N A T I O N A L P E T R O L E U M R E S E R V E I N A L A S K A

GEOLOGICAL REPORT

DREW POINT TEST WELL NO. 1

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

For the

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

The Drew Point Test Well No. 1, located 890' FSL and 1940' FEL of protracted Section 26, T18N, R8W, Umiat Meridian, is approximately 72 miles east-southeast of Barrow, Alaska (Figure 1). Drilling below conductor casing at 80 feet (driller) began on January 13, 1978. Cretaceous through Triassic age strata were drilled with the well terminating in Pre-Mississippian argillite at a driller's depth of 7,946 feet. Drilling was completed on March 8, 1978 and the rig released after drill-stem testing on March 13, 1978.

PRE-DRILLING PROGNOSIS

The primary objectives of the Drew Point well were the Ivishak Formation of the Sadlerochit Group, and possibly the Lisburne Group and the Kekiktuk Conglomerate, if present. Approximately 250 feet of Ivishak were expected with stratigraphic termination to the north and west. Termination to the north was interpreted to be due to truncation of the Ivishak by the Pre-Cretaceous unconformity and subsequent deposition of the Cretaceous shales; to the west by a pinchout onto the Barrow Arch. Seismic interpretations indicated south and east dip below Cretaceous age rocks. Some north dip was indicated in the Lower Cretaceous rocks.

POST-DRILLING SUMMARY

Drilling of the Drew Point Test Well No. 1 confirmed the presence of several low permeability reservoirs with hydrocarbon shows, mainly the lower Torok Formation, Sag River Sandstone, Shublik and Ivishak Formations.

Some gas was encountered in the Torok sandstones and Drill-Stem Test No. 1 was taken over the best hydrocarbon interval in a sandstone at 5848-5906'. Sixty-three feet of mud filtrate were recovered. Porosities and permeabilities were very low as exhibited by Core No. 3 taken from the lower part of the sandstone. Electric log computation from the upper portion of the sandstone revealed good porosity, but high water saturations (Appendices C & E).

Fair to good oil staining and fluorescence were present in the Sag River Sandstone, Upper and Lower Shublik and Ivishak sandstones. The Sag River is believed to be only 16 feet thick in this well and is underlain by bioturbated sandstones of the Shublik Formation. Some geologists have placed the top of the Shublik Formation as much as 80' lower and believe the Sag River Sandstone to be about 100 feet thick. Because of the thinness of the Sag River and the low porosities and permeabilities of the Shublik sandstones, no testing was performed.

Sandstones of the lower Shublik Formation were hard, calcareous, oil stained and contained fractures with free oil. These were tested (Drill-Stem Test No. 2) with negative results.

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Drill-Stem Test No. 3 (7765-7821') tested an oil-saturated sandstone at the base of the Ivishak, again results were negative. Porosities were fair, but permeabilities very low (Appendix E).

Post-drilling studies of the electric logs and samples have strengthened our belief that the Sag River Sandstone is only 16 feet thick and is underlain by a thick bioturbated sandstone which is placed in the Shublik in this report.

The Ivishak Formation, which was predicted to be 250 feet, is 240 feet thick. The Lisburne Group and Kekiktuk Conglomerate are missing from this well.

After evaluation of all available data and test results, the hole was determined to be dry, thus plugged and abandoned.

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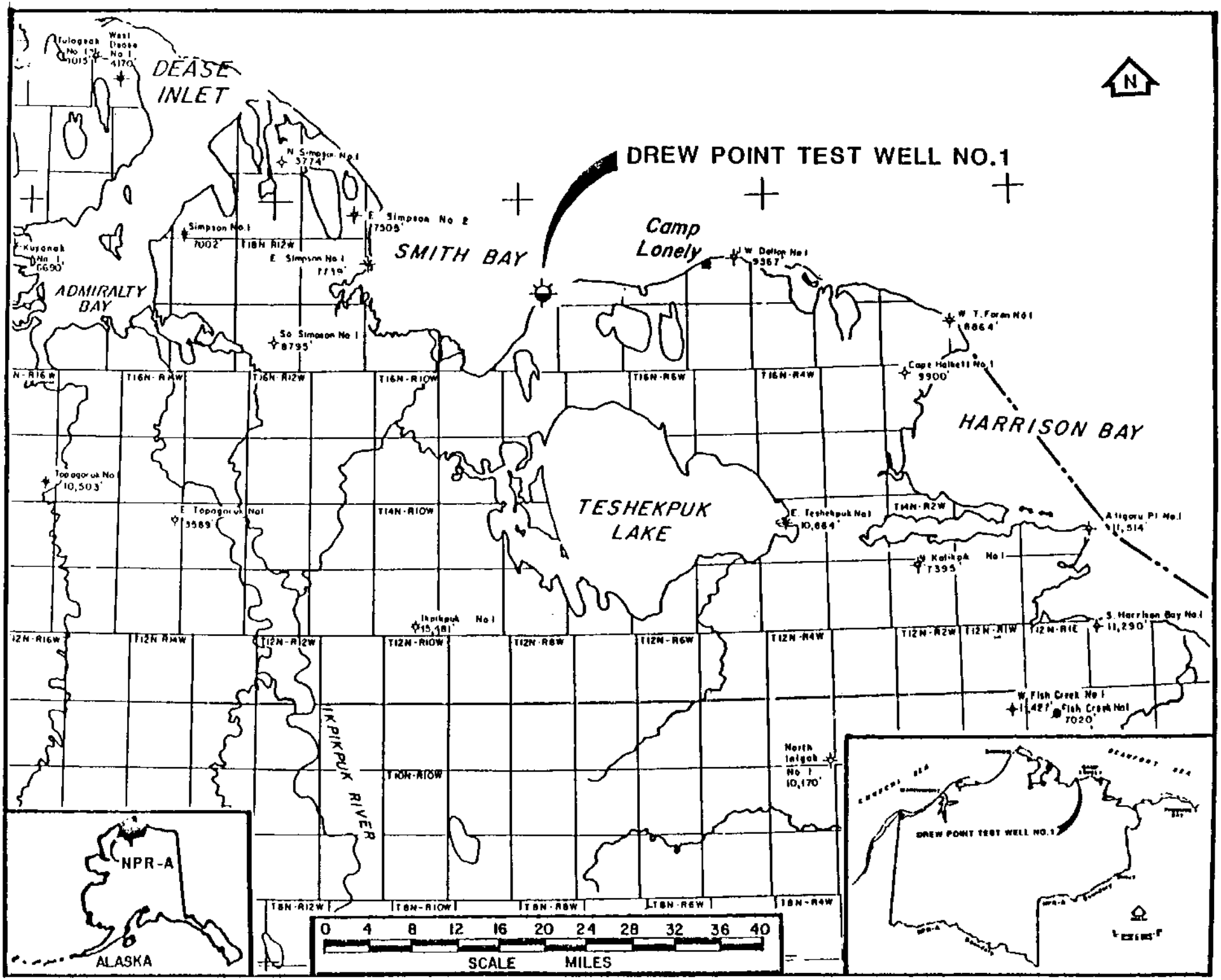
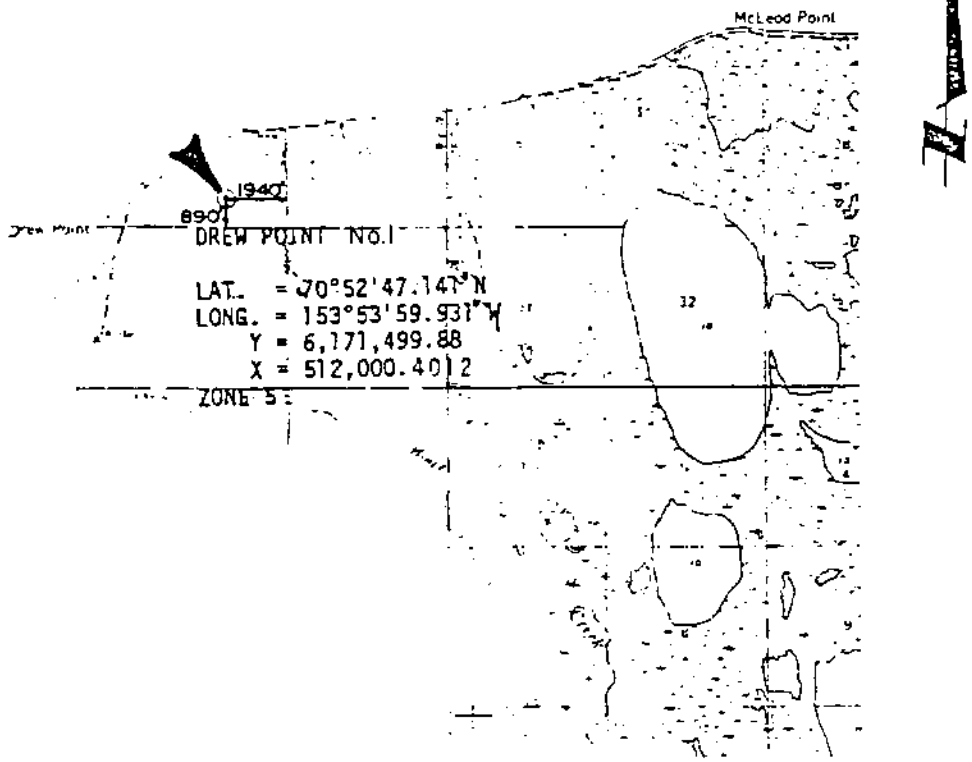


FIGURE 1 - LOCATION MAP - DREW POINT TEST WELL NO. 1



CERTIFICATE OF SURVEYOR

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

August 17, 1977

STATE OF ALASKA
4979
JOHN L. KISSEL
No. 4979-S
REGISTERED PROFESSIONAL LAND SURVEYOR

0 1/2 1 2
SCALE IN MILES

AS STAKED
DREW POINT No. 1
LOCATED IN
SE1/4 PROTRACTED SEC. 28 T 18 N, R 8 W, UMIAT MERIDIAN, AK.

Surveyed for
HUSKY OIL
N.P.R. OPERATIONS INC.

Surveyed by
Bell, Herring and Associates
ENGINEERS AND LAND SURVEYORS
801 West Fireweed, Suite 102
ANCHORAGE, ALASKA 99503

FIGURE 2 - CERTIFICATE OF SURVEYOR - DREW POINT TEST WELL NO. 1

GEOLOGICAL REPORT
BY: AL SCOULER
EDITED BY: RONALD G. BROCKWAY

SUMMARY

As a result of the continuing exploration of the former Naval Petroleum Reserve No. 4, subsequent to being transferred to the U. S. Department of the Interior and renamed National Petroleum Reserve in Alaska, the Drew Point Test Well No. 1 was drilled in early 1978. This well was located on a seismic prospect 890' FSL, 1940' FEL, protracted Section 26, T18N, R8W, Umiat Meridian. The location was between the so-called U. S. Navy "Simpson Oil Field", on the west side of Smith Bay, and the recently abandoned (April 30, 1977) W. T. Foran No. 1 well, protracted Section 13, T17N, R2W, Umiat Meridian. The W. T. Foran well, although "dry", had encountered encouraging hydrocarbon shows in the primary objective Sadlerochit Group sandstones and conglomerates of Permo-Triassic age.

Drew Point Test Well No. 1 was drilled to a depth of 7,946 feet, penetrating rocks of Recent to Pleistocene, Late to Early Cretaceous, Jurassic, Triassic, Permo-Triassic and Pre-Carboniferous age. Small shows of gas, found in the Early Cretaceous Torok Formation, were tested, but were not productive. Fair oil shows were found in the Jurassic age Sag River Sandstone, but because of limited thickness (16 feet) and deteriorating hole conditions, no test was attempted. Slight shows of oil were recorded in very "tight" Triassic age Shublik sandstone and limestone. In spite of extremely limited permeability (less than 1 millidarcy), one test was attempted but failed to recover any hydrocarbons, recovering, in fact, only rat-hole mud below the packer. Good oil shows were observed in the Permo-Triassic Sadlerochit sandstone, but a drill-stem test failed to yield hydrocarbons. No suitable reservoir rocks were found in this well.

WIRELINE TOPS

	Drilled Depth (Feet Below) Kelly Bushing)	Subsea
QUATERNARY		
Recent to Pleistocene	80' samples start	-42'
CRETACEOUS		
Colville Group		
Seabee Formation	140'	-102'
Nanushuk Group		
Grandstand Formation	1040'	-1002'
Torok Formation	2955'	-2917'
"Pebble Shale"	6700'	-6662'

JURASSIC		
Kingak Formation	6890'	-6852'
TRIASSIC		
Sag River Sandstone	6960'	-6922'
Shublik Formation	6976'	-6938'
TRIASSIC-PERMIAN		
Sadlerochit Group		
Ivishak Formation	7600'	-7562'
PRE-MISSISSIPPIAN		
Argillite	7840'	-7802'

STRATIGRAPHY

QUATERNARY

The upper 140 feet of sediments are of Recent to Pleistocene age and consist of unconsolidated sands, gravels, clay, chips of lignite and wood fragments in a permafrost matrix. The sands are light gray in color, very fine to fine grained, angular with scattered rounded coarse quartz grains and detrital microcrystalline pyrite. Pebbles consist of black, gray and red chert, quartzite, argillite and lignite. Clay is abundant in this section with much of it dispersing in the drilling mud.

CRETACEOUS

Colville Group

Seabee Formation: 140-1040'

Sediments of probable Late Cretaceous age (Senonian), Zone AWA-F-5 of Anderson, Warren & Associates, Inc. (AWA), consist of very fine to fine grained quartz sandstones, large angular to subangular pieces of chert, common wood fragments, lignite, common fine grained, black ferromagnesian minerals, scattered microcrystalline pyrite and abundant clay in a permafrost matrix lie between 140 and 350 feet. These sediments continue to a depth of 1,040 feet becoming light gray, argillaceous siltstones from a depth of 590' to 1040'. From a depth of 350-1040' sediments are placed in the Late Cretaceous, AWA F-6 Zone.

Nanushuk Group

Grandstand Formation: 1040-2955'

The interval from 1040-1760' is considered to be Late Cretaceous (Cenomanian-Turonian) in age, AWA F-7, F-8(?) zones. From 1760-2860', the sediments are Early Cretaceous (probable Middle to Late Albian) AWA Zone F-9. The Grandstand Formation consists of interbedded sandstones, siltstones, and siliceous shale. Sandstones are light gray in color and consist of very fine to fine grained quartz, large scattered grains of

rounded to angular chert and quartz, disseminated pyrite, scattered fragments of lignite and are extremely argillaceous. Siltstones are light gray, gray and brown in color, argillaceous and contain common wood, scattered angular chert and subrounded quartz grains as irregular inclusions. Brown siliceous shale, hard, dense, and exhibiting conchoidal fracture was logged from a depth of 2560' to 2715' and again from 2730' to 2800'.

The Grandstand-Torok Formation contact has been placed at 2955', the base of a thick sandstone sequence, which begins at 2845'. These sandstones have the characteristics of the Grandstand sandstones already described although slightly darker. The contact between the two formations is gradational but for the purpose of this report has been placed at the electrical log break at 2955' (DIL) and where lithologies become predominantly shales, claystones and siltstones.

Anderson, Warren & Associates, Inc. have included the majority of these sandstones (2860-2955') into their Zone F-10 which extends downward to 4740'.

Commencing at 1760', common small fossil fragments, not identifiable as to species, were logged. In samples immediately below 2100', one fragment of reworked Inoceramus prisms was found; below 2200', the first worm borings were noted. At approximately 2400', large scattered fragments of Inoceramus prisms were observed. Immediately below 2500', small scattered pelecypod fragments were logged (species indeterminate). Of the total thickness of sediments of the Grandstand Formation represented at this location, 1915', approximately 44% are sandstones, 43% silt (siltstone) and 13% siliceous shale.

The depositional environment of strata from a depth of 140' to a depth of 2860' is suggested to be shallow marine, quiet water. Depositional direction was from south to north. Water salinity between 140' and 1760' is considered to be below that of normal sea water, and between 1760' and 2860' normal sea water. From 2860-4740', deposition was considered to be in fluctuating turbidity, inner to middle neritic depths.

Torok Formation: 2955-6700'

Approximately 3745' of Torok Formation were penetrated in this well with the top at 2955', base at 6700'. The top of the Torok is represented by soft, gray-brown claystone with common pyrite throughout, becoming hard, brown siliceous shale with interbedded thin stringers of sandstone by a depth of 3000'. The thin sandstone stringers are very fine grained and contain very fine disseminated crystals, and aggregates of crystalline pyrite. Shale, light tan claystone and thin stringers of very fine grained sandstone continue to a depth of approximately 3500'. Small pelecypod fragments occur below 3200' and large angular to subangular grains of chert and quartz below 3350'. Light gray, gray, and light brown siltstone occurs between 3500' and 4040'. This siltstone is very hard and contains thin interbeds of brown and tan shale, light gray, fine grained sandstone, and lignite in thin seams. The entire siltstone interval is argillaceous.

At a depth of 4040', a major lithologic change occurs with rocks changing abruptly from siltstone to brown shale and claystone. The claystone is very soft and is readily dispersed by the drilling fluid. The result of this is to observe the hole "making mud", necessitating the periodic dumping of large quantities of drilling fluid and the continuous addition of water to control viscosity and solids content.

Core No. 1, taken from the interval of 4130-4140', recovered 10 feet of brown, firm, silty shale, with very fine grained sandstone pods and laminae distributed throughout. The core contained abundant, fine grained lignite, carbonaceous particles, microcrystalline pyrite and was micromicaceous. One small pelecypod cast, species indeterminate, and one conodont cast was observed. Dips varied from a high of 10 degrees with best average dip suggested as 5 degrees.

Shale and claystone with thin interbeds and pods of fine grained sandstone and siltstone, containing large subrounded grains of red-brown chert continued to a depth of 5030'. Small megafossil fragments, species indeterminate, were observed at 4760'.

A light tan to light gray siltstone was topped at 4925'. This siltstone is hard to firm and contains common inclusions of angular to subrounded grains of quartz and siderite, abundant crystalline pyrite occurring in fine grains and rounded aggregates, common small megafossil fragments and abundant fragments of Inoceramus prisms.

From 5335-5430', the interval consists of interbedded light gray, fine grained quartz sandstone, firm to hard, with thin interbeds of shale, claystone and siltstone.

Dark gray-brown shale, brittle, firm to hard, exhibiting fissility occurs from 5430' to approximately 5848' and contains abundant Inoceramus prisms throughout, along with thin laminae, pods and interbeds of very fine to fine grained, light gray-brown quartz sandstone and siltstone.

Core No. 2, cut from 5530-5540', recovered 2.5' of shale, dark gray-brown, firm to medium hard, readily fracturing along bedding planes. The shale was laminated throughout with thin sandstone and siltstone beds ranging from less than 1 mm to 12 mm in thickness. Sandstone laminae were light gray-brown in color and consisted of very fine to fine grained quartz, were hard and exhibited extensive micro-crossbedding. Siltstone laminae were light to brownish-gray and hard. Bedding plane fractures exhibited abundant micromica and black carbonaceous particles. Excellent dips of 3 to 4 degrees were observed.

At approximately 5848', a bed of light gray sandstone was topped. This was generally firm to hard, but in some intervals moderately friable. Predominantly very fine to fine grained, the sandstone consisted of angular to subangular quartz grains with some feldspar, approximately 10 percent ferromagnesian minerals, and scattered aggregates of fine

crystalline pyrite. In addition to C_1, this marked the first occurrence of C_2 and C_3 constituents. As this sandstone interval was not accompanied by a drilling break, 47 feet of interval was penetrated before the first sandstone samples surfaced for examination. Core No. 3 was cut from 5900-5923', resulting in recovery of 18' with 5' lost. The top 6' was light to dark gray sandstone, hard, mottled, exhibiting irregular slumped, contorted bedding. The bottom 12' consisted of dark gray shale with well developed "poker chip" parting and thin sandstone and siltstone laminae.

Seven samples of sandstone between 5820' and 5900' were field tested to determine if swelling clays were present. All tests proved negative with respect to the presence of swelling clays. Tests of the 6' of sandstone recovered in Core No. 3 also proved negative. In addition, it was noted that no carbonate cementing material was present either in ditch samples or in Core No. 3.

Drill-Stem Test No. 1 was run covering the interval 5850-5923' and is discussed under the section headed Oil and Gas Indications.

From 5923' to the base of the Torok Formation at 6700', the formation is predominantly dark gray shale, hard, at times "splintery", with interbeds of light gray, very fine to fine grained sandstone varying in thickness from thin partings to as much as 60'. The sandstone is occasionally somewhat friable. Thin interbeds of siltstone and claystone occur throughout this interval along with abundant fragments of Inoceramus prisms.

Of the total 3745' of Torok sediments, shale represents approximately 65%, siltstone 25% and sandstone 10%.

Age of the Torok ranges from Early to Late Aptian (AWA Zones F-10 and F-11).

"Pebble Shale": 6700-6890'

A very distinctive lithologic unit unconformably underlies the Torok Formation and is known as the "Pebble Shale". The rock is a dark gray to black clay shale containing clear, well rounded quartz grains, generally very coarse in size, randomly scattered throughout, varying from common to abundant in quality. Very coarse, well rounded, reddish-brown chert grains are scattered throughout along with rare, coarse, well rounded, black chert grains. Deposited in a marine environment, the Pebble Shale exhibits good platy cleavage, thin, well defined streaks of pyrite and common to abundant Inoceramus prisms.

The "Pebble Shale" is Early Cretaceous in age, Neocomian stage, AWA F-12 to F-13 zones. Total thickness for this unit is approximately 190' at this location. The unit is considered to rest unconformably on Jurassic sediments. The Neocomian unconformity, believed by some geologists to exist within the "Pebble Shale", was penetrated at 6890' and is at the base of the unit at this location.

JURASSIC

Kingak Formation: 6890-6960'

The Kingak Formation is composed of dark gray to black shales which closely resemble those of the overlying "Pebble Shale". No distinction between the two formations could be made from the ditch samples, however, probable Early Jurassic (AWA Zone F-18) microfauna were found in Cores Nos. 4, 5 and 6 taken from the interval 6905-6957'. Cores Nos. 5 and 6 had some distinct brown and tan color banding and the shales become much harder. Electric log correlations indicate the top of the Kingak Formation at 6890'.

Core No. 4, taken with a Globe Junk Basket, recovered 1.5' of very hard, dark gray shale, which fractures readily along well developed flat lying bedding planes. Thin streaks and laminae of very fine grained, hard sandstone were common. Streaks and pods of fine crystalline pyrite occurred throughout.

Core No. 5 from 6917-6947' recovered 26' of dark gray, black, brown, and tan shale in distinct color bands, somewhat concretionary and very hard. Some thin interbeds and laminae of light gray siltstone and fine grained, very hard sandstone occur throughout. Some minor slumping and crossbedding were observed in the sandstone interbeds. Core No. 6, cut from 6947-6957', recovered 10' of banded shale, as seen in Core No. 5. Three additional feet of shale, as logged in Cores Nos. 5 and 6, continued to a depth of 6960'. Strata of the Kingak Formation were probably deposited in a turbid middle neritic to upper bathyal environment, according to Anderson, Warren & Associates, Inc.

TRIASSIC

Sag River Sandstone: 6960-6976'

The sandstone immediately underlying the Kingak Formation is commonly known as the Sag River Sandstone. The sand, topped at a depth of 6960', is distinctly different lithologically than the Lower Cretaceous and Jurassic sandstones. Light brown in color, the sand consists of well rounded, uniformly fine grained clear quartz, with scattered black ferromagnesian minerals and scattered earthy green glauconite. No conventional cores were cut due to the thinness of the sand interval, but seven sidewall cores were shot and recovered between 6960' and 6975'. Good shows of oil and gas were logged in the 16 feet of sand that comprises this unit and are discussed under the section detailing oil and gas shows.

Shublik Formation: 6976-7600'

Core No. 7, cut from 6977' to 7009', recovered 32 feet of bioturbated sandstone, siltstone and shale yielding poorly preserved Triassic age microfauna. This sequence unconformably underlies the Jurassic Sag River Sandstone interval. Core No. 8 from 7093-7103' recovered 10' of dark

gray to gray-black, very silty shale, with scattered thin interbeds of light gray, very fine grained sandstone. Very well preserved pelecypods of Halobia sp. and Monotis sp. were abundantly distributed throughout the 10' of recovered shale. Core No. 9 (7350-7380') also recovered 30' of shale and fossils as described for Core No. 8.

Interbedded silty shale containing abundant pelecypod fragments of Halobia sp. and Monotis sp., siltstone, buff-yellow, with very fine grained sandstones, as much as 55 feet in thickness and light gray to reddish-brown limestone continued to a depth of 7599'. A thin conglomerate (7599-7602') was cut in Core No. 11 and may represent the base of the Shublik. Sandstone and siltstone interbeds were calcareous cemented, composed primarily of quartz and buff-yellow chert and contained scattered glauconite. Phosphatic nodules, common to the lower Shublik, were present (7544-7552') in Core No. 10.

Dense, microcrystalline limestone was topped at approximately 7465' and continued to approximately 7505', becoming very silty in the bottom 20'.

Continuous coring commenced at 7544' and continued to 7629'. The interval included Cores No. 10 (7544-7572'), No. 11 (7572-7602') and No. 12 (7602-7629'). The top 55 feet of recovered material consisted primarily of fine grained sandstone and minor interbeds of coarse conglomerate in a turbidite sequence, with the bottom 27 feet consisting of siliceous shale and sandstone.

Core No. 11 (7572-7602') yielded microfossils of Triassic age, AWA F-20 zonule, which would place this interval in the Sadlerochit Group. The sandstones of this core have a calcareous cement, which is not common to the Sadlerochit. Electric log correlations with the South Simpson No. 1 and the Dalton No. 1 indicate that the top of the Sadlerochit Group should be at 7602'.

TRIASSIC-PERMIAN

Sadlerochit Group

Ivishak Formation: 7602-7840'

Interbedded fine grained sandstone consisting of approximately 50% angular grains of clear quartz and 50% angular grains of white chert with minor thin interbeds of dark gray-black shale are present to a depth of 7694'.

An unconformity marking a major change in lithology from marine to nonmarine sediments occurred at a depth of 7694'. Uniformly fine grained white sand consisting of rounded grains of approximately 50% clear quartz and 50% tripolitic chert marked the top of the nonmarine Ivishak sandstones. Core No. 13, cut from 7704-7733', recovered 23' of strata resembling a braided stream sequence. Red sandstone and siltstone alternating with gray sandstone, rest on a cobble conglomerate with a red sandstone matrix, which in turn overlays a cobble conglomerate with a light yellow-white clay matrix. Cobbles consisted of large, well rounded, stream transported black, yellow, red-brown and gray chert.

The nonmarine cobble conglomerate sequence continued to a depth of 7740'. At this point a very dark gray, siliceous shale was encountered. A uniformly fine grained sandstone consisting of well rounded grains of yellow-white tripolitic chert and clear quartz was observed at 7760'. The depth 7760' is considered to mark the top of a marine Ivishak sandstone sequence. Chert percentages ranged from 25-50%, quartz from 50-75%, with approximately 1% black accessory minerals. The sandstone was firm to hard, consistently oil stained, but with very low permeability and porosity suggested. Core No. 14 from 7793-7821' recovered 22' of evenly oil-stained, hard sandstone composed of tripolitic chert and quartz. Drill-stem test results within the interval 7765-7821' are discussed under oil and gas indications.

Oil-stained Sadlerochit sandstone continued to a depth of 7840'.

PRE-MISSISSIPPIAN

Argillite: 7840-7946'

A major unconformity exists at the base of the Sadlerochit Group sandstones in this location, with the expected remaining portions of the Sadlerochit and Lisburne Groups missing by erosional truncation.

An abrupt change in drilling rate, drilling fluid color change from reddish-brown to dark gray and change in lithology from oil stained sandstone to dark gray-black schist was observed at a depth of 7840' (DIL). Drill bit chips of soft gray-black schist containing euhedral crystals of pyrite and thin quartz stringers were rapidly replaced by hard gray-black slate with chips exhibiting pronounced slaty cleavage. Core No. 15, cut from 7882-7901', recovered 18.5' of very hard, dark gray-black slate exhibiting excellent platy cleavage. Gray-black slate continued to total depth of 7946'.

In addition to the 15 conventional cores that were cut for stratigraphic and potential reservoir analysis between the depths of 4130' and 7901', 160 (151 recovered) Schlumberger sidewall cores were taken between 2703' and 7838'. Of these, 118 were used for paleontological age determination and geochemical analysis, 6 to evaluate a zone of lost circulation and 27 to determine if potential hydrocarbon reservoirs existed. Drill bit cuttings were continuously collected and analyzed from spud to total depth: 30' increments to a depth of 2661', from 2661' to total depth, 7946', samples were collected in increments of 20' to as small as 2' where drill rates permitted.

STRUCTURE

Schlumberger Four Arm High Resolution Dipmeter was run from a depth of 2663' to a total depth of 7946' as an aid for structural analysis. Conventional cores provided calibration for the electronically determined bedding attitudes.

Within the Torok Formation, from a depth of 2860' to approximately 3460', very low dips of 1 to 2 degrees trending generally north-northeast were logged. Between 3460' and 4050', dip values ranged to 16 degrees with the best average approximately 10 degrees, in a general north-northeasterly direction. Commencing at 4050' to a depth of 4265', beds dipped in an easterly direction with dips as high as 12 to 14 degrees (dipmeter calculations), best average 6 to 8 degrees. Core No. 1, from 4130-4140', indicated dips ranging to 10 degrees, with the best regional dip approximately 5 degrees. From 4265-4470', dips averaged approximately 3 degrees in a southeasterly direction. A major scatter of dip value and direction occurs between 4470' and 5250', with best average for dip at approximately 5 degrees in directions ranging from south to northeast. Northeasterly dipping beds at 5250', with dips as high as 18 degrees, gradually decrease to approximately 2 to 3 degrees at 5370' with the direction of dip swinging from north to west to an approximate depth of 5580'. Core No. 2, from 5530-5540', although exhibiting some crossbedding, yielded excellent dips of 3 to 4 degrees. Core No. 3, 5900-5923', exhibited contorted and slumped sandstone near the top but flat-lying bedded shale in the bottom 11'. Generally low dips continued to depth of 6700', but with a scattering in direction and amount occurring at 5580-5630', 5885-5930', 6050-6115', 6417-6455', and 6603-6700'. Direction varied considerably: from northeast to east to southeast to northwest to west.

The variations in dip and direction are considered to reflect the random directional distribution of slow stream transported very fine to fine grained sands, silts and clays. Torok deposition is considered to have been in a very shallow marine environment.

Marked lithologic change, an increase in megafossils and a minor structural hiatus at 6700', suggests a disconformable relationship between the overlying Torok and underlying "Pebble Shale" Formations. Both above and below the hiatus (6605-6700'), the amount of dip and direction are approximately the same. Depositional environment is marine, relatively shallow water. Although there is a definite increase in abundance in marine mega and microfossils, paleontologic data neither supports nor denies the presence of a disconformity between the Torok and "Pebble Shale" Formations. Cores No. 4, No. 5 and No. 6, from 6905-6906.5', 6917-6947', and 6947-6957', yielded good quality regional dips in the 2 to 3 degree range. Some minor crossbedding and slumping was observed in these cores.

An abrupt change in lithology from hard, dark gray-black shales with brown and tan bonding, to light brown, well rounded, uniformly fine grained quartz sand suggests an unconformable relationship between the Jurassic Kingak Formation and Sag River Sandstones. The Sag River is only 16' in thickness in this well and lies in unconformable relationship with the underlying Triassic age Shublik Formation.

The Shublik represents an abrupt lithologic change from the overlying relatively uniformly well sorted quartz and glauconitic sands of the Sag River. In contrast, Core No. 7, from 6977-7009', yielded bioturbated

graywacke sands and shale with common megafossil fragments throughout. Because of the contorted appearance, dips were difficult to ascertain. However, dips from Cores No. 8 through No. 12 (7093-7629') were determined to be quite low, generally less than 6 degrees. Dipmeter calculations to a depth of approximately 7600' suggest dips ranging from 2 to 6 degrees in a east to southeast direction. Depositional environment for the Shublik is considered to be relatively shallow marine.

Marine and nonmarine Permo-Triassic age Sadlerochit Group sandstones unconformably underly the marine Triassic age Shublik Formation at a depth of 7602'. The nonmarine sequence from 7694-7760' yielded dipmeter information suggesting dips less than 10 degrees with most less than 6 degrees. Core No. 13, 7704-7733', suggested dips less than 6 degrees from alternating red and gray sandstones. From a depth of 7700-7725', direction varied from south to east; from 7725-7775', dip direction was southwesterly, at less than 10 degrees with most dips less than 6 degrees. The depth 7760' to 7847' represents a marine Sadlerochit sequence with low dips (2-3°) and a northerly direction. Core No. 14, from 7793-7821', being a generally massive sandstone, yielded little in the way of dip information.

A major angular unconformity exists at the base of the Sadlerochit Group. A sudden change in lithology from oil-stained tripolitic chert and quartz sandstone to gray-black schist occurred at a depth of 7847' (samples). Missing by erosional truncation was the lower portion of the Sadlerochit sequence and the entire Lisburne group (Mississippian and Pennsylvanian). Dips calculated in the Pre-Mississippian slate sequence ranged from 10 to 50 degrees in a north to northwest direction. Measured dips from Core No. 15, 7882-7901', were in excess of 25 degrees as indicated by attitudes of very hard quartz sandstone stringers.

OIL AND GAS INDICATIONS

In addition to the use of an ultraviolet light for visible detection of hydrocarbons, a standard "hot wire" was used to detect the presence of gas, and gas chromatograph to determine the various components. Chloroethane was used as a solvent to extract traces of hydrocarbons from sediments for detection by ultraviolet light.

At a depth of approximately 500', the first trace of methane gas was noted. Commencing at 550', a steady increase in background gas consisting of methane was logged. Small but increasing amounts of methane were logged with increasing depth in sandstones exhibiting low permeability and porosity.

A "hard" sandstone, topped at 5848', yielded 500 units of total gas: 97,000 ppm methane, 6,000 ppm ethane, 540 ppm propane. Samples taken from Core No. 3, from 5900-5906', measured permeabilities from 0.0 to 0.2 millidarcies; porosities from 1.4 to 7.8 percent (Appendix E). Drill-Stem Test No. 1 was run from 5850-5922', using 4300' of fresh water cushion. Dual Halliburton packers were used with the top of the top packer set at

5850'. A standard testing procedure was used in this and all subsequent tests: 30 minute initial flow, 45 minute initial shut-in, 60 minute final flow, and 120 minute final shut-in. The initial flow period yielded a very light blow of air at the surface becoming dead at the end of 20 minutes. The final flow period yielded a faint blow of air at the surface for only 2 minutes. No gas surfaced during this time. Net fluid recovery consisted of 63' of drilling fluid filtrate. Pressure charts indicated a mechanically successful test. Representative pressures in psi from the bottom outside chart at a depth of 5918' were as follows:

IHP	ISIP	IFP	FFP	FSIP	FHH
3261	2150	1998	1998	2226	3217

Hard sandstone at 6360' contained the first traces of butane.

A very faint trace of oil was observed in thin sandstone laminae from a depth of 6900-6915'. Core No. 5, 6917-6947', contained some thin sandstone pods giving a milky-white cut fluorescence only, no visible staining.

The Sag River Sandstone, from 6960-6976', contained a good show of oil and gas. A uniformly fine grained, well rounded, clear quartz sand exhibited a light brown oil stain throughout and gave an even light yellow fluorescence. Three hundred thirty units of total gas indicated constituents as follows: methane 37,500 ppm, ethane 1,000 ppm, propane 260 ppm, butane 130 ppm. A core cut from 6977-7009' yielded the information that the Sag River Sandstone was only 16' in thickness. Due to the thinness of the Jurassic sandstone interval and evidence from the following Triassic age core (6977-7009') of very low permeability (0.0 to 4.6 millidarcies) and low porosity (3.1 to a high of 16.8 percent) no attempt was made to drill-stem test. The high porosity value of 16.8 percent was accompanied by a permeability of only 0.2 millidarcies.

While circulating samples from a drilling break at 7544', sandstone exhibiting well rounded grains, with no hydrocarbon fluorescence was observed, but yielded an instant chloroethane cut fluorescence. The "hot wire" was saturated with total gas reading 1,000 units (maximum that can be recorded) with constituents as follows: methane 12,540 ppm, ethane 7,875 ppm, propane 651 ppm, butane 101 ppm. A core cut from 7544-7572' recovered calcareous cemented, hard, fine grained sandstone and coarse conglomerate with instant cut and cut fluorescence and had vertical and bedding plane fractures exhibiting free oil on their surfaces.

Drill-Stem Test No. 2, from 7472-7572', included the limestone sequence from 7465-7505'. With the top of the top packer set at 7472', and 6000' of fresh water cushion, standard procedure as previously indicated, fluid recovery consisted of 110' of rat-hole drilling fluid and filtrate. No gas surfaced during flow periods and neither gas nor oil were detected in the fluid rise. An examination of test pressure charts indicated a mechanically successful test. Representative pressures in psi from the bottom outside chart at a depth of 7568' are as follows:

IHP	IFP	ISIP	FFP	FSIP	FHH	TEMP.
4212	2965	3827	2965	3796	4212	170°F

The marine sandstone sequence of the Sadlerochit penetrated at a depth of 7760' yielded a relatively small amount of total gas: maximum of 53 units over a background of 12. The sands however appeared well oil stained, with visible oil on chert and quartz sand grains, and had a light straw chloroethane cut and instant milky-white cut fluorescence. Although small in total gas amount, the gas "show" was mainly coming from the drilling fluid with very little from cuttings, suggesting possible porosities of greater than 10 percent. Core No. 14 was cut from 7793-7821' and recovered 22 feet of oil stained sandstone. Permeabilities ranged from 0.1 to 1.0 millidarcies and porosities from 4.2 to 13.2, averaging 10.1 percent. Residual oil saturation ranged from 0.0 to 25.2 percent of pore space.

Drill-Stem Test No. 3 was performed over the interval 7765-7821'. Using standard testing procedures and 6000' of fresh water cushion, the test yielded neither gas nor oil. Examination of pressure charts at the conclusion indicated a mechanically successful test. Representative pressures in psi from the bottom outside chart at a depth of 7817' were as follows:

IHP	IFP	ISIP	FFP	FSIP	FHH	TEMP.
4404	2708	3859	2708	3891	4404	185°F

CONCLUSIONS

1. The hydrocarbon potential of this well was fully evaluated from surface to total depth having penetrated the entire sedimentary section at this location.

2. No intervals of "show" were overlooked in the effort to obtain production. The thinness of the Sag River sand, 16', could not have sustained production or economically justified further drilling with this sand as an objective even if tested and some hydrocarbons had been recovered.

3. The USGS/NPRA (Husky Oil - operator) Drew Point Test Well No. 1 test well in protracted Section 26, T18N, R8W, Umiat Meridian is a "dry hole" as no commercial hydrocarbons were discovered.

4. Although a "dry hole", the shows of oil and gas in this well should encourage additional exploration on the National Petroleum Reserve in Alaska, where possible structural advantage may be gained, along with improved permeability and porosity.

PERTINENT DATA AND APPENDICES

SUMMARY OF PERTINENT DATA

WELL NAME:	Drew Point Test Well No. 1
OPERATOR:	Husky Oil NPR Operations, Inc.
API NO.:	50-279-20002
LOCATION:	890' FSL, 1940' FEL SE 1/4 protracted Section 26, T18N, R8W, Umiat Meridian, Alaska
COORDINATES:	Latitude: 70°52'47.141"N Longitude: 153°53'59.931"W X = 512,000.4012 Y = 6,171,499.88 Zone 5
ELEVATION:	38' DF, 10' Ground, 15' Pad
CASING:	20" @ 80' (106' Schlumberger) 13-3/8" @ 2661' (2659' Schlumberger) 9-5/8" @ 6834'
DATE SPUDDED:	January 13, 1978
TOTAL DEPTH:	7,946 feet (Driller)
DATE REACHED TOTAL DEPTH	March 8, 1978
RIG RELEASED:	March 13, 1978

LOGGING RECORD:

DIL/SP	106-2658' 2659-6866' 6834-7930'
BHC/SON/GR/TTI	106-2663' 2658-6860' 6834-7938'
FDC/CNL/GR/Caliper	2660-6883' 6834-7938'
FDC/GR/Caliper	2660-6883' 6834-7938'
HDT (Dipmeter)	2653-6885' 6840-7938'
Temperature Log - 3/8/78 - Run 1	50-7938'
Temperature Log - 3/9/78 - Run 2	50-7938'
CBL/VDL/GR - Run 1	5500-6818'
CBL/VDL/GR - Run 2	5500-6780'
CCL	80-5550'
Check Shot Velocity Survey	1000-7946'

LOGGING RECORD (Continued)

Mud Log	105-7946'
Formation Pressure Log	105-7946'
Geogram Survey	2565-7818'
Computed Logs:	
Dipmeter Arrow Plot	2660-6849'
	6873-7908'
Saraband	2665-7460'
Coriband	7460-7920'

SIDEWALL CORES: Run 1 - Shot 84, recovered 82.
Run 2 - Shot 75, recovered 71.

CONVENTIONAL CORES:

No.	Interval	Recovery	Formation
1	4130-4140'	10.0'	Torok
2	5530-5540'	2.5'	Torok
3	5900-5923'	18.0'	Torok
4	6905-6906.5'	1.5'	Kingak
5	6917-6947'	26.0'	Kingak
6	6947-6957'	10.0'	Kingak
7	6977-7009'	32.0'	Shublik
8	7093-7103'	10.0'	Shublik
9	7350-7380'	30.0'	Shublik
10	7544-7572'	28.0'	Shublik
11	7572-7602'	29.0'	Shublik/Ivishak
12	7602-7629'	27.0'	Ivishak
13	7704-7733'	23.0'	Ivishak
14	7793-7821'	22.0'	Ivishak
15	7882-7901'	18.5'	Argillite

Coregraph available.

DRILL STEM TESTS:

No.	Interval	Recovery
1	5850-5922'	63' muddy water
2	7472-7572'	110' rat hole mud
3	7765-7821'	No recovery.

WELL STATUS: Dry and abandoned.

WELLSITE GEOLOGIST: Al Scouler

LOG ANALYST: Armour Kane

DRILLING CONTRACTOR: Nabors Alaska Drilling, Inc.

MUD LOGGERS:	Exploration Logging
BIOSTRATIGRAPHIC ANALYSIS:	Anderson, Warren & Associates, Inc.

DREW POINT TEST WELL NO. 1
DRILL CUTTINGS AND CORE DESCRIPTIONS

NOTE: Sample descriptions are not correlated to mechanical control.

DRILLED DEPTH (FEET BELOW KELLY BUSHING)	
0- 80	No recovery.
80- 500	Sand: light gray, fine grained to very fine grained, unconsolidated, abundant interstitial clay (mushy), grains angular, some pieces and aggregates of fine crystalline pyrite, lignite and wood fragments, some high ferromagnesian content and scattered dark gray, light gray, brown siltstone fragments and coarse, angular to subangular chert.
500- 590	Claystone: medium to dark gray, micromicaceous, abundant disseminated pyrite, lignite and woody peat chips.
590- 620	Sandstone: light gray, very silty, abundant mica, disseminated pyrite.
620- 710	Siltstone: light gray, abundant mica, disseminated pyrite.
710- 740	Sandstone: white, very fine to fine grained, moderately well sorted, white and frosted quartz grains, kaolinitic.
740-1220	Siltstone: as above, high clay content, wood and lignite fragments, some very fine grained sandstone.
1220-1250	Sandstone: light gray, very fine grained, silty, very clayey, partly unconsolidated, disseminated pyrite.
1250-1280	Claystone: brown, gray-brown, soft, silty, some Sandstone: as above.
1280-1340	Sandstone: as above.
1340-1430	Claystone: as above, very soft; some Sandstone: as above.
1430-1520	Sandstone: light gray, very fine to fine grained, scattered aggregates of pyrite crystals, rounded chert fragments, scattered lignite chips, partially unconsolidated.
1520-1550	Siltstone: light to medium gray, brown, as above, abundant lignite.

1550-1700	Sandstone: as above, light gray, very fine to fine grained, scattered lignite; interbedded Siltstone: medium gray, soft to moderately firm, clayey, sandy, pyritic.
1700-1760	Claystone: brown, gray-brown, soft, silty.
1760-1820	Sandstone: as above, fossil fragments common, pyrite crystal aggregates.
1820-2060	Siltstone: dark gray, dark brown, hard, clay content lessening.
2060-2330	Sandstone: very fine to fine grained, as above, with angular pieces of lignite, chert, siderite; common shell fragments, one piece reworked; Inoceramus prisms, scattered angular pieces of vitreous coal; rare worm borings; interbedded Siltstone: as above.
2330-2360	Siltstone: as above.
2360-2390	Sandstone: as above.
2390-2560	Siltstone: as above, with scattered to abundant fossil fragments including large, angular pieces of Inoceramus prisms; some interbedded Sandstone: as above.
2560-2660	Shale: dark brown, siliceous, very hard, conchoidal fractures; represents major lithologic change to older Cretaceous sediments; thin sandstone stringers.
2660-2715	Shale: brown, gray-brown, hard, siliceous, conchoidal fractures as at 2560'.
2715-2730	Sandstone: gray, very fine grained to fine grained, hard, angular grains, medium grained quartz, chert, siderite, abundant, disseminated and crystal-aggregate inclusions of pyrite.
2730-2780	Shale: brown-gray, brown, as above.
2780-2840	Shale: as above, but with thin interbeds of Sandstone: as above.
2840-2880	Sandstone: as above.
2880-2900	Siltstone: gray to gray-brown, hard, but with abundant clay.
2900-2960	Sandstone: gray, very fine to fine grained, hard, angular, medium grained quartz, chert and siderite, abundant pyrite.

2960-3000	Claystone: gray-brown, as above.
3000-3140	Shale: brown, siliceous, as above, with some thin interbeds of gray, hard sandstone occurring as stringers and probably not exceeding 1-2 feet in thickness; commencing at approximately 3120', interbeds of light tan Claystone: hard, conchoidal fractures; claystone is thin interbeds.
3140-3165	Shale: as above, but with slight increase in sandstone stringers; interval is and has been predominantly shale, but has interbedded thin sandstone stringers throughout in what appears to be from 1 to 10 feet thick; beginning to pick up increasing amounts of hard, gray siltstone; entire sequence appears to be gradational; Claystone: as above.
3165-3500	Shale: as above, with siltstone increasing; Claystone and Sandstone: as above.
3500-3980	Siltstone: gray, hard, varying to tan color, predominate in samples; thin interbeds of sandstone and Shale: continuously gradational.
3980-4040	Shale: as above; interbedded with Siltstone and Sandstone: as above, partly Claystone: very soft, medium gray, lignitic.
4040-4130	Shale: as above, interbedded with sandstone, siltstone and claystone.
4130-4140	<u>Core No. 1, Cut 10', Recovered 10'</u>

4130.0-4131.0' (1.0')	Shale: partly claystone, brown, firm, micaceous, well-bedded, ripple marks, small rounded inclusions of pyrite; shale beds and very thin laminae of sandstone and siltstone parallel to bedding planes.
4131.0-4132.0' (1.0')	Shale: as above, abundant fine grained lignite and mica along bedding planes, dip is 5°.
4132.0-4133.0' (1.0')	Shale: as above, small S-type slumping, dip as high as 10°.
4133.0-4134.0' (1.0')	Shale: as above.
4134.0-4135.0' (1.0')	Shale: small conodont mold, dip is 5°.

4135.0-4136.0' (1.0')	Shale: as above.
4136.0-4138.0' (2.0')	Shale: with small pelecypod cast, dip is 5°.
4138.0-4139.0' (1.0')	Shale: as above.
4139.0-4140.0' (1.0')	Shale: as above, dip 5°-10°. relatively shallow and quiet deposition is suggested in this core.

4140-4290 Shale: chocolate brown, as described in Core No. 1; very micaceous, silty, fine grained sand pods, very clayey; the clay constituents of the shale go into solution in the mud column leaving only silts and sands on shaker screen; clay and solids building up in the mud system.

4290-4340 Shale: as above, but with increasing amounts of medium to large, subrounded, red chert grains suggesting a very clayey sand sequence as an interbed; drill rate remained as in shale; very low porosity and permeability; nothing to suggest anything but clay choked sands.

4340-5020 Shale: as above (claystone) with major portion of clay going into solution in mud stream; fine grained sandstone and siltstone continued to exist as pods and laminae; small megafossil fragments in sample at 4760' plus common Inoceramus prisms becoming abundant Inoceramus at 4800'; at 4760', lignite becoming common, abundant at 4780' as small grains, suggesting thin seams; all samples show high percentage of mica; Inoceramus prisms continue; flood of prisms at 4920' and continuing.

5020-5260 Claystone: medium to dark gray, soft, very silty, slightly sandy.

5260-5380 Siltstone: light tan, with light gray scattered throughout, hard to firm, common angular to subrounded quartz, scattered angular grains of red-brown chert, abundant pyrite as fine crystalline aggregates and grains, scattered megafossils and common Inoceramus prisms, siderite grains common, appear to exist as pods, and laminae, with thin interbeds of sandstone and shale, as previously described.

5380-5410 Sandstone: light gray, fine grained, angular, firm to hard, interbedded in shale, claystone, siltstone sequence; no drilling break, but a general decrease in drilling rate continuing; gas increase accompanied these sandy interbeds, but no oil; permeability suggested very low; porosity estimated to be 10%.

5410-5530 Shale: as above, with sandstone and siltstone pods and laminae, as before.

5530-5540 Core No. 2, Cut 10', Recovered 2.5'

5530.0-5532.5' (2.5') Shale: dark gray-brown, brittle, firm to medium hard, well bedded, fractures readily along bedding planes; laminated throughout with thin sandstone and siltstone beds (less than 1 mm to 9 cm), abundant micro-crossbedding, abundant micromica, black carbonaceous particles; Sandstone: very fine to fine grained, angular hard and cemented, dip 3° to 4°, no fluorescence in entire recovery, no odor, stain, cut or fluorescence.

5532.5-5540.0' (7.5') No recovery.

5540-5848 Shale: dark gray to brown, brittle to firm, well bedded, interbedded with sandstone and siltstone, as above, sandstone percentages varied in samples from 5% to 20%; siltstone percentages varied in samples from 20% to 30%; fresh Inoceramus prisms throughout interval.

5848-5900 Sandstone: light gray, firm, consolidated, varied from hard to moderately friable, very fine to fine grained, angular to subangular quartz, possible feldspar, 10% to 20% black ferromagnesian minerals, common mica; some thin interbeds of shale in samples between 5848' and 5900', but the overall interval is primarily sandstone; good gas show in this interval with C_1, C_2, and C_3 constituents; questionable fluorescence in mud.

5900-5923 Core No. 3, Cut 23', Recovered 18'

5900.0-5906.0' (6.0') Sandstone: light to dark gray, mottled; contorted, slumped appearance; very fine to fine grained, hard, nonfriable, quartz in angular grains, some feldspars, 10-20% black Fe-Mg minerals, dip variable and often opposed, high degree of crossbedding, grades back and forth with light to dark gray siltstone; no odor, stain, color or fluorescence.

5906.0-5906.67' (0.67') Shale and Siltstone: interbedded dark gray, light gray with thin sandstone laminations and pods.

5906.67-5907.0' (0.33')	Sandstone: light gray, interbedded as above.
5907.0-5918.0' (11.0')	Shale: dark gray, extremely well bedded, laminated with fine grained sandstone and siltstone, as above, dip is 2° to 3°, poker chip parting appearance.
5918.0-5923.0' (5.0')	No recovery.
5923-6160	Shale: interbedded with sandstone and siltstone as previously logged and cored; Inoceramus prisms.
6160-6165	Sandstone: hard to soft pieces, fine grained, as above; no oil show, cut, or fluorescence; gas increase.
6165-6240	Shale: as above, sandstone and siltstone interbeds, as logged.
6240-6270	Sandstone: fine grained, soft, friable pieces to hard, as above; no oil show, cut, or fluorescence; gas increasing.
6270-6280	Shale, interbedded with sandstone and siltstone, as above.
6280-6295	Claystone: brown, soft, goes into solution in mud stream.
6295-6320	Sandstone: light gray, fine grained, as above.
6320-6360	Shale: gray to brown, dark gray, as above, with interbeds of sandstone and Siltstone: as above.
6360-6380	Sandstone: as above, but with some softer pieces; no oil show, cut, or fluorescence, but had gas increase.
6380-6495	Shale, interbedded with sandstone and siltstone, as above; splintery.
6495-6505	Sandstone: as above, but with interbeds of siltstone and Shale: as above, gas increasing.
6505-6620	Shale: as above, with interbeds of sandstone and Siltstone: as above, Inoceramus continuing, pyritic.
6620-6630	Sandstone: as above, with thin interbeds and laminae; siltstone and Shale: as above.
6630-6640	Shale: with thin interbeds of sandstone and Siltstone: as above; gas increasing.

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6640-6665 Sandstone: as above, uniformly fine grained quartz; gas show at 6665'.

6665-6745 Shale: as above, interbedded with sandstone and Siltstone: as above.

6745-6895 Shale: gray to black; major lithology change, well rounded large clear quartz grains, pyritic streaks.

6895-6905 Shale: gray to black, very hard, with pebbles, clear, rounded quartz, large, and pebbles of rounded black chert, thin streaks and laminae of very fine to fine grained Sandstone: very hard, quartz with clay matrix, dirty; no visible stain, cut, or fluorescence, but yields yellow-white cut fluorescence; very low permeability and porosity.

6905-6906.5 Core No. 4, Cut 1.5', Recovered 1.5'

6905.0-6906.5' (1.5') Shale: dark gray, very hard, fractures readily along bedding planes; well developed vertical fracture, some conchoidal fracturing, bedding dips 2°-3°, abundant casts of rounded pebbles, very thin streaks and laminations of fine grained sandstone; Sandstone: dark gray, graywacke, clay filled, abundant quartz grains, very hard, no visible stain, yields milky white-yellow cut fluorescence, bleeding gas bubbles, pyritized worm boring, streaks and pads of fine crystalline pyrite.

6906.5-6917 Shale: dark gray to black, very hard, as in Core No. 4.

6917-6947 Core No. 5 - Cut 30', Recovered 26'

6917.0-6920.0' (3.0') Shale: dark gray to black to brown interbeds, thin banded appearance, siliceous tan to brown concentrations, thin interbedded light gray siltstone and sandstone, alternating interbeds of black and dark gray shale, dip is 2°-3°, no fluorescence or stain, but has cut fluorescence.

6920.0-6923.0' (3.0') Shale: light brown to tan, as above.

6923.0-6926.0' (3.0') Shale: alternating thin interbedding, light to dark gray, black, light tan,

		brown; siltstone/sandstone, thin interbeds with pods, banded appearance.
	6926.0-6929.0' (3.0')	Shale: as above, with light tan siliceous bed, sandstone pods and streaks, very fine grained, slumped and crossbedded (low degree).
	6929.0-6932.0' (3.0')	Shale: as above, sandstone and siltstone streaks.
	6932.0-6935.0' (3.0')	Shale: banded, as above.
	6935.0-6938.0' (3.0')	Shale: as above, but minor slumping and opposed dips, slickensided face dipping 18°, cuts bedding planes, normal bedding planes dip 2°, movement perpendicular to strike, parallel to dip.
	6938.0-6941.0' (3.0')	Shale: as above, light tan, siliceous shale bed 3" thick.
	6941.0-6943.0' (2.0')	Shale: as above, dips continue in low range, maximum 2°-3°, sandstone when crushed had no odor, stain, color or fluorescence, but yielded milky white-yellow crush cut fluorescence.
	6943.0-6947.0' (4.0')	No recovery.
6947-6957	<u>Core No. 6 - Cut 10', Recovered 10'</u>	
	6947.0-6955.0' (8.0')	Shale: brown to gray to black, banded, dip is 2°-3°, "poker chip" parting, siltstone at 6951' for 8", siliceous, light tan, banded, slickensided 10° with direction of movement parallel to dip.
	6955.0-6957.0' (2.0')	Shale: as above, highly slickensided, fractured, crushed.
6957-6960	Shale: as above.	
6960-6977	Sandstone: light brown, uniformly fine grained, 98% quartz, subrounded, scattered ferromagnesian and glauconite grains, light brown oil staining; good even light yellow fluorescence, good immediate yellow-white cut fluorescence.	

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6977-7009 Core No. 7, Cut 32', Recovered 32'

6977.0-6986.0' (9.0')	Sandstone: bioturbated; fine grained, predominantly quartz, with less than 5% glauconite and Fe-Mg minerals, good yellow-white fluorescence, pale straw chloroethane cut, very tight, pyritized streaks, with streaks, pods, irregular interbeds and slumped, Shale: very clayey and silty, calcareous cement, predominately shale at 6985-6986'.
6986.0-6989.0' (3.0')	Sandstone: as above, large megafossil fragments, white to buff, in well cemented sandstone, siltstone and shale matrix, red-brown limy concretion at 6987'.
6989.0-6992.0' (3.0')	Sandstone: as above, megafossil fragments, white; Sandstone: very fine grained, less than 1% glauconite, porosity and permeability are low.
6992.0-6992.5' (0.5')	Shale: dark gray, calcareous, abundant pyrite streaks.
6992.5-6995.0' (2.5')	Sandstone: as above, with gray siltstone, Shale streaks: black-gray, poor fluorescence.
6995.0-6998.0' (3.0')	Sandstone: very fine grained, very hard, as above, well developed fractures 85°-89° wood fragments, carbonized, parallel to bedding (flat lying).
6998.0-7001.0' (3.0')	Sandstone: very fine grained, very hard, as above, near vertical fractures and pyritic streaks.
7001.0-7004.0' (3.0')	Sandstone: as above, very fine grained, siltstone streaks.
7004.0-7007.0' (3.0')	Sandstone: as above, brachiopods at 7005-7006', glauconite (10-12% of sample).
7007.0-7009.0' (2.0')	Sandstone: as above, with siltstone and shale, bioturbated, megafossils, Bacculites (Belemnites) at 7008', glauconitic.

7009-7093 Sandstone: bioturbated with Siltstone, and Shale: as above.

7093-7103	Core No. 8, Cut 10', Recovered 10'	
	7093.0-7099.0' (6.0')	Shale: dark gray to grayish-black, very hard, very silty, calcareous, conchoidal fracture, indistinct bedding approximately 4°, near vertical open fractures, abundance of fossils suggests a coquina, scattered pyrite, pyritized megafossils shells in sandstone interbedded to 1.5 cm, sandcast of unidentified cephalopod, thin light gray Sandstones: very hard, fine to medium grained, calcareous cement, no odor, stain, cut or fluroescence.
	7099.0-7103.0' (4.0')	Shale: as above, very irregular minor slumped sandstone, abundant megafossils, pyritized sandstone nodule in interbedded shale, dip is 3°-6°, very irregular sandstone interbeds, 85° open fractures, dip of interbeds are 1°-4°; Sandstone: thin interbed, 1.6 cm, very hard, fine grained, yellow-white cut fluorescence.
7103-7210	Shale: silty, some siltstone megafossil fragments, as above; some thin Sandstone interbeds: very fine grained to fine grained; occasional milky-yellow-white cut fluorescence.	
7210-7350	Siltstone: light tan to light gray, firm to soft, clayey, abundant megafossil fragments.	
7350-7380	Core No. 9, Cut 30', Recovered 30'	
	7350.0-7353.0' (3.0')	Shale: dark gray, very hard, highly calcareous, very silty, generally massive abundant irregularly oriented pyritized worm borings, very small in thickness and varying in length, abundant very thin hairline siltstone laminations.
	7353.0-7356.0' (3.0')	Shale: as above, siltstone cast of unidentified small megafossil, small remnant of Halobia sp. and common fragments of Halobia sp. scattered throughout.
	7356.0-7359.0' (3.0')	Shale: as above, one large worm boring, approximately 1.8 cm in width, parallel to flat lying bedding, abundant small worm borings, Belemnite.

	7359.0-7362.0' (3.0')	Shale: as above, small unidentified megafossils probably pelecypod, pyritized worm borings.
	7362.0-7365.0' (3.0')	Shale: as above, highly calcareous, Halobia sp. fragments, unidentified pelecypod fragments, megafossil fragments.
	7365.0-7368.0' (3.0')	Shale: as above, highly calcareous, thin partings suggest flat lying beds, very dark to black, very large Belemnite, Bacculites, partially pyritized, pyritized shell fragments.
	7368.0-7371.0' (3.0')	Shale: as above, highly calcareous, Halobia sp. fragments, pyritized worm borings.
	7371.0-7374.0' (3.0')	Shale: as above, extremely calcareous.
	7374.0-7377.0' (3.0')	Shale: as above, extremely calcareous, pyritized worm borings, pelecypod fragments, pyritized worm borings, megafossils.
	7377.0-7380.0' (3.0')	Shale: as above, extremely calcareous, vertical fractures, megafossils, pyritized worm borings.
7380-7465		Sandstone: gray to brown, very fine grained, quartz with scattered glauconite, hard to firm, very calcareous, no oil show, cut, or fluorescence, but has milky yellow-white cut fluorescence; and Siltstone: light to dark gray, hard to mushy, calcareous; Sandstone: up to 80%.
7465-7505		Limestone: light gray to reddish-brown, micritic, no apparent porosity, scattered megafossils in limestone chips.
7505-7544		Siltstone: light to dark gray, hard to firm, some fragments clayey, but with an increasing percentage of sandstone consisting of chert grains, fine to medium grained, some limestone, as above.
7544-7572		Core No. 10, Cut 28', Recovered 28'
	7544.0-7545.0' (1.0')	Shale: dark gray, very hard, calcareous, conchoidal fracture, good bedding, contains very thin sandstone

	streaks and laminae, exhibiting yellow fluorescence and milky yellow-white cut fluorescence, abundant phosphatic nodules, 5° dip.
7545.0-7547.0' (2.0')	Conglomerate, well rounded pebbles from very small to 2.5 cm, in very hard sandstone matrix, one large petrified wood fragment approximately 0.5 cm x 1.9 cm, secondary calcite inclusions, and phosphatic nodules, excellent high gravity oil odor, bright yellow-white fluorescence.
7547.0-7550.0' (3.0')	Sandstone: light to dark gray, very hard, very well cemented, calcareous, fine to medium grained, conglomeratic, rounded pebbles and phosphatic nodules, light oil stain, crossbedded, quartz, chert, 5% black mafics, low permeability and porosity, vertical fractures, open and one well developed fracture dipping 88°, open with free oil on fracture surfaces and on bedding plane surfaces, high gravity oil odor on freshly broken surfaces, rare limestone nodule, dull yellow fluorescence.
7550.0-7553.0' (3.0')	Sandstone: as above, partly quartzitic, free oil on fractures, very low porosity and permeability, abundant recrystallized calcite, dull to yellow gold fluorescence.
7553.0-7556.0' (3.0')	Sandstone: as above, highly crossbedded, abundant phosphatic nodules, oil stain and fluorescence, very hard, very well calcite cemented, very low porosity and permeability.
7556.0-7559.0' (3.0')	Sandstone: as above, fractured, phosphatic nodules, dark gray sandstone pebbles, interbedded dark gray-black shale.
7559.0-7561.0' (2.0')	Sandstone: as above, crossbedding, dark gray-black shale interbeds, light brown limestone pebbles.
7561.0-7565.0' (4.0')	Sandstone: very hard, as above, rounded white calcite inclusions, well developed open vertical fracture, small inclusion of soft oil saturated sand giving good yellow fluorescence, light straw and

		yellow-white cut fluorescence, uniformly fine grained quartz, subrounded in a pod 3.5 cm in length and average 1 cm in width, 5 cm thick interbeds of vertical fracture with fresh oil on surface, conglomerate, dense brown, silty limestone pebbles, siltstone pebbles, well rounded.
	7565.0-7571.0' (6.0')	Sandstone: as above, very hard, very well cemented with calcite, dull yellow fluorescence with good milky yellow-white cut fluorescence, vertical fractures.
	7571.0-7571.5 (0.5')	Sandstone: as above.
	7571.5-7572.0 (0.5')	Conglomerate, well rounded pebbles in sandstone matrix, fine pyrite crystals.
7572-7602'	Core No. 11 - Cut 30', Recovered 30'	
	7572.0-7573.0' (1.0')	Shale: very silty, sandy, thin interbeds of pyritic fine grained sandstone, dark gray bedded; dip is 4°, near vertical fracture, open.
	7573.0-7575.0' (2.0')	Conglomerate: hard, well cemented, pebbles less than 1/8" to 3/4" consisting of light tan chert, sandstone and siltstone encased in fine crystalline chalcopyrite.
	7575.0-7584.0' (9.0')	Sandstone: light gray, very fine to fine grained, very hard, very well cemented, carbonate cement, minor slumping, dark gray thin, contorted siltstone streaks and pods; sandstone grades into Siltstone: dark gray, irregular and varying thicknesses, near vertical to 88° fracture, no displacement apparent.
	7584.0-7588.0' (4.0')	Sandstone: as above, almost vertical fractures, Siltstone: as above.
	7588.07599.0' (11.0')	Sandstone: as above, gradational, with siltstone, pods of fine crystalline chalcopyrite, carbonate cementing medium, worm borings at 7599'.
	7599.0-7602.0' (3.0')	Conglomerate: pebble, hard, sandstone matrix, silica cemented, very thin gray-black streaks of silty shale at top,

pebbles of blue, white and gray chert, silica cemented sandstone and siltstone, 1/16" x 1-3/8" in size, limestone nodules near base, very dense, microcrystalline, light tan, dolomitic, up to 2-1/4" in length; Siltstone at base of core dark gray, silica cemented.

7602-7629 Core No. 12 - Cut 27', Recovered 27'

7602.0-7605.0' (3.0')	Shale: dark gray, very hard, conchoidal fracture, silica cemented, carbonized plant remains, very silty and sandy, 86.5° fracture, low to flat bedding, sandstone pads and thin laminations.
7605.0-7608.0' (3.0')	Shale: as above, siliceous, abundant black carbonized inclusions, and plant remains.
7608.0-7611.0' (3.0')	Shale: as above, thin bed of Chert: light gray, very hard, microcrystalline; thin, dark gray laminations.
7611.0-7617.0' (6.0')	Shale: as above, and light gray chert, as above, small inclusions of very fine crystalline pyrite, grades into gray siliceous shale with near vertical chert (silica) filled fracture, sandstone pod perpendicular to bedding, grades back to dark gray.
7617.0-7619.3' (2.3')	Shale: as above, siliceous, dark gray, dark brown, carbonaceous inclusion, unidentified megafossils, freshly fractured surfaces yield small amount of oil stain, good odor and fluorescence, grades into sandstone.
7619.3-7622.0' (2.7')	Sandstone: very hard, well cemented, fine grained, locally conglomeratic, locally slumped, crossbedding with very irregular quartz sandstone filled pods, open fracture.
7622.0-7624.0' (2.0')	Sandstone: light gray, laminated with very irregular dark gray siltstone and fine grained sandstone, dip 3°-11°, high degree of slumping, fine to medium grained, siliceous, cemented, no odor, stain, cut or fluorescence.

	7624.0-7627.0' (3.0')	Sandstone: as above, grades into dark siliceous shale and back to sandstone, highly contorted and slumped, black carbonized inclusions on bedding plane surfaces, locally interbedded with thin dark gray to black siltstone laminations.
	7627.0-7628.0' (1.0')	Sandstone: as above, with gray-black shale interbeds, silica cemented quartz sandstone, fine grained.
	7628.0-7629.0' (1.0')	Sandstone: very fine grained, silica cemented, very hard, contorted and laminated with black to dark gray siltstone, no shows.
7629-7650		Sandstone: buff-white to light gray, fine grained, very hard, siliceous cement, consisting of 50% chert and 50% quartz; interbedded with Shale: dark gray to gray-black, siliceous, and Siltstone: light to dark gray, hard to firm.
7650-7695		Sandstone and Shale: interbedded, as above.
7695-7704		Sandstone: uniformly fine grained, loose, rounded quartz and chert grains, abundant rounded red silica grains giving entire sample a reddish cast.
7704-7733		Core No. 13, Cut 29', Recovered 23'
	7704.0-7706.0' (2.0')	Sandstone: predominantly red, with gray mottling; red sandstone is very fine to fine grained, very hard, silica cemented; mottled gray sandstone is quartzose, fine grained, angular, silica cemented, very irregular, no odor, stain, cut or fluorescence, dip is 3°.
	7706.0-7707.6' (1.6')	Sandstone: gray, fine to medium grained, very hard, angular to rounded grains, silica cemented, claystone interbeds, thin, irregular, flat lying beds.
	7707.6-7710.3' (2.7')	Sandstone: gray, as above, medium grained, angular to subrounded, with 1% black to dark gray accessory minerals.
	7710.3-7713.0' (2.7')	Sandstone: red, silica cemented, as above, very fine grained, grades to siltstone with gray quartzite mottlings and interbeds.

	7713.0-7716.5' (3.5')	Sandstone: quartzitic, gray, interbedded thin quartzites, siltstone interbed.
	7716.5-7720.6' (4.1')	Sandstone: gray, quartzitic, fine to medium coarse grains, angular to subangular, interbedded with light gray siliceous claystone; becomes light gray, fine to coarse grained, angular to rounded, hard, silica cemented, quartz and chert grains, no odor, stain, cut or fluorescence, ±1% black accessory minerals, becomes coarse grained and conglomeratic in bottom 1', siliceous claystone at base overlies conglomerate.
	7720.6-7725.0' (4.4')	Conglomerate, pebble to cobble size with cobbles to 4" in length; pebbles, black, yellow, white, red, gray chert in a red cherty sandstone matrix, becoming light yellowish-white clay matrix containing well rounded coarse quartz grains, entire conglomerate crumbles badly in clay matrix, no odor, stain, cut or fluorescence.
	7725.0-7727.0' (2.0')	Conglomerate: as above, crumbled.
	7727.0-7733.0' (6.0')	No recovery.
7733-7760		Conglomerate: as above, cobbles.
7760-7793		Sandstone: 50% quartz, 50% chert (yellow-white), uniformly rounded to subrounded grains, fine grained; stringers with quartz 75%, chert 24%, black accessory minerals 1%; sample fluorescence dull yellow-gold, with immediate chloroethane cut and bright milky-white fluorescence; gas show in mud while drilling; estimated porosity greater than 10%.
7793-7821		Core No. 14, Cut 28', Recovered 22'
	7793.0-7796.0' (3.0')	Sandstone: oil saturation, hard, brownish-gray, fine grained, quartz, chert and 25% black Fe-Mg minerals, angular to subangular, calcareous, slightly siliceous, very low porosity and permeability, even, dull yellow-gold fluorescence, instant light tan chloroethane cut, bright milky white cut

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fluorescence, light tan streaks of fine grained oil saturated sandstone, irregular orientation, flat bedding, dip is 0°-5°, fair.

7796.0-7805.0' (9.0') Sandstone: as above, with light tan, oil stained sandstone, occurs in pods to several inches, thin interbeds, consists of quartz and chert, dip is 1°-3° crossbedding, irregular, scattered dark streaks, dark Fe-Mg minerals, pinpoint effervescence in 10% HCL, bright orange-yellow fluorescence, oil saturated.

7805.0-7808.7' (3.7') Sandstone: oil saturated, as above, with very dark Fe-Mg streaks.

7808.7-7810.5' (1.8') Sandstone: as above, brown-black claystone streak, uniform oil fluorescence, orange-gold to bright yellow, crossbedding, pinpoint HCL effervescence.

7810.5-7815.0' (4.5') Sandstone: as above, uniformly oil stained, suggests that porosity and permeability is increasing downward, fluorescence is brighter yellow.

7815.0-7821.0' (6.0') No recovery.

7821-7847 Sandstone: oil stained, fine grained, hard, consisting of quartz and chert with varying percentages of ferromagnesian minerals.

7847-7882 Schist: gray-black, approximately 35-40% quartz and 60-65% black, vitreous appearing mineral; becomes Slate: gray-black, very hard, dense, with slaty cleavage; contains thin stringers and pods of orthoquartzite and metamorphosed sandstones.

7882-7901 Core No. 15, Cut 19', Recovered 18.5'

7882.0-7885.0' (3.0') Argillite: slaty, gray, black, very hard, dense, exhibits slaty cleavage, orthoquartz filled partings.

7885.0-7888.0' (3.0') Argillite: as above, dip of slaty cleavage plane is 15°, thin orthoquartzite filled partings, 1/6" thickness, orthoquartzite surrounded metamorphosed breccia, dip is 25°.

7888.0-7901.0' (13.0')	Argillite: as above, orthoquartzite in large irregular pods, large euhedral pyrite crystals, dip is 8°, irregular thin interbeds, structurally contorted, irregular black structural lineation.

Log Analysis

ARMOUR KANE

Formation Evaluation

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

March 15, 1978

Mr. Gordon W. Legg
Husky Oil/NPR Operations, Inc.
2525 C Street, Suite 400
Anchorage, AK 99503

Dear Mr. Legg:

The intermediate logs on Drew Point No. 1 were run by Schlumberger on February 6 and 7 and the final logs were run March 8 and 9, 1978. Both runs consisted of Dual-Induction, Neutron/Density, Sonic, Dipmeter, two temperature logs and sidewall samples plus velocity surveys by Birdwell. Formation tops were: Pebble Shale 6700, Sag River 6960, Shublik 6972, Sadlerochit 7616 and basement at 7840. Basement from cores did not appear as usual Argillite but was a very hard, dense almost black slate-like material.

In both runs log quality was very good although there were some depth discrepancies on the intermediate run between DIL, CNL/FDC and BHC due to the fact that the cable had very few marks on it. However, Engineer Chuck Mallory did an outstanding job with no equipment failures and no lost rig time and did his best with depth control. The cable was remarked before the final run and Engineer Larry Nelson demonstrated remarkable depth control on all logs. The only lost rig time was due to a dipmeter failure which was quickly corrected by Mr. Nelson.

No zones of potential interest were found in either run, water saturations being high and in the final run porosities were low. Porosities in the Sag River reached about 15% but water saturation was in the 60% to 100% range. Porosities in the Sadlerochit were prohibitively low in the 6% to 8% range. A limestone interval interspersed with shale breaks extended from 7464 to 7562. Oil shows were observed from about 7760 to 7820 on the mud log but from log analysis were too tight to produce which was confirmed by a drill stem test within the interval. Porosities averaged 6% to 9% with some shaliness.

Thank you for the opportunity of serving you.

Very truly yours,

Armour Kane

Log Analysis

COMPANY: HUSKY OIL/NPR OPERATIONS, INC.
WELL: DREW POINT #1
FIELD: NORTH SLOPE
COUNTY:
STATE: ALASKA

DEPTH	R_T	ϕ_D	ϕ_N	ΔT	ϕ_s	GR	R_{wa}	S_w					REMARKS
6960	8.5	12	17	76	15.5	50	.14	85					
6962	10.5	15	16	76	15.5	45	.28	60					
6963	10	15	16	76	15.5	50	.25	63					
6966	10	13	19	78	17	40	.19	73					
6967	11	11	16	76	15.5	42	.15	82					
6968	10	9	14	75	15	48	.10	100					
7026-32	6	12	19	77	16	50	.10	100					
7510-20	50	4	4	56	4	65	.08	100					LIMESTONE
7720-30	18	3	11	65	10	35	—						CONGLOMERATE
7764	8	7	17	75	17	38	.04	100					
7774-80	11	6	18	75	17	50	.04	100					
7796-7802	10.5	8	18	75	17	46	.07	76					
7812	10.5	7	18	74	16.5	43	.05	85					

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HUSKY OIL/NPR OPERATIONS, INC.
DREW POINT #1

	RT	ϕ_D	ϕ_N	ΔT	ϕ_S	R_{WA}	Sw	
2847	6	18	40	96	25	.23	100	
2854-56	6.5	18	40	95	23	.25	96	
2858-64	6	19	42	112	33	.26	94	
2905	5	20	46	100	26	.24	98	
2910-16	6	22	46	103	27	.34	82	
2916-20	6	18	47	107	30	.23	100	↑
2929	7	20	45	104	28	.32	85	↓
2948-54	6	18	48	96	23	.23	100	1.3
					SONIC COMPACTION FACTOR			
5842	8	15	24	75	15	.20	100	1.0
5849	7	16	33	80	18	.20	100	↓
5862	7	18	36	83	21	.26	88	↑
5876	6.5	22	34	85	22	.39	74	
5898	9.5	15	28	81	19	.24	91	
6140-46	8	10.5	32	80	18	.10	100	
6146-50	10	13	30	78	17	.19	73	
6158-52	9	10.5	28	99	18	.11	95	
6208	8	9	26	80	18	.09	100	
6220	7	11	29	82	20	.09	88	
6232	9	12	30	78	17	.14	71	
6250	8	12	30	78	17	.12	76	
6296-98	10	10	26	74	15.5	.11	80	
6538-44	9	11	28	75	15	.12	96	
					MATRIX VELOCITY 18000 FT/SEC			

NOTE: SONIC LOG DEPTHS 4 FT DEPTH TO DIL (36-4950; 2 FT. DEPTH 4950-4926;
ON DEPTH 4926-5262; 4 FT SHALLOW 5262-6200;
3 FT SHALLOW 6200-6420; 2 FT SHALLOW 6420-6520
ON DEPTH 6520-TD.

CNL/DENSITY: 6 FT. DEPTH TO DIL (36-3450; INDETERMINATE 3450-4926
2 FT. DEPTH 4920-5564; ON DEPTH 5564-TD

HUSKY

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

LOGGING REPORT

WELL NAME Drew Point No. 1

Date 2/6-7/78 Driller Depth 6895

Elevation K.B. 35+ Logger Depth 6872

Logs Run and Intervals

DIL/SP - Casing to TD
CNL/FDC/GR/CAL - Casing to TD
BHC/GR - Casing to TD
HDT - Dipmeter - Casing to TD

Additional Logs to Run

Zones of Interest

Depth	Gross Thickness	Net Feet of Porosity	Lith.	Porosity	Probable Fluid Content (Sw)
2844-80	36	24	Shaly Sd	19	Water 100
2902-66	64	49	Shaly Sd	20	Water 93
5840-5900	60	39	Shaly Sd	17	Water 100
6130-52	22	16	Shaly Sd	10	Water 100
6200-56	56	50	Shaly Sd	10	Water 100
6536-48	12	12	Shaly Sd	11	Water 92

Discussion:

Torok - 2955 Correlates with W.T. Foran 4396
Pebble Shale - 6700 Correlates with W.T. Foran at 7334

Log Tops & Correlations:

Additional Presentation Plots

NOTE: Formation tops in this section were picked at the wellsite and may not correlate with final picks.

A. Scouler

A. Kane
Log Analyst

12/77

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HUSKY

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

LOGGING REPORT

WELL NAME Drew Point #1

Date 3/8-9/78 Driller Depth 7946

Elevation 35 KB Logger Depth 7938

Logs Run at Intervals

DIL/SP	6834 - TD
DCL/FDC/GR/CAL	6834 - TD
BHC/GR/TTI	6834 - TD
HDT - Dipmeter	6834 - TD
HRT - TEMP	SFC - TD

Additional Logs to Run

Zones of Interest

Depth	Gross Thickness	Net Feet Porosity	Lith	Average Porosity	Probable Fluid Content
6958-64	6	6	Sand	15%	Water, Some Oil Sw =70%
6968-70	2	2	Sand	9	Water
7026-32	6	6	Shaly Sd	12	Water
7470-78	8	8	Limestone	3	Nil
7510-20	10	10	Limestone	4	Nil
7720-30	10	10	Congl ?	3	Nil
7760-96	36	26	Sand & Clay	6	Water
7796-7816	18	14	Sand & Clay	9	Water

Discussion:

Log Tops & Correlations:

	Drew Point	Foran	S. Simpson
Sag River	6960	7510	7530
Shublik	6972	7590	7660
Sadlerochit	7616	7650	8200
Basement	7840		

Velocity Calibration Shots

NOTE: Formation tops in this section were picked at the wellsite and may not correlate with final picks.

A. Scouler

A. Kane
Log Analyst

12/77

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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

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Company NPR - HUSKY OIL COMPANY, OPR. Formation _____ Page 1 of 2
Well DREW POINT TEST WELL NO. 1 Cores DIAMOND File BP-3-461
Field WILDCAT Drilling Fluid WBM Date Report 2/9/78
County NORTH SLOPE State ALASKA Elevation _____ Analysts WSP, RDB
Location _____ Remarks CONVENTIONAL ANALYSIS, BOYLES POROSITY

CORE ANALYSIS RESULTS

(Figures in parentheses refer to footnote remarks)

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS			POROSITY PERCENT	GRAIN DENSITY	RESIDUAL SATURATION		REMARKS
		Horizontal Maximum	Horizontal 90°	Vertical			Oil % Pore	Total Water % Pore	
									CORE NO. 3
1	5900	0.2		0.0	6.0	2.68			ss, vfg, v slty, cly
2	5901	0.0		0.0	1.4	2.65			same
3	5902	0.1		0.0	7.8	2.69			same
4	5903	0.1		0.0	7.8	2.71			same
5	5904	0.0		0.0	6.6	2.68			same
6	5905	0.1		0.0	7.3	2.70			same
7	5906	0.1			6.6	2.73			same
									CORE NO. 7
8	6977	0.1		0.2	11.8	2.64	4.2	83.9	ss, vfg, v slty, cly
9	6978	0.1		0.1	10.2	2.67	9.9	68.1	same
10	6979	0.1		0.1	12.5	2.65	10.7	62.0	same
11	6980	0.1		0.1	10.9	2.64	8.9	63.4	same
12	6981	0.1		0.1	10.9	2.66	0.0	87.8	same
13	6982	0.0		0.1	9.7	2.67	2.1	83.1	ss, vfg, v slty, cly, shly
14	6983	0.0		0.0	4.6	2.68	0.0	76.5	ss, vfg, v slty, cly
15	6984	0.1		0.0	9.1	2.67	1.6	77.2	ss, vfg, v slty, cly, shly
16	6985				7.0	2.72	3.1	73.7	sltst, shly
17	6986	0.1		0.1	8.3	2.66	0.0	71.2	ss, vfg, v slty, shly
18	6987	0.0		0.0	4.0	2.68	0.0	65.9	same
19	6988	0.2		0.0	7.8	2.68	1.8	88.7	same
20	6989	0.0		0.0	3.9	2.67	0.0	86.8	same
21	6990	0.1		0.0	7.4	2.68	00.0	82.7	same
22	6991	0.1		0.0	5.3	2.69	0.0	85.9	same
23	6992	0.1		0.0	8.2	2.69	7.0	81.0	same
24	6993	0.1		0.0	5.5	2.68	1.6	85.4	same
25	6994	0.1		0.0	8.2	2.69	0.0	74.1	same
26	6995	0.0		0.0	2.8	2.67	3.6	83.5	sltst, sdy
27	6996	0.0		0.0	7.7	2.70	1.6	84.6	sltst, v sdy, v shly
28	6997	0.5		0.0	7.6nc	2.70	1.8	85.3	sltst, sdy, shly
29	6998	4.6		0.0	6.4	2.72	00.0	89.1	same
30	6999	0.0		0.0	3.1	2.69	0.0	86.3	sltst, sdy
31	7000	0.1		0.0	6.9	2.69	3.9	78.7	same

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Petroleum Reservoir Engineering
DALLAS, TEXAS

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Company NPR - HUSKY OIL CO., OPR Formation — Page 2 of 2
Well DREW POINT NO. 1 Cores DIAMOND File BP-3-461
Field WILDCAT Drilling Fluid WBM Date Report 3/2/78
County NORTH SLOPE State ALASKA Elevation — Analysts WSP, RDB
Location — Remarks CONVENTIONAL ANALYSIS, BOYLES LAW POROSITY

CORE ANALYSIS RESULTS

(Figures in parentheses refer to footnote remarks)

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS			POROSITY PERCENT	GRAIN DENSITY	RESIDUAL SATURATION		REMARKS
		Horizontal Maximum	Horizontal 90°	Vertical			Oil % Pore	Total Water % Pore	
32	7001	0.5		0.0	7.6	2.70	1.8	85.3	sltst, sdy, shly
33	7002	0.4		0.1	10.0	2.72	7.7	83.3	same
34	7003	0.1		0.0	10.0	2.69	0.0	88.5	ss, vfg, slty, shly
35	7004	0.0		0.1	9.0	2.69	0.0	89.6	same
36	7005	0.1		0.0	11.1	2.70	0.0	91.3	same
37	7006	0.2		0.1	16.8	2.71	1.0	81.4	same
38	7007	0.1		0.1	13.1	2.68	1.1	88.9	same
39	7008	0.1		0.1	12.2	2.72	1.2	91.1	same
									CORE NO. 14
40	7793	0.1		0.2	8.0	2.78	10.2	65.1	ss, vfg, slty, sid
41	7794	0.1		0.1	7.5	2.71	0.0	79.4	ss, vfg, slty, cht
42	7795	0.1		0.0	6.9	2.70	9.4	63.8	same
43	7796	0.1		0.1	4.2	2.69	3.1	67.7	same
44	7797	0.4		0.1	10.8	2.66	12.1	56.3	ss, vf-fg, slty
45	7798	0.3		0.2	10.8	2.66	5.3	44.5	same
46	7799	0.2		0.2	9.9	2.64	13.4	46.9	same
47	7800	1.0		0.3	12.6	2.68	3.2	42.0	same
48	7801	0.2		0.1	9.1	2.66	6.0	65.5	ss, vf-fg, slty, cht
49	7802	0.4		0.2	10.7	2.66	10.4	48.3	ss, vf-fg, slty
50	7803	0.5		0.3	1103	2865	8.0	41.0	same
51	7804	0.4		0.2	10.5	2.64	10.2	41.0	same
52	7805	0.6		0.3	10.9	2.71	5.6	44.8	same
53	7806	0.2		0.1	8.8	2.66	9.2	39.6	same
54	7807	0.2		0.1	9.8	2.65	16.6	61.6	same
55	7808	0.2		0.2	9.7	2.68	13.6	40.9	same
56	7809	0.9		0.7	11.9	2.64	13.6	36.2	same
57	7810	0.5		0.3	10.8	2.66	17.7	38.0	same
58	7811	0.4		0.4	11.5	2.64	15.2	37.7	same
59	7812	8.4		0.1	13.2	2.85	24.9	49.8	ss, vf-fg. slty, sid
60	7813	1.0		0.7	11.7	2.72	23.7	26.5	ss, vf-fg, slty
61	7814	0.8		0.5	11.7	2.66	25.2	32.3	same

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

PRELIMINARY COPY

Company NPRA - HUSKY OIL COMPANY,OPR. Formation _____ Page 1 of _____
Well DREW POINT NO. 1 Cores SIDEWALL File BP-3-470
Field WILDCAT Drilling Fluid WBM Date Report 3/27/78
County NORTH SLOPE State ALASKA Elevation _____ Analysts WSP,RDB
Location _____ Remarks SIDEWALL - DEAN-STARK ANALYSIS

CORE ANALYSIS RESULTS

(Figures in parentheses refer to footnote remarks)

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS			POROSITY PERCENT	GRAIN DENSITY	RESIDUAL SATURATION		REMARKS
		Horizontal Maximum	Horizontal 90°	Vertical			Oil % Pore	Total Water % Pore	
1	6971				26.8		4.3	59.2	ss,vfg,slty,cly
2	6975				28.9		4.6	55.0	same
3	7024				22.9		0.0	79.5	same
4	7028				27.8		0.0	76.1	same
5	7032				25.2		23.4	51.2	same
6	7034				28.0		12.9	57.1	ss,vfg,slty,cly,sc carb
7	7640				25.5		0.0	84.6	same
8	7650				23.4		0.0	82.1	ss,vfg,slty,v cly
9	7680				21.8		0.0	89.8	same
10	7693				25.7		0.0	92.1	ss,vf-cg,cly,sc carb
11	7773				22.6		4.7	80.0	ss,vfg,v cly,slty
12	7776				28.2		3.1	74.1	same
13	7832				13.8		1.2	89.4	ss,vfg, inbd carb
14	7834				26.1		1.6	75.3	ss,vf-fg,slty, cly
15	7836				23.2		3.0	83.3	same
16	7838				23.5		0.7	60.0	same

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

HUSKY

DRILL-STEM TEST REPORT FORM

WELL NAME Drew Point Test Well No. 1

Test Number 1 — Hole Size 12 1/4"

Date February 1, 1978 — Drill Pipe (Size & Lgth) 5", 5813.11 feet

Test Interval 5850 - 5922' — Drill Collars (Size & Lgth) 6 1/4", 301 feet

Total Depth 5922' — Type of Cushion Fluid Water

Amount of Cushion 4300'

TEST DATA

1. Tool open at 6:51 PM hours.
2. Initial open period 30 mins.
3. Initial shut-in period 45 mins.
4. Final flow period 60 mins.
5. Final shut-in period 122 mins.
6. Description of blow on initial open period Moderate to light blow when tool opened, steady decrease to dead 20 minutes into initial flow.
7. Description of blow during test Dead for first 6 minutes, faint blow for 2 minutes, dead remainder of test.
8. C.T.S. ____ mins; O.T.S. ____ mins; Bottom hole choke size 3/4" Surface choke size ____
9. Flow Rate: Gas ____ C.F.P.D. Oil ____ B.P.H. G.O.R. ____
10. Gravity of Gas ____ Gravity of Oil ____
11. Total fluid recovery: 63 feet of muddy water (rat hole fluid).
12. Resistivity of H_2O No test Chlorides of H_2O 500 P.P.M.
13. Depth of top press bomb Inside: 5830' Outside: 5914' Bottom Bomb Inside: 5834' Outside: 5918'

PRESSURE DATE

	Top Bomb: Inside	Top Bomb: Inside	Bottom Bomb: Outside	Bottom Bomb: Outside
I.H.P.	3193	3212	3252	3261
I.S.I.P.	2102	2111	2152	2150
I.F.P.	1952	1954	1998	1998
F.F.P.	1952	1954	1998	1998
F.S.I.P.	2183	2178	2218	2226
F.H.H.	3170	3189	3229	3217
Temp.	128°F	-		

SAMPLE CHAMBER DATA

1. Gas ____ C.F.
2. Oil ____ C.C.
3. H_2O ____ C.C.
4. Mud ____ C.C.
5. B.O.R. ____ B.S. & W. ____%

"0" pressure in sample chamber; no fluid or gas.

REMARKS:

Tested tight formation (chlorides of mud prior to testing 500 ppm).

F-1

A. Scouler
Prepared By

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

DRILL STEM TEST REPORT FORM

WELL NAME Drew Point Test Well No. 1

Test Number 2 — Hole Size 8 1/2"

Date March 1, 1978 — Drill Pipe (Size & Lgth) 5" at 7124'

Test Interval 7472 - 7572' — Drill Collars (Size & Lgth) 329' of 6" DC

Total Depth 7572' — Type of Cushion Fluid Water (750 ppm Cl⁻)

Amount of Cushion 6000 feet

TEST DATA

1. Tool open at 6:52 PM hours.
2. Initial open period 30 mins.
3. Initial shut-in period 46 mins.
4. Final flow period 63 mins.
5. Final shut-in period 117 mins.
6. Description of blow on initial open period Very weak blow; decreasing.
7. Description of blow during test No blow.
8. G.T.S. _____ mins: O.T.S. _____ mins; Bottom hole choke size .75" Surface choke size _____
9. Flow Rate: Gas _____ C.F.P.D. Oil _____ B.P.H. G.O.R. _____
10. Gravity of Gas _____ Gravity of Oil _____
11. Total fluid recovery: 110 feet of rat hole mud.
12. Resistivity of H_2O _____ Chlorides of H_2O _____ P.P.M.
13. Depth of top press bomb 7453' Bottom Bomb 7568'

PRESSURE DATE

	Inside	Inside		Outside	Outside
Top Bomb:	7453'	7457'	Bottom Bomb:	7563	7568
I.H.P.	4145	4157	I.H.P.	4233	4212
I.S.I.P.	3795	3764	I.S.I.P.	3809	3827
I.F.P.	2900	2908	I.F.P.	2961	2965
F.F.P.	2900	2908	F.F.P.	2961	2965
F.S.I.P.	3763	3764	F.S.I.P.	3776	3796
F.H.H.	4145	4157	F.H.H.	4233	4212
Temp.			Temp.		170°F

SAMPLE CHAMBER DATA

1. Gas _____ C.F.
2. Oil _____ C.C.
3. H_2O _____ C.C.
4. Mud _____ C.C.
5. B.O.R. _____ B.S. & W. _____

REMARKS.

Test was mechanically good. Charts indicated same.

A. Scouler
Prepared By

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

DRILL STEM TEST REPORT FORM

WELL NAME Drew Point Test Well No. 1

Test Number 3 — Hole Size 8 1/2"

Date March 5, 1978 — Drill Pipe (Size & Lgth) 5" - 7516 feet

Test Interval 7765 - 7821' — Drill Collars (Size & Lgth) 6 1/4" - 210 feet

Total Depth 7821' — Type of Cushion Fluid Fresh Water

Amount of Cushion 6000'

TEST DATA

1. Tool open at 5:28 PM hours.
2. Initial open period 31 mins.
3. Initial shut-in period 46 mins.
4. Final flow period 60 mins.
5. Final shut-in period 160 mins.
6. Description of blow on initial open period None
7. Description of blow during test None
8. G.T.S. ____ mins; O.T.S. ____ mins; Bottom hole choke size .75" Surface choke size ____
9. Flow Rate: Gas ____ C.F.P.D. Oil ____ B.P.H. G.O.R. ____
10. Gravity of Gas ____ Gravity of Oil ____
11. Total fluid recovery: 240 cc rat hole fluid from sample chamber. No recovery in test string.
12. Resistivity of H_2O - Chlorides of H_2O - P.P.M.
13. Depth of top press bomb 7810' Bottom Bomb 7817'

PRESSURE DATE

	Outside		Outside
Top Bomb:		Bottom Bomb:	
I.H.P.	4398	I.H.P.	4404
I.S.I.P.	3859	I.S.I.P.	3859
I.F.P.	2686	I.F.P.	2708
F.F.P.	2686	F.F.P.	2708
F.S.I.P.	3891	F.S.I.P.	3891
F.H.H.	4398	F.H.H.	4404
Temp.		Temp.	

SAMPLE CHAMBER DATA

1. Gas - C.F.
2. Oil - C.C.
3. H_2O - C.C.
4. Mud 240 C.C.
5. B.O.R. - B.S. & W. - %

REMARKS:

Charts indicate valid test.

A. Scouler
Prepared By