three-fourths full of barite. Ran in hole to 10,229'; broke circulation. Ran in hole to 12,511'. Circulated with 16 ppg in and 15 ppg out with 700 psi at 60 SPM. No loss of circulation problems; 2,500 units of background gas. Second circulation: 16 ppg in: 15.1 ppg out, 680 psi.

5/28/79
0'

TD: 12,557'; MW: 16; Vis: 48. Pulled out of hole; stood back drill collars. Ran in hole with 21 joints of Heavy Wate drill pipe to 7796'. Broke circulation; pumped 52 barrels with no loss of circulation. Ran in hole to 10,447'; circulated five and one-half hours. Pumped 1,890 barrels; 60 SPM at 500 psi; 16 ppg in; 14 ppg out; 1,400 units of gas. Ran in hole to 12,507'; circulated four hours; pumped 1,130 barrels; 46 SPM, 720 psi.

5/29/79
0'

TD: 12,557'; MW: 16; Vis: 51. Circulated at 12,507'. Ran in hole to 12,557', checking for top of barite plug. Circulated six hours; 16 ppg in; 14.7 ppg out; 1,900 units of gas. Conditioned and spotted cement plug, 12,557' to 12,357'. Pumped nine barrels of 17.2 ppg Sam V spacer ahead of 175 sacks Class G cement with 1% CFR-2 and 0.2% HR-7 with 52 sacks barite cement at 18 ppg. Displaced with one barrel spacer and 173 barrels mud. Cement in place 5/29/79 at 5:15 a.m. Pulled five stands and one single; closed Hydril. Circulated for 12 hours through three-inch with 16 ppg in; 15.9 ppg out; 128 units of gas at 43 SPM. Drill-pipe pressure: 700 psi; casing pressure: 80 psi. Shut down pumps; opened Hydril; pulled out of hole.

5/30/79
0'

TD: 12,557'; MW: 16; Vis: 52. Pulled out of hole with open-ended drill pipe; strapped out at 12,553.18'. Picked up bit and bottom-hole assembly;

ran in hole to 8264'. Cut drilling line; serviced rig; circulated one-half hour. Ran in hole to 10,234'; circulated one-half hour with full returns. Ran in hole. Bridge at 12,324'. Fell through with 10,000 lbs. Tagged cement at 12,386', leaving 171 feet of cement plug to total depth. Circulated at 12,386' for 9-1/2 hours. First circulation: 16.1 ppg in; 15.5 ppg out; 576 to 688 units of gas. Second circulation: 16 ppg in; 15.4 ppg out; 208 units of gas.

5/31/79
0'

TD: 12,557'; MW: 16; Vis: 53. Circulated 1-1/2 hours at 12,386'. Mud weight: 16 ppg in; 15.3 to 15.4 ppg out. Gas: 250 units. Made 44-stand short trip. Broke circulation at 10,234'. Circulated 8 hours at 12,386'. Mud weight: 16 ppg in; 15.5 ppg out. Gas: 120 units. Pulled out of hole to log; ran in hole for GR/SP/DLL. Logger's depth: 12,389'.

6/1/79
0'

TD: 12,557'; MW: 16; Vis: 54. Ran the following logs: DLL/GR/SP, 8298' to 12,374'; FDC/CNL/GR/CAL, 8298' to 12,387'; BHC/GR, 8298' to 12,384'; HDT Dipmeter, 8298' to 12,387'; Velocity Survey.

6/2/79
0'

TD: 12,557'; MW: 16; Vis: 52. Ran sidewall cores; recovered 13 of 45. Picked up bit and bottom-hole assembly. Ran in hole to 2624'; circulated. Ran in hole to 5987'; broke circulation. Ran in hole to 8236'; circulated bottoms up. Ran in hole to 10,054'. Laid down bent drill pipe and replaced same. Circulated 1-1/2 hours. Ran in hole to 12,386'; started circulating at 5:00 a.m. at 12,586'; 75 SPM at 5.5 BPM. No gas; no mud loss on trip in.

6/3/79
0'

TD: 12,557'; MW: 16; Vis: 54. Circulated and conditioned hole and mud at 12,386' for 7 hours; final circulation. Rate: 7.3 BPM; 1,600 psi. Mud weight: 16 ppg in; 15.7 ppg out. Gas: 125 units. Pulled out of hole to bottom-hole assembly. Pulled wear bushing; changed rams to 9-5/8". Ran test plug and tested stack to 4,000 psi. Rigged up to run casing; started picking up casing at 2:00 a.m.

6/4/79
0'

TD: 12,557'; MW: 16; Vis: 50. Ran in with 56 joints of 9-3/4" casing. Circulated two hours; no loss of circulation. Ran in hole to 10,480'; circulated one hour at 700 psi. Ran in hole to 10,855'; lost returns. Filled annulus with five barrels. Ran in hole, filling annulus on each joint run. Ran 22 joints with no returns; required 55 barrels total to fill annulus.

6/5/79
0'

TD: 12,557'; MW: 16.0; Vis: 49. Ran casing: 56 joints of 9-3/4", 59.2#, S-95. Tagged cement plug at 12,386'. Picked up to 12,385'. Float shoe at 12,385'; float collar at 12,302'. Shut off baffle at 12,265'. DV at 8798'; FOs at 2999' and 2149'. Lost total of 160 barrels mud while running in hole; lost 60 barrels while filling casing. Attempted to break circulation; built 150 barrels of new mud. Cemented first stage around shoe with 10 barrels of 16.5 ppg Sam V spacer; followed with bypass plug and 1,200 sacks of Class "G" cement containing 1% CFR-2, 0.2% HR-7, 0.75% Halad 22-A. Slurry volume: 16.5 ppg. Total slurry volume: 228 barrels of H_2O at 5.5 BPM and 660 barrels of 16.0 ppg mud. Final mud weight: 15.2 ppg in. Over-displaced by 21 barrels. Did not bump plug. Final pump pressure: 1,570 psi. Five-minute shut-in at 6:00 p.m. Built 700 barrels mud volume; dropped opening plug. Opened DV with 1,350 psi. Pressure fell to 500 psi with no returns. Mixed and pumped 10 barrels Sam V spacer at 16.5 ppg, 625 sacks Class "G" cement with 1% CFR-2, 0.2% HR-7. Had 119 barrels slurry at 16.5 ppg. Dropped closing plug and started displacing with mud.

6/6/79
0'

TD: 12,557'; MW: 15.8; Vis: 62. Completed displacing second-stage cement job. Bumped plug at 8:30 a.m. Displaced with 620 barrels of mud with rig pump. Rate: 5.8 BPM; final pressure: 400 psi. Bumped plug with 2,000 psi; held psi 15 minutes. Ports closed; no bleed back. No returns during cement job. Built 800 barrels new mud. Nippled down 5,000 psi choke manifold. Set 10,000 psi manifold. Nippled down 5,000 psi blowout-preventer stack.

6/7/79
0'

TD: 12,557'; MW: 15.5; Vis: 43. Hung off blowout-preventer stack; installed casing slips and landed 9-5/8" casing. Casing weight as cemented: 460,000 pounds. Set casing slip with 500,000 pound tension. Cut off casing and laid down 5,000 psi blowout-preventer stack. Installed support packing and casing spool. Tested packoff and flange to 5,000 psi. Nippled up 10,000 psi blowout-preventer stack.

6/8/79
0'

TD: 12,557'; MW: 15.2; Vis: 37. Nippled up 10,000 psi, 13-5/8", blowout-preventer stack. Nippled up stripper and flowline. Tied in choke manifold. Tested blowout preventer and choke to 10,000 psi; tested Hydril to 5,000 psi.

6/9/79
0'

TD: 12,557'; MW: 15.1; Vis: 51. Completed blowout-preventer equipment test. Pulled test plug; installed wear bushing. Repaired rig; set rotary floor. Picked up bottom-hole assembly; ran in hole.

60

Tagged DV plug at 8494'; drilled DV plug. Circulated out cement. Ran in hole to first-stage plug at 11,158', 1107' above baffle. Drilled cement and plugs; circulated. Laid down drill pipe to drill out cement.

6/10/79
0'

TD: 12,557'; MW: 15.5; Vis: 55. Laid down 31 joints of drill pipe. Drilled cement inside 9-5/8" and 9-3/4" casing. Drilled 11,247' to 12,306'. Did not pick up any indication of float collar. Circulated and conditioned.

6/11/79
0'

TD: 12,557'; MW: 15.4; Vis: 45. Circulated hole clean at 12,306'. Pulled out of hole. Ran CBL/VDL/CCL/GR log from 12,298' to 8200'. Logger's total depth: 12,306'. Top of cement on bottom stage at 11,150'. Top stage: top 8610'; bottom 9175'. Overall bonding, fair to poor. Rigged down loggers. Picked up FO shifting tools and RTTS packer. Ran in hole to FO at 2149'. Circulated out 9-5/8" x 13-3/8" annulus; closed FO and tested to 3,000 psi. Ran in hole to FO at 2999'; opened FO and circulated annulus. Closed annulus valves. Attempted break down below 13-3/8" shoe with 750 psi surface pressure (17.5 ppg equivalent). Could not break down. Opened annulus. Mixed 300 sacks Permafrost cement, slurry weight 15.2 ppg. Displaced with 40 barrels mud. Cement in place at 3:45 a.m. Closed FO; reversed out drill pipe. Recovered five barrels contaminated mud. Tested FO to 3,000 psi at 2999'. Pulled out of hole to 2149'. Opened FO; circulated out 9-5/8" x 13-3/8" annulus. Circulated out three barrels contaminated mud and cement.

6/12/79
0'

TD: 12,557'; MW: 16; Vis: 47. Closed FO at 2149'; and tested to 3,000 psi. Pulled out of hole; laid down FO tools. Pulled wear bushing. Tested bottom 4-1/2" rams to 10,000 psi. Serviced rig; made up bit and ran in hole to top of cement at 12,306'. Circulated and conditioned mud to 16 ppg. Drilled to 12,385'; drilled 10 feet of cement below shoe. Circulated. Bottoms-up gas: 80 units. Tested formation to 17.5 ppg equivalent gradient. Had 1,980 psi on surface; 1,900 psi in 15 minutes. Drilled cement plug.

6/13/79
0'

TD: 12,557'; MW: 16; Vis: 48. Drilled cement, 12,420' to 12,557'. Circulated hole clean; had 1,600 units gas with bottoms up. Pulled out of hole; picked up bottom-hole assembly. Ran in hole to 12,385'; serviced rig; broke circulation. Reamed 12,385' to 12,557'; circulated and cleaned hole of cement cuttings.

81

6/14/79 10'	TD: 12,567'; MW: 16; Vis: 48. Circulated; drilled, 12,557' to 12,562'. Circulated; drilled, 12,562' to 12,567'. Circulated; made short trip; circulated. Measured out of hole; picked up core barrel; ran in hole.
6/15/79 30'	TD: 12,597'; MW: 16.1; Vis: 50. Ran in hole; reamed and washed 18 feet to bottom. Cut Core No. 11, 12,567' to 12,597'. Pulled out of hole; recovered 30 feet of core. Ran in hole with bit.
6/16/79 13'	TD: 12,610'; MW: 16.1; Vis: 54. Cut drilling line; ran in hole; reamed core hole. Circulated; drilled, 12,597' to 12,610'; circulated. Pulled out of hole; rigged up Schlumberger logging unit.
6/17/79 56'	TD: 12,666'; MW: 15.9; Vis: 53. Ran BHC-Sonic/GR, 12,610' to 12,386'. Logger's total depth: 12,616'. Ran RFT at 12,582.5'. Had 30 psi in 1-1/2 minutes; no fluid. No seal at 12,585', 12,584', 12,528', 12,526', 12,525', 12,524', 12,523', 12,522'. Ran in hole; no fill.
6/18/79 127'	TD: 12,793'; MW: 16.0; Vis: 57. Drilled to 12,731'; short tripped five stands; drilled to 12,793'.
6/19/79 137'	TD: 12,930'; MW: 16; Vis: 55. Drilled to 12,860'; circulated samples. Short tripped 11 stands; no fill; no drag. Drilled to 12,873'; circulated samples. Drilled ahead.
6/20/79 58'	TD: 12,988'; MW: 16; Vis: 56. Drilled to 12,988'. Pulled out of hole; tool joints tight. Tested blowout-preventer equipment; changed flow line.
6/21/79 91'	TD: 13,079'. Repaired electric control on tubing; replaced flow line to shaker. Changed out roller reamer; ran in hole; broke circulation at 9000'. Worked junk basket on bottom at 12,988'. Drilled, 12,988' to 13,079'.
6/22/79 115'	TD: 13,194'; MW: 16.0; Vis: 55. Drilled to 13,120'. Short tripped five stands; no drag; no fill. Drilled ahead.
6/23/79 93'	TD: 13,287'; MW: 16.0; Vis: 57. Drilled to 13,230'. Short tripped 13 stands; no drag; no fill. Drilled ahead.
6/24/79 89'	TD: 13,376'; MW: 16.0; Vis: 55. Drilled to 13,318'. Short tripped 13 stands. Drilled to 13,361'; circulated samples. Drilled to 13,376'; circulated samples.

6/25/79 48'	TD: 13,424'; MW: 16; Vis: 55. Circulated samples; drilled to 13,410'. Short tripped 14 stands. Drilled to 13,424'; circulated samples. Surveyed; pulled out of hole; picked up core barrel.
6/26/79 0'	TD: 13,424'; MW: 16.2; Vis: 69. Ran in hole with core barrel; cut drilling line; broke circulation at 9000'. Ran in hole; hit bridge at 13,272'. Worked out of tight hole, 13,272' to 13,234'. Circulated; pulled out of hole. Laid down core barrel and picked up bit. Dressed bottom-hole assembly; ran in hole.
6/27/79 61'	TD: 13,485'; MW: 16.2; Vis: 69. Ran in hole; broke circulation at 9000'. Reamed 13,250' to 13,424'. Drilled to 13,485'.
6/28/79 115'	TD: 13,600'; MW: 16.3; Vis: 62. Drilled to 13,547'. Short tripped to shoe. Serviced rig; drilled ahead.
6/29/79 107'	TD: 13,707'; MW: 16.5; Vis: 64. Drilled to 13,667'. Short tripped to shoe. Serviced rig; drilled ahead.
6/30/79 71'	TD: 13,778'; MW: 16.5; Vis: 77. Drilled to 13,720'; serviced rig. Drilled to 13,778'; surveyed. Pulled out of hole.
7/1/79 52'	TD: 13,830'; MW: 16.3; Vis: 64. Pulled out of hole; pulled wear bushing. Tested blowout-preventer equipment; ran wear bushing. Ran in hole. Changed out shock sub and jars; serviced rig at shoe. Ran in hole; no fill or tight hole. Drilled ahead.
7/2/79 89'	TD: 13,919'; MW: 16.5; Vis: 74. Drilled to 13,852'; serviced rig. Drilled ahead.
7/3/79 100'	TD: 14,019'; MW: 16.6; Vis: 82. Drilled to 13,947'; serviced rig. Drilled to 14,009'. Short tripped to 12,500'; no drag or fill. Drilled to 14,019'.
7/4/79 120'	TD: 14,139'; MW: 16.8; Vis: 89. Drilled to 14,073'; serviced rig. Drilled to 14,139'.
7/5/79 80'	TD: 14,219'; MW: 17; Vis: 62. Drilled to 14,163'; serviced rig. Drilled to 14,200'; short tripped to shoe. Drilled to 14,219'; surveyed. Pulled out of hole.
7/6/79 27'	TD: 14,246'; MW: 17; Vis: 56. Ran formation leak-off test. Surface pressure: 955 psi. Equivalent gradient: 18.3 ppg. Pulled out of hole; changed roller reamer. Cut drilling line; serviced rig. Ran in hole to 13,979'; tight. Reamed, 13,979' to 14,210'; drilled to 14,246'.

7/7/79 16'	TD: 14,262'; MW: 17; Vis: 62. Serviced rig. Pulled out of hole; changed right-angle drive; changed stabilizer and cleaned junk sub. Ran in hole; washed and reamed to bottom.
7/8/79 106'	TD: 14,368'; MW: 17.1; Vis: 61. Drilled; serviced rig.
7/9/79 23'	TD: 14,391'; MW: 17.1; Vis: 70. Drilled; serviced rig. Tested blowout-preventer equipment. Drilled ahead.
7/10/79 53'	TD: 14,444'; MW: 17.1; Vis: 71. Drilled; serviced rig; drilled.
7/11/79 16'	TD: 14,460;' MW: 17.1; Vis: 65. Drilled to 14,450'. Tripped for bit; laid down nine joints of bent pipe. Reamed 14,401' to 14,450'. Drilled ahead.
7/12/79 76'	TD: 14,536'; MW: 17.3; Vis: 64. Drilled; serviced rig. Drilled ahead.
7/13/79 86'	TD: 14,622'; MW: 17.8; Vis: 65. Drilled to 14,554'; short tripped 24 stands; no fill. Drilled ahead.
7/14/79 42'	TD: 14,664'; MW: 18; Vis: 60. Drilled to 14,650'; had steady increase in pore pressure. Connected at 14,630'; had 1,850 units of gas. Shut down pumps for six minutes; had 800 U over 140 BG on bottoms up. Stopped drilling at 14,650'; continued to raise mud weight to 17.9 ppg. Drilled to 14,652'; stopped drilling; raised mud weight to 17.9+ ppg. Started to lose partial returns of 17.9+ ppg. Lost 22 barrels in one hour at 245 GPM. Slowed rate; pumped lost-circulation material pill. Retained returns prior to pill reaching bit. Drilled to 14,661' at 18 ppg; lost 12 barrels. Drilled to 14,664'; lost 15 barrels of mud.
7/15/79 62'	TD: 14,726'; MW: 18.1; Vis: 65. Circulated and conditioned mud at 14,664'; bottoms up: 70 units. Shut down pumps for 15 minutes. Bottoms up: 70 units; maximum of 560 units from shoe of 9-5/8" casing. Drilled 14,664' to 14,676' with partial returns. Lost 65 barrels at 1/2 BPM while drilling. Picked up off bottom. Reduced rate to 183 GPM. Had full returns after losing total of 75 barrels. Added lost-circulation material; drilled to 14,726'. Increased mud weight due to high pore pressure. Circulated and conditioned mud.

7/16/79 0'	TD: 14,726'; MW: 18.2; Vis: 60. Circulated and conditioned mud at 14,726'; raised mud weight to 18.1 ppg with 60 UBG. Lost partial returns. Added lost-circulation material; loss stopped after two hours. Lost 50 barrels; circulated two hours. Added barite slowly to system. Well started flowing. Gained 60 barrels in seven hours over increase due to material addition. Cut mud 18.1 ppg to 17.7 ppg; fluid appeared to be mud. Gas includes from 60 units to maximum of 1,200 units. Low Cut: 16 ppg. Added barite and lost-circulation material to system with 18.2 ppg in and 18.1+ out. Lost 25 barrels over four hours.
7/17/79 0'	TD: 14,726'; MW: 18.1; Vis: 63. Circulated and conditioned at 14,726' to 18.2 ppg. Pulled out of hole eight stands to 14,025'; hole swabbed; tight at 14,025'. Ran in hole to bottom; circulated out. Lost 202 barrels of mud; then had full returns in 15 minutes. Had a 75-barrel gain; returns stabilized. Total lost was 127 barrels. Conditioned mud to 18.2 ppg. Pulled out of hole 24 stands to shoe; hole tight on fifth and nineteenth stands off bottom. Hole swabbed all the way out. Circulated one-half hour with bottom-hole assembly inside casing. Ran in hole slowly. Worked through bridge at 14,450'; ran in hole to 14,695'. Picked up kelly; pipe became stuck; worked loose in one-half hour. Maximum gas: 4,000 units.
7/18/79 0'	TD: 14,726'; MW: 18.2; Vis: 58. Circulated at 14,726'. Mud weight in: 18.2 ppg; full returns. Pulled out of hole 25 stands to 12,280'; hole tight second and eighth off bottom. Hole swabbed while pulling out of hole. Circulated at 12,280' with 60% returns. Worked strings to throw off ball. Ran in hole; bridge at 14,495'. Washed 38 feet to bottom; circulated at 14,726'. Total mud loss: 374 barrels. Gained 260 barrels mud. Net loss: 114 barrels. Gas on steady decline. Circulated. No fluid influx since 4:00 a.m.
7/19/79 0'	TD: 14,726'; MW: 18.2+; Vis: 70. Circulated and conditioned mud. Gas: 2,000 units; down to 800 units while circulating; gained 27 barrels. Ran in hole three stands to 14,712'; circulated bottoms up. Maximum gas: 860 units; fell to 80 units. Pulled out of hole five stands; hole swabbing. Attempted to fill under bit. Pulled out of hole; laid down stabilizers and roller reamer. Changed out jars and shock sub. Ran in hole with bit to 8535'. Broke circulation at 8535'; ran in hole.

7/20/79 0'	TD: 14,726'; MW: 18.2; Vis: 74. Circulated with 30% returns at 12,385'. Mixed 55-barrel lost-circulation material pill. Ran in hole to 13,388'. Pumped lost-circulation material pill; gained full returns for one-fourth hour. Dropped to 50% returns; lost 280 barrels mud. Down five hours to build mud volume; gained 100% returns after pumping 115 barrels. Circulated; ran in hole to 14,690'. Worked through bridge at 14,412'. Circulated at 14,690' with full returns for four hours. On bottoms up, maximum cut 15.3 ppg. Had 4,000 units gas for one hour.
7/21/79 0'	TD: 14,726'; MW: 18.3; Vis: 54. Ran in hole to 14,726'. Circulated bottoms up with mud flow back. Circulated eight hours with pit gain of 146 barrels over period. Had 2,000 units; declined to 640 units over period. Built mud weight to 18.3 ppg; had full returns for 3-1/2 hours. Started losing mud; mixed lost-circulation material with reduced pump rate. Lost 148 barrels mud; started stage pumping at 15 minutes. Lost 174 barrels. Pumped five minutes during last five hours. Waited 30 minutes while hole healed. Had 90% returns during last two hours.
7/22/79 0'	TD: 14,726'; MW: 18.3; Vis: 66. Pumped in stages for 8-1/2 hours. Had 100% returns. Had 18.3 ppg in; 18.4 ppg to 18.6 ppg out, with 15 units gas. Well would flow slightly with pump off. Pumped 15-1/2 hours; stable while pumping. Well would flow while pump off. With bottoms up, had 4,000 units gas. Mud cut to 15.8 ppg at 35 SPM; full returns. At 40 SPM, 90% returns. At 53 SPM, 70% returns.
7/23/79 0'	TD: 14,726'; MW: 18.3; Vis: 75. Had 11% total lost-circulation material in system. Continued to batch-condition mud in pill pit prior to pumping into hole. Gained 60 barrels of mud last 24 hours. Maintained 18.3 ppg in. Gas at shaker declined to 640 units. Mud weight out: 17.5 ppg average. Condition stable last five hours. Each pump cycle lost 5-12 barrels; returns stable; then on shut down, gained 10-15 barrels.
7/24/79 0'	TD: 14,726'; MW: 18.2+; Vis: 66. Conditioned mud with 18.3 ppg in, 18.2+ ppg out. Short tripped 25 stands to 9-5/8" shoe. Had 30,000-pound drag first three stands. Ran in hole; circulated at 12,780', 13,266', 13,708', 14,218', 14,447'. Circulated out at 14,726'. Maximum trip gas: 3,200 units for 45 minutes. Total gain: 50 barrels after short trip. Hole stable last six hours. Prepared to short trip. Current gas: 220 units.

7/25/79
0'

TD: 14,726'; MW: 18.3+; Vis: 59. Conditioned mud at 14,726'. Pulled out of hole five stands; pipe started to pull wet. Conditioned mud 3-1/2 hours; no pit gain or loss. Pulled out of hole 20 stands into shoe. Ran in hole to 14,688'. Broke circulation at 12,780', 13,266', 13,708', 14,218', 14,447' on trip in. Hit bridge at 14,688'. Reamed 14,688' to 14,726'. Circulated bottoms up; waited on logging crew. No pit loss or gain. Had 18.3+ ppg in, 18.3 ppg out; 60 units gas. Pumped one-half drill pipe with 18.4 ppg mud; surveyed; pumped other half of drill pipe with 18.4 ppg mud. Pulled out of hole to log. Had 20,000 pound drag at 14,412'.

7/26/79
0'

TD: 14,726'. Ran in hole to condition mud. Tested blowout-preventer equipment to 10,000 psi, tested Hydril to 5,000 psi. Tested all floor valves and kelly cocks; tested lubricator to 1,500 psi. Ran DIL/GR, 14,729' to 12,385'. Tool pulled tight while logging out. Ran in hole to condition.

7/27/79
0'

TD: 14,726'; MW: 18.2; Vis: 65. Ran in hole to 9975'; cut line. Well flowed back through drill pipe. Circulated bottoms up at 50 SPM, 800 psi. Maximum gas: 21 units. Broke circulation at 12,386', 12,713'; 32 SPM; 400 psi. Circulated bottoms up at 12,860'; maximum gas: 320 units. Staged in 12,954', 13,226', 13,610'; 32 SPM; 400 psi. Circulated bottoms up 13,854'; 35 SPM; 500 psi with 1,280 units gas. Staged in 14,133', 14,412'; 35 SPM; 500 psi. No mud loss or gain last 24 hours.

7/28/79
0'

TD: 14,726'; MW: 18.3; Vis: 68. Ran in hole to 14,726'; circulated bottoms up; 35 SPM; 500 psi. Maximum gas: 3,800 units; minimum: 20 units. Second circulation: 35 SPM; 500 psi. Maximum gas: 280 units; minimum gas: 125 units. Pulled out of hole; rigged up and tested lubricator to 500 psi. Ran in hole.

7/29/79
0'

TD: 14,726'; MW: 18.3+; Vis: 62. Ran FDC/CNL/GR, 14,718' to 12,385'. Ran BHC-Sonic; stopped at 12,700'. Rigged down logging unit. Ran in hole to 10,000'; circulated bottoms up with 32 SPM; 400 psi; 12 units of gas. Ran in hole to 12,262'; circulated bottoms up with 35 SPM; 500 psi; 70 units gas. Broke circulation, 12,545' and 12,827'. Circulated bottoms up 13,106'; 35 SPM; 500 psi. No mud loss or gain last 24 hours.

7/30/79 0'	TD: 14,726'; MW: 18.3; Vis: 59. Circulated at 13,106'; 35 SPM; 500 psi; 256 units gas. Circulated at 13,388' and 13,668'. Circulated bottoms up, 13,946'; 35 SPM; 500 psi; 416 units gas. Circulated 14,221' and 14,504'. Ran in hole; reamed 14,701' to 14,726'. Torqued up; circulated 14,726'; 50 SPM; 700 psi; 360 units gas. Second circulation: 50 SPM; 700 psi; 448 units gas. Minimum gas: 102 units. Pulled out of hole to log. No loss or gain of mud in 24 hours.
7/31/79 0'	TD: 14,726'; MW: 18.3; Vis: 6. Pulled out of hole to log. Rigged up Schlumberger unit. Tested lubricator to 500 psi. Ran BHC/GR, 14,716' to 12,385'. Ran FDC/CNL/GR/CAL, 14,718' to 12,385'; Dipmeter, 14,650' to 12,385'; and Velocity Survey. Rigged down logging unit.
8/1/79 0'	TD: 14,726'; MW: 18.3; Vis: 59. Cut drilling line; ran in hole. Circulated bottoms up at 10,000'; 35 SPM; 500 psi; 18 units gas. Circulated at 12,300'; 35 SPM; 500 psi; 12 units gas. Broke circulation at 12,662'. Circulated bottoms up, 13,200'; 35 SPM; 500 psi; 5 units gas. Broke circulation at 13,480' and 13,661'. Circulated bottoms up at 13,946'; 35 SPM; 500 psi.
8/2/79 0'	TD: 14,726'; MW: 18.3; Vis: 59. Circulated bottoms up at 13,976'; 64 units gas. Broke circulation at 14,221' and 14,501'. Reamed 14,701' to 14,726'; 12 feet of fill. Circulated bottoms up; 50 SPM; maximum of 440 units of gas; minimum of 110 units. No loss or gain. Short tripped to 12,373'; tight hole at 13,950'. Ran in hole; no tight spots; 12 feet of fill. Pulled out of hole; normal drag. Laid down jars, monel, and drill collars. Pulled wear bushing. Rigged up and ran 7-5/8" liner.
8/3/79 0'	TD: 14,726'; MW: 18.3; Vis: 59. Ran 63 joints (2690.13') 7-5/8" casing. Set shoe at 14,719.24'; catcher sub at 14,673.21'; landing collar at 14,629.58'. Top of liner at 12,029.11' with 349.13' lap. Filled liner every five joints; filled drill pipe every five stands. Broke circulation at 5000', 7500', 10,000' and 12,360'. Circulated and washed 14,686' to 14,719'; 50 SPM; 600 psi. Dropped setting ball; sheared seat at 2,900 psi. Set liner hanger. Circulated to cool hole; 60 SPM; 600 psi. No loss or gain of mud.
8/4/79 0'	TD: 14,726'; MW: 18.3; Vis: 59. Circulated and conditioned hole; rigged up to cement. Cemented with 258 sacks Class G, with 1% CFR-2, 0.5% Halad

22-A, 0.4% LWL, 35% Silicia flour, 16 lb./sack High Dense III, 0.5% No Foam powder. Slurry weight: 18.5 ppg. Pumped 12 barrels Sam V spacer ahead, 18.5 ppg. Dropped plug: displaced with 276 barrels mud, 3-1/2 to 4 barrels per minute. Bumped plug with 3,000 psi. Cement in place 8/3/79 at 11:00 a.m., with full returns throughout job. Pulled out of hole; laid down Brown Oil Tools. Picked up bit and 9-5/8" casing scraper. Ran in hole, steel-line measured to 11,000'. Waited on cement.

8/5/79
0'

TD: 14,726'; MW: 18.3; Vis: 59. Waited on cement; repaired gyro. Circulated; ran in hole to liner at 12,029'; no cement. Broke circulation; pulled out of hole. Laid down 21 joints of drill pipe and bottom-hole assembly. Changed rams to 3-1/2"; picked up 4-3/4" drill collar.

8/6/79
0'

TD: 14,726'; MW: 18.3; Vis: 58. Picked up 4-3/4" drill collars and 3-1/2" drill pipe. Ran in hole to landing collar at 14,629'. Circulated and conditioned mud. Tested liner lap to 3,000 psi. Pulled out of hole; tested blowout preventers.

8/7/79
0'

TD: 14,726'; MW: 18.3; Vis: 60. Tested blowout-preventer equipment to 10,000 psi. Repaired rig. Picked up Howco test tools for negative-flow lap test. Cut drilling line. Ran in hole; ran 9400' mud cushion. Set packer at 11,958'; bottom of tail pipe at 11,980'. Opened tool at 3:00 a.m. with light blow; died in eight minutes. Tool open three hours.

8/8/79
0'

TD: 14,726'; MW: 18.3; Vis: 60. Tool shut in three hours. Dropped bar; reversed out cushion; unseated packer; pulled out of hole. Bourdon Tube gauge at 11,967'. Initial hydrostatic pressure: 11,535 psi; initial flow: 11,219 psi; final flow: 11,219 psi; shut-in pressure: 11,983 psi; final hydrostatic pressure:: 11,502 psi; Bourdon Tube gauge at 11,963'; initial hydrostatic pressure: 11,512 psi; initial flow: 9,243 psi; final flow: 9,443 psi; shut-in pressure: 9,590 psi; final hydrostatic pressure: 11,417 psi. Temperature: 248°F. Rigged up to run gyro survey.

8/9/79
0'

TD: 14,726'; MW: 18.0; Vis: 55. Logged, ran Sperry Sun Gyro survey. Made up Howco test tools with FO shifting fingers. Ran in hole to top FO at 2149'; opened FO; set packer. Circulated through FO and 9-5/8" x 13-3/8" annulus with mud. Displaced mud with water; circulated and washed annulus with water. Cleaned suction pit. Mixed 200 barrels Arctic

	Pack; pumped 165 barrels; had breakthrough at 90 barrels. Displaced drill pipe with mud. Closed FO and tested to 3,000 psi. Pulled out of hole; laid down tools. Picked up and ran in hole with 6-1/4" bit.
8/10/79 0'	TD: 14,726'; MW: 18.0; Vis: 57. Ran in hole with bit; circulated to cool hole. Pulled out of hole. Rigged up Schlumberger unit; ran CBL/VDL/GR, 14,640' to 12,010'; rigged down logging unit.
8/11/79 0'	TD: 14,726'; MW: 17.6; Vis: 43. Ran in hole with 6-1/4" bit; circulated. Removed No. 1 compound shaft; cleaned mud pits and mixed mud.
8/12/79 0'	TD: 14,726'; MW: 18.3; Vis: 52. Built mud volume; conditioned mud in pits. Completed safety check on rig with minor repairs. Received and installed compound shaft.
8/13/79 42'	TD: 14,768'; MW: 18.3; Vis: 50. Broke circulation. Drilled landing collar and cement from 14,629' to 14,719'. Drilled cement to 14,726'; drilled ten feet of formation to 14,736'. Circulated bottoms up; pulled out of hole to shoe. Ran leak-off test to equivalent gradient of 19.2 ppg; no leakoff. Drilled 14,736' to 14,768'.
8/14/79 62'	TD: 14,830'; MW: 18.3; Vis: 53. Drilled to 14,782'; pulled out of hole. Ran in hole; reamed 14,719' to 14,782'. Drilled to 14,830'.
8/15/79 26'	TD: 14,856'; MW: 18.3; Vis: 55. Drilled to 14,846'; surveyed; pulled out of hole. Made up wear-bushing puller; bushing would not go through Cameron annular blowout preventer. Worked blowout preventers; unable to pull wear bushing. Picked up core barrel; ran in hole. Cut Core No. 12, 14,846' to 14,856'. Finished circulating bottoms up.
8/16/79 61'	TD: 14,917'; MW: 18.3; Vis: 58. Pulled out of hole with Core No. 12; recovered 9 feet. Dressed and laid down core barrel. Worked on Cameron annular blowout preventer. Ran in hole with bottom-hole assembly; cut drilling line. Ran in hole; reamed core hole; drilled to 14,917'.
8/17/79 151'	TD: 15,068'; MW: 18.3; Vis: 64. Drilled to 14,951'; serviced rig; drilled to 15,068'.
8/18/79 37'	TD: 15,105'; MW: 18.4; Vis: 69. Drilled to 15,069'; surveyed. Pulled out of hole; serviced rig. Ran in hole to top of liner; repaired low drum clutch; ran in hole. Drilled ahead.

8/19/79 42'	TD: 15,147'; MW: 18.4; Vis: 68. Drilled to 15,136'; surveyed; pulled out of hole; serviced rig. Changed stripper rubbers on Strip-o-matic; ran in hole; drilled ahead.
8/20/79 130'	TD: 15,277'; MW: 18.3; Vis: 62. Drilled to 15,198'; serviced rig; drilled ahead.
8/21/79 131'	TD: 15,408'; MW: 18.2; Vis: 6. Drilled to 15,324'; serviced rig; drilled ahead.
8/22/79 30'	TD: 15,438'; MW; 18.2; Vis: 67. Dropped survey; pulled out of hole; steel-line measured; no correction. Picked up core barrel; ran in hole to top of liner. Cut drilling line; ran in hole to bottom. Circulated; dropped ball. Cut Core No. 13, 15,408' to 15,438'; pulled out of hole with core.
8/23/79 0'	TD: 15,438'; MW: 18.2; Vis: 69. Laid down core; full recovery. Serviced rig; repaired blowout preventer.
8/24/79 58'	TD: 15,496'; MW: 18.2; Vis: 66. Tested blowout-preventer equipment to 10,000 psi; tested Cameron annular to 5,000 psi. Ran in hole to 15,408'; installed drill-pipe rubbers, one per stand. Reamed core hole; drilled ahead.
8/25/79 120'	TD: 15,616'; MW: 18.2; Vis: 69. Drilled; serviced rig; drilled ahead.
8/26/79 116'	TD: 15,732'; MW: 18.1; Vis: 64. Drilled; serviced rig; drilled ahead.
8/27/79 41'	TD: 15,773'; MW: 18.1; Vis: 65. Drilled; surveyed; pulled out of hole. Laid down eight joints of 4-1/2" drill pipe; laid down jars. Set wear bushing in casing-head spool; serviced rig. Picked up bit and jars and ran in hole; picked up eight joints of 3-1/2" drill pipe. Installed drill-pipe rubbers on 74 joints of 4-1/2" drill pipe. Drilled ahead.
8/28/79 103'	TD: 15,876'; MW: 18.1; Vis: 61. Drilled; serviced rig; drilled.
8/29/79 102'	TD: 15,978'; MW: 18.0; Vis: 67. Drilled; serviced rig; drilled.
8/30/79 30'	TD: 16,008'; MW: 18; Vis: 80. Drilled to 16,008'; surveyed; pulled out of hole. Laid down eight joints of 4-1/2" drill pipe; tested blowout-preventer equipment. Picked up bit; changed bottom-hole assembly; picked up eight joints of 3-1/2" drill pipe. Ran in hole.

8/31/79 99'	TD: 16,107'; MW: 17.9; Vis: 58. Cut drilling line; tripped in. Reamed and washed 30 feet; drilled ahead.
9/1/79 99'	TD: 16,206'; MW: 17.9; Vis: 61. Drilled; serviced rig; drilled.
9/2/79 30'	TD: 16,236'; MW: 17.8; Vis: 56. Drilled to 16,236'; steel-line measured, 16.234.93', no correction; picked up core barrel; ran in hole; washed 30'; dropped ball; prepared to core.
9/3/79 25'	TD: 16,261'; MW: 17.7; Vis: 60. Cut Core No. 14; 16,236' to 16,261'. Pulled out of hole; recovered 25 feet. Worked blowout preventer; picked up bit. Ran in hole; broke circulation at 12,000'. Ran in hole; low drum clutch went out; repaired clutch. Circulated at 16,044'.
9/4/79 97'	TD: 16,358'; MW: 17.6; Vis: 57. Ran in hole to 16,236'; reamed to 16,231'. Drilled ahead.
9/5/79 104'	TD: 16,462'; MW: 17.4; Vis: 58. Drilled ahead.
9/6/79 48'	TD: 16,510'; MW: 17.4; Vis: 55. Drilled to 16,510'; surveyed; pulled out of hole. Ran magnetic particle inspection on bottom-hole assembly. Tested blowout-preventer equipment.
9/7/79 81'	TD: 16,591'; MW: 17.3; Vis: 57. Tested blowout-preventer equipment; dressed No. 2 roller reamer. Ran in hole; changed jars; cut drilling line. No fill; no tight hole. Drilled ahead.
9/8/79 132'	TD: 16,723'; MW: 17.2; Vis: 62. Drilled; serviced rig; drilled ahead.
9/9/79 117'	TD: 16,840'; MW: 17.1; Vis: 60. Drilled ahead.
9/10/79 31'	TD: 16,871'; MW: 17.1; Vis: 58. Drilled; surveyed; pulled out of hole. Hole tight at 16,800', 16,765', 16,740', 16,690', 16,580'; maximum pull over weight of 50,000 pounds. Ran in hole; broke circulation at 14,800'. Reamed 16,780' to 16,846'; no fill. Drilled ahead.
9/11/79 52'	TD: 16,923'; MW: 17.1; Vis: 60. Drilled to 16,917'; short tripped 10 stands. Hole tight at 16,855', 16,680', 16,490', 16,250'. Maximum of 50,000 pounds pull over drill-pipe weight; no fill. Drilled ahead.

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9/12/79 6'	TD: 16,929'; MW: 17.1; Vis: 60. Drilled to 16,929'; surveyed; pulled out of hole. Tight at 15,010'; pulled 50,000 pounds over weight of string. Eight buttons missing on bit; picked up bit and junk basket. Ran in hole; broke circulation at 14,800'. Worked junk basket at 16,929'; circulated survey; pulled out of hole.
9/13/79 30'	TD: 16,959'; MW: 17.1; Vis: 65. Pulled out of hole; no recovery from junk basket. Picked up 30' core barrel; ran in hole. Cut Core No. 15, 16,929' to 16,959'. Pulled out of hole.
9/14/79 29'	TD: 16,988'; MW: 17.1; Vis: 51. Pulled out of hole with core; recovered 21 feet of core. Tested rams, choke, HCR, and kill line to 10,000 psi. Tested annular blowout preventer to 5,000 psi; tested upper and lower kelly cock and inside blowout preventer to 10,000 psi. Ran in hole; picked up six joints of 3-1/2" drill pipe. Circulated at 14,765'; reamed, 16,907' to 16,959'. Drilled ahead.
9/15/79 51'	TD: 17,039'; MW: 17.1; Vis: 62. Drilled to 17,008'; pulled out of hole to 16,510'. First nine stands tight, with 20,000- to 30,000-pound drag. Dropped survey; pulled out of hole to 11,000'. Recovered survey with wireline. Ran in hole; drilled ahead.
9/16/79 49'	TD: 17,088'; MW: 17.1; Vis: 58. Drilled to 17,088'; dropped survey; pulled out of hole to 11,000'. While attempting to retrieve survey, lost overshot off end of tool. Pulled out of hole.
9/17/79 44'	TD: 17,132'; MW: 17; Vis: 60. Pulled out of hole; recovered catcher and survey. Ran in hole to 14,700'; circulated; cut drilling line. Reamed 22 feet to bottom; drilled ahead.
9/18/79 12'	TD: 17,144'; MW: 17; Vis: 59. Drilled to 17,134'; circulated bottoms up; surveyed. Pulled out of hole; picked up core barrel. Ran in hole; cut Core No. 16, 17,134' to 17,149'.
9/19/79 16'	TD: 17,160'; MW: 17; Vis: 58. Pulled out of hole; hole tight, 17,149' to 16,360', with 40,000-60,000 pounds drag. Recovered 11.5 feet of core. Ran in hole; reamed 17,134' to 17,149'; no fill.
9/20/79 41'	TD: 17,201'; MW: 16.9; Vis: 65. Drilled to 17,189'; serviced rig. Had 65,000 pounds drag on pick up. Drilled to 17,201'.

9/21/79 11'	TD: 17,212'; MW: 16.9; Vis: 70. Dropped survey and worked junk basket. Pulled out of hole; tight hole, 17,201' to 16,879', 16,730' to 16,725', and 16,449' to 16,439'. Pulled 60,000 pounds over string weight. Tested blowout-preventer equipment; serviced rig. Ran in hole to 14,695'; cut drilling line. ran in hole; reamed 30 feet to bottom. Worked junk basket; drilled ahead.
9/22/79 41'	TD: 17,253'; MW: 16.7; Vis: 50. Drilled to 17,230'; serviced rig; drilled ahead.
9/23/79 24'	TD: 17,277'; MW: 16.7; Vis: 56. Drilled to 17,255'; surveyed. Pulled out of hole. Hole tight at 16,890' and 16,830'. Installed three new stabilizers; added two stabilizers to drill-collar string and replaced jars. Ran in hole; reamed 48 feet to bottom; circulated.
9/24/79 13'	TD: 17,290'; MW: 16.7; Vis: 55. Cut Core No. 17, 17,255' to 17,286'; recovered 28-foot core. Ran in hole; reamed 17,240' to 17,284'. Drilled ahead.
9/25/79 39'	TD; 17,329'; MW: 16.6; Vis: 68. Drilled ahead.
9/26/79 11'	TD: 17,340'; MW: 16.6; Vis: 62. Drilled to 17,331'; surveyed. Pulled out of hole; had drag, 17,331' to 17,270' and 17,270' to 16,880'; tight at 15,970'. Dressed two roller reamers. Ran in hole; broke circulation. Ran in hole; reamed 17,275' to 17,331' and worked junk basket. Drilled ahead.
9/27/79 26'	TD: 17,366'; MW: 16.5; Vis: 85. Drilled to 17,366'. Pulled out of hole; tested blowout-preventer equipment.
9/28/79 1'	TD: 17,367'; MW: 16.5; Vis: 86. Ran in hole; reamed 17,319' to 17,366'. Worked junk basket. Drilled on junk and formation to 17,367' and worked junk basket. Pulled out of hole; tight at 16,695' and 15,170'. Recovered six buttons and small piece of cone. Ran in hole with new bit.
9/29/79 33'	TD: 17,400'; MW: 16.5; Vis: 67. Ran in hole; reamed 17,350' to 17,367'; worked junk basket. Drilled with 2,000 pounds for one foot; no indication of junk on bottom. Drilled ahead.
9/30/79 6'	TD: 17,406'; MW: 16.5; Vis: 80. Drilled to 17,403'; surveyed. Pulled out of hole; tight; 17,403' to 16,571'. Ran in hole to 17,340'; reamed to 17,403'. Drilled ahead.

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10/1/79 5'	TD: 17,411'; MW: 16.5; Vis: 62. Drilled to 17,411'. Pulled out of hole; changed bottom-hole assembly; serviced rig. Ran in hole to 14,626'; circulated and waited on orders.
10/2/79 17'	TD: 17,428'; MW: 16.5; Vis: 85. Circulated at 14,626'; waited on orders. Ran in hole; reamed 17,378' to 17,411'. Drilled ahead.
10/3/79 4'	TD: 17,432'; MW: 16.5; Vis: 52. Drilled to 17,432'; pulled out of hole; checked bottom-hole assembly. Ran in hole to 14,665'; broke circulation. Ran in hole to 17,392'; reamed to 17,432'.
10/4/79 45'	TD: 17,477'; MW: 16.4; Vis: 64. Reamed 17,412' to 17,432'. Drilled ahead.
10/5/79 7'	TD: 17,484'; MW: 16.4; Vis: 69. Drilled to 17,477'; surveyed. Pulled out of hole; tested blowout-preventer equipment. Ran in hole to 17,422'; reamed to 17,477'. Drilled ahead.
10/6/79 54'	TD: 17,538'; MW: 16.2; Vis: 96. Drilled ahead.
10/7/79 15'	TD: 17,553'; MW: 16.2; Vis: 62. Drilled; surveyed. Pulled out of hole; lost three cones off bit. Serviced rig; worked blowout-preventer equipment. Picked up Tri-State 5-7/8" flat-bottomed mill and extra boot basket. Changed out drilling jars. Ran in hole; circulated.
10/8/79 0'	TD: 17,553'; MW: 16.2; Vis: 52. Milled on junk at 17,533'. Pulled out of hole; picked up bit. Ran in hole; drilled on junk.
10/9/79 64'	TD: 17,617'; MW: 16.0; Vis: 78. Drilled on junk one hour at 17,553'. Drilled ahead; drilling break at 17,582' to 17,591'. Circulated bottoms up; no gas. Drilled to 17,617'; circulated. Pulled out of hole.
10/10/79 40'	TD: 17,657'; MW: 16.0; Vis: 62. Pulled out of hole; changed cutters in roller reamers. Picked up new bit; ran in hole. Drilled ahead.
10/11/79 83'	TD: 17,740'; MW: 15.9; Vis: 57. Drilled ahead.
10/12/79 9'	TD: 17,749'; MW: 15.9; Vis: 56. Drilled; surveyed; pulled out of hole. Tested blowout-preventer equipment; ran in hole; drilled ahead.

10/13/79 62'	TD: 17,811'; MW: 15.8; Vis: 62. Drilled ahead.
10/14/79 47'	TD: 17,858'; MW: 15.8; Vis: 68. Drilled to 17,858'; surveyed. Pulled out of hole for core barrel. Took two hours to pull first four stands due to key seating.
10/15/79 19'	TD: 17,877'; MW: 15.8; Vis: 68. Pulled out of hole; steel-line measured; no correction. Picked up core barrel.
10/16/79 11'	TD: 17,888'; MW: 15.7; Vis: 50. Cut Core No. 18, 17,858' to 17,888'. Pulled out of hole. Laid down core barrel; recovered 30-foot core. Ran in hole.
10/17/79 29'	TD: 17,917'; MW: 15.7; Vis: 50. Drilled ahead.
10/18/79 78'	TD: 17,995'; MW: 15.7; Vis: 50. Drilled ahead.
10/19/79 17'	TD: 18,012'; MW: 15.7; Vis: 54. Drilled to 18,012'; surveyed. Pulled out of hole; 16 stands pulled tight. Tight at 15,410'; checked bottom-hole assembly, OK. Laid down six 4-3/4" drill collars; tested blowout-preventer equipment, changed stripper rubber; ran in hole.
10/20/79 65'	TD: 18,077'; MW: 15.7; Vis: 58. Ran in hole; reamed 17,952' to 18,012'; 20 feet of fill. Drilled ahead.
10/21/79 31'	TD: 18,108'; MW: 15.7; Vis: 70. Drilled to 18,108'; worked junk basket; surveyed. Pulled out of hole; hole tight, 18,108' to 16,827'. Became stuck at 16,827'; worked free. Serviced rig.
10/22/79 0'	TD: 18,108'; MW: 15.8; Vis: 58. Picked up 5-7/8" flat-bottomed mill. Ran in hole; tight at 17,415' and 17,705' to 17,715'. Reamed 18,010' to 18,108'. Milled on bottom at 18,108'. Pulled out of hole; tight at 18,108' and 16,741'; had drag to 15,100'. Pulled out of hole; bottom of mill worn flat. Cleaned junk basket; recovered small amount of junk.
10/23/79 22'	TD: 18,130'; MW: 15.8; Vis: 59. Ran in hole; reamed 18,000' to 18,108'; no fill. Drilled ahead.
10/24/79 26'	TD: 18,156'; MW: 15.8; Vis: 60. Drilled to 18,156'; pulled out of hole. Cleaned junk basket; no junk. Changed bit; ran in hole.

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10/25/79 66'	TD: 18,222'; MW: 15.8; Vis: 62. Ran in hole to 18,100'; reamed to 18,156'. Drilled ahead.
10/26/79 38'	TD: 18,260'; MW: 15.8; Vis: 95. Drilled to 18,231'; short tripped. Had heavy drag, 18,231' to 17,251'; had medium drag, 17,251' to 16,780'. Ran in hole; reamed 18,172' to 18,231'. Drilled ahead.
10/27/79 29'	TD: 18,289'; MW: 15.8; Vis: 80. Drilled to 18,269'; short tripped 15 stands. Had heavy drag, 18,269' to 17,219'. Drill pipe stuck at 17,290'. Picked up kelly; pumped out four joints. Had medium drag, 16,670' to 16,410'. Ran in hole; reamed, 18,219' to 18,269'; no fill. Drilled ahead.
10/28/79 6'	TD: 18,295'; MW: 15.8; Vis: 60. Drilled to 18,295'; surveyed. Pulled out of hole; laid down one joint of drill pipe with kelly. Drill pipe stuck at 18,234'; worked pipe. Mixed 50 barrels SFT to 17.8 ppg.
10/29/79 0'	TD: 18,295'; MW: 15.8; Vis: 61. Spotted 50 barrels SFT; in place at 8:30 a.m., 10/28/79. Covered bottom-hole assembly with SFT; moved mud at one barrel per hour. Worked drill pipe twice each hour. String weight: 254,000 pounds; pulled to 300,000 pounds; slacked off to 100,000 pounds.
10/30/79 0'	TD: 18,295'; MW: 15.9; Vis: 58. Moved SFT one barrel per hour. Worked drill pipe 300,000/150,000 pounds twice each hour. Installed bearing in catworks. Rigged up wireline; ran in hole with free-point tool; first run failed; ran in hole with second tool.
10/31/79 0'	TD: 18,295'; MW: 15.8; Vis: 58. Ran in hole with free-point tool. Pipe stuck below 18,160'. Pulled out of hole; lost tool in drill pipe. Pulled out of rope socket; circulated and worked drill pipe 275,000/210,000 pounds. Ran free-point; tool stopped at 17,729'. Pulled out of hole; ran in hole with string shot.
11/1/79 0'	TD: 18,295'; MW: 15.8; Vis: 57. Ran in hole with string shot to 18,108'; worked 15 rounds; fired string shot; back-off failed. Pulled out of hole with wireline. Made up string shot; ran in hole to 18,108'; worked 16 rounds. Reversed torque in pipe; fired shot; backoff indicated. Picked up pipe to 325,000 pounds; pipe free. Pulled out of hole with wireline; circulated and worked pipe. Pulled out of hole; recovered 12 drill collars; had mechanical backoff.

Top of fish at 17,605'. Tested blowout-preventer equipment; made up bottom-hole assembly; ran in hole. Left in hole: five drill collars, jars, twelve drill collars, stabilizer, monel, stabilizer, lead collar, bit sub, roller reamer, and bit.

11/2/79
0'

TD: 18,295'; MW: 15.8; Vis: 52. Ran in hole to 17,605', top of fish. Circulated to clear pipe; screwed into fish. Started jarring up; jars started getting weak after one hour. Circulated and worked pipe; jarred down with bumper jars; fish came free. Rotated and worked pipe down 20 feet; pipe hung up when picked up. Rotated and worked pipe; worked three joints out of hole. Pipe free; pulled out of hole; laid down fishing tools.

11/3/79
0'

TD: 18,295'; MW: 15.8; Vis: 58. Pulled out of hole; laid down bottom-hole assembly; made up new bottom-hole assembly. Ran in hole to 18,154'; reamed to 18,295'. Circulated and worked pipe; conditioned mud. Pipe stuck for one hour, 30 feet off bottom. Freed pipe by jarring down; circulated four joints out. Short tripped; stands 33 and 34 tight; jarred down to free pipe at 15,061'. Ran in hole; reamed four joints to bottom. Circulated and conditioned hole for logs.

11/4/79
0'

TD: 18,295'; MW: 15.8; Vis: 54. Circulated and conditioned hole; surveyed; pumped out four joints of drill pipe. Pulled out of hole; had light drag on stands 33 and 34. Rigged up to log; ran DIL/SP/GR to 18,282' (Schlumberger total depth). Ran in with FDC/CNL/GR/CAL log; lost tool at 15,454' while logging. Pulled out of rope socket with 3,000 pounds over string weight. Rigged down Schlumberger; made up overshot; ran in hole.

11/5/79
0'

TD : 18,295'; MW: 15.9; Vis: 55. Ran in hole; pushed fish to bottom from 15,455' to 18,295'. Worked over fish; circulated bottoms up. Pulled out of hole; had heavy drag, 18,295' to 17,551'; tight at 14,027'. Laid down fish and tools. Rigged up Schlumberger. Ran FDC/CNL/GR/CAL from 15,545' to shoe; logged with BHCS/GR, 18,295' to 14,500'.

11/6/79
0'

TD: 18,295'; MW: 15.8; Vis: 52. Finished running sonic log, 18,273' to 14,722' (Schlumberger log interval). Rigged down Schlumberger. Ran in hole to 18,179'; reamed to 18,295'. Worked junk basket; circulated and conditioned hole. Pulled out of hole; tight at 18,295' to 16,621' and at 15,027'. Rigged up to log and to run Temperature Survey/HRT.

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11/7/79 0'	TD: 18,295'; MW: 15.9; Vis: 58. Ran Temperature Survey to 15,150'; ran Dipmeter, 18,271' to 14,705'. Attempted to run Temperature Survey with extra weight; stopped at 15,150'; final attempt reached 15,485'. Ran Velocity Survey; fired five shots; locking arm failed on tool. Pulled out of hole and repaired tool; ran in hole with Velocity Survey.
11/8/79 36'	TD: 18,331'; MW: 15.8; Vis: 63. Finished Velocity Survey; rigged down Schlumberger. Ran in hole; reamed 18,265' to 18,295'. Drilled ahead.
11/9/79 17'	TD: 18,348'; MW: 15.8; Vis: 50. Drilled to 18,348'; surveyed; pulled out of hole. Pumped two joints out. Washed through tight spot, 15,200' to 15,130'. Pulled out of hole; tested blowout-preventer equipment.
11/10/79 46'	TD: 18,394'; MW: 15.8; Vis: 58. Ran in hole; reamed 18,290' to 18,348'. Drilled ahead.
11/11/79 76'	TD: 18,470'; MW: 15.8; Vis: 75. Drilled ahead.
11/12/79 9'	TD: 18,479'; MW: 15.8; Vis: 62. Drilled to 18,479'; surveyed. Pulled out of hole; had heavy drag, 18,479' to 17,910'; had light drag, 15,200' to 15,100'. Ran in hole; reamed 18,422' to 18,479'.
11/13/79 103'	TD: 18,582'; MW: 15.8; Vis: 60. Drilled ahead.
11/14/79 86'	TD: 18,668'; MW: 15.8; Vis: 57. Drilled ahead.
11/15/79 41'	TD: 18,709'; MW: 15.8; Vis: 52. Drilled; surveyed. Pulled out of hole; tight at 18,709' to 17,380'. Tested blowout-preventer equipment; changed out stripping rubber.
11/16/79 48'	TD: 18,757'; MW: 15.8; Vis: 60. Ran in hole; reamed 18,661' to 18,709'. Drilled ahead.
11/17/79 81'	TD: 18,838'; MW: 15.8; Vis: 55. Drilled ahead.
11/18/79 79'	TD: 18,917'; MW: 15.8; Vis: 55. Drilled; surveyed; pulled out of hole.
11/19/79 17'	TD: 18,934'; MW: 15.9; Vis: 73. Pulled out of hole; picked up new bit. Ran in hole to 18,887'; reamed to 18,917'. Worked junk basket. Drilled ahead with light weight due to junk in hole.

11/20/79 27'	TD: 18,961'; MW: 15.8; Vis: 56. Drilled; surveyed. Pulled out of hole; first eleven stands tight.
11/21/79 0'	TD: 18,961'; MW: 15.8; Vis: 55. Gauged bottom-hole assembly; cleaned junk basket. Ran in hole to 12,900'; repaired rig. Ran in hole to 17,321'; repaired rig.
11/22/79 66'	TD: 19,027'; MW: 15.7; Vis: 56. Repaired rig; ran in hole. Reamed 18,910' to 18,961'. Drilled ahead.
11/23/79 56'	TD: 19,083'; MW: 15.7; Vis: 65. Drilled ahead.
11/24/79 9'	TD: 19,092'; MW: 15.8; Vis: 58. Drilled to 19,092'. Pulled out of hole; tight 10 stands. Pulled out of hole; tight, 15,314' to 15,034'. Tested blowout-preventer equipment; dressed roller reamers. Ran in hole with bit and new bottom-hole assembly.
11/25/79 44'	TD: 19,136'; MW: 15.5+; Vis: 68. Ran in hole to 19,030'; reamed to 19,092'. Drilled ahead.
11/26/79 70'	TD: 19,206'; MW: 15.6; Vis: 64. Drilled ahead.
11/27/79 27'	TD: 19,233'; MW: 15.6; Vis: 55. Drilled to 19,233'. Spotted pill with 30 sacks Nut Plug on bottom. Surveyed; pulled out of hole; tight eight stands. Pulled out of hole; picked up new bit; laid down one stabilizer. Ran in hole.
11/28/79 53'	TD: 19,286'; MW: 15.6; Vis: 60. Ran in hole to 19,193'; reamed 40 feet to 19,233'; drilled to 19,286'.
11/29/79 58'	TD: 19,344'; MW: 15.6; Vis: 55. Drilled to 19,330'. Circulated up samples; drilled ahead.
11/30/79 17'	TD: 19,361'; MW: 15.6; Vis: 52. Drilled to 19,361'; pulled out of hole. Pulled tight off bottom. Tested blowout-preventer equipment; ran in hole with new bit.
12/1/79 53'	TD: 19,414'; MW: 15.6; Vis: 67. Ran in hole; reamed 19,341' to 19,361'. Drilled ahead.
12/2/79 45'	TD: 19,459'; MW: 15.5; Vis: 67. Drilled to 19,459'; dropped survey.
12/3/79 6'	TD: 19,465'; MW: 15.6; Vis: 65. Pulled out of hole; recovered survey. Ran in hole; reamed, 19,440' to 19,459'. Drilled ahead.

12/4/79 82'	TD: 19,547'; MW: 15.5; Vis: 66. Drilled ahead.
12/5/79 79'	TD: 19,626'; MW: 15.5; Vis: 66. Drilled ahead.
12/6/79 7'	TD: 19,633'; MW: 15.5; Vis: 58. Drilled to 19,633'; pulled out of hole. Ran in hole to 19,575'; washed and reamed to bottom.
12/7/79 56'	TD: 19,689'; MW: 15.5; Vis: 65. Drilled ahead.
12/8/79 29'	TD: 19,718'; MW: 15.5; Vis: 60. Drilled to 19,718'; pumped out seven singles. Pulled out of hole; tested blowout-preventer equipment. Installed wear bushing.
12/9/79 60'	TD: 19,778'; MW: 15.5; Vis: 67. Ran in hole to 19,684'; reamed to 19,718'; drilled to 19,726'. Serviced rig and drilled ahead.
12/10/79 114'	TD: 19,892'; MW: 15.5; Vis: 64. Drilled ahead.
12/11/79 1'	TD: 19,893'; MW: 15.5; Vis: 60. Drilled to 19,893'; surveyed. Pulled out of hole; rotated through tight spot, 15,132' to 15,090'. Pulled out of hole; lost three cones off bit. Picked up flat-bottomed mill; ran in hole to 15,075'. Reamed through key seat.
12/12/79 0'	TD: 19,893'; MW: 15.5; Vis: 65. Reamed and washed through tight spot, 15,100' to 15,200'. Ran in hole to 19,835'; reamed to 19,893' with mill. Worked junk basket; milled on junk. Pulled out of hole; ran in hole with bit.
12/13/79 28'	TD: 19,921'; MW: 15.5; Vis: 59. Ran in hole; reamed to 19,893'; drilled to 19,921'. Pulled out of hole; tight at 15,100'.
12/14/79 44'	TD: 19,965'; MW: 15.5; Vis: 60. Pulled out of hole; tested blowout-preventer equipment. Ran in hole to 19,880'; reamed to 19,921'. Drilled ahead.
12/15/79 72'	TD: 20,037'; MW: 15.5; Vis: 57. Drilled to 20,037'; circulated.
12/16/79 48'	TD: 20,085'; MW: 15.5; Vis: 60. Pulled out of hole; changed bit. Ran in hole to 19,995'; reamed 19,995' to 20,037'. Drilled ahead.

12/17/79 62'	TD: 20,147'; MW: 15.5; Vis: 58. Drilled to 20,147'; pulled out of hole.
12/18/79 24'	TD: 20,171'; MW: 15.5; Vis: 73. Pulled out of hole, steel-line measured; no correction. Tight hole to 18,800' and 15,150'. Ran in hole to 20,085'; reamed to 20,147'. Drilled ahead.
12/19/79 51'	TD: 20,222'; MW: 15.5; Vis: 64. Drilled to 20,222'; circulated; surveyed. Pulled out of hole; laid down nine joints with kelly; rotated out six stands.
12/20/79 10'	TD: 20,232'; MW: 15.5; Vis: 84. Pulled out of hole; tight, 15,110' to 14,930'. Ran in hole to 20,065'; reamed to 20,222'. Drilled ahead.
12/21/79 65'	TD: 20,297'; MW: 15.5; Vis: 78. Drilled ahead.
12/22/79 38'	TD: 20,335'; MW: 15.5; Vis: 57. Drilled to 20,335'; circulated and conditioned for logs. Pulled out of hole; tight at 19,591' and 15,685' to 15,220'.
12/23/79 0'	TD: 20,335'; MW: 15.5; Vis: 61. Pulled out of hole. Ran in hole with Sonic/GR. Hit bridge at 15,200'. Pulled out of hole; no logging tool. Tested blowout-preventer equipment; ran in hole with 5-3/4" overshot; steel-line measured.
12/24/79 0'	TD: 20,335'; MW: 15.5; Vis: 60. Broke circulation at 14,650'. Ran in hole; hit bridge at 15,420'. Circulation pressure indicated fish in overshot. Pulled out of hole.
12/25/79 0'	TD: 20,335'; MW: 15.3; Vis: 46. Pulled out of hole; tight to 14,990'. Recovered fish.
12/26/79 0'	TD: 20,335'; MW: 15.3; Vis: 58. Staged in hole to 20,065'; reamed to 20,335'. Circulated and conditioned mud.
12/27/79 0'	TD: 20,335'; MW: 15.4; Vis: 82. Conditioned and circulated mud; pulled out of hole. Rigged up Schlumberger; ran DIL/GR/SP from 20,329' to 18,000'.
12/28/79 0'	TD: 20,335'; MW: 15.2; Vis: 63. Logged with GR/BHC-Sonic, 20,329' to 18,000'. Ran Velocity Survey; tool stuck at 15,385'; pulled out of rope socket. Picked up overshot; ran in hole.

12/29/79 0'	TD: 20,335'; MW: 15.2. Ran in hole to 18,108'; broke circulation to clean overshot. Ran in hole to 20,323'; pump pressure increased from 600 psi to 1,400 psi, indicating over fish. Pulled out of hole; no recovery; grapple was broken in half. Ran in hole open ended.
12/30/79	TD: 20,335'; PBTD: 17,696'; MW:' 15.2; Vis: 66. Ran in hole to 18,462'; conditioned to plug. Short tripped; circulated 200 barrels. Set Plug No. 1 per program, 18,462' to 17,696'. Cement in place, 12/29/79 at 11:30 p.m. Pulled out of hole to 17,217'; conditioned mud. Started to mix plug; shut down to work on cement bulk silo.
12/31/79	TD: 20,335'; PBTD: 14,647'; MW: 15.2; Vis: 80. Set Plug No. 2, 17,217' to 16,227'. Cement in place, 12/30/79 at 8:00 a.m. Pulled out of hole to 15,727'; circulated and conditioned mud. Set Plug No. 3, 15,727' to 14,647'. Cement in place, 12/30/79 at 2:00 p.m. Pulled out of hole to 14,170'; circulated and conditioned mud. Pulled out of hole; picked up 7-5/8" casing scraper and ran in hole to 14,076'. Circulated and conditioned mud.
1/1/80	TD: 20,335'; PBTD: 11,230'; MW: 15.3; Vis: 56. Conditioned mud at 14,076'. Pulled out of hole with bit and 7-5/8' scraper. Picked up 7-5/8" E-Z drill cement retainer. Set retainer at 14,000'. Pulled out of hole to 12,206'. Conditioned mud. Set Plug No. 4, 12,206' to 11,230'. Cement in place at 1:30 p.m. Pulled out of hole to 11,500'; conditioned mud; pulled out of hole.
1/2/80	TD: 20,335'; PBTD: 11,200'; MW: 15.3; Vis: 53. Pulled out of hole; ran in with 8-1/2" bit and 9-5/8" scraper to 11,276'. Circulated bottoms up; pulled out of hole. Picked up E-Z drill retainer; set at 11,200'. Pulled out of hole; laid down 4-1/2" drill pipe.
1/3/80	TD: 20,335'; PBTD: 11,200'; MW: 15.3; Vis: 52. Laid down 3-1/2" drill pipe and 4-3/4" drill collars. Ran in hole with excess 4-1/2" drill pipe.
1/4/80	TD: 20,335'; PBTD: 1800'. Made up E-Z drill retainer; ran in hole and set at 2065'. Displaced mud with water. Set Plug No. 5 with 100 sacks Permafrost at 14.6 ppg. Cement in place at 12:30 p.m. Pulled out of hole to 1800'; reversed out water to diesel. Laid down drill pipe; broke and laid down kelly, mouse hole, and rat hole. Rigged down iron roughneck; cleaned floor.

1/5/80	Nippled down blowout-preventer equipment; cleaned mud pits.
1/6/80	Made up Herc skid loads of 3-1/2" drill pipe and 4-3/4" drill collars.
1/7/80	Began rigging down. Released rig January 7, 1980, at 6:00 a.m.

DRILLING TIME ANALYSIS

TUNALIK TEST WELL NO. 1

PARCO, INC., RIG 95

Spud 11/10/78; Rig released 1/7/80

Total Depth: 20,335 Feet

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 1 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
1978 10-19	24																							Rigging Up	
10-20	24																							Rigging Up	
10-21	24																							Rigging Up	
10-22	24																							Rigging Up	
10-23	24																							Rigging Up	
10-24	24																							Rigging Up	
10-25	24																							Rigging Up	
10-26	24																							Rigging Up	
10-27	24																							Rigging UP	
10-28	24																							Rigging Up	
10-29	24																							Rigging Up	
10-30	24																							Rigging Up	
10-31	24																							Rigging Up	
11-1	24																							Rigging UP	
11-2	24																							Rigging Up	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 2 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
11-3	24																							Rigging Up	
11-4	24																							Rigging Up	
11-5	24																							Rigging Up	
11-6	24																							Rigging Up	
11-7	24																							Rigging Up	
11-8	24																							Rigging Up	
11-9	24																							Rigging Up	
11-10	6	15½			1½	·	1	½																Rigging Up	Spudded Well at 7:15 a. m.
11-11		11½		7			¾	½	4½															Logging	Ran Schlumberger Wireline Logs
11-12		12¾	5	4½		½	1	¾																Reaming	Opening Hole to 36"
11-13				6½				3½		10¾		1½								2				Tripping Out	Ran 30" Casing
11-14											20	4												Waiting on Cement	
11-15				2							6	16												Nipple Up	
11-16		18½			¾	½	½					3	1											Drilling	
11-17		12½		6¼	2¾	½	2																	Surveying	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 3 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
11-18		20½	¼	1¾	1½	¼	¼																	Drilling	
11-19		11½	½	7¾	¾			3½																Drilling	
11-20		14½		4¾				¾	4½															Logging	Ran Schlumberger Wireline Logs
11-21		1½		7		½										1½							13½	Fishing	
11-22				13				½								7							3½	Fishing	
11-23				8		1		½								11½							3	Fishing	
11-24		1½	1½	14½		½										1½							4½	Fishing	
11-25				13½		1		½								5½							3½	Washing Over Fish	
11-26			1½	13		½	1	1								2							5	Fishing	
11-27				5½		½										5							13	Fishing	
11-28				11½		½		3								4							5	Washing Over Fish	
11-29			22½	1		½																		Reaming	Opening Hole to 26"
11-30			15	4		1	½																3½	Dressing 26" Hole Opener	
12-1			15½	5½		½	1																1½	Tripping Out	
12-2			17½	5		½																	1	Reaming	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 4 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
12-3			4½	4			10½	5																Circulate & Condition Mud	
12-4				2½		½				21														Running 20" Casing	
12-5				7½				1½		7	8													Running 20" Casing	
12-6										1½	12	10½												Waiting on Cement	
12-7												24												Nipple Up	
12-8				9½				8½				3	3											Testing BOPE	
12-9		6½	3	5		½		1									3½						4½	Drilling on Junk	Cored For Junk
12-10		18½		5		½																		Drilling	
12-11		13		10	½	½																		Drilling	
12-12		23½				½																		Drilling	
12-13		6½		7½	½	½		1									5½						2½	Drilling	Core No. 1: 3280' - 3308'
12-14		18½	1½	2½		½																	1	Drilling	
12-15		9		11	½			1					2½											Tripping Out	
12-16		9	1½	7½		½	1½	1									2						1	Tripping Out	Core No. 2: 3820' - 3830'
12-17		17½		5	½			1																Drilling	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 5 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
12-18		15		7½		½		1																Reaming	
12-19		18		3	½	½		2																Drilling	
12-20		17½	½	4		½	½	1																Drilling	
12-21		15½	½	6	½	½	1																	Drilling	
12-22		20½		1		½		½															½	Drilling	
12-23		5½	½	7	½		5	2½					3											Drilling	
12-24		20½		1		½	2																	Drilling	
12-25		2½	1	13½	1	½		3½									2							Tripping Out	Core No. 3: 5552' - 5562'
12-26		17		5½		½																	1	Drilling	
12-27		17	1	3½		½	½	1½																Washing & Reaming	
12-28		16½	½	6	½	½																		Drilling	
12-29		7½					½	16																Circulating Out Kick	
12-30		12½	½	7	½	½	½						2½											Drilling	
12-31		23				½	½																	Drilling	
1979 1-1		9½		9½	2½	½	1	½					½											Tripping In	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 6 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
1-2		10½	2½	7½		½		½					2										½	Laying Down Core	Core No. 4: 6504' - 6514'
1-3		18½		3½	½	½	1																	Drilling	
1-4		18½	½	4½		½																		Drilling	
1-5		11		8	1	½							2½										1	Drilling	
1-6		23½				½																		Drilling	
1-7		14		7½	1	1½																		Drilling	
1-8		20½		2		½																	1	Tripping	
1-9		11½		10	1	½																	1	Drilling	
1-10		20½		1½		½	1½																	Drilling	
1-11		19	1	2		½	1½																	Drilling	
1-12		8	3½	1	½	½							10½											Tripping In	
1-13		10	1½	8		½	½	½															3	Drilling	
1-14		14		9	½	½																		Fishing	Attempting to Pull Test Plug
1-15													11			13								Drilling	
1-16		11½	1½	10½		½																		Tripping In	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 7 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
1-17		22		1½		½																		Drilling	
1-18		1½		15	1												3						2½	Tripping Out	
1-19		14½	1½	4		½	½							2									1	Tripping In	Core No. 5: 7870' - 7880'
1-20		19½		1		½		3																Tripping	
1-21		7½	½	11½	1	½		3																Drilling	
1-22		20				½		3½																Drilling	
1-23		19				½		4															½	Drilling	
1-24				10	½	½		8½	4½															Wiper Trip to Log	
1-25				4				4	16															Logging	Ran Schlumberger Wireline Logs
1-26				5½			1½	9	8															Circulating & Conditioning	
1-27				6				4½	7½														6	Tripping out	
1-28				11		½	4½	4		1½		1½											1	Circulating & Conditioning	
1-29									24															Running 13 3/8" Casing	
1-30				11		½		5½		6½													½	Circulating	
1-31				10½				12½		1														Circulating	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 8 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
2-1				1					6½			16½												Logging	CBL/VDL/GR/CCL
2-2												24												Nipple Up BOPE	
2-3				7½				2				6	8½											Nipple Up BOPE	
2-4				3				4½		4	10		½										2	Cementing	Second Stage
2-5									5	1	1					9½						6	1½	Stuck RTTS	Ran Dia-Log
2-6				4				1½														16	2½	Rigging to Run 2 3/8" Tubing	
2-7			18½	4			1	½																Washing Inside 4½" DP	
2-8			3½	11				5	2							2½								Laying Down Tubing	Ran Dia-Log
2-9				6½				½								14							3	Washing & Reaming	
2-10				4½		½										19								Washing Over Drill Pipe	
2-11			13½	9		½		½															½	Milling on RTTS	
2-12			19½	3½		½	½																	Milling on RTTS	
2-13			17	4		½							2½											Tripping In	
2-14			9	5½		½							1			8								Milling On RTTS	Recovered Fish
2-15				8				4								½							11½	Drilling on Junk	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 9 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
2-16				16				2½															5½	Tripping	
2-17				19		½	1	½															3	Tripping	
2-18		14½		2				1½															6	Drilling On Cement	
2-19		1½		15½				1					3½										2½	Inspecting BHA	Magnofluxed BHA
2-20		23½				½																		Drilling	
2-21		14		7½	½	½		1½																Drilling	
2-22		3½	2½	7½		½											9½						½	Tripping In	Core No. 6: 8782' - 8810'
2-23		18						6																Drilling	
2-24		23½				½																		Drilling	
2-25		12		9½	½	½	½																1	Tripping Out	
2-26		23				½																	½	Drilling	
2-27		11½		7	1	½							4											Testing BOPs	
2-28		23½				½																		Drilling	
3-1		13½		8½	½	½	1																	Drilling	
3-2		23½				½																		Drilling	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 10 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
3-3		12½		9	1	½																	1	Tripping Out	
3-4		11				½	3	9½																Drilling	
3-5		13½		8½	1	½																	½	Tripping Out	
3-6		11½		8									3½										1	Drilling	
3-7				7				4½									12½							Tripping In	Core No. 7: 10,472-10,502'
3-8		11	4½	7		½																	1	Tripping In	
3-9		9½		9	1	½		1½															2½	Drilling	
3-10		9		10				3½															1½	Drilling	
3-11				7		½											15½						1	Coring	Core No. 8: 10,671-10,702'
3-12		5½	7	3		½	8																	Changing Out Blocks	
3-13		23½				½																		Drilling	
3-14		14		5	½	2½							2											Drilling	
3-15				12½		½		1½									7						2½	Coring	Core No. 9: 10,910-10,940'
3-16		3½	9	9½	1	½		½																Reaming	
3-17		1½	11	9½		½		½															1	Reaming	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 11 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
3-18		23½				½																		Drilling	
3-19		½	2	12	½		9																	Changing BHA	
3-20		18	5½			½																		Drilling	
3-21		9	2	11½	½	½		½																Tripping Out	
3-22		15		5	½	½						3												Drilling	
3-23		14		6½	½	½	½					1											1	Washing & Reaming	
3-24			1½	18												3½							1	Tripping In	
3-25			5	17												1							1	Inspecting BHA	
3-26		23½				½																		Drilling	
3-27		12		7				3						2										Drilling	
3-28		21	½	2		½																		Drilling	
3-29		14		7½	½	½	½	1																Drilling	
3-30				13½				1				2½				6							1	Coring	Core No. 10: 11,672-11,694'
3-31		3	9	11		½		½																Reaming	
4-1		22½				½	1																	Drilling	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 12 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
4-2		23¼				¼																		Drilling	
4-3		19½		3½	½	¾																		Drilling	
4-4		14	1	7		¼		¼																Tripping	
4-5		23½				½																		Drilling	
4-6		23½				½																		Drilling	
4-7		22		1		½																	½	Tripping	
4-8		8						16																Drilling	
4-9								24																Circulating & Conditioning	Attempting to Kill Well
4-10								23															1	Circulating & Conditioning	
4-11								24																Circulating & Conditioning	
4-12								24																Circulating & Conditioning	
4-13								24																Circulating & Conditioning	
4-14								24																Circulating & Conditioning	
4-15								24																Circulating & Conditioning	
4-16								24																Circulating & Conditioning	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 13 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
4-17								24																Circulating & Conditioning	
4-18								24																Circulating & Conditioning	
4-19								24																Circulating & Conditioning	
4-20								24																Circulating & Conditioning	
4-21								24																Circulating & Conditioning	
4-22								24																Circulating & Conditioning	
4-23								24																Circulating & Conditioning	
4-24								24																Circulating & Conditioning	
4-25								24																Circulating & Conditioning	
4-26								24																Circulating	
4-27								24																Circulating	
4-28								24																Circulating	
4-29			1½	½				22																Circulating	
4-30				11				13																Circulating	
5-1				2½				21½																Circulating	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 14 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
5-2								23															1	Circulating	
5-3								24																Circulating	
5-4								24																Circulating	
5-5								24																Circulating	
5-6								24																Circulating	
5-7								24																Circulating	
5-8								22															2	Circulating	
5-9								24																Circulating	
5-10								22½															1½	Circulating	
5-11								24																Circulating	
5-12								24																Circulating	
5-13								23															1	Circulating	
5-14				3				21																Circulating	
5-15				14				10																Washing & Reaming	
5-16						½		20				3½												Installing Rotating Head	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 15 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
5-17								24																Circulating	
5-18				1				17															6	Circulating	
5-19				2½				21½																Circulating	
5-20				10				14																Circulating	
5-21				1½				10½															12	Circulating	Mixing Mud
5-22				8			2	9															5	Servicing Kelly	
5-23				8				16																Circulating	
5-24				1½			1	21½																Circulating	
5-25								22															2	Circulating	
5-26				5½				17½															1	Tripping	
5-27				13				11																Circulating	
5-28				½				21		1½													1	Circulating	
5-29				15		½		7½															1	Tripping Out	
5-30				8				16																Circulating	
5-31				2½					21½															Logging	Ran Schlumberger Wireline Logs

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 16 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
6-1				7				6½	10½															Logging	
6-2				12½				10½				1												Circulating & Conditioning	
6-3								2		18½		1											2½	Running Casing	Running 9⅝" and 9 5/8" Casing
6-4								7		11½	5½													Running Casing	
6-5								5		3½	15½													Cementing	
6-6											12	12												Waiting On Cement	
6-7												24												Nippling Up BOPs	
6-8		2½		9½			2	3					7											Testing BOPE	
6-9		21½		2		½																		Drilling	
6-10		4½		6½				4	5														4	Circulating	Ran CBL/VDL/CCL/GR
6-11				12½				7½												4				Circulating	
6-12		4½		9½		½		8½															1	Drilling	Drilling Out
6-13		1	1	8			1½	12½																Circulating	
6-14				11½			1½	2½									8½							Tripping In	Core No. 11: 12,567-12,597'
6-15		2	½	7		½											2						12	Tripping In	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 17 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
6-16		3½		9					11½															Logging	Ran Schlumberger Wireline Logs
6-17		23		½		½																		Drilling	
6-18		19		½		½		4																Drilling	
6-19		18½		4½	½	½																		Drilling	
6-20		10½		5½			2½	1					4½											Drilling	
6-21		23		½		½																		Drilling	
6-22		23		½		½																		Drilling	
6-23		22½		1		½																	1	Drilling	
6-24		14½		3½	1	½		4½																Circulating	
6-25				19				4															1	Picking Up Core Barrel	No Core Cut
6-26		6	9½	8½																				Tripping In	
6-27		22		1½		½																		Drilling	
6-28		22		1½		½																		Drilling	
6-29		23½				½																		Drilling	
6-30		8		12½	1	½							2											Tripping Out	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 18 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
7-1		23½				½																		Drilling	
7-2		23½				½																		Drilling	
7-3		22½		1		½																		Drilling	
7-4		22		1½		½																		Drilling	
7-5		1½	5	7	1	1		5															3½	Tripping Out	
7-6		11		9		½		1½															2	Drilling	
7-7		16½	1	5½		½																	½	Drilling	
7-8		11½	8½			½							3										½	Washing & Reaming	
7-9		20½	½	2½		½																		Drilling	
7-10		8½		13	½	½																	1½	Drilling	
7-11		21½	½	1½		½																		Drilling	
7-12		21½		2		½																		Drilling	
7-13		15½				½		8																Drilling	
7-14		10½				½		13																Circulating & Conditioning	
7-15		1½				½		22																Circulating & Conditioning	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 19 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
7-16				4½		½		19																Circulating & Conditioning	
7-17				5½		½		18																Circulating & Conditioning	
7-18				9				14															1	Circulating & Conditioning	
7-19				6				18																Tripping In	
7-20				1				23																Circulating & Conditioning	
7-21								24																Circulating & Conditioning	
7-22								24																Circulating & Conditioning	
7-23				6				18																Circulating & Conditioning	
7-24			1½	4		½		18																Circulating & Conditioning	
7-25				8	½			1½	11				3											Tripping Out	DIL/GR
7-26				9				9½	5½															Tripping In	
7-27				7½				16½																Circulating	
7-28				9				5½	9½															Logging	Ran Schlumberger Wireline Logs
7-29			1½	3				19½																Circulating	
7-30				7½				5	11½															Tripping	Ran Schlumberger Wireline Logs

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 20 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
7-31				8				10	5														1	Tripping In	
8-1			½	13½				10																Circulating	
8-2					14					9½													½	Running 7 5/8" Lines	
8-3				11		½		10												2½				Circulating	
8-4				10			2				12													Waiting on Cement	
8-5				11		½		3½															9	Picking Up BHA	
8-6				14½		½	3						3½					1					1½	Testing BOPE	
8-7				8½		½												9½					5½	DST Liner Lap	
8-8				1		½		6½	8											½			7½	Running Gyro Survey	
8-9				12½				6½	1½											3½				Tripping In	Ran CBL/VDL/GR
8-10				4½			13	1½	5															Tripping In	Pulled Compound Shaft
8-11							24																	Waiting on Parts	
8-12		8½		½		½	14	½																Installing Compound Shaft	
8-13		6½	1	13		½		2½															½	Drilling	
8-14		9½		11	1								2½											Drilling	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 21 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
8-15		3	1	12½		½	½	3									2½						1	Tripping Out	Core No. 12: 14,846-14,856'
8-16		23½				½																		Drilling	
8-17		6½		13	1	½	3																	Drilling	
8-18		12		8½	1	½																	2	Drilling	
8-19		19		4½		½																		Drilling	
8-20		23½				½																		Drilling	
8-21		6		14	1	½		½									1						1	Drilling	
8-22				6½		½	10½										6½							Tripping Out	Core No. 13: 15,408-15,438'
8-23		4½	1	8		½	2½						4½										3	Testing BOPE	
8-24		23½				½																		Drilling	
8-25		23½				½																		Drilling	
8-26		8		13½	1½	½																	½	Drilling	
8-27		23½				½																		Drilling	
8-28		23½				½																		Drilling	
8-29		12½		8	1						2½													Drilling	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 22 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
8-30		16		6½		½																	1	Tripping In	
8-31		23½				½																		Drilling	
9-1		14½		8	1	½																		Drilling	
9-2				17		½											6½							Coring	Core No. 14: 16,236-16,261'
9-3		14½	½	½		½	8																	Circulating	
9-4		23½				½																		Drilling	
9-5		17½		5	1	½																		Drilling	
9-6		7½		12½									3										1	Testing BOPE	
9-7		23½				½																		Drilling	
9-8		23½				½																		Drilling	
9-9		8		15	1																			Drilling	
9-10		23	½			½																		Drilling	
9-11		8½		14½	1																			Drilling	
9-12			1	12½	1			3									4½						2	Tripping Out	
9-13			4	12				½					3				4½							Tripping Out	Core No. 15: 16,929-16,959'

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 23 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
9-14		12	2	6	3½	½																		Drilling	
9-15		22		½	1	½																		Drilling	
9-16		10		12	1	½																	½	Tripping Out	
9-17		7		10½	1	½	½	4															½	Drilling	
9-18				13		½		2									8½							Coring	Core No. 16: 17,134-17,149'
9-19		23	½			½																		Drilling	
9-20		6½		11½	1	½		½					2½										1½	Drilling	
9-21		23½				½																		Drilling	
9-22		8		12½	1	½											2							Drilling	
9-23				10		½		2									11½							Coring	Core No. 17: 17,255-17,286'
9-24		20	2½	1		½																		Drilling	
9-25		8½		13½	1½																		½	Drilling	
9-26		16½	½	6		½																	½	Drilling	
9-27		4½	1	15		½							3											Tripping In	
9-28		10½	2½	10½		½											·							Tripping In	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 24 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
9-29		9		13	1½	½																		Drilling	
9-30		10½	2	9½		½																	1½	Drilling	
10-1		10	½	5½		½																	7½	Circulating	Waiting on Orders
10-2		13½		10		½																		Drilling	
10-3		16½	2	5		½																		Reaming	
10-4		6½		13	1	½							3											Drilling	
10-5		20½	1	1½		½		½																Drilling	
10-6		12½		10	1	½																	.	Drilling	
10-7				15½		½		½															7½	Circulating	
10-8		14	2	3½		½		3															1	Reaming	
10-9		4½	1	15½		½		2½																Tripping Out	
10-10		23½						½																Drilling	
10-11		8½		11	1	½							3											Drilling	
10-12		18½	½	4																			1	Drilling	
10-13		20½		2½	1																			Drilling	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 25 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
10-14			1	17½		½	1½	½															3	Tripping	
10-15				13½		½											9						1	Coring	Core No. 18: 17,858-17,888'
10-16			1½	2				2½															18	Laying Down Drill Pipe	
10-17		23½				½																		Drilling	
10-18		11½		11	1½																			Drilling	
10-19		11½	1½	7									2										2	Tripping In	
10-20		16		3½	1			½															3	Drilling	
10-21			2½	16½		1		½							3½									Changing BHA	
10-22		8	1	13½		½																	1	Servicing Rig	
10-23		16		6½		½	1																	Drilling	
10-24		14	1	8		½	½																	Tripping In	
10-25		19	½	4		½																		Drilling	
10-26		19	½	4		½																		Drilling	
10-27		12		11	1																			Drilling	
10-28						½		1								11							11½	Fishing	Stuck Drill Pipe

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 26 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
10-29							9									12							3	Attempting to Free Pipe	
10-30						½	½		8½							2							12½	Tripping In	Free Point Tool
10-31				6				3½	13½							1								Tripping In	String Shot
11-1				10½		½		6½					4			2							½	Picking Up Fishing Tools	
11-2			1	14½		½		5½								2½								Laying Down Fishing Tools	
11-3			1½	11½	1			2½	7½															Circulating & Conditioning	
11-4				8				6	1½							8½								Circulating & Conditioning	
11-5			1½	10½		½		3	8														½	Logging	Ran Schlumberger Wireline Logs
11-6				3½						20½														Logging	
11-7		4½	1½	6½			½		½	10½														Logging	
11-8		14½		8½	1																			Drilling	
11-9		9½	½	9½			½							3									1	Testing BOPE	
11-10		24																						Drilling	
11-11		8		11½	1		½	½	½														2	Drilling	
11-12		18	1	4½			½																	Drilling	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 27 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
11-13		21½		2			½																	Drilling	
11-14		14½		8	1		½																	Drilling	
11-15		9	½	9½			½							3									1½	Changing Out Stripper Rubbers	
11-16		23½					½																	Drilling	
11-17		23½					½																	Drilling	
11-18		2		19½	1		½																1	Tripping Out	
11-19		17	1	4½	1		½																	Drilling	
11-20				14			½	9½																Tripping Out	
11-21		15	1½	3				4½																Repairing Rig	
11-22		23½				½																		Drilling	
11-23		10		12									2											Drilling	
11-24		11	1½	7½		½	½	½					1			½							1½	Tripping In	
11-25		23½				½																		Drilling	
11-26		16		6½	1	½																		Drilling	
11-27		23½				½																		Tripping In	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 28 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
11-28		8½		10			½	3½					1½											Drilling	
11-29		15	1	6		½							½										1	Drilling	
11-30		23½				½																		Drilling	
12-1		23½				½																		Drilling	
12-2		5		12½	1		4	1½																Running Deviation Survey	
12-3		15½	½	4½		½		3																Drilling	
12-4		23½				½																		Drilling	
12-5		9½		14		½																		Drilling	
12-6		16½	1	5		½																	1	Reaming	
12-7		16½		7		½																		Drilling	
12-8		9	½	9½		½							4										½	Installing Wear Bushing	
12-9		23½				½																		Drilling	
12-10		7		14	1	½		1½																Drilling	
12-11			3½	14		½																	6	Reaming	
12-12		8	2	11½		½		2																Tripping In	

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 29 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
12-13		3½	1½	14½		½							3										1	Tripping Out	
12-14		19½		3		½		1																Drilling	
12-15		5½	1	17		½																		Tripping Out	
12-16		23½				½																		Drilling	
12-17		1½	1	20		½																	1	Tripping Out	
12-18		23½				½																		Drilling	
12-19		½		21	1½	½		½																Tripping Out	
12-20		19½	1½	½																			2½	Drilling	
12-21		15½		4		½		4																Drilling	
12-22				12					5½				5										1½	Tripping Out	
12-23				23½		½																		Fishing	
12-24				23½																			½	Tripping Out	
12-25				13		½		4½								2½							3½	Tripping Out	
12-26			1	15				6	2															Circulating & Conditioning	
12-27				4		½			18½														1	Logging	Ran Schlumberger Wireline Logs

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DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. TUNALIK TEST WELL NO. 1 Page 30 of 30

DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
12-28				21				3																Tripping Out	Lost Velocity Survey Tool in Hol
12-29				16		1	½	6½																Tripping In	
12-30				8				11½												3½			1	Working On Silo	
12-31				17½		½		5															1	Circulating & Conditioning	
1-1				17		½		6											½					Tripping Out	
1-2				5½															½				18	Laying Down Drill Pipe	
1-3	4½			7				4											½				8	Laying Down Drill Pipe	
1-4																							24	Nippling Down BOPE	
1-5																							24	Nippling Down BOPE	
1-6																							24	Nippling Down BOPE	
1-7	18																						6	Cleaning Mud Pit	Rig Released at 6 a. m.
1-8	24																							Rigging Down	
	580½		342¼		91¼		184		229¾		104½		134½		3½		127½		1½		-0-		454¾		
TOTAL HOURS		3502½		2469 ¼		125½		1850¼		153¾		158		10		156½		10½		16		22			

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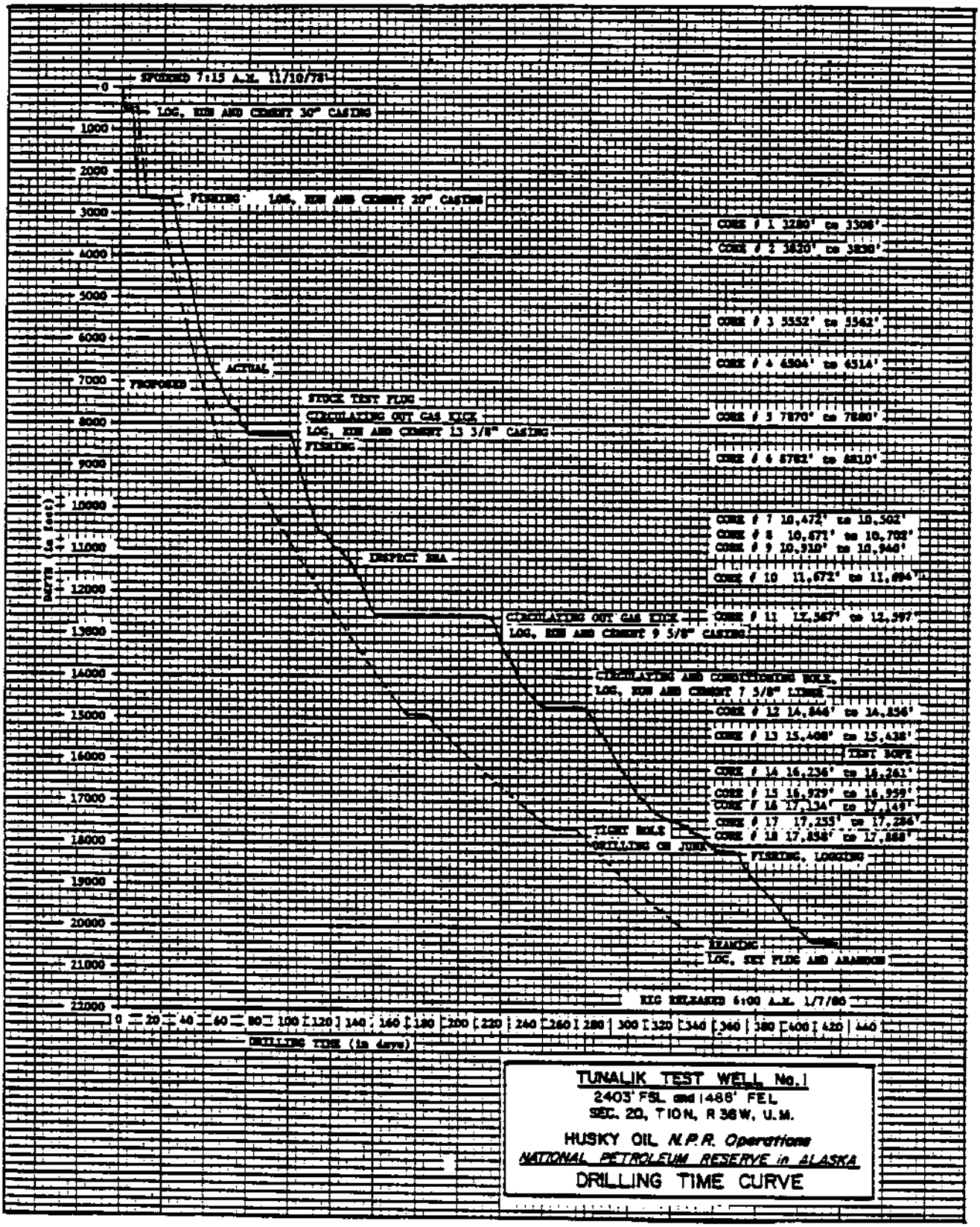
SPUDDED 7:15 A.M. 11/10/78
LOG, RUN AND CEMENT 30" CASING
FISHING
LOG, RUN AND CEMENT 20" CASING
ACTUAL
PROPOSED
STUCK TEST PIPE
CIRCULATING OUT GAS KICK
LOG, RUN AND CEMENT 13 3/8" CASING
FISHING
DEPTH (in feet)
DEFECT BHA
CIRCULATING OUT GAS KICK
LOG, RUN AND CEMENT 9 5/8" CASING
CIRCULATING AND CONDITIONING HOLE
LOG, RUN AND CEMENT 7 5/8" LINER
TIGHT HOLE
DRILLING ON JUNK
FISHING, LOGGING
REAMING
LOG, SET PLUG AND ABANDON
RIG RELEASED 6:00 A.M. 1/7/80
CORE # 1 3280' to 3306'
CORE # 2 3820' to 3830'
CORE # 3 5552' to 5562'
CORE # 4 6504' to 6514'
CORE # 5 7870' to 7880'
CORE # 6 8782' to 8810'
CORE # 7 10,472' to 10,502'
CORE # 8 10,671' to 10,702'
CORE # 9 10,910' to 10,940'
CORE # 10 11,672' to 11,694'
CORE # 11 12,367' to 12,397'
CORE # 12 14,846' to 14,856'
CORE # 13 15,408' to 15,438'
TEST BOPE
CORE # 14 16,236' to 16,261'
CORE # 15 16,929' to 16,959'
CORE # 16 17,134' to 17,145'
CORE # 17 17,255' to 17,286'
CORE # 18 17,838' to 17,868'
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440
DRILLING TIME (in days)
TUNALIK TEST WELL No. 1
2403' FSL and 1486' FEL
SEC. 20, T10N, R36W, U.M.
HUSKY OIL N.P.R. Operations
NATIONAL PETROLEUM RESERVE in ALASKA
DRILLING TIME CURVE

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ARCTIC DRILLING SERVICES

3139 Denali Street

30" @ 516'

20" @ 2584'

DRILLING MUD RECORD

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska CASING PROGRAM: 13-3/8 inch at 8298 ft.

WELL Tunalik Test Well No. 1 COUNTY North Slope 9-5/8 inch at 12,385 ft.

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W 7-5/8 inch at 14,719 ft.

STOCKPOINT _____ DATE _____ ENGINEER _____ TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1978	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/10 min Strip ☐ Meter ☐		ml API	HTHP ? °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, ml/ml	
11/10	80	8.7	80	16	39	32/38	8	28		3			300	80	0	3	0	97		Mixed spud mud. Drilled
11/11	510	9.2	100	27	40	30/33	7.5	14.5		3			600	20	1	7	0	93		Logging.
11/12	510	9.3	80	25	34	37/42	7.5	15		3			600	20	3/4	7	0	93		Opened hole to 36".
11/13	513	10.2	80	21	41	32/53	7.5	12		4			700	40	1	11	0	89		Continued opening hole.
11/14	513	9.8	37	8	0	0	7.5	12.5		3			700	20	1/4	7	0	93		Ran and cemented 30".
11/15	513	9.8	37	8	0	0	7.5	14		3			700	20	1/4	7	0	93		
11/16	565	9.9	37	7	1	0	7.5	15		3			700	20	0	7	0	93		Drilling 17 1/2" hole.
11/17	1534	10.1	33	8	1	0	11.5	11		3			700	20	1/2	12	0	88		
11/18	1934	10.1	34	7	4	0/1	8.5	11		2			450	26	1/2	11	0	89		Drilling ahead.
11/19	2490	9.9	37	10	11	3/7	8.3	12		2			350	28	1/2	10	0	90		Drilling.
11/20	2630	9.9	45	11	17	4/10	8.3	12		3			300	28	3/4	10	0	90		POH to log.
11/21	2630	9.8	40	12	18	4/11	8.3	12		3			300	36	3/4	10	0	90		Logging.
11/22	2630	9.8	38	11	14	4/09	8.3	11.5		3			300	Tr	1/2	10	0	90		Fishing for pilot bit.
11/23	2630	9.8	37	8	11	4/11	8.3	11.5		3			300	18	1/2	10	0	90		Fishing.
11/24	2630	9.7	37	8	11	4/12	8.3	11		3			300	18	1/2	10	0	90		Fishing.
11/25	2630	9.7	37	8	11	4/12	8.3	11		3			300	12	1/4	10	0	90		Fishing.
11/26	2630	9.8	41	11	17	4/15	8.5	11.5		3			300	12	1/4	10	0	90		Fishing.
11/27	2630	9.7	40	12	18	4/15	8.5	11		3			300	18	1/4	10	0	40		Fishing.
11/28	2630	9.6	51	15	20	6/22	8.5	11		3			300	18	1/4	9	0	91		Fishing.
11/29	2630	9.7	40	9	14	6/16	8.5	11		3			300	18	1/4	10	0	90		Recovered fish.
11/30	2630	9.8	41	12	18	6/16	8.5	11.5		3			300	18	1/4	10	0	90		Opening hole.
12/1	2630	9.9	38	10	13	6/16	8.5	11.5		3			300	24	1/2	10	0	90		Opening hole.
12/2	2630	10.1	41	13	16	6/25	8.3	11.5		3			300	36	1/2	11	0	89		Opening hole.
12/3	2630	10.2	42	15	20	6/24	8.5	11		3			300	18	1/2	11	0	89		Opening hole.
12/4	2630	10.2	38	10	15	4/16	8.5	10.5		3			300	12	1/4	11	0	89		POH to run 20".
12/5	2630	10.2	38	10	15	4/15	8.5	10.5		3			300	20	1/4	11	0	89		Running 20".
12/6																				Cleaning mud pits.
12/7	2630	8.9	44	10	24	14/18	9.5	22		3			300	60	0	3	0	97		Mixing mud.
12/8	2630	8.6	36	16	3	2/2	10	12		2			300	60	0	3	0	97		Nippling up.
12/9	2636	8.7	38	16	3	2/6	9	16		2			300	180	Tr	6	0	94		Drilling cement.
12/10	2654	8.7	60	18	28	14/42	10	12		2			7200	30	Tr	6	0	94		Ran globe basket.
12/11	2818	8.8	115	17	44	28/38	9.5	18.5		3			27000	30	1/4	4	0	96		
12/12	2995	8.7	41	12	20	8/28	9.5	16		2			26000	30	0	4	0	96		
12/13	3265	8.9	57	12	27	22/48	10	12.4		2			27000	30	Tr	5	0	95		Drilling.
12/14	3325	8.9	52	10	16	8/22	9.5	10.8		2			24000	30	Tr	7	0	93		Coring.

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ARCTIC DRILLING SERVICES

3139 Denali Street

DRILLING MUD RECORD

30" @ 516'
20" @ 2584'

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

WELL Tunalik Test Well No. 1 COUNTY North Slope

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W

STOCKPOINT _____ DATE _____ ENGINEER _____

CASING PROGRAM: 13-3/8 inch at 8298'
9-5/8 inch at 12,385'
7-5/8 inch at 14,719'

TOTAL DEPTH 20,335

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS			SAND	RETORT			CEC	REMARKS AND TREATMENT
1978-79	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/10 min	Strip Ø Meter Ø	ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
12/15	3775	9.5	59	8	38	12/40	9	9.2		2			28000	30	Tr	10	0	90		
12/16	3830	9.5	47	10	24	15/41	9	10.8		2			26000	30	Tr	11	0	89		Cutting Core No. 2
12/17	4045	9.4	45	8	33	12/22	9.5	12.4		3			24000	100	Tr	11	0	89		
12/18	4220	9.5	58	10	40	18/38	9.5	14		3			25000	100	Tr	11	0	89		Drilling
12/19	4450	9.6	57	10	41	35/42	9	12.4		2			24000	140	Tr	11	0	89		Drilling
12/20	4590	9.5	55	6	38	28/32	9.5	16.5		3			25000	70	Tr	11	0	89		Drilling. Adding KCL.
12/21	4890	9.8	40	11	20	4/22	9	10		1			24000	80	Tr	9	0	91		Drilling.
12/22	5044	9.7	43	9	28	10/38	9.5	10.5		1			25000	110	Tr	8	0	92		Drilling.
12/23	5390	9.5	39	9	19	4/21	9.5	14		1			22000	100	0	6	0	94		Drilling.
12/24	5390	9.5	37	7	16	3/17	9.0	13.5		1			22000	100	0	6	0	94		Drilling.
12/25	5552	9.5	40	8	23	8/23	9	15		2			20000	200	0	6	0	94		Drilling.
12/26	5562	9.4	36	7	15	5/21	9	15		2			21000	220	0	6	0	94		Drilling.
12/27	5778	9.4	36	8	17	8/20	9	14		2			21000	220	0	6	0	94		Drilling.
12/28	5987	9.3	38	6	20	10/20	9	13.5		2			23000	140	0	6	0	94		Drilling.
12/29	6106	9.5	41	8	22	10/21	9	14		2			19000	160	0	6	0	94		Drilling.
12/30	6242	10.1	39	10	20	10/19	9	14.5		2			20000	160	1/2	8	0	92		Well kicked.
12/31	6305	10.0	40	10	20	10/21	9	13.5		2			21000	160	Tr	8	0	92		Drilling.
1/1	6457	10.0	39	7	18	9/18	9	14		3			22500	220	Tr	8	0	92		POH for washout.
1/2	6514	10.0	39	9	20	8/18	9.5	14		2			19000	220	Tr	8	0	92		Drilling.
1/3	6621	10.0	39	9	19	7/19	9	14		2			19500	220	Tr	8	0	92		Drilling.
1/4	6704	10.0	41	10	21	8/21	8.7	13.5		2			19000	220	Tr	8	0	92		Drilling.
1/5	6846	10.1	41	9	21	10/21	9	13.5		3			19000	190	Tr	9	0	91		Drilling.
1/6	6906	10.1	40	10	21	10/19	9	13		3			20000	160	Tr	9	0	91		Drilling.
1/7	7037	10.1	39	8	16	8/17	9	13.5		2			19800	180	0	9	0	91		Drilling.
1/8	7119	10.1	43	10	22	9/20	9.5	13.5		2			19000	80	0	9	0	91		Drilling.
1/9	7225	10.2	42	10	22	8/20	9	13.5		2			19000	120	0	9	0	91		Drilling.
1/10	7281	10.3	45	11	22	13/41	9	14		2			19000	100	0	10	0	90		Drilling.
1/11	7370	10.3	47	9	19	10/47	9	15		3			17000	Tr	0	10	0	90		Drilling. Diluting.
1/12	7436	10.2	44	10	18	9/37	9	14		3			18000	Tr	0	10	0	90		Drilling. Sz of cuttings incsd.
1/13	7515	10.4	48	9	28	15/47	9	14		3			19000	70	0	11	0	89		
1/14	7625	10.5	52	10	30	14/47	9	14		2			20000	70	0	12	0	88		Drilling.
1/15	7641	10.5	47	10	23	12/37	9	14		2			20000	70	0	11	0	89		Drilling.
1/16	7641	10.5	47	10	23	12/37	9	14		2			20000	70	0	11	0	89		
1/17	7750	10.6	51	11	24	11/43	9.5	12		2			19000	80	0	10	0	90		Drilling.
1/18	7871	10.6	52	11	27	14/45	9	14		2			20000	40	0	11	0	89		Drilling at 6 ft/hr.

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ARCTIC DRILLING SERVICES

3139 Denali Street

DRILLING MUD RECORD

30" @ 516'

20" @ 2584'

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

WELL Tunalik Test Well No. 1 COUNTY North Slope

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W

CASING PROGRAM: 13-3/8 inch at 8298

9-5/8 inch at 12,385

7-5/8 inch at 14,719

STOCKPOINT _____ DATE _____ ENGINEER _____ TOTAL DEPTH 20,335

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1979	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/10 min	Strip □ Meter □	ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
1/19	7880	10.7	52	11	27	13/45	9.5	13		2			20000	50	0	11	0	89		Cut 10 foot core.
1/20	8025	10.7	45	12	21	12/45	9	13		2			19000	50	0	11	0	89		Raised mud weight.
1/21	8125	11.3	55	13	27	15/45	9	12		2			19000	60	1/4	16	0	84		Conditioned mud.
1/22	8150	11.5	58	17	28	15/55	9	15		3			19000	60	1/2	18	Tr	82		Gas and sloughing shale.
1/23	8245	11.7	49	14	28	14/45	9	12.5		2			19000	70	1/4	16	Tr	84		Mud gas cut to 10.8.
1/24	8301	12.4	65	15	33	20/60	9	13		3			20000	80	1/4	20	Tr	80		Drilling with gas cut mud.
1/25	8301	12.5	55	15	28	15/50	9	13		3			20000	80	1/4	20	Tr	80		Logging.
1/26	8301	12.6	55	15	28	14/45	9	13		3			19000	80	1/4	18	Tr	82		Wiper trip.
1/27	8301	12.6	55	15	28	14/45	9	13		3			19000	80	1/4	18	Tr	82		Logging.
1/28	8301	12.7	55	15	27	13/42	9	13		2			19000	80	1/4	18	Tr	82		Two wiper runs.
1/29	8301	12.5	42	16	12	8/22	8.5	14		2			18000	80	1/4	17	Tr	83		Running 13 3/8" casing.
1/30	8301	12.7	50	14	19	10/35	8.5	13.5		3			19000	80	1/4	17	Tr	83		Circulating casing.
1/31	8301	12.5	50	14	20	9/33	8.5	14		2			19000	80	1/4	17	Tr	83		Cementing casing.
2/1	8301	12.4	48	13	18	8/20	9	15		2			19000	60	1/4	17	Tr	83		WOC.
2/2	8301	12.4	48	13	18	8/19	8.5	15		2			19000	60	1/4	17	Tr	83		Nippling up.
2/3	8301	12.4	48	13	17	7/18	8.5	15		2			19000	60	1/4	17	Tr	83		Nippling up.
2/4	8301	12.1	46	12	15	6/13	8.5	15		2			15000	40	1/4	16	0	84		Cementing second stage.
2/5	8301	12.0	46	14	20	5/26	10.5	18		3			13000	400	1/4	16	0	84		Treating mud for cement.
2/6	8301	11.4	39	15	6	4/28	12	23		3			11000	900	1/4	15	0	85		Cemented RTTS in hole.
2/7	8301	11.1	37	13	6	3/14	11	24		3			10000	200	1/4	15	0	85		Fishing.
2/8	8301	10.5	32	8	4	1/6	11	30		3			10000	120	Tr	14	0	86		Washing over RTTS.
2/9	8301	10.6	33	8	4	2/7	11	30		3			10000	120	Tr	14	0	86		Washing over RTTS.
2/10	8301	11.1	46	12	19	5/30	11	25		2			10000	120	Tr	14	0	86		Washing over RTTS.
2/11	8301	11.0	45	13	18	5/16	11	24		2			10000	80	Tr	14	0	86		Washing over RTTS.
2/12	8301	11.0	42	11	13	4/13	11	26		2			10000	80	Tr	14	0	86		Washing over RTTS.
2/13	8301	10.9	40	14	18	3/20	10.5	24		2			10000	80	Tr	14	0	86		Fishing.
2/14	8301	10.9	40	14	18	3/20	10.5	24		2			10000	80	Tr	14	0	86		Washing over RTTS.
2/15	8301	10.8	43	13	19	4/22	10.5	23		2			10000	80	Tr	14	0	86		Washing over RTTS.
2/16	8301	11.3	48	12	17	3/20	10.0	26		2			9000	40	Tr	15	0	85		Cleaning pits.
2/17	8301	11.4	38	13	14	2/17	9.0	20		2			10000	80	Tr	14	0	86		Cleaning pits; building volume.
2/18	8301	11.4	48	19	15	4/16	10.5	18		4			10000	400	Tr	14	0	86		Drilling cement.
2/19	8378	11.3	44	22	24	17/41	10.5	9		2			22000	120	1/4	15	0	85		Drilling.
2/20	8461	11.3	48	19	17	11/45	10	9		2			25000	280	1/4	16	0	84		Drilling at 14 ft/hr.
2/21	8700	11.4	44	18	15	9/48	10	7		2			27000	240	1/4	17	0	84		Drilling.
2/22	8800	11.4	55	20	19	12/55	10	7		2			27000	280	1/4	16	0	84		Coring.

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ARCTIC DRILLING SERVICES

3139 Denali Street

DRILLING MUD RECORD

30" @ 516'
20" @ 2584'

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

WELL Tunalik Test Well No. 1 COUNTY North Slope

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W

STOCKPOINT _____ DATE _____ ENGINEER _____

CASING PROGRAM: 13-3/8 inch at 8298 ft.
9-5/8 inch at 12,385 ft.
7-5/8 inch at 14,719 ft.

TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1979	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/ 10 min	Strip Ø Meter Ø	ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
2/23	8864	11.5	45	18	15	11/37	10	7		2			26000	260	Tr	16	0	84		Drilling. Mud gas cut.
2/24	9040	12	45	21	18	13/51	10	6		2			26000	260	Tr	17	0	83		Drilling break. Raising mud wt.
2/25	9180	12.5	47	22	18	13/60	9.5	6		2			27000	260	0	21	0	79		Raising mud weight.
2/26	9302	12.5	47	24	14	12/52	10	7		2			24000	260	Tr	20	0	80		Drilling with high gas.
2/27	9491	12.5	45	20	15	11/46	10	7		2			25000	260	1/4	20	0	80		Drilling ahead.
2/28	9650	12.7	47	24	21	13/57	10	7		2			25000	260	1/4	21	0	79		Drilling; raising mud weight.
3/1	9822	12.7	45	23	21	13/60	9.5	9		2			26000	280	Tr	21	0	79		Drilling.
3/2	9930	12.7	48	22	18	12/57	10	8		3			23000	240	Tr	20	0	80		Drilling.
3/3	10070	12.7	60	31	28	15/68	10	8		4			25000	240	Tr	21	0	79		Drilling.
3/4	10210	12.5	56	27	17	15/61	9.5	10		4			24000	200	1/4	20	0	80		Drilling.
3/5	10315	12.7	49	25	17	21/70	9.0	12		4			24000	200	1/4	20	0	80		Drilling; mud foaming.
3/6	10430	12.7	53	24	17	12/67	10	14		4			18000	160	1/2	20	0	80		Drilling.
3/7	10472	12.5	48	18	9	8/35	10	14		4			20000	120	1/2	20	0	80		RIH to core.
3/8	10502	13.0	40	18	9	8/36	10	14		4			27000	120	1/4	20	0	80		Coring.
3/9	10590	13.0	45	20	8	9/65	10	11		4			27000	120	1/4	21	0	79		Drilling.
3/10	10640	13.0	42	19	11	5/47	9	4		4			27000	120	1/4	20	0	80		Drilling; tested formation.
3/11	10681	13.0	45	24	10	5/38	9.5	7		4			27000	120	1/4	20	0	80		Coring.
3/12	10702	13.0	45	23	15	12/40	10	6		3			27000	100	1/4	20	0	80		Working on rig.
3/13	10748	13.0	45	22	15	10/59	10	6		3			27000	120	1/4	20	0	80		Drilling.
3/14	10858	13.0	48	22	21	13/55	9.0	7		3			27000	120	1/4	20	0	80		Drilling.
3/15	10910	13.0	48	22	22	14/60	10.0	7		3			27000	100	1/4	20	0	80		Drilling.
3/16	10940	13.0	48	23	20	17/50	9.5	7		3			27000	100	1/4	20	0	80		Coring.
3/17	10955	13.0	48	19	19	16/48	9.5	7		3			27000	100	1/4	20	0	80		Drilling; shale sloughing.
3/18	10984	13.1	50	21	18	17/55	10	7		3			27000	100	1/4	21	0	79		Drilling; raising mud weight.
3/19	11077	13.2	48	21	20	14/60	10	7		3			27000	100	1/4	20	0	80		Drilling.
3/20	11077	13.2	47	23	21	19/64	9.5	7		3			27000	100	1/4	20	0	80		Drilling.
3/21	11142	13.2	45	23	19	18/64	9.0	7		3			27000	100	1/4	20	0	80		Drilling.
3/22	11208	13.2	46	22	24	17/65	9.5	7		3			27000	100	1/4	20	0	80		Drilling.
3/23	11251	13.2	56	25	25	15/65	10.2	7		3			27000	88	1/4	20	0	80		Drilling.
3/24	11308	13.3	45	20	22	17/60	9.5	7		3			27000	48	1/4	20	0	80		Drilling.
3/25	11308	13.3	52	25	19	13/45	9.5	7		3			27000	48	1/4	20	0	80		Fishing for BHA.
3/26	11330	13.2	47	20	15	12/50	9.0	7		3			27000	48	1/4	20	0	80		Drilling.
3/27	11434	13.2	47	19	20	9/47	9.0	7		3			27000	45	1/4	20	0	80		Drilling.
3/28	11484	13.2	46	18	19	11/50	9.0	7		3			27000	45	1/4	20	0	80		Drilling.
3/29	11611	13.2	48	19	21	12/55	9.0	6.5		2			27000	45	1/4	20	0	80		Drilling.

ARCTIC DRILLING SERVICES

3139 Denali Street

DRILLING MUD RECORD

30" @ 516'

20" @ 2584'

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

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9-5/8 inch at 12,385 ft.
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TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1979	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/10 min	Strip ☐ Meter ☐	ml API	HTHP @ °F	Cake 32nds	Pm	Pv/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
3/30	11678	13.2	49	21	22	12/58	9	6.5		2			27000	40	1/4	21	0	79		Coring.
3/31	11694	13.3	46	17	22	8/50	9	7		2			28000	40	Tr	20	0	80		Coring.
4/1	11738	13.3	43	17	18	7/52	9	7.5		3			27000	40	Tr	20	0	80		Drilling.
4/2	11858	13.4	54	21	24	11/57	9	6.5		3			27000	40	Tr	21	0	79		Drilling.
4/3	11991	13.3	51	21	24	11/58	9	7.5		3			25000	40	1/4	21	0	79		Drilling.
4/4	12075	13.3	50	20	24	11/55	9	7.5		3			27000	40	Tr	21	0	79		Drilling.
4/5	12195	13.4	55	20	21	11/55	9.5	7.5		3			26000	40	1/4	21	0	79		Drilling.
4/6	12317	13.5	49	18	23	11/60	9	8		3			29000	40	Tr	22	0	79		Drilling.
4/7	12428	13.5	49	18	23	10/58	9	8		3			26000	20	Tr	23	0	77		Drilling.
4/8	12540	13.5	44	18	23	10/55	9	7		3			26000	60	Tr	22	0	78		Drilling.
4/9	12557	14.3	50	20	23	8/50	9	9		3			25000	60	Tr	24	0	76		Well kicked; built weight.
4/10	12557	15.1	51	22	15	7/23	9	6		3			23000	50	Tr	22	0	78		Lost circulation at 14.7.
4/11	12557	15.1	55	23	15	6/12	9.5	6		3			18000	50	0	20	0	80		Killing well.
4/12	12557	15.2	55	25	15	8/24	8.5	8		3			20000	40	Tr	25	0	75		Circulating on choke.
4/13	12557	15.2	55	25	15	8/20	8.5	8		3			20000	80	Tr	25	0	75		Circulating on choke.
4/14	12557	15.2	55	25	15	8/20	9	8		3			15000	90	Tr	25	0	75		Attempting to kill well.
4/15	12557	15.3	55	25	16	8/22	9	8		3			15000	120	Tr	25	0	75		Circulating on choke.
4/16	12557	15.4	56	26	16	8/25	9	8		3			15000	180	Tr	26	0	74		Circulating on choke.
4/17	12557	15.6	56	26	16	8/25	9	8		3			15000	180	Tr	26	0	74		Raised mud weight.
4/18	12557	15.6	58	30	18	8/25	9	6		3			16000	180	Tr	26	0	74		Circulating on choke.
4/19	12557	15.6	55	25	15	6/18	9	6		3			10000	140	Tr	26	0	74		Losing mud.
4/20	12557	15.6	54	24	14	5/15	9	7		3			13000	140	Tr	26	0	74		Circulating on choke.
4/21	12557	15.4	48	25	10	4/12	9	8		3			29000	280	Tr	25	0	75		Circulating on choke.
4/22	12557	15.4	50	25	10	6/15	8.5	6		3			28000	160	Tr	26	0	74		Circulating on choke.
4/23	12557	15.4	50	25	10	8/15	8.5	8		3			26000	160	Tr	26	0	74		Circulating on choke; CO_2 gas.
4/24	12557	15.4	50	25	10	8/12	9	9		3			25000	140	Tr	26	0	74		Circulating on choke.
4/25	12557	15.4	50	25	10	8/15	9	8		3			19000	100	Tr	26	0	75		Circulating on choke.
4/26	12557	15.4	50	25	10	8/15	9	7		3			23000	80	Tr	26	0	74		Circulating on choke.
4/27	12557	15.4	50	25	10	8/16	9	6.5		3			23000	120	Tr	26	0	74		Circulating on choke.
4/28	12557	15.2	55	20	10	7/16	9.5	7.5		3			20500	150	Tr	26	0	74		Circulating on choke.
4/29	12557	15.2	55	24	12	6/16	9	7		3			22000	80	Tr	26	0	74		Circulating on choke.
4/30	12557	15.5	58	26	14	8/16	9	7.5		3			21000	80	Tr	28	0	72		Reaming at 1,000 feet.
5/1	12557	15.1	56	25	12	8/16	9	8		3			20000	50	Tr	28	0	72		Circulating on choke.
5/2	12557	15.2	55	25	12	7/18	9	8.5		3			18000	80	Tr	28	0	72		Circulating on choke.
5/3	12557	15.4	60	26	13	8/20	9.5	8.5		3			17000	80	Tr	29	0	71		Circulating on choke.

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ARCTIC DRILLING SERVICES

3139 Denali Street

30" @ 516'

20" @ 2584'

DRILLING MUD RECORD

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

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1979	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/10 min	Strip ☐ Meter ☐	ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
5/4	12557	15.2	60	26	12	8/18	9.5	8		3			18000	80	Tr	26	0	74		Circulating on choke.
5/5	12557	15.2	58	26	15	8/20	9	9		3			22000	80	Tr	25	0	75		Circulating on choke.
5/6	12557	15.2	58	27	14	8/20	8	8		3			20000	80	Tr	25	0	75		Circulating on choke.
5/7	12557	15.2	52	24	10	6/16	9	8		3			20000	100	Tr	25	0	75		Circulating on choke.
5/8	12557	15.2	52	24	13	6/18	9.5	8		3			20000	100	Tr	25	0	75		Circulating on choke.
5/9	12557	15.3	44	22	9	5/14	9	7		3			20000	110	Tr	25	0	75		Circulating on choke.
5/10	12557	15.3	45	22	12	5/18	9	6		3			19000	100	Tr	25	0	75		Circulating on choke.
5/11	12557	15.3	46	22	12	6/18	9	7.5		3			19500	100	Tr	25	0	75		Circulating on choke.
5/12	12557	15.6	48	23	13	6/18	9	8		3			19000	100	Tr	26	0	74		Circulating on choke.
5/13	12557	15.6	44	22	12	5/16	9	7.5		3			18000	110	Tr	25	0	75		Circulating on choke.
5/14	12557	15.7	44	22	13	5/18	9.5	8.5		3			18500	120	Tr	26	0	74		Circulating on choke.
5/15	12557	15.7	45	23	13	6/16	9.5	9		3			19000	100	Tr	26	0	74		Circulating on choke.
5/16	12557	15.7	45	23	12	6/17	9	8.5		3			18000	100	Tr	25	0	75		Circulating on choke.
5/17	12557	15.8	45	23	12	6/18	9.5	7.5		3			17500	100	Tr	25	0	75		Circulating on choke.
5/18	12557	15.9	45	22	13	6/18	9	8		3			18000	100	Tr	25	0	75		Lost circulation.
5/19	12557	15.8	45	22	12	5/16	9.5	9		3			17500	90	Tr	25	0	75		Circulating on choke.
5/20	12557	15.9	43	22	10	5/16	9	9		3			16500	100	Tr	25	0	75		Circulating on choke.
5/21	12557	16.0	44	22	10	5/16	9	9		3			16500	100	Tr	25	0	75		Circulating on choke.
5/22	12557	15.9	46	21	11	5/15	9	8		3			18000	150	Tr	20	0	80		Circulating on choke.
5/23	12557	16.0	44	23	10	5/16	9.5	10		3			18000	100	Tr	24	0	76		Circulating on choke.
5/24	12557	16.0	48	30	16	13/20	9.5	11		3			18000	100	Tr	25	0	75		Circulating on choke.
5/25	12557	16.0	48	30	18	15/30	9.5	12		4			17000	70	Tr	25	0	75		Circulating on choke.
5/26	12557	16.0	49	24	19	14/24	9.5	9.8		3			16500	100	Tr	25	0	75		Circulating on choke.
5/27	12557	16.0	48	25	24	13/29	9.5	9.5		3			16500	100	Tr	25	0	75		Circulating on choke.
5/28	12557	16.0	48	25	20	14/26	10	10.6		3			17000	80	Tr	25	0	75		Circulating on choke.
5/29	12557	16.0	51	26	21	8/20	10	12.8		3			16500	80	Tr	26	0	74		Conditioning for cement plug.
5/30	12557	16.0	52	28	24	16/35	11	13.3		4			17000	200	Tr	26	0	74		Treating for cement.
5/31	12557	16.0	53	27	21	15/29	11	13		4			17000	120	Tr	27	0	73		Logging.
6/1	12557	16.0	54	27	21	14/28	11	13.5		4			17000	120	Tr	27	0	73		Logging.
6/2	12557	16.0	52	28	20	12/27	11	13.4		4			17000	120	Tr	27	0	73		Conditioning for casing.
6/3	12557	16.0	54	28	24	14/29	11	13.8		4			17000	100	Tr	27	0	73		Running 9 5/8" casing.
6/4	12557	16.0	50	26	23	17/31	11	13.9		4			17000	100	Tr	27	0	73		Running 9 5/8" casing.
6/5	12557	16.0	49	46	28	7/13	10.5	7.5		2			5000	24	Tr	26	0	74		Cementing without returns.
6/6	12557	15.8	62	55	40	8/14	10	10		2			3500	100	Tr	26	0	74		Cementing second stage.
6/7	12557	15.5	55	43	29	6/12	10	7.0					3300	80	Tr	26	0	74		Waiting in cement.

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TOTAL DEPTH 20,335 ft.

DATE 1979	DEPTH feet	WEIGHT lb/gal	VISCOSITY Sec API @ °F	VISCOSITY PV @ °F	Yp	GELS 10 sec / 10 min	pH Strip / Meter	FILTRATION ml API	FILTRATION HTHP @ °F	FILTRATION Cake 32nds	FILTRATE ANALYSIS Pm	FILTRATE ANALYSIS Pf/Mf	FILTRATE ANALYSIS Cl ppm	FILTRATE ANALYSIS Ca ppm	SAND %	RETORT Solids %	RETORT Oil %	RETORT Water %	CEC Mud, me/ml	REMARKS AND TREATMENT
6/8	12557	15.2	49	37	21	6/10	10.5	7	6	2			2800	60	Tr	26	0	74		Nipple up.
6/9	12557	15.1	51	36	21	6/9	10.5	7	7	2			2500	100	Tr	27	0	73		Drilling cement.
6/10	12557	15.5	47	26	26	8/29	13	10		2			4200	160	Tr	27	0	73		Drilling cement; mixing mud.
6/11	12557	15.4	45	23	14	5/11	13	10	2	2			4200	160	1/2	27	0	73		Ran CBL; opened upper FO.
6/12	12557	16.0	47	37	13	7/15	12.5	13	2	2			4500	160	1/4	27	0	73		Testing formation.
6/13	12557	16.0	48	36	14	5/28	12.5	21		4			3700	180	Tr	28	0	72		Picking up BHA.
6/14	12572	16.0	48	48	17	6/28	12	19		3			3400	160	Tr	28	0	72		Running shale; coring.
6/15	12596	16.1	50	34	13	5/32	12	9	5	3			3300	100	Tr	29	0	71		Coring.
6/16	12610	16.1	54	32	17	10/49	12	9		3			3000	60	1/2	29	0	71		POH for logs.
6/17	12666	15.9	53	29	18	15/50	12	9	8	3			2800	40	3/4	29	0	71		Drilling.
6/18	12793	16.0	57	30	21	15/65	11.5	9	9	3			2500	40	1	31	0	69		Drilling.
6/19	12930	16.0	55	28	21	14/74	11	9	3	3			2300	60	1	32	0	68		Drilling.
6/20	12988	16.0	56	30	21	15/71	11	9	3	3			2300	40	1	32	0	68		Tripping for bit.
6/21	13079	16.0	51	28	18	14/62	10.5	8	7	3			2300	80	1	32	0	68		Drilling.
6/22	13194	16.0	55	33	21	10/62	10.5	7	4	3			2200	160	3/4	31	0	69		Drilling.
6/23	13287	16.0	57	30	25	13/78	10.5	7	5	3			2200	200	3/4	31	0	69		Drilling.
6/24	13376	16.0	55	31	20	8/65	10.5	6	9	3			2200	220	1	31	0	69		Drilling.
6/25	13424	16.1	55	29	20	10/64	10.5	6	8	3			2200	240	1	32	0	68		Drilling.
6/26	13424	16.2	69	47	23	8/65	10.5	7	0	3			2100	280	1	32	0	68		Bridge at 13,372'.
6/27	13485	16.2	69	42	34	10/64	11.0	5	4	3			2100	160	1/2	32	0	68		Drilling.
6/28	13595	16.3	62	38	28	14/51	11.0	5	2	2			2100	80	1/2	33	0	67		Drilling; raising mud weight.
6/29	13705	16.5	64	40	32	16/61	11.0	5	6	2			2200	40	1/2	34	0	66		Drilling.
6/30	13778	16.5	74	44	32	20/72	11.0	5	8	2			2200	120	1/2	33	0	67		Drilling.
7/1	13826	16.3	64	38	31	12/60	11.0	6	0	2			2200	40	1/2	32	0	68		Drilling.
7/2	13915	16.5	74	50	27	17/84	11.0	6	4	2			2200	20	1/2	33	0	67		Drilling.
7/3	14015	16.6	82	54	39	8/55	11.0	5	0	2			2400	Tr	1	35	0	65		Adding LCM.
7/4	14135	16.8	89	50	34	6/45	10.5	4	2	2			2300	40	1/2	35	0	65		Drilling; pore pressure rising.
7/5	14216	17.2	79	58	40	8/36	11.0	4	6	2			2000	180	1/4	36	0	64		Increasing mud weight.
7/6	14243	17.0	56	51	31	5/24	11.0	4	2	2			2000	140	1/4	36	0	64		Drilling; lost cone.
7/7	14243	17.0	62	45	37	6/38	11.0	4	2	2			2000	140	1/4	36	0	64		Repairing rig.
7/8	14365	17.1	61	58	38	8/35	10.0	4	8	2			2200	Tr	1/4	36	0	64		
7/9	14384	17.1	70	57	37	12/35	10.0	4	2	2			2300	Tr	1/4	36	0	64		Drilling.
7/10	14442	17.1	71	54	29	5/34	10.5	5	0	2			2000	80	1/2	37	0	63		Drilling.
7/11	14455	17.2	65	44	54	7/34	10.0	4	8	2			2100	40	1/2	37	0	63		Drilling.
7/12	14531	17.3	64	60	30	7/23	9.5	4	8	2			2500	60	1/2	36	0	64		Drilling.

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ARCTIC DRILLING SERVICES

3139 Denali Street

30" @ 516'
20" @ 2584'

DRILLING MUD RECORD

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

WELL Tunalik Test Well No. 1 COUNTY North Slope

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W

STOCKPOINT _____ DATE _____ ENGINEER _____

CASING PROGRAM: 13-3/8 inch at 8298 ft.
9-5/8 inch at 12,385 ft.
7-5/8 inch at 14,719 ft.

TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1979	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/ 10 min	Strip ☐ Meter ☐	ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, ms/ml	
7/13	14617	17.8	66	65	35	8/27	10.5	4.2		2			2600	40	3/4	38	0	62		Pore pressure increasing.
7/14	14661	18.0	60	65	35	7/23	10.5	3.9		2			2700	60	3/4	38	0	62	27.5	Lost some mud at 17.9.
7/15	14726	18.1	65	75	25	6/15	10.0	3.1		2			2600	40	1.5	39	0	61		Mixing LCM.
7/16	14726	18.2	60	75	25	6/16	10.0	2.9	18.4	2			2600	80	2	39	0	61		Losing mud; mixing LCM.
7/17	14726	18.1	63	77	33	5/17	10.0	2.7		2			2300	80	4	39	0	61		Sand content reflects LCM.
7/18	14726	18.2	58	65	20	6/13	10.0	2.8		2			2000	80	3	39	0	61		Lost 300 bbls mud.
7/19	14726	18.2	70	80	30	7/31	10.0	2.8		2			1900	120	2	39	0	61		Gained 120 bbls of mud.
7/20	14726	18.2	74	88	29	6/21	9.0	3.5		2			2000	120	3	39	0	61		Circulated with full returns.
7/21	14726	18.2	54	57	16	4/12	10.5	3.5		2			1800	140	5	39	0	61		Raised mud weight to 18.3
7/22	14726	18.2	66	68	24	11/33	9.5	3.4		2			1700	160	5	38	0	62		Had mud gain with pumps off; mud loss with pumps on.
7/23	14726	18.2	75	80	30	11/38	10.5	4.5		2			1600	160	5	39	0	61		Circulating.
7/24	14726	18.2	67	65	15	7/13	10.5	3.0		2			1600	160	7	39	0	61		Circulating & conditioning mud.
7/25	14726	18.3	59	60	20	7/12	10.5	2.2		2			1600	160	6	40	0	60		
7/26	14726	18.2	58	53	14	8/14	10.0	2.6		2			1600	160	5	39	0	61		Logging.
7/27	14726	18.2	65	65	20	8/17	10.5	2.3		2			1600	160	6	40	0	60		Logging.
7/28	14726	18.3	68	65	20	9/17	10.5	2.4		2			1600	160	6	40	0	60		Wiper trip. Logging.
7/29	14726	18.3	62	65	17	8/15	10.0	2.2		2			1700	160	6	40	0	60		Losses at 12510.
7/30	14726	18.3	59	58	19	9/19	10.5	2.0		2			1700	160	6	40	0	60		Wiper trip.
7/31	14726	18.3	60	58	20	8/18	10.5	2.0		2			1700	160	6	40	0	60		Logging.
8/1	14726	18.3	59	55	18	5/13	10.5	1.9		2			1700	140	6	40	0	60		Circulating and conditioning.
8/2	14726	18.3	59	55	18	5/13	10.5	1.9		1			140	100	6	40	0	60		Running 7 5/8" casing.
8/3	14726	18.3	59	55	18	5/15	10.5	1.9		2			140	100	6	40	0	60		Running casing.
8/4	14726	18/3	59	55	18	5/15	10.5	1.9		2			140	100	6	40	0	60		Cementing casing.
8/5	14726	18.3	59	55	18	5/15	10.5	1.8		2			140	100	6	40	0	60		Waiting on cement.
8/6	14726	18.3	58	53	15	5/15	11.0	2.2		2			140	100	6	42	0	58		Testing liner lap.
8/7	14726	18.3	60	55	15	5/15	11.0	2.2		2			140	100	6	42	0	58		Dry testing liner lap.
8/8	14726	18.3	60	58	15	5/15	11.0	2.2		2			140	100	6	42	0	58		Preparing to Arctic Pack.
8/9	14726	18.0	55	50	15	4/12	10.0	2.5		2			160	100	6	40	0	60		Arctic Packing.
8/10	14726	18.0	57	52	17	5/15	10.5	2.7		2			120	100	6	40	0	60		Removing LCM.
8/11	14726	17.6	43	35	9	3/12	10.0	3.0		2			110	100	0	36	0	64		Cleaning mud pits.
8/12	14726	18.3	52	52	18	5/15	10.5	2.5		2			110	90	0	38	0	62		Building mud volume.
8/13	14726	18.3	50	61	11	3/12	10.0	2.7		2			350	0	0	38	0	62		Tested formation to 19.2 equiv.
8/14	14756	18.3	50	61	11	3/12	10.0	2.7		2			300	0	0	38	0	62		Running in hole.
8/15	14856	18.3	55	55	13	4/14	10.5	4.5		2			350	100	1/4	42	0	58		Drilling.

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ARCTIC DRILLING SERVICES

3139 Denali Street

DRILLING MUD RECORD

30" @ 516'

20" @ 2584'

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

WELL Tunalik Test Well No. 1 COUNTY North Slope

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W

STOCKPOINT _____ DATE _____ ENGINEER _____

CASING PROGRAM: 13-3/8 inch at 8298 ft.

9-5/8 inch at 12,385 ft.

7-5/8 inch at 14,719 ft.

TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1979	feet	lb/gal	Sec API @ °F	PY @ °F		10 sec/10 min Strip ☐ Meter ☐		ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
8/16	14905	18.3	58	60	13	6/21	11.0	4.7		2			350	120	1/2	41	0	59		Coring.
8/17	15055	18.3	64	70	20	6/24	10.5	2.5		2			350	100	1/4	40	0	60		Drilling.
8/18	15100	18.4	69	85	20	5/22	10.5	2.4		2			350	120	1/4	40	0	60		Drilling.
8/19	15140	18.4	68	90	20	5/23	10.5	2.4		2			350	100	1/4	41	0	59		Increasing mud weight.
8/20	15270	18.3	62	75	10	4/10	10.0	2.2		2			500	160	1/4	41	0	59		Drilling.
8/21	15400	18.2	66	95	15	4/12	10.5	2.1		2			600	160	1/4	41	0	59		Drilling.
8/22	15435	18.2	67	95	15	4/9	10.5	2.1		2			600	160	1/4	41	0	59		Picking up core barrel.
8/23	15438	18.2	69	90	10	4/12	10.5	2.0		2			700	140	1/4	41	0	59		Coring.
8/24	15490	18.2	66	90	15	4/10	10.0	1.9		1			700	140	1/2	41	0	59		Testing BOPs; drilling.
8/25	15605	18.2	69	95	15	5/12	10.5	2.1		2			800	160	1/2	40	0	60		Drilling.
8/26	15730	18.1	64	80	10	4/8	10.5	1.9		2			800	200	1/4	40	0	60		Drilling.
8/27	15765	18.1	65	80	10	4/9	10.0	1.8		2			800	200	1/4	40	0	60		Drilling.
8/28	15870	18.1	61	80	10	4/6	10.5	2.1		2			850	280	1/2	40	0	60		Drilling.
8/29	15972	18.0	67	90	15	4/7	10.0	2.1		2			850	340	1/2	40	0	60		Drilling.
8/30	16008	18.2	80	101	10	3/9	11.5	1.8		2			1000	340	1/4	40	0	60		Drilling.
8/31	16104	17.9	58	76	9	3/10	11.5	1.6		2			1000	200	1/4	39	0	61		Lowering mud weight.
9/1	16200	17.9	61	74	15	4/10	11.5	1.5		2			1200	240	1/4	40	0	60		Drilling ahead.
9/2	16236	17.8	56	76	12	3/9	11.5	1.6		2			1200	240	1/4	38	0	62		RIH with core barrel.
9/3	16261	17.7	60	83	9	3/10	11.0	1.4		2			1100	200	1/4	38	0	62		Coring.
9/4	16359	17.6	57	72	13	3/8	11.0	1.5		2			1100	80	1/4	37	0	63		Drilling.
9/5	16456	17.4	58	70	12	3/9	11.0	1.5		2			1100	100	1/4	36	0	64		Lowering mud weight.
9/6	16510	17.4	55	67	8	3/8	11.5	1.6		2			1000	80	1/4	35	0	65		Drilling.
9/7	16585	17.3	57	69	13	3/10	11.0	1.6		2			1200	100	1/4	37	0	63		Drilling.
9/8	16717	17.2	62	68	15	3/11	11.5	1.4		2			1200	80	1/4	36	0	64		Drilling.
9/9	16835	17.1	60	64	14	3/10	11.0	1.5		2			1400	100	1/4	36	0	64		Drilling.
9/10	16863	17.1	58	66	15	4/10	11.0	1.5		2			1400	80	1/4	36	0	64		Drilling.
9/11	16922	17.1	60	62	15	3/10	11.5	1.8		2			1200	80	1/4	36	0	64		Drilling.
9/12	16931	17.1	60	66	15	4/6	10.5	1.6		1			1400	60	1/2	36	0	64		POH for Core No. 15.
9/13	16960	17.1	68	65	15	4/6	10.5	1.2		1			1400	60	1/2	36	0	64		Coring.
9/14	16982	17.1	51	58	6	3/5	10.0	1.4		1			1400	60	1/2	35	0	65		Drilling.
9/15	17008	17.1	62	64	15	3/6	10.5	1.4		1			1400	60	1/4	35	0	65		Drilling.
9/16	17077	17.1	58	50	24	4/6	10.5	1.6		1			1200	60	1/2	37	0	63		Drilling.
9/17	17130	17.0	60	62	14	4/15	10.0	1.2		1			1000	60	1/4	35	0	65		Drilling.
9/18	17142	17.0	59	60	18	5/16	10.0	1.2		1			1000	40	1/4	35	0	65		Cutting Core No. 16.
9/19	17158	17.0	58	65	8	4/15	10.0	1.6		1			1000	40	1/2	36	0	64		Drilling.

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ARCTIC DRILLING SERVICES

3139 Denali Street

30" @ 516'

20" @ 2584'

DRILLING MUD RECORD

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

WELL Tunalik Test Well No. 1 COUNTY North Slope

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W

CASING PROGRAM: 13-3/8 inch at 8298 ft.
9-5/8 inch at 12,385 ft.
7-5/8 inch at 14,719 ft.

STOCKPOINT _____ DATE _____ ENGINEER _____ TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION		Cake 32nds	FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1979	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/10 min	Strip ☐ Meter ☐	ml API	HTHP @ °F		Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, ml/ml	
9/20	17200	16.9	65	50	24	4/20	10.5	2.0		1			1000	40	1/4	36	0	64		Drilling.
9/21	17208	16.9	70	61	21	3/22	10.5	2.6		1			1000	40	1/2	36	0	64		Drilling.
9/22	17252	16.7	50	49	14	5/8	10.5	2.0		2			800	40	1/4	33	0	67		Drilling.
9/23	17274	16.7	56	56	16	3/12	10.0	2.0		1			800	40	1/2	33	0	67		Running core barrel.
9/24	17289	16.7	82	64	23	4/26	10.0	3.4		2			625	40	1/2	33	0	67		Trip.
9/25	17326	16.6	68	56	31	5/28	10.5	2.0		1			625	40	1/4	32	0	68		Drilling.
9/26	17337	16.6	94	83	82	20/110	10.0	3.8		2			625	40	1/2	33	0	67		Drilling.
9/27	17366	16.5	90	60	38	9/35	10.5	2.1		2			600	40	1/4	34	0	66		Drilling.
9/28	17367	16.5	90	52	43	9/57	10.5	2.6		2			600	60	1/4	34	0	66		
9/29	17399	16.5	67	46	24	7/28	10.5	2.5		2			500	80	1/4	33	0	67		Drilling at 2 ft/hr.
9/30	17406	16.5	80	50	28	9/42	10.5	3.0		2			500	20	1/4	32	0	68		Drilling with diamond bit.
10/1	17411	16.5	62	48	15	6/17	10.5	2.5		2			500	20	1/4	32	0	68		Circulating at shoe.
10/2	17428	16.5	85	54	29	10/34	10.5	2.6		2			700	20	1/4	32	0	68		Drilling Quartzite.
10/3	17432	16.5	52	43	15	6/28	10.5	2.1		2			700	20	1/4	32	0	68		Discontinuing Lignosulfonate.
10/4	17477	16.4	64	58	14	6/25	10.5	2.0		2			700	Tr	1/4	33	0	67		Drilling Limestone.
10/5	17484	16.4	69	59	17	5/18	10.5	2.9		2			700	Tr	1/2	33	0	67		Drilling.
10/6	17538	16.2	96	55	41	10/46	10.5	4.2		2			900	Tr	1/2	31	0	69		Drilling.
10/7	17552	16.2	52	42	9	5/14	10.5	3.2		2			900	Tr	1/4	31	0	69		Lost 3 cones in hole.
10/8	17552	16.2	52	49	10	6/12	10.5	3.8		2			900	0	1/4	31	0	69		Milling on junk.
10/9	17618	16.0	78	55	20	9/32	10.5	4.4		2			1000	0	1/2	30	0	70		Drilling.
10/10	17657	16.0	62	57	20	8/26	10.5	5.0		2			1100	Tr	1/2	31	0	69		Drilling.
10/11	17736	15.9	57	40	15	3/19	10.5	5.6		2			1100	Tr	1/2	30	0	70		Drilling.
10/12	17745	15.9	55	40	15	3/17	11.2	5.4		2			1100	Tr	1/2	30	0	70		Drilling.
10/13	17807	15.8	62	42	23	4/27	11.2	6.4		2			1100	Tr	1/4	29	0	71		Drilling.
10/14	17858	15.8	68	64	22	6/26	11.1	7.2		2			1100	Tr	1/4	29	0	71		Drilling.
10/15	17870	15.8	68	57	16	4/15	10.9	7.5		2			1100	Tr	1/4	30	0	70		POH for core. Hole tight.
10/16	17880	15.7	50	35	10	3/10	10.9	6.6		2			1100	Tr	1/4	30	0	70		Cutting core.
10/17	17910	15.7	50	45	10	2/12	10.8	7.2		2			1100	Tr	1/4	29	0	71		Drilling.
10/18	17988	15.7	50	35	5	2/7	10.4	7.4		2			1100	Tr	1/4	29	0	71		Drilling.
10/19	18012	15.7	54	43	9	2/7	10.5	6.8		2			1100	Tr	1/4	29	0	71		Drilling.
10/20	18070	15.7	58	50	20	6/18	10.8	5.5		2			1100	Tr	1/4	29	0	71		Drilling.
10/21	18108	15.7	70	67	21	4/18	10.6	5.2		2			1100	Tr	1/4	29	0	71		Pipe stuck at 16827'.
10/22	18108	15.8	58	55	15	3/12	10.7	5.1		2			1200	Tr	1/2	31	0	69		Drilling.
10/23	18126	15.8	59	55	15	3/9	10.4	5.3		2			1200	Tr	1/2	29	0	71		Drilling.
10/24	18156	15.8	60	15	15	3/11	10.1	5.3		2			1200	Tr	1/2	29	0	71		Drilling.

ARCTIC DRILLING SERVICES

3139 Denali Street

30" @ 516'

20" @ 2584'

DRILLING MUD RECORD

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska CASING PROGRAM: 13-3/8 inch at 8298 ft.

WELL Tunalik Test Well No. 1 COUNTY North Slope 9-5/8 inch at 12,385 ft.

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W 7-5/8 inch at 14,719 ft.

STOCKPOINT _____ DATE _____ ENGINEER _____ TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1979	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/ 10 min	Strip ☐ Meter ☐	ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
10/25	18218	15.8	62	56	16	3/9	9.2	5.2		2			1200	Tr	1/4	29	0	71		Drilling.
10/26	18254	15.8	95	82	31	5/25	10.8	5.0		2			1000	Tr	1/4	31	0	69		Hole very tight on trips.
10/27	18285	15.8	80	60	22	5/22	10.8	5.0		2			1000	Tr	1/4	31	0	69		Drilling.
10/28	18299	15.8	60	52	15	3/12	11.0	5.0		2			1000	Tr	1/2	30	0	70		POH for core. Pipe stuck.
10/29	18299	15.8	61	53	14	3/12	11.0	5.0		2			1000	Tr	1/2	30	0	70		Spotted SFT on collars.
10/30	18299	15.9	58	46	20	3/18	10.7	4.8		2			1000	Tr	1/2	30	0	70		Preparing to back off.
10/31	18299	15.8	58	40	18	3/15	10.7	4.8		2			1000	Tr	1/4	30	0	70		Dropped freepoint tool.
11/1	18299	15.8	57	60	16	2/8	10.7	5.0		2			1000	Tr	1/4	30	0	70		Backed off.
11/2	18299	15.8	52	44	18	2/5	10.7	5.0		2			1000	Tr	1/4	29	0	71		Jarred fish loose.
11/3	18299	15.8	58	50	16	3/13	11.2	4.8		2			1000	Tr	1/2	29	0	71		Circulating & conditioning.
11/4	18299	15.8	54	42	18	2/18	11.1	4.8		2			1000	Tr	1/4	29	0	71		Logging.
11/5	18299	15.9	55	48	16	2/8	10.7	5.0		2			1000	Tr	1/4	30	0	70		Logging.
11/6	18299	15.8	52	38	16	2/8	10.7	5.0		2			1000	Tr	1/4	30	0	70		Wiper trip.
11/7	18299	15.9	58	52	12	2/12	10.9	5.4		2			1000	Tr	1/4	30	0	70		Logging.
11/8	18325	15.8	63	55	20	4/26	10.6	5.8		2			1200	Tr	1/2	31	0	69		Drilling.
11/9	18348	15.8	50	30	15	3/25	10.6	5.6		2			1200	Tr	1/2	30	0	70		Drilling; tight hole.
11/10	18390	15.8	58	40	20	4/36	10.8	5.9		2			1200	Tr	1/2	30	0	70		Reaming and drilling.
11/11	18468	15.8	55	25	25	6/58	10.9	6.1		2			1200	Tr	1/4	30	0	70		Drilling.
11/12	18479	15.8	62	45	20	4/48	10.7	6.1		2			1200	Tr	1/4	30	0	70		Tripped for bit; repaired rig.
11/13	18580	15.8	60	53	19	3/26	10.7	6.2		2			1200	Tr	1/2	30	0	70		Drilling.
11/14	18660	15.8	57	55	15	3/11	10.8	6.4		2			1200	Tr	1/2	30	0	70		Drilling.
11/15	18709	15.8	52	45	15	3/9	10.7	6.3		2			1200	Tr	1/2	30	0	70		Drilling.
11/16	18750	15.8	60	60	15	3/12	10.9	6.6		2			1200	Tr	1/2	30	0	70		Drilling.
11/17	18834	15.8	55	55	10	3/8	10.8	6.7		2			1200	Tr	1/2	30	0	70		Drilling.
11/18	18917	15.8	55	52	9	3/9	10.7	6.7		2			1200	Tr	1/2	30	0	70		Drilling.
11/19	18930	15.9	73	65	30	4/10	10.7	6.8		2			1200	Tr	1/2	30	0	70		Tight hole on trip.
11/20	18961	15.8	56	51	13	3/12	10.8	6.8		2			1200	Tr	3/4	30	0	70		Drilling; working pipe.
11/21	18961	15.8	55	48	14	3/8	10.6	6.8		2			1200	Tr	3/4	30	0	70		Working on rig.
11/22	19023	15.7	55	56	11	2/9	10.7	6.4		2			1200	Tr	1/2	30	0	70		Reducing mud weight.
11/23	19080	15.7	65	68	11	3/14	11.0	6.8		2			1200	Tr	1/2	30	0	70		Drilling.
11/24	19092	15.8	58	58	10	2/6	11.0	6.4		2			1200	Tr	1/2	30	0	70		Tripping; working pipe.
11/25	19132	15.5	68	73	14	2/8	10.8	6.8		2			1200	Tr	1/2	30	0	70		Drilling.
11/26	19204	15.6	64	64	6	2/12	10.8	6.8		2			1000	Tr	1/2	29	0	71		Drilling.
11/27	19230	15.6	55	52	10	2/10	10.6	6.4		2			1000	Tr	1/2	29	0	71		Tripping for bit.
11/28	19284	15.6	100	62	8	2/12	10.3	6.6		2			1000	–	1/2	29	0	71		Drilling.

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ARCTIC DRILLING SERVICES

3139 Denali Street

30" @ 516'
20" @ 2584'

DRILLING MUD RECORD

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska

WELL Tunalik Test Well No. 1 COUNTY North Slope

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W

CASING PROGRAM: 13-3/8 inch at 8298 ft.
9-5/8 inch at 12,385 ft.
7-5/8 inch at 14,719 ft.

STOCKPOINT _____ DATE _____ ENGINEER _____ TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS			SAND	RETORT			CEC	REMARKS AND TREATMENT
1979/80	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/ 10 min	Strip ☐ Meter ☐	ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
11/29	19306	15.6	55	50	10	2/10	10.5	6.6		2			1000	Tr	1/2	29	0	71		Drilling.
11/30	19306	15.6	52	49	8	2/8	10.5	6.4		2			1000	Tr	1/2	29	0	71		Drilling.
12/1	19414	15.6	67	75	12	3/14	10.5	6.6		2			1000	Tr	1/2	29	0	71		Drilling.
12/2	19457	15.5	67	72	12	3/12	10.3	6.4		2			1000	Tr	1/4	29	0	71		Drilling.
12/3	19457	15.6	65	66	14	3/18	10.3	6.4		2			1000	Tr	1/4	29	0	71		Tripping.
12/4	19542	15.5	70	70	18	8/32	11.0	6.8		2			1000	Tr	1/4	30	0	70		Drilling.
12/5	19623	15.5	66	75	12	3/14	10.4	6.6		2			1000	Tr	1/4	30	0	70		Drilling.
12/6	19633	15.5	58	52	11	3/14	10.3	6.8		2			1200	Tr	1/4	30	0	70		Tripping.
12/7	19685	15.5	65	68	19	4/18	10.3	6.6		2			1200	Tr	1/4	30	0	70		Drilling.
12/8	19718	15.5	60	55	15	4/15	10.2	6.0		2			1200	Tr	1/4	30	0	70		Drilling.
12/9	19765	15.5	67	70	15	4/16	10.3	6.1		2			1200	Tr	1/4	30	0	70		Drilling.
12/10	19885	15.4	64	76	14	4/16	10.2	6.0		2			1200	Tr	1/2	30	0	70		Drilling.
12/11	19893	15.5	60	50	15	4/16	10.3	5.8		2			1200	Tr	1/2	30	0	70		Tripping; tight hole.
12/12	19893	15.5	65	47	11	3/13	10.1	5.9		2			1200	Tr	1/2	30	0	70		Milling on junk.
12/13	19921	15.5	59	48	14	4/13	10.0	5.8		2			1200	Tr	1/2	30	0	70		Drilling.
12/14	19950	15.5	60	65	15	4/15	10.0	6.1		2			1200	Tr	1/2	30	0	70		Drilling.
12/15	20037	15.5	57	40	15	4/14	10.0	5.8		2			1200	Tr	1/2	30	0	70		Drilling.
12/16	20075	15.5	60	60	15	4/15	9.9	5.7		2			1200	Tr	1/4	30	0	70		Drilling.
12/17	20147	15.5	58	55	20	5/17	10.0	5.8		2			1200	Tr	1/2	30	0	70		Drilling.
12/18	20160	15.5	73	80	15	6/18	9.9	6.1		2			1200	Tr	1/2	30	0	70		Tripping.
12/19	20222	15.5	64	70	20	5/18	10.2	5.7		2			1200	Tr	1/2	30	0	70		Drilling.
12/20	20226	15.5	84	85	17	4/15	10.1	4.8		2			1200	Tr	1/2	30	0	70		Tripping.
12/21	20295	15.6	78	74	24	3/18	10.2	5.2		2			1200	Tr	1/4	30	0	70		Drilling.
12/22	20335	15.5	57	65	8	3/15	10.7	5.0		2			1200	Tr	1/2	30	0	70		POH to log.
12/23	20335	15.5	61	68	15	4/16	10.4	4.6		2			1200	Tr	1/2	30	0	70		Logging.
12/24	20335	15.5	67	67	15	4/16	10.4	4.6		2			1200	Tr	1/2	30	0	70		Fishing for logging tool.
12/25	20335	15.3	46	40	7	2/5	10.2	3.8		2			1200	Tr	1/4	29	0	71		Fishing; mud diluted.
12/26	20335	15.3	58	58	8	2/8	10.2	4.0		2			1200	Tr	1/2	28	0	72		Wiper trip.
12/27	20335	15.4	82	82	10	2/12	10.0	4.6		2			1200	Tr	1/2	28	0	72		Circulating & conditioning mud.
12/28	20335	15.2	63	66	2	2/4	9.8	5.6		2			1200	Tr	1/2	28	0	72		Fishing for Birdwell tool.
12/29	20335	15.2	62	62	2	2/4	9.8	5.6		2			1200	Tr	1/2	28	0	72		Fishing.
12/30	20335	15.2	66	68	8	2/8	9.8	5.6		2			1200	Tr	1/2	28	0	72		Circulating; preparing to plug.
12/31	20335	15.2	80	82	8	2/8	9.8	5.6		2			1200	Tr	1/2	28	0	72		Plugging.
1/1	20335	15.3	56	55	10	3/14	10.3	5.7		2			1200	Tr	1/2	29	0	71		Plugging.
1/2	20335	15.3	53	46	8	2/13	10.3	5.7		2			1200	Tr	1/2	29	0	71		Plugging.

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ARCTIC DRILLING SERVICES

3139 Denali Street

DRILLING MUD RECORD

30" @ 516'
20" @ 2584'

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska CASING PROGRAM: 13-3/8 inch at 8299 ft.

WELL Tunalik Test Well No. 1 COUNTY North Slope 9-5/8 inch at 12,385 ft.

CONTRACTOR Parco, Inc. LOCATION NPRA SEC 20 TWP 10N RNG 36W 7-5/8 inch at 14,719 ft.

STOCKPOINT _____ DATE _____ ENGINEER _____ TOTAL DEPTH 20,335 ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
	feet	lb/gal	Sec API @ °F	PV @ °F		10 sec/10 min	Strip ☐ Meter ☐	ml API	HTHP @ °F	Cake 32nds	Pm	Pf/Mf	Cl ppm	Ca ppm	%	Solids %	Oil %	Water %	Mud, me/ml	
1/3	20335	15.3	52	45	7	2/12	10.2	5.6		2			1200	Tr	1/2	29	0	71		Plugging.
1/4	20335																			Abandoning.

DRILLING BIT RECORD

COMPANY	CONTRACTOR	COUNTY	STATE
Husky Oil Company NPR	Parco, Inc.	North Slope	Alaska

LEASE	WELL NO	SEC	TOWNSHIP	RANGE	BLOCK	FIELD
National Petroleum Reserve	Tunalik Test Well No.1	20	10 North	36 West		

TOOL PUSHER	DRILL PIPE				DRAW WORKS	
DAY DRILLER	TOOL JOINT	MAKE	SIZE	TYPE	POWER H P	UNDER SURF
EVENING DRILLER	DRILL COLLAR	NO	O D	I D	LENGTH	PUMP NO 1 MAKE / MODEL / STROKE	INT DATE
MORNING DRILLER	DRILL COLLAR	NO	O D	I D	LENGTH	PUMP NO 2 MAKE / MODEL / STROKE	I D DATE

BIT NO	BIT SIZE	BIT MFGR	BIT TYPE	SERIAL NO OF BIT	JET SIZE 1	2	3	DEPTH OUT	FTGE	HOURS RUN	ACC HOURS	FT/HR	WEIGHT 1000 LBS	ROTARY R P M	VERT DEV	PUMP PRESS	PUMPS No	Liner	SPM	MUD Wt	Vis	DULL CODE T	B	G	REMARKS FORMATION, CIRC FLUID, ETC	DATE
1	17½	HTC	OACJ	JH225	16	16	18	510	510	15.25	15.25	33	20	130	3/4	1500	1 2	6" 6"	85 85	9.2	90	4	4	I		
2	26	STC	HO	H516	16 16	16 16	16 16	513	513	11.25	26.5	45	15/20	125		1000	1 2	6" 6"	80 80	9.2	85	4	4	I		
3	36	STC	HO	101650	16 16	16 16	16 16	513	513	11	38.5	44.5	15/20	125	3/4	1000	1 2	6" 6"	80 80	9.2	85	2	2	I		
4	17½	Sec	S3SJ	789597	15	15	18	1814	1301	27.5	66	47.3	45	160	1	1450	1 2	6" 6"	80 80	9.2	30	5	3	I		
5	17½	Sec	S3SJ	548352	15	15	18	2500	686	27.5	93.5	24.9	50	160	3/4	1750	1 2	6" 6"	44 94	9.9	36	6	4	I		
6	17½	Sec	S3SJ	780448	15	15	18	2630	130	4.5	96.75	28.8	50	160	-	1750	1 2	6" 6"	44 94	9.9	36					
7	17½	HTC	OSC3A	PH491	16	16	16	2651	21	5.5	102.25	3.8	10/20	100	-	2000	1 2	6" 6"	50 50	8.2	38	3	4	I	Locked w/iron junk	
8	17½	HTC	OSC3J	HS818	16	16	16	2827	173	25.5	127.75	6.7	45	100	1/2	2000	1 2	6" 6"	50 100	8.2	150	6	6	I		
9	17½	HTC	OSC3J	JH224	16	16	16	3280	453	35.5	163.25	12.7	45	100	1/4	2000	1 2	6" 6"	100 50	8.9	57	5	6	I		
10	17½	HTC	OSC3A	PJ317	15	15	15	3820	510	27.5	196.25	18.5	50	140	1/4	2600	2	6	156	9.6	52	6	6	I		
11	17½	HTC	OSC3A	PH751	15	15	15	4220	390	26.5	224	14.7	40/50	140	1/4	2700	2	6	154	9.0	48	5	5	I		
12	17½	HTC	OSC3A	PH750	15	15	15	4590	370	33	257	11.2	40/50	140	1/4	2750	2	6	158	9.6	55	5	6	I		
13	17½	HTC	OSC3A	PJ448	15	15	15	4953	363	30	287	12.1	40/50	140	1/4	2750	2	6	158	9.9	45	6	8	I		
14	17½	HTC	OSC3A	PJ531	15	15	15	5321	368	29	316	12.6	40/50	140	1/2	2750	2	6	154	9.9	38	6	6	I		
15	17½	HTC	OSC3A	PH353	15	15	15	5552	231	22	338	10.5	50	100	3/4	2700	2	6	154	9.9	39	4	5	I		
16	17½	HTC	OSC3A	PH549	15	15	15	5770	208	18.5	358.5	11.2	45/50	140	0	2750	2	6	154	9.0	39	6	5	I		
17	17½	HTC	OSC3JA	PJ453	15	15	15	6040	270	29.5	388	9.2	45/50	130	1 1/4	2750	2	6	150	9.4	40	5	5	I		
18	17½	HTC	OSC3JA	PJ316	15	15	15	6268	228	22	410	10	35/40	135	1 1/2	2750	2	6	150	10	39	4	5	I		
19	17½	HTC	OSC3JA	PJ314	15	15	15	6504	236	32.5	442.5	7.3	45/50	130/140	3/4	2750	2	6	150	10	38	4	6	I		
20	17½	HTC	OSC3JA	PJ191	16	16	15	6696	182	29	471.5	6.1	50/55	110/130	3/4	2750	2	6	150	10	39	3	6	I		
21	17½	HTC	OSC3JA	JB198	16	16	15	6858	162	26.5	498	6.1	45/50	100/110	-	2750	2	6	150	10	40	3	3	I		

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DRILLING BIT RECORD

COMPANY	CONTRACTOR	COUNTY	STATE
Husky Oil Company NPR	Parco, Inc.	North Slope	Alaska

LEASE	WELL NO	SEC	TOWNSHIP	RANGE	BLOCK	FIELD
National Petroleum Reserve	Tunalik Test Well No.1	20	10 North	36 West		

TOOL PUSHER	DRILL PIPE	DRAW WORKS	
DAY DRILLER	TOOL JOINT MAKE / SIZE / TYPE	POWER HP	UNDER SURF
EVENING DRILLER	DRILL COLLAR NO / O D / I D / LENGTH	PUMP NO 1 MAKE / MODEL / STROKE	INT DATE
MORNING DRILLER	DRILL COLLAR NO / O D / I D / LENGTH	PUMP NO 2 MAKE / MODEL / STROKE	T D DATE

BIT NO	BIT SIZE	BIT MFGR	BIT TYPE	SERIAL NO OF BIT	JET SIZE 1	2	3	DEPTH OUT	FTGE	HOURS RUN	ACC HOURS	FT/HR	WEIGHT 1000 LBS	ROTARY R P M	VERT DEV	PUMP PRESS	PUMPS No	Liner	SPM	MUD Wt	Vis	DULL CODE T	B	G	REMARKS FORMATION CIRC FLUID, ETC	DATE
22	17½	HTC	OSC3J A	PJ547	16	16	15	7045	187	33	531	6	45/50	110	3/4	2750	2	6	150	10	44	2	5	I		
23	17½	HTC	OSC3J A	PJ546	16	16	15	7225	180	33.5	564.5	5.4	55	100/110	-	2800	2	6	150	10	41	1	6	I		
24	17½	HTC	OSC3J A	PJ391	16	16	15	7395	170	32.5	597	5.3	55	100/110	3/4	2800	2	6	150	10	43	1	5	I		
25	17½	HTC	OSC3J A	PJ542	16	16	15	7438	43	7	604	6	55	100/110	-	2800	2	6	150	10	43	1	1	I	Jet washed out.	
26	17½	HTC	OSC3J A	PJ544	16	16	15	7641	203	33	637	6.1	55	100/110	-	2800	2	6	150	10	50	1	5	I	One cone loose.	
27	17½	HTC	OSC3J A	PJ390	16	16	15	7870	229	35	672	6.5	60/70	80/90	3/4	2800	2	6	144	10	50	2	6	I		
28	17½	HTC	OSC3J A	PJ533	16	16	15	8138	258	41	716	6.2	65	80/90	1/2	2800	2	6	1	20	55	2	4	I		
29	17½	HTC	OSC3J A	PJ537	16	16	16	8301	163	39	755	4.1	65	90	3/4	2850	2	6	12	6	52	2	5	I	Last 17 1/2" run.	
30	12¼	HTC	X1G	WP374	16	16	16	8385	84	14.5	769.5	5.7	60	90	-	2600	2	6	110	11	44	4	3	I		
31	12¼	HTC	X3A	PM713	11	11	11	8782	397	39	808.5	10.1	60	90	1	3000	2	6	94	11	47	5	4	I		
32	12¼	HTC	X3A	PM709	11	11	11	9180	370	48	864.5	7.7	60	90	1 1/4	3000	2	6	94	12	47	7	5	I		
33	12¼	HTC	X3A	PM789	11	11	11	9411	311	32	896.5	9.7	60	90	1 1/4	3000	2	6	94	12	48	5	8	I		
34	12¼	HTC	X3A	PM730	11	11	11	9840	349	41	937.5	8.6	60	90/100	1 3/4	3100	2	6	90	12	48	3	4	I		
35	12¼	HTC	X3	NM837	11	11	11	10068	228	34.5	972	6.9	70	100	1 1/4	3100	2	6	90	12	48	6	8	I		
36	12¼	HTC	X3	NM874	11	11	11	10316	248	32	1004	7.7	60/70	100	1 1/4	3100	2	6	90	12	58	7	7	I		
37	12¼	HTC	X1G	LJ999	11	11	11	10472	156	21.5	1025.5	7.1	60/70	90/100	-	3100	2	6	90	12	50	3	2	I		
38	12¼	HTC	X3	NM711	11	11	12	10614	112	20.5	1058.5	5.2	60/65	90/100	1 1/4	3100	2	6	90	13	45	7	3	I		
39	12¼	HTC	X1G	SJ978	11	11	12	10671	57	9	1067.5	6.3	45/55	80/90	-	3100	2	6	90	13	42	3	2	I		
40	12¼	SDC	F2	532NR	11	11	12	10910	208	43	1126	4.9	50/60	75	1	3100	2	6	90	13	46	3	2	I		
41	12¼	HTC	X1G	ZK039	11	11	12	10955	15	9.5	1142.5	1.5	20/55	45/60	1 1/2	3100	2	6	90	13	46	8	8	O		
42	12¼	HTC	J7	FK182	11	11	12	10955		10.5	1153	Reaming under-gauge hole										1	1	I		

DRILLING BIT RECORD

COMPANY	CONTRACTOR		COUNTY	STATE
Husky Oil Company NPR	Parco, Inc.		North Slope	Alaska
LEASE	**WELL NO**	**SEC**	**TOWNSHIP**	**RANGE** / **BLOCK** / **FIELD**
National Petroleum Reserve	Tunalik Test Well No.1	20	10 North	36 West

TOOL PUSHER — DRILL PIPE — DRAW WORKS

DAY DRILLER — TOOL JOINT: MAKE / SIZE / TYPE — POWER: H P — UNDER SURF

EVENING DRILLER — DRILL COLLAR: NO / O D / I D / LENGTH — PUMP NO 1: MAKE / MODEL / STROKE — INT DATE

MORNING DRILLER — DRILL COLLAR: NO / O D / I D / LENGTH — PUMP NO 2: MAKE / MODEL / STROKE — T D DATE

BIT NO	BIT SIZE	BIT MFGR	BIT TYPE	SERIAL NO OF BIT	JET SIZE 1	2	3	DEPTH OUT	FTGE	HOURS RUN	ACC HOURS	FT/HR	WEIGHT 1000 LBS	ROTARY R P M	VERT DEV	PUMP PRESS	PUMPS No	Liner	SPM	MUD Wt	Vis	DULL CODE T	B	G	REMARKS FORMATION CIRC FLUID ETC	DATE
43	12¼	STC	F2	431-NR	11	11	12	11078	123	25.5	1178.5	4.8	50	55	1	3100	2	6	90	13	48	8	8	0	One inch under gauge.	
44	12¼	HTC	J33	TN-833	11	11	12	11142	64	19.5	1198	3.5	50	55		3100	2	6	90	13	45	8	8	I		
45	12¼	STC	F3	336-NP	12	12	11	11251	109	24	1222	4.3	50	55	1 1/4	3100	2	6	90	13	46	8	6	½	Center eaten out.	
46	12¼	STC	F3	803-NP	12	12	11	11308	57	14	1236	4.0	45	45	1 1/4	3100	2	6	90	13	46	8	6	I	Center eaten out.	
47	12¼	STC	4JS	332-FT	12	12	12	11308	0	0	1236	0	Didn't get to bottom.			Fishing.										
48	12¼	STC	5JS	477-ER	12	12	12	11460	152	35.5	1271.5	4.2	60	55	-	3100	2	6	86	13	47	5	3	I		
49	12¼	STC	F3	199-ER	12	12	12	11672	212	35	1306.5	4.7	55	50	1 1/4	3100	2	6	86	13	49	5	3	½	Pulled for CB.	
50	12¼	HTC	J08	DZ293	12	12	12	11705	11	3	1315.5	3.2	15/20	60	-	3100	2	6	88	13	45	5	3	I	Used to ream CH.	
51	12¼	STC	F2	346NS	12	12	12	12075	370	65.5	1381	5.6	55/60	50	1 1/4	3100	2	6	88	13	50	3	3			
52	12¼	STC	F2	463-NS	12	12	12	12557	482	91	1475.5	5.2	55/60	45/50	-	3100	P	6	88	13	50	2	2	½	Bit on bottom 6 wks while killing well.	
53	8½	HTC	OSC1G	ND-191	12	12	12	12303	1149	-	-	-	30	75	-	3000	2	5	84	15	47	4	6	I	Drilling cement.	
54	8½	HTC	OSC1G	ND-032	16	16	16	12567	241	1	1476.5	-	35	75	-	2250	2	5	95	15	48	5	5	I	Drilling cement and new hole.	
55	8½	HTC	J22	EC-876	12	12	12	12610	13	2	1483.5	-	35	50	-	2200	1	5	96	16	50	1	1	I	Pulled to test.	
56	8½	Reed	HPSMJ	290979	12	12	12	12988	378	64	1547.5	5.9	35	65/75	-	2500	1	5	92	16	49	2	2	I		
RR55	8½	HTC	J22	EC-876	14	14	14	13424	436	99	1646.5	4.4	45	45/50	-	2000	1	5	90	16	53	2	3			
57	8½	HTC	J22	NT-707	14	14	14	13778	354	75	1721.5	4.7	45/50	45/50	1 1/2	2000	2	5	90	16	67	5	4		Eight broken buttons.	
58	8½	Reed	HPSMJ	290980	14	14	14	14219	441	100.5	1822.5	4.3	45/55	45/60	3/4	2300	2	5	90	17	56	5	4		Lost 1/2 of one cone.	
59	8½	STC	H775	844016	12	12	13	14262	43	11	1833	3.9	40/55	45/60	-	2500	1	5	90	17	68	6	4		Milled on iron.	
60	8½	HTC	J22	JS591	12	12	12	14384	122	38	1871	3.2	40/55	45/60	-	2500	2	5	90	17	70	7	4		Iron on bottom.	
61	8½	HTC	J33	ZW-693	12	12	12	14450	66	29	1890	2.3	40/55	45/60	-	2500	2	5	90	17	68	2	2	I	Wrong bit for formation	
62	8½	STC	F2	VS050	12	12	12	14	276	71	1961															

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DRILLING BIT RECORD

COMPANY	CONTRACTOR	COUNTY	STATE
Husky Oil Company NPR	Parco, Inc.	North Slope	Alaska

LEASE	WELL NO	SEC	TOWNSHIP	RANGE	BLOCK	FIELD
National Petroleum Reserve	Tunalik Test Well No.1	20	10 North	36 West		

TOOL PUSHER	DRILL PIPE	DRAW WORKS	
DAY DRILLER	TOOL JOINTS MAKE / SIZE / TYPE	POWER H P	UNDER SURF
EVENING DRILLER	DRILL COLLAR NO / O D / I D / LENGTH	PUMP NO 1 MAKE / MODEL / STROKE	INT DATE
MORNING DRILLER	DRILL COLLAR NO / O D / I D / LENGTH	PUMP NO 2 MAKE / MODEL / STROKE	T D DATE

BIT NO	BIT SIZE	BIT MFGR	BIT TYPE	SERIAL NO OF BIT	JET SIZE 1	2	3	DEPTH OUT	FTGE	HOURS RUN	ACC HOURS	FT/HR	WEIGHT 1000 LBS	ROTARY R P M	VERT DEV	PUMP PRESS	PUMPS No	Liner	SPM	MUD Wt	Vis	DULL CODE T	B	G	REMARKS FORMATION, CIRC FLUID, ETC	DATE
63	8½	HTC	X1G	SA-034	0	0	0	No hole made with this bit.																		
64	6¼	STC	DGJ	070MB	0	0	0	No hole made with this bit.																		
65	6¼	STC	DGJ	103-NT	0	0	0	14782	56	7	1968	-	20	60	-	2500	1	5	74	18	53	5	6	I	Cones loose.	
66	6¼	STC	DGJ	232-NT	0	0	0	14846	60	9.5	1977.5	-	20	60	5 3/4	2500	2	5	74	18	55	5	6	I	Cones loose.	
67	6¼	STC	F-3	746-KC	11	11	11	15069	213	33	2012.5	6.5	18	45	6 1/4	2800	2	5	70	18	66	3	3	I		
68	6¼	STC	DGJ	620LL	11	11	11	15136	67	12	2024.5	5.5	10/12	45	6 1/4	2800	1	5	70	18	65	2	4	I		
69	6¼	HTC	J-33	VT243	11	11	11	15408	272	48.5	2073	5.6	20	45	3 1/4	2800	2	5	70	18	66	3	4	I	Pulled for CB.	
70	6¼	HTC	J-33	MJ495	11	11	11	15735	297	58	2137.5	5.1	22/24	45	3	2800	2	5	70	18	69	3	7	I		
71	6¼	HTC	J-33	VT210	11	11	11	16008	273	61	2198.5	4.5	18/23	45	4	2800	2	5	70	18	67	2	6	I		
72	6¼	HTC	J-33	VT303	11	11	12	16236	228	54	2252.5	4.2	18/20	45	5	2700	2	5	68	17	58	2	8	I	Bearings out of no. 2 cone.	
73	6¼	HTC	J-33	VT245	10	10	10	16510	249	55.5	2313.5	4.5	20	45	9	3500	2/1	5	72	17	62	2	4	I	Second cone loose.	
74	6¼	HTC	J-33	VT110	10	10	10	16846	336	62.5	2376	5.3	20/25	45	-	3500	1/2	5	72	17	60	2	4	I	Cones heat burned.	
75	6¼	HTC	J-33	HB221	12	12	12	16929	83	31.5	2407.5	2.6	15	40/45	17 1/2	2750	1/2	5	70	17	58	4	6	I	Lost eight buttons.	
RR73	6¼	HTC	J-33	VT245	12	12	12	16929	Clean out run. No new hole.																	
76	6¼	CDP	MD331	9L3195	0	0	0	17134	175	51	2466.5	3.4	15	60/80	17 3/4	3400	2	5	67	17	60				Some damage; diamonds good.	
77	6¼	HTC	J-55	SP-334	12	12	12	17201	52	29.5	2504	1.7	15/20	45	17 3/4	2750	2	5	68	16	58	7	7	I	Seal failure on #2; center 2 rows btns msg.	
78	6¼	STC	F-7	AB6693	12	12	12	17255	54	31.5	2535.5	1.7	15/20	35/40	16 3/4	2800	1	5	68	16	56	3	6	I	One cone loose.	
79	6¼	HTC	J-55	SN551	10	10	10	17331	45	28.5	2573.5	1.2	15/20	35	15 3/4	3400	1	5	66	16	60	7	3	I	No. 2 cone skidded; outer buttons shelled.	
80	6¼	HTC	J-33	VT-246	10	10	10	17366	35	16.5	2590	2.1	15/30	35/45	-	3400	2	5	62	16	60	8	8		No. 2 cone gone; others milled to bearings.	
81	6¼	STC	H7J	849953	12	12	12	17367	1	4.5	2594.5	-	15	45	-	3400	2/1	5	62	16	80	8	8	I	Drilled on junk.	
82	6¼	STC	F7	AB6691	12	12	12	17403	36	19.5	2614	1.8	25	40/42	15 1/2	3400	1/2	5	66	16	80	8	2		Bald & under gauge.	

DRILLING BIT RECORD

COMPANY	CONTRACTOR	COUNTY	STATE
Husky Oil Company NPR	Parco, Inc.	North Slope	Alaska

LEASE	WELL NO	SEC	TOWNSHIP	RANGE	BLOCK	FIELD
National Petroleum Reserve	Tunalik Test Well No.1	20	10 North	36 West		

TOOL PUSHER	DRILL PIPE	DRAW WORKS	
DAY DRILLER	TOOL JOINT MAKE / SIZE / TYPE	POWER H P	UNDER SURF
EVENING DRILLER	DRILL COLLAR NO / O D / I D / LENGTH	PUMP NO 1 MAKE / MODEL / STROKE	INT DATE
MORNING DRILLER	DRILL COLLAR NO / O D / I D / LENGTH	PUMP NO 2 MAKE / MODEL / STROKE	T D DATE

BIT NO	BIT SIZE	BIT MFGR	BIT TYPE	SERIAL NO OF BIT	JET SIZE 1	JET SIZE 2	JET SIZE 3	DEPTH OUT	FTGE	HOURS RUN	ACC HOURS	FT/HR	WEIGHT 1000 LBS	ROTARY R P M	VERT DEV	PUMP PRESS	PUMPS No	PUMPS Liner	PUMPS SPM	MUD Wt	MUD Vis	DULL CODE 1	DULL CODE 2	DULL CODE 3	REMARKS FORMATION, CIRC FLUID, ETC	DATE
83	6½	CDP	MD41	9W-2420	0	0	0	17411	8	10.5	2624.5	1.3	25	60	-	3400	1/2	5	68	16	80				Like new.	
84	6¼	CDP	MD37	9W-2421	0	0	0	17432	21	23.5	2648	1.1	20/30	60/90	-	3300	1	5	65	16	52				Like new.	
85	6¼	Reed	FP73J	111403	11	11	12	17477	45	23	2671	1.9	20/28	40/45	14 1/4	3100	2	5	67	16	64	2	4	I	Good condition.	
86	6¼	STC	F7	AE2442	11	11	12	17553	76	33	2688.5	2.3	25/28	45	-	2800	1	5	68	16	72				Lost three cones.	
87	6¼	STC	F7	AE1970	11	11	12	17617	64	17.5	2688.5	3.6	20/25	45	-	3000									Inside row of inserts missing.	
88	6¼	HTC	J55	SN-541	11	11	12	17745	128	33	2751.5	3.9	20	45	12 1/2	3000	1	5	69	15	55	3	4	I	Good condition; one insert missing.	
89	6¼	HTC	J55	PX585	11	11	12	17858	113	39	2795	2.9	20	45	12 3/4	3000	1	5	68	15	68	2	6	I	Seal in #2 cone questionable.	
90	6¼	HTC	J55	SN593	11	11	12	18012	124	35	2837.5	3.5	20	45	14	3100	1	5	60	15	60	2	4	I	Like new.	
91	6¼	HTC	J55	JB395	12	12	12	18108	96'	27.5	2865	3.5	20/22	45	14.5	3100	1	5	61	15	68	4	6	I	One insert broken.	
92	6¼	STC	F-7	AE2023	12	12	12	18156	48	24	2889	2	19/22	45	-	3100	2	5	61	15	65	3	7	I	Seal missing from no. 2 cone.	
93	6¼	CDP	MD37	9W2453	-	-	-	18295	139	64	2953	2.1	20	55	-	3800	1	5	50	15	76				1/2X3/4" groove cut into face of bit.	
94	6¼	STC	H7	85049	0	0	0	18295	-	-	2953	Clean out trip; cleaned junk off bottom.														
95	6¼	STC	DGJ	978NR	0	0	0	18295	-	-	2953	Clean out run between logs.														
96	6¼	STC	F7	AE2336	12	12	12	18348	53	19	2972	2.8	20	48	-	2950	2	5	60	15	60	2	2	I	Like new.	
97	6¼	Reed	FP72	297858	12	12	12	18479	131	41.5	3013.5	3.2	18/20	45	-	3000	1	5	60	15	62	2	3	I	Good condition.	
98	6¼	Reed	FP72	297853	12	12	12	18709	230	54	3067.5	4.2	18/20	45	-	3100	2	5	61	15	57	4	5	I	Two broken inserts; two cracked inserts.	
99	6¼	Reed	FP72	297857	12	12	12	18917	208	58	3125.5	3.6	18/20	45	-	2950	2	5	64	15	60	8	8	I	Badly damaged.	
100	6¼	STC	F7	AE2333	12	12	12	18961	44	17	3142.5	2.6	18/20	45	13.5	3000	1	5	60	15	58	2	6	I	Badly damaged.	
101	6¼	Reed	FP72	744913	12	12	13	19092	131	48.5	3191	2.7	18/20	45	-	3000	1	5	60	15	58	3	8	I	90% worn.	
102	6¼	Reed	FP72	744915	12	12	13	19233	141	50.5	3241.5	2.7	18/20	45	11.5	3000	2	5	60	15	60	5	7	I	70% worn.	
103	6¼	Reed	FP73	4202151	12	12	13	19361	128	45	3286.5	2.8	18/20	42	-	3000	1	5	60	15	52	2	3	I	Like new.	

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DRILLING BIT RECORD

COMPANY	CONTRACTOR	COUNTY	STATE
Husky Oil Company NPR	Parco, Inc.	North Slope	Alaska

LEASE	WELL NO	SEC	TOWNSHIP	RANGE	BLOCK	FIELD
National Petroleum Reserve	Tunalik Test Well No.1	20	10 North	36 West		

TOOL PUSHER	DRILL PIPE		DRAW WORKS	
DAY DRILLER	TOOL JOINT MAKE / SIZE / TYPE		POWER H.P	UNDER SURF
EVENING DRILLER	DRILL COLLAR NO / O.D. / I.D. / LENGTH		PUMP NO 1 MAKE / MODEL / STROKE	INT DATE
MORNING DRILLER	DRILL COLLAR NO / O.D. / I.D. / LENGTH		PUMP NO 2 MAKE / MODEL / STROKE	T.D. DATE

BIT NO	BIT SIZE	BIT MFGR	BIT TYPE	SERIAL NO OF BIT	JET SIZE 1	2	3	DEPTH OUT	FTGE	HOURS RUN	ACC HOURS	FT/HR	WEIGHT 1000 LBS	ROTARY R P M	VERT DEV	PUMP PRESS	PUMPS No.	Liner	SPM	MUD Wt	Vis	DRILL CODE T	B	G	REMARKS FORMATION, CIRC FLUID, ETC	DATE
104	6¼	Reed	FP72	744914	12	12	13	19459	98	43.5	3330	2.2	18/20	42	12	3000	2	5	60	15	66	8	5	I	All inserts missing.	
105	6¼	Reed	FP73	748265	12	12	13	19633	174	48.5	3378 5/8	3.6	18/20	42	-	3000	1	5	62	15	58	7	7	I	No. 1 cone cracked.	
106	6¼	Smith	F-7	AE2022	13	13	13	19718	85	33.5	3412	2.5	18/20	42		2000	2	5	45	15 5/8	60	2	6	I		
107	6¼	Reed	FP73	748258	12	12	13	19893	175	39.5	3451 5/8	4.4	18/20	42		1900	2	5	45	15 5/8	60	8	8	1/8		
108	6¼	Reed	FP73	887598	12	12	13	19921	28	8	3459 5/8	3.5	18/20	40/45		2000	2	5	45	15 5/8	60	7	4	1/8		
109	6¼	Reed	FP73	299547	12	12	13	20037	116	23	3482 5/8	5.0	18/20	40/45		2000	2	5	45	15 5/8	57	6	4	I		
110	6¼	Reed	FP73	299546	12	12	13	20147	110	30	3512 5/8	3.7	18/20	40/45		1825 1000	2	5	46 30	15 5/8	73	4	5	I		
111	6¼	Reed	FP73	299548	12	12	13	20222	75	24	3536 5/8	3.1	18/20	40/45	12					15 5/8	84	7	7	I		
112	6¼	Reed	FP73	748257	13	13	13	20335	113	35	3571 5/8	3.2	18/20	35/40		1900 1450	2	5	45 35	15.	57	7	7	I		

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INTRODUCTION

After the 1976 drilling season, casing requirements were reviewed and design of casing strings standardized. Every effort was made to minimize weight and grade changes for simplicity, cost effectiveness, and to reduce chances of error during handling and running operations. Casing sizes were selected to accommodate designs for wells from 2,000' to 20,000'. Steel grade selection was the controlling factor on design with low hardness (Rockwell C24-28) steel being selected for Arctic application and possible H_2S environment. Below is listed casing sizes and design criteria required by Husky:

		YIELD STRENGTH (PSI)		MINIMUM PRESSURE REQUIREMENT (PSI)		
SIZE[1]	WEIGHT	MIN.	MAX.	COLLAPSE	BURST	CONNECTION
20"	133#/ft.	55,000	80,000	1,500	3,050	STC
13-3/8"[2]	72#/ft.	95,000	110,000	3,450	5,350	BTC
9-5/8"[3]	53.5#/ft.	95,000	110,000	8,850	7,900	BTC
9-3/4"[3]	59.2#/ft.	95,000	110,000	9,750	8,540	BTC
7"	38#/ft.	95,000	110,000	12,600	9,200	BTC

(1) OD tolerance to be within API requirements unless adjustment absolutely necessary to meet ID requirements.

(2) Special drift to 12.25".

(3) Special drift to 8.50".

The following are additional requirements primarily to assure that the steel exhibits the metallurgical properties for Arctic applications and resistance to hydrogen embrittlement.

1. All pipe that is 13-3/8" OD and smaller to be quenched and tempered.

2. Run Charpy "V" notch tests on two random samples per 50 tons per heat. Minimum acceptance of 15 ft.-lb.@-50°F. Furnish test reports with order.

3. Perform all testing normally required for API approved pipe.

4. Furnish test reports for ladle analysis, quantitative analysis, and all check tests as per API requirements.

In addition, the following handling requirements were made:

1. Collars must be of same steel grade as pipe body.

2. Apply an API modified thread compound on mill-installed collar before bucking on.

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3. Inspect at mill using Tuboscope's Amalog IV or equivalent on 9-3/4" and smaller, and at least magnetic particle on 13-3/8" and 20". All pipe to have special and area inspection together with full length API drifting. (Note special drifting requirements.)

4. Apply Arctic grade grease on all connections before installing thread protectors.

5. Install closed-end type thread protectors. Plastic plugs can be used to secure wrench openings in protectors.

6. Buck up thread protectors with impact wrench. Both mill and third party inspection personnel should observe the installation of thread protectors.

7. Palletize or containerize the tubulars, if possible, prior to shipment from mill. Do not haul pipe like cordwood in gondola railroad cars.

8. All pipe to be Range 3.

9. No "V" notching or metal stenciling on pipe body or collars.

Casing programmed for Tunalik No. 1 was as follows: 42" conductor at ±100', 30" at ±500', 20" at ±2600', 13-3/8" at ±9000', 9-5/8" at ±14,900', 7-5/8" liner at ±17,650', and 5-1/2" liner to a total depth of 19,980' if needed for evaluation. Actual casing run was 42" at 106', 30" at 516', 20" at 2584', 13-5/8" at 8298', 9-5/8" at 12,385', and 7-5/8" liner from 12,029' to 14,719'. The 9-5/8" casing was run high to forecast to aid in regaining control of the well after encountering a gas producing zone at 12,549'. Also, the 7-5/8" liner was run high to forecast to control overpressured shales drilled in the Kingak and Shublik Formations. The 5-1/2" liner was not needed.

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CASING TALLY
SUMMARY SHEET

DATE: November 14, 1978

FIELD National Petroleum Reserve in AK LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 30 " CASING

SUMMARY OF PAGE MEASUREMENTS			
	NO. OF JOINTS	FEET	.00'S
PAGE 1			
PAGE 2			
PAGE 3			
PAGE 4			
PAGE 5			
PAGE 6			
PAGE 7			
PAGE 8			
PAGE 9			
TOTAL			

SUMMARY OF DEPTH CALCULATIONS				
		NO. OF JOINTS	FOOTAGE FEET	.00'S
1	TOTAL CASING ON RACKS	17	664	60
2	LESS CASING OUT (JTS NOS.	4	156	30
3	TOTAL (1 – 2)		508	30
4	SHOE LENGTH		2	65
5	FLOAT LENGTH			
6	MISCELLANEOUS EQUIPMENT LENGTH			
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)		510	99
8	LESS WELL DEPTH (KB REFERENCE)			
9	"UP" ON LANDING JOINT			

Weight indicator before cementing: _____ ; after slack-off: _____ ; inches slacked off _____ .

SUMMARY OF STRING AS RUN								
WEIGHT	GRADE	THREAD	MANUFACTURER	CONDITION NEW-USED	LOCATION IN STRING	NO. OF JOINTS	FOOTAGE	INTERVAL
196	X 32	Vetco		New	JT NO. 1 THRU NO. 13	13	508.30	513 ' – 0 '
					JT NO. Shoe THRU NO.	1	2.65	516 ' – 513 '
					JT NO. THRU NO.			' – '
					JT NO. THRU NO.			' – '
					JT NO. THRU NO.			' – '
					JT NO. THRU NO.			' – '
					JT NO. THRU NO.			' – '

PAGE 1 OF 1 **CASING TALLY** DATE: November 11, 1978

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 30 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	39	45			
2	37	53			
3	39	07			
4	39	04			
5	40	96			
6	39	03			
7	39	03			
8	39	06			
9	39	05			
0	39	07			
TOTAL A	391	29			

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL D					

1	39	00			
2	38	98			
3	39	07			
4	39	08			
5	39	06			
6	39	07			
7	39	06			
8					
9					
0					
TOTAL B	273	32			

1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL E					

1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL C					

TOTAL A	391	29		
TOTAL B	273	32		
TOTAL C	2	65	(Shoe)	
TOTAL D				
TOTAL E				
TOTAL PAGE	667	26		

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CASING OR LINER CEMENT JOB

Lease National Petroleum Reserve Well Tunalik Test Well No. 1 Date November 14, 1978

Size Casing 30" Setting Depth 516' Top (liner hanger) -

Hole Size 36" " Mud Gradient _____ Viscosity 37

Casing Equipment

Howco duplex shoe, _____ float located _____ feet

above shoe, _____ (DV, FO) collars located at _____ feet

and _____ feet.

_____ centralizers located _____

_____

_____ scratchers located _____

_____

Liner hanger and pack off (describe) _____

_____

Miscellaneous (baskets, etc.) _____

_____

Cement (around shoe)

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(1)	1660	Pmfst			14.8	281 Bbls
(2)						

Cement through (DV, FO) Collar at _____ feet

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(3)						
(4)						

Cementing Procedure (around shoe) (cross out where necessary)

Circulated 318 bbls @ 6 BPM, pumped in 30 ~~(cu. ft.)~~, (barrels) water

_____ prewash, used bottom plug (yes, no), mixed cement (1) above 50

minutes, cement (2) above _____ minutes, top plug (yes, no) displaced with

725 ~~(cu. ft.)~~, (barrels) in 1 1/2 minutes at rate of 5 BPM, CFM.

(Bumped plug) (Did not bump plug). Final Pressure _____. Reciprocated

pipe _____ feet while (mixing) and (displacing) cement. Displacing time 1 1/2

minutes. Had full to 14.5; then no circulation (full, partial,

none, etc.). Completed job at 9:15 a.m., ~~p.m.~~

Cementing Procedure (through (DV, FO) at _____ **feet)** (cross out where necessary)

Opened (DV, FO) at _____ a.m., p.m., circulated _____ bbls @ _____ BPM, pumped in

_____ (cu. ft.), (barrels) _____ prewash, mixed cement (3) above

_____ minutes, cement (4) above _____ minutes, dropped closing plug, dis-

placed with _____ (cu. ft.), (barrels) in _____ minutes at rate of _____

_____ BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure _____.

Displacing time _____ minutes. Had _____ circulation

(full, partial, none, etc.)

Remarks (Third Stage Job, etc.)

Lost returns with 14.5 returns to surface. Had fluid up outside cellar. Continued pumping until 14.5 returns reached.

Jim McGee

Foreman

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CASING TALLY
SUMMARY SHEET

DATE: December 4, 1978

FIELD National Petroleum Reserve in AK LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 20 " CASING

SUMMARY OF PAGE MEASUREMENTS			
	NO. OF JOINTS	FEET	.00'S
PAGE 1	50	2092	41
PAGE 2	20	810	86
PAGE 3			
PAGE 4			
PAGE 5			
PAGE 6			
PAGE 7			
PAGE 8			
PAGE 9			
TOTAL		2903	27

SUMMARY OF DEPTH CALCULATIONS				
		NO. OF JOINTS	FOOTAGE	
			FEET	.00'S
1	TOTAL CASING ON RACKS	70	2903	27
2	LESS CASING OUT (JTS NOS.	8	323	32
3	TOTAL (1 - 2)	62	2580	95
4	SHOE LENGTH		2	42
5	FLOAT LENGTH		2	60
6	MISCELLANEOUS EQUIPMENT LENGTH			
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)		2585	97
8	LESS WELL DEPTH (KB REFERENCE)		2584	97
9	"UP" ON LANDING JOINT		1	00

Weight indicator before cementing: 255 ; after slack-off: _____ ; inches slacked off _____ .

SUMMARY OF STRING AS RUN								
WEIGHT	GRADE	THREAD	MANUFACTURER	CONDITION NEW-USED	LOCATION IN STRING	NO. OF JOINTS	FOOTAGE	INTERVAL
					JT NO. THRU NO.			. _ .
					JT NO. THRU NO.			. _ .
					JT NO. THRU NO.			. _ .
					JT NO. THRU NO.			. _ .
					JT NO. THRU NO.			. _ .
					JT NO. THRU NO.			. _ .
					JT NO. THRU NO.			. _ .

PAGE 1 OF 2 **CASING TALLY** DATE: December 1, 1978

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 20 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	41	72			
2	42	60			
3	40	75			
4	40	81			
5	42	52			
6	41	80			
7	43	28			
8	42	25			
9	42	60			
0	40	90			
TOTAL A	419	23			

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	41	25			
2	42	52			
3	39	61			
4	42	24			
5	40	48			
6	43	57			
7	41	90			
8	43	30			
9	43	05			
0	43	45			
TOTAL D	421	37			

1	42	30			
2	42	95			
3	42	17			
4	42	20			
5	43	75			
6	42	84			
7	42	80			
8	44	11			
9	42	45			
0	41	87			
TOTAL B	427	44			

1	36	24			
2	42	62			
3	43	00			
4	41	29			
5	41	33			
6	37	85			
7	41	90			
8	41	52			
9	41	75			
0	41	55			
TOTAL E	409	05			

1	42	83			
2	41	20			
3	43	10			
4	36	65			
5	42	15			
6	39	90			
7	41	02			
8	40	82			
9	42	85			
0	43	17			
TOTAL C	413	69			

TOTAL A	419	23		
TOTAL B	427	44		
TOTAL C	413	69		
TOTAL D	421	37		
TOTAL E	409	05		
TOTAL PAGE	2090	78		

PAGE 2 OF 2 **CASING TALLY** DATE: December 1, 1978

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 20 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	36	02			
2	42	35			
3	41	35			
4	39	05			
5	40	95			
6	35	86			
7	39	95			
8	42	43			
9	41	30			
0	41	71			
TOTAL A	400	97			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL D					

1	40	18			
2	40	62			
3	41	58			
4	36	68			
5	41	57			
6	40	78			
7	41	56			
8	42	30			
9	42	20			
0	42	11			
TOTAL B	409	58			

1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL E					

1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL C					

TOTAL A	400	97		
TOTAL B	409	58		
TOTAL C				
TOTAL D				
TOTAL E				
TOTAL PAGE	810	55		

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CASING OR LINER CEMENT JOB

Lease National Petroleum Reserve Well Tunalik Test Well No. 1 Date December 5, 1978

Size Casing 20" Setting Depth 2584' Top (liner hanger) _____

Hole Size 26" " Mud Gradient 10.2 Viscosity 38

Casing Equipment

2584' shoe, _____ float located _____ feet

above shoe, _____ (DV, FO) collars located at _____ feet

and _____ feet.

_____ centralizers located _____

_____

_____ scratchers located _____

_____

Liner hanger and pack off (describe) _____

_____

Miscellaneous (baskets, etc.) _____

_____

Cement (around shoe)

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(1)	5100		G		14.9	.93
(2)						

Cement through (DV, FO) Collar at _____ feet

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(3)						
(4)						

Cementing Procedure (around shoe) (cross out where necessary)

Circulated _____ bbls @ _____ BPM, pumped in 847 ~~(cu. ft.)~~, (barrels) _____

_____ prewash, used bottom plug ~~(yes~~, no), mixed cement (1) above 135

minutes, cement (2) above _____ minutes, top plug (yes, no) displaced with

28 ~~(cu. ft.)~~, (barrels) in 15 minutes at rate of 2 BPM, ~~CFM;~~

(Bumped plug) (Did not bump plug). Final Pressure 1000. Reciprocated

pipe _____ feet while (mixing) and (displacing) cement. Displacing time 15

minutes. Had full circulation (full, partial,

none, etc.). Completed job at 12:00 a.m., ~~p.m.~~

Cementing Procedure (through (DV, FO) at _____ feet) (cross out where necessary)

Opened (DV, FO) at _____ a.m., p.m., circulated _____ bbls @ _____ BPM, pumped in

_____ (cu. ft.), (barrels) _____ prewash, mixed cement (3) above

_____ minutes, cement (4) above _____ minutes, dropped closing plug, dis-

placed with _____ (cu. ft.), (barrels) in _____ minutes at rate of _____

_____ BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure _____.

Displacing time _____ minutes. Had _____ circulation

(full, partial, none, etc.)

Remarks (Third Stage Job, etc.)

_____

_____

_____

_____

_____

John Williams

Foreman

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CASING TALLY
SUMMARY SHEET

DATE: January 25, 1979

FIELD National Petroleum Reserve in AK LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 13 3/8" CASING

SUMMARY OF PAGE MEASUREMENTS			
	NO. OF JOINTS	FEET	00'S
PAGE 1	50	2048	72
PAGE 2	50	2002	41
PAGE 3	50	2032	71
PAGE 4	50	2049	19
PAGE 5	44	1804	57
PAGE 6			
PAGE 7			
PAGE 8			
PAGE 9			
TOTAL	244	9937	60

SUMMARY OF DEPTH CALCULATIONS				
		NO. OF JOINTS	FOOTAGE FEET	00'S
1	TOTAL CASING ON RACKS	244	9937	60
2	LESS CASING OUT (JTS NOS.	40	1653	55
3	TOTAL (1 - 2)	204	8284	05
4	SHOE LENGTH		2	00
5	FLOAT LENGTH		1	90
6	MISCELLANEOUS EQUIPMENT LENGTH (3 FOs, 3.90 each)		11	70
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)		8299	65
8	LESS WELL DEPTH (KB REFERENCE)		8298	
9	"UP" ON LANDING JOINT			

Weight indicator before cementing: 475,000 ; after slack-off: _____ ; inches slacked off _____ .

SUMMARY OF STRING AS RUN								
WEIGHT	GRADE	THREAD	MANUFACTURER	CONDITION NEW-USED	LOCATION IN STRING	NO OF JOINTS	FOOTAGE	INTERVAL
72#	S-95	Buttress	Lone Star	New	JT NO. 1 THRU NO. 204	204	8284.05	' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '

PAGE 1 OF 5

CASING TALLY

DATE: January 25, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 13 3/8 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	40	29			
2	42	57			
3	41	14			
4	43	18			
5	41	84			
6	41	85			
7	42	52			
8	41	78			
9	42	48			
0	40	94			
TOTAL A	420	59			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	42	68			
2	38	35			
3	38	90			
4	41	70			
5	41	36			
6	42	09			
7	41	98			
8	40	94			
9	37	89			
0	40	54			
TOTAL D	406	43			

1	41	83			
2	42	80			
3	38	10			
4	42	58			
5	41	70			
6	42	08			
7	36	19			
8	36	88			
9	42	88			
0	41	54			
TOTAL B	406	58			

1	35	43			
2	40	19			
3	38	71			
4	42	35			
5	41	42			
6	43	03			
7	37	53			
8	43	60			
9	40	68			
0	40	35			
TOTAL E	403	29			

1	36	42			
2	37	83			
3	42	59			
4	41	87			
5	40	51			
6	41	54			
7	42	74			
8	43	02			
9	42	92			
0	42	39			
TOTAL C	411	83			

TOTAL A	420	59		
TOTAL B	406	58		
TOTAL C	411	83		
TOTAL D	406	43		
TOTAL E	403	29		
TOTAL PAGE	2048	72		

PAGE 2 OF 5 **CASING TALLY** DATE: January 25, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 13 3/8" CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	41	74			
2	36	59			
3	40	55			
4	42	01			
5	34	86			
6	42	83			
7	41	14			
8	40	61			
9	37	56			
0	41	63			
TOTAL A	399	53			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	34	64			
2	37	41			
3	42	88			
4	43	07			
5	41	40			
6	42	53			
7	42	61			
8	43	58			
9	43	18			
0	40	61			
TOTAL D	411	91			

1	37	08			
2	35	28			
3	40	29			
4	36	70			
5	42	09			
6	42	39			
7	42	42			
8	42	05			
9	39	19			
0	36	28			
TOTAL B	393	77			

1	42	77			
2	36	28			
3	41	48			
4	37	15			
5	39	18			
6	41	05			
7	42	58			
8	37	39			
9	41	18			
0	34	63			
TOTAL E	393	69			

1	41	33			
2	42	51			
3	42	34			
4	41	73			
5	43	09			
6	42	03			
7	36	48			
8	41	22			
9	38	15			
0	34	63			
TOTAL C	403	51			

TOTAL A	399	53		
TOTAL B	393	77		
TOTAL C	403	51		
TOTAL D	411	91		
TOTAL E	393	69		
TOTAL PAGE	2002	41		

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PAGE 3 OF 5 **CASING TALLY** DATE: January 25, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 13 3/8 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	42	50			
2	42	56			
3	40	67			
4	44	20			
5	40	98			
6	43	78			
7	39	17			
8	42	75			
9	35	87			
0	39	35			
TOTAL A	411	84			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	41	15			
2	42	88			
3	41	98			
4	37	60			
5	39	46			
6	40	82			
7	39	30			
8	41	12			
9	39	93			
0	40	58			
TOTAL D	404	82			

1	34	57			
2	40	70			
3	42	38			
4	41	32			
5	40	08			
6	41	41			
7	43	21			
8	42	76			
9	41	68			
0	39	08			
TOTAL B	406	79			

1	41	66			
2	41	07			
3	41	22			
4	35	94			
5	39	80			
6	40	28			
7	38	13			
8	41	32			
9	41	73			
0	40	05			
TOTAL E	401	20			

1	40	31			
2	42	52			
3	40	46			
4	40	27			
5	36	56			
6	39	47			
7	41	30			
8	42	43			
9	42	55			
0	42	19			
TOTAL C	408	06			

TOTAL A	411	84			
TOTAL B	406	79			
TOTAL C	408	06			
TOTAL D	404	82			
TOTAL E	401	20			
TOTAL PAGE	2032	71			

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PAGE 4 OF 5 **CASING TALLY** DATE: January 25, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 13 3/8 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	42	99			
2	41	51			
3	41	21			
4	43	41			
5	41	70			
6	40	19			
7	42	58			
8	38	62			
9	40	18			
0	42	08			
TOTAL A	414	47			

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	42	13			
2	41	96			
3	41	81			
4	38	67			
5	42	76			
6	40	24			
7	42	48			
8	42	02			
9	42	12			
0	42	71			
TOTAL D	416	90			

1	42	81			
2	42	31			
3	42	41			
4	43	62			
5	42	15			
6	42	63			
7	37	23			
8	33	95			
9	39	26			
0	42	90			
TOTAL B	409	27			

1	41	20			
2	41	88			
3	42	62			
4	42	79			
5	38	03			
6	41	93			
7	39	18			
8	41	64			
9	36	88			
0	36	12			
TOTAL E	402	87			

1	43	51			
2	43	32			
3	38	43			
4	40	82			
5	33	91			
6	40	46			
7	42	35			
8	40	44			
9	42	32			
0	40	12			
TOTAL C	405	68			

TOTAL A	414	47			
TOTAL B	409	27			
TOTAL C	405	68			
TOTAL D	416	90			
TOTAL E	402	87			
TOTAL PAGE	2049	19			

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PAGE 5 OF 5

CASING TALLY

DATE: January 25, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 13 3/8 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	36	88			
2	38	48			
3	35	23			
4	40	43			
5	41	41			
6	38	82			
7	39	76			
8	41	89			
9	41	44			
0	43	32			
TOTAL A	397	66			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	40	92			
2	40	76			
3	39	86			
4	41	12			
5	37	25			
6	42	66			
7	41	85			
8	41	69			
9	41	48			
0	42	95			
TOTAL D	410	54			

1	39	08			
2	40	05			
3	43	12			
4	40	78			
5	43	27			
6	42	85			
7	41	13			
8	41	10			
9	42	88			
0	42	54			
TOTAL B	416	20			

1	42	91			
2	41	93			
3	38	08			
4	42	46			
5	42	46			
6					
7					
8					
9					
0					
TOTAL E	165	38			

1	38	41			
2	42	48			
3	41	71			
4	41	33			
5	41	20			
6	43	17			
7	39	71			
8	42	08			
9	40	68			
0	44	02			
TOTAL C	414	79			

TOTAL A	397	66		
TOTAL B	416	20		
TOTAL C	414	79		
TOTAL D	410	54		
TOTAL E	165	38		
TOTAL PAGE	1804	57		

CASING OR LINER CEMENT JOB

Lease National Petroleum Reserve Well Tunalik Test Well No. 1 Date January 31, 1979

Size Casing 13 3/8" Setting Depth 8298' Top (liner hanger) _____

Hole Size _____" Mud Gradient _____ Viscosity _____

Casing Equipment

8298' float shoe, duplex float located 85 feet

above shoe, 3 ~~(DV,~~ FO) collars located at 5886, 2885 feet

and 1493 feet.

Thirty-five centralizers located 10 feet above shoe, collars #1, 2, 3, 6, 9-12, 15, 18, 21, 24, 27, and two each above and below each FO.

_____ scratchers located _____

Liner hanger and pack off (describe) _____

Miscellaneous (baskets, etc.) _____

Cement (around shoe)

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(1)	2000	Howco	G	1% CFR 2; .25% HR 7	15.8	410
(2)						

Cement through (DV, FO) Collar at _____ feet

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(3)	1950	Howco	G	1% CFR 2; .1% HR 7	14.2	528 Bbls
(4)	3200	Howco	Pmfst	4% Gel	14.9	607.8 Bbls

Cementing Procedure (around shoe) (cross out where necessary)

Circulated 3000 bbls @ 7 BPM, pumped in 20 ~~(cu. ft.)~~, (barrels) 1% Cla Sta prewash, used bottom plug (~~yes~~, no), mixed cement (1) above 90 minutes, cement (2) above _____ minutes, top plug (~~yes~~, no) displaced with 111 ~~(cu. ft.)~~, (barrels) in 30 minutes at rate of 3 BPM, CFM, (Bumped plug) (Did not bump plug). Final Pressure 200 psi. Reciprocated pipe 0 feet while (mixing) and (displacing) cement. Displacing time 30 minutes. Had full circulation (full, partial, none, etc.). Completed job at 1:00 a.m., ~~p.m.~~

Cementing Procedure (through (DV, FO) at 5886 **feet)** (cross out where necessary)

Opened (~~DV~~, FO) at 1:00 a.m., ~~p.m.~~, circulated 1300 bbls @ 7 BPM, pumped in 20 ~~(cu. ft.)~~, (barrels) 1% Cla-Sta prewash, mixed cement (3) above 120 minutes, cement (4) above _____ minutes, dropped closing plug, displaced with 77 ~~(cu. ft.)~~, (barrels) in 20 minutes at rate of 3 _____ BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure 850. Displacing time _____ minutes. Had full circulation (full, partial, none, etc.)

Remarks (Third Stage Job, etc.)

Opened FO at 2885'; circulated and conditioned mud through FO. Waited on cement 15 hours. Had contaminated mud. Dumped 50 bbls. Mixed 3200 sacks Permafrost cement mixed at 14.9 ppg. Had 14.6 ppg returns. Displaced cement with 5 bbls water and 329 bbls mud. Left 3 bbls cement in DP. CIP at 1:00 AM 2/5/79. Could not get RTTS tool to release. Pulled tool up 20 feet. Could not go down to close FO. FO open at 2885'. After cement set, put 10 bbls of 10.8 ppg $CaCl_2$ in top of 20 X 13 3/8" annulus.

D. L. Fields
Foreman

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CASING TALLY
SUMMARY SHEET

DATE: June 4, 1979

FIELD National Petroleum Reserve in AK LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 3/4 & 9 5/8" CASING

SUMMARY OF PAGE MEASUREMENTS

	NO. OF JOINTS	FEET	.00'S
PAGE 1	50	1946	59
PAGE 2	6	231	55
PAGE 3	50	2000	39
PAGE 4	50	2036	96
PAGE 5	50	2000	82
PAGE 6	50	2005	34
PAGE 7	50	2036	17
PAGE 8	10	407	31
PAGE 9			
TOTAL	316	12,665	13

SUMMARY OF DEPTH CALCULATIONS

		NO. OF JOINTS	FOOTAGE FEET	FOOTAGE .00'S
1	TOTAL CASING ON RACKS	316	12,665	13
2	LESS CASING OUT (JTS NOS. #254 thru #260	7	288	11
3	TOTAL (1 - 2)		12,377	02
4	SHOE LENGTH		2	00
5	FLOAT LENGTH		1	55
6	MISCELLANEOUS EQUIPMENT LENGTH DV + Two FO Tools		11	01
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)		12,391	58
8	LESS WELL DEPTH (KB REFERENCE)		12,385	00
9	"UP" ON LANDING JOINT		6	58

Weight indicator before cementing: 515,000 ; after slack-off: X ; inches slacked off X

After cementing: 460,000. Set casing slips w/510,000 indicator reading.

SUMMARY OF STRING AS RUN

WEIGHT	GRADE	THREAD	MANUFACTURER	CONDITION NEW-USED	LOCATION IN STRING	NO. OF JOINTS	FOOTAGE	INTERVAL
53.5	S-95	Buttress		New	JT NO. 253 THRU NO. 201	53	2155.37	+658 - 2148.79
One Halliburton FO Tool				New	JT NO. THRU NO.		3.86	2148.79 - 2152.65
53.5	S-95	Buttress		New	JT NO. 200 THRU NO. 180	21	846.20	2152.65 - 2998.85
One Halliburton FO Tool				New	JT NO. THRU NO.		3.88	2998.85 - 3002.73
53.5	S-95	Buttress		New	JT NO. 179 THRU NO. 36	144	5795.36	3002.73 - 8798.09
One Halliburton DV Cementer				New	JT NO. THRU NO.		3.27	8798.09 - 8801.36
53.5	S-95	Buttress		New	JT NO. 35 THRU NO. 1	35	1401.95	8801.36 - 10,203.31

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CASING TALLY
SUMMARY SHEET

DATE: June 4, 1979

FIELD National Petroleum Reserve in Alaska LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 3/4 & 9 5/8" CASING

SUMMARY OF PAGE MEASUREMENTS			
	NO. OF JOINTS	FEET	.00'S
PAGE 1			
PAGE 2			
PAGE 3			
PAGE 4			
PAGE 5			
PAGE 6			
PAGE 7			
PAGE 8			
PAGE 9			
TOTAL			

PAGE 2

	SUMMARY OF DEPTH CALCULATIONS	NO. OF JOINTS	FOOTAGE FEET	FOOTAGE 00'S
1	TOTAL CASING ON RACKS			
2	LESS CASING OUT (JTS NOS.			
3	TOTAL (1 - 2)			
4	SHOE LENGTH			
5	FLOAT LENGTH			
6	MISCELLANEOUS EQUIPMENT LENGTH			
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)			
8	LESS WELL DEPTH (KB REFERENCE)			
9	"UP" ON LANDING JOINT			

Weight indicator before cementing: _____ ; after slack-off: _____ ; inches slacked off _____ .

SUMMARY OF STRING AS RUN								
WEIGHT	GRADE	THREAD	MANUFACTURER	CONDITION NEW/USED	LOCATION IN STRING	NO OF JOINTS	FOOTAGE	INTERVAL
59.2	S-95	Buttress		New	JT NO. 56 THRU NO. 4	53	2062.57	10,203.31' - 12,265.88'
Halliburton Shut Off Baffle Installed in Casing Collar of Joint No. 3					JT NO. THRU NO.			12,265.88'
					JT NO. THRU NO.			
59.2	S-95	Buttress		New	JT NO. THRU NO.	1	36.20	12,265.88' - 12,302.08'
Halliburton Float Collar w/Bypass Baffle					JT NO. THRU NO.		1.55	12,302.08' - 12,303.63'
59.2	S-95	Buttress		New	JT NO. THRU NO.	2	79.37	12,303.63' - 12,383.00'
Halliburton Super Seal Float Shoe				New	JT NO. THRU NO.		2.00	12,383.00' - 12,385.00'

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PAGE 1 OF 8

CASING TALLY

DATE: May 30, 1979

FIELD NPRA LEASE & WELL NO. Tumalik Test Well No. 1 TALLY FOR 9 3/4 & 9 5/8 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	38	97			
2	40	40			
3	36	20			
4	39	57			
5	40	10			
6	40	24			
7	35	52			
8	39	50			
9	39	77			
0	35	60			
TOTAL A	385	87			

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	41	63			
2	39	61			
3	40	76			
4	40	50			
5	40	63			
6	39	88			
7	36	00			
8	40	75			
9	39	52			
0	36	10			
TOTAL D	395	38			

1	41	26			
2	37	97			
3	40	15			
4	40	53			
5	34	51			
6	40	46			
7	36	33			
8	40	60			
9	36	39			
0	36	05			
TOTAL B	384	25			

1	37	05			
2	40	49			
3	40	37			
4	38	66			
5	40	32			
6	40	07			
7	39	44			
8	40	37			
9	36	08			
0	40	43			
TOTAL E	393	28			

1	40	44			
2	35	72			
3	39	81			
4	40	24			
5	37	27			
6	43	26			
7	35	97			
8	39	65			
9	36	63			
0	38	82			
TOTAL C	387	81			

TOTAL A	385	87		
TOTAL B	384	25		
TOTAL C	387	81		
TOTAL D	395	38		
TOTAL E	393	28		
TOTAL PAGE	1946	59		

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PAGE 2 OF 8 **CASING TALLY** DATE: May 30, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 5/8 & 9 3/4 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT 00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT 00'S	WT GR.
1	40	49			
2	40	02			
3	39	32			
4	35	89			
5	36	31			
6	39	52			
7					
8					
9					
0					
TOTAL A	231	55			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT 00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT 00'S	WT GR
1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL D					

1				
2				
3				
4				
5				
6				
7				
8				
9				
0				
TOTAL B				

1				
2				
3				
4				
5				
6				
7				
8				
9				
0				
TOTAL E				

1				
2				
3				
4				
5				
6				
7				
8				
9				
0				
TOTAL C				

TOTAL A	231	55		
TOTAL B				
TOTAL C				
TOTAL D				
TOTAL E				
TOTAL PAGE	231	55		

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PAGE 3 OF 8

CASING TALLY

DATE: May 30, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 3/4 & 9 5/8 " CASI..

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	41	11			
2	39	92			
3	41	60			
4	42	42			
5	36	61			
6	37	00			
7	45	64			
8	43	59			
9	38	28			
0	43	19			
TOTAL A	409	36			

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	39	12			
2	40	29			
3	34	25			
4	39	59			
5	42	62			
6	41	58			
7	38	68			
8	36	65			
9	37	85			
0	41	42			
TOTAL D	392	05			

1	41	10			
2	40	75			
3	35	15			
4	40	73			
5	44	57			
6	40	22			
7	35	09			
8	39	29			
9	39	83			
0	36	57			
TOTAL B	393	30			

1	42	02			
2	40	04			
3	35	60			
4	40	37			
5	39	19			
6	38	35			
7	40	70			
8	43	61			
9	41	25			
0	41	13			
TOTAL E	402	26			

1	36	27			
2	41	71			
3	41	15			
4	40	26			
5	39	84			
6	36	47			
7	42	32			
8	42	43			
9	43	95			
0	39	02			
TOTAL C	403	42			

TOTAL A	409	36		
TOTAL B	393	30		
TOTAL C	403	42		
TOTAL D	392	05		
TOTAL E	402	26		
TOTAL PAGE	2000	39		

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PAGE 4 OF 8 **CASING TALLY** DATE: May 30, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 3/4 & 9 5/8 " CASIN

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	38	49			
2	42	19			
3	44	43			
4	37	82			
5	41	05			
6	41	86			
7	41	50			
8	41	88			
9	42	46			
0	38	43			
TOTAL A	410	11			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR
1	41	14			
2	40	30			
3	43	29			
4	43	89			
5	40	57			
6	37	42			
7	46	03			
8	42	89			
9	38	95			
0	41	46			
TOTAL D	415	94			

1	45	00			
2	39	88			
3	41	98			
4	43	71			
5	36	91			
6	42	08			
7	39	98			
8	42	30			
9	35	97			
0	40	62			
TOTAL B	408	43			

1	37	41			
2	42	69			
3	41	44			
4	40	09			
5	41	80			
6	41	76			
7	40	70			
8	41	00			
9	39	59			
0	39	09			
TOTAL E	405	57			

1	41	80			
2	40	65			
3	37	22			
4	35	69			
5	41	62			
6	41	08			
7	39	90			
8	36	92			
9	40	24			
0	41	79			
TOTAL C	396	91			

TOTAL A	410	11		
TOTAL B	408	43		
TOTAL C	396	91		
TOTAL D	415	94		
TOTAL E	405	57		
TOTAL PAGE	2036	96		

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PAGE 5 OF 8 **CASING TALLY** DATE: May 30, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 3/4 & 9 5/8 " CASIN

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	40	66			
2	43	45			
3	38	81			
4	42	21			
5	41	23			
6	35	21			
7	39	52			
8	42	09			
9	40	06			
0	40	41			
TOTAL A	403	65			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR
1	40	89			
2	35	29			
3	39	02			
4	41	50			
5	39	23			
6	39	40			
7	41	79			
8	37	92			
9	40	06			
0	45	89			
TOTAL D	400	99			

1	37	23			
2	35	56			
3	41	17			
4	41	93			
5	41	47			
6	41	26			
7	41	43			
8	41	76			
9	34	60			
0	41	43			
TOTAL B	397	84			

1	40	18			
2	35	35			
3	40	08			
4	41	21			
5	39	55			
6	41	59			
7	37	64			
8	38	00			
9	39	46			
0	39	36			
TOTAL E	392	42			

1	41	45			
2	40	82			
3	40	63			
4	41	98			
5	41	47			
6	41	53			
7	39	86			
8	37	54			
9	43	13			
0	37	51			
TOTAL C	405	92			

TOTAL A	403	65		
TOTAL B	397	84		
TOTAL C	405	92		
TOTAL D	400	99		
TOTAL E	392	42		
TOTAL PAGE	2000	82		

PAGE 6 OF 8 **CASING TALLY** DATE: May 30, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 3/4 & 9 5/8" CASIN

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	38	08			
2	38	90			
3	42	24			
4	37	84			
5	37	85			
6	41	11			
7	45	38			
8	40	05			
9	42	95			
0	39	94			
TOTAL A	404	34			

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR
1	39	62			
2	40	46			
3	42	52			
4	41	52			
5	41	42			
6	41	82			
7	40	51			
8	41	13			
9	42	00			
0	41	29			
TOTAL D	412	29			

1	39	06			
2	41	67			
3	41	22			
4	41	77			
5	41	38			
6	40	08			
7	41	60			
8	41	23			
9	37	51			
0	35	00			
TOTAL B	400	52			

1	41	82			
2	36	85			
3	41	32			
4	41	03			
5	38	39			
6	37	05			
7	39	34			
8	42	95			
9	35	77			
0	38	68			
TOTAL E	393	20			

1	41	53			
2	39	74			
3	34	67			
4	39	08			
5	42	86			
6	39	95			
7	38	71			
8	37	87			
9	39	87			
0	40	71			
TOTAL C	394	99			

TOTAL A	404	34		
TOTAL B	400	52		
TOTAL C	394	99		
TOTAL D	412	29		
TOTAL E	393	20		
TOTAL PAGE	2005	34		

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PAGE 7 OF 8 **CASING TALLY** DATE: May 30, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 3/4 & 6 5/8" CASING

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	45	50			
2	41	29			
3	39	05			
4	38	11			
5	37	54			
6	44	96			
7	41	46			
8	40	20			
9	41	71			
0	42	02			
TOTAL A	411	84			

1	41	16			
2	39	59			
3	42	11			
4	43	21			
5	41	84			
6	35	29			
7	41	83			
8	41	60			
9	39	92			
0	41	78			
TOTAL B	408	33			

1	41	26			
2	42	19			
3	40	90			
4	39	40			
5	41	96			
6	35	84			
7	42	79			
8	34	49			
9	42	43			
0	37	47			
TOTAL C	398	73			

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	41	55			
2	39	90			
3	41	19			
4	40	73			
5	41	72			
6	40	63			
7	44	66			
8	37	59			
9	39	90			
0	42	81			
TOTAL D	410	68			

1	42	02			
2	42	12			
3	40	61			
4	40	06			
5	38	35			
6	42	39			
7	42	12			
8	41	51			
9	40	58			
0	36	83			
TOTAL E	406	59			

TOTAL A	411	84		
TOTAL B	408	33		
TOTAL C	398	73		
TOTAL D	410	68		
TOTAL E	406	59		
TOTAL PAGE	2036	17		

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PAGE 8 OF 8 **CASING TALLY** DATE: May 30, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 9 3/4 & 9 5/8" CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	40	50			
2	41	53			
3	37	17			
4	41	97			
5	41	50			
6	37	02			
7	41	46			
8	41	19			
9	42	85			
0	42	12			
TOTAL A	407	31			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL D					

1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL B					

1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL E					

1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL C					

TOTAL A	407	31		
TOTAL B				
TOTAL C				
TOTAL D				
TOTAL E				
TOTAL PAGE	407	31		

NOTE: Joint #231 was used for the landing joint. Joint #237 was the next joint down. These joints were run last because their OD was 9 5/8". The remainder of the joints were run in numerical order.

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CASING OR LINER CEMENT JOB

Lease National Petroleum Reserve Well Tunalik Test Well No. 1 Date June 3, 1979

Size Casing 9 3/4" and 9 5/8" Setting Depth 12,385' Top (liner hanger) Surface

Hole Size 12 1/4" " Mud Gradient 0.832 Viscosity 49

Casing Equipment

Float shoe, at 12,302' ; float located 83 feet

above shoe, at 12,302' (DV, FO) collars located at 8798' feet

and FOs at 2149 and 2999 feet.

~~centralizers located~~ Halliburton shut off baffle at 12,265'--

three joints above float shoe.

scratchers located

Liner hanger and pack off (describe)

Miscellaneous (baskets, etc.)

Cement (around shoe)

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(1)	1200		"G"	1% CFR 2, 0.2% HR-7, & 0.7% Halad 22A	16.5	228 Bbls
(2)						

Cement through (DV, FO) Collar at feet

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(3)	625		"G"	1% CFR 2 to 2% HR-7	16.5	119 Bbls
(4)						

* Would not circulate after getting casing in hole. Lost fluid in open hole interval.

Cementing Procedure (around shoe) (cross out where necessary)

Circulated * bbls @ _____ BPM, pumped in 10 ~~(cu. ft.)~~, (barrels) 16.5 #/gal SAM 5 prewash, used bottom plug (yes, ~~no~~), mixed cement (1) above 35 minutes, cement (2) above _____ minutes, top plug (yes, ~~no~~) displaced with 230 bbls water 660 bbls mud ~~(cu. ft.)~~, (barrels) in 170 minutes at rate of 5.2 BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure 1570 psi. Reciprocated pipe _____ feet while (mixing) and (displacing) cement. Displacing time 170 minutes. Had 13 3/8 X 9 5/8" annulus full but would not circulate. ~~circulation (full, partial,~~ none, etc.). Completed job at 6:15 a.m., ~~p.m.~~

Cementing Procedure (through (DV, ~~FO~~) at 8798 ~~feet~~ (cross out where necessary)

Opened (DV, FO) at 5:00 a.m., ~~p.m., circulated~~ Well would not circulate. ~~bbls @~~ ~~BPM~~, pumped in 10 ~~(cu. ft.)~~, (barrels) 16.5 #/gal SAM-5 prewash, mixed cement (3) above 30 minutes, cement (4) above 0 minutes, dropped closing plug, displaced with 622 ~~(cu. ft.)~~, (barrels) in 150 minutes at rate of 5.8 _____ BPM, ~~CFM~~. (Bumped plug) ~~(Did not bump plug)~~. Final Pressure 2000 psi. Displacing time 150 minutes. Had no circulation (full, partial, none, etc.)

Remarks (Third Stage Job, etc.)

Well started taking mud while going in hole with 9 5/8" casing. Lost 160 bbls, filling the annulus, while going in hole with last 38 joints of casing. Took 60 bbls to fill casing. Could not get well to circulate. Lost mud to lost-circulation zone in open hole. No returns on either of the two-stage cement jobs.

Donnie Fields and Gene Harmon
Foreman

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CASING TALLY
SUMMARY SHEET

DATE: August 4, 1979

FIELD National Petroleum Reserve in Alaska LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 7 5/8" CASING

SUMMARY OF PAGE MEASUREMENTS			
	NO. OF JOINTS	FEET	.00'S
PAGE 1	76	3228	92
PAGE 2			
PAGE 3			
PAGE 4			
PAGE 5			
PAGE 6			
PAGE 7			
PAGE 8			
PAGE 9			
TOTAL			

SUMMARY OF DEPTH CALCULATIONS				
		NO. OF JOINTS	FOOTAGE FEET	.00'S
1	TOTAL CASING ON RACKS	76	3228	92
2	LESS CASING OUT (JTS NOS.)		561	47
3	TOTAL (1 - 2)		2667	45
4	SHOE LENGTH	1	1	85
5	FLOAT LENGTH	1	1	75
6	MISCELLANEOUS EQUIPMENT LENGTH		19	08
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)		2690	13
8	LESS WELL DEPTH (KB REFERENCE)			
9	"UP" ON LANDING JOINT			

Weight indicator before cementing: 220,000 ; after slack-off: _____ ; inches slacked off _____ .

SUMMARY OF STRING AS RUN								
WEIGHT	GRADE	THREAD	MANUFACTURER	CONDITION NEW USED	LOCATION IN STRING	NO. OF JOINTS	FOOTAGE	INTERVAL
39.0	S-95	ABFL4S		New	JT NO. 1 THRU NO. 63	63	2667.45	14,719.00' - 12,029.00'
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '
					JT NO. THRU NO.			' - '

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PAGE 1 OF 1

CASING TALLY

DATE: July 31, 1979

FIELD NPRA LEASE & WELL NO. Tunalik Test Well No. 1 TALLY FOR 7 5/8 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	42	43			
2	42	73			
3	41	79			
4	38	96			
5	43	62			
6	39	35			
7	39	34			
8	43	62			
9	39	65			
0	42	68			
TOTAL A	414	17			

JOINT NO.	FIRST MEASUREMENT FEET	.00'S	CHECK MEASUREMENT FEET	.00'S	WT GR.
1	41	71			
2	44	55			
3	40	30			
4	41	94			
5	45	20			
6	42	46			
7	42	71			
8	43	34			
9	43	53			
0	43	44			
TOTAL D	429	18			

1	43	27			
2	44	35			
3	40	40			
4	41	99			
5	43	58			
6	43	64			
7	41	48			
8	43	49			
9	43	73			
0	43	28			
TOTAL B	429	21			

1	43	40			
2	42	92			
3	42	62			
4	43	76			
5	41	95			
6	44	20			
7					
8					
9					
0					
TOTAL E	258	85			

1	35	14			
2	43	98			
3	39	28			
4	42	25			
5	43	96			
6	42	90			
7	42	73			
8	41	72			
9	41	96			
0	44	03			
TOTAL C	417	95			

TOTAL A	834	59		
TOTAL B	855	63		
TOTAL C	850	67		
TOTAL D	429	18		
TOTAL E	258	85		
TOTAL PAGE	3228	92		

CASING OR LINER CEMENT JOB

Lease National Petroleum Reserve Well Tunalik Test Well No. 1 Date August 3, 1979

Size Casing 7 5/8" Setting Depth 14,719' Top (liner hanger) 12,029'

Hole Size 8 1/2 " Mud Gradient .94 Viscosity 59

Casing Equipment

_____ shoe, _____ float located 89.66 feet

above shoe. _____ (DV, FO) collars located at _____ feet

and _____ feet.

_____ centralizers located _____

_____

_____ scratchers located _____

_____

Liner hanger and pack off (describe) BOT type

_____

Miscellaneous (baskets, etc.) _____

_____

Cement (around shoe)

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(1)	258		G	1% CFR 2; .5% Halad 22A 0.4% LWL; 35% SSA-2	18.0	330 ft³
(2)				16 pps Hi Dense; 0.5% NFR		

Cement through (DV, FO) Collar at _____ **feet**

	No. Sacks	Brand	Type	Additives	Slurry Weight	Slurry Volume
(3)						
(4)						

190

Cementing Procedure (around shoe) (cross out where necessary)

Circulated 320 bbls @ 4 BPM, pumped in 12 ~~(cu. ft.)~~, (barrels) _____

SAM 5 prewash, used bottom plug (yes, no), mixed cement (1) above 40

minutes, cement (2) above _____ minutes, top plug (yes, no) displaced with

276 ~~(cu. ft.)~~, (barrels) in 85 minutes at rate of 3 to 4.5 BPM, ~~CFM.~~

(Bumped plug) ~~(Did not bump plug)~~. Final Pressure 3000#. Reciprocated

pipe _____ feet while (mixing) and (displacing) cement. Displacing time _____

minutes. Had full circulation (full, partial,

none, etc.). Completed job at 11:00 a.m., ~~p.m.~~

Cementing Procedure (through (DV, FO) at _____ feet) (cross out where necessary)

Opened (DV, FO) at _____ a.m., p.m., circulated _____ bbls @ _____ BPM, pumped in

_____ (cu. ft.), (barrels) _____ prewash, mixed cement (3) above

_____ minutes, cement (4) above _____ minutes, dropped closing plug, dis-

placed with _____ (cu. ft.), (barrels) in _____ minutes at rate of _____

_____ BPM, CFM. (Bumped plug) (Did not bump plug). Final Pressure _____.

Displacing time _____ minutes. Had _____ circulation

(full, partial, none, etc.)

Remarks (Third Stage Job, etc.)

Prewash: 4 BPM - 700#. Mixed cement, 1800-2000# at 5.5 BPM. Displaced 160 bbls.

4 BPM: 116 bbls, 3 BPM. Bumped plug, 276 bbls. No mud loss.

Bob J. Smith

Foreman

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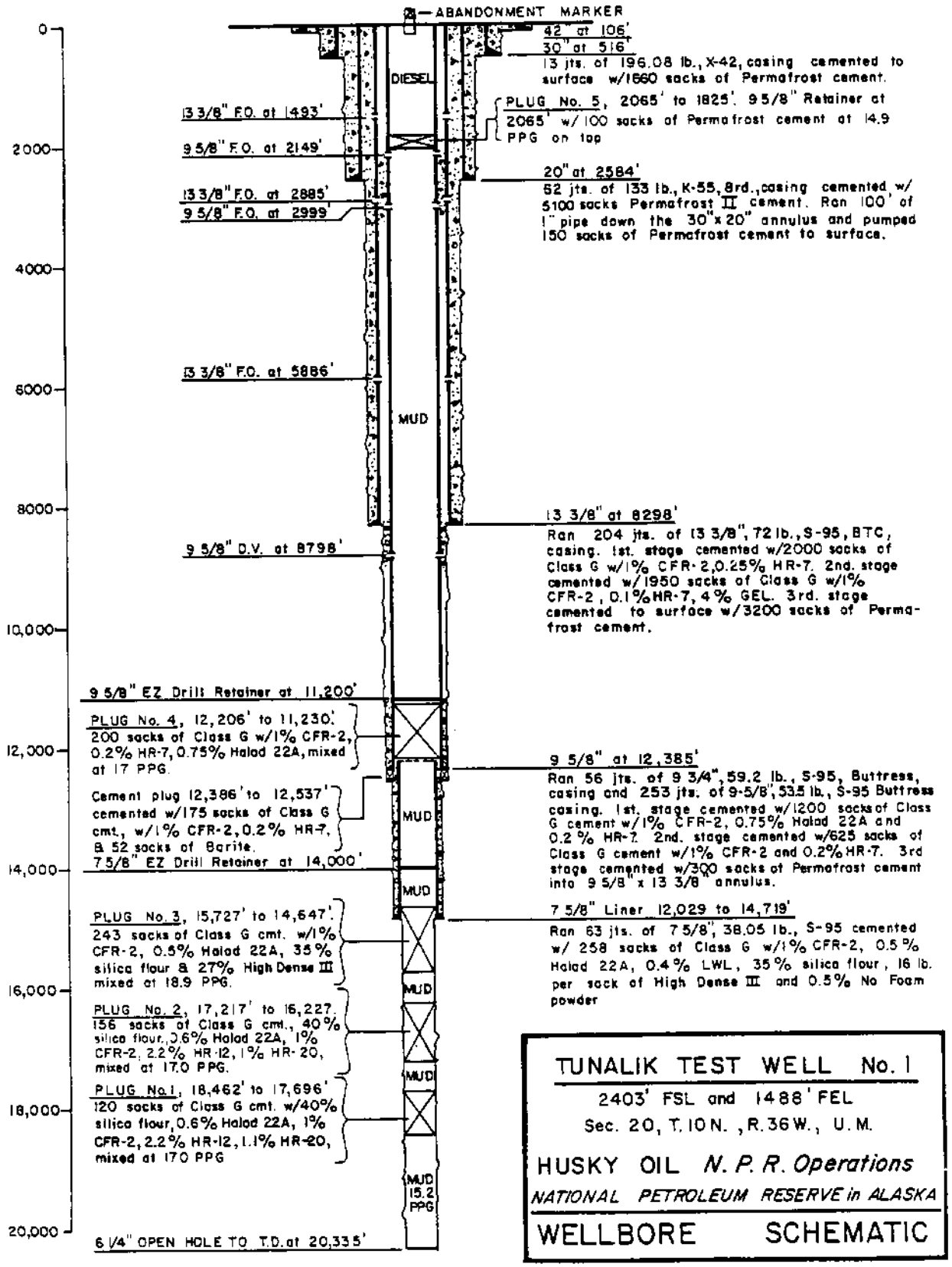
ABANDONMENT MARKER
0
2000
4000
6000
8000
10,000
12,000
14,000
16,000
18,000
20,000
42" at 106'
30" at 516'
13 jts. of 196.08 lb., X-42, casing cemented to surface w/1660 sacks of Permafrost cement.
DIESEL
PLUG No. 5, 2065' to 1825'. 9 5/8" Retainer at 2065' w/ 100 sacks of Permafrost cement at 14.9 PPG on top
13 3/8" F.O. at 1493'
9 5/8" F.O. at 2149'
20" at 2584'
52 jts. of 133 lb., K-55, 8rd., casing cemented w/ 5100 sacks Permafrost II cement. Ran 100' of 1" pipe down the 30"x 20" annulus and pumped 150 sacks of Permafrost cement to surface.
13 3/8" F.O. at 2885'
9 5/8" F.O. at 2999'
13 3/8" F.O. at 5886'
MUD
13 3/8" at 8298'
Ran 204 jts. of 13 3/8", 72 lb., S-95, BTC, casing. 1st. stage cemented w/2000 sacks of Class G w/1% CFR-2, 0.25% HR-7. 2nd. stage cemented w/1950 sacks of Class G w/1% CFR-2, 0.1% HR-7, 4% GEL. 3rd. stage cemented to surface w/3200 sacks of Permafrost cement.
9 5/8" D.V. at 8798'
9 5/8" EZ Drill Retainer at 11,200'
PLUG No. 4, 12,206' to 11,230'. 200 sacks of Class G w/1% CFR-2, 0.2% HR-7, 0.75% Halad 22A, mixed at 17 PPG.
Cement plug 12,386' to 12,537' cemented w/175 sacks of Class G cmt., w/1% CFR-2, 0.2% HR-7, & 52 sacks of Barite.
MUD
9 5/8" at 12,385'
Ran 56 jts. of 9 3/4", 59.2 lb., S-95, Buttress, casing and 253 jts. of 9-5/8", 53.5 lb., S-95 Buttress casing. 1st. stage cemented w/1200 sacks of Class G cement w/1% CFR-2, 0.75% Halad 22A and 0.2 % HR-7. 2nd. stage cemented w/625 sacks of Class G cement w/1% CFR-2 and 0.2% HR-7. 3rd stage cemented w/300 sacks of Permafrost cement into 9 5/8" x 13 3/8" annulus.
7 5/8" EZ Drill Retainer at 14,000'
MUD
7 5/8" Liner 12,029 to 14,719'
Ran 63 jts. of 7 5/8", 38.05 lb., S-95 cemented w/ 258 sacks of Class G w/1% CFR-2, 0.5 % Halad 22A, 0.4 % LWL, 35 % silica flour, 16 lb. per sack of High Dense III and 0.5% No Foam powder
PLUG No. 3, 15,727' to 14,647'. 243 sacks of Class G cmt. w/1% CFR-2, 0.5% Halad 22A, 35 % silica flour & 27% High Dense III mixed at 18.9 PPG.
MUD
PLUG No. 2, 17,217' to 16,227'. 156 sacks of Class G cmt., 40 % silica flour, 0.6% Halad 22A, 1% CFR-2, 2.2% HR-12, 1% HR-20, mixed at 17.0 PPG.
MUD
PLUG No. 1, 18,462' to 17,696'. 120 sacks of Class G cmt. w/40% silica flour, 0.6% Halad 22A, 1% CFR-2, 2.2% HR-12, 1.1% HR-20, mixed at 17.0 PPG
MUD 15.2 PPG
6 1/4" OPEN HOLE TO T.D. at 20,335'
TUNALIK TEST WELL No. 1
2403' FSL and 1488' FEL
Sec. 20, T. 10 N., R. 36 W., U. M.
HUSKY OIL N. P. R. Operations
NATIONAL PETROLEUM RESERVE in ALASKA
WELLBORE SCHEMATIC

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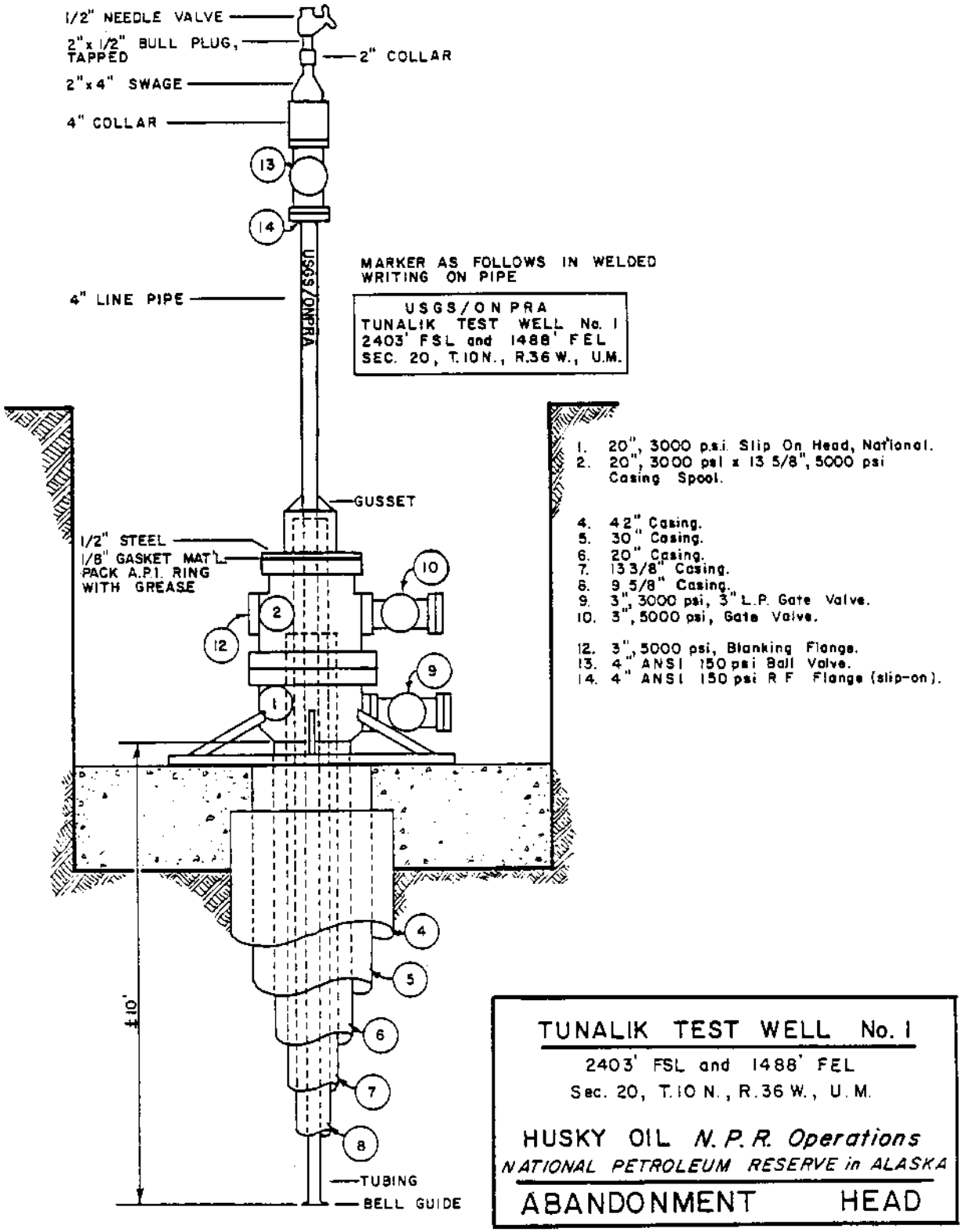

TUNALIK TEST WELL No. 1

2403' FSL and 1488' FEL

Sec. 20, T.10 N., R.36 W., U.M.

HUSKY OIL *N.P.R. Operations*

NATIONAL PETROLEUM RESERVE in ALASKA

ABANDONMENT HEAD

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ARCTIC CASING PACK

In production wells, wells suspended through summer months, and wells completed for re-entry with temperature recording tools, Baroid Arctic Casing Pack was used between casing strings. It is a stable, highly viscous fluid which will not freeze and collapse casing set in permafrost zones. Its unique gelling characteristics exhibit excellent thermal properties (heat transfer coefficient of approximately 0.1 BTU per hour per square feet per degree F at 32°F). Composition of Baroid Arctic Casing Pack used is as follows for each 100 barrels mixed:

Diesel	82.0 barrels
Water	5.0 barrels
Salt	60.0 ppb per barrel of water
EZ Mul	12.5 ppb
Gel Tone	50.0 ppb
Barite	103.0 ppb

The 9-5/8" x 13-3/8" annulus in Tunalik No. 1 was Arctic Packed through the FO in the 9-5/8" casing at 2149'. This was done after the 7-5/8" casing was run at 14,719'. The annulus was then left full of diesel from 1800' to the surface when the well was abandoned to allow future temperature measurements by U. S. Geological Survey personnel.

ARCTIC PACK RECORD

DATE: August 9, 1979

I. JOB SUMMARY

Annulus volume: 9 5/8" x 13 3/8" x 2129'	123.7	bbl
Drill pipe volume: 4 1/2 x 16.6 #/ft x 2149 '	30.5	bbl
Total volume of system:	154.2	bbl
Volume of water used in water wash	1100	bbl
Volume of water pumped at water breakthrough	138	bbl
Volume of pack pumped	165	bbl
Volume of pack pumped at breakthrough	90	bbl
Displacement efficiency at breakthrough	58	%
% Water contamination of returns at end of job	1	%

Remarks (including weather): Temperature of premix at start of job: 72°F. Weather: warm and clear.

II. PILOT TEST OF FLUIDS

A. Prepack

Retort Data:

% Oil	86	
% Water	5	
% Solids	9	
Weight	9.4	#/gal

Rheology (at 72 °F):

PV	33	cps
YP	39	#/100 ft^2
10 Sec Gel	25	#/100 ft^2
Emulsion Stability	2000 +	volts

B. Gelled Pack (14 #/bbl Geltone added to prepack):

Rheology (at 75 °F):

PV	70	cps
YP	170	#/100 ft^2
10 Sec Gel	120	#/100 ft^2

C. Drilling Mud (prior to displacement with water): Drilling mud was not annulus mud.

Wt	18.3	#/gal
PV	55	cps
YP	15	#/100 sq ft
10 Sec Gel	5	#/100 sq ft

Remarks: Annulus mud was displaced and dumped. Had breakthrough at 51 barrels. Held pressure at 2000 psi. Was able to increase pumping rate from 4.4 bbls/min. Pressure then dropped to 1400 psi. Circulated 1100 barrels.

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III. RELEVANT WELL DATA

Outer casing: 13 3/8" ; 72 #/ft
Inner casing: 9 5/8" ; 53.5 #/ft
Drill pipe: 4 1/2 ; 16.6 #/ft

Depth of cement sleeve: 2149 ft

Casing annulus volume: 123.7 bbls

Drill pipe volume (includes height to floor) 30.5 bbls
Total system volume 154.2 bbls
Rig pump capacity 13.725 strokes/bbl
Cementing unit pump capacity _____ strokes/bbl

Remarks: Annulus last circulated June 8, 1979.

IV. WATER WASH STEP

Volume water pumped 1100 bbls

Rate 7.3 bbl/min

Volume pumped at water breakthrough (0.5 #/gal drop in weight of mud return) 138 bbls

Appearance of water at end of water wash _____ clear

X turbid

_____ muddy

Remarks: Wash water was taken from reserve pit. No, or very few solids, apparent. Large amount of Lignosulfonate and other chemicals. Breakthrough figure includes mud left in mud tank when wash was started. Unable to use second mud pump because of plugged suction.

V. ARCTIC PACK DISPLACEMENT

a. Volume of pre-mix spacer 10 bbl
b. Total volume of gelled pack pumped 155 bbl
c. Total number of (50 lb) sacks of Geltone added 43 sacks
d. Average lb Geltone added per bbl 14 lb/bbl
e. Pumping rate 3 - 4 bbl/min
f. Total volume of pre-mix and gelled pack pumped at breakthrough 90 bbl
g. Volume of returns dumped into mud system 0 bbl
h. Volumes of fluids used to displace drill pipe 29.5 bbl of drilling mud

_____ bbl of _____

i. Volume of uncontaminated returns 0 bbl

k. Remarks: One percent H_2O; contamination at end of job. Early breakthrough contaminated the rest of premix. Wash did not clean annulus effectively. Large amount of solidified mud left in annulus.

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APPENDIX NO. 1

SPERRY-SUN

GYROSCOPIC SURVEY

0'-14,620'

SPERRY-SUN WELL SURVEYING COMPANY
ANCHORAGE, ALASKA

SOHIO OIL AND GAS OPERATIONS INC.
TOPAGORUK TEST WELL NO.1
COLVILLE
ALASKA

DATE OF SURVEY AUGUST 4, 1979
EOSS GYROSCOPIC SURVEY
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 110.00 FT.
COMPUTATION DATE
AUGUST 10, 1979

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	COURSE INCLINATION DEG	MIN	COURSE DIRECTION DEGREES	DOG-LEG SEVERITY DEG/100	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	VERTICAL SECTION
0	0.00	-110.00	0	0	N 0. 0 E	0.00	0.00	0.00	0.00
100	100.00	-10.00	0	28	N 21.10 W	.48	.39 N	.15 W	.37
200	200.00	90.00	0	22	N 2. 9 E	.20	1.10 N	.29 W	1.06
300	299.99	189.99	0	34	N 4.69 E	.26	1.92 N	.24 W	1.88
400	399.99	289.99	0	22	N 14.89 W	.25	2.74 N	.28 W	2.69
500	499.98	389.98	0	33	N 2.89 W	.20	3.54 N	.39 W	3.47
600	599.98	489.98	0	36	N 8.29 W	.07	4.54 N	.49 W	4.45
700	699.97	589.97	0	37	N 10. 0 W	.03	5.59 N	.66 W	5.47
800	799.96	689.96	1	1	N 6. 0 E	.46	7.01 N	.66 W	6.88
900	899.95	789.95	0	36	N 26.79 W	.61	8.36 N	.80 W	8.23
1000	999.95	889.95	0	40	N 5. 0 W	.25	9.41 N	1.09 W	9.21
1100	1099.94	989.94	0	40	N 2.89 W	.02	10.57 N	1.17 W	10.36
1200	1199.93	1089.93	0	40	N 1.50 E	.05	11.75 N	1.19 W	11.57
1300	1299.92	1189.92	1	8	N 11.80 E	.50	13.33 N	.97 W	13.12
1400	1399.90	1289.90	0	46	N 15.89 E	.39	14.95 N	.58 W	14.78
1500	1499.89	1389.89	0	57	N 6.20 W	.37	16.43 N	.48 W	16.25
1600	1599.88	1489.88	1	10	N 10.69 E	.38	18.25 N	.38 W	18.09
1700	1699.86	1589.86	0	49	N 5.50 W	.44	19.98 N	.26 W	19.84
1800	1799.85	1689.85	0	53	N 4.19 E	.16	21.48 N	.27 W	21.36
1900	1899.84	1789.84	0	52	N 0.50 W	.08	23.03 N	.22 W	22.84
2000	1999.83	1889.83	0	49	N 0.70 E	.06	24.52 N	.22 W	24.32
2100	2099.81	1989.81	1	5	N 9.50 E	.31	26.17 N	.05 W	25.96
2200	2199.80	2089.80	0	40	N 5.20 W	.47	27.70 N	.05 E	27.51
2300	2299.79	2189.79	0	45	N 11.89 W	.11	28.93 N	.14 W	28.71
2400	2399.78	2289.78	1	4	N 7.40 E	.44	30.50 N	.15 W	30.26
2500	2499.77	2389.77	0	42	N 2.70 E	.38	32.03 N	.01 W	31.81
2600	2599.76	2489.76	0	48	N 18.20 E	.23	33.31 N	.24 E	33.11
2700	2699.75	2589.75	0	46	N 29.79 E	.05	34.61 N	.70 E	34.45
2800	2799.74	2689.74	0	21	N 44.50 E	.47	35.46 N	1.16 E	35.35
2900	2899.74	2789.74	0	39	N 64. 0 E	.35	35.93 N	1.69 E	35.84
3000	2999.73	2889.73	0	24	N 72. 9 E	.26	36.29 N	2.75 E	36.36

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SPERRY-SUN WELL SURVEYING COMPANY — PAGE 2
ANCHORAGE, ALASKA

HUSKY OIL NPR OPERATIONS INC.
TUPALIK TEST WELL NO.1
WILDCAT
ALASKA

DATE OF SURVEY AUGUST 8, 1979
COMPUTATION DATE
AUGUST 10, 1979
BOSS GYROSCOPIC SURVEY
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 110.00 FT.

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	COURSE INCLINATION DEG	COURSE INCLINATION MIN	COURSE DIRECTION DEGREES	DOG-LEG SEVERITY DEG/100	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	TOTAL RECTANGULAR COORDINATES EAST/WEST	VERTICAL SECTION
3100	3099.73	2989.73	0	27	N 66.50 E	.07	36.56 N	3.45 E	36.71
3200	3199.73	3089.73	0	34	N 50.20 E	.19	37.05 N	4.21 E	37.28
3300	3299.72	3189.72	0	16	S 69.69 E	.50	37.29 N	4.82 E	37.60
3400	3399.72	3289.72	0	15	N 89.80 E	.09	37.21 N	5.26 E	37.57
3500	3499.72	3389.72	0	22	S 64.59 E	.13	37.18 N	5.81 E	37.60
3600	3599.72	3489.72	0	12	S 56.89 E	.22	37.05 N	6.28 E	37.53
3700	3699.72	3589.72	0	22	S 84.39 E	.22	36.92 N	6.76 E	37.46
3800	3799.72	3689.72	0	9	S 48.89 E	.27	36.80 N	7.20 E	37.39
3900	3899.72	3789.72	0	17	N 56. 0 E	.29	36.85 N	7.51 E	37.49
4000	3999.71	3889.71	0	28	N 26. 0 E	.26	37.36 N	7.90 E	38.03
4100	4099.71	3989.71	0	19	N 48.29 E	.21	37.92 N	8.30 E	38.63
4200	4199.71	4089.71	0	26	N 6. 0 E	.36	38.49 N	8.55 E	39.23
4300	4299.71	4189.71	0	28	N 14.89 E	.08	39.27 N	8.70 E	40.02
4400	4399.70	4289.70	0	27	N 23.39 E	.07	40.04 N	8.96 E	40.81
4500	4499.70	4389.70	0	20	N 14.89 E	.13	40.69 N	9.20 E	41.49
4600	4599.69	4489.69	0	47	N 30.50 E	.47	41.57 N	9.62 E	42.42
4700	4699.69	4589.69	0	42	N 24.79 E	.12	42.72 N	10.23 E	43.63
4800	4799.69	4689.69	0	35	N 4.50 W	.34	43.79 N	10.45 E	44.72
4900	4899.67	4789.67	0	44	N 13.59 E	.26	44.93 N	10.56 E	45.86
5000	4999.66	4889.66	0	46	N 18.10 E	.07	46.19 N	10.91 E	47.16
5100	5099.66	4989.66	0	41	N 12. 0 E	.11	47.42 N	11.25 E	48.42
5200	5199.65	5089.65	0	55	N 24.70 E	.30	48.75 N	11.71 E	49.79
5300	5299.63	5189.63	1	13	N 7.29 W	.65	50.54 N	11.92 E	51.65
5400	5399.61	5289.61	0	51	N 17.20 E	.56	52.32 N	12.21 E	53.37
5500	5499.60	5389.60	1	2	N 22.89 E	.20	53.87 N	12.58 E	54.98
5600	5599.58	5489.58	1	10	N 7.90 E	.32	55.72 N	13.06 E	56.87
5700	5699.55	5589.55	1	17	N 24. 0 E	.37	57.76 N	13.68 E	58.98
5800	5799.53	5689.53	1	6	N 13.29 W	.79	59.74 N	13.52 E	60.97
5900	5899.51	5789.51	1	6	N 18.70 E	.61	61.60 N	14.00 E	62.83
6000	5999.49	5889.49	1	7	N 3.50 E	.30	63.56 N	14.37 E	64.76
6100	6099.47	5989.47	1	17	N 13. 0 E	.26	65.58 N	14.69 E	66.86

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SPERRY-SUN WELL SURVEYING COMPANY
ANCHORAGE, ALASKA

HUSKY OIL NPR OPERATIONS INC.
TUNALIK TEST WELL NO.1
WILDCAT
ALASKA

COMPUTATION DATE
AUGUST 10, 1979

DATE OF SURVEY AUGUST 3, 1979
BOSS GYROSCOPIC SURVEY
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 110.00 FT.

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	COURSE INCLINATION DEG	MIN	COURSE DIRECTION DEGREES	DOG-LEG SEVERITY DEG/100	TOTAL RECTANGULAR NORTH/SOUTH	COORDINATES EAST/WEST	VERTICAL SECTION
6200	6199.44	6089.44	1	31	N 10.50 E	.24	67.99 N	15.18 E	69.31
6300	6299.41	6189.41	1	11	N 24.60 E	.47	70.23 N	15.86 E	71.62
6400	6399.39	6289.39	1	2	N 7.60 W	.63	72.08 N	16.17 E	73.49
6500	6459.38	6349.38	0	52	N 17.50 E	.45	73.70 N	16.28 E	75.11
6600	6599.37	6489.37	0	52	N 23.39 E	.09	75.12 N	16.81 E	76.58
6700	6699.35	6589.35	1	22	N 18.29 E	.51	76.95 N	17.48 E	78.48
6800	6799.32	6689.32	1	12	N 13.60 E	.19	79.11 N	18.11 E	80.70
6900	6899.31	6789.31	0	48	N 18.39 E	.41	80.81 N	18.58 E	82.44
7000	6959.30	6889.30	0	36	N 44.70 E	.37	81.89 N	19.20 E	83.58
7100	7099.29	6989.29	0	45	N 26.70 E	.31	82.91 N	19.63 E	84.66
7200	7199.28	7089.28	0	52	N 17.70 E	.12	84.25 N	20.30 E	86.07
7300	7299.26	7189.26	1	21	N 28.29 E	.53	86.32 N	21.09 E	87.91
7400	7399.24	7289.24	1	2	N 26.10 E	.32	87.88 N	22.06 E	89.88
7500	7499.22	7389.22	0	53	N 6.40 E	.45	89.48 N	22.46 E	91.51
7600	7599.21	7489.21	0	52	N 28. 0 E	.43	90.94 N	22.83 E	93.01
7700	7699.20	7589.20	0	56	N 13.10 E	.24	92.42 N	23.37 E	94.54
7800	7799.19	7689.19	0	43	N 11.19 E	.22	93.84 N	23.68 E	95.96
7900	7899.18	7789.18	0	49	N 16.80 E	.11	95.16 N	23.94 E	97.32
8000	7999.17	7889.17	0	39	N 3.70 E	.19	96.45 N	24.11 E	98.63
8100	8099.16	7989.16	0	57	N 16.60 W	.40	97.82 N	23.91 E	99.96
8200	8199.15	8089.15	1	2	N 18.70 E	.61	99.47 N	23.97 E	101.61
8300	8299.12	8189.12	1	26	N 25.50 E	.43	101.47 N	24.80 E	103.69
8400	8359.09	8289.09	1	34	N 31.20 E	.21	103.78 N	26.15 E	106.14
8500	8499.05	8389.05	1	21	N 36.40 E	.26	105.92 N	27.47 E	108.42
8600	8599.03	8489.03	1	19	N 52.59 E	.38	107.57 N	29.09 E	110.26
8700	8699.00	8589.00	1	6	N 45. 0 E	.26	108.95 N	30.69 E	111.82
8800	8798.99	8688.99	1	6	N 62. 0 E	.33	110.09 N	32.23 E	113.14
8900	8898.97	8788.97	1	11	N 70.59 E	.19	110.89 N	34.06 E	114.35
9000	8998.94	8888.94	1	15	N 58. 9 E	.28	111.82 N	35.98 E	115.36
9100	9098.92	8988.92	1	14	N 57.40 E	.07	113.03 N	37.89 E	116.72
9200	9198.89	9088.89	1	6	N 57.40 E	.22	114.17 N	39.68 E	118.07

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SPERRY-SUN WELL SURVEYING COMPANY — PAGE 4
ANCHORAGE, ALASKA

HUSKY OIL NPR OPERATIONS INC.
TOKLAT TEST WELL NO.1
WILDCAT
ALASKA

COMPUTATION DATE
AUGUST 10, 1979

DATE OF SURVEY AUGUST 8, 1979
LOSS GYROSCOPIC SURVEY
JOB NUMBER BOSS-16457
KELLY BUSHING ELEV. = 110.00 FT.

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	COURSE INCLINATION DEG	COURSE INCLINATION MIN	COURSE DIRECTION DEGREES	DOG-LEG SEVERITY DEG/100	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	TOTAL RECTANGULAR COORDINATES EAST/WEST	VERTICAL SECTION
9300	9298.88	9188.88	1	1	N 48.59 E	.19	115.28 N	41.17 E	119.35
9400	9398.86	9288.86	1	8	N 46.79 E	.13	116.56 N	42.57 E	120.78
9500	9498.83	9388.83	1	20	N 55.59 E	.27	117.91 N	44.26 E	122.32
9600	9598.81	9488.81	1	13	N 42.29 E	.32	119.35 N	45.94 E	123.96
9700	9698.78	9588.78	1	32	N 45. 9 E	.34	121.10 N	47.62 E	125.89
9800	9798.74	9688.74	1	46	N 34.79 E	.38	123.33 N	49.46 E	128.32
9900	9898.69	9788.69	1	51	N 39.79 E	.18	125.85 N	51.38 E	131.05
10000	9998.64	9888.64	1	41	N 30.20 E	.34	128.36 N	53.15 E	133.75
10100	10098.60	9988.60	1	38	N 24.29 E	.18	130.95 N	54.49 E	136.48
10200	10198.55	10088.55	1	46	N 25.20 E	.13	133.66 N	55.74 E	139.33
10300	10298.51	10188.51	1	42	N 23.70 E	.08	136.44 N	57.00 E	142.23
10400	10398.46	10288.46	1	34	N 21.89 E	.14	139.08 N	58.11 E	144.99
10500	10498.42	10388.42	1	42	N 28.50 E	.23	141.67 N	59.34 E	147.71
10600	10598.38	10488.38	1	39	N 34. 0 E	.17	144.18 N	60.66 E	150.38
10700	10698.34	10588.34	1	37	N 31.50 E	.08	146.59 N	62.41 E	152.95
10800	10798.31	10688.31	1	15	N 34.70 E	.37	148.70 N	63.78 E	155.21
10900	10898.26	10788.26	2	4	N 21.89 E	.89	151.28 N	65.08 E	157.92
11000	10998.20	10888.20	1	53	N 17.10 E	.24	154.54 N	66.24 E	161.33
11100	11098.16	10988.16	1	22	N 11.39 E	.54	157.30 N	66.96 E	164.13
11200	11198.13	11088.13	1	26	N 13.89 E	.09	159.70 N	67.50 E	166.58
11300	11296.09	11186.09	1	41	N 18.50 E	.28	162.32 N	68.27 E	169.27
11400	11398.04	11288.04	2	5	N 21.39 E	.41	165.42 N	69.40 E	172.49
11500	11497.98	11387.98	1	55	N 25.10 E	.21	168.63 N	70.78 E	175.83
11600	11597.92	11487.92	1	47	N 15.10 E	.35	171.67 N	71.90 E	178.98
11700	11697.87	11587.87	1	46	N 24.50 E	.29	174.60 N	72.95 E	182.01
11800	11797.83	11687.83	1	43	N 17. 0 E	.23	177.45 N	74.04 E	184.98
11900	11897.77	11787.77	2	12	N 24.39 E	.54	180.65 N	75.28 E	188.31
12000	11997.70	11887.70	1	53	N 32. 0 E	.41	183.81 N	76.95 E	191.64
12100	12097.65	11987.65	1	57	N 46.79 E	.30	186.51 N	78.94 E	194.65
12200	12197.59	12087.59	1	57	N 21.39 E	.66	189.38 N	80.67 E	197.61
12300	12297.52	12187.52	2	13	N 17.79 E	.31	192.82 N	81.85 E	201.16

SPERRY-SUN WELL SURVEYING COMPANY — PAGE 5
ANCHORAGE, ALASKA

HUSKY OIL NPR OPERATIONS INC. — DATE OF SURVEY AUGUST 8, 1979
TOKALIK TEST WELL NO.1 — COMPUTATION DATE — BOSS GYROSCOPIC SURVEY
PTEDCAT — AUGUST 10, 1979 — JOB NUMBER BOSS-16437
ALASKA — KELLY BUSHING ELEV. = 110.00 FT.

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	COURSE INCLINATION DEG	COURSE INCLINATION MIN	COURSE DIRECTION DEGREES	DOG-LEG SEVERITY DEG/100	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	TOTAL RECTANGULAR COORDINATES EAST/WEST	VERTICAL SECTION
12400	12397.46	12287.46	1	46	N 27.89 E	.57	196.34 N	83.21 E	204.52
12500	12497.40	12387.40	2	8	N 28.10 E	.36	199.06 N	84.82 E	207.71
12600	12597.32	12487.32	2	27	N 32.79 E	.36	202.50 N	86.85 E	211.37
12700	12697.23	12587.23	2	27	N 60.40 E	1.17	205.36 N	89.87 E	214.56
12800	12797.16	12687.16	1	43	N 44.29 E	.93	207.49 N	92.78 E	217.02
12900	12897.12	12787.12	1	23	N 36.29 E	.39	209.54 N	94.55 E	219.27
13000	12997.08	12887.08	1	49	N 62. 0 E	.82	211.27 N	96.67 E	221.24
13100	13097.05	12987.05	0	49	N 17.50 W	1.86	212.71 N	97.86 E	222.81
13200	13197.04	13087.04	0	49	N 8.20 W	.13	214.12 N	97.54 E	224.17
13300	13297.01	13187.01	1	53	N 70.79 W	1.68	215.38 N	95.88 E	225.22
13400	13396.90	13286.90	3	19	S 82.20 W	1.85	215.53 N	91.45 E	224.85
13500	13496.70	13386.70	3	57	S 83.60 W	.65	214.75 N	85.15 E	223.35
13600	13596.42	13486.42	4	27	S 77.50 W	.67	213.52 N	77.92 E	221.25
13700	13696.10	13586.10	4	43	S 78.39 W	.27	211.85 N	70.10 E	218.67
13800	13795.82	13685.82	3	54	N 86.39 W	1.40	211.24 N	62.67 E	217.18
13900	13895.58	13785.58	4	1	N 77.50 W	.63	212.21 N	55.66 E	217.34
14000	13995.36	13885.36	3	34	N 65.79 W	.69	214.25 N	49.59 E	218.61
14100	14095.07	13985.07	4	59	N 40.50 W	2.33	218.83 N	45.93 E	222.44
14200	14194.79	14084.79	3	27	N 29.70 W	1.72	224.76 N	39.61 E	227.87
14300	14294.54	14184.54	4	33	N 13.79 W	1.55	231.23 N	37.17 E	234.01
14400	14394.21	14284.21	4	44	N 15.29 W	.23	239.07 N	35.13 E	241.55
14500	14493.81	14383.81	5	32	N 16.60 W	.81	247.68 N	32.66 E	249.81
14600	14593.41	14483.41	4	37	N 5.29 W	1.35	256.32 N	30.91 E	258.18
14620	14613.34	14503.34	4	51	N 3.10 W	1.47	257.97 N	30.79 E	259.81

HORIZONTAL DISPLACEMENT = 259.81 FEET AT NORTH, 6 DEG. 46 MIN. EAST AT MD = 14620

THE CALCULATION PROCEDURES ARE BASED ON THE USE OF THREE DIMENSIONAL RADIUS OF CURVATURE METHOD.

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SPERRY-SUN WELL SURVEYING COMPANY — PAGE 6
ANCHORAGE, ALASKA

HUSKY OIL NPR OPERATIONS INC. — DATE OF SURVEY AUGUST 8, 1979
TOPAGLIK TEST WELL NO.1 — COMPUTATION DATE
WILDCAT — AUGUST 10, 1979 — JOB NUMBER BOSS-16437
ALASKA — KELLY BUSHING ELEV. = 110.00 FT.

INTERPOLATED VALUES FOR EVEN 1000 FEET OF MEASURED DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
0	0.00	-110.00	0.00	0.00	0.00	
1000	999.95	889.95	9.41 N	1.09 W	.05	.05
2000	1999.83	1889.83	24.52 N	.22 W	.17	.12
2683	2999.73	2889.73	36.29 N	2.75 E	.27	.09
4000	3999.71	3889.71	37.36 N	7.90 E	.29	.02
5000	4999.66	4889.66	46.19 N	10.91 E	.34	.05
6000	5999.49	5889.49	63.50 N	14.37 E	.51	.17
7000	6999.30	6889.30	81.49 N	19.20 E	.70	.20
8000	7999.17	7889.17	96.45 N	24.11 E	.83	.13
8888	8998.94	8888.94	111.82 N	35.98 E	1.06	.23
10000	9998.64	9888.64	128.36 N	53.15 E	1.36	.30
11000	10996.20	10888.20	154.54 N	66.24 E	1.80	.44
12000	11997.70	11887.70	183.81 N	76.95 E	2.30	.50
13000	12997.08	12887.08	211.27 N	96.67 E	2.92	.62
14000	13996.36	13886.36	214.25 N	43.59 E	4.64	1.72
14528	14613.34	14503.34	257.97 N	30.79 E	6.66	2.01

THE CALCULATION PROCEDURES ARE BASED ON THE USE OF THREE DIMENSIONAL RADIUS OF CURVATURE METHOD.

HUSKY OIL NPR OPERATIONS INC. DATE OF SURVEY AUGUST 8, 1975
TOLKLIK TEST WELL NO.1 COMPUTATION DATE
WILDCAT AUGUST 10, 1975 JOB NUMBER BOSS-16437
ALASKA KELLY BUSHING ELEV. = 110.00 FT.

INTERPOLATED VALUES FOR EVEN 100 FEET OF SUB-SEA DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
0	0.00	-110.00	0.00	0.00	0.00	
10	10.00	-100.00	0.00	0.00	0.00	0.00
110	110.00	0.00	.47 N	.18 W	.00	.00
210	210.00	100.00	1.17 N	.29 W	.00	.00
310	310.00	200.00	2.02 N	.23 W	.01	.00
410	410.00	300.00	2.80 N	.30 W	.01	.00
510	510.00	400.00	3.63 N	.40 W	.02	.00
610	610.00	500.00	4.64 N	.51 W	.02	.01
710	710.00	600.00	5.69 N	.68 W	.03	.01
810	810.00	700.00	7.18 N	.64 W	.04	.01
910	910.00	800.00	8.45 N	.85 W	.05	.01
1010	1010.00	900.00	9.52 N	1.10 W	.05	.01
1110	1110.00	1000.00	10.69 N	1.18 W	.06	.01
1210	1210.00	1100.00	11.87 N	1.18 W	.07	.01
1310	1310.00	1200.00	13.52 N	.92 W	.08	.01
1410	1410.00	1300.00	15.09 N	.54 W	.10	.01
1510	1510.00	1400.00	16.59 N	.50 W	.11	.01
1610	1610.00	1500.00	18.46 N	.34 W	.13	.02
1710	1710.00	1600.00	20.12 N	.28 W	.14	.01

SPERRY-SUN WELL SURVEYING COMPANY
ANCHORAGE, ALASKA

MOBIL OIL NPR OPERATIONS INC.
TUBALIK TEST WELL NO.1
WILDCAT
ALASKA

DATE OF SURVEY AUGUST 8, 1979
COMPUTATION DATE
AUGUST 10, 1979
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 110.00 FT.

INTERPOLATED VALUES FOR EVEN 100 FEET OF SUB-SEA DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
1810	1810.00	1700.00	21.64 N	.26 W	.15	.01
1910	1910.00	1800.00	23.19 N	.22 W	.16	.01
2010	2010.00	1900.00	24.66 N	.22 W	.18	.01
2110	2110.00	2000.00	26.16 N	.02 W	.15	.01
2210	2210.00	2100.00	27.82 N	.04 E	.20	.01
2310	2310.00	2200.00	29.06 N	.17 W	.21	.01
2410	2410.00	2300.00	30.69 N	.13 W	.22	.01
2510	2510.00	2400.00	32.16 N	.00 W	.24	.01
2610	2610.00	2500.00	33.45 N	.29 E	.24	.01
2710	2710.00	2600.00	34.74 N	.75 E	.25	.01
2810	2810.00	2700.00	35.50 N	1.20 E	.26	.00
2910	2910.00	2800.00	35.96 N	1.99 E	.26	.00
3010	3010.00	2900.00	36.31 N	2.82 E	.27	.00
3110	3110.00	3000.00	36.59 N	3.53 E	.27	.00
3210	3210.00	3100.00	37.11 N	4.29 E	.27	.00
3310	3310.00	3200.00	37.27 N	4.87 E	.28	.00
3410	3410.00	3300.00	37.21 N	5.30 E	.28	.00
3510	3510.00	3400.00	37.17 N	5.88 E	.28	.00
3610	3610.00	3500.00	37.03 N	6.31 E	.28	.00

HUSKY OIL NPR OPERATIONS INC. DATE OF SURVEY AUGUST 8, 1979
TUNALIK TEST WELL NO.1 COMPUTATION DATE
WILDCAT AUGUST 10, 1979 JOB NUMBER BOSS-16437
ALASKA KELLY BUSHING ELEV. = 110.00 FT.

INTERPOLATED VALUES FOR EVEN 100 FEET OF SUB-SEA DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
3710	3710.00	3600.00	36.92 N	6.83 E	.28	.00
3810	3810.00	3700.00	36.78 N	7.22 E	.28	.00
3910	3910.00	3800.00	36.88 N	7.55 E	.28	.00
4010	4010.00	3900.00	37.43 N	7.94 E	.29	.00
4110	4110.00	4000.00	37.96 N	8.34 E	.29	.00
4210	4210.00	4100.00	38.57 N	8.56 E	.29	.00
4310	4310.00	4200.00	39.35 N	8.72 E	.30	.00
4410	4410.00	4300.00	40.11 N	8.99 E	.30	.00
4510	4510.00	4400.00	40.75 N	9.21 E	.30	.00
4610	4610.00	4500.00	41.63 N	9.70 E	.31	.01
4710	4710.00	4600.00	42.83 N	10.28 E	.32	.01
4810	4810.00	4700.00	43.89 N	10.44 E	.32	.01
4910	4910.00	4800.00	45.06 N	10.59 E	.33	.01
5010	5010.00	4900.00	46.33 N	10.96 E	.34	.01
5110	5110.00	5000.00	47.54 N	11.27 E	.35	.01
5210	5210.00	5100.00	48.90 N	11.78 E	.36	.01
5310	5310.00	5200.00	50.76 N	11.89 E	.36	.02
5410	5410.00	5300.00	52.46 N	12.05 E	.39	.02
5510	5510.00	5400.00	54.04 N	12.66 E	.41	.01

SPERRY-SUN WELL SURVEYING COMPANY
ANCHORAGE, ALASKA

HUSKY OIL NPR OPERATIONS INC.
TUPPLIK TEST WELL NO.1
WILDCAT
ALASKA

DATE OF SURVEY AUGUST 8, 1979
COMPUTATION DATE
AUGUST 10, 1979
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 110.00 FT.

INTERPOLATED VALUES FOR EVEN 100 FEET OF SUB-SEA DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
7410	5610.00	5500.00	55.93 N	13.11 E	.42	.02
5710	5710.00	5600.00	57.98 N	13.77 E	.45	.02
5810	5810.00	5700.00	59.94 N	13.87 E	.47	.02
5910	5910.00	5800.00	61.79 N	14.07 E	.49	.02
6010	6010.00	5900.00	63.71 N	14.39 E	.51	.02
6110	6110.00	6000.00	65.82 N	14.74 E	.53	.02
6210	6210.00	6100.00	68.26 N	15.23 E	.56	.03
6310	6310.00	6200.00	70.43 N	15.95 E	.59	.03
6410	6410.00	6300.00	72.27 N	16.14 E	.61	.02
6510	6510.00	6400.00	73.86 N	16.33 E	.62	.01
6610	6610.00	6500.00	75.27 N	16.87 E	.63	.01
6710	6710.00	6600.00	77.20 N	17.56 E	.65	.02
6810	6810.00	6700.00	79.33 N	18.16 E	.68	.02
6910	6910.00	6800.00	80.98 N	18.63 E	.69	.01
7010	7010.00	6900.00	81.97 N	19.25 E	.70	.01
7110	7110.00	7000.00	83.04 N	19.88 E	.71	.01
7210	7210.00	7100.00	84.41 N	20.35 E	.72	.01
7310	7310.00	7200.00	86.25 N	21.21 E	.74	.02
7410	7410.00	7300.00	88.06 N	22.14 E	.76	.02

SUPPY OIL AND GAS OPERATIONS INC.
TONALIK TEST WELL NO.1
WILDCAT
ALASKA

DATE OF SURVEY AUGUST 8, 1979
COMPUTATION DATE
AUGUST 10, 1979
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 110.00 FT.

INTERPOLATED VALUES FOR EVEN 100 FEET OF SUB-SEA DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
7510	7510.00	7400.00	89.65 N	22.46 E	.78	.01
7610	7610.00	7500.00	91.09 N	22.90 E	.79	.01
7710	7710.00	7600.00	92.59 N	23.41 E	.80	.01
7810	7810.00	7700.00	93.97 N	23.71 E	.81	.01
7910	7910.00	7800.00	95.32 N	23.97 E	.82	.01
8010	8010.00	7900.00	96.58 N	24.12 E	.83	.01
8110	8110.00	8000.00	97.99 N	23.86 E	.84	.01
8210	8210.00	8100.00	99.66 N	24.03 E	.86	.02
8310	8310.00	8200.00	101.71 N	24.92 E	.88	.03
8410	8410.00	8300.00	104.04 N	26.21 E	.92	.04
8510	8510.00	8400.00	106.12 N	27.62 E	.95	.03
8610	8610.00	8500.00	107.72 N	29.29 E	.98	.03
8710	8710.00	8600.00	109.11 N	30.84 E	1.00	.02
8811	8810.00	8700.00	110.19 N	32.42 E	1.02	.02
8911	8910.00	8800.00	110.97 N	34.28 E	1.04	.02
9011	9010.00	8900.00	111.45 N	36.18 E	1.06	.02
9111	9110.00	9000.00	113.16 N	38.11 E	1.09	.03
9211	9210.00	9100.00	114.29 N	39.86 E	1.11	.02
9311	9310.00	9200.00	115.41 N	41.31 E	1.13	.02

SPERRY-SUN WELL SURVEYING COMPANY
ANCHORAGE, ALASKA

HUSKY OIL NPR OPERATIONS INC.
TULIK TEST WELL NO.1
PRUDHOE
ALASKA

DATE OF SURVEY AUGUST 8, 1979
COMPUTATION DATE
AUGUST 10, 1979
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 110.70 FT.

INTERPOLATED VALUES FOR EVEN 100 FEET OF SUB-SEA DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
9411	9410.00	9300.00	116.71 N	42.73 E	1.14	.02
9511	9510.00	9400.00	118.35 N	44.48 E	1.17	.02
9611	9610.00	9500.00	119.53 N	46.10 E	1.19	.02
9711	9710.00	9600.00	121.31 N	47.83 E	1.22	.03
9811	9810.00	9700.00	123.62 N	49.66 E	1.27	.04
9911	9910.00	9800.00	126.13 N	51.61 E	1.32	.05
10011	10010.00	9900.00	128.65 N	53.32 E	1.37	.05
10111	10110.00	10000.00	131.25 N	54.62 E	1.41	.04
10211	10210.00	10100.00	133.99 N	55.89 E	1.45	.05
10311	10310.00	10200.00	136.75 N	57.14 E	1.50	.05
10411	10410.00	10300.00	139.38 N	58.23 E	1.54	.04
10511	10510.00	10400.00	141.98 N	59.51 E	1.58	.04
10611	10610.00	10500.00	144.46 N	61.05 E	1.62	.04
10711	10710.00	10600.00	146.87 N	62.58 E	1.67	.04
10811	10810.00	10700.00	148.91 N	63.92 E	1.70	.03
10911	10910.00	10800.00	151.67 N	65.23 E	1.75	.05
11011	11010.00	10900.00	154.91 N	66.35 E	1.80	.06
11111	11110.00	11000.00	157.58 N	67.02 E	1.84	.04
11211	11210.00	11100.00	159.99 N	67.57 E	1.87	.03

HUSKY OIL NPR OPERATIONS INC.
TONEK TEST WELL NO.1
WILDCAT
ALASKA

DATE OF SURVEY AUGUST 8, 1979
COMPUTATION DATE
AUGUST 10, 1979
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 110.70 FT.

INTERPOLATED VALUES FOR EVEN 100 FEET OF SUB-SEA DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
11411	11310.00	11200.00	162.65 N	66.38 E	1.91	.04
11511	11410.00	11300.00	165.82 N	69.56 E	1.97	.06
11612	11510.00	11400.00	169.00 N	70.95 E	2.03	.06
11712	11610.00	11500.00	172.03 N	72.00 E	2.08	.05
11812	11710.00	11600.00	174.94 N	73.11 E	2.13	.05
11912	11810.00	11700.00	177.80 N	74.15 E	2.18	.05
12012	11910.00	11800.00	181.08 N	75.47 E	2.24	.06
12112	12010.00	11900.00	184.16 N	77.17 E	2.32	.06
12212	12110.00	12000.00	186.83 N	79.22 E	2.36	.06
12312	12210.00	12100.00	189.77 N	80.83 E	2.42	.06
12412	12310.00	12200.00	193.28 N	82.04 E	2.49	.07
12512	12410.00	12300.00	196.38 N	83.39 E	2.55	.06
12612	12510.00	12400.00	199.48 N	85.04 E	2.61	.06
12712	12610.00	12500.00	202.96 N	87.15 E	2.69	.08
12812	12710.00	12600.00	205.63 N	90.35 E	2.78	.09
12912	12810.00	12700.00	207.76 N	93.35 E	2.85	.06
13012	12910.00	12800.00	209.80 N	94.74 E	2.88	.04
13112	13010.00	12900.00	211.47 N	97.04 E	2.92	.04
13212	13110.00	13000.00	212.69 N	97.80 E	2.95	.03

SPERRY-SUN WELL SURVEYING COMPANY
ANCHORAGE, ALASKA

SOHIO OIL AND GAS OPERATIONS INC.
TONALIK TEST WELL NO.1
WILDCAT
ALASKA

DATE OF SURVEY AUGUST 8, 1979
COMPUTATION DATE
AUGUST 10, 1979
JOB NUMBER BOSS-16437
KELLY BUSHING ELEV. = 113.00 FT.

INTERPOLATED VALUES FOR EVEN 100 FEET OF SUB-SEA DEPTH

MEASURED DEPTH	TRUE VERTICAL DEPTH	SUB-SEA VERTICAL DEPTH	TOTAL RECTANGULAR COORDINATES NORTH/SOUTH	EAST/WEST	MD-TVD DIFFERENCE	VERTICAL CORRECTION
13212	13210.00	13100.00	214.30 N	97.51 E	2.96	.01
13312	13310.00	13200.00	215.52 N	95.47 E	3.00	.04
13413	13410.00	13300.00	215.42 N	90.70 E	3.12	.13
13513	13510.00	13400.00	214.65 N	84.24 E	3.34	.21
13613	13610.00	13500.00	213.29 N	76.89 E	3.62	.28
13713	13710.00	13600.00	211.62 N	68.97 E	3.94	.33
13814	13810.00	13700.00	211.30 N	61.71 E	4.21	.27
13914	13910.00	13800.00	212.43 N	54.87 E	4.46	.24
14014	14010.00	13900.00	214.62 N	48.76 E	4.67	.21
14114	14110.00	14000.00	219.62 N	43.08 E	4.98	.31
14215	14210.00	14100.00	225.56 N	39.15 E	5.24	.25
14315	14310.00	14200.00	232.43 N	36.88 E	5.51	.27
14415	14410.00	14300.00	240.33 N	34.79 E	5.84	.33
14516	14510.00	14400.00	249.16 N	32.21 E	6.27	.43
14616	14610.00	14500.00	257.70 N	30.81 E	6.64	.38
14620	14613.34	14503.34	257.97 N	30.79 E	6.66	.01

THE CALCULATION PROCEDURES USE A LINEAR INTERPOLATION BETWEEN THE NEAREST 20 FOOT MD (FROM RADIUS OF CURVATURE) POINTS

RIG INVENTORY

Draw Works

National 130, 25,000 pound, Serial No. 615648.

Hydromatic Brakes

Parkersburg, hydromatic, 60", Serial No. 48173.

Catworks Unit

National 130, Serial No. 438-3.

Compound and Rig Drive

National, B Sec, three engine, 2000 H.P. with gyro drive.

Drilling Engines

Caterpillar, diesel turbo, D-398, 750 H.P., Serial No. 66B2440.
Caterpillar, diesel turbo, D-398, 750 H.P., Serial No. 66B2436.
Caterpillar, diesel turbo, D-298, 750 H.P., Serial No. 66B2439.

Starting Engines
Three Switzer, air, 40 H.P.

Sheds
Parker, steel, 8' x 30'.

Skids.

Transmissions

Torque Converters.

Rig Lights

GE, vapor proof, 500 WT to 1500 WT.

No. 1 Light Plant

Caterpillar, diesel turbo AC, 250 KW.

No. 1 Engine
Caterpillar, diesel turbo, D353, 450 H.P., AC power plant, Serial No. 46B2997.

No. 1 AC Generator
Caterpillar, AC electric, 250 KW, AC power plant, Serial No. 250TH1550.

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No. 2 Light Plant

Caterpillar, turbo diesel, 250 KW.

No. 2 Engine
Caterpillar, turbo diesel, D-353, 450 H.P., Serial No. 46B2999.

No. 2 AC Generator
Caterpillar/GE, AC electric, 250 KW, Serial No. 250TH1549.

No. 3 Light Plant

Caterpillar/GE.

No. 3 Engine
Caterpillar, turbo diesel, D-353, 450 H.P.

No. 3 AC Generator
Caterpillar/GE, AC electric 250 KW.

Mast and Substructure

L. C. Moore, jackknife, 142' x 1,025M, Serial No. T-2560.
L. C. Moore, box type, 18' x 34' x 32' with engine sub 8' x 32' draw works and engine sub.

Crown
L. C. Moore, 7" x 54", 1" x 60" fast line, 500 ton.

Wire Line Anchor

National, 500 ton, 1-3/8", substructure.

Windwalls

Parker, steel, 25' x 8'.

Catwalks

Parker, steel, 6' x 54'.

Pipe Racks
Parker, drill pipe triangular, 4' x 20'.

Pumps

No. 1 Pump
EMSCO, D-1000 duplex, 1,000 H.P.

Power End
EMSCO, steel, 1,000 H.P.

912

Pumps (cont.)

Fluid End
EMSCO, steel, 7" x 18", 1,000 H.P.

Pulsation Dampener
EMSCO, PD2, 20 gallon.

No. 2 Pump
EMSCO, DB700 duplex, 700 H.P.

Power End
EMSCO, steel, 700 H.P., 7" x 16".

Pulsation Dampener
EMSCO, PD2, 20 gallon.

Mud Mixing Equipment

Mud Mixing Unit
Mission/Caterpillar/Parker.

Engine
Caterpillar, diesel turbo, D-330, 130 H.P.

Pump
ASH, B-65 centrifugal, 6"x 8".

Mud Mixing Unit
Caterpillar, diesel turbo.

Pump
ASH, B-65, centrifugal, 6" x 8".

Lightening Mixers
Lightening, 73Q80, 7.5' x 32".

Utility Skid

Shale Shaker

Milchem, single decks, 6' x 8'.

Motor
U. S. electric, 10 H.P.

Desander

Dorcone, 12".

Pump
Harrisburg, centrifugal, 5" x 6".

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Desander (cont.)

Motor
Newman, electric, 60 H.P., with No. 5 starter and switchgear.

Desilter

DEMCO, 4", 8 cone.

Pump
Harrisburg, centrifugal, 5" x 6".

Motor
Pacemaker, CJ48, electric 60 H.P., with No. 5 starter and switchgear

Degasser

Oliver Door, FAC, 6' x 6'.

Pump
Gorman Rupp, Model No. 1682B, centrifugal, 6" x 6".

Traveling Block

IDECO, UTB Big Shorty, 525 ton.

Hook

IDECO, Big Shorty, 525 ton.

Swivel

National, N-815, 400 ton.

Tongs-Nonpower

BJ, 2-3/8" x 13-5/8".

Elevators

BJ, MGG, 5", 500 ton.
BJ, MG, 4-1/2", 350.
BJ, side door, A, 6-1/2".
BJ, side door, A, 8-5/8".

Casing Tools-Nonpower

Tubing Tools-Nonpower

Elevator Bails

BJ, forged steel, 106" 350 ton.
BJ, forged steel, 96", 350 ton.

Rotary Table

National, roller bearing, 350 ton, 27-1/2".
National, roller bearing, 20.5.

Master Bushings

Varco, forged steel, 27.5 WI.

Kelly Drive Bushings
Baash Ross, IRH 56, 2' x 5' Hex.

Kelly

Drilco, Hex, 4-1/2" IF x 6-5/8" Reg, 5-1/4" x 45'.

Kelly Cock

Shaffer, ball, 6-5/8" x 10,000 psi.

Air Compressor

Quincy, piston, 390.
Quincy, piston, 350.

Motor
U. S. Electric, 10 H.P.

Air Hoist

Ingersoll Rand, air.
Ingersoll Rand, hoist, K6U.

Drilling Lines

U. S. Steel, Tiger brand WRC, 1-3/8" x 6000'.
Oilwell, WRC, 1-3/8" x 7500'.

Steam Heater

Modene, steam, HL 1250, V-419.

Stove.

Hot Air Blower.

Safety Heater.

Boilers

Cleaver Brooks, steam, 100 H.P.

Boilers (cont.)

Hot Air Heaters
Arctic Air, diesel, C-240-0-F, 2,400,000 BTU.

Hot Air Heaters
T109A, IDF 600,000, 600,000 BTU.

Motors.

Boiler House
Parker, steel 7.5' x 34'.

Rotary Hose

Hewett Robbins, rubber steel, 55' x 7,500 psi.

Vibrator Hose

Hewett Robbins, rubber steel, 12' x 7,500 psi.

Tool House

Parker, wood and steel, 8' x 40'.

Dog House

Parker, steel.

Sanitary Facility House

Parker, steel insulated, 16' x 40'.

Sewage Unit
MetPro, 1 PC 140,000, 7,000 GPD.

Clothes House

Light Plant House

Parker, steel, 8' x 34'.

Mud House

Mud Sample House

Parts Storage House

Blowout Preventers

Shaffer, hubbed LWS, 13-5/8" - 5,000 psi.
Shaffer, LWS, 13-5/8" - 5,000 psi.

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Blowout Preventers (cont.)

Annular Spherical Preventer
Shaffer, hubbed LW, 13-5/8" - 5,000 psi.

Choke Manifold
Cameron, 2" - 5,000 psi.
Cameron, 4" - 5,000 psi.

Tees
Cameron, 4" with 2" outlets.
Cameron, 4 way T with one 4" outlet and two 2" outlets.
Cameron, positive choke.
Cameron, adjustable choke.
Two spacer spools.
One spool, 2" - 10,000 psi to 2" - 5,000 psi.

Flanges
Shaffer, 2" - 5,000 psi.

Drilling Spools
Cameron, 13-5/8" - 5,000 psi.
Shaffer, clamp to hub, 13-5/8" - 5,000 psi.
Shaffer, hub to hub.
Double studded 13-5/8" to 12".
Shaffer double, 10" - 1,500 psi to 13-5/8" - 5,000 psi.
Shaffer, 13-5/8" - 5,000 psi; 13-5/8" - 5,000 psi.

Adapters.

Rams
Shaffer, 70, 4-1/2" rams.
Shaffer, 70, blind rams.
Shaffer, 70, 9-5/8" rams.
Shaffer, 70, 7" rams.

Kill Line
Steel, 4-1/2" drill pipe.

Gate Valves
Demco, 4" - 5,000 psi.
Demco, 2" - 5,000 psi.

Accumulator

Koomey, T315-15-3, 160 gallons.

Water Tanks

PDC, steel, 17,500 gallon.

Tong Torque Gauge

Martin Decker.

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Rotary Torque Gauge

Martin Decker.

Mud Pressure Gauge

Cameron.

Drilling Recorder

Totco, 61-A, 4 Pen.

Weight Indicator

Cameron C.
Martin Decker, E, with Type E sensator.

Welding Machine

Lincoln, diesel, 300 AMP.

Motor
GMC, diesel, 2/53.

Wire Line Unit

Halliburton, XLD, 18,000 with Ramsey gear box.

Drill Pipe Slips

Varco, SDL, 4-1/2".

Drill Collar Slips

Baash/Ross.

Clamps
Baash/Ross.

Subs

2 6-5/8" Reg x 6-5/8" Reg.
1 5" H90 x 6-5/8" Reg.
2 4-1/2" IF x 4" H90.
2 4" H90 x 4-1/2" IF.
1 4-1/2" IF x 4-1/2" IF.
1 4-1/2" IF x 4-1/2" Reg.
2 6-5/8" Reg. x 4-1/2" IF.
2 4-1/2" IF x 6-5/8" Reg.
1 5" H90 x 4-1/2" Reg.
2 6-5/8" Reg. x 7-5/8" Reg.
2 4-1/2" IF x 7-5/8" Reg.
2 Junk Baskets 4-1/2" Reg. x 4-1/2" Reg.

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Subs (cont.)

2 Junk Baskets 6-5/8" Reg. x 6-5/8" Reg.
1 6-5/8" x 7-5/8" Reg.
1 4-1/2" Reg. x 4-1/2" Reg.
1 4-1/2" Reg. x 6-5/8" Reg.

Fishing Tools

Overshots
- Top Subs
- Grapples
- Jars
- Basket Subs
- Bumper Subs

Rat Hole

Parker, 8-5/8" x 30'

Mouse Hole

Parker, 7" x 30'

Wire Line Guides

Oteco, roller.

Crownomatics

Stewart Stevenson, TCB

Fire Extinguishers

General, powder, 30#