THE CALIFORNIA STANDARD COMPANY

14605 - 118 Ave., Edmonton, Alberta

WELL HISTORY REPORT

SOBC SHELL BEAVERCROW Y.T. K-2

Unit K, Section 2, Grid 60°10', 125°00'

DATE: 5-14-63

SIGNED R.C. Richardson

R.C. RICHARDSON
District Superintendant

CONTENTS

WELL HISTORY REPORT

Section I - Summary of Well Data

a) Well name - SOBC SHELL BEAVERCROW Y.T. K-2

b) Permittee - The California Standard Company
Medical Arts Building
Calgary, Alberta
Licencee - Standard Oil Company of British Columbia
Medical Arts Building
Calgary, Alberta

c) Operator - Standard Oil Company of British Columbia
Medical Arts Building
Calgary, Alberta

d) Location - Unit - K Section - 2 Grid - 60°10' 125°00'

e) Co-ordinates - Latitude 60° 1' 41.53" N
Longitude 125° 1' 10.60" W

f) Permit Number - 1470

g) Drilling Contractor - Arrow Drilling Co. Rig #21
136' L.C. Moore derrick

h) Drilling authority - #113 Issued - February 28, 1962

i) Classification - New Field Well

j) Elevations - Ground - 3705' K.B. 3720'

k) Spudded - March 20, 1962

l) Completed drilling - December 24, 1962

m) Total depth - 13,045'. Plugged back to surface

n) Well status - Abandoned

0) Rig released - January 11, 1963

p) Hole size: 20" surface to 69'
17½" 69' to 852'
12¼" 852' to 4648'
8-5/8" 4648' to T.D.

q) Casing

Size	Type	Weight	Set at	Sax of cement
20"	H-40	94#	65'	182
13-3/8"	J-55	54.5#	843.60'	840
9-5/8"	J-55 & N-80	36# & 40#	4630'	1100

Section II - Geological Summary

a) Formation Tops

Markers	Samples	Logs	Elevation
Lower Mattson Sandstone	1395	1395	+2325
Fort Creek Shale	2005	2005	+1715
Nahanni Limestone	4600	4605	-885
Lone Mountain Dolomite	4770	4770	-1050
Anhydrite and Silty Dol. (Buff group)	9880	9870	-6150
Ronning Dolomite	11340	11346	-7626

b) Cored Intervals

Core #1	4611-4614	Rec. 1'	Nahanni Lst.
Core #2	4786-4808	Rec. 20.5'	Lone Mountain Dol.
Core #3	7630-7635	Rec. 5'	Lone Mountain Dol.
Core #4	10637-10681	Rec. 43'	Devono-Silurian Anhydrite and Silty Dolomite
Core #5	11495-11514	Rec. 9.0'	Ronning Dol.
Core #6	11516-11549	Rec. 29.6'	Ronning Dol.

Coring and Testing by Eastland Testers Ltd.

c) Core Descriptions:

See Appendix A.

d) Sample Descriptions:

See Appendix B.

Section III - Engineering Summary

a) Drill Stem Tests: DST charts and pressure reports were forwarded previously.

DST #1 - Lr Mattson Sandstone (1480-1573') May 12, 1962
Valve open 60 minutes ISI - 30 FSI - 60
Good air blow.
Recovered 580' of muddy water.
ISIP - 340 FSIP - 340 IFP - 333 FFP - 337 IHP - 748

DST #2 - Nahanni Limestone (4603 - 4690') August 13, 1962
Valve open 110 minutes ISI - 60 FSI - 60
Strong air blow decreasing to nil. 2877 ppm
Recovered 470' drilling mud + 3000' fresh water.
ISIP - 1538 FSIP - 1547 IFP - 519 FFP - 1543 IHP - 2510

DST #3 - Lone Mt. Dolomite (4784 - 4806') August 22, 1962
Valve open 116 minutes ISI - 30 FSI - 30
Good air blow decreasing to fair. 4785 ppm
Recovered 3050' fresh water.
ISIP - 1620 FSIP - 1575 IFP - 107 FFP - 1356 IHP - 2146

DST #4 - Lone Mt. Dolomite (7612 - 7635') September 22, 1962
Valve open 120 minutes ISI - 60 FSI - 60
Very weak air blow. 3115 ppm
Recovered 1350' fresh water.
ISIP - 2828 FSIP - 2837 IFP - 99 FFP - 620 IHP - 3669

DST #5 - Ronning Dolomite (11,412 - 11,514') November 19, 1962
Misrun

DST #6 - Ronning Dolomite (11,330 - 11,616') November 21, 1962
Valve open 120 minutes ISI - 30 FSI - 57
Very weak air blow.
Lost 630' of water cushion to formation.
ISIP - 2858 FSIP - 2627 IFP - 759 FFP - 805 IHP - 5657

DST #7 - Ronning Dolomite (12,853 - 13,045') December 31, 1962
Misrun

DST #8 - Ronning Dolomite (12,830 - 13,045') January 4, 1963
Valve open 110minutes ISI - 30 FSI - 60
Faint puff. 21336 ppm
Recovered 2800' water cushion + 500' drilling mud.
ISIP - nil FSIP - 3614 IFP - 1283 FFP - 1448 IHP - 6149

b) Casing record

Size	Type	Weight	Set at	Cement (sacks)
20"	H-40	94#	65'	182
13-3/8"	J-55	54.5	843.60'	840
9-5/8"	J-55 & N-80	40 & 36	4630'	1100

c) Bit record:

See Appendix C.

d) Mud Report

Gel - Chemical mud
The following materials were used:

Aquagel - 245.5 Tons
Q-Broxin - 1146 sacks (50#/sx)
Caustic - 117 dr. (100#/dr)
Plaster - 645 sacks (50#/sx)
Driscose - 150 sacks (50#/sx)

e) Deviation Record - See Engineering Summary Part C)

f) Abandonment Plugs

Plug #1 (12,900 - 13,045')	60 sacks
Plug #2 (11,650 - 11,750')	60 sacks
Plug #3 (9,830 - 9,930')	60 sacks
Plug #4 (4,580 - 4,820')	130 sacks
Plug #5 (15 - 65')	25 sacks

g) Lost Circulation Zones - none

h) Blow outs - none

Section IV - Logs.

Run # 1 - April 5, 1962

Induction ES Log:	2" = 100'	64' - 823'
	5" = 100'	64' - 823'
Gamma Ray - Sonic:	2" = 100'	64' - 819'
	5" = 100'	64' - 819'
	25" = 100'	64' - 819'
Microlog - Caliper:	5" = 100'	64' - 822'
	25" = 100'	64' - 822'

Run #2 - August 11, 1962

Induction ES Log:	2" = 100'	812' - 4690'
	5" = 100'	812' - 4690'
Gamma Ray - Sonic:	2" = 100'	812' - 4685'
	5" = 100'	812' - 4685'
	25" = 100'	4525' - 4684'
Laterolog:	2" = 100'	812' - 4684'
	5" = 100'	812' - 4684'
Microlog - Caliper:	5" = 100'	812' - 4690'
	25" = 100'	4530' - 4690'

Run #3 - December 25, 1962

Induction ES Log:	2" = 100'	4639' - 13,048'
	5" = 100'	4639' - 13,048'
Gamma Ray-Sonic:	2" = 100'	4636' - 13,032'
	5" = 100'	4636' - 13,032'
Laterolog:	2" = 100'	4636' - 13,037'
	5" = 100'	4636' - 13,037'
Microlog-Caliper:	5" = 100'	4636' - 13,044'

A continuous Dipmeter Survey was run from 4636 - 13,029'. A velocity survey was conducted, by Century Geolphysical and Schlumberger. All logging by Schlumberger.

NOTE: All logs were forwarded previously.

Section V - Analysis

(a) Core Analysis: none

(b) Water Analysis: See Appendix D

(c) Gas Analysis: none

(d) Oil Analysis: none

APPENDIX A

CORE DESCRIPTIONS

S.O.B.C. SHELL BEAVERCROW YT K-2

Approx. 60°02'N 125°01'W

Core description by: J.W. Terrill

Core #1 4611-4614' Rec. 1'

Drilling Times in min./ft. - 46,39?

1' Limestone, completely silicified, medium to dark grey, argillaceous, cryptocrystalline, tight and very dense, vertical and 45° fractures up to ¼" completely filled with calcite. Interlaced with very tight, fine fractures lined with calcite crystals. Brecciated in part, completely infilled with calcite.

Core #2 4786-4808' Rec. 20.5'

Drilling Times in min./ft. - 20,13,11,15,14,22,13,9,10,7,8,20,30, 22,20,18,18,11,20,17,33,20

5' Dolomite, medium grey, mottled light grey, very fine crystalline, angular, fairly well sized crystals, bituminous in part, dense and tight, brecciated and infilled with white dolomite rhombs and calcite, fractured, mostly at approximately 45° and a few vertical fractures, fractures are cemented open with calcite up to 1/8" wide. Numerous fossil casts (gastrapods, brachs etc.) infilled with calcite. Scattered crystals of galena appear to be associated with fractures. The rock appears to be an altered biomicrite. Some dead oil in fracture linings (no fluorescence or cut).

6' Dolomite, as above, very brecciated but completely infilled, a few tight fractures.

6' Dolomite, dark grey, mottled medium grey, microcrystalline, well sized crystals, bituminous and/or argillaceous, dense, only slightly brecciated, numerous open fractures both at 45° and vertical, and vugs up to ¼", both lined with calcite, good fracture, porosity.

35' Dolomite, as in second interval described.

Core #3 7630-7635' Rec. 5' Described by - H.R. Hovdebo

Cored 5', jammed off, recovered 5'.

Coring Times in min./ft. - 54,30,15,15,36

Dolomite, dark grey, very finely to microcrystalline, traces to no intercrystalline porosity, some relict crinoid? stem fragments of coarser crystalline, lighter colored dolomite. Fairly argillaceous, scattered vugs up to 3/4" across, lined with white dolomite crystals. Irregular shaped random patches of white, coarse, crystalline dolomite, and some fracture zones healed with white crystalline dolomite, 1/8" thick, occasional stylolite seams, black in color, with some leaching and accompanying porosity. Unhealed fractures: at 30 to 45° from horizontal, slickensiding along these fracture planes. Planes are from one foot to more commonly 6" and less apart. Some fractures are so closely spaced as to cause the core to fall into small pieces. Fracture porosity and permeability probably quite high. No apparent bedding. Some suggestion of beds being about 20° from horizontal attitude.

This rock could be called an altered biomicrite.

Core #4 10,637-10,681 Rec. 43' Described by - W.Hamilton

Core jammed in barrel after 44'.

Coring Times in min./ft. - 8,11,9,7,10,10,8,9,8,12,9,9,15,9,10,10,9
9,9,12,12,13,19,15,15,12,15,9,12,11,10,10,11,
9,9,19,23,11,39,20,13,10,15,22

10637-10652' Dolomite, light grey, cryptocrystalline, very silty, slightly argillaceous, hard, dense, no intercrystalline on vuggy porosity. Occasional interval of medium grey, less silty dolomite, lenses and irregular patches of anhydrite, generally less than 1" thick, occur in the dolomite, comprising about 5% of rock. Anhydrite is light grey-medium grey, microcrystalline, soft and dense, bedding not readily perceptible but attitude of anhydrite lenses suggests the beds are nearly flat. The dolomite is massive. Fracturing not pronounced but rare, unhealed fractures on cracks can be observed, running at random through the core in places. Fracture porosity, if any, is probably very poor. No fossils, no trace of hydrocarbons. This rock is probably a primary, silty dolomite, on a micrite that has been dolomitized shortly after deposition.
Traces of very finely disseminated pyrite.

Beginning at 10,642, there is 1½' of dolomite, medium grey, silty, slightly anhydritic, slightly argillaceous, with fine laminae (1/8") of light grey dolomite, as above, bedding flat.

10652-10656' Dolomite, light to medium grey, microcrystalline, very anhydritic, slightly silty, traces of finely disseminated pyrite, dense

Interbedded with anhydrite, light grey to white, microcrystalline to very fine crystalline, soft, occurring as thin beds ¼-1½" thick, Contacts of these thin interbeds are somewhat gradational. Beds are generally flat but some contacts dip as much as 15°. This may be local depositional dip. Anhydrite is about 30% of rock. As well as the white anhydrite interbeds there are occasional lenses and irregular patches of medium grey, microcrystalline, anhydrite, scattered through the dolomite. No porosity, no fractures, no fossils. This dolomite is probably primary.

10656-10657 Dolomite, medium grey, microcrystalline, silty, slightly argillaceous, traces of pyrite, anhydritic, dense. Irregular patches of anhydrite, medium grey, as before. Patches are mainly lenticular and commonly less than ½" thick. Occasional short unhealed fractures but no effective fracture porosity.

10657-10659' Dolomite, light grey, cryptocrystalline, anhydritic, dense. Rare vertical fractures infilled with white crystalline dolomite, 1/8" wide. Also some very thin and short veinlets which appear to be infilled with anhydrite, running randomly through the core at the top of the interval. No bedding perceptible. No porosity, no fossils.

10659-10665 Interlaminated dolomite and siltstone.
Dolomite, generally light grey, cryptocrystalline, very silty, in laminae 1/16 to 1/4" thick, hard, dense. About 60% of rock.
Siltstone, medium grey, very dolomitic, hard, dense, well cemented with dolomite. About 40% of interval. A few poorly developed, unhealed fractures, some randomly orientated and some at about 45° to horizontal. Probably result from twisting action of the bit. Not likely any fracture porosity. Siltstone laminae 1/16 to 1/8" thick. Bedding is flat. Well developed laminations cause core to break along bedding and would probably form platy rubble if weathered. At about 10,660' there is about 0.5' of anhydrite and anhydritic, medium grey dolomite. No porosity in this interval.

10665-10669 Dolomite, light grey, cryptocrystalline, silty to very silty, traces of finely disseminated pyrite, hard, dense, no porosity. Irregular patches of medium grey, microcrystalline, anhydrite up to 1½" thick. Amounts to about 5% of interval.
Some poorly developed, unhealed fractures running about 45° to horizontal. May have resulted from turning action of bit. Probably no fracture porosity. Bedding not perceptible in this interval. This is probably a primary dolomite as before.

10669-10671 Dolomite, light greenish-grey, microcrystalline to cryptocrystalline, anhydritic, slightly silty, dense, hard, no porosity. This interval of the core was broken up, and appears to have been fractured to some extent. The observable fractures have random orientation but many are parallel to bedding. This is probably just splitting along the bedding. Bedding cannot be observed directly, except from the way the core splits. There may be some poor fracture porosity in this interval.

10672-10678 Anhydrite, light grey to white, microcrystalline to very fine crystalline, translucent, soft, dense.
Finely interlayed with: anhydrite, medium grey, microcrystalline, very dolomitic, soft, dense and dolomite, medium to dark grey, microcrystalline, anhydritic, slightly silty, rather soft, dense. Finely disseminated pyrite, occurs throughout interval. The above rock types appear to be interbedded on a fine scale, with occasional concentrations of one or the other. Approximate proportions of the components are white anhydrite/ medium grey anhydrite/dolomite 30/45/25.
Bedding is flat, seen from fine, wavy laminations of dark dolomite and anhydrite in white anhydrite. No porosity, no fracturing.

10678-10681 Dolomite, medium to dark grey, microcrystalline, anhydritic, traces of finely disseminated pyrite, hard, dense. A few vertical fractures are present, some of which are unhealed and some of which are infilled with white crystalline dolomite forming veinlets 1/16" wide.
There may be some poor fracture porosity in this interval, but doubtful. Bedding not perceptible.

Core #5 11495-11514 Rec. 9.0' Described by - N. Astill

0.0' Dolomite, dark grey to black, siliceous, argillaceous, microcrystalline, dense, frequent hairline fractures horizontal or slightly oblique with a vertical fracture at 5' and at 7'. No fossils noted. Blebs and fracture infilling of secondary anhydrite, white, very fine, crystalline making up to 5% of the section at the top of the core, decreasing to traces at the base.
No effective porosity or permeability. No oil staining.

Core #6 11516-11549 Rec. 29.6' Described by - J.W. Terrill

5' Dolomite, medium to dark grey, cryptocrystalline, silty, very slightly argillaceous, a few vertical fractures up to ½", completely infilled with calcite also a few vugs

filled with calcite, a few scattered hairline vertical fractures filled with anhydrite, brittle, tight, dense, no porosity or permeability.

6.8' Dolomite, medium to dark grey, cryptocrystalline, silty, very slightly argillaceous, a few vugs filled with anhydrite and calcite, brittle, light, dense, no porosity or permeability.

6.2' Dolomite, medium to dark grey, cryptocrystalline, silty, very slightly argillaceous, zones of anhydrite up to 4" thick, made up of a concentration of anhydrite blebs or vug fillings, also scattered blebs of anhydrite, tight, dense, no porosity or permeability.

6.2' Dolomite, medium grey anhydrite, fine crystalline, sugary in appearance due to anhydrite crystals, finely interbedded with anhydrite, light grey, dolomitic, fine crystalline, sugary appearance, banding, varies from horizontal to about 10%, interval is tight and dense with no porosity and permeability.

5.4' Dolomite, medium to dark grey, very fine crystalline, silty, very slightly argillaceous, a few fractures and vugs top of interval filled with white calcite and anhydrite, a few thin up to ½", shale breaks, tight, dense, brittle, no porosity or permeability.

APPENDIX B

SAMPLE DESCRIPTIONS

S.O.B.C. Shell Beavercrow Y.T. K-2

(Originally called Y.T. # 1)

Approximately 60° 02' N 125° 01' W

SAMPLE DESCRIPTION

S.O.B.C. SHELL BEAVERCROW Y.T. K-2

Approximately 60° 02' N 125° 01' W

Sample Description by:
J. W. Terrill

Spot samples from above conductor pipe.

0' Ground level (outcrop sample from the celler)

Sandstone cream, rust speckled due to weathered pyrite, very fine ground, well sorted, slightly calcareous, tight dense.

Approximately 38' Shale, medium to dark grey, fissile slightly calcareous, approximately 50%.

Sandstone, cream to red, fine grained, fair sorting, poor to fair hematite infilling, some chip probably fairly high in hematite (give good streak) tight dense approximately 50%.

Approximately 41' As in 38' sample.

Approximately 70' Shale as above, approximately 95%, approximately 5% sandstone as above.

Note: There seemed to be drilling break at approximately 28 feet, which was probably the contact between the dense sandstone and the shale. Probably this is a slightly graduational contact as sandstone beds appear to carry on down to about 100 feet.

SAMPLE DESCRIPTIONS:

Note: Calstan color chart used. Rotary Sandgrain chart used.

Sample start at 70' (below conductor pipe).

70' - 80'	Shale, medium gray, slightly blocky graded appearance, very slightly calcareous, very slightly pyrite, slightly sandy (sand grain, very fine, argillaceous). Sandstone, less then 5% of sample, cream to red, very fine grained, slightly rounded, fair sorting, siliceous cement, hematite infilling in part (possibly weathered pyrite), calcareous in part (hematite chips) tight.
80' - 90'	Shale as above, less then 1% sandstone as above.
90' - 100'	Shale as above, slightly fissile, sandstone less then 5% fine grained to very fine grained, cream to light yellow, with rusty specks, (due to pyrite weathering) calcareous, tight.
100' - 110'	Shale as above, slightly fissile, slightly waxy in appearance, scattered pyrite, fossil fragments (brachipod, trilobite), approximately 1% sandstone as above.
110' - 120'	Shale as above, microscopic calcite stringers.
120' - 130'	Shale dark to medium gray, fissile to blocky, slightly waxy in part, microscopic pyrite and calcite crystals.
130' - 140'	Shale as above, a few scattered chips of the above sandstone.
140' - 150'	Shale as above.
150' - 160'	Shale dark gray, gnarled appearance, sightly pyritic in part, slightly calcareous.
160' - 170'	Shale dark gray - as above.
170' - 180'	Shale as above.

180' - 190'	Shale as above, same shale as from 120 - 130'.
190' - 200'	Shale as above, same shale as from 120 - 130'.
200' - 210'	Shale dark gray, gnarled appearance, slightly pyritic, slightly calcareous.
210' - 220'	Shale dark gray, gnarled in part, silty in part pyritic, slightly calcareous, approximately 75%. Sandstone light gray, fine grained, well sorted, subangular quartz grains, a few scattered black chert grains?, pyritic, quartz cement hard, tight dense.
220' - 230'	Sandstone as above approximately 50%. Shale as above approximately 50% (possibly cavings).
230' - 240'	Sandstone, quartzite light to medium gray, fine grained, well sorted, subangular to angular quartz grains, slightly calcareous and argillaceous, hard tight, a few black chert grains?.
240' - 250'	Sandstone as above to sandstone light gray, with only scattered black chert grains and not argillaceous.
250' - 260'	Sandstone as above sightly pyritic, some chips speckled and stained with rust probably due to weathered pyrite.
260' - 270'	Sandstone as above, very pyritic in part.
270' - 280'	Sandstone, light to medium gray, fine to very fine grained, argillaceous in part; subangular, well sorted quartz, scattered pyrite a few chips have rusting stains, calcareous to slightly calcareous tight dense.
280' - 290'	Sandstone, red to dark gray, slightly argillaceous pyritic some very finely disseminated, slightly calcareous in part, fine to very fine grained; subangular fair sorted quartz grains, tight and dense.

290' - 300'	Sandstone as above.
300' - 310'	Sandstone as above.
310' - 320'	Sandstone as above, microscopic stringers of white chert in some chips.
320' - 330'	Sandstone as from 280 - 290', some chips pinkish color due to rusting of pyrite.
330' - 340'	Sandstone as above.
340' - 350'	Sandstone as above, pyrite, very finely disseminated rusty stains on approximately 50% of chips; a few black chert grains.
350' - 360'	Sandstone as above, not as pyritic, a few chips with rusty stains.
360' - 370'	Shale, medium dark gray, slightly silty, slightly micaceous with very finely disseminated mica, and some finely disseminated pyrite fissile to black.
370' - 380'	Shale dark gray to black, calcareous micaceous as above, bituminous slightly silty in part, slightly fissile. Sandstone, light gray, calcareous, slightly argillaceous in part, fine grained, subangular well sorted quartz grains, tight dense approximately 10%.
380' - 390'	Shale as above, very bituminous.
390' - 400'	Shale as above, a few very thin coal stringers.
400' - 410'	Sandstone, medium to dark gray, very argillaceous and/or bituminous, slightly calcareous, made up of very fine subrounded to subangular, fairly well sorted quartz and white chert grains, finely disseminated mica. Shale as above approximately 40%.

410' - 420'	Sandstone as above, a few microscopic pyrite stringers and grains.
420' - 430'	Sandstone as above, no visible pyrite.
430' - 440'	Sandstone as above, no visible pyrite.
440' - 450'	Sandstone as above, no visible pyrite.
450' - 460'	Shale, dark gray to black, bituminous, micaceous, slightly pyriticin part, calcareous, slightly silty, slightly fissile in part, a few scattered coal seams, some infilling with white crystalline calcite.
460' - 470'	Shale as above, infilling with white crystalline calcite, no coal visible, a few very thin stringers of sandstone, dark gray brown argillaceous, tight less than 1% of sample.
470' - 480'	Shale as above, calcite sandstone stringers as above.
480' - 490'	Shale as above, less bit, in part, slightly waxy in appearance, noncalcareous. Sandstone less than 5% light gray, slightly calcareous, very fine grained, slightly rounded, well sorted quartz grains tight and dense.
490' - 500'	Shale as above slightly calcareous, sandstone less than 5% as above.
500' - 510'	Shale as above slightly calcareous, approximately 75%. Sandstone medium gray, slightly argillaceous, subangular to angular, quartz grains, calcareous fine grained disseminated pyrite tight dense approximately 25%.
510' - 520'	Shale, dark gray to black, bituminous, micaceous, pyrite in part, silty in part, calcareous, some very fine calcite veinlets. Sandstone, medium gray, argillaceous, fine grained made up of subangular poorly sorted quartz and white chert? grains calcareous some very fine calcite veins, tight approximately 10%.

520' - 530'	Shale as above approximately 90%. Sandstone as above approximately 10%.
530' - 540'	Shale as above, scattered calcite veinlets, trace of above sandstone.
540' - 550'	Shale as above, scattered calcite veinlets, trace of above sandstone.
550' - 560'	Shale as above, slightly fissile, slightly waxy appearance, trace of above sandstone.
560' - 570'	Shale as above, silty approximately 70%. Sandstone, medium to dark gray, very fine grained, argillaceous, slightly micaceous, calcareous, subangular well sorted quartz grains tight approximately 30%.
570' - 580'	Shale as above, silty in part approximately 90%, sandstone as above approximately 10%, a few white calcite crystilline.
580' - 590'	Shale as above sandy in parts approximately 60%, sandstone as above argillaceous approximately 40%.
590' - 600'	Shale as above, sandy in parts , pyrite in parts approximately 60%. Sandstone as above agrillaceous approximately 40%.
600' - 610'	Shale as above slightly sandy approximately 80%. Sandstone as above agrillaceous approximately 20%. A few very thin white calcite stringers.
610' - 620'	Sandstone medium to dark gray, calcareous, argillaceous, fine grained subangular, fair sorted quartz, a few black chert, a few pyrite grains, a few very thin calcite stringers approximately 70%. Shale, dark gray to black bituminous, micaceous, pyrite in part, slightly calcareous approximately 30%.
620' - 630'	Sandstone as above approximately 50%. Shale as above, silty in part approximately 50%.

630' - 640'	Sandstone as above and sandstone as above, a little less argillaceous with very poor intergranular porousity in part, very pyritic zones mostly in shale dense approximately 90%, shale as above approximately 10%.
640' - 650'	Sandstone, medium gray, fine grained, slightly argillaceous, slightly cabareous well sorted subangular quartz some poor intergranular porosity hard.
650' - 660'	Sandstone as above pyrite in parts approximately 30%. Shale as for 610' - 620' approximately 70%.
660' - 670'	Shale, dark gray to black, very slightly calcareous, bituminous in part, pyritic in part, fracture zone filled with white calcite and pyrite approximately 90%. Sandstone as above approximately 10%.
670' - 680'	Shale, dark gray, noncalcareous, slightly bituminous pyritic in part, fissile, waxy appearance. Trace of above sandstone.
680' - 690'	Shale as above.
690' - 700'	Shale as above.
700' - 710'	Shale dark gray, silty in part, mostly bituminous a small per cent, only slightly, slightly calcareous in part, scattered microscopic meca flakes scattered pyrite.
710' - 720'	Shale as above.
720' - 730'	Shale, dark gray, slightly bituminous to bituminous, slightly calcareous in part, scattered microscopic mica flakes and pyrite grains.
730' - 740'	Shale as above silty in part.
740' - 750'	Shale as above silty in part.
750' - 760'	Shale as above silty in part.

760' - 770' Shale as above, a few hairline calcite stringers.

770' - 780' Shale as above, up to 10% sandstone light gray, very fine grain, subangular, well sorted quartz grain, slightly argillaceous, probable caving.

780' - 790' Shale, dark gray, fissile, scattered microscopic mica flakes and pyrite grain, slightly bituminous, a few hairline calcite stringers.

790' - 800' Shale as above.

800' - 810' Shale as above.

810' - 820' Shale as above.

820' - 830' Shale dark gray, fissile in part, silty in part, slightly calcareous in part, scattered pyrite zones and sandstone stringers, sandstone red gray, very fine grained, slightly argillaceous, slightly calcareous, pyrite in part, tight less than 5% of sample.

830' - 840' Shale as above with less than 5% sandstone as above.

840' - 850' Shale as above with less than 5% sandstone as above.

850' - 860' Shale as above with less than 5% sandstone as above.

860' - 870' Shale, dark gray, fissile, a few scattered pyrite zone, slightly bituminous?.

870' - 880' Shale as above plus sandstone stringers, medium gray, fine grained, angular, well sorted quartz and black chert grains, pyritic, slightly calcareous, tight dense, less than 5% of sample. A few very thin white calcite stringers cutting both shale and sandstone.

880' - 890' Sandstone, medium gray, fine to very fine grained, subangularly fairly well sorted quartz and black chert(in part) grains, calcareous, slightly argillaceous, tight approximately 60% shale as above 40%.

890' - 900' Sandstone as above approximately 60% shale as above approximately 40%. Pyrite in part.

900' - 910'	Sandstone as above approximately 40% shale as above approximately 60%.
910' - 920'	Sandstone as above approximately 40% shale as above very pyritic in part approximately 60%.
920' - 930'	Shale, dark gray, blocky to fissile, slightly bituminous in part, slightly pyritic in part, a few salmon pink quartz stringers.
930' - 950'	Shale, dark gray, fissile, slightly waxy appearance, slightly bituminous, scattered mica flakes, scattered pyrite crystals.
950' - 960'	Shale as above.
960' - 970'	Shale as above approximately 95%. Sandstone medium cream, fine grained, subangular, well sorted quartz grains, slightly argillaceous, a few scattered very thin calcite stringers - tight.
970' - 980'	Sandstone, medium gray, fine to very fine grained, subangular, fair sorted quartz grains, slightly argillaceous, tight dense approximately 50% shale as above, slightly silty, slightly micaceous approximately 50%.
980'- 990'	Sandstone as above, slightly pyritic in part, 75% shale as above 25%.
990' - 1000'	Sandstone as above 75% shale as above 25% a few stringers.
1000' - 1010'	Sandstone as above a few scattered black chert grains approximately 75% shale as above 25%.
1010' - 1020'	Sandstone as above approximately 50% shale as above approximately 50%, a few pyritic zones.
1020' - 1030'	Sandstone as above approximately 10%, shale, medium gray, slightly fissile to slightly blocky approximately 90%.
1030' - 1040'	Sandstone as above less than 10%, shale, medium to dark gray, fissile, slightly bituminous, pyritic stringers, sandy stringers.

1040' - 1050' Sandstone light to medium gray, fine grained subangular, poorly sorted quartz grains approximately 25%. Shale as above 75%.

1050' - 1060' Sandstone as above 25%, shale as above 75%.

1060' - 1070' Sandstone as above 10%, shale as above 75%, scattered pyritic zones.

1070' - 1080' Sandstone medium gray, fine grained, subangular, poorly sorted quartz grains, slightly argillaceous in part, dense, approximately 75% shale as above 25% scattered white quartz stringers.

1080' - 1090' Sandstone as above approximately 10%. Shale as above blocky approximately 90%.

1090' - 1100' Shale, dark gray to black, silty, slightly calcareous in part, slightly bituminous, mostly blocky, slightly pyritic in part. Sandstone as above less than 10%.

1100'- 1110' Shale as above.

1110' - 1120' Shale as above, bituminous.

1120' - 1130' Shale as above, bituminous.

1130' - 1140' Shale as above, bituminous, waxy appearance, fissile.

1140' - 1150' Shale as above, bituminous, slightly silty, slightly micaceous, fissile. Sandstone red gray, fine grained subangular fairly well sorted quartz grains dense less than 10%, scattered white quartz stringers.

1150' - 1160' Shale as above, sandstone as above less than 10%, scattered white quartz stringers.

1160' - 1170' Shale dark gray to black, blocky, bituminous, micaceous in parts. Sandstone dark gray, very fine grained poorly sorted subangular quartz and black chert?, argillaceous, dense.

1170' - 1180'	Shale, as above, sandstone, medium gray, fine grains fair sorted subangular quartz less than 10% a few scattered calcite veinlets.
1180' - 1190'	Shale as above, bituminous, sandstone as above less than 10%.
1190' - 1200'	Shale as above, bituminous, silty in part, sandstone as above less than 10%.
1200 - 1210'	Sandstone medium gray, fine grained, fair sorted subangular quartz and some black chert grains, slightly argillaceous, dense approximately 15%. Shale as above.
1210' - 1220'	Sandstone as above very little black chert, approximately 10%. Shale as above.
1220' - 1230'	Sandstone as above very little black chert, approximately 10%. Shale, dark gray, fissile, bituminous, pyrite, laminea, a few scattered white calcite stringers.
1230' - 1240'	Shale, dark gray, fissile, bituminous, waxy appearance, a few pyritic zones.
1240' - 1250'	Shale, as above, fissile, bituminous, waxy appearance, a few pyritic zones.
1250' - 1260'	Shale as above.
1260' - 1270'	Shale as above.
1270' - 1280'	Shale as above, the odd calcite stringer.
1280' - 1290'	Shale as above, fracturer filled with pyrite calcite and white quartz in that order.
1290' - 1300'	Shale dark gray, bituminous, slightly silty, slightly micaceous, slightly pyritic.
1300' - 1310'	Shale as above, the odd fractured filled with pyrite and calcite.

1310' - 1320'	Shale, dark gray, fissile bituminous, slightly micaceous, slightly pyritic.
1320' - 1330'	Shale as above, sandstone, dark gray, very fine grained, subangular, quartz and black chert, very pyritic, argillaceous less than 10%.
1330' - 1340'	Shale as above, sandstone as above less than 10%.
1340' - 1350'	Shale as above, sandstone as above less than 10%.
1350' - 1360'	Sandstone, dark brownish gray, fine grained, poor sorted subangular quartz and some black chert grains, micaceous (biotite) argillaceous, slightly pyrite in part, slightly calcareous approximately 25%. Shale as above 75%.
1360' - 1370'	Sandstone, dark brownish gray, fine grained, poorly sorted subangular quartz and a few black chert grains, pyritic in part approximately 50%, a few silica fracture fillings. Shale as above approximately 50%.
1370' - 1380'	Sandstone as above 25%. Shale as above 75%. Very poor sample.
1380' - 1390'	Sandstone, dark brownish gray, to dark gray, fine grained subangular to angular, fairly well sorted quartz and some black chert grains, pyritic, very dense.
1390' - 1400'	Sandstone as above slightly pyritic.
1400'- 1410'	Sandstone medium gray, fine grained, subangular, well sorted quartz grains, slightly argillaceous, dense tight, very slightly pyritic.
1410' - 1420'	Sandstone, dark gray, fine grained, subangular well sorted quartz and black chert, argillaceous and/or bituminous slightly pyritic, mostly dense and tight approximately 50% shale dark gray to black, fissile, bituminous approximately 50%, silicaeous fracture fillings.

1420' - 1430' Sandstone, as above approximately 50% shale as above approximately 50%.

1430' - 1440' Sandstone, medium gray, fine grained, subangular, well sorted quartz grains, slightly argillaceous and/or bituminous, very slightly pyritic in parts, tight and dense, sandstone as above with poor to fair intergranular porosity approximately 10%. Shale as above approximately 40%.

1440' - 1450' Sandstone medium gray, fine grained, subangular, well sorted quartz, slightly argillaceous and/or bituminous, slightly pyritic, friable, no visible prosity, approximately 60%. Shale as above approximately 40%.

1450' - 1460' Sandstone as above friable to dense approximately 60%. Shale as above approximately 40%.

1460' - 1470' Sandstone, medium gray, fine grained, subangular, well sorted quartz grains, slightly argillaceous in part, tight, very dense.

1470' - 1480' Sandstone as above, slightly pyritic.

1480' - 1490' Sandstone as above, hard and dense except for a few chips that are slightly friable.

1490' - 1500' Sandstone, medium gray, fine grained, subangular, well sorted quartz, slightly argillaceous, friable to dense no visible porosity.

1500' - 1510' Sandstone, light gray, fine grained subangular, well sorted quartz grains, friable, some loose sand in sample, poor intergranular proosity to no visible porosity.

1510' - 1520' Sandstone as above.

1530' - 1540' Sandstone as above mostly loose sand.

1540' - 1550' Sandstone as for 1500' - 1510'.

1550' - 1560' Sandstone as above friable to dense, bituminous in part quartz crystilline (possible fracture?).

1560' - 1570'	Sandstone medium to dark gray, fine grained subangular well sorted quartz, argillaceous and/or bituminous, slightly pyritic, mica flakes, mostly tight.
1570' - 1580'	Sandstone light gray, fine grained subangular well sorted quartz mostly friable, a few chips with poor intergranular porosity.
1580' - 1590'	Sandstone as from 1530' - 1540' some silicaeous infilling of fractures.
1590' - 1600'	Sandstone as from 1560' - 1570'.
1600' - 1610'	Sandstone, light gray, fine grained, subangular, well sorted quartz friable to dense, slightly pyritic, very slightly bituminous and/or argillaceous in part, no visible porosity.
1610' - 1620'	Sandstone as from 1560' - 1570'.
1620 - 1630'	Sandstone as above.
1630' - 1640'	Sandstone as above, rusty stains.
1640' - 1650'	Sandstone as above, dense.
1650' - 1660'	Sandstone as above, dense.
1660' - 1670'	Sandstone as above, dense.
1670' - 1690'	Sandstone as above, fractures filled with quartz crystilline, bituminous shale and coal.
1680' - 1700'	Sandstone as above approximately 35%, sandstone as above very argillaceous and bituminous approximately 30%. Shale dark gray to black, bituminous, fissile approximately 35%.
1700' - 1710'	Sandstone as above, a lot of loose sand 60%, Shale as above 40%.
1710' - 1720'	Sandstone and shale as from 1690' - 1700'

1720' - 1730'	Sandstone, light to medium gray, fine grained, well sorted subangular quartz grains, some very fine black mineral, slightly argillaceous approximately 80%, shale and sandy shale as above approximately 20%.
1730' - 1740'	Sandstone, light gray, few grained well sorted sub-angular grain, slightly argillaceous in part, dense approximately 80%. Shale as above approximately 20%.
1740'- 1750'	Sandstone as above approximately 80%. (Possible cavings).
1750' - 1760'	Sandstone as above.
1770' - 1780'	Sandstone as above, a few chips with fair intergranular porosity and some pyrobitumen infillings.
1780' - 1790'	Sandstone as above, poor intergranular porosity in part fairly lined with pyrobitumen. Shale black bituminous fissle approximately 40%.
1790' - 1800'	Sandstone as above, slightly argillaceous, shale as above sandy in part approximately 40%.
1800' - 1810'	Shale, black, bituminous, fissile.
1810' - 1820'	Shale, as above scattered mica flakes, a few stringers of the above sandstone.
1820' - 1840'	Shale as above, scattered mica flakes, stringers of sandstone.
1840' - 1850'	Shale as above, approximately 85%. Sandstone light to medium gray, fine grained subangular well sorted, quartz graining pyrite some poor intergranular prosity otherwise tight and dense. Fractures in the shale filled with quartz crystilline.
1850' - 1860'	Shale as above approximately 85%. Sandstone as above, appears to be in the form of stringers.
1860' - 1870'	Shale as above approximately 90%. Sandstone as above, appears to be in the form of stringers.

1870' - 1880'	Shale 95%. Sandstone less than 5%.
1880' - 1890'	Shale as above slightly calcareous in part, microscopic stringers of calcite and quartz. Sandstone as above approximately 15%.
1890' - 1900'	Shale as above approximately 75% sandstone, light to medium gray, fine grained, subangular well sorted quartz, slightly argillaceous, slightly pyritic, scattered mica flakes, dense tight.
1900' - 1910'	Shale as above approximately 75% sandstone as above.
1910' - 1920'	Shale as above approximately 75% sandstone as above, pyritic.
1920'- 1930'	Shale as above approximately 60% sandstone as above, pyritic.
1930' - 1940'	Shale as above approximately 60% sandstone as above, pyritic.
1940' - 1950'	Shale as above approximately 85% sandstone as above, pyritic sandstone appears to be intergranular stringers.
1950' - 1960'	Shale as above approximately 50% sandstone as above, pyritic approximately 50%.
1960' - 1970'	Sandstone, light gray, fine grained, subangular well sorted quartz, grains dense scattered pyrite 75%. Shale as above 25%.

Sample Description by:
A. Falloom

1970' - 1980'	Sandstone as above approximately 85%. Shale as above approximately 15%.
1980' - 1990'	Sandstone as above approximately 75%. Shale as above approximately 25%.
1990' - 2000'	Sandstone as above approximately 50%. Shale as above approximately 50%.
2000' - 2010'	Shale dark gray, biteminous fissile, scattered pyrite and mica approximately 75%. Sandstone as above approximately 25%.
2010' - 2020'	Shale as above approximately 90%. Sandstone as above approximately 10%.
2020' - 2030'	Shale as above approximately 95%. Sandstone as above approximately 5%.
2030' - 2040'	Shale as above approximately 95%. Sandstone as above in stringers less than 5% ? pyrite stringers in shale.
2040' - 2050'	Shale black as above, pyrite, a few chips of sandstone.
2050' - 2060'	Shale black as above, pyrite, a few chips of sandstone.
2060' - 2160'	Shale black bituminous micro micaceous pyrite slightly dolomitic. Sandstone as above, trace. Shale black silicified trace. Shale dark brown slightly dolomitic trace.

2160' - 2180' Shale black etc. as above 95%.
Sandstone white very fine grained slightly dolomitic tight 5%.

2180' - 2210' Shale black bituminous pyritic slightly dolomitic.
Sandstone as above trace.

2210' - 2220' Shale as above 95%.
Siltstone dark gray to black bituminous micro micareous slightly dolomite 5%.

2220' - 2420' Shale as above.
Shale black silicified trace.
Anhydrite white veined trace.

2420' - 2440' Shale as above except less bituminous 99%.
Anhydrite/Dolomite white veined 1%.

2440' - 2550' Shale black bituminous slightly dolomitic.
Anhydrite/Dolomite as above trace.
Pyrite trace.

2550' - 2750' Shale dark gray to black slightly bituminous slightly dolomitic.
Anhydrite/Dolomitic white veined trace.
Pyrite trace.

2750' - 2770' Shale black slightly bituminous pyritic.

2770' - 2780' Shale black silicified bituminous? Slightly dolomitic.

2780' - 2800' Shale silicified as above 50%.
Shale black slightly bituminous, pyritic slightly dolomitic 50%.

2800' - 2820' Shale as above 50%.
Dolomite light to medium gray, very fine grained.
Partly silicified occasionally, argillaceous.

2820' - 2840' Shale black slightly bituminous pyrite 80%.
Shale silicified as above 20%.

2850' - 2900' Shale black slightly bituminous pyritic slightly dolomitic.

2900' - 2940'	Shale black dolomitic, slightly bituminous. Dolomite veining trace. Pyrite trace.
2940' - 2960'	Shale as above 90%. Shale silicified as above 10%. Dolomite veining trace.
2960' - 2980'	Shale as above 50%. Shale silicified as above 50%.
2980' - 3000'	Shale silicified as above. Dolomite veining trace.
3000' - 3100'	Shale dark gray slightly dolomitic, slightly bituminous. Pyrite trace, Shale black, siliceous trace. Dolomite white veined trace. Quartz trace.
3100' - 3110'	Shale as above 70%. Shale midium to dark gray, slightly calcareous. Speckled 30%. Pyrite trace. Quartz veined trace.
3110' - 3130'	Shale slightly bituminous as above 80%. Shale black silicified 20%. Pyrite trace.
3130' - 3180'	Shale dark gray bituminous 90%. Pyrite trace. Quartz veined trace. Shale silicified as above 10%.
3180' - 3210'	Shale dark gray to black bituminous.
3210' - 3280'	Shale as above 98%. Shale calcareous or shaly limestone speckled black 2%. Quartz veined trace. Calcite veined trace.

3280' - 3360'	Shale black silicified (chert?) 80%. Shale black bituminous 20%. Quartz veined trace. Pyrtie trace. Calcite veined trace (more common toward base of interest).
3360' - 3390'	Silicified shale (chert?) black 80%. Shale black bituminous 18%. Calcite white crystalline veined 2%. Quartz veined trace. N.B. Shale chips often have shiny faces.
3390' - 3440'	Shale silicified (chert?) as above. Calcite white veined trace. Quartz veined trace. Anhydrite white veined? trace. Sandstone? white quartzose trace.
3440' - 3450'	Shale black bituminous slightly silicified. Calcite white veined trace.
3450' - 3480'	Shale silicified as above 80%. Shale black bituminous as above 20%. Calcite white veined trace. Pyrite trace.

Sample Description by:
W. Lugg

3490' - 3500'	Shale black bituminous - slightly calcareous 50%. Shale, silicified, as above, 50% cherty. Calcite white veined trace. Pyrite, trace.
3500' - 3540'	Shale black bituminous, slightly calcareous, cherty in part 100%. Calcite, white veined trace. Pyrite trace.
3540' - 3500'	Shale, black bituminous, slightly calcareous, slightly siliceous, 100%. Calcite, white veined trace. Pyrite, trace.
3600' - 3610'	Shale, black bituminous, slightly calcareous, Slightly siliceous 90%. Shale - black, calcareous 10%. Trace of pyrite 5%. Calcite - white veined - trace.
3610' - 3690'	Shale - black bituminous, slightly calcareous, Slightly siliceous, 100%. Trace of pyrite 5%. Calcite, white veined, trace.
3690' - 3740'	As above plus Trace of shale - gray black calcareous.

Sample Description by:
H.R. Hovdebo

3740' - 3750'	Shale, dark gray, noncalcareous, fairly hard trace to 10% of rock contains finely disseminated pyrite.
3750' - 3760'	Shale, as above, pyrite more abundant, some shale is slightly dolomitic (3%).
3760' - 3770'	Shale, dark gray, noncalcareous fairly brittle, rarely dolomitic, fairly abundant finely disseminated pyrite, slightly bituminous, slickensiding noted.
3770' - 3780'	Shale, as abovedolomitic particles appear speckled (dolomite is white in black matrix of shale). Pyrite particles up to 2mm across seen.
3780' - 3790'	Shale, dark gray, frangible, to hard. Up to 30% is dolomitic, remainder noncalcareous. Disseminated pyrite-trace, slightly bituminous or carbonaceous slickensiding seen.
3790' - 3800'	As above.
3800' - 3820'	Shale, dark gray, noncalcareous, fairly hard, slightly bituminous and/or carbonate. Finely disseminated pyrite in at least half of the cuttings. Also tyrite cubes up to 1 mm seen (80%). Dolomitic shale - 20% (and less). Dolomite is light gray, finely shine.
3820' - 3840'	Shale, dark gray to black, frangible to hard mainly noncalcareous. Veinlets of quartz and calcite - trace, pyrite trace.
3840' - 3850'	Shale, dark gray to black, frangible to hard mainly (90%) noncalcareous. Dolomitic shale trace. Quartz crystillines (very fine grain) trace, Pyrite trace.
3850' - 3870'	Shale, dark gray to black, mainly noncalcareous frangible. Pyrite - trace, some medium grain size particles seen. Quartz crystalline (very fine crystilline) trace. Dolomitic shale trace. Slickensiding seen on shale.

3870' - 3890' Shale, dark gray to black, noncalcareous, frangible to hard. Pyrite-trace, Calcite veinlets, trace. slickensiding seen - 90%. Dolomitic shale and carbonaceous shale trace.

Sample Description by:
J.W. Terrill

3900' - 3930' Shale as above, pyrite crystillines, slickenside, trace to 5% of dolomitic shale.

3930' - 3940' Dolomitic shale dark gray approximately 10%, shale consists of approximately 30%. Very fine dolomite crystilline. Shale as above, pyritic approximately 90%.

3940' - 3950' Shale, dark gray, earthy slightly pyritic.

3950' - 3970' Shale, as above approximately 90%.
Shale dolomitic as above 10%.

3970' - 3990' Shale as above 95%. Shale dolomitic approximate 5%.

3990' - 4020' Shale, dark gray, approximately 50% slightly dolomitic, finely disseminated. Pyrite in approximately 10% of shale, a few very fine calcite veins.

4020' - 4070' Shale black as above, finely disseminated pyrite slightly bituminous, approximately 5% dolomitic as above.

4070' - 4090' Shale, dark gray, some fine disseminated pyrite, dolomitic shaly approximately 5%.

4090' - 4200' Shale, dark gray, pyritic crystillines and a few scattered pyrite veins.
(4130 - 50' microscopic crystilline dolomite veins.)
(4170 - 80' Shale, dolomitic medium gray, very pyritic approximately 40%.)
(4180 - 90' Scattered very fine crystilline dolomite veins).

4200' - 4250' Shale, dark gray, finely disseminated pyrite, and limestone slightly to gray, microcrystalline, pyritic argillaceous dense, less than 1% of sample abo a few chips of solid pyrite.
4230 - 50 limestone becomes very agrillaceous and pyritic.

4250' - 4270' Shale as above, a few very thin white calcite fracture fillings lessthan 1%. A few chips of sandstone medium gray fine grained, quartz sand, a few chips of solid pyrite as above.
4260 - 70, a few chips of sandstone as above.

4270' - 4290' Shale, dark gray, finely disseminated pyrite in approximately 50% of chips, slickensides, calcite fracture fillings as above.

4290' - 4450' Shale, dark gray, finely disseminated pyrite in approximately 50% of chips, slightly siliceous in part, slightly bituminous in part, a few crystalline calcite and quartz and pyrite fracture fillings.
4380 - 4400 - a few sandstone chips as above.

4450' - 4550' Shale dark gray, finely disseminated pyrite in most chips slightly bituminous, a few calcite and pyrite veins.
4490 - 4500 - a few chips of sandstone, dense and hard.
4500 - 4550 - approximately 10% shale, calcite, otherwise as above.
4520 - 4550 - numerous calcite and pyrite veins, slickensides.
4440 - 4550 - trace of lst, agrillaceous, dense.

4550' - 4600' Shale dark gray, bituminous, slightly pyritic, slightly siliceous in part. Scattered very thin white calcite veins, approximately 90% shale, medium gray, calcareous approximately 10%.
4570 - 80 a few chips of limestone, medium gray, agrillaceous tight.
4580 - 4700 - 10% limestone, medium gray, micocrystilline, very argillaceous, tight, calcite fracture fillings.

4600' - 4611'	Limestone medium gray, silicified argillaceous, microcrystalline to cryptocrystalline fracture and/or vugs lined with calcite and dolomite crystalline tight dense no shows. Shale as above approximately 20%.
4611' - 4614'	Core # 1. See core descriptions.
4614' - 4690'	Limestone medium gray, slightly siliceous in part (4644 to 4620') microcrystilline argillaceous, white calcite fracture fillings tight no show. 4660' - 90 - scattered sponge spicules. the last, could be needles
4690' - 4720'	Limestone, light gray, argillaceous dolomitic micro-crystilline, dense, chips of white calcite, indicating some fracturing - very poor sample.
4720' - 4740'	Limestone, light gray as above, 80% dolomite, medium gray, very fine crystilline, argillaceous and/or bituminous, fractured and infilled with white calcite. Very poor sample.
4740' - 4760'	Limestone, light to medium gray as above.
4760' - 4770'	Limestone, light to medium gray as above 80%, dolomite, medium gray as above.
4770' - 4786'	Dolomite, medium to dark gray, very fine crystilline, bituminous tight, white calcite and dolomite infilling breccial and fractures, good fracture porosity.
4786' - 4808'	Cored See core # 2.
4808' - 4890'	Dolomite as in core # 2,
4890' - 5080'	Dolomite, medium gray, fine crystilline bituminous and/or argillaceous, brecciated and fractured filled with white calcite and white to dolomite rhombs a few chips have crystilline faces either lining fractures or very probably good fracture porosity.

Sample Descriptions by:
W. Lugg

5080' - 5120'	Dolomite, medium gray, fine crystalline, bituminous and argillaceous, bricciated, filled with coarsely crystalline calcite and dolomite veins, traces of pyrite, probably good fracture porosity, otherwise dense.
5120' - 5150'	Dolomite - as above plus minor white chalky limestone.
5150' - 5400'	Dolomite - light to dark gray, fine to medium crystalline, argillaceous, brecciated, fractured, traces of pin point porosity, veined with fine to coarsely crystalline white calcite and dolomite, traces of pyrite very poor intercrystalline porosity, probably has good fracture porosity. The odd gragment has fair intercrystalline porosity. Traces of coarsely crystalline galena.
5400' - 5460'	As above plus minor white chalky limestone.
5460' - 5600'	Dolomite - light to dark gray, fine to medium crystalline, argillaceous, brecciated, fractured, veined with fine to coarsely crystalline white calcite and dolomite, traces of pyrite and galena, scattered pin point porosity, minor patchy fair intercript porosity but generally dense, probably has good fracture porosity. Some large clear crystalline rhombs of dolomite and calcite are present.
5600' - 5630'	Limestone - white and clear crystalline 60% coarsely crystalline and dolomite 4% light to dark gray, fine to medium crystalline, argillaceous brecciated, fractured veined with white coarsely crystalline limestone as above. Minor patchy fair intercrystalline porosity, generally dense - good fracture porosity? Traces of pyrite.

Note: The increasing amount of limestone in this interval is probably due to a local increase in vein calcite.

5630' - 5750' Dolomite - light to dark gray, fine to medium crystalline, argillaceous, brecciated, fractured veined with fine to coarsely crystilline white calcite and dolomite, traces of pyrite, minor scattered pin point porosity, minor patchy fair intercript porosity, generally dense, probably has good fracture porosity. Some large clear crystalline rhombs of calcite are present.

5750' - 5900' Dolomite - light greenish gray to dark gray, microcrystalline to medium crystalline, argillaceous, brecciated fractured, veined with fine to coarsely crystalline white to clear crystalline dolomite and calcite, traces of pyrite and galena, minor scattered pin point and fair intercrystalline, generally dense, probably has good fracture porosity.

5900' - 5950' Dolomite - light gray to dark gray, microcrystalline to medium crystalline, argillaceous, brecciated, fractured veined with fine to coarsely crystalline dolomite plus calcite (15% of rock, some scattered pin point plus minor fair intercript, porosity generally dense. Probably has good fracture porosity.

5950' - 6070' Dolomite - light gray to black, fine to medium grained, slightly argillaceous, brecciated, fractured veined with white crystalline dolomite and calcite 10% of rock, some scattered pin point porosity, poor to fair intercrystalline porosity - generally poor. Probably has good fracture porosity?

6070' - 6150' Dolomite as above with an increase in white crystalline calcite to 30% of the rock. Traces of crystalline pyrite.

6150' - 6180' Dolomite - light gray to black, fine to medium grained, slightly argillaceous, brecciated, fractured, veined with white crystalline dolomite plus calcite (30% of rock) some scattered pin point porosity, poor intercrystalline porosity to dense generally dense probably has good fractured porosity plus dolomite - light greenish gray microcrystalline dense 15% of sample.

6180' - 6210' Dolomite - dark gray to black - fine to medium crystalline, slightly argillaceous or bituminous, brecciated fractured veined with white crystalline dolomite plus calcite (30% of rock) traces of pin point porosity - otherwise dense, probably has good fractured porosity.

6210' - 6250' Dolomite - light gray to black, otherwise as above.

Logged by H.R. Hovdebo
September 8, 1962

6250' - 6340' Dolomite, medium to dark gray, very finely crystalline, slightly silty, white crystalline dolomite (vein and fracture fillin) makes up 5 to 10% of total sample. Dolomite is dense, hard, has no visible porosity, probably has fracture porosity.

6350' - 6460' Dolomite, dark gray to black, finely crystalline, slightly silty and argillaceous. White crystalline dolomite fracture and vein filling makes up 5% of total sample. Probably fractured and brecciated with good fracture porosity intercrystalline porosity poor.

6470' - 6600' Dolomite, dark gray to black finely crystalline, occasional pin point intercrystalline, slightly silty, argillaceous, looks dull or earthy due to argillaceous content, little or no white crystalline dolomite vein filling.

6610' - 6670' Dolomite, medium to dark gray (crystalline?) very fine to finely crystalline, poor to (fair) interval porosity, slightly argillaceous. (Altered silty micrite?).

6680' - 6750' Dolomite medium gray to dark gray slightly argillaceous (when completely dissolved in acid leaves a dark scum) of clay material). Poor to no visible intercrystalline porosity. Calcite - white crystalline - veinlet filler - makes up about 2% of sample.

6760' Dolomite, medium gray, very finely crystalline, trace of intercrystalline porosity, some white crystilline calcite veinlets, very slightly argillaceous.

6770' Dolomite, light to medium gray, some of the light gray dolomite is hard, dense, cryptocrystalline (porcellaneous) some is very finely to microcrystalline. Remainder (60%) is medium gray dolomite as in 6760.

6780' Dolomite, medium to dark gray, finely crystalline, slightly argillaceous trace of intercrystalline porosity, trace pyrite, calcite.

6790'-6800' - 6810'
Dolomite, medium to dark gray, very fine to finely crystalline, slightly argillaceous, poor to no intercrystalline porosity. Trace white crystilline calcite vein filling.

6820' Dolomite as above, but color is light gray to medium gray.

6830' Dolomite, light gray, finely crystalline, trace of intercrystalline porosity, very slightly argillaceous. Occasional particle of white crystalline calcite.

6840' - 6850' - 6860'
As above, but light to medium gray.

6870' - 6880' Dolomite, dark gray to black, fine to medium crystalline, argillaceous or bituminous particles make up the dark color. Not very porous to trace intercrystalline porosity. This looks as if it were from the "Ronning".

6890' - 6900' Dolomite, medium to dark gray, very slightly argillaceous very finely crystalline, traces of white crystalline calcite. No visible porosity, fairly hard.

6910' - Dolomite, as above but light to dark gray.

6920' - Dolomite, light gray, very finely crystalline, not argillaceous, little or no porosity, fairly hard, traces calcite white crystalline vein filler.

6930' - Dolomite as above.

6940' - 6950' Dolomite, medium to dark gray, very fine to finely crystalline, slightly argillaceous or bituminous traces of intercrystalline porosity, fairly hard. Traces white crystalline calcite.

6960' - 6970' Dolomite as above, but medium gray and slightly less argillaceous or bituminous.

6980' As in 6920'.

6990' - 7000' Dolomite, light to medium gray, very finely crystalline, very slightly silty, trace white crystalline calcite vein filling. No apparent porosity, fairly hard.

7010' - 7030' Dolomite - light gray, very finely crystalline, trace of argillaceous material trace of intercrystalline porosity. Occasional trace of white crystalline calcite, hard clean looking. Typical Lone Mountain dolomite.

7040' Dolomite, very light gray very finely crystalline, clean, some poor intercrystalline porosity, hard.

7050' Dolomite, medium gray, slightly argillaceous or bituminous, very finely crystalline, trace intercrystalline porosity, occasional white crystalline calcite infiller.

7060' Dolomite, light gray, very finely crystalline, trace of argillaceous material. Hard, clean looking. Some chips have a layer of clear, medium crystalline dolomite, growing out from one side - indicating there must be vugs. No relict textures.

7080' - 7100' Dolomite, medium gray, as in 7050'.

7110' Dolomite, dark gray, very finely crystalline, argillaceous or bituminous, traces of intercrystalline porosity, occasional white fracture infill of crystalline calcite.

7120' Dolomite, medium gray, very finely crystalline slightly argillaceous or bituminous, trace of intercrystalline porosity. Occasional clear dolomite crystals, possibly ingrowths in very small vugs. Fairly hard, no relict textures for use as clue to original rock type.

7130' - 7140' Dolomite, dark gray, very finely crystalline, slightly argillaceous or bituminous fairly hard and tight. Very thin - thread-like - lines of white dolomite cut across chips, indicating healed fractures, some larger amplitude fracturing (white dolomite infilling) also noted. Trace white crystalline calcite.

7150' - 7170' Dolomite, medium gray, as in 7120' but occasional calcite crystals, traces of cryptocrystalline dolomite, and no dolomite intergrowths seen.

7180' - 7200' Dolomite, medium gray, very finely crystalline, no visible porosity, little or no infilling of white crystalline carbonate. Some dolomite chips are lighter gray, cryptocrystalline hard, tight approximately less than 10%. All has a trace of argillaceous? or bituminous material.

7210' Dolomite, dark gray, very finely crystalline argillaceous? or bituminous. Occasional trace of white crystalline calcite, occasional particle of cryptocrystalline dolomite as in 7180' - 7200'. No visible porosity.

7220' - 7240' Dolomite, medium to dark gray, very finely crystalline, no visible porosity, slightly argillaceous occasional light gray to white crystalline calcite, 5% of rock is light gray dolomite, sometimes medium crystalline, with fiar interval porosity.

7250' Dolomite, medium to dark gray, very finely crystalline, argillaceous or bituminous, traces of fair intercrystalline porosity, fairly hard. There was a very small gas-kick in thisinterval.

7260' - 7280' Dolomite, medium gray, very finely crystalline, no visible porosity, slightly argillaceous. Very rare trace of white, calcite, and occasional chip of: Dolomite, finely crystalline fair to good intercrystalline porosity, light to medium gray, very slightly argillaceous. All is fairly hard.

7290' Dolomite, dark gray, very finely crystalline, slightly to fairly bituminous, some traces intercrystalline porosity. 5% to 10% of rock is as in 7260' - 7680'.

7300' - 7310' Dolomite, medium gray, very fair crystalline trace bituminous or argillaceous? material. No visible porosity except in occasional grain chip of finely crystalline dolomite. No accessory minerals.

7320' Dolomite asin 7300' - 40%.
Dolomite as in 7290' - 30%.
and 30% - Dolomite, cryptocrystalline, hard, tight, light gray, conchoidal appearance.

7330' - 7350' Dolomite, medium gray, very finely crystalline, slightly argillaceous, no visible porosity, traces of white crystalline calcite, also up to 10% Dolomite - crypotcrystalline, light gray, hard, tight, conchoidal fracture.

7360' Dolomite, as in 7330' - 7350'.

7370' - 7380' Dolomite, light gray, very fine to cryptocrystalline, very slightly argillaceous, clean, hard, some intercrystalline porosity in coarse slightly crystalline chips.

7390' - 7450' Dolomite, medium gray, very finely crystalline traces of argillaceous and/or bituminous material, traces of intercrystalline porosity, and occasional minute dolomite lined vug. Occasional white crystalline calcite particle. 7410' has 60% of above, plus40% Dolomite, light gray, cryptocrystalline, tight, hard, clean.
Color varies from medium to sometimes light gray for this whole interval.

7460' Dolomite, medium to light gray, very finely crystalline, slightly bituminous, traces, intercrystalline porosity, traces of white crystalline calcite, traces of (cryptocrystalline light gray dolomite - hard, tight.)

7470' Dolomite light gray, very finely crystalline to cryptocrystalline, no visible porosity, slightly argillaceous. Occasional calcite chip.

7480' Dolomite, medium to dark gray, cryptocrystalline to .0625 (silt size) crystalline, argillaceous or bituminous, no visible porosity. Also some (20%) dolomite medium grain, very fair crystalline, slightly porosity, trace bituminous material.

7490' Dolomite, medium gray (some light green and dark green chips) very finely crystalline to cryptocrystalline, slightly argillaceous or bituminous, no visible porosity hard.

7500'	Dolomite, light gray, microcrystalline? .0625 crystalline to cryptocrystalline, tight, hard, trace of argillaceous material, 7520 has a few (5%) chips of medium gray color.
7530'	Dolomite, medium to dark gray, microcrystalline no visible porosity, slightly argillaceous.
7540' - 7590'	Dolomite, medium gray, cryptocrystilline to microcrystalline, probably some small? vugular porosity, because angular, clear dolomite crystals seen on some chips. Otherwise tight, very slightly argillaceous, no staining, no gas kicks on gas log. Some chips have white dolomite and gray dolomite in contact - due to fracture and healing or relict fossils?
7600'	Dolomite, dark gray, microcrystalline to rarely, cryptocrystalline, argillaceous or bituminous, tight (no visible porosity). White dolomite crystals and vein fillings (and fracture filling) material forms approximately 5% of rock.
7610'	Dolomite, light gray, microcrystalline to cryptocrystalline, very slightly argillaceous, no visible porosity. White crystalline dolomite vein and fracture fillings approximately 5%.

TOP RONNING - 7612'

7620' - 7630'	Dolomite, dark gray to black?, microcrystalline, argillaceous and slightly bituminous, no visible intercrystalline porosity, but dolomite crystals indicate vuglar porosity. Dolomite crystallines are white.

CORED 7630' - 7635'

7640' - 7680'	Dolomite, dark gray, bituminous and argillaceous, microcrystalline to cryptocrystalline, fairly hard, tight. Fine to medium crystalline white dolomite, from vug linings, etc. , makes up less than 5% of rock, indicating vugular porosity. Some slickensiding on chips indicates fracture zones - so probably good fracture porosity.
7690' - 7710'	Dolomite, dark gray to black, microcrystalline, hard, argillaceous and bituminous, no visible porosity. White crystalline dolomite (from vug linings and fracture fills) makes up 5% of sample. These crystals vary from silt size to coarsely crystalline.

7720' - 7750'	Dolomite, light gray, very finely to cryptocrystalline but mainly microcrystalline, slightly argillaceous, no visible porosity of intercrystalline type. Some (30%) is medium gray in color. Occasional white crystalline dolomite as in 7690' - 7710'.
7760'	Dolomite, dark gray, very finely crystalline to microcrystalline, argillaceous and bituminous, hard, traces of intercrystalline porosity in lighter colored parts. 10% of rock is very fine to medium crystalline white dolomite - vug linings, fracture fill, and possibly relict fossils.
7770'	Dolomite, as in 7720' - 7750'.
7780'	Dolomite as above - 70%. Dolomite as in 7760' - 30%.
7790'	Dolomite, medium gray, occasional dark gray chip, mainly microcrystalline, argillaceous and bituminous, no visible porosity. 10% of sample is a lighter gray to white very fine crystalline to medium crystalline dolomite with some indication of vugular porosity.
7800' - 7810'	Dolomite, light gray microcrystalline to cryptocrystalline, sometimes slightly argillaceous, some intercrystalline porosity, and pin point vugular porosity, indications of larger vugs seen from medium crystalline dolomite rhombs, clear in color, lining what could be vugs.
7820' - 7845'	Dolomite, medium gray, very fine to microcrystalline, slightly argillaceous, occasional darker, bituminous chip, fairly hard, and little intercrystalline porosity. White crystalline dolomite grains and dolomite crystals on chips indicate vugs and fractures.
7845' - 7930'	Dolomite as above, but microcrystalline to cryptocrystalline.
7940' - 7950'	Dolomite (30%) dark gray, very finely crystalline, argillaceous and bituminous, no apparent porosity. Dolomite (70%) medium to occasionally light gray, microcrystalline to cryptocrystalline, hard, slightly argillaceous, tight (no intercrystalline porosity). Traces of white crystalline dolomite indicate vugular porosity or fracture fill.
7960'	Dolomite (dark gray) as above 30% - 80%. Remainder is light gray as above 70%.

7970' Dolomite, light gray, very finely crystalline to cryptocrystalline, slightly argillaceous, varies from tight to fair intercrystalline porosity. (Overall porosity probably poor).

7980' - 8000' Dolomite, dark gray, very finely shine to mainly microcrystalline, argillaceous, and bituminous, no visible porosity. 5% of rock is a dense light gray hard cryptocrystalline dolomite. There are traces of white crystalline dolomite forming fracture, vein vug fillings.

8000' - 8010' Dolomite, medium to dark gray, very finely crystalline to cryptocrystalline, traces of intercrystalline porosity in very fine crystalline chips, varies from fairly clean (light colored chips) to argillaceous and bituminous (dark colored chips).
White dolomite crystals and crystalline dolomite from vein filling, fracture filling and vug? linings can be seen throughout.

Sample description by:
W. Hamilton

8020' Dolomite, light gray, microcrystalline, equigranular, rare fine vugs giving poor vuggy porosity, may also be traces of intercrystalline porosity, permeability probably very low. Thin veinlets of white dolomite common, and also some clear crystalline dolomite - may be vug or fracture filling.

8030' Dolomite, light gray (about 40%) microcrystalline to cryptocrystalline, slightly calcareous, scattered fine to medium sized vugs, occasionally abundant, gives patchy vuggy porosity and permeability. 60% of sample is Dolomite, medium gray, microcrystalline, very slightly argillaceous and bituminous, may have some very poor intercrystalline porosity but no effective permeability.

8040' Dolomite, light to medium gray, microcrystalline, slightly calcareous, lighter colored fragments appear more calcareous while darker fragments are slightly argillaceous. No effective porosity or permeability. Vein and fracture fillings of clear and white crystalline calcite.

8050' Dolomite, medium to dark gray, very fine crystalline, slightly argillaceous and bituminous, no effective porosity or permeability.

8060' Dolomite, medium to dark gray, as in 8050', about 40% 60% of sample is: Dolomite, light to medium gray, cryptocrystalline, waxy, translucent appearance, hard siliceous, tight.

8070' Dolomite, medium to dark gray, as in 8050', about 80% Dolomite, light to medium gray, siliceous, as in 8060' about 20%. No effective porosity or permeability but traces of clear and white crystalline dolomite may indicate coarse vugs or fractures.

8080' As in 8070', but medium to dark gray dolomite about 70%.

8090' Dolomite, light to medium gray, microcrystalline, equigrandular, about 30% of sample.
Dolomite, medium to dark gray, very fine crystalline to microcrystalline, slightly argillaceous and bituminous about 65% of sample.
Remaining 5% is light to medium gray, crystocrystalline, siliceous dolomite, as in 8060'.
No effective porosity or permeability but may be some coarse vugs and fractures, evidenced by clear and white crystalline dolomite.

8100' Dolomite, medium to dark gray, very fine crystalline, slightly argillaceous and bituminous, traces of pyrite, dense, no effective porosity or permeability. Traces of white, crystalline dolomite and calcite, probably vein fillings.

8110' Dolomite, light gray, microcrystalline, equigranular, slightly friable, traces of poor intercrystalline and fine vuggy porosity but permeability probably very low. About 25% of sample. Remaining 75% is dolomite, medium to dark gray, asin 8100'.

8120' Dolomite, medium gray, microcrystalline to cryptocrystalline, hard (cryptocrystalline) and siliceous, dense, no effective porosity or permeability. Microcrystalline dolomite not siliceous.

8130' Dolomite, medium gray, occasional dark gray, microcrystalline, slightly argillaceous and bituminous, some of darker chips are very bituminous, dense, no effective porosity or permeability. About 10% of sample is medium gray, cryptocrystalline, siliceous dolomite.

8140' Dolomite, medium gray to light gray, microcrystalline, dense, no effective porosity or permeability.

8150' Dolomite, light to medium gray, as in 8140'. About 5% of sample is: dolomite, medium to dark gray, very fine crystalline, argillaceous and bituminous, dense.

8160' Dolomite, medium to dark gray, microcrystalline to very fine crystalline, argillaceous and bituminous, dense, no effective porosity or permeability. Some chips are almost black and are very bituminous. Clear and white crystalline dolomite is plentiful, probably vein filling.

8170' Dolomite, medium gray, microcrystalline to fine crystalline, slightly argillaceous, slightly siliceous, hard dense, no effective porosity or permeability. Traces of clear and white crystilline dolomite, probably vein filling.

8180' Dolomite, medium gray, as in 8170'. Trace of pyrite in some chips.

8190' Dolomite, medium to dark gray, microcrystalline, slightly argillaceous, occasional bituminous, slightly siliceous, hard, traces of pyrite, dense, no effective porosity or permeability.

8200' Dolomite, medium gray, microcrystalline, slightly argillaceous, slightly siliceous, hard traces of finely disseminated pyrite, dense, no effective porosity or permeability.

8210' Dolomite, medium gray, microcrystalline, slightly argillaceous, very slightly siliceous, hard dense, no effective porosity. White crystalline dolomite is present, probably as vein filling.

8220' Dolomite, medium gray, microcrystalline to cryptocrystalline, siliceous, slightly argillaceous, hard, dense, no effective porosity. Traces of finely disseminated pyrite.

8230' Dolomite, as in 8220'. 15% is dolomite, medium to dark gray microcrystalline to very fine crystalline, argillaceous and bituminous, slightly siliceous. Clear and white crystalline dolomite is present.

8240' Dolomite, as in 8230'. Medium to dark gray dolomite is about 10%.

8250' Dolomite, light to medium gray, cryptocrystalline to microcrystalline, siliceous, slightly calcareous, hard dense, waxy lustre; grades into: dolomite, medium to dark gray, microcrystalline, slightly argillaceous and bituminous, slightly siliceous, dense, about 15%. No effective porosity. Traces of clear and white crystalline dolomite.

8260' Dolomite, medium to dark gray, microcrystalline, occasional cryptocrystalline, slightly argillaceous, bituminous, slightly siliceous, traces of finely disseminated pyrite, dense, hard, no effective porosity. Traces of white crystalline dolomite, probably vein filling.

8270' Dolomite, medium gray, microcrystalline to cryptocrystalline, slightly argillaceous, bituminous, siliceous, traces of finely disseminated pyrite, hard, dense, no effective permeability.

8280' Dolomite, as in 8270'. About 10% is: dolomite, light gray, cryptocrystalline, siliceous, hard, dense. No effective porosity.

8290' Dolomite, light gray, cryptocrystalline, calcareous, siliceous, traces of pyrite, very hard, dense, with a translucent waxy appearance, resembles chert. About 50% of the sample is: dolomite, medium gray, as in 8270'.

8300' Dolomite, medium to dark gray, microcrystalline to cryptocrystalline, slightly siliceous, slightly argillaceous, bituminous, hard, dense, no effective porosity. Traces of pyrite. Chips are platy.

8310' Dolomite, light gray to white, microcrystalline, slightly calcareous, friable, crumbles easily, may have poor porosity but permeability probably very low. 60% of sample is dolomite, medium to dark gray, as in 8300'.

8320' Dolomite, medium gray, microcrystalline to cryptocrystalline, slightly argillaceous and bituminous, slightly siliceous, hard waxy appearance. 20% is dolomite, dark gray argillaceous, bituminous, microcrystalline. No effective porosity. Traces of pyrite.

8330' Dolomite, light gray, microcrystalline, in part almost white, and rather friable, crumbling easily. May have some poor intercrystalline porosity but probably no permeability.

8340' Dolomite, light gray, as in 8330'. About 15% of sample is: Dolomite, medium gray, microcrystalline, slightly argillaceous, slightly bituminous, slightly siliceous, hard and dense.

8350' Dolomite, medium to dark gray, microcrystalline, argillaceous and bituminous, rather friable in part, some chips are almost black and are very bituminous. May have some poor intercrystalline porosity but probably no permeability. Small gas (wet) kick on Baroid meter (6 units).

8360' Dolomite, dark gray to black, microcrystalline, argillaceous, bituminous, slightly siliceous, some chips have glossy lustre, dense, no effective porosity. Trace of pyrite in some chips.

8370' Dolomite, dark gray to black, as in 8360'. Traces of white crystalline dolomite, seen in some chips in contact with dark gray dolomite, probably vein filling.

8380' Dolomite, medium gray to occasional light gray, microcrystalline, to cryptocrystalline, siliceous, slightly argillaceous in part, hard, dense, occasional irregular patches of clear crystalline dolomite.

8390' Dolomite, medium gray, as in 8380'. About 10% is dolomite, dark gray to black, as in 8360'.

8400' Dolomite, medium gray, as in 8380'.

8410' Dolomite, dark gray, microcrystalline, bituminous, slightly siliceous, argillaceous, rather hard, dense, some chips are almost black and have a glossy lustre.

8420' Dolomite, medium to dark gray, microcrystalline, bituminous, argillaceous, slightly siliceous, hard, dense. About 10% is dolomite, light gray, mircocrystalline, slightly friable and with poor intercrystalline porosity but probably no permeability.

8430' Dolomite, medium gray, cryptocrystalline to microcrystalline, slightly argillaceous, slightly siliceous, hard, dense, no effective porosity.

8440' Dolomite, medium gray, as in 8430'. Occasional patches of clear crystalline dolomite.

8450' Dolomite, light to medium gray, microcrystalline in part friable crumbles easily, may have some poor intercrystalline porosity but no permeability. About 30% is dolomite, medium gray, as in 8430'. Clear and white crystalline dolomite is present, probably as vein filling.

8460' Dolomite, light to medium gray, as in 8450'. 40% is dolomite, medium to dark gray, microcrystalline to cryptocrystalline, slightly argillaceous, bituminous, slightly siliceous, hard, dense.

8470' Dolomite, medium gray, cryptocrystalline to microcrystalline, slightly argillaceous, dense. Traces of white crystalline. About 10% is dolomite, light gray, as in 8450'.

8480' Dolomite, medium gray, microcrystalline, slightly argillaceous, dense. About 5% is dolomite, light gray as in 8450'.

8490' Dolomite, medium gray, cryptocrystalline to microcrystalline, slightly siliceous, hard, dense. Traces of pyrite.

8500' Dolomite, medium gray, as in 8490'.

8510' Dolomite, medium gray, as in 8490'.

8520' Dolomite, dark gray, microcrystalline, argillaceous, bituminous, slightly siliceous. Traces of finely disseminated pyrite, hard, dense no effective porosity. Some chips are almost black and have a glossy lustre, are very bituminous.

8530' Dolomite, light gray to occasional medium gray, cryptocrystalline to occasional microcrystalline, very slightly siliceous, clear and white crystalline dolomite is present, probably as vein filling material, also irregular patches of clear crystalline dolomite is common in chips, possibly replacement of fossils?.

8540' Dolomite, light to medium gray, as in 8530'. About 5% is dark gray, microcrystalline, argillaceous, bituminous, slightly siliceous, hard, dense.

8550' Dolomite, dark gray, microcrystalline, argillaceous, bituminous, slightly siliceous, hard, dense. Traces of pyrite.

8560' Dolomite, medium gray, cryptocrystalline to occasional microcrystalline dense, clear and white crystalline dolomite is present, occasionally seen in contact with medium gray dolomite, and is probably vein filling. Irregular patches of clear crystalline dolomite also seen in some chips.

8570' Dolomite, medium gray, as in 8560'.

8580' Dolomite, medium gray, asin 8560'. 10% is dolomite, light gray, microcrystalline, rather soft and friable, with possibly some poor porosity but no permeability.

8590' Dolomite, light gray, microcrystalline, rather soft and friable, crumbles easily, can be seen occasionally grading into a darker light gray cryptocrystalline dolomite. The friable nature could be the result of bituminous damage?. About 5% of sample is dolomite, medium to dark gray, microcrystalline to occasional cryptocrystalline, bituminous slightly argillaceous, dense, clear and white crystalline calcite is abundant. Poor intercrystalline porosity but probably no permeability.

8600' Dolomite, medium gray, to occasionally light gray, cryptocrystalline, dense, slightly argillaceous, slightly siliceous, rather hard. Traces of clear and white crystalline dolomite, probably vein filling.

8610' Dolomite, medium to occasionally dark gray, cryptocrystalline, siliceous, slightly argillaceous, dense, hard.

8620' Dolomite, medium gray, cryptocrystalline to occasional microcrystalline, slightly siliceous, slightly argillaceous, hard, dense. Occasionally irregular patches of clear coarser crystalline dolomite, could be fossil replacement?.

8630' Dolomite, medium gray, as in 8620'.

8640' Dolomite, medium gray, as in 8620'.

8650' Dolomite, medium gray to occasional light gray, microcrystalline, to cryptocrystalline, slightly argillaceous, traces of pyrite, very slightly siliceous, hard. Traces of clear and white crystalline dolomite.

8660' Dolomite, medium to dark gray, microcrystalline, slightly argillaceous, bituminous, slightly pyrtic, clear and white crystalline dolomite, occurs partly as vein filling on the chips (fossil replacement?). Traces of fine vugs seen in chips that have the patches of the coarser, clear crystalline dolomite. Part of this interval may have poor vuggy porosity and permeability.

8670' Dolomite, medium to dark gray, as in 8660'. Traces of vuggy porosity.

8680' Dolomite, medium to dark gray, as in 8660'. Traces of poor vuggy porosity.

8690' Dolomite, light to medium gray, cryptocrystalline to microcrystalline, hard and dense. Some chips apparently recrystallized?, to form a white microcrystalline dolomite - slightly friable and with poor intercrystalline porosity but no permeability, may result from bit crushing. Traces of clear and white coarser crystalline dolomite.

8700' Dolomite, medium gray, microcrystalline, slightly argillaceous, slightly siliceous, hard, dense, with occasional patches of fine crystalline, clear dolomite (possibly some are fossil replacement and some represents recrystallization). About 25% of sample is: dolomite, light gray, cryptocrystalline, some of which is apparently recrystallized to form white friable microcrystalline dolomite, having poor intercrystalline porosity but no permeability.

8710' Dolomite, light gray, microcrystalline, with patches of fine to medium crystalline, clear dolomite (probably resulting from partial recrystallization?). Traces of poor vuggy and intercrystalline porosity and permeability is present associated with the recrystallized patches. Clear fine to medium crystalline dolomite and dolomite rhombs are abundant.

8720' Dolomite, light to medium gray, microcrystalline, dense.

8730' Dolomite, light to medium gray, microcrystalline to occasional cryptocrystalline, dense, with occasional small patches of fine crystalline, clear dolomite.

8740' Dolomite, medium gray very fine crystalline, slightly argillaceous, bituminous with traces poor intercrystalline porosity and permeability. About 50% of sample is dolomite, light to medium gray, as in 8720'.

8750' Dolomite, medium to dark gray, microcrystalline to very fine crystalline, slightly argillaceous, bituminous, traces of poor intercrystalline porosity and permeability in the coarser material.

8760' Dolomite, medium gray, cryptocrystalline to occasional microcrystalline, hard, dense. Clear and white crystalline dolomite is present, probably as vein filling.

8770' Dolomite, light gray to white, microcrystalline, soft and friable, crumbles easily, appears to have been recrystallized from a light gray dolomite, microcrystalline to cryptocrystalline, hard and dense. The friable material probably has poor intercrystalline porosity but no permeability. About 50% of this interval is dolomite, medium gray, as in 8760.

8780' Dolomite, light gray, microcrystalline to cryptocrystalline, hard, dense, partially recrystallized into white friable dolomite, as in 8770'. About 10% is medium gray dolomite, as in 8760'. Traces of clear and white crystalline dolomite.

8790' Dolomite, medium to occasional dark gray, microcrystalline to cryptocrystalline, hard and dense bituminous, slightly siliceous, relic sedimentary textures can be observed, with organic remains (foraminifera?) and intraclasta?, entirely recrystallized.

8800' Dolomite, medium gray, cryptocrystalline to microcrystalline, slightly bituminous, slightly argillaceous, very slightly siliceous with traces of pyrite, relic sedimentary textures can be observed rarely, with intraclasts and fossils (?) all completely recrystallized.

8810' Dolomite, medium gray, as in 8800'. Irregular patches of clear crystalline dolomite in chips, also traces of white crystalline dolomite, probably vein filling. Occasional dolomite rhombs.

8820' Dolomite medium gray, cryptocrystalline to occasional microcrystalline, with streaks and patches of clear fine crystalline dolomite, slightly bituminous, slightly argillaceous, hard, dense. No relic textures seen. About 10% is dolomite, light gray, cryptocrystalline to microcrystalline, hard and dense but commonly grading into a soft, friable, white microcrystalline dolomite.

8830' Dolomite, light to medium gray, microcrystalline to cryptocrystalline, slightly argillaceous and bituminous, hard dense, trace of white and clear crystalline dolomite and dolomite rhombs.

8840' Dolomite, medium gray, microcrystalline to occasional cryptocrystalline, slightly argillaceous and bituminous, dense, appears partially recrystallized?, forming a soft friable, light gray to white, microcrystalline dolomite around the edges and on the surface of some chips. Bit crushing?

8850' Dolomite, medium gray, as in 8840'. Traces of clear and white, coarse crystalline dolomite, probably vein filling.

8860' Dolomite, medium gray, microcrystalline, slightly argillaceous but bituminous dense.

8870' Dolomite, dark gray, microcrystalline, bituminous, slightly argillaceous, hard, dense.

8880' Dolomite, medium gray, microcrystalline, slightly bituminous, slightly calcareous dense.

8890' Dolomite, medium to dark gray, microcrystalline, bituminous, slightly argillaceous, dense. Streaks and patches of fine crystalline, clear dolomite. About 20% is dolomite, light gray, cryptocrystalline, calcareous, slightly bituminous in part, dense.

8900' Dolomite, dark gray, microcrystalline to very fine crystalline, numberous euhedra of medium crystalline dolomite developed within rock, some poor intercrystalline porosity and permeability, and traces of vugs linedwith clear euhedral dolomite, argillaceous and bituminous, hard.

8910' Dolomite, dark gray, as in 8900'. Streaks of white crystalline dolomite.

8920' Dolomite, dark gray, as in 8900'.

8930' Dolomite, medium to dark gray, microcrystalline, argillaceous and bituminous, rather soft and friable crumbles easily, may have some poor intercrystalline porosity but probably no permeability.

8940' Dolomite, dark gray, as in 8930'. About 20% is dolomite, medium gray, microcrystalline, slightly bituminous and argillaceous, hard, dense, partially recrystallized (?) one the surface and around the edges of chips to form a light gray, powdery friable dolomite.

8950' Dolomite, medium gray, cryptocrystalline to occasional microcrystalline, slightly bituminous, slightly calcareous, dense, hard. About 50% is dolomite, dark gray, as in 8930'.

8960' Dolomite, dark gray, microcrystalline, argillaceous and bituminous, dense but appears to have been recrystallized on the surface and at edges of chips, to form light and medium gray, friable microcrystalline dolomite. Bit crushing?

8970' Dolomite, dark gray, as in 8960'.

8980' Dolomite, medium to dark gray, microcrystalline, argillaceous and bituminous, the lighter colored material is soft and friable crumbles easily and probably has poor intercrystalline porosity but no permeability. Darker gray material is more brittle.

8990' Dolomite, dark gray, microcrystalline, argillaceous and bituminous, dense. About 10% is friable, medium gray dolomite, as in 8980'.

9000' Dolomite, medium gray, cryptocrystalline, sliceous slightly argillaceous, hard and dense.

9010' Dolomite, medium gray, as in 9000'.

9020' Dolomite, medium gray as in 9000'.

9030' Dolomite, light to medium gray, cryptocrystalline, calcareous, very slightly siliceous, dense.

9040' Dolomite, medium gray, as in 9000', about 30% is dolomite, dark gray to black, argillaceous and bituminous, microcrystalline, dense.

9050' Dolomite, dark gray to black, microcrystalline, argillaceous and bituminous, dense.

9060' Dolomite, dark gray, as in 9050'.

9070' Dolomite, medium gray, cryptocrystalline, slightly siliceous, hard, dense, with occasional irregular patches of fine crystalline, clear dolomite. Relic textures seen but not identified. About 20% is: dolomite, dark gray, asin 9050'.

9080' Dolomite, medium gray to light gray, cryptocrystalline to microcrystalline but some chips appear to grade into a microcrystalline, friable, light gray dolomite, slightly siliceous, hard and dense, about 10% is dolomite, dark gray, as in 9050'. Traces of clear dolomite rhombs and crystalline dolomite.

9090' Dolomite, light to medium gray, as in 9080'. About 10% is dolomite, dark gray, as in 9050'.

9100' Dolomite, medium gray, microcrystalline to occasional cryptocrystalline, slightly siliceous, grading into dolomite, light gray, microcrystalling, soft and friable, about 40% of sample. The friable dolomite has poor intercrystalline porosity but probably no permeability.

9110' Dolomite, light gray, microcrystalline to cryptocrystalline, dense, partially recrystallized (?) and grading into dolomite, light gray to white, soft and friable, microcrystalline, with poor intercrystalline porosity but probably no permeability. About 40% of sample is dolomite, medium gray, cryptocrystalline to microcrystalline, slightly siliceous and bituminous and dense.

9120' Dolomite, light gray to white, microcrystalline to very fine crystalline, slightly argillaceous, rather soft and friable, crumbles redily, abundant medium crystalline clear dolomite, euhedra on the surface and within some chips - may be cavity linings. Clear dolomite rhombs are present and also a trace of calcite rhombs. About 40% of sample is: dolomite, medium, gray, cryptocrystalline to microcrystalline and argillaceous and slightly bituminous, hard, dense. Probably some poor porosity in the light gray friable dolomite but little or no permeability.

9130' Dolomite, light to medium gray, cryptocrystalline, slightly siliceous, hard, dense. About 25% is dolomite, light gray, to white, friable as in 9120'.

9140' Dolomite, light to medium gray, as in 9130'.

9150' Dolomite, light gray, microcrystalline rather soft and friable, crumbles easily, probably has poor porosity but little or no permeability.

9160' Dolomite, light gray, friable, as in 9150'.

9170' Dolomite, light gray and friable, as in 9150', occasional observed grading into dolomite, light to medium gray, microcrystalline, hard and dense, about 10% of sample.

9180' Dolomite, light gray and friable, as in 9150'. About 40% is dolomite, medium gray to occasional light gray, microcrystalline, slightly bituminous, slightly argillaceous, hard and dense.

9190' Dolomite, medium to light gray, cryptocrystalline to occasional microcrystalline, hard and dense. About 30% is dolomite, light gray and friable, as in 9150'.

9200' Dolomite, light to medium gray, as in 9190'. About 20% is dolomite, light gray and friable, as in 9150'. Traces of clear, fine to coarse crystalline dolomite, possibly vein and cavity fillings.

9210' Dolomite, light gray to white, microcrystalline to cryptocrystalline, dense, slightly calcareous.

9220' Dolomite, light gray, microcrystalline, equagranular, dense, very pur looking.

9230' No sample.

9240' Dolomite, light gray, as in 9220', grades into light gray to white, friable dolomite, with poor intercrystalline porosity but no permeability, about 20% of sample.

9250' Dolomite, medium gray, microcrystalline to cryptocrystalline slightly siliceous, hard, dense.

9260' Dolomite, medium gray, as in 9250'.

9270' Dolomite, medium gray, as in 9250'. Occasional light gray.

9280' Dolomite, light gray to medium gray, cryptocrystalline, dense, grading into dolomite, light gray, microcrystalline to cryptocrystalline, rather soft and friable, about 20%.

9290' Dolomite, medium to dark gray, microcrystalline, slightly calcareous, slightly bituminous, hard, dense, occasional grading into friable light to medium gray, microcrystalline dolomite (18%).

9300' Dolomite, light gray, cryptocrystalline, hard and dense, grades into light gray to white, friable dolomite, about 10%. 30% of sample is dolomite, medium to dark gray, as in 9290'.

9310' Dolomite, light gray to almost white, cryptocrystalline, generally quite dense but some chips are rather soft and crumble easily. About 10% of the sample is dolomite, medium to dark gray, microcrystalline and slightly bituminous, hard and dense.

9320' Dolomite, light gray to white as in 9310'. About 10% of sample is medium gray to dark gray, microcrystalline dolomite, slightly bituminous, hard and dense. The light gray dolomite appears to grade from a fairly hard and dense rock into a rther soft and friable rock (about 30%) having poor intercrystalline porosity but little or no permeability.

9330' Dolomite, light gray, cryptocrystalline to microcrystalline, dense. About 30% of sample is dolomite, dark gray, microcrystalline, slightly argillaceous and bituminous, hard and dense. Trace of white, clear crystalline, dolomite, probably vein filling.

9340' Dolomite, light gray, as in 9330'. About 30% is dolomite, dark gray, microcrystalline, slightly argillaceous and bituminous, hard and dense. Trace of clear and white crystalling dolomite.

9350' Dolomite, medium gray, cryptocrystalline, slightly argillaceous, hard and dense. About 10% is dolomite, dark gray, microcrystalline, slightly argillaceous and bituminous, hard and dense.

9360' Dolomite, dark gray, microcrystalline, slightly argillaceous, bituminous, dense.

9370' Dolomite, light gray to medium gray, microcrystalline to cryptocrystalline, with occasional euhedra of medium crystalline, clear dolomite on the surface and within some chips. Traces of pyrite. About 20% is dolomite, microcrystalline, dark gray, as in 9360'.

9380' Dolomite, light gray to occasional medium gray, cryptocrystalline, hard and dense.

9390' Dolomite, light gray, microcrystalline to cryptocrystalline, hard and dense.

9400' Dolomite, cryptocrystalline, light gray, slightly calcareous, pure looking, hard and dense. The occasional chip has relic textures, with intraclasts? of cryptocrystalling dolomite floating in a calcareous microcrystalling cryptocrystalline dolomite matrix. These chips are rare. Traces of white, microcrystalline dolomite.

9410' Dolomite, light gray, somewhat mottled, microcrystalline to cryptocrystalline, relic textures with intraclasts? of dolomite (darker in color) imbedded in a light gray to white matrix of calcareous delomite. The majority of the sample (80%) is light gray, hard dense dolomite, as in 9400'.

9420' Dolomite, dark gray, microcrystalline, bituminous, slightly argillaceous, hard and dense.

9430' Dolomite, dark gray, as in 9420'.

9440' Dolomite, light gray, cryptocrystalline to microcrystalline, with occasional patches of fine crystalline, clear dolomite, hard, dense.

9450' Dolomite, medium gray, microcrystalline, hard and dense, with euhedra of fine crystalline, clear dolomite developed on surface of some chips. Traces of white, clear crystalline dolomite rhombs.

9460' Dolomite, light gray, microcrystalline, hard, with traces of poor vuggy porosity and permeability. Vugs are fine to medium and lined with clear, fine crystalline dolomite.

9470' Dolomite, light gray, asin 9460'.

9480' Dolomite, light to medium gray, microcrystalline to cryptocrystalline, hard, dense.

9490' Dolomite, light to medium gray, as in 9480'.

9500' Dolomite, light to medium gray, as in 9480'. Traces of clear and white crystalline dolomite.

9510' Dolomite, medium gray, microcrystalline, slightly argillaceous, hard and dense. Relic textures seen in some chips but could not be identified. Traces of clear and white crystalline dolomite.

9520' Dolomite, as in 9480'. In some rare chips, relic textures can be seen, lumps? or intraclasts?.

9530' Dolomite, as in 9480'. About 10% is dolomite, dark gray, microcrystalline, slightly argillaceous and bituminous, hard and dense.

9540' Dolomite, dark gray, microcrystalline, bituminous, slightly argillaceous, hard and dense.

9550' Dolomite, as in 9540', with occasional rounded patches of clear, fine crystalline dolomite (vug fillings?). Some veinlets of white crystalline dolomite.

9560' Dolomite, light gray to occasional medium gray, microcrystalline, hard and dense. Bit bruising has altered many chips to a light gray to white, friable dolomite.

9570' Dolomite, light gray, microcrystalline, hard and dense, very pure looking. Occasional euhedra of fine cystalline, clear dolomite developed on some chips.

9580' Dolomite, light to occasional medium gray, as in 9560'.

9590' Dolomite, light gray, microcrystalline to occasional cryptocrystalline, hard, dense.

9600' Dolomite, light gray, microcrystalline, hard, dense, slightly silty, occasional irregular patches of fine crystalline, clear dolomite.

9610' Dolomite, light gray, as in 9600'.

9620' Dolomite, light gray, asin 9600'. Patches of medium to fine crystalline, clear dolomite.

9630' Dolomite, light gray, as in 9600'.

9640' Dolomite, light as in 9600'. About 20% is dolomite, medium gray, microcrystalline, slightly bituminous, hard and dense although bit bruising has altered many chips to a soft, friable, dolomite.

9650' Dolomite, medium gray, microcrystalline, slightly silty, slightly argillaceous, irregular patches of pyrite, hard and dense. 50% is dolomite, light gray, as in 9600'.

9660' Dolomite, as in 9650'. Traces of pyrite and bituminous. About 35% as in 9600'.

9670' Dolomite, medium gray, asin 9650', with scattered streaks and patches of pyrite. 10% is as in 9600'. Dolomite, light gray, microcrystalline, slightly silty, hard and dense.

9680' Dolomite, light gray, microcrystalline with occasional patches of fine crystalline clear dolomite, hard, dense, very pure looking. About 20% is dolomite, medium gray as in 9650'.

9690' Dolomite, light gray as in 9680'. About 40% is dolomite, medium gray as in 9650'.

9700' Dolomite, medium gray, cryptocrystalline to occasional microcrystalline, slightly siliceous, slightly argillaceous, slightly bituminous, hard and dense.

9710' Dolomite, light gray, microcrystalline, hard and dense, very pure looking. About 10% is dolomite as in 9700'.

9720' Dolomite, medium gray, microcrystalline slightly siliceous, slightly argillaceous, hard and dense. Occasional irregular patches of fine crystalline, clear dolomite.

9730' Dolomite, dark gray, microcrystalline, bituminous, slightly siliceous and argillaceous hard and dense.

9740' Dolomite, as in 9730'.

9750' Dolomite, as in 9730'.

9760' Dolomite, as in 9730'.

9770' Dolomite, medium to dark gray, microcrystalline, slightly bituminous, slightly argillaceous, very slightly siliceous, hard and dense. Traces of pyrite.

9780' Dolomite, dark gray, as in 9730'.

9790' Dolomite, medium gray, microcrystalline, siliceous, slightly argillaceous, hard and dense.

9800' Dolomite, as in 9790'.

9810' Dolomite, as in 9790'.

9820' Dolomite, medium to dark gray, microcrystalline, sliceous, slightly argillaceous, slightly bituminous, hard, dense.

9830' Dolomite, light to medium gray, microcrystalline to occasional cryptocrystalline, slightly silty, very slightly argillaceous, hard and dense.

9840' Dolomite, as in 9830'.

9850' Dolomite, light gray, cryptocrystalline to microcrystalline, slightly silty, hard and dense, numberous coarse rhombs of clear, crystalline dolomite. Some chips are stained yellow. Traces of finely disseminated pyrite.

9860' 9800 Comp Dolomite, as in 9850'. Yellow staining is common-probably sulphur - and occurs especially along veinlets and over patches of clear crystalline dolomite. About 10% of sample is dolomite, medium to dark gray, microcrystalline, slightly argillaceous and bituminous, hard and dense.

9870' Dolomite, medium gray, microcrystalline, slightly silty, slightly argillaceous, hard and dense. About 40% of chips are stained yellow with sulphur, and there are traces of native yellow sulphur. Irregular patches of clear, fine to medium crystalline dolomite in a few chips.

9880' Dolomite, anhydritic, sandy, light gray to medium gray, microcrystalline with abundant grains of quartz, sub rounded, clear, silty-to very fine sand-size. Surfaces of most chips are bit-bruised to form a white, sandy-textured soft coating. Rather soft and crumbly, although some chips are brittle. No effective porosity or permeability.

9890' Dolomite, as 9880', interbedded with: anhydrite, dolomitic, microcrystalline, light gray translucent, soft and crumbly but dense (about 40%).

9900' Dolomite, as in 9880', interbedded with dolomite, light gray, cryptocrystalline to microcrystalline, anhydritic, silty dense. Traces of finely disseminated pyrtie.

9910' Anhydrite, light cream to white microcrystalline to fine crystalline, translucent, waxy lustre, soft, dense; with occasional interbeds of dolomite, medium gray, microcrystalline to cryptocrystalline, slightly pryitic, slightly argillaceous, slightly silty, hard and dense, about 30%.

9920' Anhydrite, light cream to white, microcrystalline to fine crystalline, translucent with somewhat pearly lustre, soft, dense.

9930' Anhydrite, as in 9920'.

9940' Dolomite, medium gray, cryptocrystalline to microcrystalline, anhydritic, sandy with subrounded to rounded, clear quartz grains, silty - to fine sand - size. Traces of pyrite. Dense, interbedded with anhydrite, as in 9930', about 40%.

9950' Dolomite, as 9940', interbedded with light gray anhydrite, about 30%.

9960' Dolomite, as in 9940', interbedded with about 30% light gray anhydrite.

9970' Anhydrite, light cream, microcrystalline to fine crystalline, slightly dolomitic, translucent, somewhat pearly lustre, soft, dense.

9980' Anhydrite, as in 9970'. Occasional interbeds of dolomite, as in 9940', about 20%.

9990' Anhydrite, light cream to light gray, microcrystalline, to fine crystalline, dolomitic, translucent, pearly lustre, soft dense.

10,000' Anhydrite, as in 9990', with occasional interbeds of dolomite, as in 9940, about 10%.

10,010' Anhydrite, as in 9990'.

10,020' Dolomite, very silty, medium gray, microcrystalline to cryptocrystalline, with subangular to rounded grains of quartz ranging from silty to medium sand-size. Most grains are silty or very fine sand-size. Occasional medium grains are well rounded and frosted, slightly anhydritic, moderately hard, dense. 20% is anhydrite, as in 9990'.

10,030' Dolomite, as in 10,020'.

10,040' Dolomite, light gray, cryptocrystalline, slightly siliceous, hard, dense.

10,050' Siltstone, very dolomitic, medium gray, subangular, clear grains of quartz cemented with dolomite, dense, no effective porosity or permeability. Traces of anhydrite, probably stringers.

10,060' Siltstone, very dolomitic, as in 10,050' with occasional rounded, medium size quartz grains, slightly frosted on surface. Traces of pyrite, dense.

10,070' Sandstone, silty, dolomitic, medium to dark gray, very fine grained, poorly sorted with sizes ranging from silt to fine sand, subround to round, surface of grains slightly frosted, quartzose, well cemented with dolomite, slightly argillaceous in part. No effective porosity or permeability. Thin interbeds of sandstone, dolomitic, light gray, fine grained, moderately well sorted, rounded, frosted grains, well cemented and no porosity.

10,080' Dolomite, dark gray to black, microcrystalline, silty, argillaceous, slightly bituminous, hard and dense.

10,090' Dolomite, light to medium gray, cryptocrystalline, slightly silty, very slightly anhyritic, hard, dense.

10,100' Dolomite, light cream to light gray, microcrystalline to cryptocrystalline, silty, with occasional rounded fine grains of quartz. Rather soft, and with waxy lustre, dense.

10,110' Dolomite, light to medium gray, microcrystalline to cryptocrystalline silty, slightly argillaceous in part, occasional rounded fine grains of quartz. Hard, dense, about 10% is dolomite, light cream, as in 10,100'.

10,120' Dolomite, light to medium gray, microcrystalline slightly silty, dense. Traces of pyrite, slightly anhydritic.

10,130' Dolomite, as in 10,020'. Stringer of anhydrite, about 10%, light cream, translucent, soft, microcrystalline.

10,140' Dolomite, light cream to light gray, cryptocrystalline to microcrystalline, slightly silty, rather soft, dense. Traces of pyrtie. About 15% is dolomite, dark gray microcrystalline, argillaceous, slightly bituminous, slightly silty, hard and dense.

10,150' Dolomite, as in 10,040'. Dark gray dolomite is about 10%.

10,160' Dolomite, medium gray, microcrystalline, slightly silty, hard, dense.

10,170' Dolomite, as in 10,160'.

10,180' Dolomite, dark gray, microcrystalline, silty with occasional rounded, fine sand grains, slightly argillaceous, traces of bituminous, hard dense.
Interbedded with sandstone, light gray, very dolomitic, very fine grained, poorly sorted with particles ranging from silt to medium sand. Rounded, well cemented with dolomite. No effective porosity or permeability. About 15%.

10,190' Anhydrite, light cream, cryptocrystalline to microcrystalline, soft, dense, translucent. Interbedded with dolomite, light gray, cryptocrystalline, anhydritic, slightly silty, rather soft, dense. About 65%.

10,200' Dolomite, medium to dark gray, cryptocrystalline to microcrystalline, very silty, with occasional grains of sand, fine to medium grain, rounded, clear, traces of pyrite, slightly argillaceous, hard, dense, slightly anhydritic. Interbedded with sandstone, very dolomitic, fine grained poorly sorted with grains ranging in size from silt to medium sand, rounded, slightly frosted, dense. No effective porosity or permeability. About 10%.

10,210' Anhydrite, light cream, microcrystalline, translucent, pearly lustre, soft, dense. Interbedded with: dolomite, light to medium gray, silty, microcrystalline to cryptocrystalline, anhydritic, dense. About 60%.

10,220' Dolomite, cryptocrystalline to microcrystalline, light gray, light greenish-gray, silty, slightly anhydritic, rather soft, dense.

10,230' Dolomite, medium gray, cryptocrystalline, slightly silty hard, dense.

10,240' Dolomite, medium gray, cryptocrystalline, silty, slightly anhydritic, hard, dense. About 10% is anhydrite, as in 10,210'.

10,250' Dolomite, dark gray, microcrystalline, to occasional cryptocrystalline, argillaceous, silty bituminous, silty, hard, dense. About 10% is anhydrite, as in 10,210'.

10,260' Anhydrite, as in 10,210'. Interbedded with: dolomite, medium to dark gray, silty, slightly argillaceous, hard, dense. About 30%.

10,270' Dolomite, dark gray, microcrystalline, bituminous, slightly silty, anhydritic, hard, dense. Occasional interbeds of anhydrite, as in 10,210'. About 10%.

10,280' Anhydrite, light cream to light greenish-gray, microcrystalline, soft, translucent, pearly lustre. Interbedded with: dolomite, medium greyish green, cryptocrystalline, anhydritic, slightly silty, hard, dense 40%.

10,290' Dolomite, medium to dark gray, microcrystalline, argillaceous, slightly silty, slightly bituminous, slightly anhydritic, hard, dense. Interbedded with anhydrite, as in 10,280', about 30%.

10,300' Dolomite, light to medium gray, microcrystalline, silty, hard, dense.

10,310' Dolomite, light gray, to medium gray, microcrystalline to cryptocrystalline, silty, anhydritic, dense. Interbedded with anhydrite, as in 10,280'. About 50%.

10,320' Dolomite, medium to dark gray, cryptocrystalline to microcrystalline, silty, anhydritic, slightly argillaceous, and bituminous, hard, dense. Interbedded with anhydrite, as in 10,280'. About 20%.

10,330' Dolomite, light to dark gray, cryptocrystalline to microcrystalline, silty, anhydritic, darker chips are slightly bituminous and argillaceous, traces of pyrite, dense. About 5% is anhydrite, possibly cavings?.

10,340' Dolomite, light to medium gray, cryptocrystalline to microcrystalline, slightly silty, hard, dense.

10,350' Dolomite, light gray to medium gray, microcrystalline, very silty, slightly argillaceous, dense. Occasional rounded sand grain, fine to medium grained.

10,360' Dolomite, as in 10,350'. Traces of sandstone, light gray, fine grained, very dolomitic, poorly sorted, subround to rounded grains range in size from silt to medium sandstone, sandstone lessthan 5%.

10,370' Dolomite, medium gray, cryptocrystalline to microcrystalline, silty, slightly anhydritic, hard, dense.

10,380' Dolomite, medium to dark gray, microcrystalline to cryptocrystalline, silty, argillaceous, darker chips are biuminous, hard, dense.

10,390' Dolomite, light gray, cryptocrystalline, very silty, slightly anhydritic, hard, dense. Interbedded with anhydrite, light cream, microcrystalline, translucent, pearly lustre, soft, dense. About 10%.

10,400' Dolomite, light gray, microcrystalline to cryptocrystalline, very silty, hard, dense.

10,410' Dolomite, as in 10,390'. Interbedded to about 10% anhydrite.

10,420' Anhydrite, light cream, microcrystalline, translucent, pearly, soft, dense. Interbedded with dolomite, as in 10,400'. About 50%.

10,430' Dolomite, dark gray, microcrystalline, silty, slightly anhydritic, slightly argillaceous, dense. Interbedded with anhydrite, as in 10,420'. About 10%.

10,440' Dolomite, as in 10,430'. Interbedded anhydrite, about 10%.

10,450' Dolomite, dark gray, as in 10,440'. Slightly bituminous.

10,460' Dolomite, dark gray to black, microcrystalline, silty, slightly bituminous, slightly argillaceous, hard and dense. Slightly anhydritic. Brittle.

10,470' Dolomite, as in 10,460'.

10,480' Dolomite, as in 10,460'. Interbedded with dolomite, medium greenish gray, cryptocrystalline to occasional microcrystalline, silty, hard, brittle, dense 10%.

10,490' Anhydrite, as in 10,420' but light gray to light cream. Interbedded with dolomite light gray, cryptocrystalline, anhydritic, dense, about 40%.

10,500' Dolomite, medium to dark gray, silty, slightly argillaceous, slightly anhydritic, hard, dense.

10,510' Dolomite, medium to dark gray, microcrystalline, very silty, slightly argillaceous, hard, dense.

10,520' Dolomite, light to medium gray, microcrystalline, very silty, slightly anhydritic, hard, gritty, dense.

10,530' Dolomite, medium to dark gray, microcrystalline to cryptocrystalline, silty, argillaceous, slightly anhydritic, hard, dense, pyritic.

10,540' Dolomite, as in 10,530'. Interbedded with anhydrite, light gray, microcrystalline, soft, dense, slightly dolomitic, 10%.

10,550' Dolomite, dark gray, microcrystalline, silty, argillaceous, slightly anhydritic, hard, dense. Slightly bituminous. Traces of pyrite.

10,560' Dolomite, medium gray, microcrystalline, silty, argillaceous, slightly bituminous. Traces of pyrite, hard, dense.

10,570' Siltstone, light gray, very dolomitic, slightly argillaceous, slightly anhydritic, gritty, hard, dense.

10,580' Dolomite, light to medium gray, very silty, slightly argillaceous, slightly anhydritic, hard, dense. Interbedded with anhydrite, light cream to white, microcrystalline, silty?, often bit-bruised and recrystallized, slightly dolomitic, soft, dense. Appears to be about 30% of sample.

10,590' Dolomite, light to dark gray, cryptocrystalline to microcrystalline, silty, slightly argillaceous, slightly anhydritic, hard, dense.

10,600' Siltstone, as in 10,570'.

10,610' Dolomite, light gray, cryptocrystalline, very silty, slightly anhydritic traces of pyrite, hard, dense.

10,620' Dolomite, very silty, asin 10,610'. Grades into dolomitic siltstone.

10,630' Dolomite, light to medium gray, cryptocrystalline, very silty slightly argillaceous, slightly anhydritic, hard, dense.

10,640' Dolomite, as in 10,610'.

10,650' Dolomite, as in 10,610'.

10,660' Dolomite, light to medium gray, microcrystalline, very anhydritic, slightly silty, traces of finely disseminated pyrite, dense. Interbedded with anhydrite, light gray to white, microcrystalline to very fine crystalline, soft, translucent, dense. About 30%.

10,670' Dolomite, light gray, occasional medium gray, cryptocrystalline, very silty, hard, dense. Grades into siltstone in part.

10,680' Dolomite, medium to dark gray, microcrystalline, anhydritic traces of pyrite, dense. Interbedded with anhydrite, medium gray to white, microcrystalline to very fine crystalline, soft, dense, about 30%.

10,690' Dolomite, medium gray, cryptocrystalline to microcrystalline, ahydritic, slightly argillaceous and silty, traces of finely disseminated pyrite. Hard, dense.

10,700' Dolomite, as in 10,690'.

10,710' Dolomite, light gray to medium gray, microcrystalline to cryptocrystalline, silty, slightly anhydritic, traces of finely disseminated pyrite, hard, dense.

10,720' Dolomite, light to medium gray, as in 10,710'. Traces of anhydrite, less than 5%, lighter chips are occasionally very silty.

10,730' Dolomite, as in 10,710'. About 30% of sample is dolomite, dark gray, microcrystalline, slightly silty, slightly argillaceous, hard, dense, with occasional veinlets of white crystalline dolomite.

10,740' Dolomite, light gray, microcrystalline to crystalline, anhydritic, slightly silty, dense, interbedded with anhydrite, light to medium gray, microcrystalline, soft, about 30% of sample. Traces of pyrite.

10,750' Dolomite, light to medium gray, microcrystalline, anhydritic, slightly silty. Lighter gray chips are occasionally very silty. About 30% is interbedded anhydrite, light gray, soft microcrystalline, dense.

10,760' Dolomite, medium to dark gray, microcrystalline, slightly anhydritic, slightly argillaceous, slightly silty, hard, dense.

10,770' Dolomite, medium gray, microcrystalline, silty, slightly argillaceous, slightly bituminous, traces of finely disseminated pyrite, hard, dense.

10,780' Dolomite, as in 10,770'. Traces of anhydrite, less than 5%.

10,790' Dolomite, light to medium gray, microcrystalline, anhydritic, silty, traces pyrite, dense. Interbedded with anhydrite, light to medium gray, microcrystalline, soft, translucent, dense. About 30%.

10,800' Dolomite, as in 10,790'. Interbedded to about 10%.

10,810' Dolomite, as in 10,790'. Interbedded anhydrite, about 10%.

10,820' Dolomite, medium to dark gray, microcrystalline, silty, slightly argillaceous, hard, dense.

10,830' Dolomite, medium gray to occasional light gray, anhydritic, silty, traces of finely disseminated pyrite. Interbedded with anhydrite, medium gray to white, soft, dolomitic in part microcrystalline. About 20%.

10,840' Dolomite, medium to dark gray, microcrystalline, silty, slightly anhydritic, slightly argillaceous, hard, dense. Interbedded with anhydrite, medium gray to white, soft, translucent, dense. About 30%.

10,850' Dolomite, light to medium gray, cryptocrystalline to microcrystalline, silty, very silty in part, anhyritic, finely disseminated, pyrite, dense. Interbedded with anhydrite, light gray to white, soft, dense. About 20%.

10,860' Dolomite, light to medium gray, anhydritic, slightly silty, dense. Interbedded with anhydrite, light to white, microcrystalline to very fine crystalline, soft, dense. About 30%.

Sample Description by:
N. Astill

10,870' Dolomite, medium to dark gray, cryptocystalline, scattered silt grains, no effective porosity.

10,880' Dolomite, medium to dark gray, cryptocrystalline, scattered silt grains, dense, interbedded with 5% anhydritie, white microcrystalline.

10,890' Dolomite, light to medium gray, microcrystalline to cryptocrystalline, dense. Occasional laminated, very silty.

10,900' Dolomite, medium to dark gray, microcrystalline to cryptocrystalline dense. Traces anhydrite, white microcrystalline.

10,910' Dolomite, dark gray, microcrystalline to cryptocrystalline, dense. Interbedded with 5% anhydrite, white microcrystalline.

10,920' Dolomite, light to medium gray, microcrystalline to cryptocrystalline, dense. Interbedded with 5% anhydrite, white, microcrystalline.

10,930' Dolomite, dark gray, microcrystalline to cryptocrystalline, dense.

10,940' Dolomite, medium gray, microcrystalline to cryptocrystalline, dense. Interbedded with 5% anhydrite white, microcrystalline.

10,950' Dolomite, medium gray, microcrystalline to cryptocrystalline, dense. Interbedded with anhydrite, white microcrystalline.

10,960' Dolomite, dark gray, microcrystalline to cryptocrystalline, dense. Scattered silt grains.

10,970' Dolomite, medium gray, microcrystalline to cryptocrystalline, dense. Scattered silt grains and pyrtie crystalline. Interbedded with 10% anhydrite, white, microcrystalline.

10,980' Dolomite, light to medium gray, microcrystalline to cryptocrystalline, dense.

10,990' Dolomite, medium to dark gray, microcrystalline to cryptocrystalline, dense. Scattered silt grains with occasional laminae very silty.

11,000'	Dolomite, medium gray, microcrystalline to cryptocrystalline, dense. Traces anhydrite.
11,010'	Dolomite, medium gray, microcrystalline to cryptocrystalline, scattered silt grains, traces anhydrite. Dense.
11,020'	Dolomite, dark gray, microcrystalline to cryptocrystalline, scattered silt grains, traces anhydrite, dense.
11,030'	Dolomite, medium gray, microcrystalline to cryptocrystalline, interbedded with 10%, anhydrite, white, microcrystalline.
11040'	Dolomite, medium gray microcrystalline to cryptocrystalline, scattered silt grains, dense with 10% interbedded anhydrite.
11,050'	Dolomite, medium gray, microcrystalline to cryptocrystalline, scattered silt grains. Dense. Interbedded anhyrite 5%.
11,060'	Dolomite, light to medium gray, anhydritc, micocrystalline, scattered silt grains, no effective porosity or permeability.
11,070'	Dolomite light to medium gray, anhydritic, microcrystalline, scattered silt grains, no effective porosity or permeability.
10,080'	Dolomite, dark gray, microcrystalline to cryptocrystalline, scattered silt grains, dense.
11,090'	Dolomite, light gray, cryptocrystalline, scattered, silt grains. Dense.
11,100'	Dolomite, dark gray, microcrystalline to cryptocrystalline, scattered silt grains. Dense.
11,110'	Dolomite, dark gray, microcrystalline to cryptocrystalline, scattered silt grains. Dense.
11,120'	Dolomite, medium gray, anhydritic, microcrystalline, no effective porosity or permeability.

11,130' Dolomite, medium to dark gray, anhydritic, microcrystalline, to crystalline, scattered silt grains, No effective porosity or permeability.

11,140' Dolomite, medium to dark gray, anhydritic, silty, microcrystalline to cryptocrystalline. No effective porosity or permeability.

11,150' Dolomite, light gray, silty, microcrystalline. No effective porosity or permeability.

11,160' Dolomite, medium gray, microcrystalline, silty, no effective porosity or permeability.

11,170' Dolomite, medium gray, anhydritie, silty, microcrystalline to cryptocrystalline, no effective porosity or permeability.

11,180' Dolomite, light to medium gray, anhydrite, silty, microcrystalline to cryptocrystalline. Dense.

11,190' Dolomite, light gray, anhydritic, silty, cryptocrystalline. Dense.

11,200' Dolomite, light gray, anhydritic, silty, cryptocrystalline. Dense.

11,210' Dolomite, medium gray, silty, anhydritic, microcrystalline to cryptocrystalline. Dense.

11,220' Dolomite, dark gray, microcrystalline to very fine crystalline, no effective porosity or permeability.

11,230' Dolomite, dark gray, silty, anhydritic, microcrystalline to cryptocrystalline, silty, dense.

11,240' Dolomite, light gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,250' Dolomite, medium gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,260' Dolomite, medium gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,270' Dolomite, light gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,280' Dolomite, light to medium gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,290' Dolomite, light gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,300' Dolomite, medium green-gray, silty, microcrystalline to cryptocrystalline, dense.

11,310' Dolomite, medium gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,320' Dolomite, medium gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,330' Dolomite, light gray, silty, anhydritic, microcrystalline to cryptocrystalline, dense.

11,340' Dolomite, medium gray, silty, anhydritic, microcrystalline to cryptocrystalline. Dense.

base ?

11,350' Dolomite, dark gray, silty, microcrystalline to cryptocrystalline, dense.

Rounded Cal Std

11,360' Dolomite, dark gray, silty, slightly argillaceous, microcrystalline. Dense, hard. Traces calcite veining.

11,370' Dolomite, dark gray, silty, microcrystalline to cryptocrystalline. Dense. Traces of calcite veining with occasional quartz crystalls, very fine anhedral.

11,380' Dolomite, dark gray, silty, slightly argillaceous, microcrystalline, dense. Traces of calcite veining.

11,390'	Dolomite, dark gray, silty, slightly argillaceous, microcrystalline to crptocrystalline. Dense, traces of calcite veining.
11,400'	Dolomite, dark gray, silty, slightly argillaceous, microcrystalline to cryptocrystalline, dense. Traces dolomite, veining, white.
11,410'	Dolomite, dark gray, silty, siliceous, slightly argillaceous, microcrystalline to cryptocrystalline, dense. Traces calcite veining, white.
11,420'	Dolomite, dark gray, siliceous, slightly argillaceous, microcrystalline to cryptocrystalline, dense.
11,430'	Dolomite, dark gray, silty, siliceous, slightly argillaceous, microcrystalline to cryptocrystalline. Dense. Traces dolomite veining.
11,440'	Dolomite, medium gray, microcrystalline, slightly silty, poor porosity, very poor permeability. Interlaminated, gradational with dolomite, dark gray, silty as 11,430'. Traces calcite veining.
11,450'	Dolomite, dark gray, moderately siliceous, slightly argillaceous, slightly silty, microcrystalline to cryptocrystalline. Dense - traces dolomite veining.
11,460'	Dolomite, mottled medium, dark gray, slightly siliceous, very fine to fine crystalline, no apparent porosity, or permeability. No oil-staining. Traces of dolomite veinlets, white.
11,470'	Dolomite, medium gray, slightly silty, microcrystalline to cryptocrystalline, dense.
11,480'	Dolomite, medium gray, slightly silty, microcrystalline. No effective porosity or permeability.
11,490'	Dolomite, dark gray, siliceous, argillaceous, microcrystalline to cryptocrystalline. Dense.

Sample Description by:
J. Terrill

11,495' - 11,549' See core description.

11,500' - 11,640' Dolomite, microcrystalline, dark gray, silty, very slightly argillaceous approximately 90% decreasing to approximately 65% at base of interval. Dolomite, light gray, very anhydrite, silty cryptocrystalline to microcrystalline remainder. Scattered fractures and vugs filled with white anhydrite and some calcite. Possibly some open fractures otherwise no porosity or permeability.

11,640'-11,660' Dolomite, light to medium gray, microcrystalline to cryptocrystalline, silty anhydritic in part, scattered pyrite crystallines. No porosity or permeability.

11,660'-11,770' Dolomite, dark gray to gray microcrystalline, silty, anhydrite in part, slightly argillaceous, scattered fractures and vugs filled with white anhydrite and possibly some calcite tight, no porosity and or permeability.

11,770'-11,830' Dolomite, gray, microcrystalline to very fine crystalline in part, very silty, slightly calcareous, scattered, fractures filled with white sugary anhydrite, possibly some open fractures?

11,780' - 11,800' Very poor intercrystalline porosity in a few chips probably no premeability.

11,780' - 11,790' Sulphur crystalline lining fractures, fractures probably open.

11,830'-11,870' Dolomite, dark gray, microcrystalline silty, some white anhydrite filling fugs and fractures, tight no porosity or permeability.

11,870'-11,910' Dolomite, gray to dark gray as above.

11,910' - 11,940'	Dolomite, dark gray, microcrystalline to very fine crystalline, silty, a few chips of white chert, a trace of very poor intercrystalline porosity, no permeability also a trace of open fractures (a few crystalline on fracture faces) otherwise fractures filled white whole anhydrite and minor calcite.
11,940' - 11,970'	Dolomite, gray to dark gray, microcrystalline, silty, slightly calcareous, scattered pyrite crystallines, a few fracture filled with white anhydrite and calcite, tight no porosity and permeability.
11,970' - 12,010'	Dolomite, gray to dark gray, microcrystalline, very silty, scattered chips of white chert, slightly calcareous, a trace of very poor intercrystalline porosity, no permeability, also a trace of open fractures (a few crystalline on fracture faces) otherwise fractures are filled with white and anhydrite and minor dolomite.
12,020' - 12,050'	Dolomite, gray to light gray, microcrystalline to fine crystalline, doesn't appear to be silty, tight, no porosity or permeability.
12,050' - 12,080'	Dolomite, gray, microcrystalline to very fine crystalline, a few vugs and fractures filled with anhydrite, a few scattered sulphur crystalline in fractures, tight and dense, possibly a trace of very poor intercrystalline porosity, no permeability.
12,080' - 12,100'	Dolomite, light gray to gray, slightly argillaceous, microcrystalline, tight dense no porosity or permeability.
12,100' - 12,150'	Dolomite, gray to dark gray, very fine crystalline to fine crystalline a few dolomite rhombs in fractures and matrix, a few scattered sulphur crystalline, tight and dense, possibly atrace of very poor intercrystalline porosity possibly a trace of open fractures and/or Vugs.

Sample Description by:
R. Handfield

12,150' - 12,160'	Dolomite gray, very fine crystalline to micro-crystalline, few vugs and fractures completely filled with anhyrite. No visible porosity or permeability. Some minor pyrite.
12,160' - 12,170'	Dolomite gray to dark gray, very fine crystalline to fine crystalline, a few fractures filled with anhydrite mostly white but with some yellowish staining (sulphur?) possibly trace of intercrystalline porosity, some minor less than 1% black bituminous matrix infilling crystalline faces along fractures, negative cut with chlorothene and ultra-violet light.
12170' - 12180'	Dolomite light gray to gray, very fine crystalline to fine crystalline with secondary anhydrite as above. Tight. Anhydrite filling vugs and fractures.
12180' - 12200'	Dplomite gray to dark gray, fine crystalline with some possible intercrystalline porosity less than 2%, possible low permeability less than 1 md.
12,200' - 12,220'	Dolomite light gray to gray, very fine crystalline, slightly calcareous, no apparent porosity or perm-eability. Anhydrite filling fractures.
12,220' - 12,240'	Dolomite gray to dark gray fine crystalline no apparent porosity or permeability, well developed crystalline anhydrite filling possible vugs and/or fractures. Possible porosity less than 2% but no permeability.
12,240' - 12,260'	Dolomite gray to dark gray fine crystalline, crystalline and amorphous anhydrite partialy infilling vugs. Possible porosity of 2% but question-able permeability. Some minor disseminated pyrite.
12,260' - 12,280'	Dolomite light to dark gray microcrystalline to fine crystalline, disseminated and amorphous anhydrite along fractures. Possible porosity of less than 2% but very questionable permeability.

12,280' - 12,300'	Calcareous dolomite light gray mostly to white microcrystalline, with about 3-4% disseminated amorphous anhydrite. Possible fracture porosity with questionable permeability. No apparent visual porosity or permeability.
12,300' - 12,310'	Dolomite gray to dark gray fine crystalline, slightly calcareous with no obvious porosity or permeability.
12,310' - 12,320'	Dolomite gray to dark gray, very fine to fine crystalline, with whit e dolomite completely infilling microcrystalline fractures. No obvious porosity or permeability.
12,320' - 12,330'	Dolomite banded and mottled light gray, dark gray, microcrystalline to very fine crystalline, mostly to fine crystalline, no obvious porosity or permeability.
12,330' - 12,340'	Dolomite gray to dark gray very fine crystalline to fine crystalline. Possible trace of porosity but no permeability, cut by crystalline anhydrite (less than 3%) filled fractures and thin microcrystalline bands of light gray to white microcrystalline to very fine crystalline calcareous dolomite (less than 10%) some euhedral crystalline of pyrite. No obvious porosity associated with fractures or bands.
12,340' - 12,360'	Dolomite gray to dark gray hard to friable in part. Possible trace of porosity less than 2% with some possible permeability less than 5 md. Microcrystalline to mostly fine crystalline. Lighten gray fractions slightly calcareous.
12,360' - 12,370'	Dolomite gray to dark gray microcrystalline to fine crystalline, with some minor anhydrite crystalline filled vugs. No visual porosity or permeability.
12,370' - 12,390'	Dolomite as above with minor less than 5% dolomite. Very calcareous light gray friable sucrosie with possible low permeability. Minor less than 1% disseminated pyrite within lighter colored fractions.

12,390' - 12,400'	Dolomite as above with some loose aggregates less than 1% of euhedral calcite crystalline, suggesting possible vugs and/or incompletely filled fractures. No visible porosity or permeability.
12,400' - 12,410'	Dolomite light to dark gray mostly microcrystalline to some very fine crystalline. Few microcrystalline fractures filled with either white anhydrite less than 1% and/or white calcite. Lessthan 1%. No visible porosity or permeability.
12,410' - 12,430'	Dolomite light to dark gray very fine crystalline to fine crystalline mostly. Trace of loose aggregates of calcite crystalline with some veiwing and or fractures completely filled with anhydrite. Trace of possible vug porosity with questionable permeability, no visual porosity or permeability, less than 2% pyrite crystalline.
12,430' - 12,440'	Dolomite, gray, very fine crystalline to microcrystalline mostly, trace of euhedral crystalline cluster of quartz, trace of possible vugs and/or fracture porosity with possible very low permeability. No visual porosity or permeability.
12,400' - 12,450'	Dolomite medium to dark gray fine to very fine crystalline, trace of calcite and anhydrite crystalline along veiws and/or fractures. No visual porosity or permeability. Possible fracture porosity or permeability.
12,450' - 12,460'	Dolomite as above with disseminated pyrite throughout 20% of the sample. No visual porosity or permeability.
12,460' - 12,470'	Dolomite gray, very fine crystalline with about 10% white dolomite siliceous, and white anhydrite completely infilling fractures. Trace of euhedral pyrite crystalline. No visual or assumed intercrystalline or fracture porosity or permeability.

12,470' - 12,480' Dolomite gray as above. No porosity or permeability. Trace of light gray slightly calcareous, very fine granular, somewhat friable dolomite with possible porosity of greater than 2% and possible very low permeability.

12,480' - 12,500' Dolomite gray to dark gray hard, very fine crystalline, trace of white dolomite and anhydrite crystalline clusters. No visual intercrystalline porosity or permeability. Trace of dark gray cryptocrystalline dolomite.

12,500' - 12,510' Dolomite, light gray hard microcrystalline 30% to very fine crystalline 35% non porous and non permeability, trace of dolomtic limestone , light gray, friable, fine granular, porosity less than 3% with no effective permeability, slightly trace of light gray silicified intrasparite, (light gray - rounded nonequant fairly well sorted silicified intraclasts in a slighter darker but clear, silicified matrix.) and dolomite dark gray hard fine crystalline nonporous 35% with some disseminated pyrite.

12,510' - 12,530' Dolomite gray to dark gray very fine to fine crystalline, nonporous or permiable, trace of white dolomite.

12,530' - 12,540' Dolomite light to dark gray hard mostly to friable in part (action of button bit?) microcrystalline 20% pyrite to very fine crystalline 80%. Nonporous and permiable, trace of white calcite crystalline clusters.

Sample Description by:
W. Hamilton

12,550 Dolomite, medium gray, very fine crystalline, occational microcrystalline, traces of native sulfur occurring probably as infilling material in veinlets. Traces of white, microcrystalline, dolomite, probably vein filling material. Hard, dense, no effective porosity.

12,560' Dolomite, medium gray, very fine crystalline to occasional microcrystalline, traces of white crystalline calcite as vein filling material. Hard, dense. Traces of native sulfur.

12,570' Dolomite, medium to dark gray, microcrystalline, occasional very fine crystalline, argillaceous traces of finely disseminated pyrite. Hard, dense.

12,580'	Dolomite, as in 12,570'.
12,590'	Dolomite, medium gray, microcrystalline, hard, dense, and tight. No effective porosity.
12,600'	Dolomite as in 12,590'. About 20% of sample is Dolomite, medium to dark gray, very fine crystalline, slightly argillaceous and/or bituminous, somewhat friable, no effective porosity.
12,610'	Dolomite as in 12,590'. About 35% is very fine crystalline, as above. Traces of white crystalline calcite and dolomite as vein filling material. Trace of finely disseminated pyrite.
12,620'	Dolomite, light to dark gray, very fine crystalline, slightly argillaceous in part. Somewhat friable but dense and tight. About 40% of sample is microcrystalline as in 12,590'. Traces of dolomite rhombs and white crystalline calcite and dolomite.
12,630'	Dolomite, light to medium gray, very fine crystalline to microcrystalline traces of finely disseminated pyrite, rare dolomite rhombs some tiny veinlets infilled with dolomite, slightly bituminous, argillaceous, very slightly silty, microcrystalline. Part of sample is occasionally silty. Dense and tight.
12,640'	Dolomite medium to less commonly light gray, mainly microcrystalline but grades of very fine crystalline, slightly argillaceous in part, traces of pyrtie, occasional tiny veinlets of white calcite and dolomite cutting the rock.
12,650'	Dolomite, medium gray, microcrystalline silty hard and brittle, tight. Cut by thin veinlets of calcite and dolomite. Traces of pyrite.
12,660'	Dolomite, medium gray, microcrystalline silty, dense and tight. Cut by veinlets of dolomite and quartz.
12,670'	Dolomite asin 12,660'. About 40% of sample is dolomite, dark gray, sometimes mottled with white, very fine crystalline, slightly bituminous or argillaceous, brittle but chips break rather easily along crystal boundaries. Dense and tight. No visible porosity.

12,680' Dolomite, medium gray to rarely light gray, microcrystalline, slightly silty, hard dense and tight. About 30% of sample is dolomite, dark gray, microcrystalline, slightly bituminous and/or argillaceous, hard and brittle, dense and tight.

12,690' Dolomite, medium to dark gray, microcrystalline, slightly silty, very slightly argillaceous, hard, dense and tight. Rare crystals of pyrite. About 20% is dolomite, very fine crystalline, asin 12,670'.

12,700' Dolomite, light to medium gray, occasionally dark gray, microcrystalline, slightly silty, dense and tight. Darker chips appear slightly glossy and are slightly bituminous and/or argillaceous. Traces of finely disseminated pyrite.

12,710' Dolomite, as above. About 20% of sample is dolomite, light gray, microcrystalline, very silty, with finely disseminated pyrite, dense and tight. Very silty dolomite probably occurs as a 2'+ band within the interval.

12,720' Dolomite, medium gray grading to dark gray, microcrystalline, silty, very silty in part, finely disseminated pyrite is common, slightly bituminous and/or argillaceous in part, hard, dense and tight.

12,730' Limestone, light cream, cryptocrystalline to microcrystalline, slightly dolomitic, rare crystals of pyrite, dense and tight. About 40% of sample. Interbedded with: Dolomite, light to medium gray, fine to medium crystalline, and slightly siliceous, splintery appearance, brittle, dense and tight. About 40% of sample. 20% of sample is Dolomite, as in 12,720'.

12,740' Dolomite, light gray to occasional medium gray, microcrystalline, silty, traces of finely disseminated, pyrite, dense and tight. About 20% of sample is dolomite, medium to fine crystalline, as in 12,730', with traces of limestone.

12,750' Dolomite, medium to dark gray, microcrystalline to occasional very fine crystalline, slightly bituminous and/or argillaceous, hard and brittle, dense and tight.

12,760' Dolomite, microcrystalline to rarely very fine crystalline as in 12,750'. About 15% of sample is light gray, silty dolomite, as in 12,740'.

12,770' Dolomite, asin 12,750'. About 40% of sample is Dolomite, light to medium gray, microcrystalline, silty, traces of finely disseminated pyrtie, rare veinlets of white dolomite and calcite, dense and tight.

12,780' Dolomite, dark gray, in part mottled with white, very fine crystalline, slightly bituminous, somewhat glossy appearance hard and brittle, breaks easily along crystal boundaries. Dense and tight. About 40% of sample is dolomite, microcrystalline, as in 12,750'.

12,790' Dolomite, dark gray mottled with white, as in 12,780' scattered patches of clear and white, fine to medium crystalline dolomite probably representing infilled cavities (vugs or minor fractures). No suggestion of porosity, however. About 50% of sample is dolomite, dark grey to black, microcrystalline, bituminous and/or argillaceous, some rare chips display a slaty or schistose appearance with a somewhat polished and slickensided cleavage surface. Dense and tight.

12,800' Dolomite, dark gray to black, microcrystalline to less commonly very fine crystalline, argillaceous and bituminous chips have a rather glossy appearance, hard and brittle, dense and tight.

12,810' Dolomite, medium gray, grading to dark gray, microcrystalline, slightly silty and argillaceous, slightly bituminous, hard, dense and tight. Traces of clear and white crystalline, dolomite, probably cavity or fracture infilling.

12,820' Dolomite, light to medium gray, microcrystalline, silty traces of finely disseminated pyrite, hard, dense and tight. About 20% of sample is dolomite, very fine crystalline as in 12,780'. Traces of white crystalline dolomite and calcite, probably tiny fracture infillings.

12,830' Dolomite, dark gray, microcrystalline to very fine crystalline, bituminous and/or argillaceous and hard and brittle, dense and tight. About 25% is dolomite, light to medium gray, as in 12,820'.

12,840' Dolomite, as in 12,830'. Scattered veinlets of white crystalline dolomite, probably infilled fractures. Trace of finely disseminated pyrite.

12,850' Dolomite, as in 12,830'.

12,860' Dolomite, medium gray, microcrystalline, slightly calcareous, slightly silty, hard, dense and tight. About 30% of sample as in 12,830'.

12,870' Dolomite, medium gray grading to light gray, microcrystalline, calcareous, slightly silty, hard, dense and tight.

12,880' Dolomite, as in 12,870'. Traces of finely disseminated pyrite.

12,890' Dolomite, as in 12,870'. Traces of white crystalline calcite as fracture filling material.

12,900' Dolomite, as in 12,870', grading to dark gray, traces of finely disseminated pyrite. Trace of white crystalline dolomite.

12,920' Dolomite, light to medium gray, microcrystalline, very calcareous, slightly argillaceous, slightly silty traces of finely disseminated pyrite. Traces of white crystalline calcite, probably fracture infilling. Hard, dense and tight. About 40% islimestone, as in 12,910'.

12,910' Limestone, dark gray, grading rarely to medium gray, microcrystalline, slightly argillaceous, hard, dense and tight.

12,930' Limestone, asin 12,910'. Slightly dolomitic in part, argillaceous, slightly silty.

12,940' Limestone, medium gray, microcrystalline, slightly silty, hard, dense and tight.

12,950' Dolomite, dark gray to less commonly medium gray, microcrystalline, slightly calcareous, slightly argillaceous, slightly silty, traces of finely disseminated pyrite. Traces of white crystalline calcite as fracture and cavity fillings. Hard, dense and tight. About 30% of sample is limestone, as above.

12,960' Dolomite, medium gray, microcrystalline, calcareous, slightly silty, hard, dense and tight. About 30% is Limestone, as in 12,940'.

12,970' Dolomite, asin 12,960'. About 25% is limestone.

12,980' Dolomite, asin 12,960' but grading to dark gray slightly argillaceous 20% islimestone, medium brown gray, cryptocrystalline to microcrystalline, slightly dolomitic in part, traces of pyrite. Some scattered small irregular patches of white crystalline calcite, and also veinlets of calcite, probably infilling of fractures and cavities. In rare cases euhedral crystal development seen on face of calcite veinlets, suggesting some open fractures. May be some poor fracture porosity.

12,990' Dolomite medium gray to rarely light gray, microcrystalline, calcite, occasionally very calcareous grading into limestone, silty, traces of finely disseminated pyrite. Hard, dense and tight.

13,000' Dolomite, medium to dark gray, microcrystalline calcareous in part very calcareous and grading into a limestone, argillaceous, slightly silty, hard, dense and tight.

13,010' Limestone, dark gray, microcrystalline to occasional cryptocrystalline, argillaceous, slightly dolomitic in part, traces of finely disseminated pyrite, scattered fine patches of dolomite within the limestone probably represents partial dolomitization. Also some irregular patches of white crystalline dolomite and calcite that is probably cavity fillings. Hard, dense and tight.

13,020' Dolomite, medium to dark gray, microcrystalline, slightly calcareous, argillaceous, slightly silty, traces of finely disseminated pyrite. Traces of white crystalline calcite and some dolomite occuring as fracture infilling. Dense and tight. About 20% of sample is limestone, as above.

13,030' Limestone, asin 13,010'. About 40% of sample is dolomite, dark gray to less commonly medium gray, as in 13,020'.

13,040' Dolomite, as in 13,020', slightly calcareous to calcareous, and in part very calcareous - grading into limestone, about 35% of sample, as in 13,010'. Difficult to determine relative proporations of limestone and dolomite due to their identity in appearance.

APPENDIX C

BIT RECORD

BIT RECORD

Field Yukon Territory District Edmonton - Northern

Contractor Arrow rig #21 Company SOBC - Shell Well Beavercrow K-2

Date Drilling Started ..... Completed ..... Actual Drilling ..... Days

BIT NO.	TYPE AND SIZE	DEPTH FROM	DEPTH TO	FOOTAGE	TIME	DRLG. SPEED	WT 1000#	RPM	Pump Press	Vert. Dev.	SERIAL	REMARKS T B G
1	OSC 12¼"	15	37	22	2	11.0	10	45	100			1-1-1
2	OWS 24"	15	18	3	3½	0.9	10	45	100			1-1-1
2A	OSC 12¼"	37	41	4	2	2.0	10	45	100			2-2-1
3	OWS 17½"	18	40	22	12½	1.7	10	45	150			2-1-1
2A	OWS 24"	18	37	19	10	1.9	10	45	150	¾°		1-1-1
3	OSC 12¼"	41	71	30	8¾	3.4	3	45	150	1°		1-2-1
3A	OWS 17½"	40	70	30	6½	4.6	10	45	150	—		2-2-1
3B	OWS 24"	37	69	32	8	4	10	40	150	—		2-1-1
4	OSC 12¼"	71	205	134	24½	5.5	5	100	200	½°		2-1-1
5A	OSC 12¼	205	254 / 255	49	19½	2.5	6	120	500	¾°		3-1-1
6	OWV 12¼	254	320	76	13¾	5.5	8	120	500	⅞°		2-1-1
7	M4N 12¼	320	373	53	17	3.1	6	120	500	¾°		2-1-1
8	M4N 12¼	373	440	67	19½	3.4	6	120	500	—		3-1-1
9	M4N 12¼	440	494	54	13	4.1	4	120	500	¾°		1-2-1
10	OSC 12¼	494	610	116	33	3.5	8	120	450	¾°		2-2-1
11	OSC 12¼	610	631	21	10	2.1	8	120	450	—		3-1-0
12	OSC 12¼	631	658	27	12½	2.2	8	120	450	—		3-2-1
13	WT 12¼	658	760	102	20¼	5.0	15	120	600	¾°		1-1-1
7RR	M4N 12¼	760	823	63	7¼	8.7	10	95	600	⅞°		2-2-1
4	C.P(reamer) 12¼	517	829	311	15½	—	12	140	400	¾°		2-1-1
13RR	WT 12¼	829	833	4	5	.8	10	40	500	--		2-2-1
5	OWC 12¼	833	852	19	5	3.8	6	60	500	¾		1-1-1
5R	C.P(reamed) 12¼	829	852	23	8	—	10	120	500	—		2-2-1
15A	OWC 12¼	852	876	24	4	6	10	60	500	1°		2-2-1
16	OWV 12¼	876	925	49	18	2.7	10-15	100	500	½°		3-2-1
17	M4N 12¼	925	983	58	9½	6.1	15	100	400	—		2-2-1
18	M4N 12¼	983	1003	20	8¾	2.3	16	98	600	¾°		4-3-0
19	WT 12¼	1003	1007	4	6½	.6	16	100	600	—		2-1-1
20	WT 12¼	1007	1016	9	5	1.8	16	100	600	—		1-1-1
21	WT 12¼	1016	1077	61	16¼	3.8	15	98	600	—		3-1-1
22	WT 12¼	1077	1187	110	17½	6.3	5-15	98	600	—		2-3-1
23	WT 12¼	1187	1232	45	15	3.0	5	98	600	—		1-2-1

BIT RECORD

Field Yukon Territory District Edmonton Northern

Contractor Arrow rig # 21 Company SOBC Shell Well Beavercrow K-2

Date Drilling Started ..... Completed ..... Actual Drilling ..... Days

No.	TYPE AND SIZE	DEPTH FROM	DEPTH TO	FOOTAGE	TIME	DRLG. SPEED	Wt 1000#	RPM	Pump Press	Vert Dev	SERIAL	REMARKS T - B - G
24	OWV 12¼	1232	1347	115	22¾	5.1	7-14	98	650	—		2 - 3 -
25	M4N 12¼	1347	1379	32	8½	3.8	10-15	98	700	—		2 - 1 - 1
26	W7 12¼	1379	1402	23	13½	1.7	15	98	700	¾°		2 - 2 - 1
27	M4N 12¼	1402	1402	0	3 circ.	—						
27RR	M4N 12¼	1402	1403	1	3	.3	15	60	725	-		2 - 2 1
28	W7 12¼	1403	1403	0	1 circ.	—						
30	W7 12¼	1403	1429	26	6	4.3	15	60	725	1°		2 1 1
31	W7 12¼	1429	1456	27	9½	2.8	15	60	700	¾°		3 - 1 - 0
32	W7 12¼	1456	1480	15	5½	2.7	25	50	650	¾°		2 - 2 1

BIT RECORD

Field Yukon Territory District Edmonton - Northern

Contractor Arrow Rig 21 Company SOBC Well Beavercrow K-2

Date Drilling Started ..... Completed ..... Actual Drilling ..... Days

BIT NO.	TYPE AND SIZE	DEPTH FROM	DEPTH TO	FOOTAGE	TIME	DRLG. SPEED		WT	RPM		SERIAL	REMARKS
33	W7R 12¼	1480	1487	7	4½	1.5		15-20	50		S.S.	2-1-I
34	RR2 12¼	1487	1573	86	18¼	4.8		45	50		"	1-3-1
		~~1487~~	~~1573~~								"	
35	H-7 12¼	1576	1596	20	5¼	4		20	56		"	1-2-1
36	OWC 12¼	1596	1633	37	11¼	3.4		20	56		"	3-1-0
37	H-7 12¼	1639	1651	~~44~~ 12	4½	2.6		25	50		"	4-2-0
38	W7R 12¼	1651	1658	7	2¼	3.5		25	40		"	2-2-0
38A	RR2 12¼	1658	1672	14	7¾	1.8		35	40		"	1-4-1
39	W7R 12¼	1672	1685	13	6½	2		30	50		"	4-2-0
40	W7R 12¼	~~1685~~	~~1696~~	~~11~~	~~6¼~~	~~2~~					"	
		1685	1700	15	8¼	2		40	50		"	3-2-0
41	W7R 12¼	1700	1713	13	5½	2.4		30	48		"	4-2-0
42	W7R 12¼	1713	1729	16	7½	2		30	48		"	3-2-0
43	W7R 12¼	1729	1738	9	6½	1.5		25-35	48		"	3-2-0
44	W7R 12¼	1738	1746	8	6¼	1.2		30	45		"	3-2-1
45	R32BJ 12¼	1746	1780	30	24	1.2		30-35	52		"	1-2-1
46	W7R 12¼	1780	1815	35	8¼	4		35-25	50		"	
47	W7 12¼	1815	1859	44	10½	4.4		30	50		SHALE+SS	2-1-1
48	W7 12¼	1859	1909	50	12	4		25	50		"	3-2-1
49	W7 12¼	1909	1950	41	10	4.1		20	52		"	2-2-1
50	W7R 12¼	1950	1968	18	6¾	2.5		25	52		S.S.	3-1-1
51	W7R 12¼	~~1968~~	~~1978~~	~~5~~	~~2~~	~~2.5~~						
		1968	1986	18	7	2.5		20	54		S.S.	3-1-0
52	W7R 12¼	1986	2000	14	6½	2		20	54		SH. S.S.	3-1-0
53	W7R 12¼	2000	2020	20	8	2.5		20	54		SH SS	2-1-1
54	W7R 12¼	2020	2102	82	12	6.8		20	54		BIT. SH.	1-1-1
55	M4L 12¼	2102	2200	98	16¾	5.8		20	54		BIT. SH.	1-1-1
56	OWV 12¼	2200	2326	126	30¾	4		10	100		BIT SH	2-1-1
57	OSC 12¼	2326	2440	114	26¼	4.4		10	100		SH	3-2-1
58	M4N 12¼	~~2440~~	~~2569~~	~~129~~	~~24¾~~	~~5.2~~		~~10~~	~~100~~		~~SH~~	
		2440	2621	181	30½	6		10	100		BIT SH	3-2-1
59	OWV 12¼	2621	2776	155	24	6.4		10	100		BIT SH	2-1-1
60	H7 12¼	2776	2795	19	7	2.7		25-30	60		SIL. SH	4-1-1

BIT RECORD

Field Yukon Territory District Edmonton - Northern

Contractor Arrow Rig #21 Company SOBC Shell Well Beaverdraw K-2

Date Drilling Started ..... Completed ..... Actual Drilling ..... Days

BIT NO.	TYPE AND SIZE	DEPTH FROM	DEPTH TO	FOOTAGE	TIME	DRLG. SPEED	Wt 1000#	RPM	Pump Pressure	Vert. Dev.	SERIAL	REMARKS T B G
61	W7 12 1/4	2795	2810	15	5	3	30	60	600	3°		2 - 1 - 1
62	W7 12 1/4	2810	2861	51	10 1/2	4.9	30	60	600	-		1 - 1 - 1
63	M4L 12 1/4	2861	2937	76	19 3/4	3.9	12	60	600	-		1 - 1 - 1
64	M4N 12 1/4	2937	2988	51	17	3.0	12	100	600	4°		2 - 1 - 1
65	M4N 12 1/4	2988	3098	110	40	2.8	12	100	500	3 1/8°		2 - 1 - 1
66	OSC-1G 12 1/4	3098	3211	115	26	4.4	12	100	550	3°		2 - 2 - 1
67	M4N 12 1/4	3211	3,313	103	15 1/4	6.7	15	100	550	-		2 - 1 - 1
68	W7 12 1/4	3,313	3,354	41	15 1/4	2.7	15	60	550	3 1/4°		3 - 2 - 1
69	W7R 12 1/4	3,354	3,431	77	22 1/4	3.4	20	60	550	4°		2 - 1 - 1
70	OWJ 12 1/4	3,431	3,488	57	15 1/4	3.7	15	60	550	5°		3 - 2 - 1
71	W7R 12 1/4	3,488	3,547	59	19 1/4	3.1	15	60	550	4 1/2°		2 - 2 - 1
72	OWC 12 1/4	3,547	3,589	42	17	2.5	12	60	550	-		2 - 1 - 1
73	W7R 12 1/4	3,589	3,657	68	23 1/4	2.9	10	60	600	5 3/4°		2 - 2 - 1

BIT RECORD

Field Yukon Territory - Wildcat District Northern - Edmonton

Contractor Arrow Rig 21 Company SOBC - Shell Well Bearcrow YT K-

Date Drilling Started ..... Completed ..... Actual Drilling ..... Days

BIT NO.	TYPE AND SIZE	DEPTH FROM	DEPTH TO	FOOTAGE	TIME	DRLG. SPEED ft/hr		WT (1000)	RPM		SERIAL	REMARKS
74	OWC 12 1/4	3657	3742	85	35 1/2	2.4		5-8	60			2-2-I
75	OSC - 12 1/4	3742	3784	42	17	2.5		6	60			2-1-I
76	OWV - 12 1/4	3784	3892	108	23 1/2	4.6		6	60			2-4-O
77	OWV - 12 1/4	3892	3940	48	16 1/4	2.6		5	60			2-1-I
78	OWV - 12 1/4	3940	3990	50	16 1/4	3.1		5	60			2-1-I
79	◇ - 8 5/8	3[illegible]	3348	15	19 3/4	7.7		10-14	44			Good
80	WT - 12 1/4	[illegible]	3369	17	14	1.2		15	60			—
81	OWV "	3369	3386	17	16 1/2	1.0		7	60			2-1-I
82	WT "	3386	3400	14	8	1.8		8	60			2-1-I
83	WT 12 1/4	3400	3439	39	12 3/4	3.1		10	60			2-2-I
84	OWC "	3439	3462	23	10 1/4	2.2		10	60			1-1-I
85	ZTR "	3462		Run on Iron								Damaged
86	OWV "	3462	3493	31	12 3/4	2.4		5	100			Crippled
87	OWC "	3493	3526	33	7 3/4	4.3		—	—			"
88	OWC "	3526	3544	18	8 1/2	2.2		5	100			"
89	OSC "	3544	3557	13	6 1/4	2.1		10	60			—
90	WT "	3557	3580	23	14 1/4	1.6		10	100			—
91	OWV "	3580	3613	33	15	2.2		8	100			Damaged
92	OWC "	3613	3624	11	10 1/4	1.1		8	60			2-1-I
93	OWC "	3624	3649	25	13 1/4	1.9		8	100			2-1-I
94	OSC "	3649	3660	11	8	1.4		8	100			—
95	ZTR "	3660	3675	15	9 1/4	1.6		10	100			Crippled
96	OSC "	3675	3698	23	12 1/2	1.9		8	100			2-1-I
97	OWV	3698	3743	45	17 1/2	2.6		8	140			3-1-I
98	OWV "	3743	3758	15	5 1/4			8	140			1-1-I
99	OWC 8 5/8	3758	[illegible]	31	[illegible]	2		3-5	80			1-1-1
100	OWV - 12 1/4	3758	3778	17	20 1/4	2.9		5	140			1-1-I
101	OWV - "	3778	3818	40	31 1/4	1.3		5	140			1-2-I
102	OWV - "	3818	3888	70	27 3/4	2.5		5	140			2-3-I
103	OWV "	3888	3951	63	26 1/4	2.4		5	140			2-3-I
104	OWC - "	3951	4032	81	28 1/4	2.9		5	140			2-4-I
105	OWC	4032	4102	70	20	3.5		5	140			3-3-I
106	OSC-16	4102	4163	61	21 1/4	2.9		5	140			3-3-I

BIT RECORD

Field YUKON TERRITORY - GRAYLOCK District NORTHERN - EDMONTON

Contractor ARDEN RIG 21 Company SOBC SHELL Well K-2

Date Drilling Started ..... Completed ..... Actual Drilling ..... Days

BIT NO.	TYPE AND SIZE	DEPTH FROM	DEPTH TO	FOOTAGE	TIME	DRLG. SPEED FT/HR	WT 1000#	RPM	PUMP PRESS	DEVIATION DEG.	SERIAL	REMARKS T B G
	OWC 12¼	4240	4275	35	20	1.75	5	140	450	5⅜°	46561	4-3-0
	OWV 12¼	4275	4315	40	14¼	2.8	5	140	450	—	19864	2-2-1
	OWV 12¼	4315	4366	51	25	2.04	5	140	450	5¾°	18638	4-3-1
	OWV 12¼	4366	4412	46	23¼	2.0	5	140	450	5½°	24118	3-2-1
	OWV 12¼	4366	4458	46	22	2.1	5	140	450	5°	32715	2-2-1
	OWV 12¼	4458	4521	63	29¾	2.1	5	110	450	5¾	71263	3-3-1
	OWV 12¼	4521	4570	49	20¼	2.42	5	140	450	5¼	32699	4-4-1
	W7 12¼	4570	4611	41	21½	1.9	5	110	450	—	85873	4-2-1
	[illegible] 6⅞	4611	4613	2	4½	0.45	12	60	800	—	02-62	BROKEN
	W7R 12¼	4613	4648	37	17	2.2	35	60	850	6°	28815	1-1-1
	OWV 8¾	4648	4685	37	12¼	3.0	25	60	900	5¾	50179	4-3-1
	M4L 8¾	4685	4772	87	16	5.4	8-20	130	650	5°	470277	4-3-1
	M4L 8¾	4772	4786	14	3½	4.0	8	✓	✓	✓	465449	1-1-[illegible]
	[illegible] 6⅛"	4786	4808	22	7¾	2.8	12	60	✓	✓	07-62	GOOD
	M7W 8¾	4808	4873	65	16¼	4.0	12	60	650	5°	463628	2-2-1
	W7 8¾	4873	4961	88	16¼	5.4	12	130	650	4¾	75555	2-1-1
	H7 8¾	4961	5060	99	20	5.0	14	130	✓	4°	475015	2-1-1
	H7 8¾	5060	5178	118	19¼	6.1	14	100	1000	3¾	474408	3-3-1
	H7 8¾	5178	5280	102	18	5.7	20	90	1000	3°	464398	3-2-1
	M4L 8¾	5280	5358	78	18¾	4.2	20	80	1000	3½	467899	3-3-1
	EN1 8¾	5358	5435	77	18	4.3	24	85	850	4½	172084	2-2-1
	H7 8¾	5435	5555	120	19¾	6.0	24	85	—	—	43491	2-2-1
	H7 8¾	5555	5657	102	19½	5.2	24	85	850	2	464753	2-3-1
	W7 8¾	5657	5758	101	17¼	5.8	24	85	800	2¼	63924	2-2-1
	H-7 8¾	5758	5879	121	19	6.4	24	85	—	✓	475016	2-3-1
	M4N 8¾	5879	6006	127	19	6.7	24	85	—	2¼	449977	2-3-1
	M4N 8¾	6006	6114	108	17½	6.1	27	85	900	2°	403495	1-2-1
	E3-2 8¾	6114	6182	68	13¾	5.0	27	85	900	3¼°	151448	3-2-1
	M4N 8⅜	6182	6265	83	20½	4.0	31	80	900	1½°	368211	2-2-1
	W7 8¾	6265	6355	90	18¾	4.7	30	80	800	2¼°	63932	4-3-1
	W7 8¾	6355	6508	153	26½	5.8	30	80	800	4°	75568	2-2-1
	W7 8¾	6508	6713	205	28¼	7.3	30	80	800	2½°	75550	2-4-1
	W7 8⅜	6713	6818	105	23½	4.5	15	85	850	2½°	63921	2-2-1

BIT RECORD

Field YUKON TERRITORY - BEAVERCROW District NORTHERN - EDMONTON

Contractor ARROW RIG 21 Company SOBC SHELL Well BEAVERCROW K-2

Date Drilling Started ..... Completed ..... Actual Drilling ..... Days

BIT NO.	TYPE AND SIZE	DEPTH FROM	DEPTH TO	FOOTAGE	TIME	DRLG. SPEED	WT 1000#	RPM	PUMP PSI	VERT DEV.	SERIAL	REMARKS T.B.G.
140	W7 8 5/8	6818	6938	120	26	4.6	15	85	900	2 5/8	63921	3-3-1
141	H7 8 5/8	6939	7052	114	28 3/4	4.0	25	85	900	2 1/2	464754	4-4-1
142	EH1 8 5/8	7058	7217	165	30	5.5	30	85	900		172078	3-3-1
143	W7 8 5/8	7217	7394	177	29	6.1	30	85	900		63930	3-3-1
144	W7 8 5/8	7394	7524	130	26	5.0	15-30	75	900		63923	3-2-1
145	H7 8 5/8	7524	7630	106	29 1/2	3.6	15	85	900	3 1/2	474405	3-3-1
146	SDHE Q 6 3/4	7630	7635	5	3	1.7	12	60	900	—	07-62	FAIR
147	W7 8 5/8	7635	7778	143	35 1/4	4.0	20	80	900	2 1/4	66602	3-3-1
148	M4N 8 5/8	7778	7894	116	21 1/2	5.4	30	80	900	2°	462896	4-3-1
149	EH1A 8 5/8	7894	7947	53	8 3/4	6.0	30	100	900	2°	152970	LOST 1 1/2 CONES
150	W7 8 5/8	7947	7947	0	1 3/4	—	30	80	900	2°	75713	3-2-1
151	H7 8 5/8	7947	8051	104	19 3/4	5.2	35	80	900	2 1/2°	475009	3-4-1
152	W7 8 5/8	8051	8168	117	26 1/4	4.5	35	80	900	2 1/2°	65387	3-3-1
153	W7 8 5/8	8168	8271	103	23 1/2	4.3	35	80	900	2°	70572	4-2-1
154	W7 8 5/8	8271	8366	95	23 1/2	4.1	35	80	900	2 3/4°	65386	4-2-1
155	M4N 8 5/8	8366	8444	78	20	3.9	35	80	900	2 3/4°	369199	4-3-1
156	WTR2 8 5/8	8444	8588	144	36 3/4	4.0	35	80	900	2°	3486	4-3-1
157	WTR2 8 5/8	8588	8729	141	30	4.7	35	70	800	2 3/4°	3485	3-1-1
158	WTR2 8 5/8	8729	8896	170	36 1/2	4.7	35	70	800	2 3/4°	3493	4-4-1
159	WTR2 8 5/8	8896	9030	134	32 1/2	4.1	35	80	900	3°	3489	3-2-1
160	WTR2 8 5/8	9030	9181	151	30 1/2	4.5	35	80	900	3 1/2°	3479	3-2-1
161	WTR2 8 5/8	9181	9325	144	31 1/2	4.5	35	80	900	4 1/2°	3494	4-4-1
162	WTR2 8 5/8	9325	9437	112	25 1/2	4.5	20	80	900	4 1/2°	3495	2-1-1
163	W7 8 5/8	9437	9537	82	27 1/2	3.0	15	80	900	4 1/2°	63926	3-1-1
164	W7 8 5/8	9537	9617	80	27 1/2	2.9	15	70	1000	3 1/4°	75560	3-1-1
165	WTR-2 8 5/8	9617	9700	83	30 1/4	2.7	25	70	1000	3°	3487	3-1-1
166	WTR-2 8 5/8	9700	9796	96	29	3.3	35	75-80	750	3 1/4°	3488	3-1-1
167	WTR-2 8 5/8	9796	9912	116	27 1/4	4.2	30	80	950	3°	3483	3-1-1
168	WTR-2 8 5/8	9912	10086	174	31 1/4	5.5	35	80	1000	2 1/2°	3491	4-3-1
169	WTR-2 8 5/8	10086	10226	140	28	5.0	35	80	1000	2°	3492	4-2-1
170	WTR-2 8 5/8	10226	10380	154	26 1/4	5.8	35	80	1000	1°	3484	3-2-1

PRO - 302 - CS

BIT RECORD

Field Yukon Territory - Beavercrow District Northern - Edmonton

Contractor Arrow Rig 21 Company SOBC Shell Well Beavercrow K-2

Date Drilling Started ..... Completed ..... Actual Drilling ..... Days

BIT NO.	TYPE AND SIZE	DEPTH FROM	DEPTH TO	FOOTAGE	TIME	DRLG. SPEED	Wt 1,000#	RPM	Pump Pressure	Vert. Dev.	SERIAL	REMARKS T B G
171	WTR-2 - 8 5/8	10,380	10,526	146	28 1/4	5.2	35	80	1000	3°		3-2-1
172	H7 8 5/8	10,526	10,637	111	23	4.8	35	80	1000	1°		3-3-1
173	Boyle ◊ 6 1/8	10,637	10,681	44	11 1/2	3.8*	6-14	60-75	1200	—		Good
174	WTR 8 5/8	10,637	10,766	127	29 3/4	4.3	35	80	1000	1 1/8°		3-2-1
175	WTR-2 8 5/8	10,766	10,905	139	33	4.2	35	80	1000	1/2°		3-2-1
176	WTR-2 8 5/8	10,905	11,019	109	29 1/4	3.7	35	80	1000	3/4°		4-2-1
177	WTR-2 8 5/8	11,014	11,119	105	32	3.3	35	80	1000	3/4°		3-2-1
178	WTR-2 8 5/8	11,119	11,174	55	19 1/2	2.8	35	80	1000	—		4-2-1
179	WTR-2 — 8 5/8	11,174	11,226	62	24 1/4	2.5	35	55	1000	—		4-2-1
180	WTR 8 5/8	11,226	11,300	64	25 1/2	2.5	35	55	1000	1 1/2°		4-2-1
181	RG7×J 8 5/8	11,300	11,495	195	45 1/2	4.3	35	36	1400	1 1/2°		2-1-1
182	Boyle ◊ 6 1/8	11,495	11,514	19	3 1/4	8.5*	12	70	1250	—		Good
182A	RG7×J 8 5/8	11,495	11,516	21	4	5.3	30	36	850	—		2-1-1
182A	Boyle ◊ 6 1/8	11,516	11,599	33	11	3.0*	12	80	850	—		Cracked matrix
182B	RG7×J 8 5/8	11,599	11,616	67	23 3/4	2.8	35	36	850	2 1/2°		3-2-1
183	WTR 8 5/8	11,616	11,696	80	25 1/2	3.1	30	55	800	—		3-2-1
184	WTR 8 5/8	11,696	11,769	73	26 3/4	2.7	30	55	850	2°		4-2-1
185	WTR 8 5/8	11,769	11,839	70	25 1/2	2.7	30	55	850	—		3-2-1
186	RG1J 8 5/8	11,839	12,004	165	56 1/2	2.9	35	36	1200	—		2-3-1
187	RG1J 8 5/8	12,004	12,159	155	57 3/4	2.7	35	36	1200	4 1/4		1-3-1
188	RG7×J 8 5/8	12,159	12,414	255	69 1/2	4.0	35	36	1200	—		1-3-1
189	RG7×J 8 5/8	12,414	12,637	223	74 3/4	3.0	25	36	1000	6 3/4		3-4-0
190	RG7×J 8 5/8	12,637	12,720	83	37	2.2	30	36	1100	5 7/8		3-2-1
191	WTR 8 5/8	12,720	12,729	9	7 3/4	1.2	30	52	1000			4-2-1
192	RG1J 8 5/8	12,729	12,881	152	49	3.1	30	36	1000	—		4-3-1
193	RG1J 8 5/8	12,881	13,045	194	51 1/4	3.8	30	36	1000	—		4-2-1

APPENDIX D

WATER ANALYSIS

CGL-6

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton – Fort St. John – Calgary

WATER ANALYSIS REPORT

Field (Wildcat), N.W.T. Well No. SOBC Shell Beavererow YTK-2

Operator The California Standard Company Date Received June 26, 1962.

Formation Fort Creek Depths 1480' - 1573'

Other pertinent data D.S.T., #1. Sampled from drill pipe at bottom of fluid column on May 11, 1962. Recovery 580' drilling mud and water. Pressure and temperature at sampling point 0 psig. and 40°F.. Location: Unit K Section 2 Grid area 60°10' - 125°00'. Elevation: 3720.3' KB.; 3705' Grd.. Date Sampled: May 11, 1962. Lab. No. E19705

PARTS PER MILLION (MILLIGRAMS PER LITER)

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
2174	514	21	Present	5045	172		740		

MILLIGRAM EQUIVALENTS

94.55	25.65	1.73		104.96	4.85		12.14		

MILLIGRAM EQUIVALENTS IN PERCENT

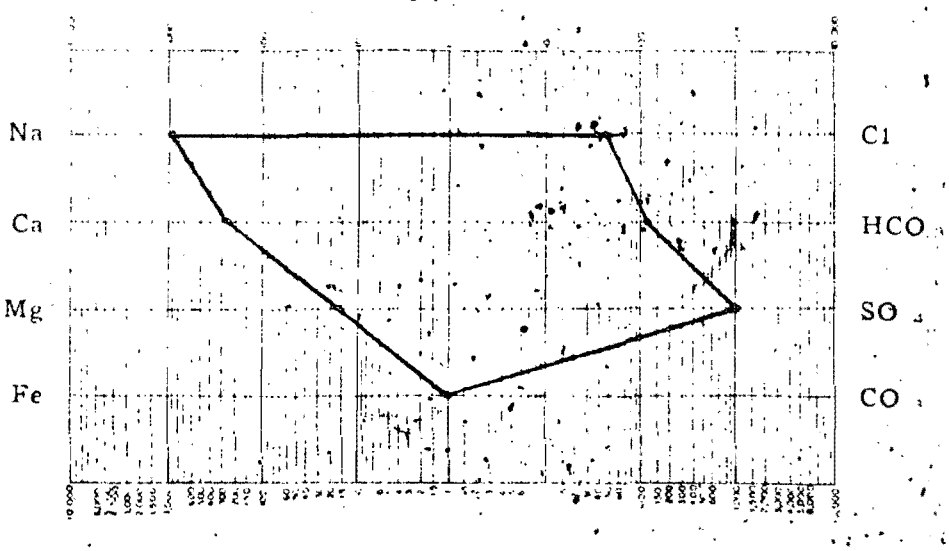
38.77	10.52	0.71		43.03	1.99		4.98		

Total Solids in Parts per Million		Properties of Reaction in Percent	
By evaporation	9,950	Primary salinity	77.54
After ignition	6,620	Secondary salinity	12.50
Calculated	8,291	Primary alkalinity	---
Specific Gravity	1.005	Secondary alkalinity	9.96
Observed pH	8.1	Chloride salinity	4.42
Resistivity 1.25	ohm meters @ 68° F.	Sulfate salinity	95.58

Remarks and conclusions Organic matter present in total solids. This sample appears to be a filtrate water.

Milligram Equivalents Multiplied by 10 On Pattern.

LOGARITHMIC PATTERN
MEQ per unit



Lab. No. E19705

OIL AND GAS CONSERVATION BOARD

STANDARD SAMPLE INFORMATION SHEET

INFORMATION TO BE FORWARDED WITH EACH SAMPLE OF WATER, OIL OR GAS (Please supply as much of the following information as possible. Please Print Clearly.)

Kind of sample (water, oil or gas): Water

Marks on sample container: Bottom of fluid column.

Sample obtained by: Operator Date: May 11,1962.

Operator: The California Standard Company

Mailing address for results: 14605 - 118th Avenue, Edmonton, Alberta.

Well name and No. SOBC Shell Beavercrow VT K-2 Field or Area: (Wildcat)

Located in: L.S.D. Unit K Section 2 Grid Area 60°10' - 125°00' Elev: K.B. 3720.3' Grd. 3705'

Sample obtained from (line, tubing, separator, etc.): Drill pipe

Pressure: (a) at point of sampling 0 psig. (b) Gas Bomb pressure NA psig.

Temperature: (a) at point of sampling 40 F (b) Separator NA °F

Name of Zone and Formation: Fort Creek

Method of Production: D.S.T., Pump, Flowing, Swabbing,

Other (specify) D.S.T. #1

If D.S.T. sample, D.S.T. results: Interval 1480' - 1573'

Recovery 580' drilling mud and water.

Well production at sampling time: Oil NA Bpd; Gas NA MCFD; Water NA Bpd.

Perforations or open hole interval: NA

Pressures: Reservoir 384 , Tubing NA , Casing NA , Separator NA

REMARKS:

L. J. Homer.
(Signed)

The California Standard Company
(Company)

CHEMICAL & GEOLOGICAL LABORATORIES LTD

WATER ANALYSIS REPORT

Field Wildcat, Y.T. Well No. S.O.B.C. Shell Beavercrow YT #1

Operator The California Standard Company Date received September 20, 1962

Formation Nahanni Depths 4603' - 4690'

Other pertinent data Location: Unit K Section 2 Grid Area 60° 10' - 125° 00'.
See information sheet

Date Sampled: August 13, 1962 Lab. No. E20126-1

PARTS PER MILLION

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3
361	490	72	Present	1379	349	460

MILLIGRAM EQUIVALENTS

15.69	24.45	5.92	28.68	9.84	7.54

MILLIGRAM EQUIVALENTS IN PERCENT

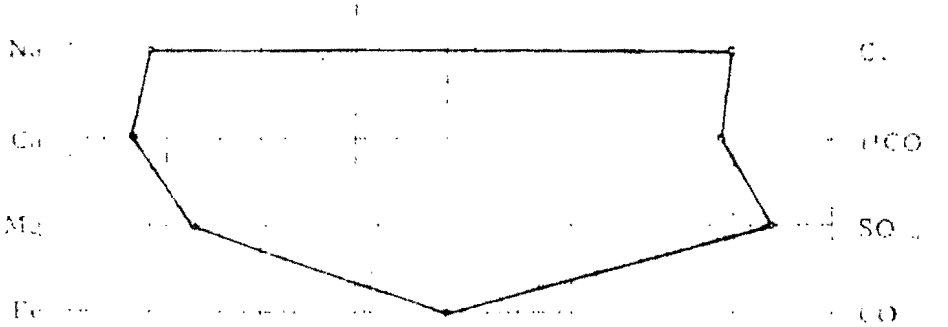
17.03	26.54	6.43	31.13	10.68	8.19

Total Solids in Parts per Million		Base Exchange Reaction in Percent	
By evaporation	3055	Primary alkalinity	34.06
After ignition	2355	Secondary alkalinity	49.56
Calculated	2877	Primary salinity	---
Specific Gravity	1.002	Secondary salinity	16.38
Observed pH	8.2	Chloride salinity	25.54
Resistivity 3.16	ohm meters @ 68° F	Total salinity	74.46

Remarks and conclusions **Refractive Index: 1.3360 We have nothing on file from this same area with which to correlate this water. The sample appears to be a filtrate water.**

Milligram Equivalents Multiplied by 100 on the pattern.

MEQ per cent



Lab. Number E20126-1

OIL AND GAS CONSERVATION BOARD (PROVINCE OF ALBERTA)

STANDARD SAMPLE INFORMATION SHEET

INFORMATION TO BE FORWARDED WITH EACH SAMPLE OF WATER, OIL OR GAS (Please supply as much of the following information as possible. Please Print Clearly.)

Kind of sample (water, oil or gas): Water

Marks on sample container: 100' above tool

Sample obtained by: Operator Date: August 13, 1962

Operator: The California Standard Company

Mailing address for results: 14605 - 118th Avenue

Well name and No. SOBC Shell Beavercrow K-2 Field or Area: Wildcat, Y.T.

Located in: L.S.D. Sec. Twp. Rge. W Mer Elev: K.B. 3720.3
Unit K Section 2 Grid Area 60° 10' - 125° 00' Grd. 3705.

Sample obtained from (line, tubing, separator, etc.): Drill pipe

Pressure: (a) at point of sampling 0 psig. (b) Gas Bomb pressure NA psig.

Temperature: (a) at point of sampling 50 F (b) Separator NA °F

Name of Zone and Formation: Nahanni

Method of Production: D.S.T., Pump, Flowing, Swabbing,

Other (specify) D.S.T. #2

If D.S.T. sample, D.S.T. results: Interval 4603 - 4690

Recovery 470' water mud and 3000' fresh water.

Well production at sampling time: Oil NA Bpd; Gas NA MCFD; Water NA Bpd.

Perforations or open hole interval: NA

Pressures: Reservoir 1542 , Tubing , Casing , Separator

REMARKS:

I.S.I.P. 1547 comp. in 5 mins.

G. Johnson
(Signed)

The California Standard Company
(Company)

WATER ANALYSIS

Field Wildcat, Y.T. Well No. S.O.B.C. Shell Beavercrow YT #1

Operator The California Standard Company Date Rec'd September 20, 1962

Formation Nahanni Depth 4784' - 4808'

Other pertinent data Location: Unit K Section 2 Grid Area 60° 10' - 125° 00'.
See Information Sheet

Date Sampled: August 24, 1962 No. E20126-2

PARTS PER MILLION

Na + K	Ca	Mg	Fe	SO4	Cl	HCO3
951	620	114	Present	066	1970	520

MILLIGRAM EQUIVALENTS

Na + K	Ca	Mg	Fe	SO4	Cl	HCO3
41.38	31.34	9.37		18.01	55.55	8.53

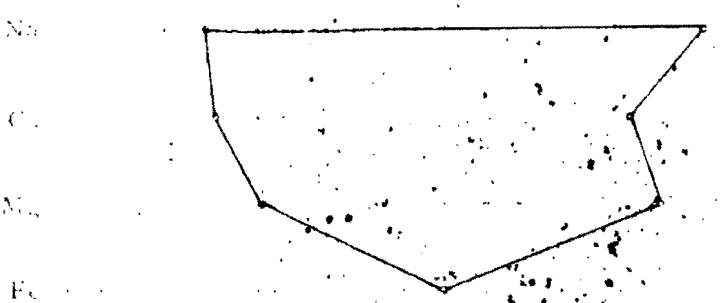
MILLIGRAM EQUIVALENTS

Na + K	Ca	Mg	Fe	SO4	Cl	HCO3
25.20	19.09	5.71		10.97	33.83	5.20

Total Solids in Parts per Million		Reacting Percentage
By evaporation	5,545	50.40
After ignition	4,110	39.20
Calculated	4,785	---
Specific Gravity	1.002	10.40
Observed pH	8.2	75.51
Resistivity 1.45	ohm meters @ 68°F	24.49

Remarks and conclusions Refractive Index: 1.3360. We have nothing on file from this same area with which to correlate this water. The sample appears to be a filtrate water.

Milligram Equivalents Multiplied by 10 on the pattern.



Lab. Number E20126-2

OIL AND GAS CONSERVATION BOARD (PROVINCE OF ALBERTA)

STANDARD SAMPLE INFORMATION SHEET

INFORMATION TO BE FORWARDED WITH EACH SAMPLE OF WATER, OIL OR GAS (Please supply as much of the following information as possible. Please Print Clearly.)

Kind of sample (water, oil or gas): Water

Marks on sample container: Caught 100' above tool

Sample obtained by: Operator **Date:** August 21, 1962

Operator: The California Standard Company

Mailing address for results: 14605 - 110th Avenue

Well name and No. SOBC Shell Beavercrow YT K-2 **Field or Area:** Wildcat

Located in: L.S.D. Unit K **Sec** Section 2 **Twp.** **Rge.** Grid Area 60° 10' - 125° 00' **W Mer.** **Elev:** **K.B.** 3720.3 **Grd.** 3705

Sample obtained from (line, tubing, separator, etc.): Drill pipe

Pressure: (a) at point of sampling 10 psig. **(b) Gas Bomb pressure** NA psig.

Temperature: (a) at point of sampling 50 °F **(b) Separator** NA °F

Name of Zone and Formation: Nahanni

Method of Production: D.S.T., Pump, Flowing, Swabbing.

Other (specify) D.S.T. #3

If D.S.T. sample, D.S.T. results: **Interval** 4784 - 4808

Recovery 3050' fresh water

Well production at sampling time: Oil NA Bpd; **Gas** NA MCFD; **Water** NA Bpd.

Perforations or open hole interval: NA

Pressures: Reservoir 1680 , **Tubing** NA , **Casing** NA , **Separator** NA

REMARKS: I.S.I.P. 1680 comp in 10 mins.

G. Johnson
(Signed)

The California Standard Company
(Company)

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton — Fort St. John — Calgary

WATER ANALYSIS REPORT

Field Wildcat Well No. S.O.B.C. Shell Beavercrow YT#1

Operator The California Standard Company Date Received October 15, 1962

Formation Bonning - Silurian Depths 7612' - 7635'

Other pertinent data D.S.T. #4. Sampled 90 feet above tool, from drill pipe on September 22, 1962. Recovered 1350 feet formation water. Elevation: 3720.3' KB.; 3705' Grd. Location: Unit K Sec. 2 60° 11' 02" N, 125° 01' W..

Date Sampled: Sept. 22 1962 Lab. No. E20254

PARTS PER MILLION (MILLIGRAMS PER LITER)

Na+K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
547	433	83	Present	900	950		410		

MILLIGRAM EQUIVALENTS

23.80	21.61	6.82		18.72	26.79		6.72		

MILLIGRAM EQUIVALENTS IN PERCENT

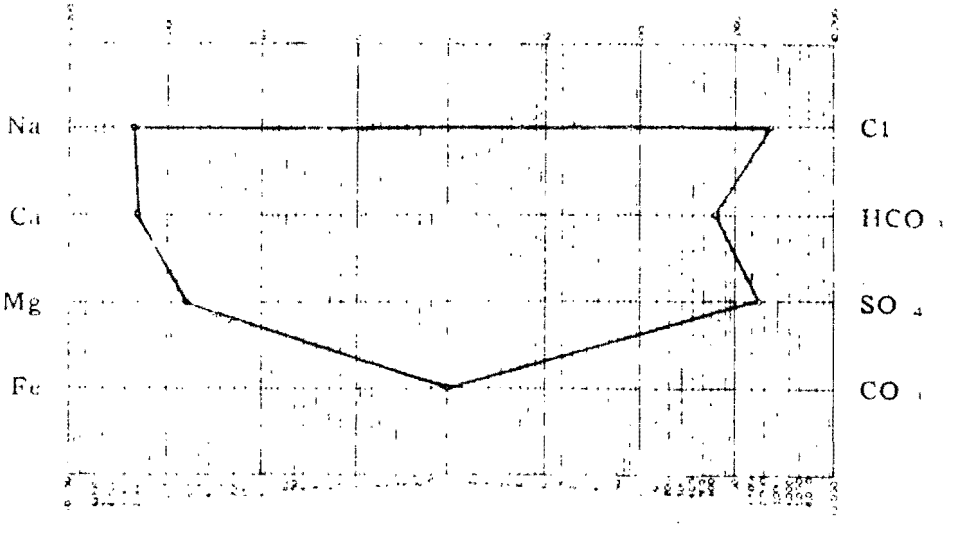
22.78	20.69	6.53		17.92	25.65		6.43		

Total Solids in Parts per Million		Properties of Reaction in Percent	
By evaporation	3,400	Primary salinity	45.56
After ignition	2,470	Secondary salinity	41.58
Calculated	3,115	Primary alkalinity	---
Specific Gravity	1.003	Secondary alkalinity	12.86
Observed pH	7.0	Chloride salinity	58.87
Resistivity 2.41	ohm meters @ 68° F.	Sulfate salinity	41.13

Remarks and conclusions Refractive Index: 1.3365. We have nothing on file with which to correlate this sample.

Milligram Equivalents Multiplied by 100 on the pattern.

LOGARITHMIC PATTERN
MEQ per unit



Lab. No. E20254

OIL AND GAS CONSERVATION BOARD (PROVINCE OF ALBERTA)

STANDARD SAMPLE INFORMATION SHEET

INFORMATION TO BE FORWARDED WITH EACH SAMPLE OF WATER, OIL OR GAS (Please supply as much of the following information as possible. Please Print Clearly.)

Kind of sample (water, oil or gas): Water

Marks on sample container: 90' above tool

Sample obtained by: Operator Date: September 22, 1962

Operator: The California Standard Company

Mailing address for results: 14605 - 118th Avenue

Well name and No. S.O.B.C. Shell Beavercrow YT K-2 Field or Area: Wildcat

Located in: L.S.D. Sec. Twp. Rge. W Mer Elev: K.B. 3720.3

Unit K Section 2 Grid Area 60° 10' N 125° 00' W Grd. 3705

Sample obtained from (line, tubing, separator, etc.): Drill Pipe

Pressure: (a) at point of sampling 0 psig. (b) Gas Bomb pressure NA psig.

Temperature: (a) at point of sampling 45 °F (b) Separator NA °F

Name of Zone and Formation: Silurian

Method of Production: D.S.T., Pump, Flowing, Swabbing,

Other (specify) D.S.T.#4

If D.S.T. sample, D.S.T. results: Interval 7612 - 7635

Recovery 1350' formation water

Well production at sampling time: Oil NA Bpd; Gas NA MCFD; Water NA Bpd.

Perforations or open hole interval: 7612 - 7635

Pressures: Reservoir 2056 , Tubing NA , Casing NA , Separator NA

REMARKS:

P. Malorony
(Signed)

The California Standard Company
(Company)

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Edmonton — Fort St. John — Calgary

WATER ANALYSIS REPORT

Field (Wildcat), Yukon. Well No. S.O.B.C. Shell Beaver River YT K-2

Operator The California Standard Company Date Received January 30, 1963

Formation [illegible] Depths 12,890' - 13,049'

Other pertinent data D.S.T. #8. Recovered 2800 feet drilling mud, 500' drilling mud. Duration of test - 90 minutes. Sample obtained from drillpipe at 90 feet above tool. Location: Unit K Section 2 Grid area 60°10'N 125°00'W. Elevation: 3720.3' KB, 3705' Grd.

Date Sampled: January 4, 1963 Lab. No. E20997

PARTS PER MILLION (MILLIGRAMS PER LITER)

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
6644	820	35	Present	8222	4940		1370		

MILLIGRAM EQUIVALENTS

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
289.00	40.92	2.88		171.02	139.31		22.47		

MILLIGRAM EQUIVALENTS IN PERCENT

Na & K	Ca	Mg	Fe	SO_4	Cl	CO_3	HCO_3	OH	H_2S
43.42	6.15	0.43		25.69	20.93		3.38		

Total Solids in Parts per Million

By evaporation 32,736
After ignition 18,928
Calculated 21,336
Specific Gravity 1.021
Observed pH 8.0
Resistivity 0.691 ohm meters @ 68° F.

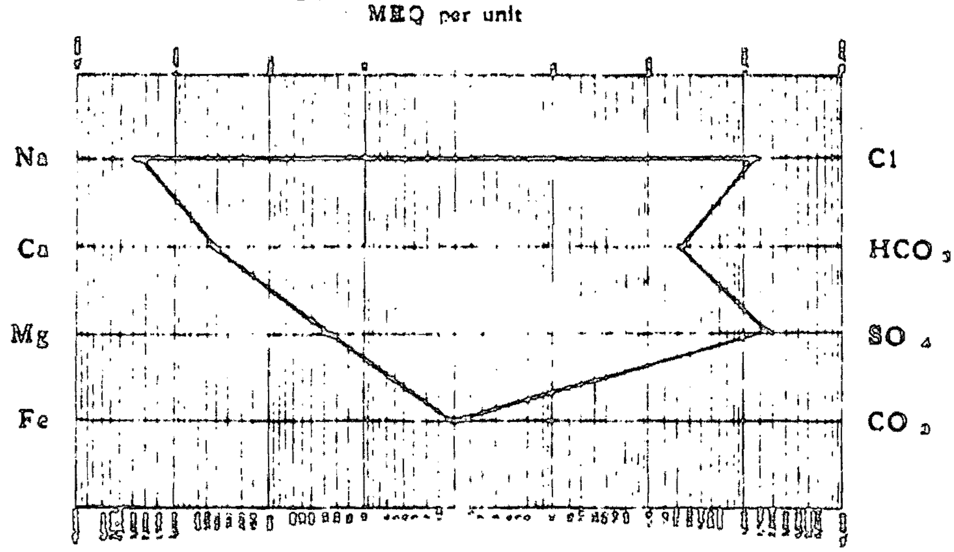
Properties of Reaction in Percent

Primary salinity 86.84
Secondary salinity 6.40
Primary alkalinity ---
Secondary alkalinity 6.76
Chloride salinity 44.89
Sulfate salinity 55.11

Remarks and conclusions Very large amount of organic matter present in total solids. The sample appears to be a filtrate water. The unusually high sulfate content could be due to the additives in the sample. Refractive Index: 1.3400

Milligram Equivalents Multiplied by 10 On the Pattern.

LOGARITHMIC PATTERN
MEQ per unit



Lab. No. 28997

OIL AND GAS CONSERVATION BOARD (PROVINCE OF ALBERTA)

STANDARD SAMPLE INFORMATION SHEET

INFORMATION TO BE FORWARDED WITH EACH SAMPLE OF WATER, OIL OR GAS (Please supply as much of the following information as possible. Please Print Clearly.)

Kind of sample (water, oil or gas):

Marks on sample container: 90° above tool.

Sample obtained by: Operator Date: Jan 4/63

Operator: The California Standard Co.

Mailing address for result: 14605 - 118th Ave.

Well name and No. SOBC Shell Beavercrow YT K-2 Field or Area: Wildcat Yukon

Located in: L.S.D. Sec. Twp. Rge. W Mer. Elev: K.B. 3720.3
Unit K Section 2 Grid Area 60°10' N 125°00' W. Grd. 3705

Sample obtained from (line, tubing, separator, etc.): drill pipe

Pressure: (a) at point of sampling 0 psig. (b) Gas Bomb pressure NA psig.

Temperature: (a) at point of sampling - 30 °F (b) Separator NA °F

Name of Zone and Formation: Ronning

Method of Production: D.S.T., Pump, Flowing, Swabbing,

Other (specify)

If D.S.T. sample, D.S.T. results: D.S.T. #8 Interval 12,830 - 13045

Recovery 2800' water cushion & 500' drilling mud

Well production at sampling time: Oil NA Bpd; Gas NA MCFD; Water NA Bpd.

Perforations or open hole interval: 12830 - 13045

Pressures: Reservoir 3705? , Tubing , Casing , Separator

REMARKS:

P. Malobery
(Signed)

The California Standard Company
(Company)