NATIONAL PETROLEUM RESERVE IN ALASKA

GEOLOGICAL REPORT

EAST SIMPSON TEST WELL NO. 2

HUSKY OIL NPR OPERATIONS, INC.
Prepared by: Harry Haywood & R. G. Brockway

For the

U. S. GEOLOGICAL SURVEY
Office of the National Petroleum Reserve in Alaska
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COMPOSITE LITHOLOGY LOG (In Pocket)

GEOLOGIC SUMMARY

INTRODUCTION

The East Simpson Test Well No. 2 is located in the SE 1/4 of protracted Section 23, Township 19 North, Range 11 West, Umiat Meridian, Alaska. The site is 52 miles east-southeast of Barrow, Alaska, near the west shore of Smith Bay and five miles north-northwest of East Simpson No. 1 (see Figures 1 and 2). Drilling began below 20" casing at 99 feet on January 29, 1980, and was terminated at a total depth of 7,505 feet below kelly bushing on March 10, 1980. The well was plugged and abandoned and the drilling rig released on March 16, 1980. Hydrocarbon shows were generally poor throughout the well and limited to spotty fluorescence and stain and minor gas shows. One eight-foot zone in the Ivishak Formation (Core No. 5, 7175.5-7183.5') had poor to fair shows. A drill-stem test (7152-7197') produced formation water with a trace of oil (see Appendix E).

PRE-DRILLING PROGNOSIS

Drilling of the East Simpson Test Well No. 2 was undertaken to test a seismically defined structural nose with possible closure to the east, west and south at the top of the Ivishak sandstone (primary objective). Possible updip closure on the north could be provided by pinchout of the Ivishak onto the basement rocks of the Barrow Arch (see Figure 3). Minor hydrocarbon shows were noted in the Torok, Sag River and Ivishak Formations in the East Simpson No. 1; therefore, by moving updip towards a possible structural closure and pinchout edge there appeared a very good chance of locating producible hydrocarbons.

Secondary objectives were sandstones in the Nanushuk Group and Torok Formation and the Sag River Sandstone. The Torok sandstones were expected to be water wet but could possibly contain hydrocarbons in stratigraphic traps due to pinchout of individual beds. The presence of the Sag River would depend on the extent of the basal Cretaceous unconformity.

Estimated subsea depths for formation tops were: Sag River, -6635'; Ivishak, -7110'; and Pre-Mississippian Argillite, -7535'.

POST-DRILLING SUMMARY

The results of the drilling of the East Simpson Test Well No. 2 were disappointing as there did not appear to be any increase in the amounts of hydrocarbons found in this well over those in the East Simpson Test Well No. 1. The well site was selected updip approximately five miles from East Simpson Test Well No. 1.

As prognosed from seismic interpretations and well correlations, the Ivishak Formation has thinned from 142 feet in the No. 1 well to 33 feet in the No. 2 well. Structurally the No. 2 well is 51 feet higher at the top of the "Pebble Shale" and 316 feet on the Ivishak than the East Simpson Test Well No. 1. At the top of the argillite, however, there is only 210 feet

difference. Possibly the presence of Lower Mississippian rocks (Kekiktuk Formation) which are not present in the No. 1 well has some influence on this. The Kekiktuk Formation occupies the interval 7187-7392' and seems to indicate that during Early Mississippian time, the area near the No. 1 well was structurally higher than that near the No. 2 well.

Hydrocarbon shows were nil until the sands of the lower Torok Formation were drilled. The shows in this formation consisted of small gas kicks and spotty fluorescence and stains from nearly impermeable sandstones (less than 1.0 millidarcy in Core No. 2, 6056-6086'). A 640-unit gas kick from a sand at 6184-6196' (6205' on mud log) was the maximum reading in the Torok Formation.

No other shows were observed until the Sag River Sandstone was penetrated where random spotty hydrocarbon shows were present. Porosities appear to be good as shown by Core No. 4 (6705-6735') where they averaged 20.3%, but the average permeability was less than 1.0 millidarcy (see Appendix G). Electric log computations and core analysis indicate that the Sag River sandstones are highly water saturated.

The best shows in the well were encountered in the Ivishak Formation. Although most shows were of the heavy dead oil type, one eight-foot zone in Core No. 5 (7167-7197') had moderate to good shows and porosities which varied from 10.3% to 19.3%. Permeability was good to excellent reaching a maximum of 903 millidarcies (average 495 millidarcies - Appendix G). A drill-stem test was performed over the interval 7152-7197', which included the above-mentioned zone. The test recovered formation water, with a trace of oil, at a rate of 24 barrels per hour (Appendix E).

Good porosities and permeabilities were also present in a sandstone (7238-7288') of the Kekiktuk Formation. From a core cut at 7248-7278' (Core No. 7), the upper 14 feet had an average of 13.2% porosity and permeability of 263 millidarcies. Because of poor shows, no tests were undertaken. This sand also computed to be water wet.

In summary, the drilling of the East Simpson Test Well No. 2 confirmed that the Ivishak Formation approaches an updip pinchout edge as predicted. It is shown that as the Ivishak Formation approaches the pinchout edge, porosities and permeabilities are equal to or better than those in the No. 1 well.

As the Ivishak sandstones have only patchy fluorescence and stain, much of it the dead oil variety, it is concluded that any moveable hydrocarbons have migrated or been flushed from the area. If this is true, then it appears that there was not a trapping mechanism on the seismically postulated structural nose.

Since all of the porous sandstones in the East Simpson Nos. 1 and 2 wells are computed to be water saturated, it is probable that any well drilled in this area would also encounter only water wet sands.

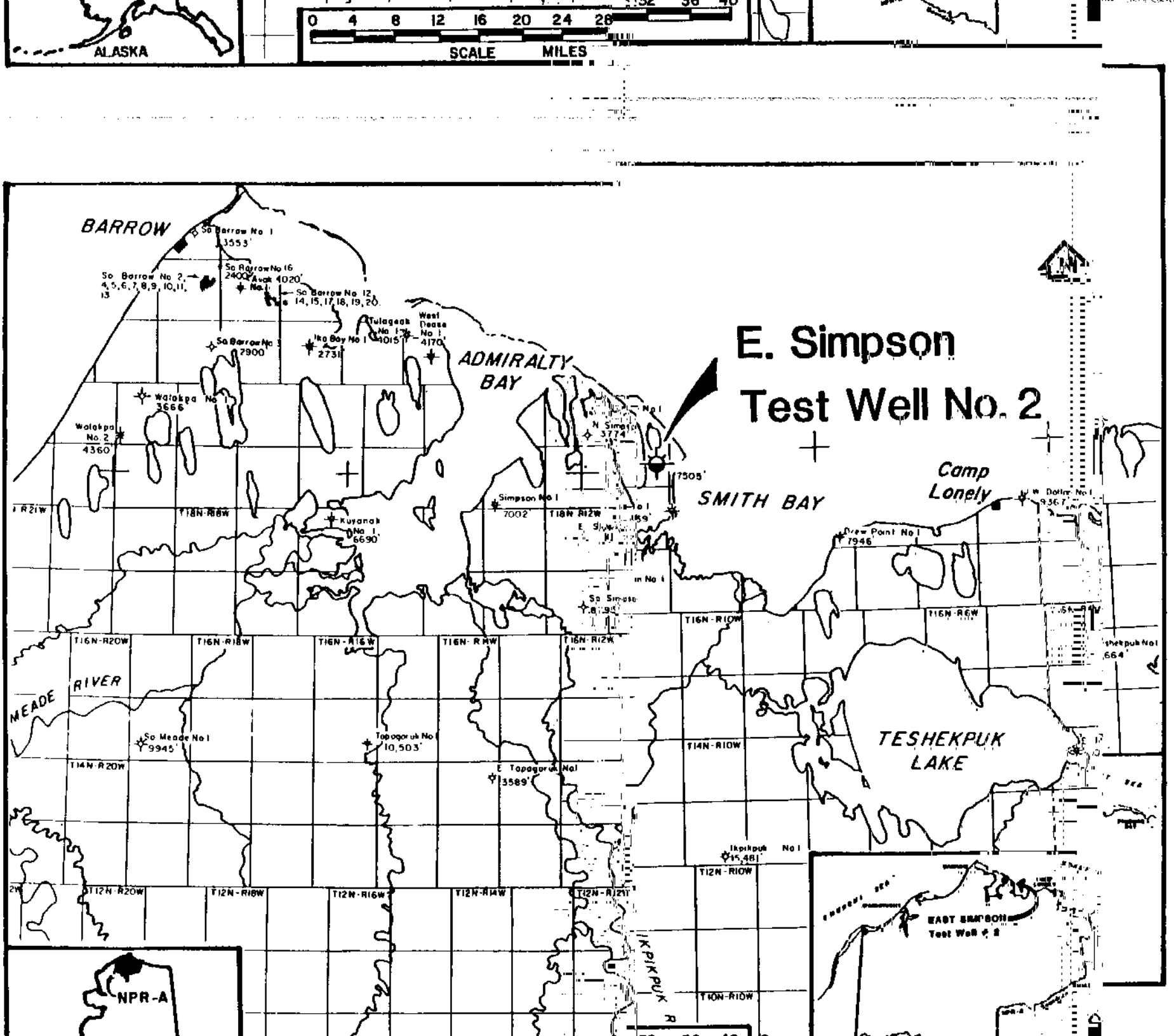
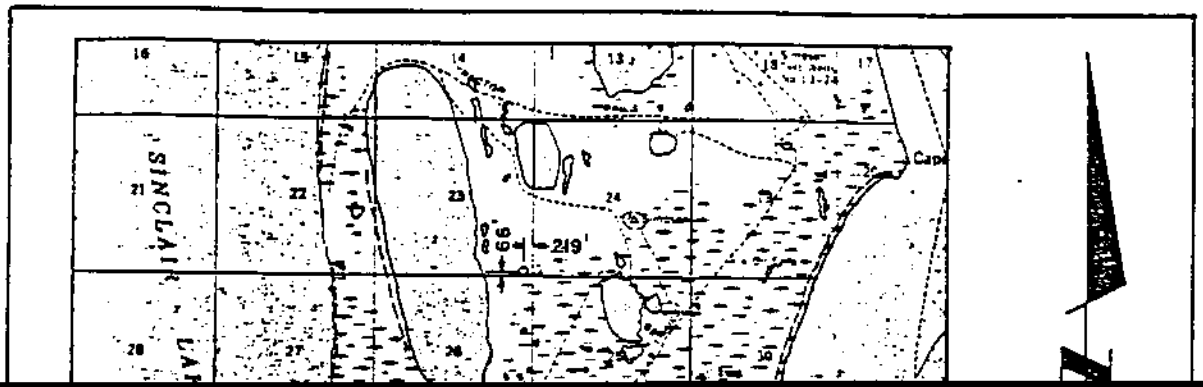


FIGURE 1 - LOCATION MAP - EAST SIMPSON TEST WELL NO. 2


SINCLAIR
219'

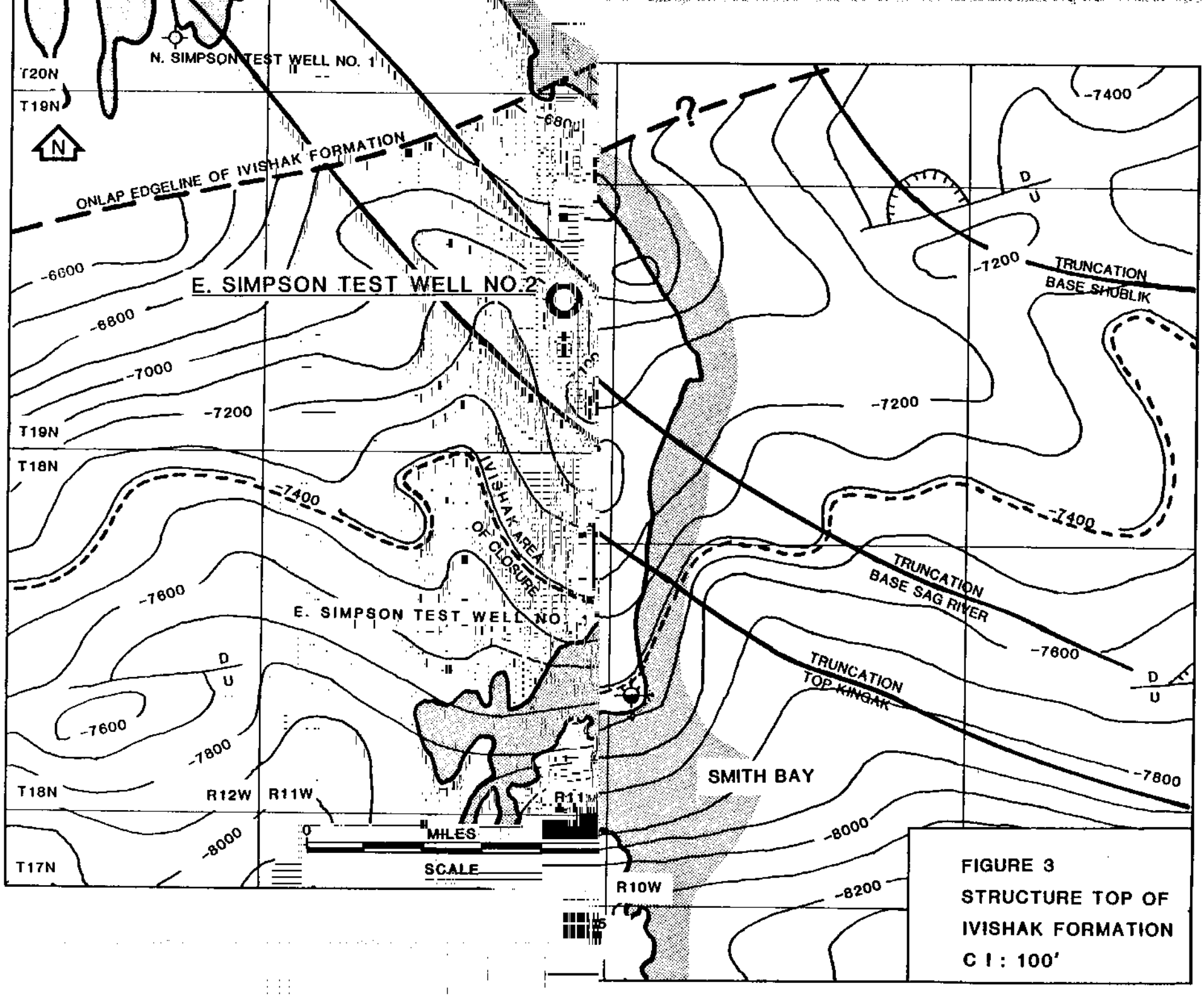


FIGURE 3
STRUCTURE TOP OF
IVISHAK FORMATION
C I : 100'

WELLSITE GEOLOGIST'S REPORT
BY: R. V. NELSON, JR.
EDITED BY: R. G. BROCKWAY

ABSTRACT

The East Simpson Test Well No. 2 was drilled during the 1979-1980 drilling season as a follow-up to the shows encountered in the East Simpson Test Well No. 1 (NW 1/4, Section 18, T18N, R10W, Umiat Meridian). The well was to test the Sadlerochit Group where seismic mapping showed a nosing which provided possibilities of closure to the west, south and east with the north updip closure provided by the pinchout edge where the unit laps up onto the ancestral Barrow Arch. As a secondary target, the seismic interpretation indicated that this well should also test the Sag River Sandstone near the point where it is truncated by the basal Cretaceous unconformity (see Figure 3).

The Sag River Sandstone was encountered at a subsea depth of -6577'. This is 262' structurally high to the East Simpson Test Well No. 1. In thickness and character, the Sag River was very similar in both wells. Though poor shows of oil were noted in the sandstone, the electric log computations showed it to be wet.

The top of the Sadlerochit Group came in at -7114' (subsea), which put it 316' structurally high to East Simpson Test Well No. 1. Only poor to fair oil shows were seen, and a drill-stem test (DST No. 1, 7152-7197') recovered formation water with only a trace of oil (Appendix E). Electric logs also showed the sandstones to be wet. The thickness and lithology of this section has changed greatly; with only a 33' sandstone present in the No. 2 well compared to a 142' interval of conglomerates, sandstones and red shale in the No. 1 well.

A sandstone sequence (7238-7288') originally included in the Sadlerochit Group has now been placed in the Kekiktuk Formation. Scattered hydrocarbon shows were present in the core taken from this sandstone.

It would appear that either the onlapping edge of the Sadlerochit Group does not form a trap or that the area of accumulation, if the trap does exist, is still above the point at which this well penetrated the Group.

Nine conventional cores were cut, 90 sidewall cores were shot (60 recovered), and one drill-stem test was performed on this well.

SUMMARY

The background geological and geophysical interpretations and the location selection for the East Simpson Test Well No. 2 (SE 1/4, Section 23, T19N, R11W, Umiat Meridian) were done by the U. S. Geological Survey in conjunction with Tetra Tech, Inc., the contractor for that portion of the project. Actual drilling and wellsite supervision were performed by Husky Oil NPR Operations, Inc. and its subcontractors. Nabors Alaska Drilling, Inc.'s Rig 1 was used to drill the well.

Construction crews set the 20" conductor pipe to 99' as part of the location preparation. The well was spudded on January 29, 1980, encountering sediments of the Prince Creek and Schrader Bluff Formations in the first samples. After drilling Upper Cretaceous and a portion of Lower Cretaceous sediments, Core No. 1 (2380-2410') was cut in the Nanushuk Group. On February 1, 1980, the well reached 2650' where it was logged, sidewall cores taken, and 13-3/8" casing set to 2635'.

Drilling resumed on February 8, 1980, in a mudstone section of the Nanushuk Group. The top of the Torok Formation was encountered at 2734'. On February 15, Core No. 2 was taken from 6056' to 6086', recovering 27.5' of core. Normal drilling resumed and the top of the black "Pebble Shale" was observed in the sample at 6325' on the 16th of February. Core No. 3 (6340-6370') was then cut on February 17, 1980. The hole was drilled to a depth of 6450' and logged. Twenty-four sidewall cores were shot (23 recovered), and a velocity survey was shot at 13 levels. The hole was cased to a depth of 6427' with 9-5/8" casing, and drilling resumed using 8-1/2" bits on February 24, 1980.

By February 25, the top of the Kingak Formation had been noted in the samples at 6538' (6529' E-log), and the top of the Sag River Sandstone was seen at 6620' (6617' E-log). Core No. 4 was cut from 6705' to 6735' on the 25th with 30' of recovery. A conventional bit was run back in the hole, and the top of the Shublik Formation was drilled at 6770'.

On February 28, 1980, the top of the Sadlerochit sand was drilled at 7154', and Core No. 5 was cut from 7167' to 7197' with a recovery of 29'. Because of the poor to fair oil shows in the core, a test tool was run in the hole, and the packer was set at 7152'. The well was flowed and produced formation water at a rate of 24 barrels per hour with only traces of oil. After the test, the hole was conditioned, and DIL, CNL/FDC and Sonic logs were run. It was noted here that electric logs seem to be running about 9' shallow to the driller's depths. Core No. 6 was cut from 7197' to 7227' with 28' of recovery on March 4, 1980. The hole was drilled conventionally to 7248' where another 30' core, No. 7 (7248-7278'), was cut with full recovery.

Another thin sandstone, with traces of oil, was penetrated at 7290' so the core barrel was run back in the hole at that point on March 6, 1980. Core No. 8, which was cut from 7293' to 7346', recovered 53' of claystones, sandstones and coals up to 3' thick.

Below Core No. 8, the hole penetrated a conglomeratic sandstone, and then on March 8, very soft redbeds were topped at 7398'. This lithology continued downward and became somewhat firmer though still almost completely soluble. In the hope of recovering minerals suitable for paleo-magnetic studies, an oriented core was cut from 7424' to 7458' on March 8. The core showed the red material to be slightly metamorphosed, steeply dipping, and grading to typical black argillite below 7435.5'. The well was then drilled on down to a final depth of 7505'. A full set of logs were run, sidewall cores were taken and a velocity survey was shot.

A full analysis of all the information showed that no further testing was warranted. Plugs were set and the well was abandoned on March 16, 1980.

WIRELINE LOG TOPS

	Drilled Depth (BKB)	Subsea Depth
UPPER CRETACEOUS		
Colville Group		
Prince Creek and Schrader Bluff Formations Undifferentiated	Surface	Surface
Seabee Formation	970'	-930'
UPPER-LOWER CRETACEOUS		
Nanushuk Group	1050'	-1010'
LOWER CRETACEOUS		
Torok Formation	2734'	-2694'
"Pebble Shale"	6325'	-6285'
JURASSIC		
Kingak Formation	6529'	-6489'
JURASSIC-TRIASSIC		
Sag River Sandstone	6617'	-6577'
TRIASSIC		
Shublik Formation	6770'	-6730'
TRIASSIC-PERMIAN		
Sadlerochit Group	7154'	-7114'
Ivishak Formation	7154'	-7114'
MISSISSIPPIAN		
Kekiktuk Formation	7187'	-7147'
PRE-MISSISSIPPIAN		
Argillite	7382'	-7342'
TOTAL DEPTH	7505'	-7465'

STRATIGRAPHY

UPPER CRETACEOUS

Colville Group

Prince Creek and Schrader Bluff Undifferentiated: Surface-970'

Starting with the first samples at 105' and extending to approximately 970', the section was interbedded soft gray claystone and buff colored siltstone with scattered coal grains and rare pyrite nodules. Conditions during deposition were probably marginally marine and no age dating by foraminifera was possible. Palynology performed by Anderson, Warren & Associates, Inc. (AWA) put the interval 90-930' into Zonule P-M14, Santonian-Campanian.

Seabee Formation: 970-1050'

This interval, tentatively called Seabee Formation, consists of siltstone and claystone that is similar to the overlying strata. An interval 930-1088' has been called possible (AWA) Zonule P-M15, Turonian-Conianian. Foraminifera were not observed until a depth of 1050' was reached. The formation top was arbitrarily picked on a small break on the electrical logs.

UPPER-LOWER CRETACEOUS

Nanushuk Group: 1050-2734'

Below 1050', the sediments became much coarser with subangular sandstones interbedded with light gray-brown claystones and brown siltstones. White to clear quartz characterized the sandstones, but varicolored grains and carbonaceous material were also common. These sandstones are clayey, silty and in part calcareous and grade from coarse to medium grained at the top to fine and very fine grained at the base. Sandstones comprise approximately 43% of the group and occur as thin laminations to beds as much as 75' in thickness. Core No. 1 (2380-2410') recovered 30 feet of interbedded claystone and fine to very fine grained sandstone with no hydrocarbon shows. Shows were non-existent throughout the group.

The interval 1088-2410' has been dated as Middle to Late Albian in age by palynology (AWA Zonule P-M15). Foraminifera (AWA Zone F-9) established the same age for the interval 1050-2640'. The depositional environment probably was inner to middle neritic.

LOWER CRETACEOUS

Torok Formation: 2734-6325'

Top of the Torok Formation has been picked at an electrical log break (2734') below an interbedded sandstone and siltstone section in which the sandstones have the same characteristics as those higher in the Nanushuk Group.

The upper 1,200 feet of the Torok Formation is characterized by interbedded medium gray claystones and siltstones. At approximately 3950', the claystones become gray shales with interbedded siltstones to a depth of 5118'. These shales grade downward to a dark gray. Carbonaceous matter is common throughout along with scattered grains of quartz and chert.

In the interval 5118' to 6325', the sediments become coarser with very fine to fine and occasional medium grained sandstones interbedded with medium to dark gray shales. These sandstones are medium to light gray and occasionally "salt and pepper" in color, subangular, argillaceous, carbonaceous, slightly to very calcareous, and contain feldspar grains. Visible porosity was generally poor. Hydrocarbon shows were detected in some of these sandstones but most were minor and inconsequential. A maximum reading of 640 units of gas was recorded at 6205' on the mud log. This gas probably came from the sandstone logged at 6184-6196' on the composite log. Spotty fluorescence and slight crush cut were also observed.

Core No. 2 (6056-6086') recovered 27.5' of gray to light brown very fine grained sandstone, gray silty shale, and gray-brown siltstone. Hydrocarbon shows observed in a 3.5' sandstone bed at 6060' consisted of spotty bright yellow fluorescence and a fair to good gassy odor. Porosities (Appendix G) varied from 8.1 to 14.6 percent, but permeabilities were less than 1.0 millidarcy.

Foraminiferal zonation showed the section 2640-3510' to be Late Aptian to Early Albian in age (AWA Zone F-10) and 3510-6340' to be Aptian (AWA Zone F-11).

"Pebble Shale": 6325-6529'

The top of the "Pebble Shale" has been picked at 6325', the top of a radioactive zone shown on the Gamma Ray logs. Core No. 3 (6340-6370') recovered 30' of dark charcoal-gray, fissile to splintery shales, which are micromicaceous to very finely micaceous, noncalcareous, and very organic. The shales also contain very finely disseminated pyrite, scattered pyritic worm tubes, and rare rounded polished fine to coarse quartz grains. Occasional organic remains, probably fish scales, are present.

The base of the formation was picked at 6529' (electric log), although paleontology and palynology reports place the base at 6600' and 6660', respectively. Anderson, Warren & Associates, Inc. (AWA) have dated the intervals 6340-6600' (Paleontology, AWA Zones F-12 to F-13) and 6340-6660'? (Palynology, AWA Zonule P-M18a) as Early Cretaceous.

There appears to be a distinct correlation of the zones 6529-6617' in this well and 6760-6870' in the East Simpson Test Well No. 1, located about 5 miles to the south. These beds in the No. 1 well are probably Early Jurassic in age (Paleontology, AWA Zone F-18) and are assigned to the Kingak Formation, therefore, this zone has been placed in the Kingak in the No. 1 well rather than the "Pebble Shale". Age dating in the No. 1 well was established from drill cuttings and cores; dating in the No. 2 well was from drill cuttings only.

Correlation between the No. 1 and No. 2 wells establishes that the No. 2 well is 51' structurally higher than the No. 1 at the top of the "Pebble Shale".

JURASSIC

Kingak Formation: 6529-6617'

The interval 6529-6617' has been placed in the Kingak Formation for the reasons mentioned in the "Pebble Shale" discussion. The interval is composed of shales much the same as these of the "Pebble Shale" with interbedded gray-brown, splintery, silty shale, and very fine grained, light gray, subangular, partly siliceous sandstones. This correlates reasonably well with the descriptions of the 6760-6870' interval in the East Simpson No. 1 well.

There is a substantial reduction in thickness of the Kingak between the two wells, 88' in the No. 2 well and 290' in the No. 1. The Kingak shale section present in the No. 1 well (6580-6760') probably was removed by pre-"Pebble Shale" erosion or is missing because of depositional thinning, probably the former. No hydrocarbon shows were observed.

JURASSIC-TRIASSIC

Sag River Sandstone: 6617-6770'

The Sag River Sandstone is typically a very fine to fine grained subangular sandstone with glauconite grains common. It grades downward from light gray to gray-green, probably due to the increase of glauconite grains and pellets. It is both calcareous and siliceous and has scattered fossils replaced by secondary calcite. A core taken at 6705-6735' (Core No. 4) had 30' of this type sandstone with a 1-foot zone (6710.5-6711.5') grading to a fossiliferous, very sandy limestone (possible Monotis sp. zone?).

Laboratory analysis (Core Lab) of Core No. 4 shows a minimum of 7.2% porosity to a maximum of 25.3% with an average of 20.3%, but permeabilities were poor, generally less than 1.0 millidarcy. Hydrocarbon shows are limited to random spotty shows.

Biostratigraphic determinations by Anderson, Warren & Associates (AWA) has given a paleontological age determination of Early Jurassic (possible AWA Zone F-18 and Triassic AWA Zone F-19) to the intervals 6600-6705' and 6705-7167'. Palynology suggests an Early Jurassic(?) (AWA Zonule P-M24) for the interval 6660-6705' and Late Triassic (AWA Zonule P-M26) for 6705-6736'.

TRIASSIC

Shublik Formation: 6770-7154'

The Shublik Formation is composed of splintery gray calcareous shales, light gray to gray-green very fine grained sandstones which grade to

siltstones, and gray to dark brown limestones. The sandstones and siltstones are moderately to very calcareous while the limestones are argillaceous, sandy and silty, and occasionally contain pelecypod fragments.

The limestones are confined primarily to the lower 116' of the formation although thin beds, intergradational with sandstones, siltstones and shales, are present in the upper section.

Reservoir conditions in the Shublik were very poor to non-existent, and the only hydrocarbon shows were restricted to traces of dead and tarry oil.

Paleontological evidence, although sparse, indicates a Triassic age for the Shublik, probably AWA Zone F-19. Palynology is indeterminate.

TRIASSIC-PERMIAN

Sadlerochit Group: 7154-7187'

Ivishak Formation: 7154-7187'

The primary objective of the well was the Ivishak Formation of the Sadlerochit Group near the pinchout on the Barrow Arch. The upper contact of the Ivishak has been placed at 7154' where there is a definite break on the Gamma Ray and SP logs, although the sandstone was not observed until the 7160-7167' sample.

Substantial thinning of the Sadlerochit Group has taken place between the two East Simpson wells with 142' in the No. 1 well and only 33' in the No. 2.

The Ivishak sandstones are light to medium gray, mostly very fine grained and partly medium grained with conglomeratic streaks. They are calcareous to very siliceous, contain tripolitic chert fragments and some very fine pyrite. Thin dark gray shale stringers are interbedded. Only scattered patches of dead oil stain are present with the exception of one 8-foot zone (7175.5-7183.5') in Core No. 5 (7167-7197') which is a medium grained sandstone with fair stain, fluorescence and cut. Porosities through this sandstone interval varied from 10.3% to 19.3%, and permeability reached a maximum of 903 millidarcies (see Appendix G). A drill-stem test over the interval 7152-7197' produced only formation water, with a trace of oil, at a rate of 24 barrels per hour (Appendix E).

The section 7167-7504' has been interpreted by Anderson, Warren & Associates as being Late Mississippian (Visean) age (AWA Zonule P-T21). Paleontological data was indeterminate.

Although the sandstone (7154-7187') has been given a Late Mississippian age, it appears to correlate with the Sadlerochit Group present in the No. 1 East Simpson well. Tetra Tech, Inc., in their final report, dated October 24, 1980, has included the above-described sandstone into the Endicott Group of Mississippian age.

Correlation with the No. 1 well shows that the East Simpson No. 2 well is 316' structurally higher at the top of the Sadlerochit Group.

MISSISSIPPIAN

Kekiktuk Formation: 7187-7382'

The top of the Kekiktuk is picked at 7187' in Core No. 5 (7167-7197'), at the top of a dark gray, hard, siliceous and dense siltstone. This occurred as a 1.5' thick bed, below which was a 3' thick sandstone which was light gray to off-white, fine to medium grained, well cemented with silica and having poor porosity and only traces of dead oil. At 7191.5', a 1-foot coal was recovered. Below the coal and continuing through Core No. 6 (7197-7227') to a depth of 7238' were light gray to black mudstones and shales. They were micromicaceous and carbonaceous with coaly inclusions and seams.

Sandstone was encountered at 7238', and coring was resumed at 7248'. Core No. 7 (7248-7278') recovered 30' of mostly white to gray sandstone, medium to occasionally fine grained, with some white clay filling and scattered carbonaceous material. Only scattered patches of fluorescence were noted. The upper 14 feet had an average porosity of 13.2% and permeability of 263 millidarcies, but due to the poor shows, no tests were undertaken.

Core No. 8 cut 53' from 7293' to 7346'. Above 7304' were interbedded carbonaceous shales and coals up to 3' thick. Pyrite was very common in the coals and the shales, often in large blebs. Below 7304' were siltstones with very fine grained sandstone laminations that often showed soft-sediment deformation. A very fine grained "dirty" sandstone with shale laminations occurred from 7320' to 7323.5'. Another 1' coal seam was cored at 7324.6' and below that a soft, crumbly green claystone and black waxy shale with 1' to 3' thick hard coals. Apparent dips in the lower part of this core were approximately 15-20°.

Below 7346' to a depth of 7398', sample observation showed white to tan, very fine grained, conglomeratic sandstones with interbedded claystone, shale and siltstone.

As mentioned in the previous discussion, the Kekiktuk interval has been given a Late Mississippian (Visean) age (AWA Zonule P-T21).

PRE-MISSISSIPPIAN

Argillite: 7382-7505' - Total Depth

At 7382', a soft red siltstone and shale was encountered which turned the entire mud system red. The top of the Argillite zone has been picked at the top of the redbed sequence that begins at 7382'. There is a change on the electric logs at this point and it is also confirmed by sidewall cores. Sediments change from a light gray shale with sandstone at 7377'

to red, red-brown and gray claystones and mudstones at 7392'. The dipmeter log shows a definite change in dip below 7355'; dips of 85° were noted at 7435-7456.7' of Core No. 9.

It appears that the redbeds at the top may be a weathered zone that grades downward into the typical black, micaceous, metamorphosed argillites.

Core No. 9 (7424-7458') recovered a red lightly metamorphic claystone with clasts of light gray mudstone and black satiny argillite with dips of 80° to 85°. The argillite was highly fractured and had abundant slickensides. Scattered fractures with a filling of light gray mineral, similar to the Wilkeite found in the metamorphic basement at Ikpikpuk No. 1 (NE 1/4, Section 25, T13N, R10W, Umiat Meridian), were observed.

CONCLUSIONS

It is hereby concluded, after all information has been evaluated, that:

1. The well is a dry hole.

2. Although the Ivishak Formation has thinned from 142' in the East Simpson No. 1 to 33' in the No. 2 well, fair to good porosities and permeabilities have been retained. The Ivishak is water wet with random spotty oil shows, but because of the good reservoir characteristics, it is possible that a hydrocarbon accumulation may be encountered closer to the pinchout edge which appears to be to the north and northwest.

   The Sag River Sandstone, which is also considered a possible potential reservoir, has fair to good porosities, but permeabilities are very low as they were in the East Simpson No. 1 well and it appears that this sandstone is not a good objective in this area.

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SUMMARY PERTINENT DATA, OPERATIONS & ANALYSIS*

WELL:	East Simpson Test Well No. 2
API NO.:	50-279-20007
OPERATOR:	Husky Oil NPR Operations, Inc.
LOCATION:	66 ft. FSL, 219 ft. FEL (SE 1/4) Section 23, T19N, R11W Umiat Meridian North Slope Borough, Alaska
COORDINATES:	Latitude: 70°58'42.51" North Longitude: 154°40'25.74" West X = 419,557.85 Y = 6,208,069.66 Zone 5
ELEVATION:	40 ft. Kelly Bushing, 22.5 ft. Pad
DATE SPUDDED:	January 29, 1980
TOTAL DEPTH:	7,505 ft. Driller; 7506 ft. Schlumberger
DATE REACHED TOTAL DEPTH:	March 10, 1980
DATE RIG RELEASED:	March 16, 1980
CASING:	20" @ 99' (Schlumberger 91') 13-3/8" @ 2635' 9-5/8" @ 6427'

LOGGING RECORD:

Open Hole:	DIL/SP/GR 91-7496' (4 runs) CNL/FDC/GR/CAL 91-7490' (4 runs) BHC-Sonic/GR/TTI 91-7496' (4 runs) FDC/GR/CAL 91-7490' (4 runs) HDT-Dipmeter 100-7496' (3 runs) HRT-Temp. - Run #1 before final logging 100-7512' HRT Temp. - Run #2 after final logging 100-7510' Mud Log (B&G) 105-7505' Dc Exponent 2400-7500' Velocity Survey (Birdwell) 500-7507'
COMPUTED LOGS:	Saraband (3-5-80) 6422-7168' Saraband (5-28-80) 6420-7484' Saraband (5-31-80) 2644-6410' Geogram Survey 460-7469'

SIDEWALL CORES: Run #1 - 208-2614' (shot 43, recovered 41)
Run #2 - 2900-6400' (shot 24, recovered 23)
Run #3 - 6512-7406' (shot 23, recovered 19)

CONVENTIONAL CORES:

No.	Interval	Recovered	Formation
1	2380-2410'	30.0'	Nanushuk
2	6056-6086'	27.5'	Torok
3	6340-6370'	30.0'	"Pebble Shale"
4	6705-6735'	30.0'	Sag River
5	7167-7197'	29.0'	Ivishak/Kekiktuk
6	7197-7227'	28.0'	Kekiktuk
7	7248-7278'	30.0'	Kekiktuk
8	7293-7346'	53.0'	Kekiktuk
9	7424-7458'	32.7'	Argillite

CORE ANALYSIS: (Core Laboratories, Inc.)

Date	Interval	Core No.	Spl. No.
2/25/79	2387-2409'	1	1- 23
2/25/79	6057-6083'	2	24- 48
2/25/79	6705-6735'	4	49- 79
2/25/79	7167-7190'	5	80-109
2/25/79	7248-7277'	7	110-139
2/11/79	1150-5694'	Sidewall	1- 9

NOTE: Coregraphs available.

HYDROCARBON SHOWS:

5710-5730' - Torok - Small gas kick - 220 units - No stain, cut or fluoresence.

6190-6210' - Torok - Fair gas kick - 640 units - Spotty fluorescence, slight cut.

6632-6770' - Sag River - No gas, spotty stain, trace dead and asphaltic oil, occasional slight cut.

7163-7180' - Ivishak - No gas, spotty dead to live oil stain, bright uniform to spotty fluorescence and instant cut 7175-7180'.

TESTS: Drill Stem Test No. 1 - 7152-7197'
Recovered 161 barrels formation water.

FLUID ANALYSIS:
(Chemical & Geological Laboratories of Alaska, Inc.) Drill Stem Test No. 1 - sample chamber fluid
Chlorides 14,000.

STATUS:	Dry and abandoned.
WELLSITE GEOLOGISTS:	R. Wermeyer G. Legg R. Nelson
WELL LOG ANALYST:	Armour Kane
DRILLING CONTRACTOR:	Nabors Alaska Drilling, Inc.
MUD LOGGERS:	Borst & Giddens Logging Service, Inc. (The Analysts)
BIOSTRATIGRAPHIC ANALYSIS:	Anderson, Warren & Associates, Inc. (AWA)
ELECTRIC LOG SURVEYS:	Schlumberger Offshore Services

* Copies and/or reproducibles of all geological data are available from:

National Oceanic and Atmospheric Administration
EDIS/NGSDC (D62)
325 Broadway
Boulder, CO 80303

EAST SIMPSON TEST WELL NO. 2
DRILL CUTTINGS AND CORE DESCRIPTIONS
BY

R. WERMEYER	-	105-2650'
G. LEGG	-	2650-7278'
R. NELSON	-	7278-7505'

NOTE: Sample and core descriptions were written at wellsite before mechanical logging was performed, therefore, descriptions are not adjusted to mechanical control. With the exception of the cored intervals, 30 foot samples were taken from 105' to 6540' and 10 foot thereafter to 7505' - Total Depth. Rates of penetration in the upper hole (105' to 2300'±) were very fast, generally less than 0.5 minutes per foot.

DRILLED DEPTH (FEET BELOW KELLY BUSHING)	
0 - 105	No samples recovered.
105 - 120	Siltstone: buff, firm, speckled with carbonaceous material or lignite, slightly calcareous, and Coal: black, firm to hard, glossy with trace quartz grains, subrounded to round, milky white, clear.
120 - 210	Clay: light gray-tan, very soft to water soluble, slightly silty with rare pyrite nodules.
210 - 240	Siltstone: light tan, very fine grained, very soft to water soluble with scattered fine grains of coal.
240 - 370	Clay: light tan, silty, very soft, water soluble, rare coal fragments.
370 - 1080	Interbedded Silt: as above, and Clay: as above.
1080 - 1290	Siltstone: light gray, very soft, water soluble, very clayey with very fine specks of carbonaceous material; locally becoming siltstone, moderately compacted, slightly dolomitic, and traces Dolomite: light tan, dense, cryptocrystalline, rare incomplete carbonized wood fragments.
1290 - 2250	Interbedded Sandstone: light gray, clear, varicolored, frosted grains, coarse to very coarse grained probably in a fine grained matrix, subangular, poor to moderately sorted, very silty, very clayey, with common coal fragments; locally becomes fine grained sandstone, moderately cemented, in part calcareous, and Clay: light gray, very soft and water soluble, silty, and Siltstone:

light gray, generally water soluble, very clayey, locally becomes siltstone, moderately compacted, locally abundant Lignite: black, firm, blocky.

2250 - 2310 Interbedded Siltstone: brown-gray, firm to moderately indurated, clayey, trace pale yellow pinpoint fluorescence, trace brown pinpoint stain, brown cut, and Lignite and Claystone: very soft and water soluble, and Claystone: as above.

2310 - 2380 Sandstone: light gray, fine grained, speckled with fine black carbonaceous(?) material, subangular, fair sorting, very clayey, no show, and Lignite and Clay: as above.

2380 - 2410 Core No. 1: Cut 30', Recovered 30'

2380.0-2386.5' (6.5')	Clay: brown-gray, soft, platy, micromicaceous, in part very finely sandy; interbedded with Sandstone: light gray, very fine to fine grained, angular to subangular, fair sorting, poorly compacted and cemented, micromicaceous, rare to scattered black, fine carbonaceous material, fairly clean to slightly clayey, fair to good intergranular porosity, no shows.
2386.5-2392.5' (6.0')	Sandstone: as above, with interbeds and lenses of Clay: as above.
2392.5-2393.0' (0.5')	Clay: as above (2380-2386').
2393.0-2410.0' (17.0')	Sandstone: as above, with thin stringers and lenses of Clay: as above.

2410 - 2650 Predominantly Clay: brown-gray, soft to firm, in part water soluble, very silty, speckled with fine black carbonaceous material, and Sandstone: light gray, very fine to fine grained, angular, moderately sorted, speckled with black fine carbonaceous material, poorly cemented, slightly dolomitic, slightly clayey, fair intergranular porosity, and traces pyrite and lignite, locally traces shell fragments.

2650 - 2670 No sample - all cement.

2670 - 2840 Claystone: gray, soluble, with Siltstone: dark gray, very argillaceous, hard, with abundant coal.

2840 - 2930 Claystone: as above, with occasional medium grained, subrounded sand grains.

2930 - 2960	Claystone: becoming more lithified, with slight increase in siltstone.
2960 - 2990	Claystone, with Siltstone: as above.
2990 - 3020	Claystone: becoming more soft, soluble, sticky, and Siltstone: as above.
3020 - 3080	Claystone, with some Siltstone: as above.
3080 - 3110	Claystone, with increase in siltstone.
3110 - 3200	Claystone: silty, grading to siltstone.
3200 - 3290	Claystone: as above, with scattered Inoceramus prisms and brown siderite.
3290 - 3380	Claystone: soluble, soft.
3380 - 3410	Claystone: as above.
3410 - 3530	Claystone becoming more silty, grading to siltstone.
3530 - 3590	Claystone: as above, with trace of coal.
3590 - 3650	Claystone becoming more silty, very carbonaceous with very fine carbonaceous flakes, trace of coal.
3650 - 3680	Claystone grading to Siltstone.
3680 - 3740	Claystone and siltstone gradational.
3740 - 3770	Siltstone grading to Claystone: as above.
3770 - 3830	Siltstone and claystone in equal amounts.
3830 - 3920	Claystone becoming mostly Siltstone: medium gray, very argillaceous and clayey, grading to Claystone: very fine, carbonaceous.
3920 - 3950	Siltstone becoming more clay-like.
3950 - 3980	Essentially Mudstone: dark gray, grading to Shale: dark gray, very silty, platy.
3980 - 4010	Shale: as above, with some carbonaceous laminae, appears to be plant remains.
4010 - 4040	Shale: light to medium gray, very clayey, grading to Claystone: very silty, subfissile to fissile, with some Siltstone: as above.

4040 - 4130	Shale: as above, with increase in clay.
4130 - 4220	Shale and Claystone: as above, with calcite from Inoceramus prisms.
4220 - 4250	Shale: as above, with occasional subrounded to rounded medium grained frosted quartz and chert grains.
4250 - 4280	Shale: as above, with trace of Sandstone: dirty gray, very fine grained to silt, very argillaceous and silty, poor to nil porosity.
4280 - 4490	Shale: as above, very silty in part, grading to siltstone, with trace of Sandstone: as above, but very finely carbonaceous.
4490 - 4640	Shale: becoming more silty, slightly sandy with trace of Sandstone: as above.
4640 - 4670	Shale: as above, with minor Sandstone: as above, very argillaceous, frequently with some shale banding, probably thin zones along shale bedding planes.
4670 - 4730	Shale: as above, with minor Sandstone: as above, but becoming carbonaceous.
4730 - 4880	Shale: as above, with minor Sandstone: as above, with flakes and inclusions of carbonaceous material.
4880 - 5060	Shale: as above, but becoming slightly more indurated, slightly darker gray, more fissile.
5060 - 5150	Shale: gray, gray-brown, and gray-black, subfissile to fissile, silty in part, carbonaceous in part, moderately calcareous, with trace of Sandstone: as above.
5150 - 5300	Shale: as above, with abundant free pyrite, with Sandstone: gray, mottled black with carbonaceous material, very fine grained to silt, some medium grained, poorly sorted, moderate to well indurated and cemented with calcite, poor porosity, no show.
5300 - 5420	Sandstone: dirty gray, as above, but becoming more very fine grained to fine grained, some medium grained, heavy argillaceous and calcareous cement, poor porosity.
5420 - 5570	Shale: as above, with Sandstone: becoming more silty, grading in part to siltstone.
5570 - 5660	Shale now splintery in part, very finely micaceous.
5660 - 5690	Shale: as above, with occasional free pyrite.

5690 - 5700	Shale becoming silty in part, with Sandstone: as above, but mostly argillaceous to silty.
5700 - 5720	Sandstone: gray, fine grained, some medium grained, quartz and feldspar, argillaceous, some carbonaceous inclusions, poor to fair porosity, no fluorescence or stain, no cut, slight cut residue when crushed with no visible cut fluorescence.
5720 - 5780	Sandstone: as above, some slightly friable, still generally poor porosity.
5780 - 5900	Shale: as above, but very silty, partly sandy in part, grading to siltstone, with traces of Sandstone: as above.
5900 - 6030	Shale: as above, with minor Sandstone: as above, but even more argillaceous, silty, grading to siltstone.
6030 - 6056	Sandstone: light to medium gray, salt and pepper, with carbonaceous material, abundant feldspar, fine grained, some medium grained, argillaceous, slightly calcareous, some swelling clay, no fluorescence or stain, slight residue when crushed cut, no visible cut fluorescence.
6056 - 6086	Core No. 2: Cut 30', Recovered 27.5'

6056.0-6057.0' (1.0')	Sandstone: gray to light brown, very fine grained, heavy calcareous cement with some sparry calcite and secondary quartz overgrowths, occasional muscovite, abundant feldspar, poor to nil porosity, no show.
6057.0-6058.0' (1.0')	Shale and shale partings, with sandstone lenses; Shale: gray, very silty, grading to Siltstone: fissile, very finely micaceous, very slightly calcareous to noncalcareous.
6058.0-6059.8' (1.8')	Sandstone: as above, but with occasional brown organic flakes.
6059.8-6060.0' (0.2')	Shale: as above.
6060.0-6063.5' (3.5')	Sandstone: as above, with general porosity, spotty bright yellow fluorescence (20%); no visible cut, fair ring residue, fair to good gassy odor; hairline, mostly closed, discontinuous vertical fracture, fair fluorescence on fracture face, cut as above.

	6063.5-6064.2' (0.7')	Siltstone grading to Shale: gray-brown very finely micaceous, subfissile to fissile, very carbonaceous.
	6064.2-6072.0' (7.8')	Sandstone: gray to light brown, as above, but poor to nil porosity, no show with occasional shale partings less than 1" thick.
	6072.0-6083.5' (11.5')	Alternating thin beds (typically 1-6") of Shale: as above, and Sandstone: as above; no show.
	6083.5-6086.0' (2.5')	No recovery.
6086 - 6110	Sandstone and Shale: as in Core No. 2.	
6110 - 6120	Shale: as above, with Sandstone: as above, with poor porosity and with 30% medium yellow spotty fluorescence, no visible cut, good ring residue.	
6120 - 6130	Shale: as above, with Sandstone: as above, 50% of sandstone with fluorescence, becoming dull yellow gray, residue obtained only with crushed cut.	
6130 - 6140	Shale: as above, with Sandstone: as above.	
6140 - 6170	Sandstone: as above with 20-30% very poor	

nic with occasiona obably fish scales, fine grained to se grained quartz, long white to buff partings, dip	disseminated pyrite	occasional pyrite wormtubes, very orga organic remains, pro rare rounded polished medium grained to coar some muscovite flakes occasional claystone essentially horizontal.
	6370 - 6440	Shale: as in Core No. 3.
	6440 - 6450	Shale becoming slightly silty in part.
om cement and gel	6450 - 6530	Shale: as above, with contamination fr particles.
fissile, organic,	6530 - 6540	Shale: dark gray to black, micromicaceous.
nt gray, very fine e: very slightly eous cement, very oor to nil porosity,	6540 - 6550	Shale: as above, with Sandstone: lig grained to silt, grading to Siltston calcareous, very hard with heavy silic fine grained dark shale inclusions, po no show.
to brown, silty, above.	6550 - 6590	Shale: as above, with Shale: gray splintery, with Sandstone-Siltstone: as
	6590 - 6610	No samples recovered.
oor porosity, with	6610 - 6620	Sandstone: as above, but very po Shale: as above.
ned, some black lauconite grains, ous cement, friable	6620 - 6630	Sandstone: gray, very fine grai carbonaceous inclusions, rare g moderately calcareous, hard with silice in part, poor to fair porosity, no show.
secondary quartz ite, slight increase porosity, trace of nil cut.	6630 - 6640	Sandstone: as above, with abundant overgrowths, slight increase in glaucon in porosity, mostly fair with some poo yellow gray fluorescence, very slight to
andstone becoming grains and very to fair porosity,	6640 - 6670	Sandstone: as above, with some S gray-green and green with glauconite fine glauconite, some white clay, poo trace of fluorescence, as above.
ite replaced fossil	6670 - 6680	Sandstone: as above, occasional calc fragments.

6680 - 6690 Sandstone: as above, with increase in glauconite, color now mostly gray-green.

6690 - 6705 Sandstone: as above, with increase in glauconite grain size, some pellets.

6705 - 6735 Core No. 4: Cut 30', Recovered 30'

6705.0-6735.0' (30.0') Sandstone: gray and gray-green, very fine grained to fine grained, slightly to very calcareous with occasional heavy spar in matrix (zone 6710.5-6711.5' grades to very sandy limestone, abundant pelecypod fossils), argillaceous, silty, very glauconitic with inclusions and pellets, generally well indurated, occasionally slightly friable, generally poor porosity, occasional zones of fair porosity, very spotty random oil stain and odor in streaks and pods, occasionally dead and asphaltic with no fluorescence or cut, thin 1/4" lense of gilsonite 6715-6716', some fair porosity 6717-6720', good odor, spotty stain, dull gold-brown fluorescence, good immediate cut, occasional fractures at approximately 60°, some calcite crystals along one face.

6735 - 6770 Very poor samples, primarily cavings, presumed to be Sag River Sandstone as in Core No. 4.

6770 - 6810 Shale: gray, splintery, micromicaceous, calcareous, with Sandstone: as above, but becoming slightly friable, cleaner, mostly fair porosity.

6810 - 6820 Shale: as above, with Sandstone: becoming more calcareous, grading to limestone.

6820 - 6850 Limestone: gray, silty to sandy, microcrystalline, argillaceous, glauconitic, chalky in part, nil visible porosity.

6850 - 6870 Sandstone: very silty, grading to Siltstone: very calcareous, grading to limestone, with Limestone: brown and gray, very silty, sandy and argillaceous, grading to very calcareous siltstone, with Shale: as above.

6870 - 6890 Samples extremely poor, mostly cavings.

6890 - 6900 Shale and Siltstone: as above, with trace of Sandstone: light gray, very fine grained to fine grained, very glauconitic, silty, poor to nil porosity.

6960 - 6970	Shale, Siltstone and traces of Sandstone: as above, with minor Limestone: gray and brown, argillaceous and silty, microcrystalline.
6970 - 6990	Shale and Siltstone: as above, with Sandstone: very calcareous and silty, grading to limestone, with Limestone: as above, grading to sandstone.
6990 - 7030	Siltstone and limestone gradational.
7030 - 7050	Limestone: gray and brown, argillaceous and very silty, gradational with siltstone, occasionally sandy, occasionally chalky, nil porosity with minor Shale and Siltstone: as above, and with trace of gray smoky chert.
7050 - 7060	Limestone: gray, gray-brown and mottled gray, brown and white, very argillaceous and silty, grading to siltstone, [illegible] occasionally sandy, [illegible] crystalline, poor intergranular porosity.

Limestone: as above, but slightly cleaner, more chalky, some nacreous thin pelecypod shells, Monotis sp.(?).	7060 - 7080
Limestone becoming sandy and siliceous in part.	7080 - 7090
Limestone: as above, but becoming darker, more argillaceous and silty.	7090 - 7100
Limestone: as above, with Shale: very pale gray to gray to dark gray, some organic, very splintery.	7100 - 7130
Limestone: as above, but becoming generally darker, more argillaceous and silty.	7130 - 7150
Limestone: now mostly brown to dark brown, siliceous and with sucrosic texture, fine crystalline to medium crystalline.	7150 - 7160
Limestone: as above, with Sandstone: clear to light gray, very fine grained, calcareous, very fine grained black shale inclusions, slightly friable, poor to fair porosity, 25% dull yellow-gray fluorescence, fair streaming cut, fair residue.	7160 - 7167
Core No. 5: Cut 30', Recovered 29'	7167 - 7197

7167.0-7168.5' (1.5')	Sandstone: medium gray, very fine grained, occasional very fine grained shale inclusions, very calcareous with heavy calcareous and siliceous cement, moderate to well indurated, some secondary quartz overgrowths, very finely pyritic, poor porosity, no show.

7168.5-7168.7' (0.2')	Conglomerate: pebbles and cobbles (3 mm to 5 cm) of vein quartz, pyrite and black, impure chert, matrix of sand, argillaceous material and silt tightly cemented with silica, nil visible porosity, no show.
7168.7-7169.2' (0.5')	Shale: dark gray to black, very silty and organic, fissile to subfissile, micaceous.
7169.2-7173.0' (3.8')	Sandstone: light gray, very fine grained to fine grained, very siliceous and quartzitic, hard and dense, noncalcareous, some white clay from tripolitic chert, occasional patches of dead stain resembling bioturbation, poor to nil porosity, no show.
7173.0-7173.5' (0.5')	Shale: dark gray to black, as above, bedding 10-15° from shale partings.
7173.5-7174.5' (1.0')	Sandstone: light gray, very fine grained to fine grained, quartzitic with patches of dead stain and asphaltic residue, as above.
7174.5-7175.5' (1.0')	Interlaminated Sandstone, and dark gray Shale: as above.
7175.5-7183.5' (8.0')	Sandstone: light gray, stained tan to brown top 5.0' with oil, medium grained, subrounded to subangular, well sorted, abundant fragments of tripolitic chert, occasional medium grained black shale inclusions, noncalcareous, fair porosity, good odor, moderately uniform to patchy stain, bright yellow uniform to slightly patchy fluorescence, good immediate flooding cut, good heavy residue; no stain, fluorescence or cut in bottom 3.0' (wet).
7183.5-7187.0' (3.5')	Sandstone: light gray, very fine grained, very siliceous and quartzitic, grading to quartzite in part, marbled, with irregular lenses of black shale, nil porosity, no show.
7187.0-7188.5' (1.5')	Siltstone: dark gray, argillaceous and sandy, siliceous, hard and dense.

	7188.5-7191.5' (3.0')	Sandstone: off-white to light gray, fine to medium grained, well cemented with silica, subangular to subrounded, hard with mostly poor, some fair intergranular porosity, rare patches of dead stain.
	7191.5-7192.5' (1.0')	Coal: black, impure with some clay, occasional pyrite, burns readily (subbituminous).
	7192.5-7196.0' (3.5')	Mudstone: light gray to tan, moderately indurated, no fissility, abundant lenses of asphalt and gilsonite.
	7196.0-7197.0' (1.0')	No recovery.

Apparent bedding dips vary 10-21°.

7197 - 7227 Core No. 6: Cut 30', Recovered 28.0'

	7197.0-7225.0' (28.0')	Shale, Mudstone and Coal: light gray to medium gray to black, well indurated to poorly indurated, poorly developed fissility in shale, grades to mudstone, micromicaceous, carbonaceous and with occasional coaly partings, lenses, seams, inclusions and beds, occasional wood-like texture, occasionally grades to impure coal which burns readily producing a tarry bleeding, occasional large blebs of pyritized wood, grades to very weakly indurated mudstone bottom 3.0', bedding approximately 5°.
	7225.0-7227.0' (2.0')	No recovery.

7227 - 7243 Shale, Mudstone and Coal: as in Core No. 6.

7243 - 7248 Shale, Mudstone and Coal: as above, with Sandstone: clear to white, medium grained, subangular to subrounded, abundant white clay from tripolitic chert, black carbonaceous inclusions, poor to fair porosity, occasional good porosity, 50% pale yellow patchy fluorescence, very slight streaming cut, occasional fair streaming cut, very slight residue, strong sulfur odor.

7248 - 7278 Core No. 7: Cut 30', Recovered 30'

	7248.0-7249.0' (1.0')	Sandstone: clear to white to gray, medium grained, subangular to

subrounded, quartzose, occasional white clay inclusions, from tripolitic chert, occasional dark shale inclusions, slightly friable, fair porosity, patchy bright yellow fluorescence, very patchy light tan stain, fair streaming cut, fair residue.

7249.0-7250.5' (1.5') Interbedded Sandstone: as above, but fine grained to medium grained, well indurated, poor porosity, no show, with Shale: dark gray, grading to Mudstone: very finely micaceous, weakly fissile, carbonaceous.

7250.5-7257.0' (6.5') Sandstone: clear to white to gray, medium grained as above, but more abundant white clay, more well indurated, poor to fair porosity, friable in part, abundant woody coal and carbonized wood inclusions and marbled with frequent dead stain, no show.

7257.0-7267.3' (10.3') Sandstone: as above, but becoming more fine grained, white clay as much as 25% of rock at times, more well indurated, generally poor porosity, occasional zones of fair porosity with increase in grain size and decrease in white clay, no show.

7267.3-7268.0' (0.7') Shale: medium gray, very carbonaceous, with carbonized wood fragments and gilsonite, micromicaceous, subfissile to fissile, bedding approximately 5°.

7268.0-7278.0' (10.0') Sandstone: white to gray, medium grained, marbled with dead stain as above, abundant white clay, well cemented and indurated, very poor to poor porosity, no show except for 1-2" very patchy fluorescence at 7272' and 7274'; 3" shale parting at 7271'.

7278 - 7290 Mudstone: light to dark gray, partly silty, partly carbonaceous with varying amounts of coal as probable slough.

7290 - 7293 Sandstone: white, medium to coarse grained, hard, with minor amounts of white clay and tripolitic chert, well indurated, with occasional excellent quartz overgrowths, poor to very poor porosity, no visible stain, occasional yellow gold speckled fluorescence, very weak cut fluorescence.

7293 - 7346 Core No. 8: Cut 53', Recovered 53'

7293.0-7294.7' (1.7')	Shale: medium to dark gray to gray-brown, partly silty, carbonaceous, very finely laminated, with slickensided surfaces.
7294.7-7294.9' (0.2')	Siltstone and Coal, interlaminated Siltstone: dark, carbonaceous; and Coal: black, hard, with pyrite blebs.
7294.9-7295.2' (0.3')	Shale: very dark gray, very carbonaceous, firm to hard with pyrite blebs.
7295.2-7295.8' (0.6')	Coal: black, hard, with pyrite blebs up to more than one inch diameter.
7295.8-7297.5' (1.7')	Shale: dark gray-brown, carbonaceous, firm to hard.
7297.5-7300.7' (3.2')	Coal: black, hard, clean to partly argillaceous, with blebs of fine grained pyrite, traces of black, dead, tarry oil associated with fractures in coal.
7300.7-7303.5' (2.8')	Shale and Coal, interlaminated Shale: dark gray, silty, carbonaceous; and Coal: black, subbituminous; slightly contorted by compaction and soft sediment deformation.
7303.5-7304.5' (1.0')	Shale: dark gray, massive, silty, with scattered very fine detrital micaceous and black carbonaceous plant remains.
7304.5-7310.8' (6.3')	Siltstone: medium to dark gray, sandy, slightly micaceous, firm to hard, argillaceous, with scattered black carbonaceous plant remains.
7310.8-7315.8' (5.0')	Siltstone: dark gray, as above; with irregular laminations of Sandstone: light gray, very fine grained, firm to hard, complex soft sediment slumping and deformation at 7312.8', very poor porosity, traces of weak yellow-gold fluorescence in some sandstone laminations, weak, milky blue-gold cut fluorescence, apparent dip approximately 25°.

7315.8-7317.1' (1.3')	Siltstone: very dark gray, argillaceous, firm to hard, very carbonaceous.
7317.1-7320.0' (2.9')	Siltstone: dark gray, firm to hard, argillaceous; with irregular very thin laminations of Sandstone: light gray, very fine grained, exhibits soft sediment deformation, very poor porosity, no shows.
7320.0-7323.5' (3.5')	Sandstone: light gray, very fine grained, dirty, hard, no porosity, with laminations of Shale: dark gray, soft, carbonaceous, silty, no shows.
7323.5-7324.6' (1.1')	Siltstone: dark gray, argillaceous, hard, sandy; with thin sandstone laminations, as above.
7323.6-7324.6' (1.0')	Siltstone: dark gray, argillaceous, hard, sandy; with thin sandstone laminations, as above.
7324.6-7325.4' (0.8')	Coal: hard, black, slightly argillaceous, with pyrite blebs.
7325.4-7328.0' (2.6')	Claystone: gray to greenish-brown, soft, crumbly, slightly micaceous, moderately carbonaceous.
7328.0-7330.5' (1.5')	Shale: very dark gray, firm, very carbonaceous, waxy, slightly silty, occasionally grading to argillaceous coal, apparent dip 15-20°.
7330.5-7333.8' (3.3')	Claystone and Coal; interlaminated Claystone: gray to olive; and Coal: black, thin.
7333.8-7336.0' (2.2')	Coal: black, firm to hard, argillaceous, streaks pyritic.
7336.0-7336.8' (0.8')	Shale: very dark gray to black, very carbonaceous, firm, waxy.
7336.8-7338.0' (1.2')	Coal: black, hard, with pyrite blebs, traces of dead black tar giving no initial fluorescence, but milky cut fluorescence and dark visible cut.

	7338.0-7339.8' (1.8')	Claystone: gray-brown, soft, crumbly with coal laminations.
	7339.8-7342.4' (2.6')	Shale: dark gray to brown, carbonaceous, with rare coal streaks.
	7342.4-7345.0' (2.6')	Coal: hard, black, relatively clean, with pyrite blebs.
	7345.0-7346.0' (1.0')	Siltstone: light gray, sandy, hard, partly carbonaceous, with soft sediment distortions, large pyrite blebs, trace yellow-gold fluorescence on fracture, milky cut fluorescence.
7346 - 7350	Claystone and Shale: dark gray-brown, firm.	
7350 - 7380	Sandstone: white to tan, very fine grained, occasionally coarse grained, with occasional conglomerate, rare to abundant chert and tripolitic chert, generally no porosity, rare sandstone with very poor porosity; no odor, stain, cut or fluorescence; interbedded with claystone, shale and siltstone.	
7380 - 7390	Sandstone: as above, with increasing claystone and shale, nil porosity, no odor, stain, cut or fluorescence.	
7390 - 7398	Sandstone: white to tan, conglomeratic, no porosity, as above, with Siltstone and Shale interlaminations: as above.	
7398 - 7424	Claystone and Shale: red, soft to firm, iron stained, becomes hard with streaks of red siltstone and very fine grained red sandstone.	
7424 - 7458	<u>Core No. 9: Cut 34', Recovered 32.7'</u>	
	7424.0-7432.0' (8.0')	Claystone: red, appears metamorphic, slightly micaceous, hard, highly fractured with streaks and clasts of light gray mudstone and scattered fillings of light gray material, traces of very fine sand as elongated inclusions, near vertical bedding.
	7432.0-7434.5' (2.5')	Claystone: light gray to tan, slightly sandy, hard, deformed, appears metamorphic, with scattered small elongated clasts of red claystone.
	7434.5-7456.7' (22.2')	Argillite: black, satiny micaceous, sheen, highly fractured, with

	slickensides; common 1-10 mm thick Sandstone laminations: hard, very. fine grained, no porosity, well developed vertical (85°) bedding.
7456.7-7458.0' (1.3')	No recovery.
7458 - 7480	Argillite: as above, with trace metamorphosed Sandstone: as above, fine to medium grained.
7480 - 7505	Argillite: dark gray to black, as above.

Log Analysis

ARMOUR KANE
Well Log Analyst
18360-6 Cantara St
Reseda, Ca. 91335
(213) 993-0586

Formation Evaluation

February 23, 1980

Mr. S. L. Hewitt
Husky Oil/NPR Operations, Inc.
2525 C Street
Anchorage, Ak 99503

Dear Mr. Hewitt:

At 1830 hours on February 17, 1980, Schlumberger began logging [redacted] No. 2 and by 1400 hours on February 18, 1980, had completed DIL, CNL/FDC, BHC, HRD, Birdwell velocity survey and sidewall cores. All logs were of excellent quality and no lost rig time or tool failures were experienced. 23 of 24 sidewall cores were recovered and Engineer Larry Nelson and his crew are to be commended for a very fine performance, one of the fastest and smoothest I have seen on the Slope.

The Pebble Shale was found at 6325 and correlates well with East Simpson No. 1 at 6365.

Several zones of mild interest were found from 5690 to 6190, indicating the presence of some gas saturation although the zones are thin and water saturation is relatively high. The Sw calculations on the attached tabulation were computed using an Rwa figure of 0.11 to 0.12 which seems to be an average figure for many of the wells drilled to date. The interval 6184-90 would appear to be oil rather than gas since the FDC and CNL are moving in the same direction while in the other zones of interest they are moving in opposite directions although there is no "cross-over" due to shaliness. This shaliness is indicated by the gamma ray which has a minimum value of 50 API Units and the separation of FDC and CNL also indicates considerable shaliness. In my opinion none of the zones would warrant the cost of a drill-stem test.

Very truly yours,

A. Kane

Armour Kane

Log Analysis

COMPANY: HUSKY OIL/NPR OPERATIONS, INC. | WELL: E. SIMPSON #2

FIELD: NORTH SLOPE | COUNTY: | STATE: ALASKA

DEPTH	R_T	ϕ_D	ϕ_N	ΔT	ϕ_S	R_{wa}	S_W	REMARKS
5690-96	12	15	22	83	20	.34	60	Poss. GAS
5710-20	10	12	24	80	18	.16	83	
5761-63	7	21	27	99	16	.38	54	Poss. GAS
5820-26	8	11	24	98	17	.12	100	
5950-60	7.5	11	23	96	15	.11	100	
6092-96	11	12	23	99	16	.20	74	
6101-03	10	15	21	85	22	.25	66	Poss. GAS
6184-90	13	12	20	98	17	.21	73	Poss. OIL?

Log Analysis

ARMOUR KANE
Well Log Analyst
18360-6 Cantara St
Reseda, Ca. 91335
(213) 993-0586

Formation Evaluation

March 16, 1980

Mr. S . L. Hewitt
Husky Oil/NPR Operations, Inc.
2525 C Street
Anchorage, Ak 99503

Dear Mr. Hewitt:

This report will cover two Schlumberger logging runs at East Simpson No. 2, the first of which was begun at 2200 hours on March 2, 1980, and the second began at 1800 hours on March 9. By 0600 hours, March 3, after only eight hours of logging, Schlumberger had completed DIL, CNL/FDC and BHC. No lost rig time or tool failures were experienced and logs were of very good quality although it is believed a depth discrepancy of 7 to 9 feet exists between the logs and the drilling depth, casing shoe and lithology log, the Schlumberger logs being shallow.

Formation tops found were:

	E. Simpson #2	E. Simpson #1
Kingok	6529	6580
Sag River Sand	6617	6868
Shublik	6770	7024
Sadlerochit	7161	7454

Correlations with E. Simpson #1 were good.

No potential productive zones are to be found, both the Sag River Sands and the Sadlerochit appear to be 100% water bearing. Porosities in the Sag River range from 9% to 21% with a weighted average over the interval 6617-6770 of 16%. R. values range from 2.2 to 7.0 ohms and the variations [illegible]

...tions are due entirely to
...s is 11 to 14 (See attached
...r due to shaliness. Cross-
...shaly limestone with porosities
...t are about 10% and Rwa is .13
...ert to a salinity of 17,000
...om water recovered from the
...he density value using a matrix

...arch 9, with a temperature
...e runs were completed at 1100
...ature log was 130°. The bore
... encountered so a clean-out
...eted at 2000 hours. Birdwell
...sidewall coring were com-
...e or tool failures and log
... bottom-hole temperature of

porsity changes. Rwa computed in a number of spo... tabulations). Sonic porosities are somewhat high... plots in the lower Shublik indicate limestone and ... of 2% to 5%. Density porosities in the Sadleroch... which results in Sw = 100%. These Rwa values con... to 18,000 ppm compared with 16,000 ppm measured f... DST. Sonic porosity in the Sadlerochit confirms ... velocity of 19,500 ft/sec.

The second set of logs began at 1800 hours, ... log followed by DIL, CNL/FDC, BHC and HRD and thes... hours March 10. Maximum temperature on the tempe... hole was becoming sticky and some bridges had bee... run was begun about noon on March 10 and was compl... velocity survey, the second temperature log and ... pleted at 0430 hours March 11 with no lost rig tim... quality was good. The temperature log indicated ... 194° and 19 of 23 sidewall cores were recovered.

The Argillite was found at 7420 and no zones of interest were seen although a comparatively clean wet sand was encountered at 7250 showing a porosity of from 10% to 15.5% and resistivities of 4.8 to 8 ohms with very little shaliness. Here again, Rwa varied from o.11 to o.14. All previous logs were run back up to the casing shoe and repeatability was mainly good except for a significant reduction on Rt in the limestone beginning a t 7050 and for which an explanation is not obvious. It is possible that some gas saturation was displaced by conductive mud filtrate thus reducing Rt but this is just a theory.

Very truly Yours

A. Kane

A . Kane

Log Analysis

COMPANY: HUSKY OIL/NPR OPERATIONS, INC. | WELL: E. SIMPSON #2

FIELD: NPRA #4 | COUNTY: NORTH SLOPE | STATE: ALASKA

DEPTH	R_T	ρ_B	ϕ_D	ϕ_N	ΔT	ϕ_S	GR	R_{WA_D}	V_{SH} GR	REMARKS
6624-30	4	2.34	19	26	80	18	35	.14	23	
6636-42	3.5	2.43	14	23	78	17	35	.11	23	
6645-48	5.1	2.45	12.5	23	75	15	45	.10	35	
6658-62	2.7	2.30	21	31	88	24	45	.14	35	
6680-86	2.3	2.31	20	29	86	23	40	.12	29	
6694-6700	2.2	2.33	19.5	30	89	25	40	.11	29	
6704-08	3.0	2.34	19.5	28	78	17	40	.14	29	
6710-16	2.5	2.29	21	29	88	24	38	.13	27	
6716-20	2.8	2.39	19	26	86	23	40	.12	29	
6722-26	2.4	2.31	21	28	86	23	40	.13	29	
6728	3.2	2.38	16.5	27	81	19	40	.12	29	
6730-34	2.5	2.31	21	28	87	23.5	40	.13	29	
6750-54	4.1	2.36	16.5	27	82	20	45	.12	35	
7160-64	2.4	2.30	21	22	78	19.5	15	.13	0	
7250-60	2.8	2.39	15.5	16	93	16	20	.13	6	
7270-74	0	2.49	10	11	69	11	25	.11	12	

APPENDIX D

NOTE: Formation tops listed in the logging reports were picked at the wellsite at the time electrical surveys were taken and may or may not agree with the tops established after final evaluation of samples and logs.

HUSKY

HUSKY OIL NPR OPERATIONS, INC.
U.S. GEOLOGICAL SURVEY/ONPRA

LOGGING REPORT

WELL NAME EAST SIMPSON #2

Date 2-2-80 Driller Depth 2650'

Elevation GL 22.5', KB 40' Logger Depth 2644'

Logs Run and Intervals

DIL/SP/GR	91 - 2638'
CNL/FDC/GP/CAL	90 - 2641'
BHCS/GR/CAL/TTI	91 - 2639'
HDT	100 - 2644'
Sidewall Cores	208 - 2614'

Additional Logs to Run

NONE

[illegible]

Depth	Gross Thickness	Net Feet of Porosity	Lith	Porosity	Probable Fluid Content
NONE					

Discussion:

Log Tops & Correlations:

	DEPTH	RELATIONSHIP TO EAST SIMPSON
SEABEE/NANUSHUK	Surface-2478'	
TOROK	2478 (-2434')	-68'

[illegible]

NONE

R.A. WERMEYER

[illegible]

HUSKY OIL NPR OPERATIONS, INC.
U.S. GEOLOGICAL SURVEY/ONPRA

LOGGING REPORT

WELL NAME EAST SIMPSON #2

Date Feb. 17-18, 1980 Driller Depth 6450'

Elevation 40' KB Logger Depth 6435'

Logs Ran and Intervals

GR/SP/DIL	2623-6428'	CST-Sidewall Cores Top 2900, Btm. 6400'
GR/CAL/CNL/FDC	2623-6434'	
GR/BHCS	2627-6434'	
~~HRD~~ or DIPMETER	2627-6435'	
BIRDWELL VELOCITY SURVEY	Top 500', Btm. 6425'	

Additional Logs to Run

None

Zones of Interest

Depth	Gross Thickness	Net Feet of Porosity	Lith	Porosity	Probable Fluid Content S_w
5690-5696'	6	6	Ss	15	62%- Gas & Water
5761-5763'	2	2	Ss	21	56%- Gas & Water
5820-5826'	6	6	Ss	11	100%- Water
6101-6103'	2	2	Ss	15	69%- Gas & Water
6184-6190'	6	6	Ss	12	74%- Oil & Water

Conclusions:

Above S_w calculations based on Rwa of 0.12 derived from density porosity and may be reasonably accurate. Zones are thin and S_w high.

Log Tops & Correlations:

	E. Simpson #2	E. Simpson #1
Pebble Shale	6325'	6365'

Structure Plans:

GORDON W. LEGG
Wellsite Geologist

ARMOUR KANE
Log Analyst

HUSKY OIL NPR OPERATIONS, INC.
U.S. GEOLOGICAL SURVEY/ONPRA

LOGGING REPORT

WELL NAME EAST SIMPSON #2

Date March 2-3, 1980 Driller Depth 7197'

Elevation 40' KB Logger Depth 7190

Logs Run and Intervals

GR/SP/DIL	6418-7182'
GR/CAL/CNL/FDC	6418-7187'
GR/BHCS/TTI	6418-7185'

Additional Logs to Run

None

Zones of Interest

Depth	Gross Thickness	Net Feet of Porosity	Lith	Porosity	Probable Fluid Content
NO ZONES OF INTEREST.					
THE SADLEROCHIT SAND (6-8', Ø = 20% ±) IS 100% WET.					
ALL SAG RIVER SANDS ARE WET WITH Ø RANGING FROM 9-21% - Avg. 15% ±.					

Discussion:

Rwa in both the Sag River and Sadlerochit indicates salinity of about 17,000 ppm compared to the measured value of 16,000 ppm from DST recovered water. Cross-plots indicate limestone and shaly limestone with Ø from 2-5% in the Lower Shublik.

Log Tops & Correlations:

	E. SIMPSON #2	E. SIMPSON #1
Kingak	6529'	6580'
Sag River Sand	6617'	6868'
Shublik	6770'	7024'
Sadlerochit	7151'	7454'

Stimulation Plans:

Core and log.

GORDON LEGG
Wellsite Geologist

ARMOUR LANE
Log Analyst

HUSKY OIL NPR OPERATIONS, INC.
U.S. GEOLOGICAL SURVEY/ONPRA

LOGGING REPORT

WELL NAME EAST SIMPSON #2

Date March 9-11, 1980 Driller Depth 7504'

Elevation 40' KB Logger Depth 7506'

Logs Run and Intervals

Temp. Survey (2)	100-7512'	CST Sidewall Cores: Top 6512'; Btm. 7406'
GR/SP/DIL	6418-7496'	
GR/CAL/CNL/FDC	6418-7490'	
GR/BHCS/TTI	6418-7496'	
HDT-Dipmeter	6418-7496'	
Birdwell Velocity	Top 5560'; Btm. 7506'	

Additional Logs to Run

NONE

Zones of Interest

Depth	Gross Thickness	Net Feet of Porosity	Lith	Porosity	Probable Fluid Content
7250-7260'	10	10	Ss	15.5	Water
7270-7274'	4	4	Ss	10	Water

Discussion:

No zones of any real interest.

Log Tops & Correlations:

	E. Simpson #2	E. Simpson #1
Argillite	7420-7430'	7625'

Additional Evaluation Plans:

RICH NELSON
Senior Geologist

ARMOUR KANE
Log Analyst

HUSKY

HUSKY OIL NPR OPERATIONS, INC.
U.S. GEOLOGICAL SURVEY/ONPRA

CORRECTED
PRELIMINARY (3-4-80)

DRILL STEM TEST REPORT FORM

WELL NAME EAST SIMPSON #2 DST. NO. 1 DATE 3-1-80

Formation Tested SADLEROCHIT

Hole Size 8 1/2"

Test Interval 7152-7197'

Drill Collar Length 647.65' I.D. 2.75"

Total Depth 7197'

Drill Pipe Length 6482.93' I.D. 4.276"

Choke Size:
Surface 1/4" Bottom Hole 1/2"

Packer Depth(s) 7152' Ft.

Depth Tester Valve 7119.73' Ft.

Cushion Type wtr Amount 500.'

TEST DATA

Tool open at 0247 hrs 3-1-80

Initial flow period 30 min.

Initial shut-in period 60 min.

Final flow period 240 min.

Final shut-in period 480 min.

Unseated packer at 1617 hrs. 3-1-80

RESISTIVITY/CHLORIDE DATA

	Resistivity	Chloride Content
Recovery Water	@ 58 °F.	16000 ppm
Recovery Mud	@ °F.	ppm
Water cushion	@ 58 °F.	700 ppm
Mud Pit Sample	@ 58 °F.	2300 ppm
Mud Pit Sample Filtrate	@ °F.	ppm
Mud Weight 9.8	vis 38	cp

Description of initial flow period Mod strong blow when opened, increase to strong blow in 3 min., gradual increase to v. strong blow at initial shut in; wtr cushion to surface in 26 min. initial flow.

Description of final flow period V. strong blow when opened with wtr cushion at surface; flowing at 40 bbls/hr @ 30 min final flow. 30 bbl/hr @ 1hr final flow. 24 bbls/hr @ 2 hr final flow. mud cut wtr cushion w/tr oil @ 2½ hr final flow. gas to surface TSTM w/mud cut fm fluid @ 2 3/4 hr final flow; fm fluid 14000 ppm chlorides at 4 hr final flow. At 3 hrs and 3 min of final shut in had 2480 units gas and droplets of oil in the mud with a scum to sheen of oil on the mud pits from annulus which appears to have come from test interval as result of packer leak.

PRESSURE DATA

TEMPERATURE	Gauge No. 1489 Depth: 7124.73 ft.		Gauge No. 1460 Depth: 7128.85 ft.		Gauge No. 1274 Depth: 7175.55 ft.		Gauge No. 1249 Depth: 7180.95 ft.	
	24 Hour Clock		48 Hour Clock		24 Hour Clock		48 Hour Clock	
Est. °F.	Blanked Off		Blanked Off		Blanked Off		Blanked Off	
Actual 190 °F.	Pressures		Pressures		Pressures		Pressures	
	Field	Office	Field	Office	Field	Office	Field	Office
Initial Hydrostatic	3702		3701		3726		3728	
FLOW Initial	2948		3028		3202		3216	
FLOW Final	3209		3232		3345		3351	
Closed In	3470		3496		3535		3539	
FLOW Initial	3383		3408		3426		3458	
FLOW Final	3354		3379		3399		3431	
Closed In	3702		3730		3752		3648	
FLOW Initial								
FLOW Final								
Closed In								
Final Hydrostatic	3702		3730		3753		3755	

RECOVERY DATA

Cushion	Type	Amount	Depth Back Pres. Valve	Surface Choke	Bottom Choke	Water Resist.
Recovered	7124'/161 bbls of fm wtr.					
Recovered						
Recovered		Feet/bbl of				
Recovered		Feet/bbl of				

Remarks

NOTE: CLEANEST SPL FM WTR FROM TEST TOOLS - 16000 PPM CHLORIDES.

GORDON LEGG
Prepared by

11/78

CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

P.O. BOX 4-1276
Anchorage, Alaska 99509

TELEPHONE (907)-279-4014
274-3364

ANCHORAGE INDUSTRIAL CENTER
5633 B Street

ANALYTICAL REPORT

From Husky Oil Company — Product Suspended Solids

Address Anchorage, Alaska — Date March 5, 1980

Other Pertinent Data

Analyzed by DB — Date March 18, 1980 — Lab No. 3073

REPORT OF ANALYSIS
SUSPENDED SOLIDS
SAMPLE CHAMBER SAMPLE
EAST SIMPSON NO. 2, ALASKA

Suspended Solids, mg/l ---------- 755

PARAMETER	RESULTS-%
Ignition Loss @ 550°C (Organics)	23.0
Acid insoluble material (Sand and Silt)	39.0
Iron as Fe_2O_3	26.0
Barium	5.0
Calcium	1.3
Zinc	1.2
Silicon (Dissolved)	0.92
Aluminum	0.70
Sodium	0.47
Lead	0.21
Magnesium	0.19
Strontium	0.13
Phosphorous	0.11
Boron	0.09
Copper	0.09
Chromium	0.03
Nickel	0.03

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274-3364

ANCHORAGE INDUSTRIAL CENTER
5633 B Street

ANALYTICAL REPORT

CUSTOMER Husky Oil Company SAMPLE LOCATION: East Simpson No. 2, Alaska

DATE COLLECTED 3-5-80 TIME COLLECTED: —

SAMPLED BY — SOURCE Sample Chamber

REMARKS

FOR LAB USE ONLY
RECVD.BY SE LAB # 3073-5
DATE RECEIVED 3-5-80
DATE COMPLETED 3-18-80
DATE REPORTED 3-21-80
SIGNED Archie L Green

	mg/l		mg/l		mg/l
[]Ag,Silver	<0.05	[]P,Phosphorous	0.49	[]Cyanide	
[]Al,Aluminum	0.23	[]Pb,Lead	0.08	[]Sulfate	
[]As,Arsenic	<0.10	[]Pt,Platinum	<0.10	[]Phenol	
[]Au,Gold	<0.10	[]Sb,Antimony	<0.05	[]Total Dissolved Solids	
[]B,Boron	95	[]Se,Selenium	<0.10	[]Total Volatile Solids	
[]Ba,Barium	5	[]Si,Silicon	7.7	[]Suspended Solids	
[]Bi,Bismuth	<0.05	[]Sn,Tin	<0.10	[]Volatile Suspended Solids	
[]Ca,Calcium	2.0	[]Sr,Strontium	23	[]Hardness as $CaCO_3$	
[]Cd,Cadmium	0.02	[]Ti,Titanium	<0.05	[]Alkalinity as $CaCO_3$	
[]Co,Cobalt	<0.05	[]W,Tungsten	<0.10	[]	
[]Cr,Chromium	<0.05	[]V,Vanadium	<0.05	[]	
[]Cu,Copper	<0.05	[]Zn,Zinc	14	[]	
[]Fe,Iron	6	[]Zr,Zirconium	<0.05	[]	
[]Hg,Mercury	<0.10	[]Ammonia Nitrogen-N		* * * * * * []mmhos Conductivity	
[]K,Potassium	37	[]Kjedahl Nitrogen-N		[]pH Units	
[]Mg,Magnesium	43	[]Nitrate-N		[]Turbidity NTU	
[]Mn,Manganese	0.62	[]Nitrite-N		[]Color Units	
[]Mo,Molybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
[]Na,Sodium	9203	[]Chloride		[]	
[]Ni,Nickel	0.21	[]Fluoride		[]	

CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

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274-3364

ANCHORAGE INDUSTRIAL CENTER
5633 B Street

WATER ANALYSIS REPORT

OPERATOR Husky Oil Company
WELL NO. East Simpson No. 2
FIELD NPRA
COUNTY
STATE Alaska

DATE March 21, 1980 LAB NO. 3073-1
LOCATION
FORMATION
INTERVAL DST No. 1 (2-28-80)
SAMPLE FROM Flow line just prior to final shut in.

REMARKS & CONCLUSIONS: Water Cushion, Chloride, mg/l———380

Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	9109	396.26	Sulfate	25	0.52
Potassium	32	0.82	Chloride	13800	389.16
Calcium	208	10.38	Carbonate	0	0
Magnesium	39	3.21	Bicarbonate	1280	20.99
Iron	–	—	Hydroxide	–	–
Total Cations		410.67	Total Anions		410.67

Total solids, mg/l 23849
Dissolved, mg/l 23574
pH 7.3

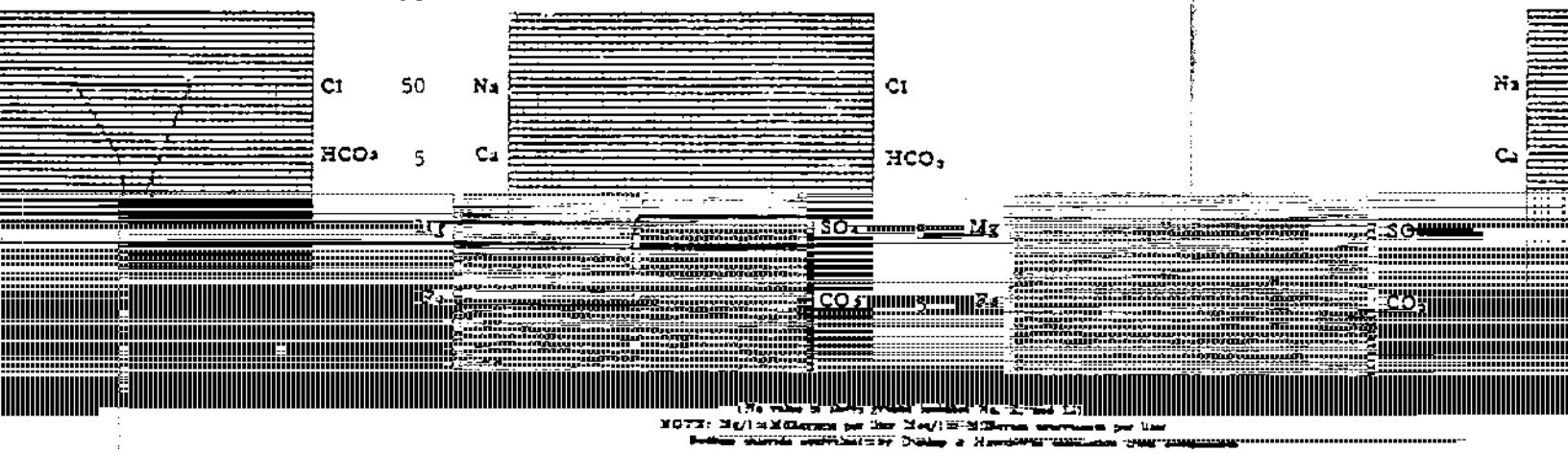
Specific resistance @ 68°F.:
Observed 0.31 ohm-meters
Calculated 0.30 ohm-meters

Total Hardness
NaCl equiv.
Observed p

WATER ANALYSIS PATTERN

Sample above described

Scale
MEQ per Unit



NOTE: Mg/l = Milligrams per liter Meq/l = Milligram equivalents per liter

CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

P.O. BOX 4-1276
Anchorage, Alaska 99509

TELEPHONE (907)-279-4014
274-3364

ANCHORAGE INDUSTRIAL CENTER
5633 B Street

WATER ANALYSIS REPORT

OPERATOR Husky Oil Company
WELL NO. East Simpson No. 2
FIELD NPRA
COUNTY
STATE Alaska

DATE March 21, 1980 LAB NO. 3073-2
LOCATION
FORMATION
INTERVAL DST No. 1 (2-28-80)
SAMPLE FROM Reverse Water

REMARKS & CONCLUSIONS:

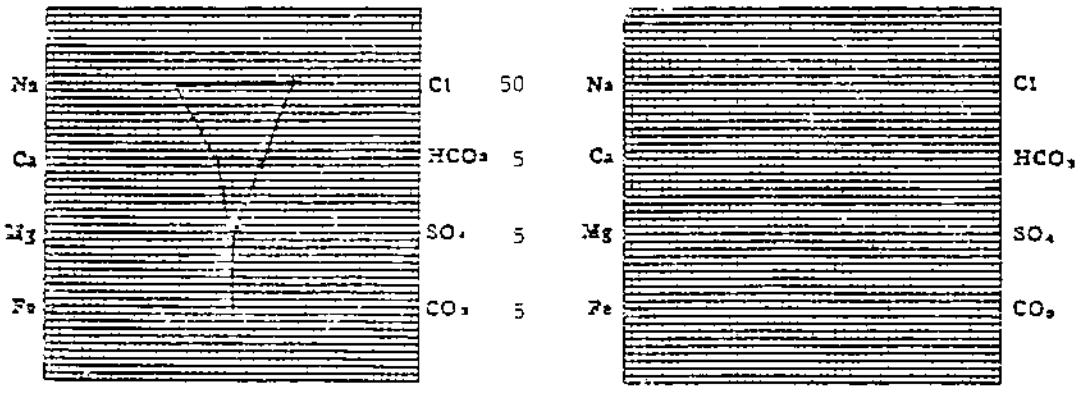
Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	9486	412.64	Sulfate	24	0.50
Potassium	35	0.90	Chloride	14400	406.08
Calcium	212	10.58	Carbonate	0	-
Magnesium	40	3.29	Bicarbonate	1270	20.83
Iron	-	--	Hydroxide	-	--
Total Cations		427.41	Total Anions		427.41

Total dissolved solids, mg/l 24828
NaCl equivalent, mg/l 24557
Observed pH 7.0

Specific resistance @ 64°F.:
Observed 0.30 ohm-meters
Calculated 0.29 ohm-meters

WATER ANALYSIS PATTERN

Sample above described



(Na value is above graph includes Na, K, and Li)
NOTE: Mg/l = Milligrams per liter Meq/l = Milligram equivalents per liter
Sodium chloride equivalent by Dunlap & Hawthorne correlation from components

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Anchorage, Alaska 99509

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274-3364

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5633 B Street

WATER ANALYSIS REPORT

OPERATOR Husky Oil Company
WELL NO. East Simpson No. 2
FIELD NPRA
COUNTY
STATE Alaska

DATE March 21, 1980 LAB NO. 3073-4
LOCATION
FORMATION
INTERVAL DST No. 1 (2-28-80)
SAMPLE FROM End of reverse out

REMARKS & CONCLUSIONS: Oil & Grease, mg/l----------76

Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	3652	158.87	Sulfate	1500	31.20
Potassium	24	0.61	Chloride	3800	107.16
Calcium	82	4.09	Carbonate	240	7.99
Magnesium	19	1.56	Bicarbonate	1145	18.78
Iron	-	—	Hydroxide	-	—
Total Cations		165.13	Total Anions		165.13

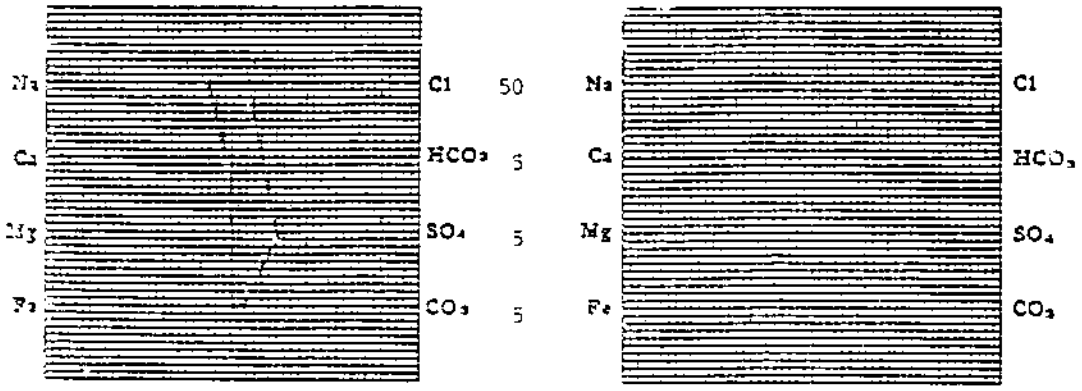
Total dissolved solids, mg/l 9886
NaCl equivalent, mg/l 8953
Observed pH 8.3

Specific resistance @ 68°F.:
Observed 0.80 ohm-meters
Calculated 0.74 ohm-meters

WATER ANALYSIS PATTERN

Sample above described

Scale
MEQ per Unit



(Na value is above graph between Na, K, and Li)
NOTE: mg/l = Milligrams per liter meq/l = Milliequivalents per liter
Sodium chloride equivalent by Dunlap & Henderson calculation from components

CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.

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Anchorage, Alaska 99509

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274-3364

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5633 B Street

WATER ANALYSIS REPORT

OPERATOR Husky Oil Company
WELL NO. East Simpson No. 2
FIELD NPRA
COUNTY
STATE Alaska

DATE March 21, 1980 LAB NO. 3073-5
LOCATION
FORMATION
INTERVAL DST No. 1 (2-28-80)
SAMPLE FROM Sample Chamber

REMARKS & CONCLUSIONS: Suspended Solids, mg/l ——— 755 (See Attached Analysis)
Specific Gravity ——— 1.0233 at 60°F

Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium	9203	400.35	Sulfate	24	0.50
Potassium	37	0.95	Chloride	14000	394.80
Calcium	210	10.48	Carbonate	0	—
Magnesium	33	2.53	Bicarbonate	1220	20.01
Iron	—	—	Hydroxide	—	—
Total Cations		415.31	Total Anions		415.31

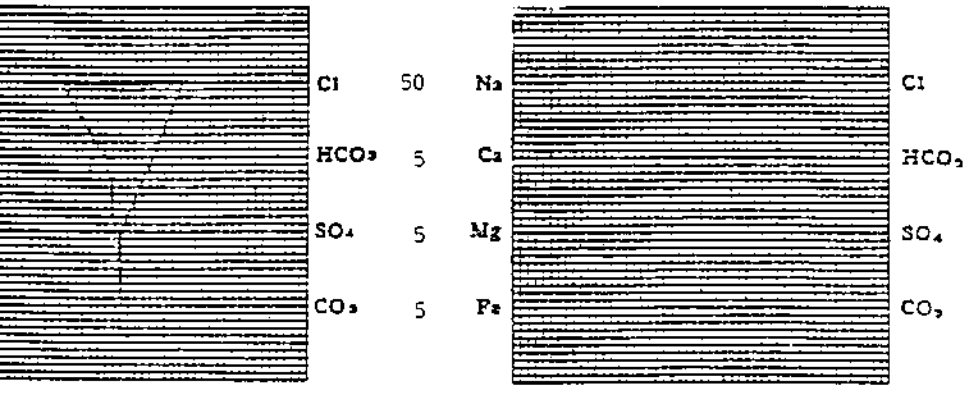
Total dissolved solids, mg/l 24124
NaCl equivalent, mg/l 23827

0.32 0.2

WATER ANALYSIS PATTERN

Sample above described

Scale
MEQ per Unit



(Na value is above graph because Na, K, and Li)
NOTE: Mg/l = Milligrams per liter Meq/l = Milligram equivalents per liter
Sodium chloride equivalent by Dunlap & Hawthorne conversion from components

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

USGS/HUSKY OIL CO., OPR.
EAST SIMPSON NO. 2
WILDCAT
NORTH SLOPE, ALASKA

DATE : 25-FEB-79
FORMATION :
DRLG. FLUID: WBM
LOCATION : SEC. 23-T19N-R11W

FILE NO : BP-3-571
ANALYSTS : WSP,TLS
LABORATORY: ANCHORAGE

CORE ANALYSIS RESULTS
(CONVENTIONAL FULL DIAMETER)

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY (MD) MAXIMUM	90 DEG	VERTICAL	POR %	GRAIN DEN.	FLUID SATS. OIL	WTR	DESCRIPTION
1	2387.0	296.			28.6	2.68		--	ss;fgr
2	2388.0	332.			29.2	2.69		--	same
3	2389.0	232.			28.2	2.69		--	same
4	2390.0	153.			27.4	2.69		--	same
5	2391.0	160.			27.7	2.69		--	same
6	2392.0	89.			26.4	2.69		--	ss;vf-fgr
7	2393.0	12.			22.9	2.70		--	ss;vfgr
8	2394.0	94.			26.6	2.70		--	ss;vf-fgr
9	2395.0	116.			26.9	2.70		--	same
10	2396.0	89.			26.1	2.70		--	same
11	2397.0	80.			26.2	2.70		--	same
12	2398.0	63.			25.6	2.69		--	same
13	2399.0	3.77			21.7	2.71		--	same
14	2400.0	88.			26.4	2.69		--	same
15	2401.0	32.			24.8	2.70		--	same
16	2402.0	20.			24.1	2.70		--	ss;vfgr carb lam
17	2403.0	74.			26.0	2.70		--	ss;vfgr
18	2404.0	43.			25.3	2.70		--	same
19	2405.0	7.75			24.2	2.70		--	same
20	2406.0	49.			25.2	2.69		--	same
21	2407.0	38.			24.8	2.70		--	ss;vfgr
22	2408.0	61.			25.5	2.69		--	ss;vf-fgr
23	2409.0	105.			26.5	2.69		--	ss;fgr
24	6057.0	0.05			11.0	2.69		--	ss;vf-fgr
25	6058.0	0.02			8.1	2.71		--	ss;vf-fgr carb lams calc
26	6059.0	0.12			11.5	2.66		--	ss;vf-fgr carb lams
27	6060.0	0.12			12.0	2.66		--	same
28	6061.0	0.63			14.1	2.68		--	ss;vf-fgr sl calc

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25-FEB-79

FILE NO : BP-3-571
ANALYSTS : WSP,TLS

LYSIS RESULTS

COPELA
Petroleum

USGS/HUSKY OIL CO., BSR.
EAST SIMPSON NO. 2

DATE
FORMATION

CORE ANA

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY (MD) MAXIMUM	90 DEG	VERTICAL	POR %	GRAIN DEN.	FLUID OIL	SATS. WTR		DESCRIPTION
29	6062.0	0.46			14.0	2.67			--	ss;vf-fgr
30	6063.0	0.48			14.2	2.68			--	same
31	6064.0	0.43			14.1	2.67			--	same
32	6065.0	0.10			12.9	2.70			--	same
33	6066.0	0.41			14.6	2.68			--	same
34	6067.0	0.48			13.8	2.67			--	same
35	6068.0	0.60			14.5	2.69			--	same
36	6069.0	0.46			14.3	2.68			--	same
37	6070.0	0.29			13.4	2.68			--	same
38	6071.0	0.36			13.8	2.68			--	same
39	6072.0	0.26			13.7	2.67			--	same
40	6073.0	0.14			13.2	2.68			--	same
41	6074.0	0.38			13.8	2.68			--	ss;vf-fgr fn carb lams
42	6075.0	0.31			14.6	2.67			--	ss;vf-fgr
43	6077.0	0.41			14.0	2.68			--	same
44	6078.0	0.39			14.2	2.66			--	ss;vf-fgr fn carb lams
45	6079.0	0.26			13.6	2.68			--	same
46	6080.0	0.10			13.3	2.68			--	ss;vf-fgr
47	6081.0	0.02			12.0	2.67			--	ss;vf-fgr carb lams
48	6083.0	0.51			10.6	2.63			--	same
49	6705.0	0.73			21.0	2.69	1.2	82.4	--	ss;vfgr
50	6706.0	0.19			21.6	2.71	3.9	77.8	--	same
51	6707.0	3.22			23.9	2.68	1.2	85.0	--	same
52	6708.0	0.12			22.3	2.71	10.7	48.1	--	same
53	6709.0	0.90			22.7	2.71	1.2	83.0	--	same
54	6710.0	0.19			19.0	2.72	3.2	82.0	--	same
55	6711.0	<0.01			7.2	2.67	2.8	74.9	--	ss;vfgr calc
56	6712.0	1.72			23.2	2.70	3.5	70.7	--	ss;vfgr
57	6713.0	0.48			20.9	2.70	2.9	81.5	--	same
58	6714.0	0.02			16.2	2.70	1.1	68.4	--	same\

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USGS/HUSKY OIL CO., OPR.
EAST SIMPSON NO. 2

DATE : 25-FEB-79
FORMATION :

FILE NO : BP-3-571
ANALYSTS : WSP,TLS

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY (MD) MAXIMUM	90 DEG	VERTICAL	POR %	GRAIN DEN.	FLUID SATS. OIL	WTR	DESCRIPTION
59	6715.0	0.17			18.8	2.71	1.4	80.7	-- same
60	6716.0	1.07			21.4	2.68	3.4	73.1	-- same
61	6717.0	0.65			20.9	2.69	2.9	77.3	-- same
62	6718.0	1.14			22.8	2.68	8.8	69.6	-- same
63	6719.0	2.39			24.7	2.67	1.1	79.1	-- same
64	6720.0	0.34			21.8	2.68	1.1	76.1	-- same
65	6721.0	2.68			23.1	2.68			-- same
66	6722.0	0.48			20.3	2.68			-- same
67	6723.0	0.41			21.4	2.71			-- same
68	6724.0	0.41			19.6	2.68			-- same
69	6725.0	0.59			25.3	2.70			-- same
70	6726.0	2.07			22.3	2.67			-- same
71	6727.0	0.46			19.5	2.69			-- same
72	6728.0	0.10			13.3	2.68			-- ssivfgr calc
73	6729.0	0.89			21.8	2.67			-- ssivfgr
74	6730.0	0.51			22.8	2.68			-- same
75	6731.0	0.10			17.4	2.69			-- same
76	6732.0	0.39			19.1	2.67			-- same
77	6733.0	0.12			17.2	2.68			-- same
78	6734.0	0.12			17.4	2.66			-- same
79	6735.0	0.46			21.3	2.69			-- same
80	7167.0	15.			15.1	2.68			-- ssivfgr slty calc
81	7168.0	7.95			13.6	2.70			-- same
82	7169.0	1.17			7.1	2.64			-- ssivfgr slty
83	7170.0	0.84			7.4	2.64			-- same
84	7171.0	1.38			7.8	2.64			-- same
85	7172.0	0.08			5.3	2.63			-- same
86	7173.0	0.06			2.9	2.64			-- same
87	7174.0	428.		250.	15.6	2.64	5.1	34.4	-- ssivf-mgr slty
88	7174.5	491.		461.	17.0	2.64			-- same

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USGS/HUSKY OIL CO., OPR.
EAST SIMPSON NO. 2

DATE : 25-FEB-79
FORMATION :

FILE NO : BP-3-571
ANALYSTS : WSP,TLS

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY (MD) MAXIMUM	90 DEG	VERTICAL	POR %	GRAIN DEN.	FLUID SATS. OIL	WTR	DESCRIPTION
89	7175.0	744.		218.	19.3	2.64	6.1	34.4	-- same
90	7175.5	139.		388.	10.3	3.26			-- ss;vf-mgr slty pyr
91	7176.0	693.		62.	17.6	2.64	7.1	50.4	-- ss;vf-mgr slty
92	7176.5	347.		215.	15.6	2.76			-- ss;vf-mgr slty pyr
93	7177.0	837.		99.	16.9	2.64	1.4	67.7	-- ss;vf-mgr slty
94	7177.5	464.		60.	17.2	2.64			-- same
95	7178.0	903.		36.	19.0	2.64	7.4	44.4	-- same
96	7178.5	14.		128.	17.2	2.64			-- same
97	7179.0	688.		163.	18.8	2.64	3.4	68.2	-- same
98	7179.5	801.		238.	17.5	2.64			-- same
99	7180.0	875.		74.	17.5	2.64	1.5	70.3	-- same
100	7180.5	642.		127.	16.5	2.68			-- same
101	7181.0	466.		153.	14.7	2.64	1.7	76.0	-- same
102	7181.5	499.		171.	15.4	2.64			-- same
103	7182.0	0.10		0.02	3.6	2.64			ss;vfgr slty cly
104	7183.0	<0.01		<0.01	2.1	2.64			sltst
105	7184.0	0.17		0.04	5.7	2.64			ss;vfgr v slty
106	7187.0	62.		68.	11.8	2.64			ss;vfgr
107	7188.0	116.		116.	14.3	2.64			ss;fgr
108	7189.0	95.		9.11	13.1	2.64			same
109	7190.0	256.		53.	13.5	2.64			ss;mgr
110	7248.0	280.		166.	15.4	2.62	3.1	45.0	ss;m-cgr
111	7249.0	<0.01		<0.01	1.4	2.64			ss;vfgr slty
112	7250.0	59.		7.09	13.3	2.65	1.9	63.2	ss;fgr
113	7251.0	341.		21.	12.9	2.62	0.8	51.5	ss;m-cgr sc carb
114	7252.0	252.		86.	15.0	2.62	0.0	55.2	ss;mgr sc carb
115	7253.0	854.		129.	14.0	2.63	0.0	55.3	ss;m-cgr sc carb
116	7254.0	324.			15.6	2.64			same
117	7255.0	275.			12.8	2.63			same
118	7256.0	647.			14.0	2.63			same

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USGS/HUSKY OIL CO., OPR.
EAST SIMPSON NO. 2

DATE : 25-FEB-79
FORMATION :

FILE NO : BP-3-571
ANALYSTS : WSP;TLS

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY (MD) MAXIMUM	90 DEG	VERTICAL	POR %	GRAIN DEN.	FLUID SATS. OIL	WTR	DESCRIPTION
119	7257.0	189.			17.7	2.64			ss;fgr
120	7258.0	136.			14.4	2.63			ss;fgr sc carb
121	7259.0	100.			12.8	2.63			same
122	7260.0	95.			13.8	2.63			same
123	7261.0	198.			12.8	2.63			ss;mgr
124	7262.0	195.			12.3	2.63			same
125	7263.0	2.61			5.4	3.32			ss;mgr pyr nodes
126	7264.0	72.			14.0	2.63			ss;f-mgr
127	7265.0	170.			14.7	2.64			same
128	7266.0	10.			8.5	2.63			same
129	7267.0	3.39			2.0	2.63			sltst;sdy
130	7268.0	29.			8.5	2.63			ss;vf-fgr
131	7269.0	40.			10.5	2.64			same
132	7270.0	60.			10.2	2.63			ss;f-mgr sc carb
133	7271.0	0.22			4.5	2.64			ss;fgr slty sc carb
134	7272.0	2.29			10.4	2.62			same
135	7273.0	7.87			10.7	2.64			same
136	7274.0	21.			9.1	2.63			same
137	7275.0	2.52			6.9	2.64			ss;vf-fgr
138	7276.0	2.60			9.6	2.54			ss;vf-fgr v carb
139	7277.0	1.35			7.2	2.61			same

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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

USGS/HUSKY OIL COMPANY, OPR.
EAST SIMPSON NO. 2
WILDCAT
NORTH SLOPE, ALASKA

DATE : 11-FEB-80
FORMATION :
DRLG. FLUID: WBM
LOCATION :

FILE NO : BP-3-571
ANALYSTS : TLS,WSP
LABORATORY: ANCHORAGE

CORE ANALYSIS RESULTS
DEAN-STARK ANALYSIS

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY (MD) MAXIMUM	90 DEG	VERTICAL	POR %	GRAIN DEN.	FLUID SATS. OIL	WTR	DESCRIPTION
	SIDEWALL CORE ANALYSIS								
1	1150.0	44.			29.2	2.65			ss;vfgr slty
2	1482.0	338.			30.3	2.68			ss;vf-fgr slty
3	1754.0	211.			29.3	2.71			ss;vf-fgr cly slty
4	2326.0	40.			27.8	2.65			ss;vfr slty
5	2340.0	20.			26.9	2.64			same
6	2418.0	9.79			23.8	2.68			same
7	2436.0	31.			29.0	2.67			same
8	2508.0	5.63			24.2	2.66			same
9	5694.0				23.0	2.64			same

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E. SIMPSON #2 PS-3

East Simpson 2

GEOGRAM SURVEY

DEPTH REFERENCE:

KB IS 40 FEET ABOVE REFERENCE
NOTE: ALL DEPTH DATA, EXCEPT THAT FOR TVD CORRECTION, MUST BE SPECIFIED WITH RESPECT TO GEOGRAM REFERENCE INDICATED

GEOGRAM REFERENCE: [N] SUB SEA; [ ] LOG DEPTHS

DIMENSIONS

HOLE DEVIATION:

TRUE VERTICAL DEPTH CORRECTION?
IF "YES" SUBMIT (1) TABLE OF LOG DEPTH, HOLE DRIFT AND AZIMUTH OF DRIFT OF THE BOREHOLE, OR (2) LOG DEPTH VS. TVD DEPTH.

[N] NO; [ ] YES

VERTICAL SCALE:

TOP DEPTH OF GEOGRAM IS: 450 FT.
TWO-WAY TRAVEL TIME AT TOP IS: 0.12 14 SEC.
BOTTOM DEPTH OF GEOGRAM IS: 7496 FT.

HORIZONTAL SCALE:

NUMBER OF TRACES IN GEOGRAM: 25

VELOCITY CHECK

INTERVAL VELOCITY CHECK-SHOT CORRECTION TO BE MADE?:

IF "YES" SUBMIT TABLE OF DEPTH VS. ONE-WAY TIME (SEE REVERSE SIDE)

[N] YES; [ ] NO

SEISMIC LINE

AZIMUTH OF SEISMIC LINE (SEE REVERSE SIDE): 25° 0-360°
DISTANCE FROM WELL TO SEISMIC LINE: 4167 FT.

WAVELET

RICKER: ZERO PHASE [N] MIN. PHASE [ ]: 25, 30 HZ

GAIN CONTROL

RESTORE TRANSMISSION LOSSES?: [N] NO; [ ] YES ____ (% RESTORATION)

(100% RESTORATION SIMULATES AMPLITUDE LOSSES OF SEISMIC SECTION)

R20-78
SPSS

STRUCTURAL ANALYSIS:

STRUCTURAL DIPS		
TOP DEPTH OF ZONE AS PER GEO.REF-	DIP 0-90°	AZIMUTH 0-360°

NOTE: IN THE EVENT OF PINCHOUTS, THE UPPER ZONE CONTROLS TRUNCATION OF LOWER ZONE(S).

INTERPRET DIPMETER AND ENTER DATA ON REVERSE SIDE. MAXIMUM ENTRIES = 50

DISPLAY

DEFINE SCALES TO MATCH SEISMIC SECTION

HORIZONTAL SCALES: 150 FT./TRACE; 12 TRACES/INCH

VERTICAL SCALE: .2 SEC/INCH

POLARITY OF AMPLITUDE SHADING ON GEOGRAM: [N] POS. [ ] NEG.

SCHLUMBERGER LOGS WITH LINEAR TIME SCALE: (SEE REVERSE SIDE)

SWS- 7 N = NORMAL CHOICE *©1974 SCHLUMBERGER

Fig. PS-1

TVD CORRECTION

MEASURED LOG DEPTH	TVD DEPTH DRIFT	TVD DEPTH AZM.	– or +

VELOCITY CHECK SHOTS

DEPTH	1-WAY TIME
460	0.0607
1090	0.1561
1965	0.2559
2285	0.3044
2580	0.3376
3510	0.4500
3805	0.4732
4230	0.5139
5050	0.5947
5585	0.6410
5620	0.6440
5975	0.6742
6292	0.6994
6397	0.7064
6495	0.7175
6563	0.7221
6730	0.7321
7121	0.7677
7244	0.7771
7321	0.7842
7469	0.7946

STRUCTURAL DIPS

MD DEPTH	DIP 0-90°	AZM. 0-360°
150	6°	330°
650	5°	315°
1350	2°	220°
1750	3°	220°
2400	2°	090°
4080	1°	035°
4500	3°	360°
4750	4°	025°
6400	2°	120°
6650	5°	130°
6950	4°	175°
7050	4°	170°
7350	6°	245°

WELL LOG DISPLAY (LINEAR TIME SCALE)

TRACK

LOG

LISTING OF OTHER AVAILABLE GEOLOGICAL DATA

A. Final Micropaleontology Reports by Anderson, Warren & Associates, Inc.

1. Foraminifera Report - April 24, 1980.

2. Palynology Report - April 24, 1980.

SOURCE OF OTHER GEOLOGICAL AND WELL DATA

Copies and some reproducibles of information referenced in this report which was generated as part of the USGS/NPRA exploration effort, can be obtained by contacting:

National Oceanic and Atmospheric Administration
EDIS/NGSDC (D62)
325 Broadway
Boulder, CO 80303