NATIONAL PETROLEUM RESERVE IN ALASKA

HISTORY
OF
DRILLING OPERATIONS

SOUTH BARROW WELL NO. 20

HUSKY OIL NPR OPERATIONS, INC.
Edited by: S. L. Hewitt and Gordon W. Legg

For the

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

TABLE OF CONTENTS

	Page
INTRODUCTION	1
DRILLING SUMMARY	2
GOVERNMENT FORMS AND REPORTS	
Notice of Intent to Drill	6
Sundry Notices and Reports	
Subsequent Notice of Spud Date	7
Subsequent Notice of Running and Cementing 9-5/8" Casing	8
Subsequent Notice of Running and Cementing 7" Casing	9
Subsequent Notice of Change of Plans (Plug back)	10
Notice of Intent to Re-enter and Clean Up Well and Install Production Tubing	12
Report of Oil Well Completion	13
Well Completion Report	15
LOCATION DATA	
Certificate of Surveyor	19
Drill Pad Drawing	20
DRILLING DATA	
Operations History	21
Drilling Time Analysis	27
Drilling Time Curve	31
Drilling Mud Record	32
Bit Record	33
CASING DATA	
Introduction	34
Casing Tally Summary 9-5/8" Casing	36
Casing Tally 9-5/8" Casing	37
Casing Cement Job 9-5/8" Casing	38
Casing Tally Summary 7" Casing	39
Casing Tally 7" Casing	40
Casing Cement Job 7" Casing	42
Casing Tally Summary 2-7/8" Tubing	43
Casing Tally 2-7/8" Tubing	44
COMPLETION DATA	
Wellbore Completion Schematic	46
Wellhead Drawing	47
Arctic Casing Pack	48

APPENDIX NO. I - Rig Inventory I-1

LIST OF FIGURES

Figure 1, Well Location Map 1

SOUTH BARROW WELL NO. 20

INTRODUCTION

South Barrow Well No. 20 is located in the East Barrow Gas Field (Figure 1). The designation "East Barrow Gas Field" is now applied to those wells which were earlier identified as "South Barrow Gas Field, East Area". The South Barrow Gas Field and the East Barrow Gas Field are now recognized as two separate fields. The well is located approximately 10 miles southeast of the village of Barrow, and is 1,600 feet from the east line and 1,980 feet from the north line of protracted Section 26, Township 22 North, Range 17 West, Umiat Meridian; Latitude: 71°13'57.02"N; Longitude: 156°20'11.98"W. Alaska State Plane Coordinates are: Y = 6,303,300.91 and X = 696,001.93, Zone 6. The elevations are 30' kelly bushing, 12' pad, and 7' ground.

Rig-up started on April 4, 1980, and the well was spudded on April 7, 1980. The hole was drilled to a total depth of 2,356 feet. The primary objective of the well was the Jurassic, Lower Barrow sandstone, encountered between 2062' and 2082'. The secondary objectives of the well were the Upper Barrow sandstone at 1980' to 2043' and the Sag River Sandstone at 2240' to 2314'. A third objective of the well was sandstones in the "Pebble Shale". At the conclusion of the drilling and evaluation, the well was plugged back and completed in two sandstones of the "Pebble Shale" as a shut-in "marginal" oil well, and the rig was released on May 10, 1980.

Husky Oil NPR Operations, Inc., supervised and directed the drilling and support operations as prime contractor for the USGS, ONPRA. U. S. Department of the Interior. Brinkerhoff Signal, Inc. was the drilling contractor; Brinkerhoff Rig 31, a National T-20, was used to drill the well.

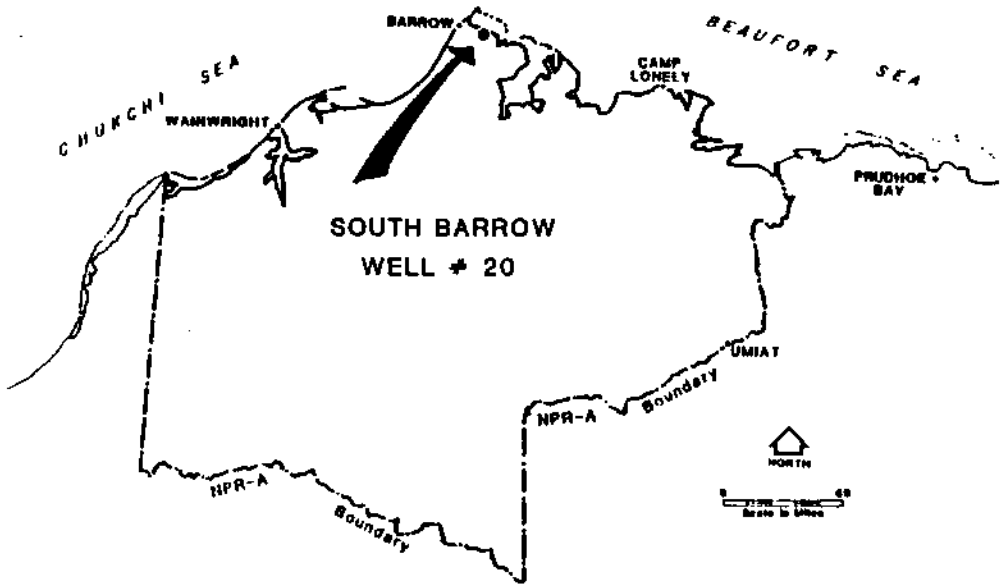


FIGURE 1- WELL LOCATION MAP - SOUTH BARROW NO. 20

DRILLING SUMMARY

Rig-up operations started on April 4, 1980, and 13-3/8" conductor pipe was set at 100' and cemented with 230 sacks of Class "G" cement. The well was spudded April 7, 1980, at 6:00 a.m. A 12-1/4" hole was drilled to 1500'; the hole was then surveyed, and logged with DIL/SFL/GR/SP and BHC-Sonic/GR/TTI. Thirty-five joints of 9-5/8", 53.5#, S-95 Buttress casing were run to 1490' and cemented with 1,300 sacks of permafrost cement mixed at 14.9 ppg. A float collar and nine centralizers were run on the casing. A $CaCl_2$ mud system was built while waiting on cement, and for the blowout-preventer stack to be nippled up. The purpose in converting to a calcium-chloride based mud system was to inhibit the fresh water induced "swelling" of montmorillonitic clays, which had been proved to exist in the Barrow sandstones and in the Sag River Sandstone from water susceptibility tests that had been conducted on core samples taken from South Barrow Nos. 12 and 13. The blowout-preventer stack and the wellhead were tested. The Hydril element had to be replaced. After installing the wear bushing, the hole was reamed from 40' to 550' to remove frozen drilling mud. The casing was tested to 1,500 psi. The float collar, shoe, and ten feet of formation were drilled to 1510'. The formation was then tested to 0.61 psi/ft. equivalent gradient.

An 8-1/2" hole was drilled to 2140', and conditioned for logs. Logs were run as follows: DLL/GR/SP/MSFL; BHC-Sonic/GR/TTI; FDC/CNL/GR/CAL. Fifty-five joints of 7", 38#, S-95 Buttress casing were run after the hole had been conditioned and the drill collars laid down. The casing shoe was landed at 2127', with the float collar at 2090' and FOs at 1297' and 1217'. Circulation was lost prior to cementing the casing. The casing was cemented with 80 sacks of Class "G" cement containing 2% $CaCl_2$ and 2% CFR-2 mixed at a slurry weight of 15.8 ppg, with very slight returns. The lower FO at 1297' was opened, a RTTS packer set, and the 7" x 9-5/8" annulus circulated. The FO was closed, the blowout preventer nippled down, and the casing landed. The packoff and tubing head were installed and tested to 3,000 psi. The blowout preventer was nippled up, tested and the wear bushing installed. Both FO's were opened, circulated, closed and tested to 2,000 psi.

Preparations were made to Arctic Pack the 7" x 9-5/8" annulus. The lower FO was reopened, an injection rate of 3.4 BPM at 350 psi established, and 60 sacks of 15.0 ppg Permafrost cement down-squeezed through it. The cement was displaced with a barrel of water and 6.5 barrels of mud. The packer was released and the FO closed and tested to 2,000 psi. The original mix of Arctic Pack was found to be contaminated with 36% water, and it was remixed. The 7" x 9-5/8" annulus was then displaced with Arctic Pack through the FO at 1217' to the surface. The FO was closed and tested to 2,000 psi.

Drilling ahead continued. The shoe was drilled out to 2150' and the formation tested to a 0.61 equivalent gradient with no leak off. The 5-5/8" hole was drilled to 2356' with the following cores cut: Core No. 1, 2247' to 2269', 20.2' recovered; Core No. 2, 2269' to 2299', 29' recovered;

Core No. 3, 2299' to 2314', 14.9' recovered. Ran in hole for Drill-Stem Test No. 1. Open hole Drill-Stem Test No. 1 was conducted on the way down in the interval 2127' to 2314' with no water cushion. Results were as follows:

> 1st FP (120 minutes): IHP 1,163 psi, opened tool with strong blow, decreased to weak blow in 20 minutes through 1" surface choke, GTS in 60 minutes. IFP 181 psi, shut in for 240 minutes, ISIP 909 psi. (gauge No. 134 @ 2139'; field report).
>
> 2nd FP (480 minutes): Opened with strong blow, stabilized flow rate through 1/8" choke of 12 MCFPD with 17 psi SFP, FFP 206-289 psi, shut in for 900 minutes, FSIP 958 psi, FHP 1,163 psi (gauge No. 134 @ 2139'; field report). Recovered 2.6 barrels of slightly gas-cut mud with trace of oil.

Resumed drilling to 2356' (total depth). Schlumberger logs were run at total depth as follows: DII/GR/SP; FDC/CNL/GR/CAL; BHC-Sonic/GR; MLL/GR. A CBL/VD/CCL log was also run. It showed cement only as high as the top of the Lower Barrow sandstone suggesting possible breakdown of the reservoir during the initial cementing of the 7" casing.

After logging, a decision was made to plug back and production test the Barrow sandstones. Plug No. 1, 50 sacks of 15.8 ppg Class "G" cement was spotted from 2343' to 2025' in the 7" casing. Ran in hole and tagged cement plug at 2080', cleaned out to 2100', and made preparations to recement across the sands behind the 7" casing to insure isolation of the test zones. An E-Z drill retainer was set at 2095', the casing tested to 2,000 psi, and four perforations shot at 1950'. A second E-Z drill retainer was set at 1930' and tested to 2,000 psi. An injection rate of 3 BPM at 1,000 psi was established, and 10 barrels of water followed by 35 sacks of 15.8 ppg Class "G" cement were pumped. An additional 25 sacks of cement were mixed and displaced at 1-1/2 BPM at 500 psi.

Procedures for Production Test No. 1 of the Barrow sandstones were started. The lubricator was rigged up and tested to 500 psi. The sands were perforated at four shots per foot from 1994' to 2046' and 2064' to 2082'. Two and seven-eights inch tubing was run and landed at 2083' (69 joints, N-80, 6.5#). Ten centralizers were spaced out on the tubing and 1/4" alcohol injection lines run in on it at depths of 1200' and 1900'. The blowout-preventer was nippled down, the test tree nippled up and tested, and the mud displaced with 9.2 ppg $CaCl_2$ water. Initial attempts to rock the well in with nitrogen failed. The well broke down with 400 to 600 psi and $CaCl_2$ water. Further attempts to bring the well in were unsuccessful, and the test was aborted.

The intervals 1994-2046' and 2064-2082' were reperforated at 1994-2046' and 2064-2079', and retested (Production Test No. 2). Seven barrels of Halliburton MCA was poured down the tubing, displaced with $CaCl_2$ water,

and squeezed into the test zones. Gas from Barrow Well No. 19 was used to clean up Barrow Well No. 20, and the test was conducted. Flow through a 1-1/2" choke was 1.31 MMCFGPD, with a maximum flowing wellhead tubing pressure of 30 psi. Bottom-hole temperature and pressure were recorded with a Hewlett-Packard recorder as follows: initial bottom-hole temperature 34.7°F; final bottom-hole temperature 37.2°F; maximum bottom pressure 786 psi.

The well was killed and the Lower Barrow sandstone was squeezed with 48 barrels of Halliburton FEA acid, in an attempt to improve production. The acid was injected at a rate of 1/3 barrels per minute at 350 psi to two barrels per minute at 450 psi. Isolation was lost between the Upper and Lower Barrow sandstones during the acid squeeze, and it appeared that the acid was not squeezed into the desired zones.

The well was again blown clean with gas from Barrow Well No. 19 and flowed. Maximum rate was 1.3 MMCFGPD with approximately 1 barrel of water per minute at a flowing wellhead tubing pressure of 30 psi. After two hours of flow, the well was shut in, and a 4-point flow test conducted. Results are summarized as follows:

Choke	Final Flowing Surface Annulus Pressure	Final Flowing Surface Tubing Pressure	Final Flowing Pressure Through Flow Prover	Rate
1/16	600 psi	500 psi	480 psi	40 MCFPD
3/32	580 psi	450 psi	450 psi	100 MCFPD
1/8	550 psi	365 psi	355 psi	100 MCFPD
3/16	545 psi	330 psi	290 psi	Water to Surface

The well was shut in, and a maximum bottom-hole pressure of 786 psi was recorded with a Hewlett-Packard downhole recorder.

After reviewing test results, it was decided to plug back across the Barrow sandstones and test the higher "Pebble Shale" sands. It must be noted that results from Production Test No. 2 suggests that irreversible formation damage occurred to the Lower Barrow sandstone during the initial cementing of the 7" casing. Wireline log analysis indicates that much better production rates should have been obtained from these sandstones.

Preparations were made to plug-back to the "Pebble Shale" sandstones and isolate the two zones. A retainer was set at 1904', and the perforations in the Barrow sandstones were squeezed with 100 sacks of 15.8 ppg Class "G" cement. Four perforations were shot at 1780', a retainer set at 1749', and 20 sacks of 14.8 ppg Permafrost cement squeezed away.

The "Pebble Shale" sand zones from 1629' to 1639', and from 1556' to 1574' were perforated at four shots per foot for Production Test No. 3. Two and seven-eights inch tubing was run and landed at 1644'. The test is summarized as follows:

Hole full of $CaCl_2$ water. Opened well with no flow, unloaded well with gas from Barrow No. 19, maximum FWHP 170 psi declining to 0 psi at end of test, FSIBHP 193 psi, swabbed total recovery of approximately 21 barrels of gas-cut oil and mud. An engineering production report speculated that a maximum producing rate, by pumping, of 20 BOPD, maybe 25 BOPD, might be attained.

At the conclusion of the test, the well was shut-in, and officially designated an "oil well", although the small amount of oil recovered, the high viscosity of the oil at the low formation temperature (approximately 40° as reported on production engineering report "Pebble Shale Sands Well Test"), and the effect the high viscosity flow would have in reducing the formation pressure away from the wellbore, casts considerable doubt on the validity of the designation of "oil well". The rig was released May 10, 1980 at 6:00 a.m. and then moved to the South Barrow No. 15 location.

Form P-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
ONSHORE DIST. OFFICE
APR 3 1980
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 [ ] GAS WELL [X] 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: 1600' FEL and 1980' FNL
At proposed prod. zone: Same (straight hole)

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE*: 9.8 Miles Southeast of Barrow, 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.: So. Barrow Well No. 20 (East Area)
10. FIELD AND POOL, OR WILDCAT: South Barrow Gas Field
11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 26, T22N, R17W, UM
12. COUNTY OR PARISH: North Slope Borough, AK
13. STATE: AK

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. unit line, if any): 10,000
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.: 3,300'
19. PROPOSED DEPTH: ± 2300'
20. ROTARY OR CABLE TOOLS: Rotary
21. ELEVATIONS (Show whether DF, RT, GR, etc.): Ground = 7'; Pad = 12'; KB = 30'
22. APPROX. DATE WORK WILL START*: April 5, 1980

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
17 1/2"	13 3/8" (Cond)	72# (S-95)	110' KB	± 100 Sx Permafrost to Surface
12 1/4"	9 5/8"	53.5# (S-95)	1500'	± 1000 Sx Permafrost to Surface
8 1/2"	7"	38# (S-95)	2100'	± 80 Sx Class "G" w/additives from TD to ± 1600'. Second stage: Down squeeze through FO @ ± 1300' with ± 60 sx Permafrost. Arctic Pack 9 5/8" X 7" annulus through FO at 1220' with ± 60 barrels Arctic Pack.

Blowout Preventer Program:

From ± 110' KB to ± 1500'
12", 3000 psi, SA Diverter Assembly

From ± 1500' to TD:
12", 3000 psi, SRRA BOP Assembly
w/3000 psi Choke Manifold and Kill Line

See Drilling Program for details.

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 C. Brewer TITLE Chief of Operations DATE 3 April 80

(This space for Federal or State office use)

APPROVED BY William James Mahon ACTING DISTRICT SUPERVISOR DATE 4/4/80

CONDITIONS OF APPROVAL, IF ANY:

*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 ☐ 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: 1600' FEL; 1980' FNL
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.
So. Barrow Well No. 20 (East Area)

10. FIELD OR WILDCAT NAME
South Barrow Gas Field

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 26, T22N, R17W, UM

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

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
GL 7'; Pad 12'; KB 30'

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.)

RECEIVED
ONSHORE DIST. OFFICE
APR 18 1980
CONSERVATION DIVISION
U.S. GEOLOGICAL SURVEY
ANCHORAGE, ALASKA

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 was spudded April 7, 1980, at 6:00 AM. Hole size at spud was 12 1/4". A 13 3/8" conductor pipe was cemented in place with 230 sacks of Class "G" cement at 100' previous to spud.

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 Operation DATE 16 April 80

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Barry A. Bondreau TITLE DISTRICT SUPERVISOR DATE 4-21-80

*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 ☐ 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: 1600' FEL; 1980' FNL
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.
So. Barrow Well No. 20 (East Area)

10. FIELD OR WILDCAT NAME
South Barrow Gas Field

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 26, T22N, R17W, UM

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

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
GL 7'; Pad 12'; KB 30'

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 9 5/8" Casing

RECEIVED
APR 22 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.)*

Drilled a 12 1/4" hole to 1500'. Logged with DIL/GR and BHC-Sonic/GR. Ran 35 joints of 9 5/8",53.5#/ft, BTC, S-95 casing. Shoe at 1490'. Pumped 20 bbls of water ahead of 1300 sacks of Permafrost cement. Slurry weight at 14.9 ppg. Had good returns. Displaced with 9.5 bbls of water. CIP at 12:30 PM, 4/9/80. Nippled up BOPE and tested to 3000 psi. OK. Tested casing to 1500 psi. OK. Drilled out shoe and 10 feet of formation. Tested formation to 0.61 psi/ft equivalent gradient. Drilling ahead with 8 1/2" bit.

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 21 April 80

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Barry A Bondreau TITLE _____ DATE 4-22-80

*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 ☐ 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: 1600' FEL; 1980' FNL
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.: So. Barrow Well No. 20 (East Area)

10. FIELD OR WILDCAT NAME: South Barrow Gas Field

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 26, T22N, R17W, UM

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

14. API NO.:

15. ELEVATIONS (SHOW DF, KDB, AND WD): GL 7'; Pad 12'; KB 30'

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 7" Casing			

RECEIVED
ONSHORE DIST. OFFICE
APR 25 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.)*

Drilled an 8 1/2" hole to 2140'. Logged with MSFL/GR, BHC-Sonic/GR, FDC/CNL/GR. Ran 55 joints of 38 lb/ft, S-95, BTC casing. Landed shoe at 2127'. FOs at 1217' and 1297'. Pumped a 25 bbl water spacer with 2% Cla Sta. Cemented with 80 sx Class "G" cement with 2% $CaCl_2$ and 2% CFR-2 at 15.8 ppg. Had returns. CIP at 7:30 AM, 4/15/80. Nippled up and tested BOPE to 3000 psi. OK. Opened FO at 1297' and cemented with 60 sacks of Permafrost cement at 15.0 ppg. Tested FO to 2000 psi OK. Arctic Packed 7"X9 5/8" annulus. Drilled out shoe and 10 feet of formation. Tested formation to 0.61 psi/ft equivalent gradient. Drilling ahead with 5 5/8" bit.

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 24 April 80

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Barry A Bondreau TITLE _____ DATE 4-25-80

*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 ☐ 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: 1600' FEL; 1980' FNL
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.
So. Barrow Well No. 20 (East Area)

10. FIELD OR WILDCAT NAME
South Barrow Gas Field

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec 26, T22N, R17W, UM

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

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD)
GL 7'; Pad 12'; KB 30

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) Confirming Notice to Plug Back			

RECEIVED
ONSHORE OIL & GAS OFFICE
MAY 1 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 plug back South Barrow Well No. 20. This well was drilled to a total depth of 2356', logged, and tested. As a result of the evaluation, plans were developed to plug back the well to evaluate and complete the Barrow Sands. The plug back procedure is attached.

This plan has been discussed with and verbally approved by Mr. Weber on 4/23/80.

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 29 April 80

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Barry A Bondurant TITLE [illegible] DATE 5-2-80

*See Instructions on Reverse Side

SOUTH BARROW WELL NO. 20
PLUG-BACK CEMENTING PROCEDURE

1. Trip in with open-ended drill pipe to TD (2356'). Spot a 50-sack plug. (This is a 216' plug in open hole and 102' inside 7" casing.) Pump ± 10-bbl water spacers ahead and 3 bbl behind the slurry. Adjust spacers to balance the plug. Slurry weight to be 15.8 ppg. Add 2% calcium chloride to the Class "G" cement. The thickening time is ± four hours.

2. Pick up slowly out of the slurry plug. Pull up into the casing and reverse out DP. Trip out.

3. Pick up 5 5/8" bit and 4 3/4" drill collars. Trip in to three stands above the 7" casing shoe. Circulate and WOC 12 hours.

4. Trip in and tag cement plug. Polish plug as required to allow 10-15' of open hole below the bottom perf interval (± 2100').

5. Run cement retainer on drill pipe. Set retainer at 2090' ± 10' below the base of the Barrow Sand. Do not set retainer in a casing collar. Test casing to 1500 psi.

6. Proceed with completion of Barrow Sands.

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: 1600' FEL; 1980' FNL
AT TOP PROD. INTERVAL: Same
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.: South Barrow Well No. 20

10. FIELD OR WILDCAT NAME: South Barrow Gas Field

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 26, T22N, R17W, UM

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

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD): 30' 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) Complete as an Oil Well			

(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.)*

Operation: Reenter and clean up well, install production tubing. See attached completion procedure for details.

Starting Date: May 9, 1980

Husky has been directed by USGS/ONPRA, through Mr. George Gryc, to complete this well. Mr. Jim Weber, USGS Conservation Division, has verbally discussed and approved the attached completion procedure on May 9, 1980.

RECEIVED
DEPUTY CONSERVATION
ONSHORE

SEP 5 1980

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

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

SIGNED Max Peavey TITLE Chief of Operations DATE 15 May 80

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

APPROVED BY Harold Hedlund TITLE ACTING DISTRICT SUPERVISOR DATE 12-5-80

*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 ☒ 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: 1600' FEL; 1980' FNL
AT TOP PROD. INTERVAL: Same (straight hole)
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.: So. Barrow Well No. 20 (East Area)

10. FIELD OR WILDCAT NAME: South Barrow Gas Field

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Sec 26, T22N, R17W, UM

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

14. API NO.

15. ELEVATIONS (SHOW DF, KDB, AND WD): Ground = 7'; Pad = 12', KB = 30'

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) Oil Well Completion Report			

(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 final procedure describes the completion of South Barrow Well No. 20 as an oil well. Zones 1556'-1574' and 1629'-1639' were tested and found to produce hydrocarbons.

1. After pulling drill pipe, RIH with 55 joints of 2 7/8" tubing and landed at 1644.7' (with 4' mule shoe included).
2. Ten centralizers were run on tubing at 1640', 1609', 1580', 1551', 1520', 1429', 1128', 830', 525', and 226'.
3. All connections were broken, cleaned, redoped, and retorqued when running. Make-up torque was 2300 ft-lbs.
4. Rig down BOPE and nipple up Xmas tree. Test Xmas tree to 3000 psi.
5. Run BPV; secure wellhead.

DEPUTY CO[illegible]
ONSHOR[illegible]

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 20 May 80

SEP[illegible]

(This space for Federal or State office use)

Conforms with pertinent provisions of 30 CFR 221.

Harold J. Hedlund ACTING TITLE ~~DISTRICT SUPERVISOR~~ DATE 11-6-82

*See Instructions on Reverse Side

COMPLETION PROCEDURE
SOUTH BARROW WELL NO. 20

1. Run 2 7/8" tubing and land at ± 2000'.
2. Rig down BOP and nipple up Xmas tree; pressure test to 3000 psi.
3. Secure wellhead.

AMENDED MARCH 21, 1983

Form 9-330
(Rev. 5-63)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUBMIT IN DUPLICATE* (See 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 [ ] Other

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

2. NAME OF OPERATOR: USGS 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 1600' FEL; 1980' FNL
At top prod. interval reported below Same (straight hole)
At total depth

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.: South Barrow Well No. 20
10. FIELD AND POOL, OR WILDCAT: South Barrow Gas Field
11. SEC., T., R., M., OR BLOCK AND SURVEY OR AREA: Sec 26, T22N, R17W, UM
12. COUNTY OR PARISH:
13. STATE:

14. PERMIT NO.	DATE ISSUED
N/A	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
4/7/80	4/23/80	5/10/80	GL 7'; Pad 12'; KB 30'	12'

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
2356' MD & TVD	1749'	N/A	→	Rotary	

24. PRODUCING INTERVAL(S), OF THIS COMPLETION—TOP, BOTTOM, NAME (MD AND TVD)*: 1556'-1574' and 1629'-1639' MD & TVD - Pebble Shale Sands

25. WAS DIRECTIONAL SURVEY MADE: No

26. TYPE ELECTRIC AND OTHER LOGS RUN: DIL/GR, FDC/CNL/GR, Micro Laterolog, CBL, MSFL, GR, BHC/GR, DLL

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
13 3/8"	72# (S-95)	100' KB	17 1/2"	230 Sx Cl G to Surface	None
9 5/8"	53.5# (S-95)	1490' KB	12 1/4"	1300 Sx Pmfst to Surface	None
				80 Sx Cl G w/2% CFR-2	None
7"	38# (S-95)	2127' KB	8 1/2"	60 Sx Downsqueeze 2d Stg	None

29. LINER RECORD

SIZE	TOP (MD)	BOTTOM (MD)	SACKS CEMENT*	SCREEN (MD)
N O N E				

30. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)

31. PERFORATION RECORD (Interval, size and number)
1556'-1574' and 1629'-1639'
4" Hyperjet II; 4 Shots per Foot
1994'-2046' - Perforations Squeezed
1780' - Perforations Squeezed

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

DEPTH INTERVAL (MD)	AMOUNT AND KIND OF MATERIAL USED
2095'-2343' MD	50 Sx Cl G w/2% $CaCl_2$ and 0.5% CFR 2 - Open Hole Plug
1994'-2046' MD	100 Sx Cl G w/2% $CaCl_2$, 1% CFR
1780'	200 Sx Permafrost Cmt @ 14.8 ppg

33. PRODUCTION

DATE FIRST PRODUCTION	PRODUCTION METHOD (Flowing, gas lift, pumping—size and type of pump)	WELL STATUS (Producing or shut-in)
	Gas Lift	Shut In

DATE OF TEST	HOURS TESTED	CHOKE SIZE	PROD'N. FOR TEST PERIOD →	OIL—BBL.	GAS—MCF.	WATER—BBL.	GAS-OIL RATIO
5/7 - 5/8/80	11	1 1/2"		10		10	

FLOW. TUBING PRESS.	CASING PRESSURE	CALCULATED 24-HOUR RATE →	OIL—BBL.	GAS—MCF.	WATER—BBL.	OIL GRAVITY-API (CORR.)
			20-25 (Est)*		25 (Est)*	

34. DISPOSITION OF GAS (Sold, used for fuel, vented, etc.): N/A
TEST WITNESSED BY: Henry Peterson

35. LIST OF ATTACHMENTS

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

SIGNED Dan Yokel TITLE Chief of Operations, ONPRA DATE 3-2-83

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

Original signed
10/3/80

* "South Barrow No. 20, Pebble Shale Sands Well Test", speculates that the recovery of "gas cut oil and mud" was 50% oil and 50% water, and that a maximum rate of 20-25 BOPD might be produced by pumping, and thus reducing the bottom hole pressure to 100 psia. Engineering report,

AMENDED MARCH 21, 1983

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.)

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 Log TOP MEAS. DEPTH	TRUE VERT. DEPTH
				GR/Pebble Sh	1313'	
				Kingak	1787'	
				Barrow Sand	1980'	
				Sag River	2240'	
				Argillite	2307'	

U.S. GOVERNMENT PRINTING OFFICE: 1983—O 683436

671-233

AMENDED MARCH 21, 1983

Well Completion Report
National Petroleum Reserve in Alaska
South Barrow Well No. 20
Summary of Drill Stem Tests and Production Tests

Production Test No. 1	Upper & Lower Barrow sand	Perforations: 1994-2046' 2064-2082'	Could not unload calcium-chloride water; test aborted.
Production Test No. 2	Upper & Lower Barrow sand	Perforations: 1994-2046' 2064-2079'	Production Test: Perforated with 4 shots/ft. Well flowed at maximum rate of 1.3 MMCFGPD on 1.5" choke and FTP of 30 psi. Shut in well for 8 hours with maximum bottom hole SIP of 786 psi.
Production Test No. 3	"Pebble Shale" sands	Perforations: 1558-1574' 1629-1639'	Production Test: Perforated with 4 shots/ft. Opened well with no fluid to surface. Maximum surface tubing pressure 170 psi, declining to 0 psi. Unloaded well four (4) times in 24 hours with gas from Well No. 19. Recovered approximately 20 bbls. fluid consisting of gas-cut oil with mud. Bottom hole shut-in pressure: 192.5 psi.

AMENDED MARCH 21, 1983

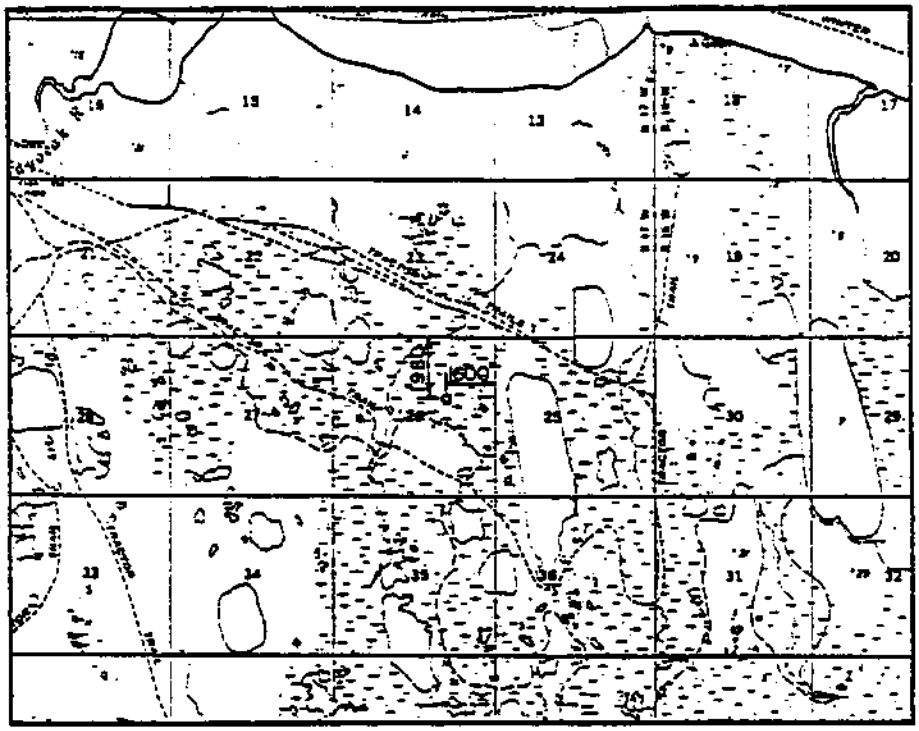
Well Completion Report
National Petroleum Reserve in Alaska
South Barrow Well No. 20

SUMMARY OF CORED INTERVALS

CORE NO.	FORMATION	INTERVAL	CORE DESCRIPTION
1	Sag River	2247-2269' (Rec. 20')	Sandstone: very fine grained, argillaceous, grades to siltstone, fair to nil porosity, bleed heavy dark brown oil. Analysis indicates nil to fair permeability.
2	Sag River	2269-2299' (Rec. 29')	Sandstone: very fine grained, argillaceous, partly silty and glauconitic, poor to fair porosity, nil to fair permeability, bleed heavy residual oil from pores and fractures.
3	Sag River/ Argillite	2299-2314' (Rec. 15')	Sandstone: very fine to coarse grained, calcareous, argillaceous, poor to fair porosity, thin zones of fair to good permeability, generally bleeding very heavy residual dead oil from thin zones. Argillite (1.2') at base of core.

SUMMARY OF DRILL STEM TESTS AND PRODUCTION TESTS

DST No. 1	Triassic undifferentiated and Sag River	2127-2314'	Open Hole DST with packer set in shoe of 7" casing. No cushion above test tool. 1st FP (120 minutes): IHP 1163 psi, opened tool with strong blow decreasing to weak blow in 20 minutes on 1" choke, GTS in 60 minutes, 1st FP pressure 181 psi, shut in for 240 minutes, ISIP 909 psi. 2nd FP (480 minutes): Opened tool with strong blow on 1" choke, choked down to 1/16" with 15 psi FWHP after 5 hours. Changed to 1/8" choke with 19.5 psi FWHP, 2nd FP pressure 206-289 psi, shut in well for 900 minutes, FSIP 958 psi, (gauge set at 2139') recovered 2.6 barrels slightly gas-cut mud with trace of oil.



0 1/2 1 2

SCALE IN MILES

BARROW GAS WELL No. 20

LAT. = 71°13'57.02"
LONG. = 156°20'11.98"
Y = 6,303,300.91
X = 696,001.93
ZONE 6

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.

STATE OF ALASKA * 49TH * James L. Roberts No. 3260-S REGISTERED PROFESSIONAL LAND SURVEYOR

AS STAKED

BARROW GAS WELL No. 20

LOCATED IN

NE 1/4 PROTRACTED SEC. 26, T22N, R17W, UMIAT MERIDIAN, AK.

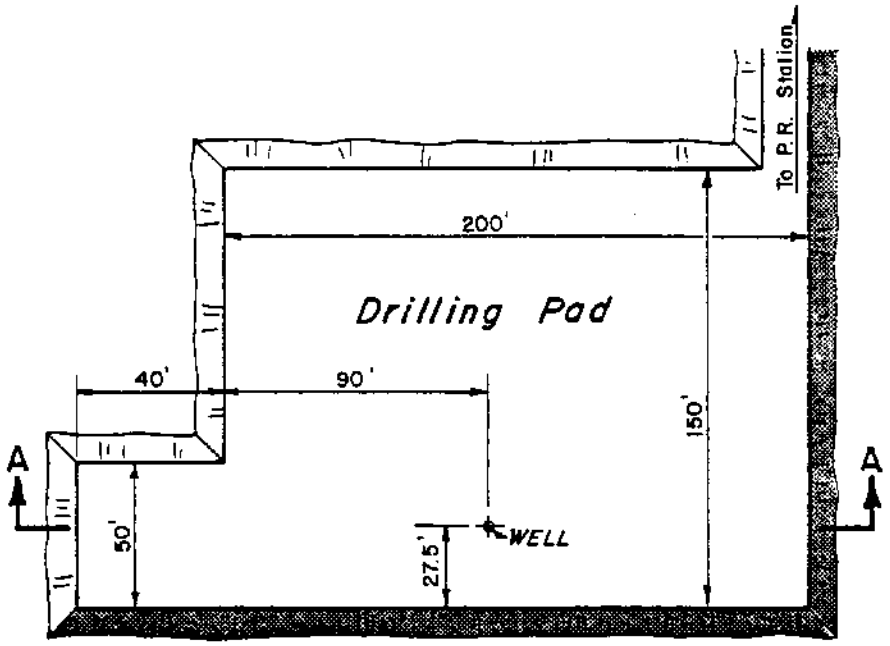
SURVEYED FOR

HUSKY OIL

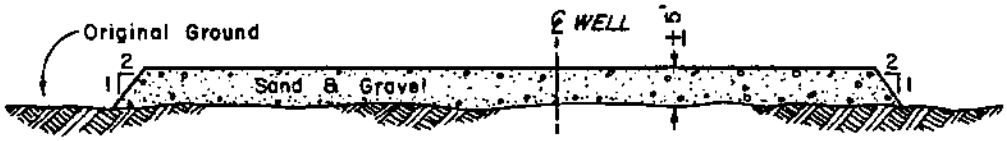
N. P. R. OPERATIONS, INC.

TECTONICS INC.

P.O. BOX 4-2295, ANCHORAGE, AK 99509



PLAN VIEW



SECTION A-A

SOUTH BARROW No. 20 DRILL PAD

OPERATIONS HISTORY

DATE AND FOOTAGE DRILLED AS OF 6:00 A.M.	ACTIVITY
4/6/80	Raised derrick. Set 13-3/8" conductor at 100' and cemented with 230 sacks of Class "G" cement. Welded on 13-3/8" starter head; tested weld to 750 psi. Nippled up blowout preventer; continued with general rig up.
4/7/80	Finished nippling up blowout preventer; completed rig up. Tested Hydril and diverter to 250 psi. Prepared to spud.
4/8/80 1400'	Total Depth: 1500'; Mud Weight: 9; Viscosity: 37. Spudded well April 7, 1980, at 6:00 a.m. Drilled and surveyed to 1500'. Circulated and conditioned mud.
4/9/80 0'	TD: 1500'; MW: 9.1; Vis: 47. Circulated; surveyed. Made wiper trip; no fill. Circulated and conditioned mud; pulled out of hole. Ran DIL/SFL/GR/SP and BHCS/GR/TTI logs. Ran in hole; circulated and conditioned mud. Pulled out of hole. Ran 35 joints of 9-5/8", 53.5#, BTC, S-95 casing. Float shoe at 1490'; float collar; nine centralizers.
4/10/80 0'	TD: 1500'; MW: 9.1; Vis: 37. Cleared floor; ran Howco stab-in tool on drill pipe. Circulated and conditioned mud to cement. Pumped 20 barrels of water ahead of 1,300 sacks of Permafrost cement at 14.9 ppg. Returns at 14.8 ppg. Displaced with 9.5 barrels water. Cement in place March 9, 1980, at 12:30 p.m. Pulled out of hole; waited on cement; built $CaCl_2$ mud.
4/11/80 0'	TD: 1500'; MW: 10; Vis: 49. Waited on cement. Cut off 9-5/8" casing. Nippled down diverter system. Installed 9-5/8" weld-on flange. Tested weld to 1,000 psi. Nippled up blowout-preventer.
4/12/80 0'	TD: 1500'; MW: 10; Vis: 49. Nippled up blowout-preventer; tested. Repaired kelly cock; replaced Hydril element. Thawed out kelly. Tested blowout-preventer equipment.
4/13/80 270'	TD: 1770'; MW: 10.4; Vis: 58. Finished testing blowout-preventer equipment. Ran in hole; tagged float at 1443'. Tested casing to 1500 pounds. Drilled float and shoe; drilled to 1510'. Tested formation to 0.61 psi gradient; no leak off. Drilled ahead.

4/14/80 370'	TD: 2140'; MW: 10.8; Vis: 60. Drilled to 1830'; dropped survey. Pulled out of hole. Drilled to 2090'; circulated a gas show. Drilled to 2140'; circulated and conditioned mud. Dropped survey; pulled out of hole. Began logging.
4/15/80 0'	TD: 2140'; MW: 10.8; Vis: 58. Ran DLL/GR/SP/MSFL, BHCS/GR/TTI, and FDC/CNL/GR/CAL logs. Circulated and conditioned mud. Ran 7", 38# casing; landed at 2127'. Stabbed in and circulated. Lost-circulation in five minutes.
4/16/80 0'	TD: 2140'; MW: 10.7; Vis: 51. Picked up Halliburton unit and ran in hole to cement. Pumped a 25-barrel water spacer with 2% Cla-Sta and 80 sacks Class "G" cement with 2% $CaCl_2$ and 2% CFR-2 at 15.8 ppg; followed with two barrels water. Very slight returns during job. Cement in place April 15, 1980, at 7:30 a.m. Pulled out of hole. Ran in hole; shifted FO at 1297' and circulated annulus. Nippled down and set casing slips; installed packoff and tested to 3,000 psi. Nippled up blowout-preventer and tested.
4/17/80 0'	TD: 2140'; MW: 10.7; Vis: 51. Tested blowout-preventer equipment. Down squeezed 60 sacks Permafrost cement through lower FO. Waited on cement. Mixed Arctic pack; prewashed annulus through upper FO. Arctic pack became contaminated during prewash. Pumped Arctic pack in annulus as clean-out spacer. Began mixing new batch of Arctic pack.
4/18/80 21'	TD: 2161'; MW: 10; Vis: 38. Pumped contaminated Arctic pack around annulus; mixed and pumped second batch. Ran in hole, steel-line measuring. Tagged cement at 2085'. Circulated and conditioned mud. Drilled float, cement, and shoe to 2127'; cleaned out to 2140'; drilled to 2150'. Tested formation to 0.61 psi. Drilled ahead.
4/19/80 86'	TD: 2247'; MW: 9.9; Vis: 42. Drilled to 2162'; tripped for bit. Drilled to 2235'; tripped for bit. Drilled to 2247'; circulated samples. Pulled out of hole for core.
4/20/80 62'	TD: 2309'; MW: 9.9; Vis: 39. Picked up core barrel; ran in hole. Cut Core No. 1, 2247' to 2269'. Barrel jammed. Pulled out of hole; recovered 20.2 feet of core. Conditioned hole with bit. Cut Core No. 2, 2269' to 2299'. Barrel jammed. Pulled out of hole; recovered 29 feet of core. Conditioned hole with bit. Ran in hole with core barrel.

4/21/80
5'

TD: 2314'; MW: 9.9; Vis: 38. Cut Core No. 3, 2299' to 2314'. Pulled out of hole; recovered 14.9 feet of core. Picked up tools and ran in hole for Drill-Stem Test No. 1. Set packer at 2117' in 7" casing with no water cushion. Opened tool 4/20/80 at 12:10 p.m. for two-hour initial flow. Opened with strong blow, decreasing to weak blow in 20 minutes. Gas to surface in one hour. Shut well in for four hours. Opened for second flow period at 6:10 p.m. for eight-hour final flow. Opened with strong blow, stabilized on 1/8" choke at measured rate of 12 MCFPD at flow line. Flowing surface pressure: 17 psi. Downhole pressures, measured at 2139', were as follows: Initial hydrostatic: 1163 psi; first open period initial flow pressure: 88 psi; final flow pressure: 181 psi; initial shut-in pressure: 909 psi; second open period initial flow pressure: 206 psi; final flow pressure: 289 psi; final shut-in pressure: 958 psi; final hydrostatic pressure: 1163 psi. Well shut in for 15 hours.

4/22/80
40'

TD: 2354'; MW: 10.1; Vis: 38. Reversed out drill pipe. Recovered 2.6 barrels gas-cut mud. Pulled out of hole at 5:10 p.m. Laid down tools. Ran in hole; reamed core hole to 2314'. Drilled ahead.

4/23/80
2'

TD: 2356'; MW: 9.9; Vis: 33. Drilled to 2356'. Logging crew delayed due to weather. Made wiper trip to shoe. Ran in hole; circulated and conditioned mud. Pulled out of hole to log.

4/24/80

TD: 2356'; PBTD: 2025'; MW: 9.9; Vis: 33. Pulled out of hole for logs. Ran SP/GR/DLL. GR/CAL/CNL/FDC, GR/MLL, BHC/GR, and CBL/CCL. Ran in hole open-ended; set Plug No. 1 with 50 sacks Class "G" containing 2% $CaCl_2$ and 0.5% CFR-2 at 15.8 ppg (2343-2025'). Pulled out of hole to 2025'; reversed out. Waited on cement; cement in place at 12:15 a.m.

4/25/80

TD: 2356'; PBTD: 1930'; MW: 10.3; Vis: 35. Ran in hole; tagged cement at 2080'. Drilled to 2100'. Circulated and conditioned mud. Ran in hole with scraper. Ran in hole with retainer and set at 2095'. Tested to 2,000 pounds. Rigged up Schlumberger unit; perforated 1950-1951' with 4 shots/ft. Ran in hole with retainer and set at 1930'; tested to 2,000 pounds. Mixed and pumped ten barrels water with 2% Cla-Sta, followed with 60 sacks Class "G" cement at 15.8 ppg containing 2% $CaCl_2$ and 0.5% CFR-2. Displaced at 1.5 BPM at 500 pounds; built to 550 pounds. Final pressure: 300 pounds. Pulled out of hole to 1880'; reversed out. Cement in place April 25, 1980, at 4:00 a.m. Waited on cement.

4/26/80 PBTD: 2095'; MW: 10.3; Vis: 34. Waited on cement; tagged cement at 1907'. Drilled cement and retainer and cleaned out to 2095'. Circulated; tested perforations to 1,000 psi. Rigged up Schlumberger and tested lubricator to 500 psi. Ran in hole with perforating guns.

4/27/80 PBTD: 2095'. Perforated at four shots per foot for Production Test No. 1 of the Barrow sandstones, 1994' to 2046' and 2064' to 2082'. Ran 69 joints of 2-7/8", N-80, 6.5# EUE tubing. Landed tubing at 2083'. Nippled down blowout-preventer.

4/28/80 PBTD: 2095'. Nippled down blowout-preventer; nippled up tree and tested to 3,000 psi. Displaced well to 9.2 ppg $CaCl_2$ water. Attempted to rock well in with nitrogen but could not establish a reliable flow, so test was aborted.

4/29/80 PBTD: 2095'. Cleaned up well.

4/30/80 PBTD: 2095'. Cleaned well and killed flow. Installed back pressure valve; nippled down production tree. Nippled up box. Tested blowout preventer, choke, and Hydril. Pulled out of hole with tubing. Rigged up Schlumberger; ran in hole with perforating guns.

5/1/80 PBTD: 2095'. Reperforated at four shots per foot for Production Test No. 2 of the Barrow Sandstones, 1994' to 2046' and 2064' to 2079', Ran tubing. Nippled down blowout preventers; nippled up tree. Laid gas line from Barrow Well 19 to Barrow Well 20. Pumped seven barrels MC acid down tubing and squeezed away at 1/4 BPM. Unloaded well, 800 pounds on annulus and 600 pounds on tubing.

5/2/80 PBTD: 2095'. Cleaned up well. Shut well in at 11:30 p.m. with 1.315 MMCPD at 19 psi flowing pressure on 1-1/2" choke. Ran in hole with Hewlett Packard recorder. Initial BHT: 34.7°. BHT at 6:00 p.m.: 37.2°. BHP at 6:00 p.m.: 734 psi. Surface pressure: 625 psi.

5/3/80 PBTD: 2095'. Completed build up. Final BHP: 765 psi. BHT: 37.2°F. Killed well. Nippled up blowout preventers. Pulled out of hole with tubing. Ran in hole with RTTS. Tested perforations to 1,000 psi. Spotted Halliburton FEA. Set packer at 2056'. Pumped 48 barrels FEA, 1/3 BPM at 350 psi and 2 BPM at 450 psi. Shut in 30 minutes. Bled back; killed well with calcium-chloride water. Pulled out of hole with tubing.

5/4/80 PBTD: 2095'. Finished pulling out of hole with RTTS. Ran in hole with tubing. Nippled down blowout-preventer; nippled up tree. Tested to 3,000 psi. Unloaded well. Tubing became plugged. Injected alcohol; thawed tubing. Flowed well at 1.3 MMCF, 30 psi, with 1 BPM, 8.8 ppg water.

5/5/80 PBTD: 2095'. Flowed well; no choke. Casing: 130 psi; tubing: 30 psi. Well unloaded approximately 1 BPM water at 8.8 ppg. Shut in well for two hours. Began four-point flow test on 1/16" choke. Initial casing pressure: 550 psi; tubing pressure: 450 psi. Shut well in at 6:00 p.m. Ran Hewlett Packard recorder to bottom. Opened at 8:30 p.m. to clear liquids. Initial pressure: 690 psi; after blowing out liquids: 519 psi. Pressure at 4:30 a.m.: 786 psi.

5/6/80 PBTD: 2095'. Finished buildup; killed well. Nippled down tree and nippled up blowout-preventer. Tested to 3,000 psi. Pulled out of hole with tubing. Ran in hole with drill pipe and scraper to 1903'. Circulated and pulled out of hole.

5/7/80 PBTD: 1749'. Circulated; pulled out of hole with scraper. Ran in hole and set retainer at 1904'. Mixed and pumped ten barrels water and 100 sacks Class "G" with 2% $CaCl_2$ and 1% CFR-2 at 15.8 ppg. Squeezed and reversed out drill pipe. Pulled out of hole. Perforated at 1780'. Ran in hole and set retainer at 1749'. Mixed and pumped 20 sacks Permafrost cement at 14.8 ppg. Squeeze pressure: 1,000 psi. Reversed out and conditioned. Pulled out of hole. Cement in place May 6, 1980, at 5:00 p.m. Pulled out of hole. Ran in hole with tubing. Laid down 12 joints. Perforated from 1629' to 1639' and from 1556' to 1574' of the "Pebble Shale" sandstones for Production Test No. 3. Ran in hole with drill pipe. Circulated and conditioned mud to 9.6 (160 psi when perforated). Pulled out of hole; changed rams. Ran tubing with accessories.

5/8/80 PBTD: 1749'. Ran 55 joints of 2-7/8" tubing; landed at 1644'. Installed tree. Waited on cement. Unloaded well; flowed well. Rigged-up and ran Hewlett Packard recorder and temperature tool. Well depleted on flow test. BHT: 39.3°F, 270 psi. Final flow: 60 psi. Build up after five hours and twenty minutes: 382 psi.

5/9/80 PBTD: 1749'. Tested with Hewlett Packard and temperature recorders in well. Built-up for eight

hours. Opened on 1/16" choke; well died. Lifted out liquids with Well No. 19. Recovered an estimated 21 barrels of gas-cut oil and mud. Flowed on 1/8" choke; well died faster. Opened to test tank. BHP: 110 psi; built to 192.5 psi at termination. Pulled out of hole with wireline. Killed well. Nippled down Christmas tree and nippled up blowout-preventer.

5/10/80

PBTD: 1749'. Nippled up blowout-preventer and tested. Nippled up Christmas tree and tested to 3,000 psi. Unloaded $CaCl_2$ from well. Shut well in.

Removed all test lines. Laid down drill pipe, drill collars, and kelly. Released rig May 10, 1980, at 6:00 a.m. Cleaned pits. Began rigging down.

DRILLING TIME ANALYSIS

SOUTH BARROW WELL NO. 20

BRINKERHOFF SIGNAL, INC., RIG 31

Spud 4/7/80; Rig released 5/10/80

Total Depth: 2,356 Feet

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. SOUTH BARROW WELL NO. 20 Page 1 of 3

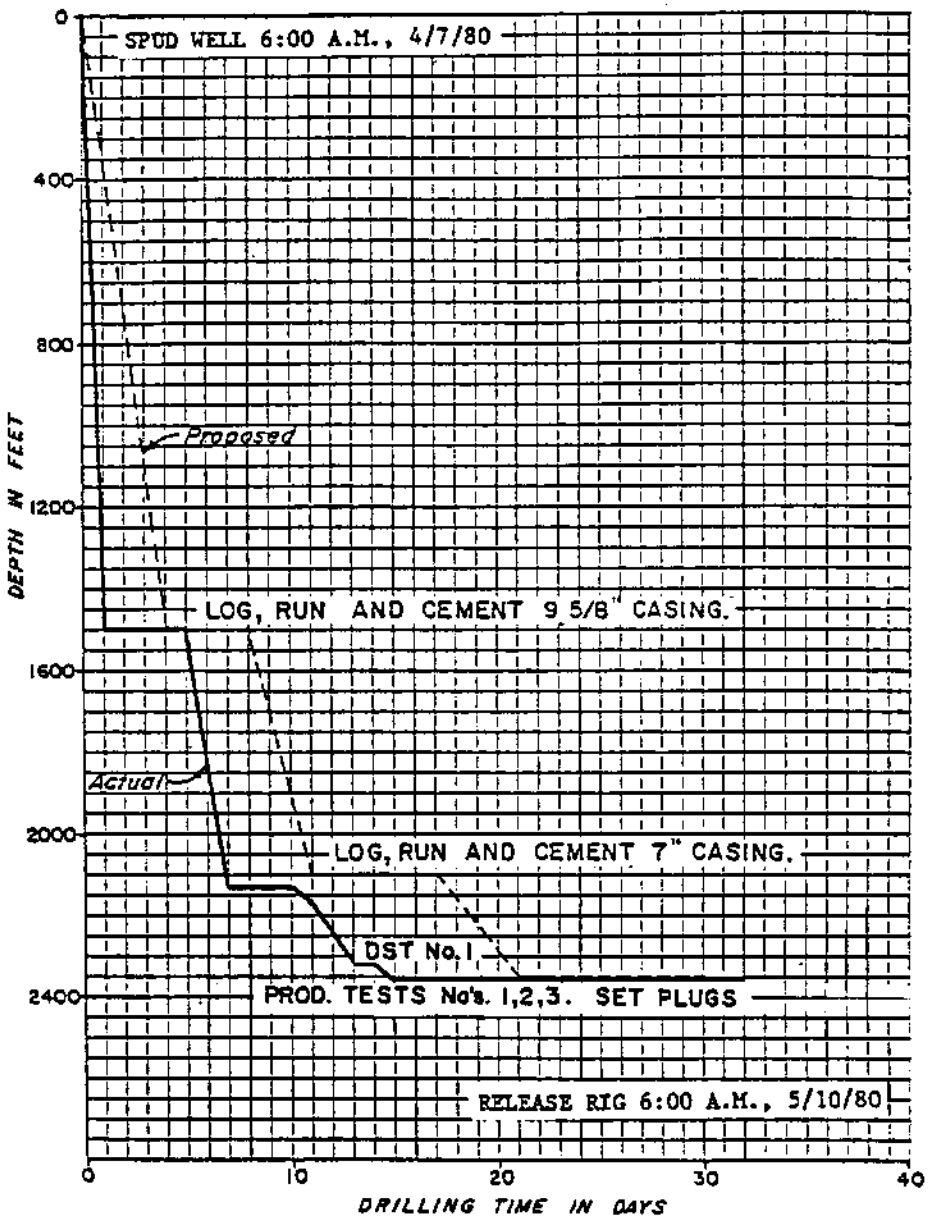
DATE	RIG UP/RIG DOWN	DRILLING	REAMING	TRIP	DEV. SURVEY	RIG MAINT.	RIG REPAIR	CIRC. & COND. MUD	LOGGING	CASING & CEMENT	W O C	NIPPLE UP/DOWN BOP	TEST BOP	CHANGE BHA	LOST CIRC.	FISHING	CORING	DST	PLUG BACK	SQUEEZE CEMENT	DIR. WORK	W O MAT./EQUIP.	OTHER	Operations at 6:00 a.m.	Comments
4-3	24																							Moving Camp	Began Moving Camp
4-4	24																							Rigging Up	
4-5	24																							Rigging Up	
4-6	12										12													Waiting On Cement	Set 13 3/8" at 100'
4-7	6	16½			1½																			Testing Hydril	Spudded Well at 6:00 a. m.
4-8		5½		6½	½			5	6½															Circulating	Ran Schlumberger Wireline Logs
4-9				3½				1		7½	11												1	Running 9 5/8" Casing	Set 9 5/8" at 1490'
4-10											12	12												Waiting On Cement	
4-11							8					11	5											Nipple Up BOPs	
4-12		6½		5¼									6½										5¼	Testing Kelly Cocks	
4-13		19¼		2¼	¼			1¼																Drilling	
4-14				7¼	¼			3	8	5½														Logging	Ran Schlumberger Wireline Logs
4-15				6¼				1¼		5		11												Circulating	Set 7" Casing at 2127'
4-16	6			2						4½	7½		4											Testing Blind Rams	
4-17				5				1¼			2												15¼	Mixing Arctic Pack	

DRILLING TIME ANALYSIS (HOURS) - HUSKY NPR OPERATIONS, INC. SOUTH BARROW WELL NO. 20 Page 2 of 3

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
4-18		15½		4¾																			3¼	Drilling	
4-19		1	½	11¾				1¾									6						3	Picking Up Core Barrel	Core No. 1: 2247' - 2269' Core No. 2: 2269' - 2299'
4-20			½	8½				1									2	12						Coring	Core No. 3: 2299' - 2314'
4-21		2	½	3				1										16					1½	Drill Stem Testing	DST No. 1
4-22		7						17																Drilling	
4-23				3				6½	14½															Circulating	Ran Schlumberger Wireline Logs
4-24		2		10½				1½			9												1	Waiting on Cement	
4-25		5		4½				5½	1½	½	4												2½	Tripping	
4-26				2				2															20	Perforating	Perforated 1994' - 2046' 2064' - 2082'
4-27												6											18	Nippling Down BOP	Production Test No. 1
4-28																							24	Trying To Bring Well In	
4-29								½				11											12½	Shutting Well In	
4-30												4½	1½										18	Perforating	Re-perforated
5-1																							24	Testing	
5-2								1	9½			5	1										7½	Logging	Production Test No. 2

DRILLING TIME ANALYSIS (HOUR[illegible]S) - HUSKY NPR OPERATIONS, INC. SOUTH BARROW WELL NO. 20 Page 3 of 3

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
5-3																									
5-4								1				4											19	Making Tubing Trip	
5-5																							24	Testing	
5-6				11								7½											16½	Testing	
5-7				2				2½												4½			6	Pulling Out Of Hole	
5-8								1½			2	5½											13	Making Tubing Trip	Ran 2 7/8" Tubing
5-9																							24	Testing	Production Test No. 3
5-10	18											13	1½										9½	Nippling Up BOP	
																							6	Laying Down Drill Pipe	Released Rig at 6:00 a. m.
	114		1½		2½		8																		
TOTAL HOURS		80¼		100¼	-0-	[illegible]50		40		59½		19½		-0-		8		-0-		-0-		275¼			
						[illegible]4		23		90½		-0-		-0-		23		4½		-0-					



Core No. 1, 2247'- 2269'
Core No. 2, 2269'- 2299'
Core No. 3, 2299'- 2314'

SOUTH BARROW No. 20

1600' FEL and 1980' FNL
Sec. 26, T.22N., R.17W., U.M.

HUSKY OIL *N.P.R. Operations*

NATIONAL PETROLEUM RESERVE in ALASKA

DRILLING TIME CURVE

DRILLING MUD RECORD

ARCTIC DRILLING SERVICES

COMPANY Husky Oil NPR Operations, Inc. STATE Alaska CASING PROGRAM: 13 3/8 inch at 100 ft.

WELL South Barrow Gas Well No. 20 COUNTY North Slope Borough 9 5/8 inch at 1490 ft.

CONTRACTOR Brinkerhoff Signal, Inc. LOCATION NPRA SEC 26 TWP 22N RNG 17W 7 inch at 2127 ft.

STOCKPOINT _____ DATE _____ BAROID ENGINEER _____ TOTAL DEPTH _____ ft.

DATE	DEPTH	WEIGHT	VISCOSITY		Yp	GELS	pH	FILTRATION			FILTRATE ANALYSIS				SAND	RETORT			CEC	REMARKS AND TREATMENT
1980	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	
4/8	1500	9.0	37	7	6	0/2	8	-		1	.0	.1	400	80	Tr	4	0	96		Raised viscosity to log.
4/9	1500	9.1	47	14	8	5/8	8	-		1	.0	.1	400	80	Tr	4	0	96		Running 9 5/8" casing.
4/10	Mixed $CaCl_2$ mud.																			
4/11	1500	10	49	12	17	10/15	10	10		2	.4	1.4	121000	67700	0	4	0	96		
4/12	1500	10	49	11	17	10/16	10	10		2	.4	1.6	118000	66000	0	4	0	96		
4/13	1740	10.4	58	19	27	15/30	9.5	10		3	.3	1.9	116000	64900	1/4	6	0	94		
4/14	2140	10.8	60	18	28	15/29	9.0	10		3	.0	.5	105000	58800	3/4	10	0	90		
4/15	2140	10.8	58	19	25	15/17	9.0	10		3	.0	.5	98000	54800	3/4	10	0	90		Lost returns while running casing.
4/16	2140	10.7	51	14	21	12/20	9.0	11		3	.0	.4	94000	52600	3/4	10	0	90		
4/17	-	10.7	50	14	21	12/20	9.0	11		3	.0	.4	94000	52600	3/4	10	0	90		Mixed Arctic pack.
4/18	2155	10.0	38	8	11	3/7	10	9.5		2	.2	.3	43000	24000	1/4	6	0	94		
4/19	2248	9.9	42	10	11	6/10	9.5	10		2	.0	.5	46000	25700	1/4	6	0	94		Cut Core No. 1
4/20	2302	9.9	39	10	9	3/7	9.5	10		2	.1	.4	41000	22900	1/4	6	0	94		Cut Cores No. 2 and No. 3
4/21	2314	9.9	38	10	8	3/6	9.5	10		2	.1	.4	41000	22900	1/4	6	0	94		
4/22	2345	10.1	38	11	8	2/6	9.5	13		3	.2	-	49000	24000	1/4	6	0	94		
4/23	2356	9.9	33	9	3	2/4	9.0	16		3	.2	-	46000	22000	Tr	6	0	94		
4/24	2356	9.9	33	9	2	2/3	9.0	14		3	.2	-	46000	22000	Tr	5	0	95		Plugging back.
4/25	2356	10.3	35	11	3	2/3	11.0	15		3	.6	-	110000	52000	Tr	5	0	95		
4/26	2356	10.3	34	11	3	2/3	11.0	15		3	.6	-	110000	52000	-	5	0	95		
4/27	2356	-																		Cleaning pits.
4/28	2000	9.2																		$CaCl_2$ water for test and completion.
5/3																				Killed well with 9.2 ppg $CaCl_2$ water.
5/7																				Circulate and condition $CaCl_2$ to 9.6 ppg perf., run tubing. Injected down annulus, displaced $CaCl_2$ water up the tubing to flare pit.
5/9																				Kill well with 9.6 ppg $CaCl_2$. Run back-pressure valve; nipple down tree; nipple up BOP

BIT RECORD

COMPANY	CONTRACTOR			COUNTY	STATE
Husky Oil NPR Operations	Brinkerhoff Drilling Company			North Slope Borough	Alaska
LEASE	WELL NO	SEC	TOWNSHIP	RANGE	BLOCK	FIELD
East Barrow Gas Field	South Barrow No. 20	26	22	17 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	BUCK CODE I	B	G	REMARKS FORMATION CIRC FLUID ETC	DATE
1	12¼	HTC	OSC 3AJ	KD391	10	10	13	1500	1400	22	22	63.6	10/30	150	3°	1100		5½	60	9.0	37	3	3	1/8	Clay and Shale	
2	8½	HTC	X3A	WN707	10	10	11	1830	330	15.75	37.75	21	15/25	100	3°	1500		5½	60	10⅛	54	4	5	I	Clay and Shale	
3	8½	HTC	X1C	HL531	10	10	11	2140	310	10.5	48.25	29.5	25	100	2°	1500		5½	60	10⅛	60	8	6	I	Sand	
4	5 5/8	STC	D6	AA69113				2162	22	2.75	51	8	10/12	65	2°	350		5½	55	9.9	42	3	3	I	Sand	
5	5 5/8	STC	D6	AA69109				2235	74	12.75	63.75	5.8	10/12	65		350		5½	55	9.9	42	4	7	I	Sand and Shale	
6	5 5/8	STC	D6	AA69110				2247	12	1	64.75	12	10/12	65		350		5½	55	9.9	39	1	1	1	Sand and Shale	
CH 1	5 5/8	ACC	EHStr	17061				2269	22	2.5	67.25	8.8	10	48		600		5½	55	9.9	39	G	O	O	D	
CH 1	5 5/8	ACC	EHStr	17061				2298	29	3.5	70.75	8.3	10	50		600		5½	55	9.9	39	G	O	O	D	
CH 1	5 5/8	ACC	EHStr	17061				2314	16	2	72.75	8	10	50		600		5½	55	9.9	39	G	O	O	D	
7	5 5/8	STC	DG	AA69112				2356	42	9	81.75	4.6	10/12	65		400		5½	59	9.9	33	3	3	1		
8	5 5/8	STC	DG	AA68419				Drilling cement and retainer.																		

SMITH REPRESENTATIVE _____ PHONE _____

Compliments of SMITH TOOL

P O BOX C19511 • IRVINE CALIF 92713
DIVISION OF SMITH INTERNATIONAL INC

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.

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 for South Barrow Well No. 20 was programmed as follows: 13-3/8" conductor at ±110'; 9-5/8" at ±1500'; 7" at ±2100'; 2-7/8" production tubing to the top of the producing zone should the well be completed.

Temperatures in the reservoirs in the East Barrow gas field range from 50-55°F due to permafrost depth. Because of this, production completions have been modified to prevent downhole freeze-off of the wells due to hydrate formation. Husky's usual procedure has been to suspend a 2-7/8" string of production tubing in the 7" casing to the top of the producing zone. The well is then produced through the 7" x 2-7/8" annulus. The lesser pressure drop in the larger annulus helps to prevent the formation of hydrates downhole. The 2-7/8" tubing is then used to inject alcohol (blown down the well) when freeze-off does occur. In South Barrow No. 20, a string of 2-7/8" production tubing was run to 1644' (just below the bottom perforations at 1639') when the well was completed in the "Pebble Shale" sands.

Casing actually run in the well was 13-3/8" at 100'; 9-5/8" at 1490', and 7" at 2127'.

CASING TALLY
SUMMARY SHEET

DATE: April 8, 1980

FIELD East Barrow Gas Field

LEASE & WELL NO. South Barrow Well No. 20

TALLY FOR 9 5/8" CASING

SUMMARY OF PAGE MEASUREMENTS			
	NO OF JOINTS	FEET	.00'S
PAGE 1	43	1852	57
PAGE 2			
PAGE 3			
PAGE 4			
PAGE 5			
PAGE 6			
PAGE 7			
PAGE 8			
PAGE 9			
TOTAL	43	1852	57

SUMMARY OF DEPTH CALCULATIONS				
		NO. OF JOINTS	FOOTAGE FEET	.00'S
1	TOTAL CASING ON RACKS	43	1852	57
2	LESS CASING OUT (JTS NOS.)	8	345	32
3	TOTAL (1 – 2)		1507	25
4	SHOE LENGTH		1	45
5	FLOAT LENGTH		1	37
6	MISCELLANEOUS EQUIPMENT LENGTH			
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)		1510	07
8	LESS WELL DEPTH (KB REFERENCE)			
9	"OP" 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
					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 1 **CASING TALLY** DATE: April 8, 1980

FIELD NPRA LEASE & WELL NO. South Barrow Well No. 20 TALLY FOR 9 5/8" CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT 00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT 00'S	WT GR.
1	43	32			
2	45	81			
3	45	90			
4	43	42			
5	41	27			
6	40	57			
7	34	01			
8	42	22			
9	41	85			
0	44	91			
TOTAL A	423	28			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT 00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT 00'S	WT GR.
1	40	94			
2	42	75			
3	41	29			
4	40	90			
5	40	89			
6					
7					
8					
9					
0					
TOTAL D	206	77			

1	45	67			
2	39	87			
3	42	14			
4	45	34			
5	37	68			
6	43	39			
7	45	03			
8	40	99			
9	44	32			
0	42	00			
TOTAL B	426	43			

1	47	40			
2	41	75			
3	46	88			
4	46	86			
5	46	00			
6	46	39			
7	45	73			
8	44	51			
9					
0					
TOTAL E	365	52			

1	41	08			
2	44	03			
3	40	80			
4	44	00			
5	46	23			
6	45	56			
7	42	90			
8	41	56			
9	43	52			
0	40	89			
TOTAL C	430	57			

TOTAL A	423	28		
TOTAL B	426	43		
TOTAL C	430	57		
TOTAL D	206	77		
TOTAL E	365	52		
TOTAL PAGE	1852	57		

CASING AND CEMENTING REPORT

WELL NAME South Barrow Well No. 20

LOCATION East Barrow Gas Field

RAN CASING AS FOLLOWS:

35	Jts	9 5/8"	53.5#	Buttress		
	Jts					
	Jts					

Shoe @ 1490' Float @ 1443' DV @ _____

Centralizer @ ten feet above shoe, on every other collar above float collar, and on last three collars below cellar.

FIRST STAGE

Sx of Cement 1300 Type Permafrost Additives _____ % Excess _____

Preflush 20 Barrels Water Initial Pressure _____

Displacement 215 bbls. Final Pressure _____

CIP 12:00 Noon AM PM

SECOND STAGE - Stage Collar @ _____

Sx of Cement _____ Type _____ Additives _____ % Excess _____

Preflush _____ Initial Pressure _____

Displacement _____ bbls. Final Pressure _____

Plug Down _____ AM PM

Well Depth 1500' Overall Casing Tally 1490.85

KB to Top of Cut Off Casing 20.10 Length of Landing Jt Removed 20.88

Weight Indicator Before Cementing 82,000 lbs.

Weight Indicator After Slacking Off _____ lbs.

Inches Slacked Off _____

Remarks: Continuous returns at 1050 sacks pumped. Continued pumping until 14.8 ppg returns.

CASING TALLY
SUMMARY SHEET

DATE: April 16, 1980

FIELD East Barrow Gas Field LEASE & WELL NO. South Barrow Well No. 20 TALLY FOR 7 " CASING

SUMMARY OF PAGE MEASUREMENTS			
	NO OF JOINTS	FEET	00'S
PAGE 1	50	1924	81
PAGE 2		313	61
PAGE 3			
PAGE 4			
PAGE 5			
PAGE 6			
PAGE 7			
PAGE 8			
PAGE 9			
TOTAL		2238	42

SUMMARY OF DEPTH CALCULATIONS				
		NO. OF JOINTS	FOOTAGE FEET	00'S
1	TOTAL CASING ON RACKS	58	2238	42
2	LESS CASING OUT (JTS NOS.	3	121	78
3	TOTAL (1 - 2)		2116	64
4	SHOE LENGTH		1	88
5	FLOAT LENGTH		1	72
6	MISCELLANEOUS EQUIPMENT LENGTH Two FOs		7	30
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)		2127	54
8	LESS WELL DEPTH (KB REFERENCE)		2140	
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	
					JT NO Shoe THRU NO		1.88	2127.54	2125.66
38	S-95	Buttress		New	JT NO 1 THRU NO	1	35.62	2125.66	2090.04
					JT NO Float THRU NO Collar		1.72	2090.04	2088.32
38	S-95	Buttress		New	JT NO 2 THRU NO 21	20	787.12	2088.32	1301.20
					JT NO FO THRU NO		3.65	1301.20	1297.55
					JT NO 22 THRU NO 23	2	76.39	1297.55	1221.16
					JT NO FO THRU NO		3.65	1221.16	1217.51
38	S-95	Buttress		New	24 55	32	1217.51	1217.51	KB

PAGE 1 OF 2 **CASING TALLY** DATE: April 15, 1980

FIELD NPRA LEASE & WELL NO. South Barrow Well No. 20 TALLY FOR 7 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT 00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT 00'S	WT GR.
1	35	62			
2	41	42			
3	37	42			
4	40	57			
5	37	50			
6	42	08			
7	42	90			
8	42	78			
9	39	10			
0	42	98			
TOTAL A	402	37			

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT 00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT 00'S	WT GR.
1	36	97			
2	38	55			
3	36	32			
4	' 35	60			
5	35	59			
6	35	50			
7	35	72			
8	37	10			
9	40	38			
0	40	03			
TOTAL D	371	76			

1	43	61			
2	36	18			
3	40	42			
4	36	11			
5	38	41			
6	37	62			
7	36	35			
8	35	48			
9	42	15			
0	37	48			
TOTAL B	383	81			

1	35	89			
2	34	18			
3	42	85			
4	36	13			
5	37	72			
6	42	50			
7	38	08			
8	36	40			
9	41	80			
0	42	42			
TOTAL E	387	97			

1	36	56			
2	37	49			
3	38	90			
4	39	90			
5	40	00			
6	37	54			
7	37	96			
8	37	21			
9	36	54			
0	36	80			
TOTAL C	378	90			

TOTAL A	402	37		
TOTAL B	383	81		
TOTAL C	378	90		
TOTAL D	371	76		
TOTAL E	387	97		
TOTAL PAGE	1924	81		

PAGE 2 OF 2

CASING TALLY

DATE: April 15, 1980

FIELD NPRA LEASE & WELL NO. South Barrow Well No. 20 TALLY FOR 7 " CASING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT 00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	37	20			
2	37	80			
3	39	95			
4	38	58			
5	38	30			
6					
7					
8					
9					
0					
TOTAL A	191	83			

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	14			
2	38	72			
3	42	92			
4					
5					
6					
7					
8					
9					
0					
TOTAL B	121	78			

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	191	83		
TOTAL B	121	78		
TOTAL C				
TOTAL D				
TOTAL E				
TOTAL PAGE	313	61		

CASING AND CEMENTING REPORT

WELL NAME South Barrow Well No. 20

LOCATION East Barrow Gas Field

RAN CASING AS FOLLOWS:

55	Jts	7"	38#	S-95	Buttress	
	Jts					
	Jts					

Shoe @ 2127' Float @ 2090' DV @ 1297' and 1217'

Centralizer @ ten feet above shoe, every other collar through #18, two below FOs, one between FOs, and one every third collar to surface (total of 22).

FIRST STAGE

Sx of Cement 80 Type "G" Additives 2% $CaCl_2$ 1% CFR-2 % Excess _____

Preflush _____ Initial Pressure _____

Displacement _____ bbls. Final Pressure _____

Plug Down _____ AM PM

SECOND STAGE - Stage Collar @ 1297'

Sx of Cement 60 Type Permafrost Additives _____ % Excess _____

Preflush 25 Barrels Water Initial Pressure 350 psi

Displacement 13.5 bbls. Final Pressure 350 psi

Plug Down 7:00 AM ~~PM~~

Well Depth _____ Overall Casing Tally _____

KB to Top of Cut Off Casing _____ Length of Landing Jt Removed _____

Weight Indicator Before Cementing _____ lbs.

Weight Indicator After Slacking Off _____ lbs.

Inches Slacked Off _____

Remarks:

TUBING **TALLY**
SUMMARY SHEET

DATE: May 8, 1980

FIELD National Petroleum Reserve in Alaska **LEASE & WELL NO.** South Barrow Well No. 20 **TALLY FOR** 2 7/8" TUBING

SUMMARY OF PAGE MEASUREMENTS			
	NO. OF JOINTS	FEET	00'S
PAGE 1	50	1477	02
PAGE 2	5	151	98
PAGE 3			
PAGE 4			
PAGE 5			
PAGE 6			
PAGE 7			
PAGE 8			
PAGE 9			
TOTAL	55	1629	00

SUMMARY OF DEPTH CALCULATIONS				
		NO. OF JOINTS	FOOTAGE FEET	FOOTAGE .00'S
1	TOTAL CASING ON RACKS	55	1629	00
2	LESS CASING OUT (JTS NOS.			
3	TOTAL (1 - 2)	55	1629	00
4	SHOE LENGTH 4:00 (Included above)			
5	FLOAT LENGTH			
6	MISCELLANEOUS EQUIPMENT LENGTH			
7	TOTAL CASING AND EQUIPMENT FROM CEMENT HEAD (3 + 4 + 5 + 6)		1629	00
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
					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 TUBING TALLY DATE: May 8, 1960

FIELD NPRA LEASE & WELL NO. South Barrow Well No. 20 TALLY FOR 2 7/8 " TUBING

JOINT NO.	FIRST MEASUREMENT FEET	00'S	CHECK MEASUREMENT FEET	00'S	WT GR
1	4	00			
2	30	45			
3	28	86			
4	29	31			
5	30	95			
6	28	63			
7	31	64			
8	31	00			
9	29	05			
0	29	32			
TOTAL A	273	21			

JOINT NO.	FIRST MEASUREMENT FEET	00'S	CHECK MEASUREMENT FEET	00'S	WT GR.
1	29	52			
2	31	76			
3	29	09			
4	30	92			
5	31	06			
6	30	57			
7	29	55			
8	29	60			
9	28	76			
0	29	32			
TOTAL D	300	15			

1	30	46			
2	31	35			
3	29	76			
4	27	91			
5	29	45			
6	30	75			
7	31	39			
8	31	38			
9	29	47			
0	28	40			
TOTAL B	300	32			

1	30	64			
2	28	30			
3	30	96			
4	30	53			
5	29	58			
6	28	57			
7	30	54			
8	31	33			
9	30	07			
0	29	78			
TOTAL E	300	30			

1	31	12			
2	31	11			
3	28	01			
4	28	42			
5	30	38			
6	29	31			
7	31	29			
8	29	96			
9	31	78			
0	31	66			
TOTAL C	303	04			

TOTAL A	273	21		
TOTAL B	300	32		
TOTAL C	303	04		
TOTAL D	300	15		
TOTAL E	300	30		
TOTAL PAGE	1477	02		

PAGE 2 OF 2 TUBING **TALLY** DATE: May 8, 1980

FIELD NPRA LEASE & WELL NO. South Barrow Well No. 20 TALLY FOR 2 7/8 " TUBING

JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT .00'S	WT GR.
1	31	49			
2	31	68			
3	30	39			
4	29	45			
5	28	97			
6					
7					
8					
9					
0					
TOTAL A	151	98			

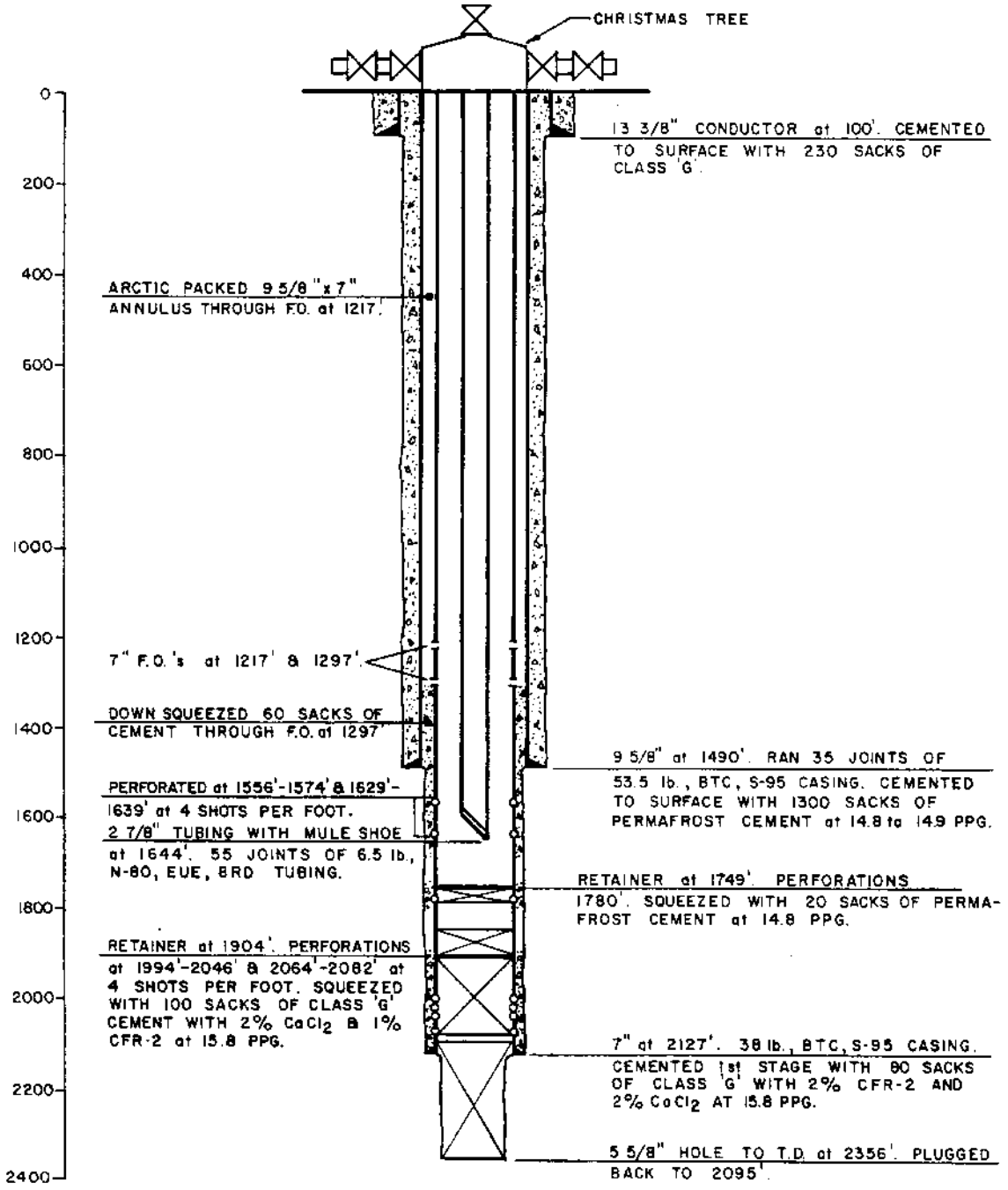
JOINT NO.	FIRST MEASUREMENT FEET	FIRST MEASUREMENT .00'S	CHECK MEASUREMENT FEET	CHECK MEASUREMENT 00'S	WT GR
1					
2					
3					
4					
5					
6					
7					
8					
9					
0					
TOTAL D					

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	151	98		
TOTAL B				
TOTAL C				
TOTAL D				
TOTAL E				
TOTAL PAGE	151	98		



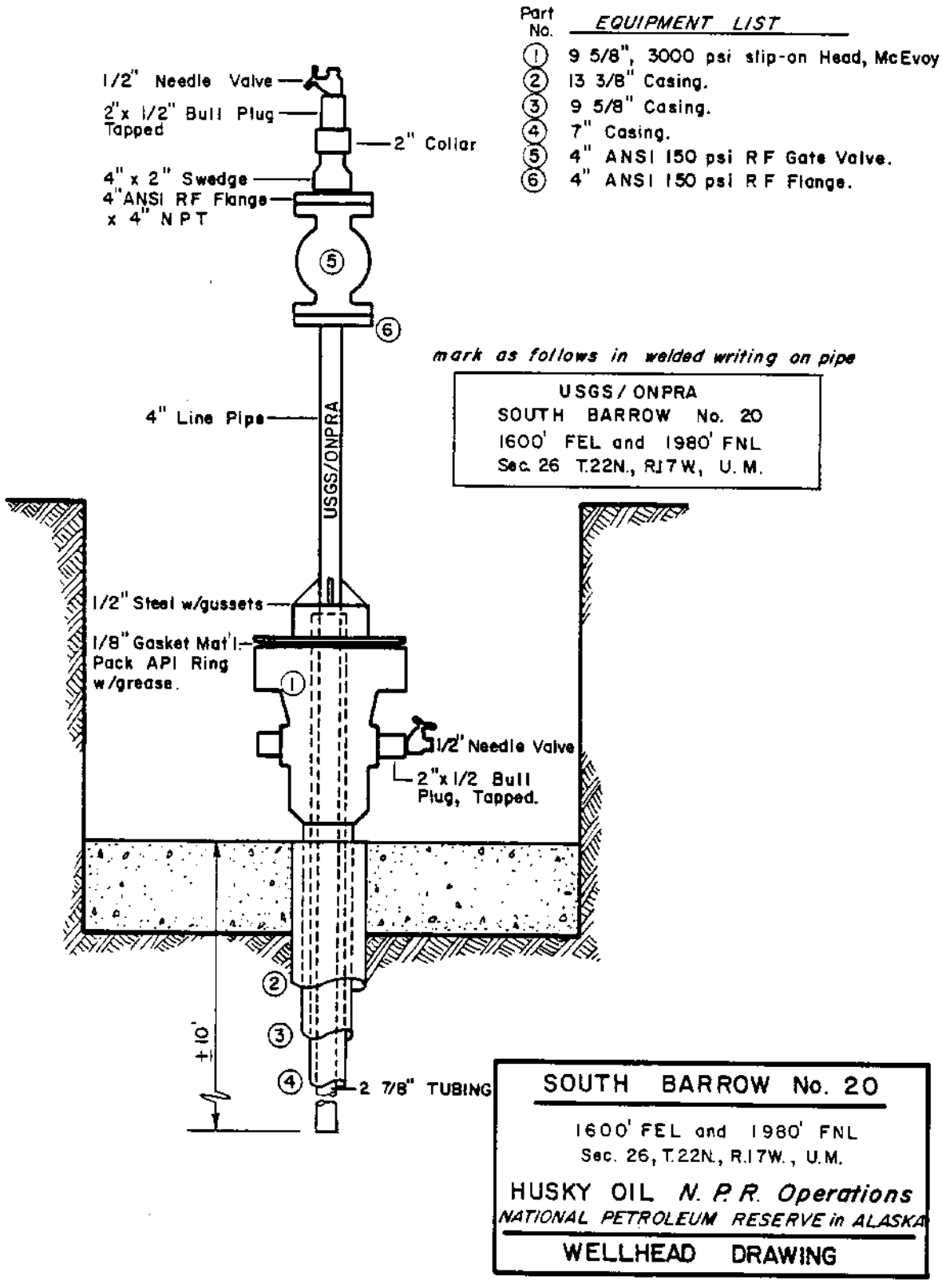
SOUTH BARROW No. 20

1600' FEL and 1980' FNL
Sec. 26, T.22N., R.17W., U.M.

HUSKY OIL *N.P.R. Operations*

NATIONAL PETROLEUM RESERVE in ALASKA

WELL COMPLETION SCHEMATIC


Part No. EQUIPMENT LIST
1 9 5/8", 3000 psi slip-on Head, McEvoy
2 13 3/8" Casing.
3 9 5/8" Casing.
4 7" Casing.
5 4" ANSI 150 psi RF Gate Valve.
6 4" ANSI 150 psi RF Flange.
1/2" Needle Valve
2"x 1/2" Bull Plug Tapped
2" Collar
4" x 2" Swedge
4"ANSI RF Flange x 4" NPT
4" Line Pipe
USGS/ONPRA
mark as follows in welded writing on pipe
USGS / ONPRA
SOUTH BARROW No. 20
1600' FEL and 1980' FNL
Sec. 26 T.22N., R.17W., U. M.
1/2" Steel w/gussets
1/8" Gasket Mat'l. Pack API Ring w/grease.
1/2" Needle Valve
2"x 1/2 Bull Plug, Tapped.
+10'
2 7/8" TUBING
SOUTH BARROW No. 20
1600' FEL and 1980' FNL
Sec. 26, T.22N., R.17W., U.M.
HUSKY OIL N. P. R. Operations
NATIONAL PETROLEUM RESERVE in ALASKA
WELLHEAD DRAWING

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 7" annulus in South Barrow No. 20 was left full of Arctic Pack from 1297' to the surface when the well was completed. The annulus was displaced with Arctic Pack through the FO at 1217' immediately after the 7" casing was run in anticipation of completing the well as a gas producer in the Barrow sandstones. When the decision was made to squeeze the Barrow sandstones and complete in the "Pebble Shale" sands, the Arctic Pack was left in place.

RIG INVENTORY

Draw Works

National T-20, single drum grooved for 1" wireline with 15" double hydromatic brake, automatic breakout and make up catheads, driven by one set GMC diesel twin 671 engines, 300 HP, through Allison torque converter, all mounted on single skid. One Westinghouse 3YC air compressor driven by main PTO.

Mast

Lee C. Moore, 95' high with 9 foot wide front by spread cantilever. Gross nominal capacity 290,000 lbs. with racking board capacity of 130 stands 4-1/2" drill pipe (doubles). Mast crown block capable of stringing eight 1" wire lines.

Subbase

Three box sections, two at ground level 8 feet high, 9 feet wide, 37 feet long; center section 8 feet 5 inches high, 9 feet wide and 37 feet long. Clear working space from bottom of rotary beam to bottom of subbase is 14 feet 7 inches. Rotary table to bottom of subbase is 17 feet (add four inches for rig matts).

Rig Matts

Ten 4" x 16' long x 8' wide; fifteen 4" x 24' long x 8' wide.

Traveling Blocks

IDECO, 160 ton, four 1" sheave combination block and hook.

Swivel

EMSCO L-140, 6-5/8" left hand API regular pin, 140 ton capacity.

Bails

Byron Jackson, 2-1/4" x 108', links 250 ton capacity.

Rotary Table

Oilwell 17-1/2" split square drive master bushing, 275 ton static load capacity.

Mud Tank

Three section, insulated tank. Capacity shale tank: 75 barrels; capacity middle tank: 100 barrels; capacity suction tank: 112 barrels. Shale tank equipped with shale jet and 16 barrel trip tank. Total capacity: 303 barrels.

Shaker

Single Brandt tandem separator driven by 3 HP, three-phase, 440 volt, 1750 RPM explosion proof electric motor.

Degasser

Drilco, see-flo, driven by 7-1/2 HP, three-phase, 440 volt, explosion proof motor with 1/2 HP, three-phase, 440 volt explosion proof blower.

Desander

Pioneer Model S2-12; capacity: 500 GPM.

Desilter

Pioneer Model T8-6; capacity: 500 GPM.

Mud Mixer

One Dreco, driven by 5 HP, three-phase, 440 volt, 1725 RPM explosion proof motor.

Hopper

One low pressure mud mixing hopper.

Generators

One Caterpillar Model 3406, 210 KW; one Caterpillar, skid mounted in Hercable house, 8' 5" high x 8' 2" wide x 29' 5" long; one Caterpillar Model D-333, 100 KW standby.

Boilers

Two Continental, 40 HP, 120 PSI diesel fired skid mounted in Hercable house, 8' 4" high x 8' wide x 35' long.

Steam Heaters

Seven Model 90H Trane steam heaters; three Model 96H Trane steam heaters.

Tongs

Byron Jackson, Type "C", short lever, with heads.

Indicator

(Weight) Cameron, Type "C", up to 400,000 lbs.

Indicator

(Rotary Torque) Martin Decker hydraulic piston wheel type with remote gauge at Driller's position.

Indicator

(Tong Torque) Martin Decker hydraulic piston type with remote gauge.

Mud Box

OKE mud box with 3-1/2" and 4-1/2" rubbers.

Slips

One set for 3-1/2" drill pipe. One set for 4-1/2" drill pipe.

Elevators

One set for 3-1/2" drill pipe, 18 degrees taper. One set for 4-1/2" drill pipe, 18 degrees taper.

Kelly

One square 4-1/4" drive, 4" FH pin, 6-5/8" API regular left hand box. One square 3-1/2" drive, 3-1/2" IF pin, 6-5/8" API regular left hand box.

y Bushing

RCO, square drive, 3-1/2" rollers.

nps

illing and Cementing) Two Halliburton, HT-400D, single acting piston
nps with Gist Oil Tool API fluid ends, each driven by GMC diesel
71N 300 HP engine thru [illegible] Model
FW180H and a twin-disc power shift transmission, Model no. T-A 61-2003.
Continuous duty with 5-1/2" API pistons at maximum of 75 SPM will
produce 185 GPM for each pump with maximum pressure up to 3000 psi.
Both pumps can be run simultaneously if desired. The discharge mud line
furnished by contractor from pumps to swivel connection is designed for
3000 psi working pressure. Each pump unit mounted on 8' 4" high x 10
wide x 40' long covered skid.

Air Compressors

One LeRoi 340 mounted on draw works compound. One Ingersoll Rand
Model 71-T2-T3011 TM, driven by 10 HP, 440 volt, 1725 RPM explosion
proof electric motor.

Water Tanks

One 7' high x 9' wide x 20' long, insulated water tank, mounted in the subbase; capacity: 225 barrels. One 17' 4" long x 6' 4" wide; capacity: 120 barrels.

Fuel Tanks

One 20' long x 8'6" wide; capacity: 6,000 gallons.

Blowout Preventer Equipment

One - ten-inch, 900 dual Shaffer gate LWS with three-inch flanged side outlet one side.
One - ten-inch 900 GK Hydril.
One - ten-inch 900 drill spool with two-inch flanged outlets both sides.
One set - 4-1/2" pipe rams.
One set - 3-1/2" pipe rams.
One set - blind rams.
One - upper kelly cock TIW 6-5/8" regular LH box to pin.
Two - TIW 10,000 psi lower kelly cocks, 4-1/2" XH joints.
Two - TIW 10,000 psi lower kelly cocks, 3-1/2" IF joints.
One - inside preventor, 10,000 lb. Hydril, 4-1/2" XH.
One - inside preventor, 10,000 lb. Hydril, 3-1/2" IF.

Choke Manifold

Three-inch, 3000 lb., with one two-inch OCT adjustable choke; one two-inch OCT positive choke and space for automatic choke.

Closing Unit

One 80-gallon Hydril closing unit with four nitrogen bottle backup. Four-station Koomey control manifold with four-station air operated remote stations.

Drill Pipe

5000 feet, 4 1/2", 16.6 lb., Grade E, 4-1/2" XH joints; 5000 feet, 3-1/2", 15.5 lb., Grade E, 3-1/2" IF joints.

Drill Collars

Nineteen - 6-1/4" x 2-1/4" x 30' four-inch H90 tool joints.
One - 6-1/4" x 2-1/4" x 30' four-inch H90 x 4-1/2" regular bottom collar.
Nineteen - 4-3/4" x 1-3/4" x 30' x 3-1/2" IF x 3-1/2" regular bottom collar.
One - 4-3/4' x 1-3/4" x 30' x 3-1/2" IF x 3-1/2" regular bottom collar.

Subs

Two - 4-1/2" XH kelly savor subs.
Two - 3-1/2" IF kelly savor subs.
Two - 4-1/2" XH box to 4" H90 pin (DC crossover).
Two - 4" H90 box to 4-1/2" regular box (bit sub).
Two - 3-1/2" IF box to 2-7/8" API regular box (bit sub).

Forklifts

One 966 Caterpillar, equipped with 60-inch forks.

Pipe Racks

One V door ramp with stairs.
One tail walk section, 6' 1" wide x 43" high x 42 feet long.
Four pipe rack sections, 43" high x 4' wide x 28 feet long.