

PCI

SAMMONS H-55

9211-P28-1-2

Nova Scotia Newfoundland Gulf of St. Lawrence	<input type="checkbox"/> West Coast <input type="checkbox"/> Northern <input type="checkbox"/> Hudson Bay	<input type="checkbox"/> Exploratory <input checked="" type="checkbox"/> Development <input type="checkbox"/> Delineation <input type="checkbox"/> Service
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AUTHORITY TO DRILL A WELL

APPLICATION

This application is submitted with Section 82 of the Canada Oil and Gas Drilling Regulations. When approved under Section 83 of the Regulations, it is the requisite authority for the commencement of drilling operations.

Well Name in Full: ... P.C.I. SAMMONS H-55
 Operator: ... Petro-Canada Inc. Drilling Program No.: ... N/A
 Contractor: ATCO Permit or Lease No.: ... N83A978
 Drilling Rig or Unit: ... ATCO #76 Estimated Well Cost: ... \$7,750,000
 Location-Unit: ... H Section: ... 55 Grid Area: ... 65-30-128-15
 Coordinates: Lat: ... 65° 24' 27.55" Long: ... 128° 24' 45.22"
 Area: Mackenzie Plains Field/Pool: ... Undefined
 Elevation-RTKB: ... 379.7m (ASL) Ground Elev. ... 374.7m (ASL)
 Approx. Spud Date: ... Late February 73° (Drilling) + Summer
 Anticipated Total Depth: ... 2000m Estimated Days on Location/Standby Period
 TWI: 300H556530128150 Target Horizon(s) Primary: ... Cambrian Mt. Cap. &
 Mt. Clark Secondary: ... Precambrian Upper Katherine

EVALUATION PROGRAM

Ten-metre sample intervals
 Five-metre sample intervals ... 350-T.D. (3 bottled sets, 1 bagged set)
 Canned sample intervals ... 350-T.D. (every 10m) (Upper Katherine Fm. - 1421.7m)
 Conventional cores at 1-18m core (Mt. Cap Fm. - 1281.7m) ... 1-18m core (Mt. Clark Fm. - 1381.7m)
 Logs and Tests ... DLL-MSTL, DI-SFL, Proximity, Microlog
 CNL-LDT, CNL FDC, HDT Directional Survey, BHC Sonic, AMS Gamma Ray,
 NGT-Possible: CET, CBL/VDT, TDT & Cased Hole Gamma Ray
 CASING AND CEMENTING PROGRAM 1 DST (Mt. Cap) 1 DST (Mt. Clark) 1 DST (Upper Katherine)

Setting Depth

O.D.	Weight:	Grade:	Below K.B.	Cementing Program (Volumes):
508mm	139.9 kg/m	K-55 BT&C	30m	14 tonnes permafrost cement
339.7mm	101.2 kg/m	K-55 BT&C	0-250m	45 tonnes permafrost cement
224.5mm	59.5 kg/m	S-95 LT&C	0-800m	63 tonnes Class G + 0.5% T.I.
*177.8mm	43.2 kg/m	S-95 LT&C	650-1250m	13 tonnes Class G + 0.5% + 0.3% Retarder
114.3mm	17.3 kg/m	S-95N-80 LT&C	0-2000m	28 tonnes Class G + 0.5% + 0.3% Retarder
*Dependent on hole conditions B.C.P. Equipment			1-346mm, 21 MPa Hydril Annular	
			1-346mm, 21 MPa Hydril Single Studded Gate	
			1-346mm, 34 MPa Hydril Single Studded Gate	

Other Information: ... Divarter system to be used on surface hole
 ... Consists of: ... 346mm, 21000 kPa Mud Cross, x, Automatic HCR valve
 ... 346mm, 21000 kPa Hydril Annular preventor

Signed: *J. L. Shanks for L. McDonald* Title: ... LAND DRILLING MANAGER
 Date: ... 84-02-03 Company: ... RETRO-CANADA INC.

APPROVAL

An approved copy of this notice is to be posted at each wellsite.

ADEQUATE
REVIEWED BY
DATE 04.02.79

Department of Energy
Minerals and Resources

Ministère de l'Énergie
des Mines et des Ressources

Department of Indian Affairs
and Northern Development

Ministère des Affaires indiennes
et du Nord Canadien

Signed: ... *L. Shanks* ...
 Date: ... 1 March 1984 ...
 Engineering Branch
 File: ... 9211-P28-1-2 ...

Canada



Canada Oil and Gas
Lands Administration Administration du pétrole
et du gaz des terres du Canada

D.A.

#1137

E.A.

#159

Nova Scotia	<input type="checkbox"/>	West Coast	<input type="checkbox"/>	Well Status	
Newfoundland	<input type="checkbox"/>	Northern	<input checked="" type="checkbox"/>	Suspended	
Gulf of St. Lawrence	<input type="checkbox"/>	Hudson Bay	<input type="checkbox"/>	Completed	
				<input type="checkbox"/>	Abandoned

WELL TERMINATION RECORD

This record is submitted in triplicate in compliance with Section 184 of the Canada Oil and Gas Drilling Regulations.

WELL DATA

Well Name: PCI Sammons H-55 Area: MacKenzie Plains
Grid Area: 65-30-128-15 Area: Undefined
Permit or Lease No.: N83A978 Final Coordinates: Lat: $65^{\circ} 24' 27.55''$ Long: $128^{\circ} 24' 45.22''$
Drilling Unit: Atco/Egutak #76 Elevation-REF/KB: 381.5m SeaGL: 374.7m
Spud Date: 1984-03-14 Rig Released: 1984-05-20 Total Depth: 1710m

CASING AND CEMENTING

O.D.	Weight:	Grade:	Depth Set:	Cement and Additives:
762 mm	-	-	10.7m	-
508 mm	140 kg/m	K-55	35.5m	16t Arctic
340 mm	101 kg/m	K-55	135 m	233t Arctic
245 mm	59.5 & 64.7	K-55 & 900 m	50095	31t "G" + 0.5% T.I.

PLUGGING PROGRAM

Approval of the following program was obtained by (person) K. M. McDonald from
(person) M. D. Thomas of the Canada Oil and Gas Lands Administration by means of
telex on May 18 1984

Type of Plug:	Interval:	Felt:	Cement and Additives:
Cement #1	1710-1610m	no	6t Class "G"
Cement #2	1300-1150m	1238m	11.2t Class "G"
Cement #3	1150m	Topped off	5.6t
*Packer	1000-800m	836m	11.8t Class "G"
*Cement	16 - 0m	no	11t Arctic Set

Lost Circulation/Overpressure zones: 138m, 143m, 474m, 495m to 900m, 929m - 978m

Equipment left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): None

Cores: Type: 171mm diamond Intervals: 1449 m to 1452
159 mm diamond 1687.8 m to 1695.2 m

Other Downhole Completion/Suspension Equipment: N/A (Abandoned)

*Note: Packer set at 16m, 10 tonnes squeezed below it, and 1 tonne on top.

CERTIFICATION

I certify on the basis of personal knowledge of operations undertaken at the above named well that the above information is accurate.

Signed: *W. E. Roche* P. Eng.
Name: W. E. Roche

Title: Area Drilling Engineer
Date: 84-11-20

Acknowledged by: *h. D. Khanal*
Engineering Branch
Date: 31 Dec 84
File: 9211-P28-1-2

Department of Energy,
Mines and Resources

Ministère de l'Énergie,
des Mines et des Ressources

Department of Indian Affairs
and Northern Development

Ministère des Affaires Indiennes
et du Nord canadien

Canada

Canada Oil and Gas
Lands Administration

SEP 24 1984

Northern Region

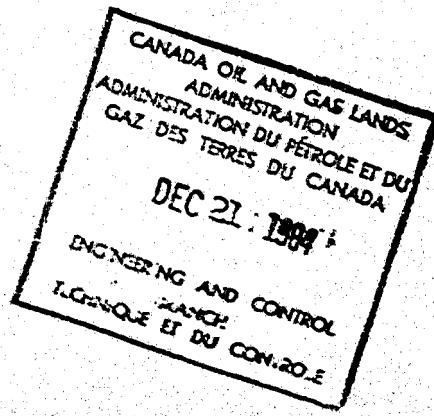
WELL HISTORY REPORT

PCI SAMMONS H-55

PETRO-CANADA INC.

CALGARY, ALBERTA

Prepared by: B. Rose
1984-06-25



WELL HISTORY REPORT

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A) Drilling Data

- A.1 Daily Mud Status Report
- A.2 Deviation Records
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PCI SAMMONS H-55

WELL SUMMARY

PCI Sammons H-55, located in the Mackenzie Plains area of the Northwest Territories, was drilled to a total depth of 1710 m in 68 days. It was the second well drilled in the 1984 Northern Interior Plains Project.

The location coordinates for this well are 65° 24' 27.55" North Latitude and 128° 24' 45.22" West Longitude. The ground elevation is 374.7 m above sea level.

Petro-Canada Inc. of Calgary operated the well and Atco Drilling Ltd. of Calgary, using Atco/Equitak #76, a diesel mechanical rig built in 1983, was the Contractor.

The primary objectives of this exploratory well were the Cambrian Mt. Cap and Mt. Clark formations.

PCI Sammons H-55 was spudded on 1984-03-14 at 0015 hrs. A 762 mm conductor barrel had been set at 10.7 m prior to spud. Within one day, a 660 mm conductor hole was drilled and 508 mm conductor pipe set at 35.5 m.

A 346 mm diverter stack was nipped up and a 444 mm surface hole drilled to 140 m, where due to lost circulation problems, 349 mm surface casing was set at 135.5 m. Deviation problems on this hole section were controlled by drilling a 311 mm pilot hole and then opening to 444 mm.

With a 346 mm, 21,000 kPa BOP system nipped up, the 311 mm intermediate hole section was drilled and logged and 244.5 mm casing set at 900 m in 17 days. The entire intermediate hole section was drilled with stable foam. At 443 m, while drilling ahead, the hole started making water at a rate of 15-22 m³/hr. At 495 m, after making a connection, circulation was lost. Drilling continued to 900 m with only occasional foam returns. Penetration rates averaged 2.9 m/hr over the intermediate hole section.

The 216 mm main hole was drilled to a depth of 1710 m in 36 days. Lost circulation problems were encountered while drilling the interval between 929 m to 1082 m. Penetration rates averaged 1.5 m/hr over the main hole section. The hole was logged with no significant hydrocarbon shows.

Abandonment was completed and the Atco/Equitak #76 rig was released on 1984-05-20 at 2400 hrs.

GENERAL DATA

2.1 Well Name and Number: PCI Sammons H-55

2.2 Well Location: North Latitude 65° 24' 27.55"
West Longitude 128° 24' 45.22"

2.3 Unique Well Identifier: 300R556530128150

2.4 Operator: Petro Canada Inc.
P.O. Box 2844
Calgary, Alberta
T2P 3E3

Contractor: Atco Drilling Ltd.
700 - 800 6th Avenue S.W.
Calgary, Alberta

2.5 Drilling Unit: Name: Atco/Equitak Rig #76
Type: Triple,diesel mechanical
Year Built: 1983
Location: Nisku, Alberta

2.6 Position Keeping: N/A to this well

2.7 Support Craft: N/A to this well

2.8 Drilling Unit Performance: N/A to this well

2.9 Difficulties & Delays: No difficulties or delays were encountered while drilling this well that were not directly associated with downhole operations.

SUMMARY OF DRILLING OPERATIONS

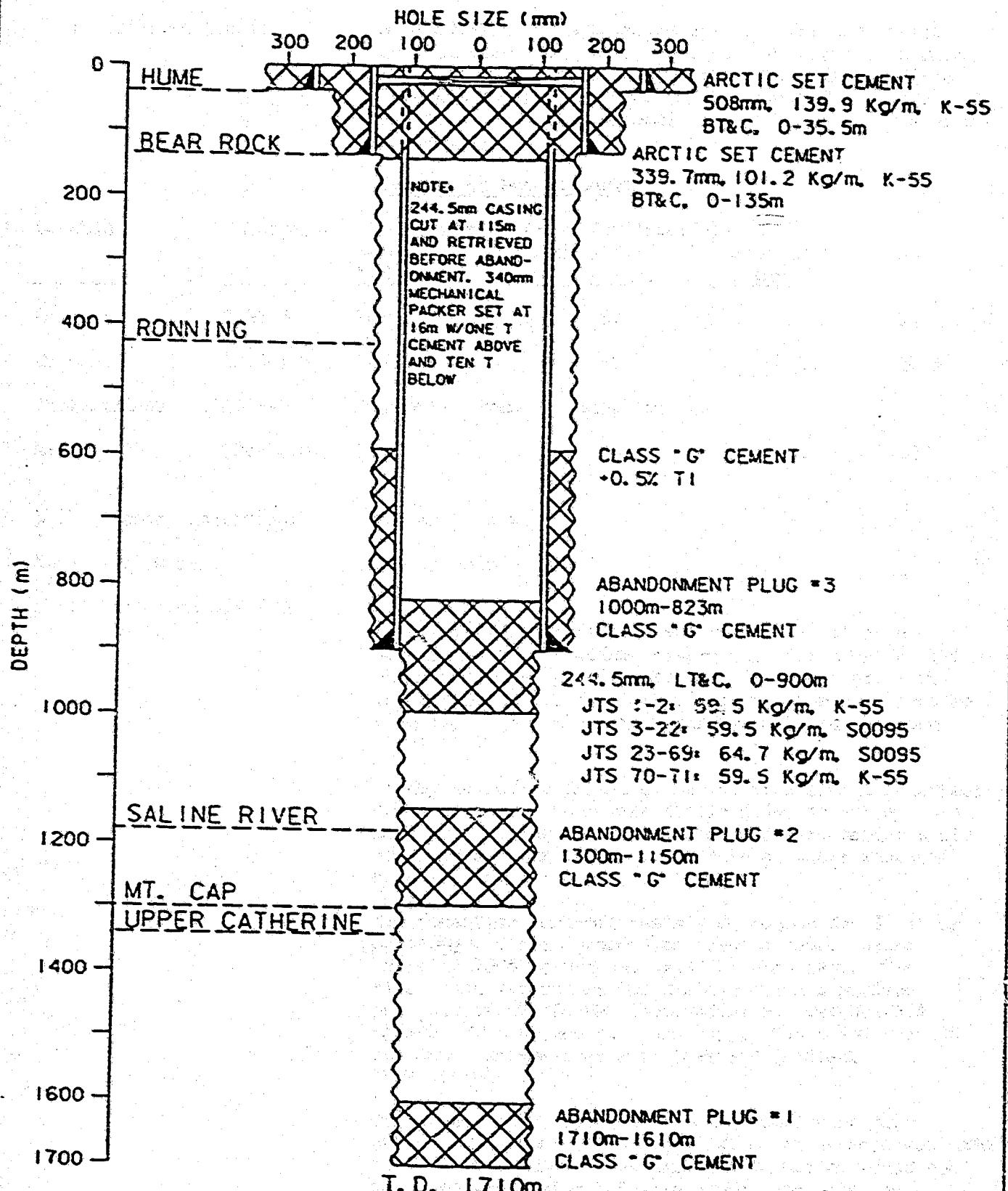
3.1	Elevations:	Ground: 374.7 m Kelly Bushing: 381.5 m
3.2	Total Depth:	Drilled: 1710 m Logged: 1710 m P.B.D.: To Surface
3.3	Date and Hour Spudded:	1984-03-14 - 0015 hrs.
3.4	Date Drilling Completed:	1984-05-16 - 1830 hrs.
3.5	Date of Rig Release:	1984-05-20 - 2400 hrs.
3.6	Well Status:	Dry and Abandoned
3.7	Hole Sizes and Depths:	

3.8 Casing and Cementing Details

Hole Classification:	Conductor	Surface	Intermediate
Hole Size	660 mm	444 mm	311 mm
Casing Size:	508 mm	340 mm	244.5
Weight:	140 kg/m	101 kg/m	59.5 kg/m, K-55 59.5 kg/m, S0095
Grade:	K-55	K-55	64.7 kg/m, S0095
Coupling:	BT&C	BT&C	LT&C
Number of Joints:	3	11	71
Number of Centralizers:	0	0	8
Date of Run:	84-03-14	84-03-22	84-04-10
Shoe Depth:	35.5 mm	135 m	900 m
Tonnes of Cement:	16	23.3	31
Type of Cement:	Arctic Set	Arctic Set	Class "G"
Additives:	none	none	0.5% T.I.
Height of Cement:	Surface	Surface	600 m
Based On:	Returns to Surface	Returns to Surface	Cement bond log

3.9 Well Diagram

PCI SAMMONS H-55



3.10 Sidetracked Hole:

N/A to this well

3.11 Drilling Fluid:

A Gel/DF-VIS mud system was utilized for the entire surface hole section and most of the main hole section. Stable foam was utilized for the entire intermediate hole section and the interval between 957 m to 985 m of the main hole. See Appendix for complete details of mud properties.

Summary of Mud Properties

Section	Interval m	Properties (Max. for Interval)				pH
		Weight kg/m ³	Funnel Vis S/L	Water Loss cm ³		
Conductor	0-35.5	1050	51			10
Surface	35.5-135	1065	60		13	10.5
Intermediate	135-900	Stable	Foam	Drilling		
Main	900-1710	1110		85	21	12

3.12 Fishing Operation:

N/A to this well

3.13 Well Kicks:

N/A to this well

3.14 Formation Leak-Off
Tests:

A formation leak-off test was run on day 11 after drilling out the surface casing shoe joint set at 135 m. Water was used for the test and no surface pressure developed. Formation leak-off pressure appeared to be slightly higher than the water hydrostatic pressure (1354 kPa).

On day 16, after drilling the interval from the surface casing shoe to 454 m with stable foam, an attempt was made to fill the hole with water. The formation would not hold and was taking 1.8 m³/min of water when the hole was full.

Two formation leak-off tests were run on day 31 after drilling out the intermediate casing shoe. Water (density 1005 kg/m³) was used for each test. The first test was run at 905 m and reached a surface pressure of 10,000 kPa (equivalent mud weight 2019 kg/m³). The second test was run at 906 m and reached the same surface pressure (leak-off gradient 19.8 kPa/m).

On day 36, after spotting a lost circulation plug between the interval 985 m to 923 m, an attempt was made to fill the hole with water. The formation would not hold and was taking 1.8 m³/min when the hole was full.

3.15 Lost Circulation:

Partial lost circulation (24 m^3) occurred between the interval 93 m to 138 m. Complete lost circulation occurred at 143 m. The remedial action taken was first, the addition of LCM to the mud system, second, placing a cement plug between the interval 143 m to 96 m, third, drilling out the cement to 135.5 m and setting surface casing.

A pressure integrity test was run below the surface casing shoe and showed the leak-off gradient to be slightly higher than the water gradient. Based on this information stable foam was used as the drilling fluid for the intermediate hole section.

While drilling ahead at 443 m with stable foam, the hole started to make water at a rate of $15-22 \text{ m}^3/\text{hr}$. At 474 m, after making a connection, circulation was lost. It required two hours of pumping foam down the hole to regain circulation. Circulation was lost again at 495 m. Drilling continued to 900 m with only occasional foam returns to surface.

Lost circulation problems were encountered while drilling with mud between the interval 929 m to 961 m. The remedial action taken was the addition of LCM to the mud system and switching to a stable foam system at 961 m. Drilling continued with no foam returns between the interval 963 m to 978 m. Lost circulation cement plugs were spotted between the interval 985 m to 891 m and drilling continued with a mud system.

Partial lost circulation (32 m^3) occurred between the interval 1054 m and 1082 m. The remedial action taken was the addition of LCM to the mud system.

Water flowed at a rate of $15-22 \text{ m}^3/\text{hr}$ (total 477 m^3) while drilling between the interval 443 m to 474 m with stable foam.

The second occurrence of water production began with the re-establishment of foam circulation at 978 m. The well produced water at a rate of $40 \text{ m}^3/\text{hr}$ until drilling was stopped at 985 m and a lost circulation cement plug set.

3.16 Water Flows:

3.17 Time Distribution:

3.17.1 Daily Activity

DATE	ACTIVITY	DAYS SINCE SPUD
1984-03-14	Spudded hole at 0015 hrs with 660 mm OSC1GJ bit. Drilled ahead to 35.5 m. Ran and cemented 508 mm conductor casing.	1
1984-03-15	WOC. Welded on bowl. Nipped up diverter stack.	2
1984-03-16	Completed nipple up. Pressure tested diverter stack. RIH with 444 mm OSC3AJ bit. Drilled out plug, cement and shoe. Drilled ahead to 42 m. POOH. RIH with 444 mm OSC-16 bit. Drilled ahead to 63 m.	3
1984-03-17	Drilled ahead to 83 m. POOH. RIH with 311 mm X3A bit. Drilled pilot hole to 93 m.	4
1984-03-18	Drilled ahead to 138 m. Lost circulation. Mixed and pumped sawdust pill. POOH. RIH with 311 mm XDV bit.	5
1984-03-19	Drilled ahead to 143 m. Lost circulation. Mixed and pumped LCM until circulation regained. POOH. RIH with 444 mm OSC-1 bit. Reamed from 83 m to 88 m. POOH. RIH with 444 mm hole opener and 311 mm XDV bit. Reamed from 88 m to 99 m.	6
1984-03-20	Continued reaming to 135 m. POOH. RIH with 311 mm XDV bit. Reamed to 140 m. POOH. RIH with open ended drill pipe. Circulated and conditioned hole. Ran lost circulation cement plug from 140 m to 121 m. Laid down drill pipe. WOC.	7
1984-03-21	WOC. RIH with 445 mm bit. WOC. Drilled out cement to 135.5 m. POOH. Ran 340 mm casing.	8
1984-03-22	Completed running casing. Float shoe landed at 135 m. Cemented 340 mm casing. WOC. Welded on bowl. Nipped up BOP stack.	9
1984-03-23	Nipped up BOP stack. Ran gyro survey. Completed nipple up. Pressure tested BOP system.	10

3.17 Time Distribution:

3.17.1 Daily Activity

DATE	DAYS SINCE SPUD	ACTIVITY
1984-03-24	11	Completed pressure test. RIH with 311 mm X3A bit. Drilled out cement and casing shoe. Drilled ahead to 138 m. Ran PIT. Displaced hole to air. Dried hole with air.
1984-03-25	12	Completed drying hole. Drilled to 141 m. Switched to stable foam. Drilled ahead to 157 m. POOH. RIH with 311 mm J22 bit. WO repairs to air compressor.
1984-03-26	13	Repaired air compressor. Drilled ahead to 215 m. WO repairs to air compressor.
1984-03-27	14	Drilled ahead to 328 m.
1984-03-28	15	Drilled ahead to 412 m. POOH. RIH with 311 mm J33 bit. Drilled ahead to 413 m.
1984-03-29	16	Drilled ahead to 454 m. Conducted PIT. Drilled ahead with stable foam to 461 m.
1984-03-30	17	Drilled ahead to 474 m. Lost circulation. Regained circulation. Drilled ahead to 495 m. Lost circulation. Drilled ahead blind to 500 m. Regained circulation with foam. Lost circulation at 503 m. Drilled ahead blind to 518 m.
1984-03-31	18	Drilled ahead blind to 535 m. POOH with plugged bit. RIH with 311 mm J33 bit. Drilled ahead blind to 575 m.
1984-04-01	19	Drilled ahead to 652 m.
1984-04-02	20	Drilled ahead blind to 684 m. POOH. RIH with 311 m J55 bit. Drilled ahead blind to 707 m.
1984-04-03	21	Mixed and pumped LCM pill. Drilled ahead blind with foam to 767 m.
1984-04-04	22	Drilled ahead blind to 800 m. Mixed and pumped mud pill. POOH for plugged bit. Prepared to log.

3.17 Time Distribution:

3.17.1 Daily Activity

DATE	DAYS SINCE SPUD	ACTIVITY
1984-04-05	23	Ran Log #1 LSS-GR from 800 m to 135 m. RIH with 311 mm J33 bit. Drilled ahead blind to 811 m. POOH for plugged bit. RIH with 311 mm J55 bit. Drilled ahead blind to 814 m. POOH to lay down shock sub.
1984-04-06	24	RIH. Drilled ahead blind to 838 m.
1984-04-07	25	Drilled ahead blind to 864 m. POOH. RIH with 311 mm J33 bit.
1984-04-08	26	Completed RIH. Drilled ahead blind to 896 m.
1984-04-09	27	Drilled ahead blind to 900 m. POOH to log. Ran Log #2 CNL-LDT-GR-CAL from 898 m to 135 m; Log #3 DISFL from 898 m to 135 m with GR to surface; Log #4 LSS-GR-CAL from 898 m to 135 m; RIH with 311 mm X3A bit. Cleaned and conditioned hole. POOH.
1984-04-10	28	Prepared to run casing. Power tongs would not operate. Ran 245 mm casing with rope and rig tongs. Casing landed at 900 m. Ran 8 centralizers, 1 cement basket and 1 external casing packer. Cemented casing in two stages. ECP set at 130 m did not seat. Calculated top of cement at 600 m.
1984-04-11	29	Nipped up BOP's. Pressure tested BOP system. RIH with 216 mm X3A bit. Drilled out DV plug and cement to 851 m. POOH to inspect drill collars.
1984-04-12	30	Completed checking collars. RIH with 216 mm X3A bit. Drilled out cement to 866 m. POOH. WOC. Ran gyro survey from 863 m to 550 m. RIH with 216 mm X3A bit. Drilled out cement to 878 m.
1984-04-13	31	POOH. RIH with 216 mm J3 bit. Drilled out cement and shoe. Performed PIT tests at 905 m and 906 m. Drilled ahead to 920 m.
1984-04-14	32	Drilled ahead to 929 m. Lost circulation. Mixed and pumped LCM. Drilled ahead to 939 m. POOH.
1984-04-15	33	RIH with 216 mm J55 bit. Drilled ahead to 957 m. Lost circulation. Mixed and pumped LCM.

3.17 Time Distribution:

3.17.1 Daily Activity

DATE	DAYS SINCE SPUD	ACTIVITY
1984-04-16	34	Mixed and pumped LCM. Drilled ahead to 961 m. Lost circulation. Rigged up air drillers. POOH. Removed nozzles. RIH.
1984-04-17	35	Displaced hole to air. Drilled ahead blind to 978 m. Drilled ahead with foam returns from 978 m to 985 m. POOH. RIH with open ended drill pipe.
1984-04-18	36	Spotted lost circulation plug #1 from 985 m to 923 m. POOH. WOC. RIH with 216 mm JD4 bit. Tagged cement at 963 m. Polished Plug #1 to 967 m. POOH. RIH with open ended drill pipe. Spotted lost circulation Plug #2 from 967 m to 891 m. POOH. WOC.
1984-04-19	37	WOC. RIH with 216 mm JD4 bit. Tagged cement plug at 961 m. Drilled out cement. POOH. RIH with 216 mm J44 bit. Drilled ahead to 994 m.
1984-04-20	38	Drilled ahead to 1040 m.
1984-04-21	39	Drilled ahead to 1091 m. Partial lost circulation (32 m ³) from 1054 m to 1082 m.
1984-04-22	40	Drilled ahead to 1134 m.
1984-04-23	41	Drilled ahead to 1143 m. POOH to change bit. RIH with 216 mm J44 bit. Drilled ahead to 1162 m.
1984-04-24	42	Drilled ahead to 1200 m.
1984-04-25	43	Drilled ahead to 1232 m.
1984-04-26	44	Drilled ahead to 1233 m. Dummy tripped to intermediate casing shoe. POOH to log. Ran Log #5 CNL-FDC-GR-CAL from 1233 m to 900 m. RIH with 216 mm J33 bit. Drilled ahead to 1235 m.
1984-04-27	45	Drilled ahead to 1278 m.

3.17 Time Distribution:

3.17.1 Daily Activity

DATE	DAYS SINCE SPUD	ACTIVITY
1984-04-28	46	Drilled ahead to 1309 m. Control drilled ahead to 1313 m.
1984-04-29	47	Control drilled ahead to 1344 m.
1984-04-30	48	Control drilled ahead to 1375 m. POOH for bit.
1984-05-01	49	POOH. RIH with 216 mm J33 bit. Reamed from 1348 m to 1375 m. Drilled ahead to 1401 m.
1984-05-02	50	Drilled ahead to 1436 m.
1984-05-03	51	Drilled ahead to 1444 m. POOH. RIH with 216 mm J55 bit. Drilled ahead to 1449 m. POOH to core.
1984-05-04	52	RIH with core barrel and 170.7 mm C201 diamond bit. Cut core #1 from 1449 m to 1452 m. POOH with core. Pressure test BOP system. RIH with 216 mm JD8 bit.
1984-05-05	53	Reamed 170.7 mm rat hole. Circulated and worked tight hole from 1442 m to 1439 m. POOH. RIH with 216 mm J77 bit. Reamed from 1443 m to 1452 m. Drilled ahead to 1464 m.
1984-05-06	54	Drilled ahead to 1496 m.
1984-05-07	55	Drilled ahead to 1506 m. POOH to change bit. Reamed from 1430 m to 1442 m. RIH with 216 mm J77 bit. Reamed from 1488 m to 1506 m. Drilled ahead to 1519 m.
1984-05-08	56	Drilled ahead to 1553 m.
1984-05-09	57	Drilled ahead to 1567 m. POOH for bit. RIH with 216 mm J77 bit. Drilled ahead to 1574 m.
1984-05-10	58	Drilled ahead to 1603 m.
1984-05-11	59	Drilled ahead to 1628 m. POOH. RIH with HPH-3J bit.

3.17 Time Distribution:

3.17.1 Daily Activity

DATE	DAYS SINCE SPUD	ACTIVITY
1984-05-12	60	Completed running in hole. Drilled ahead to 1653 m.
1984-05-13	61	Drilled ahead to 1676 m.
1984-05-14	62	Drilled ahead to 1688 m. POOH for core. RIH with core barrel and 159 mm C40 diamond bit.
1984-05-15	63	Completed RIH. Cut core #2 from 1687.8 m to 1695.2 m. POOH with core. RIH with 216 mm J77 bit. Reamed 159 mm rathole to 1691 m.
1984-05-16	64	Reamed 159 mm rathole to 1695 m. Drilled ahead to 1710 m. Circulated and conditioned hole. POOH to log.
1984-05-17	65	Ran Log #6 DIL-MSFL-GR-CAL from 1710 m to 900 m; Log #7 CNL-LDT-GR-CAL from 1710 m to 900 m; Log #8 BHC-Sonic-GR-CAL from 1710 m to 900 m; Log #9 WST from 1710 m to 900 m.
1984-05-18	66	RIH with open ended drill pipe. Ran abandonment Plug #1 from 1710 m to 1610 m; abandonment Plug #2 from 1300 m to 1150 m. WOC. Felt Plug #2 at 1238 m. Topped off Plug #2 to 1150 m. Ran abandonment Plug #3 from 1000 m to 800 m. WOC.
1984-05-19	67	WOC. Felt Plug #3 at 836 m. Laid down drill pipe. RIH with casing cutters. Cut off 244 mm casing at 115 m. POOH. Laid down BOP's. Hoisted and recovered 244 mm casing. RIH with 311 mm bit to 115 m. POOH. RIH with 340 mm squeeze packer. Planned to set packer at 110 m. Packer set at 16 m. Pumped 10 tonnes cement through string in packer. Laid down drill pipe. Pumped 1.0 tonne cement on top of packer. Laid down kelly and floor tools.
1984-05-20	68	Cut casing and welded on cap. Installed location sign. General rig out. Rig released on 1984-05-20 - 2400 hrs.

3.17.2 Time Breakdown

OPERATION	TOTAL HOURS	% OF TOTAL	TOTAL HOURS BY GROUP	% OF TOTAL BY GROUP
Move In	96.00	5.19		
Rig Up	120.25	6.51	216.25	11.70
Drilling	854.75	46.25		
Tripping	166.25	9.00		
Reaming & Cleaning	80.50	4.36		
Conditioning Mud/Hole	60.00	3.25		
Rig Service	23.00	1.24		
Survey	34.50	1.87		
Casing & Cementing WOC	53.00	2.87		
Head Up & Pressure Test	88.00	4.76		
Mechanical Downtime	3.50	0.18		
			1363.50	73.78
Circulate Up Samples	7.25	0.39		
Coring	23.75	1.29		
Logging	51.75	2.80		
Drill Stem Testing			82.75	4.48
Lost Circulation	86.75	4.69		
Air Drillers Down	15.50	0.84		
Repair Tongs	4.75	0.26		
Freeze Ups	2.00	0.11		
Drill Collar Inspection	2.50	0.14		
			111.5	5.04
Abandonment	60	3.25		
Tearout	14	.75		
			74	4.00
TOTALS	1848 hrs.	100%	1848 hrs.	100%

3.17.2 Time Breakdown

Conductor Hole

OPERATION	TOTAL HOURS	% OF TOTAL	TOTAL HOURS BY GROUP	% OF TOTAL BY GROUP
Drilling	7.50	23.81		
Tripping	1.50	4.76		
Reaming & Cleaning				
Conditioning Mud/Hole				
Rig Service				
Survey				
Casing & Cementing WOC	22.50	71.43		
Head Up & Pressure Test				
Mechanical Downtime			31.50	100

Circulate Up Samples

Coring
Logging
Drill Stem Testing

Abandonment

Tearout

TOTALS	31.5 hrs.	100%	31.5 hrs.	100
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3.17.2 Time Breakdown

Surface Hole

OPERATION	TOTAL HOURS	% OF TOTAL	TOTAL HOURS BY GROUP	% OF TOTAL BY GROUP
Drilling	51.50	28.73		
Tripping	18.50	10.32		
Reaming & Cleaning	26.00	14.50		
Conditioning Mud/Hole	9.00	5.02		
Rig Service	2.00	1.12		
Survey	2.50	1.39		
Casing & Cementing WOC	14.50	8.09		
Head Up & Pressure Test	23.00	12.83		
Mechanical Downtime				
			147	82.00

Circulate Up Samples

Coring
Logging
Drill Stem Testing

Lost Circulation	30.25	16.88		
Freeze Ups	2.00	1.12		
			32.25	18.00

Abandonment

Tearout

TOTAL	179.25 hrs.	100%	179.25 hrs.	100%
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3.17.2 Time Breakdown

Intermediate Hole

OPERATION	TOTAL HOURS	% OF TOTAL	TOTAL HOURS BY GROUP	% OF TOTAL BY GROUP
Drilling	261.75	56.78		
Tripping	40.25	8.73		
Reaming & Cleaning	23.50	5.10		
Conditioning Mud/Hole	25.00	5.42		
Rig Service	6.50	1.41		
Survey	11.00	2.39		
Casing & Cementing WOC	16.00	3.47		
Head Up & Pressure Test	42.25	9.16		
Mechanical Downtime			426.25	92.46
 Circulate Up Samples				
Coring				
Logging	16.00	3.47		
Drill Stem Testing			16.00	3.47
 Air Drillers Down				
Freeze Ups	14.00	3.04		
	4.75	1.03		
			18.75	4.07
 Abandonment				
Tearout				
 TOTAL	461 hrs	100%	461 hrs.	100%

3.17.2 Time Breakdown

Main Hole

OPERATION	TOTAL HOURS	% OF TOTAL	TOTAL HOURS BY GROUP	% OF TOTAL BY GROUP
Drilling	534.00	55.63		
Tripping	106.00	11.04		
Reaming & Cleaning	31.00	3.23		
Conditioning Mud/Hole	26.00	2.71		
Rig Service	14.50	1.51		
Survey	21.00	2.19		
Casing & Cementing WOC				
Head Up & Pressure Test	22.75	2.37		
Mechanical Downtime	3.50	0.36		
			758.75	79.04
 Circulate Up Samples	 7.25	 0.76		
Coring	23.75	2.47		
Logging	35.75	3.72		
Drill Stem Testing			66.75	6.95
 Lost Circulation	 56.50	 5.89		
Drill Collar Inspection	2.50	0.26		
Air Drillers Down	1.50	0.16		
			60.50	6.31
 Abandonment	 60.00	 6.25		
Tearout	14.00	1.45		
			74.0	7.70
 TOTAL	 960 hrs	 100%	 960 hrs.	 100%

3.18 Deviation Surveys:

A multi-shot gyro survey was run from 860 m to surface after intermediate casing had been set. Single-shot gyro surveys were taken approximately every 30 m for the remainder of the hole. The final survey was taken at 1705 m and it showed the bottom hole coordinates, in relation to the wellhead, to be 44.51 m north and 34.66 m east. See the following pages.

3.19 Abandonment Plugs:

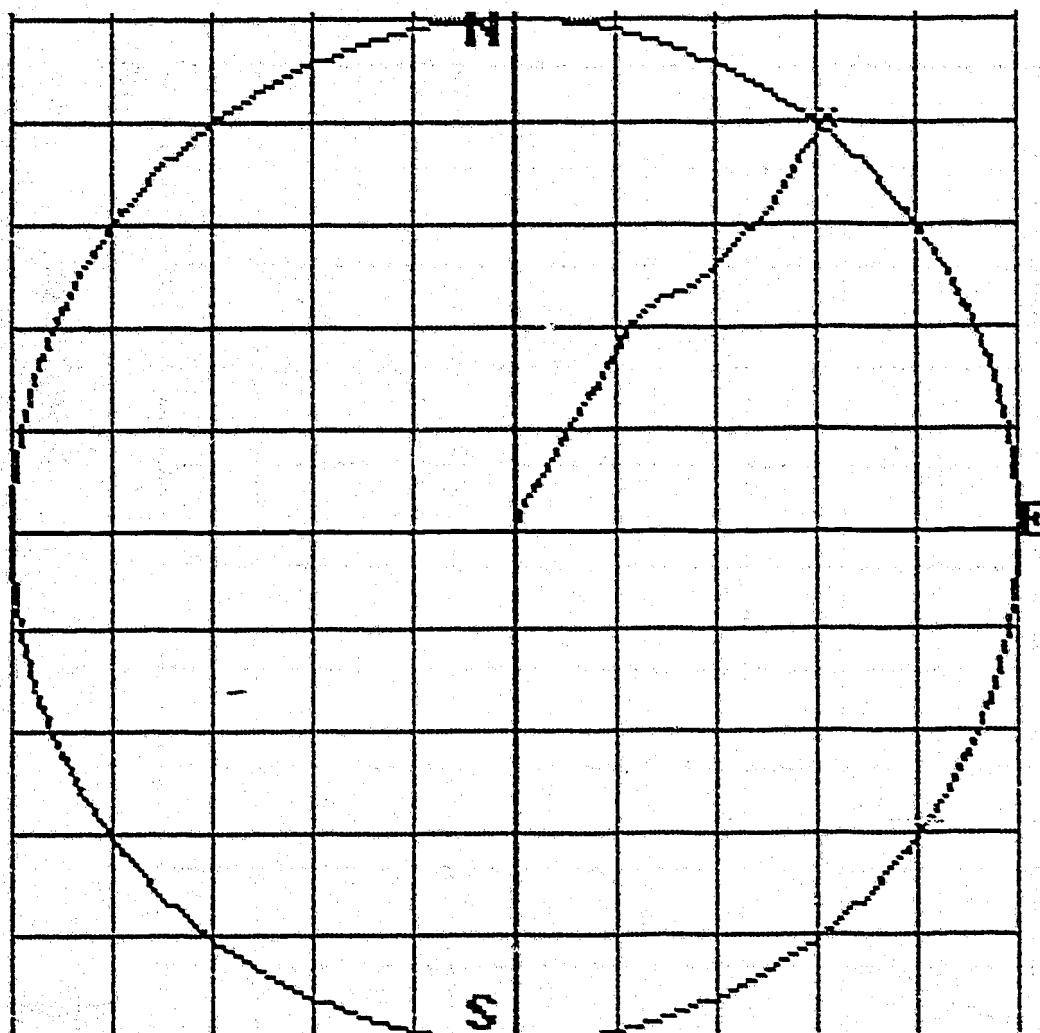
PLUG NO.	INTERVAL	TYPE	CEMENT & ADDITIVES	FLUID BELOW
1.	1710 m - 1610 m	Cement Plug	6 T Class "G" cement	on bottom
2.	1300 m - 1150 m	Cement Plug	17.8 T Class "G" cement	Drilling Fluid
3.	1000 m - 800 m	Cement Plug	11.8 T Class "G" cement	Drilling Fluid
4.	16 m	Cement Retainer	*11 T Arctic Set cement	Drilling Fluid

*It was planned to set the squeeze packer at 110 m. At 16 m, while running in with the packer, it unexpectedly set. Ten tonnes of Arctic Set cement was pumped through the packer and one tonne of Arctic Set cement was pumped on top of the packer.

3.20 Composite Well Record: See Geology Section.

PCI SAMMONS H-55

HORIZONTAL WELLCBORE DISPLACEMENT



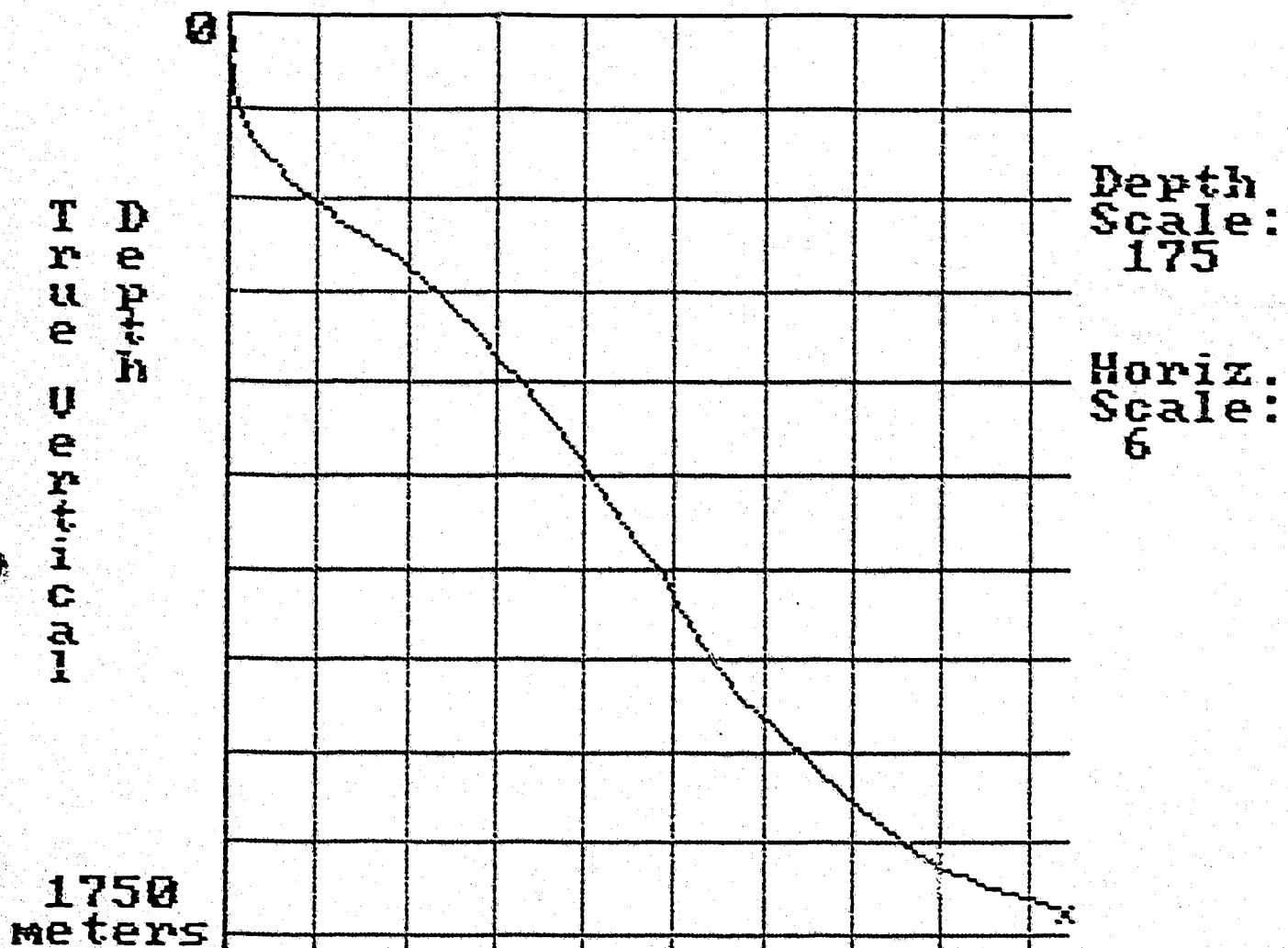
BOTTOM HOLE CO-ORDINATES:
44.51 METERS NORTH
34.66 METERS EAST

CLOSURE DISTANCE:
56.41 METERS

CLOSURE DIRECTION:
NORTH 37 DEG 55 MIN EAST

PCI SAMMONS H-55

HORIZONTAL DISPLACEMENT VS DEPTH



MAXIMUM DOGLEG SEVERITY:
5.07 DEG/30 M AT 1638 METERS

TOTAL MEASURED DEPTH:
1710 METERS

TRUE VERTICAL DEPTH:
1708.64 METERS

A P P E N D I X

A 1

A 1.

DAILY MUD STATUS REPORT

DATE	DEPTH (m)	WEIGHT kg/m ³	FUNNEL VISC. S/L	WATER LOSS c/m ³	pH	REMARKS
84-03-14	33	1050	51		10	Drill 660 mm cond. hole.
84-03-15	35.5				10	Nipple up diverter system.
84-03-16	59	1065	60	13	10.5	Drill 444 mm sur. hole.
84-03-17	93	1060	51	13	10	Drill 311 mm pilot hole.
84-03-18	137	1070	63		10	Drill 311 mm pilot hole.
84-03-19	93	1040	73	10	9.5	Ream pilot hole.
84-03-20	140	1060	75		10	Run lost circulation. Cement plug
84-03-21	135.5	1060	65	9	10	WOC. Drill out to 135.5 m.
84-03-22	135.5	1050	47	10	11	Run 340 m casing Nipple up.
84-03-23	135.5					Pressure test.
84-03-24	135.5					
84-03-25	157		STABLE FOAM DRILLING			Drill 311 mm intermediate hole
84-03-26	215	"	"	"		Drill 311 mm intermediate hole
84-03-27	248	"	"	"		Drill 311 mm intermediate hole
84-03-28	413	"	"	"		Drill 311 mm intermediate hole
84-03-29	461	"	"	"		Drill 311 mm intermediate hole
84-03-30	518	"	"	"		Drill 311 mm intermediate hole. Lost Circulation.

A 1.

DAILY MUD STATUS REPORT

DATE	DEPTH (m)	WEIGHT kg/m ³	FUNNEL VISC. S/L	WATER LOSS c/m ³	pH	REMARKS
84-04-01	652		STABLE FOAM	DRILLING		Drill 311 mm intermediate hole. No returns.
84-04-02	707		"	"		Drill 311 mm intermediate hole. No returns.
84-04-03	767		"	"		Drill 311 mm intermediate hole. No returns.
84-04-04	800		"	"		Drill 311 mm intermediate hole. No returns.
84-04-05	814		"	"		Drill 311 mm intermediate hole. No returns.
84-04-06	838		"	"		Drill 311 mm intermediate hole. No returns.
84-04-07	867		"	"		Drill 311 mm intermediate hole. No returns.
84-04-08	896		"	"		Drill 311 mm intermediate hole. No returns.
84-04-09	900		"	"		Log.
84-04-10	900		"	"		Run 245 mm casing
84-04-11	900		"	"		Nipple up & pressure test.
84-04-12	878		W A T E R			Drill out cement.
84-04-13	920	1005		30	12	Drill 216 mm main hole.

A 1.

DAILY MUD STATUS REPORT

DATE	DEPTH (m)	WEIGHT kg/m ³	FUNNEL VISC. S/L	WATER LOSS c/m ³	pH	REMARKS
84-04-14	939	1005	48		9.5	Drill 216 mm main hole.
84-04-15	950	1000	44		9.5	Drill 216 mm main hole. Lost circulation.
84-05-16	961	STABLE FOAM DRILLING				Drill 216 mm main hole.
84-04-17	985	"	"	"		Drill 216 mm main hole.
84-04-18	985	"	"	"		Run lost circulation. Cement plug.
84-04-19	987	1005	45	21	12	Drill 216 mm main hole.
84-04-20	1034	1005	60	12	11.5	Drill 216 mm main hole.
84-04-21	1079	1010	85	10	11	Drill 216 mm main hole.
84-04-22	1133	1040	59	10	10	Drill 216 mm main hole.
84-04-23	1158	1040	55	9.5	9.5	Drill 216 mm main hole.
84-04-24	1191	1020	60	9	9	Drill 216 mm main hole.
84-04-25	1226	1040	65	8	9	Drill 216 mm main hole.
84-04-26	123.3	1050	82	7	9	Drill 216 mm main hole and log.
84-04-27	1278	1050	60	8	9.5	Drill 216 mm main hole.
84-04-28	1308	1050	60	8	9	Drill 216 mm main hole.

A.1.

DAILY MUD STATUS REPORT

DATE	DEPTH (m)	WEIGHT kg/m ³	FUNNEL VISC. S/L	WATER LOSS c/m ³	pH	REMARKS
84-04-29	1339	1080	68	8	8.5	Drill 216 mm main hole.
84-04-30	1374	1080	64	7.5	10	Control drill 216 mm main hole.
84-05-01	1395	1070	60	8	8.5	Drill 216 mm main hole.
84-05-02	1436	1080	64	7.5	10	Drill 216 mm main hole.
84-05-03	1445	1110	66	7	10	Drill 216 mm main hole.
84-05-04	1450	1100	80	7	10	Core.
84-05-05	1458	1080	60	6	10	Ream rathole.
84-05-06	1488	1090	60	6	9.5	Drill 216 mm main hole.
84-05-07	1513	1110	62	6	8.5	Drill 216 mm main hole.
84-05-08	1546	1085	70	6	10	Drill 216 mm main hole.
84-05-09	1568	1090	61	6	9.5	Drill 216 mm main hole.
84-05-10	1598	1100	65	6	9.5	Drill 216 mm main hole.
84-05-11	1626	1080	62	7	10	Drill 216 mm main hole.
84-05-12	1651	1090	65	7	10	Drill 216 mm main hole.
84-05-13	1673	1100	64	6	10	Drill 216 mm main hole.
84-05-14	1687	1090	66	6	10	Drill 216 mm main hole.

A 1.

DAILY MUD STATUS REPORT

DATE	DEPTH (m)	WEIGHT kg/m ³	FUNNEL VISC. S/L	WATER LOSS c/m ³	pd	REMARKS
84-05-15	1695	1080	63	7	10	Core.
84-05-16	1710	1080	64	7	10	Ream rat-hole and log.
84-05-17	1710					Log.
84-05-18						Abandon.
84-05-19						Abandon.
84-05-20						Tear out, rig release.

A P P E N D I X

A 2



PETRO-CANADA DIRECTIONAL DRILLING PROGRAM

PETRO-CANADA

PCI SAMMONS HSS N.W.T.

Single shot directional survey. File: SAMMONS
GYRO IN INTERM. CASING PLUS ADDITIONAL SINGLE SHOTS

Measured Depth (meters)	Drift Angle (deg min)	Drift Direction	Course Length (meters)	Vertical Depth (meters)	Vertical Section (meters)	True Rectangular Co-ordinates (meters)	Closure Distance (meters)	Closure Direction (deg min)	Bogleg Severity (deg/30 m)
0.0	0 0	0	0.0	0.00	0.00	0.00 N 0.00 E	0.00	N 0 0 E	0.00
10.0	0 15	S 47 W	10.0	10.00	0.00	0.01 S 0.02 W	0.02	S 46 50 W	0.75
20.0	0 6	N 39 W	10.0	20.00	0.00	0.01 N 0.03 W	0.04	N 36 1 W	0.82
30.0	0 15	N 26 W	10.0	30.00	0.00	0.03 N 0.05 W	0.06	N 26 43 W	0.46
40.0	0 15	N 40 W	10.0	40.00	0.00	0.07 N 0.08 W	0.10	N 47 13 W	0.10
50.0	0 15	N 1 W	10.0	50.00	0.00	0.11 N 0.09 W	0.14	N 39 20 W	0.49
60.0	0 3	N 20 E	10.0	60.00	0.00	0.14 N 0.09 W	0.16	N 32 22 W	0.61
70.0	0 12	S 39 E	10.0	70.00	0.00	0.14 N 0.07 W	0.15	N 26 11 W	0.69
80.0	0 12	N 90 E	10.0	80.00	0.00	0.12 N 0.04 W	0.13	N 16 53 W	0.52
90.0	0 12	N 50 E	10.0	90.00	0.00	0.14 N 0.01 W	0.14	N 2 20 W	0.41
100.0	0 21	N 42 E	10.0	100.00	0.00	0.17 N 0.03 E	0.17	N 9 44 E	0.46
110.0	0 21	N 32 E	10.0	110.00	0.00	0.22 N 0.07 E	0.23	N 16 49 E	0.18
120.0	0 15	N 22 E	10.0	120.00	0.00	0.26 N 0.09 E	0.28	N 18 47 E	0.33
130.0	0 18	N 10 E	10.0	130.00	0.00	0.31 N 0.10 E	0.33	N 18 22 E	0.22
140.0	0 18	N 5 E	10.0	140.00	0.00	0.36 N 0.11 E	0.38	N 16 49 E	0.08
150.0	0 12	N 5 W	10.0	150.00	0.00	0.41 N 0.11 E	0.42	N 15 4 E	0.33
160.0	0 18	N 29 E	10.0	160.00	0.00	0.45 N 0.12 E	0.47	N 14 46 E	0.52
170.0	0 30	N 21 E	10.0	170.00	0.00	0.51 N 0.15 E	0.53	N 16 6 E	0.62
180.0	0 42	N 12 E	10.0	180.00	0.00	0.61 N 0.18 E	0.64	N 16 11 E	0.66
190.0	1 0	N 4 E	10.0	190.00	0.00	0.76 N 0.20 E	0.79	N 14 41 E	0.96
200.0	1 0	N 10 E	10.0	200.00	0.00	0.93 N 0.22 E	0.96	N 13 21 E	0.31
210.0	1 0	N 15 E	10.0	207.99	0.00	1.10 N 0.26 E	1.13	N 13 13 E	0.21
220.0	1 0	N 13 E	10.0	219.99	0.00	1.27 N 0.30 E	1.31	N 13 17 E	0.06
230.0	1 15	N 13 E	10.0	229.99	0.00	1.46 N 0.34 E	1.50	N 13 13 E	0.74
240.0	1 27	N 26 E	10.0	239.99	0.00	1.69 N 0.42 E	1.74	N 14 4 E	1.09
250.0	1 45	N 27 E	10.0	249.98	0.00	1.94 N 0.55 E	2.01	N 15 47 E	0.90
260.0	1 45	N 33 E	10.0	259.98	0.00	2.20 N 0.70 E	2.31	N 17 39 E	0.52
270.0	1 54	N 30 E	10.0	269.97	0.00	2.47 N 0.87 E	2.62	N 19 19 E	0.53
280.0	2 12	N 28 E	10.0	279.97	0.00	2.78 N 1.04 E	2.97	N 20 29 E	0.92
290.0	2 0	N 33 E	10.0	289.96	0.00	3.10 N 1.23 E	3.33	N 21 36 E	0.82
300.0	2 6	N 32 E	10.0	299.95	0.00	3.40 N 1.42 E	3.68	N 22 41 E	0.31
310.0	2 9	N 26 E	10.0	309.95	0.00	3.72 N 1.60 E	4.05	N 23 16 E	0.76
320.0	2 27	N 32 E	10.0	319.94	0.00	4.08 N 1.79 E	4.45	N 23 45 E	1.16
330.0	2 24	N 34 E	10.0	329.93	0.00	4.43 N 2.02 E	4.87	N 24 52 E	0.31
340.0	2 36	N 32 E	10.0	339.92	0.00	4.80 N 2.26 E	5.30	N 25 13 E	0.65

Measured Depth (meters)	Drift Angle (deg min)	Drift Direction	Course Length (meters)	True Vertical Depth (meters)	Vertical Section (meters)	Rectangular Co-ordinates (meters)	Closure Distance (meters)	Closure Direction (deg min)	Bogleg Severity (deg/50 m)
350.0	2 42	N 34 E	10.0	349.91	0.00	5.18 N 2.51 E	5.76	N 25 51 E	0.42
360.0	2 30	N 36 E	10.0	359.90	0.00	5.56 N 2.77 E	6.21	N 26 51 E	0.66
370.0	2 38	N 33 E	10.0	369.89	0.00	5.92 N 3.03 E	6.65	N 27 5 E	0.58
380.0	2 45	N 33 E	10.0	379.88	0.00	6.32 N 3.29 E	7.12	N 27 28 E	0.31
390.0	2 54	N 31 E	10.0	389.87	0.00	6.74 N 3.54 E	7.61	N 27 44 E	0.52
400.0	3 6	N 31 E	10.0	399.85	0.00	7.19 N 3.81 E	8.14	N 27 55 E	0.60
410.0	2 51	N 31 E	10.0	409.84	0.00	7.64 N 4.08 E	8.66	N 28 6 E	0.75
420.0	3 6	N 28 E	10.0	419.83	0.00	8.09 N 4.33 E	9.18	N 28 10 E	0.87
430.0	3 12	N 28 E	10.0	429.81	0.00	8.57 N 4.59 E	9.72	N 28 10 E	0.30
440.0	2 54	N 27 E	10.0	439.80	0.00	9.04 N 4.84 E	10.26	N 28 8 E	0.91
450.0	2 45	N 31 E	10.0	449.78	0.00	9.47 N 5.08 E	10.75	N 28 11 E	0.76
460.0	2 45	N 34 E	10.0	459.77	0.00	9.88 N 5.34 E	11.23	N 28 22 E	0.29
470.0	2 45	N 32 E	10.0	469.76	0.00	10.28 N 5.59 E	11.71	N 28 33 E	0.27
480.0	2 50	N 34 E	10.0	479.75	0.00	10.67 N 5.84 E	12.16	N 28 42 E	0.89
490.0	2 15	N 25 E	10.0	489.74	0.00	11.03 N 6.04 E	12.58	N 28 43 E	1.33
500.0	2 18	N 28 E	10.0	499.73	0.00	11.38 N 6.22 E	12.97	N 28 39 E	0.39
510.0	2 9	N 36 E	10.0	509.73	0.00	11.71 N 6.43 E	13.36	N 28 45 E	1.01
520.0	2 12	N 35 E	10.0	519.72	0.00	12.02 N 6.65 E	13.74	N 28 56 E	0.16
530.0	2 15	N 27 E	10.0	529.71	0.00	12.36 N 6.85 E	14.13	N 28 59 E	0.93
540.0	2 18	N 29 E	10.0	539.70	0.00	12.71 N 7.03 E	14.52	N 28 58 E	0.28
550.0	2 0	N 28 E	10.0	549.70	0.00	13.04 N 7.21 E	14.90	N 28 57 E	0.90
560.0	2 0	N 35 E	10.0	559.69	0.00	13.33 N 7.40 E	15.25	N 29 1 E	0.75
570.0	2 0	N 34 E	10.0	569.68	0.00	13.62 N 7.59 E	15.59	N 29 8 E	0.20
580.0	2 0	N 27 E	10.0	579.68	0.00	13.92 N 7.77 E	15.94	N 29 9 E	0.72
590.0	1 48	N 34 E	10.0	589.67	0.00	14.21 N 7.93 E	16.27	N 29 11 E	0.93
600.0	1 45	N 36 E	10.0	599.67	0.00	14.46 N 8.11 E	16.58	N 29 17 E	0.24
610.0	1 36	N 39 E	10.0	609.66	0.00	14.70 N 8.29 E	16.87	N 29 26 E	0.52
620.0	1 51	N 38 E	10.0	619.66	0.00	14.93 N 8.48 E	17.17	N 29 35 E	0.75
630.0	1 48	N 36 E	10.0	629.65	0.00	15.18 N 8.67 E	17.48	N 29 43 E	0.23
640.0	1 45	N 37 E	10.0	639.65	0.00	15.43 N 8.85 E	17.79	N 29 51 E	0.18
650.0	1 54	N 40 E	10.0	649.64	0.00	15.68 N 9.05 E	18.11	N 29 60 E	0.49
660.0	1 48	N 24 E	10.0	659.64	0.00	15.96 N 9.22 E	18.43	N 30 1 E	1.55
670.0	1 45	N 28 E	10.0	669.63	0.00	16.24 N 9.36 E	18.74	N 29 57 E	0.41
680.0	1 45	N 25 E	10.0	679.63	0.00	16.51 N 9.49 E	19.04	N 29 54 E	0.24
690.0	1 51	N 22 E	10.0	689.63	0.00	16.80 N 9.62 E	19.36	N 29 48 E	0.39
700.0	1 45	N 21 E	10.0	699.62	0.00	17.09 N 9.75 E	19.67	N 29 40 E	0.27
710.0	1 54	N 25 E	10.0	709.62	0.00	17.38 N 9.86 E	19.98	N 29 34 E	0.59
720.0	1 42	N 28 E	10.0	719.61	0.00	17.66 N 10.00 E	20.30	N 29 31 E	0.63
730.0	1 30	N 36 E	10.0	729.61	0.00	17.90 N 10.15 E	20.58	N 29 33 E	0.91
740.0	1 45	N 38 E	10.0	739.60	0.00	18.13 N 10.32 E	20.86	N 29 39 E	0.76

Measured Depth (meters)	Drift Angle (deg aia)	Drift Direction (deg)	Course Length (meters)	True Vertical Depth (meters)	Vertical Section (meters)	Rectangular Co-ordinates (meters)	Closure Distance (meters)	Closure Direction (deg aia)	Bogleg Severity (deg/30 m)
750.0	1 54	N 28 E	10.0	749.60	0.00	18.40 N 10.49 E	21.18	N 29 41 E	1.04
760.0	1 54	N 32 E	10.0	759.59	0.00	18.68 N 10.65 E	21.51	N 29 42 E	0.38
770.0	1 42	N 32 E	10.0	769.59	0.00	18.95 N 10.82 E	21.82	N 29 44 E	0.60
780.0	1 30	N 30 E	10.0	779.58	0.00	19.19 N 10.96 E	22.10	N 29 45 E	0.62
790.0	1 30	N 29 E	10.0	789.58	0.00	19.42 N 11.09 E	22.36	N 29 45 E	0.00
800.0	1 30	N 29 E	10.0	799.58	0.00	19.64 N 11.22 E	22.62	N 29 44 E	0.00
810.0	1 38	N 29 E	10.0	809.57	0.00	19.88 N 11.35 E	22.89	N 29 44 E	0.30
820.0	1 33	N 32 E	10.0	819.57	0.00	20.12 N 11.49 E	23.17	N 29 44 E	0.28
830.0	1 15	N 23 E	10.0	829.57	0.00	20.34 N 11.60 E	23.41	N 29 42 E	1.10
840.0	1 15	N 33 E	10.0	839.56	0.00	20.53 N 11.70 E	23.63	N 29 41 E	0.65
850.0	1 15	N 28 E	10.0	849.56	0.00	20.72 N 11.81 E	23.85	N 29 42 E	0.30
860.0	1 3	N 17 E	10.0	859.56	0.00	20.90 N 11.89 E	24.05	N 29 38 E	0.86
870.0	1 30	N 48 E	70.0	829.54	0.00	22.20 N 12.72 E	25.59	N 29 49 E	0.34
875.0	1 30	N 48 E	45.0	874.53	0.00	22.99 N 13.60 E	26.71	N 30 36 E	0.00
897.0	2 0	N 56 E	22.0	996.52	0.00	23.40 N 14.13 E	27.33	N 31 7 E	0.76
1067.0	1 15	N 21 E	70.0	1066.49	0.00	24.83 N 15.48 E	29.26	N 31 57 E	0.44
1093.0	1 0	N 76 E	26.0	1092.48	0.00	25.12 N 15.88 E	29.72	N 32 18 E	1.03
1131.0	1 30	N 61 E	38.0	1130.47	0.00	25.43 N 16.65 E	30.39	N 33 13 E	0.47
1169.0	1 45	N 86 E	38.0	1168.46	0.00	25.73 N 17.68 E	31.22	N 34 29 E	0.59
1198.0	1 30	N 71 E	29.0	1197.45	0.00	25.89 N 18.48 E	31.81	N 35 31 E	0.51
1296.0	1 45	N 39 E	98.0	1295.41	0.00	27.47 N 20.73 E	34.41	N 37 2 E	0.26
1325.0	2 30	N 61 E	29.0	1324.39	0.00	28.15 N 21.55 E	35.45	N 37 26 E	1.13
1352.0	2 15	N 41 E	27.0	1351.36	0.00	28.86 N 22.41 E	36.54	N 37 50 E	0.96
1440.0	2 0	N 37 E	88.0	1439.30	0.00	31.39 N 24.46 E	39.80	N 37 36 E	0.10
1468.0	2 45	N 62 E	28.0	1467.28	0.00	32.14 N 25.34 E	40.92	N 38 15 E	1.35
1506.0	2 30	N 46 E	38.0	1505.24	0.00	33.16 N 26.74 E	42.60	N 38 53 E	0.61
1544.0	2 30	N 36 E	38.0	1543.20	0.00	34.41 N 27.83 E	44.25	N 38 58 E	0.34
1571.0	2 45	N 31 E	47.0	1570.15	0.00	36.20 N 29.02 E	46.39	N 38 43 E	0.22
1619.0	4 15	N 31 E	28.0	1618.10	0.00	37.67 N 29.90 E	48.09	N 38 26 E	1.61
1632.0	4 45	N 35 E	13.0	1631.06	0.00	38.52 N 30.45 E	49.10	N 38 20 E	1.36
1658.0	4 0	N 26 E	6.0	1657.04	0.00	38.92 N 30.68 E	49.56	N 38 15 E	5.07
1660.0	5 30	N 36 E	22.0	1658.97	0.00	40.47 N 31.62 E	51.36	N 37 60 E	2.33
1674.0	6 0	N 40 E	14.0	1672.90	0.00	41.58 N 32.48 E	52.76	N 37 60 E	1.37
1683.0	7 0	N 34 E	9.0	1681.84	0.00	42.39 N 33.10 E	53.78	N 37 59 E	4.03
1705.0	6 45	N 39 E	22.0	1703.68	0.00	44.51 N 34.66 E	56.41	N 37 55 E	0.88

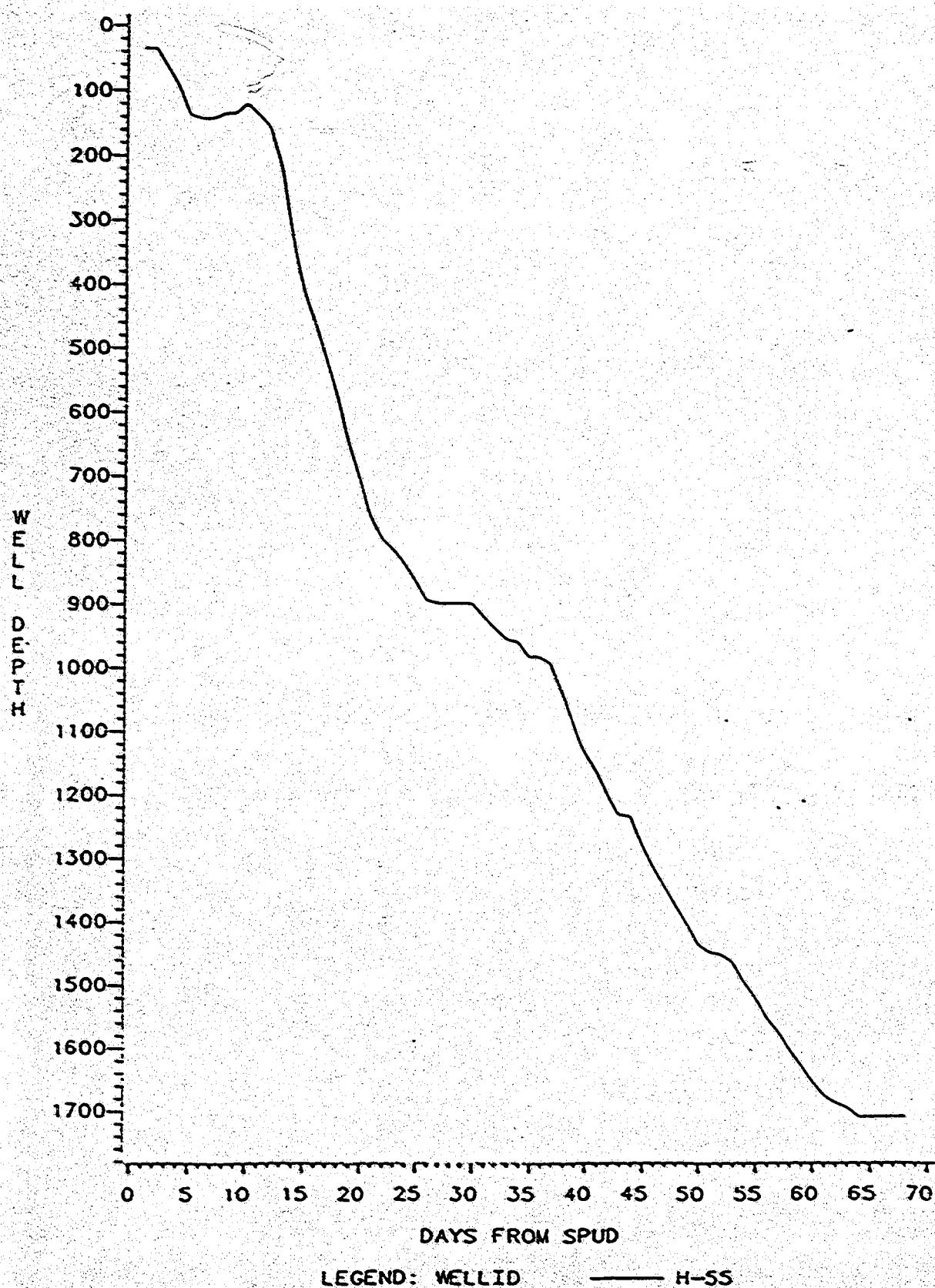
Based upon Radius of Curvature calculations except in cases of no change in Drift Direction or Drift Angle. In those cases Angle Averaging method has been used.

There is no Vertical Section as Target Bottom Hole Co-ordinates were 0.00 N 0.00 E.

APPENDIX

A 3

PCI SAMMONS H-55
PENETRATION CURVE



GEOLOGICAL WELLSITE REPORT

FOR

PCI SAMMONS H-55

65°24'27.55" N. Lat

128°02'45.22" W. Long

DA 1137

Prepared for

PETRO CANADA INCORPORATED

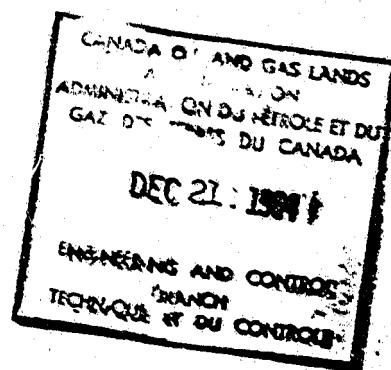
By

**T. Vader
P. Wasylyk**

PRO GEO CONSULTANTS

fb

March-May, 1984



**PRO
GEO
CONSULTANTS**

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WELL SUMMARY

WELL NAME: PCI Sammons H-55
 CO-ORDINATES: $65^{\circ} 24' 27.55''$ NLat; $128^{\circ} 24' 45.22''$ W.Long.
 LOCATION: H-55
 ELEVATIONS: Ground: 344.70 m
 KB: 381.51 m
 OPERATOR: Petro Canada Incorporated
 DRILLING CONTRACTOR: ATCO/EQUITAK #76
 WELLSITE SUPERVISION: Toolpusher: D. Kennedy
 Engineer: J. Durrell, P. Walsh, Y. Hope
 Geologist: T. Vader, Peter W. Waslyk
 WELL SPUPDED: 1984-03-14 00.15 hours
 DRILLING COMPLETED: 1984-05-17 17.30 hours
 BIT SIZES: Surface A: 660 mm
 Surface B: 445 mm
 Intermediate: 311 mm
 CASING SIZES: Surface A: 508 mm
 Surface B: 340 mm
 Intermediate: 244.5 mm
 Production: —
 TOTAL DEPTH: Driller: 1710 m
 Logger: 1710 m
 BOTTOM HOLE FORMATION: Proterozoic (L.Katherine?)
 CORES CUT: Two: #1 1449-1452.1, #2 1687.8-1695.2
 LOGS RUN: Run #1: 800-750 m LSS-GR: Run #2: 900-1345
 LSS-GR, DISFL-GR, CNL-LDT-GR: Run #3: 1232-
 900: CNL-FDC-GR-CAL: Run #4: 1710-900 m:
 DISFL, BHCS, CNL-CDT
 DRILLSTEM TESTS RUN: NII
 RIG RELEASED: 1984-05-20 24.00 hours
 WELL STATUS: Dry and Abandoned

DAILY SUMMARY

1984-03-13

- Rig up

1984-03-14

- Spud at 00.15 hours with Bit #1 (HW OSC1GJ) (660 mm)
- Drill ahead to 35.5 m
- Circulate and condition hole
- Run 3 jts 508 mm Conductor Casing

1984-03-15

- Cement conductor casing
- WOC
- Head up hydriil and diverter system

1984-03-16

- Head up hydriil and diverter system
- Drill out cement and float shoe with Bit #2 (HW OSC1G)
- Pressure test hydriil
- Drill to 40 m
- Run P.I. to test
- Drill ahead to 64 m with Bit #3 (HW OSC1G) 445 mm

1984-03-17

- Drill 445 mm hole to 83 m
- POH
- RIH with Bit #4 and new B.H.A. to drill surface pilot hole (HW X3A) 311 mm
- Drill 311 mm pilot hole to 94 m

1984-03-18

- Drill 311 mm surface pilot hole to 138 m.
- Lost 100 bbls drilling mud to formation
- Circulate and condition mud - add L.C.M.
- Drill ahead to 139 m
- POH for bit.

1984-03-19

- RIH with Bit #5 311 mm (HW XDV)
- Drill ahead to 143 m (total lost circulation)
- Add LCM to hole and mud in tanks - regained circulation
- POH and RIH with Bit #6 (445 mm HW OSC1G)
- Drill out pilot hole from 83-89 m
- POH
- RIH with 311 mm bit 445 mm hole opener
- Ream with hole opener to 93 m

1984-03-20

- Reamed to 135.5 with hole opener
- POH and RIH with slick string
- Set cement plug (4 m³ Oilwell Class G)
- WOC

1984-03-21

- WOC
- Drill out 5 m of cement (too green)
- WOC
- Drill out cement to 135.5 m
- Circulate and condition mud
- POH to run surface casing
- Run 340 mm surface casing

1984-03-22

- Run 340 mm surface casing
- Circulate and condition mud
- Cement casing
- WOC
- Head up BOP's

1984-03-23

- Head up BOP's and Grant rotating head
- RIH to 120 m
- Run Gyroscopic directional survey
- POH
- Head up BOP's
- Pressure test BOP's

1984-03-24

- Pressure test BOP's
- Drill out cement with mud to 138 m
- Run pressure integrity test
- Rig up air drilling equipment and Grant rotating head
- Dry out hole (displace mud with air)

1984-03-25

- Dry out hole with air
- Switch to foam drilling
- Drill out cement plug to 143 m
- Foam drill with Bit #9 (HW X3A) 311 mm to 159 m
- Trip for bit and stabilization
- RIH with Bit #10 (HW J-22) 311 mm

1984-03-26

- RIH with Bit #10
- Drill to 215 mm with air and stable foam
- POH (air compressor down)
- Wait on compressor repairman
- Repair air drilling compressor

1984-03-27

- Drill 311 mm hole to 330 m with air and stable foam

1984-03-28

- Drill 311 mm hole with stable foam to 412 m
- POH for bit
- RIH with new Bit #11 (HW J-33) 311 mm
- Break in new bit

1984-03-29

- Drill to 453 m with stable foam
- Fill hole with water (lost circulation)
- Resume drilling with stable foam to 462 m

1984-03-30

- Foam drill to 494 m (lost returns)
- Drill blind to 498 m (regain foam circulation)
- Foam drill to 505 m (intermittent returns to surface)
- Drill blind to 516 m (no returns to surface)

1984-03-31

- Drill blind with foam to 535 m
- Trip for bit
- RIH with Bit #12 (HW J-33) 311 mm
- POH with Bit #12 (jet plugs not removed)
- RIH with Bit #12
- Drill ahead blind to 572 m

1984-04-01

- Drill ahead blind to 646 m

1984-04-02

- Drill to 684 m with foam
- Grip for bit
- RIH with Bit #13 (HW J-55) 311 mm
- Clean to bottom (3m fill)
- Drill blind with foam to 707 m

1984-04-03

- Drill blind with foam to 767 m

1984-04-04

- Drill ahead to 800 m
- POH
- Logging with Schlumberger

1984-04-05

- Logging with Schlumberger (Run #1 BHCS 800-750 m)
- RIH with Bit #15 (HW J-55) 311 mm
- Drill blind with foam to 814 m
- POH to lay down shock sub

1984-04-06

- Drill blind with foam to 838 m

1984-04-07

- Drill 311 mm hole to 844 m using Durafoam
- POH to change bit
- RIH with Bit #16 (HW J-33) 311 mm

1984-04-08

- RIH with Bit #16
- Drill to 896 m with foam

1984-04-09

- Drill 311 mm hole to 900 m
- POH to log
- Logging with Schlumberger (Run #2)
- RIH with Bit #17 (X3A) RR
- Clean to bottom
- POH to run 244.5 mm casing.

1984-04-10

- Run 244.5 mm casing - set at 900 m
- Cement casing Stage 1 with Dowell
- Open D.V. tool
- Cement Stage #2 of casing - did not hold cement
- Set casing slips

1984-04-11

- WOC
- Head up BOP's

- Pressure test BOP's
- RIH with Bit #18 (tag cement at 848 m)
- Drill out cement to 851 m
- POH and inspect drill collars

1984-04-12

- Inspect collars
- RIH and drill out cement to 866 m
- POH
- WOC
- Run Gyro survey with Eastman and Schlumberger - misrun
- Run Cement Bond Log
- Run Gyro survey
- Drill out cement to 878 m

1984-04-13

- Drill out cement to 888 m
- Pressure test casing
- Drill out cement to 900 m
- POH for bit
- RIH with Bit #19 (HW J-3)
- Drill ahead to 903 m
- Run P.I.T. test
- Drill ahead to 906 m
- Run P.I.T test
- Drill to 920 m

1984-04-14

- Drill to 929.4 m - lost circulation
- Try to regain circulation - 7 hours
- Regain circulation
- Drill to 939 m
- POH for bit
- RIH with Bit #20 (HW J-55)

1984-04-15

- RIH with Bit #20
- Drill ahead to 957.9 m - lost circulation
- Attempt to regain circulation

1984-04-16

- Attempt to regain circulation
- Regain circulation
- Drill ahead to 961 m - lost circulation
- Attempt to blow hole dry with air (failed)
- Pull out of hole 15 stands and attempt to blow hole dry (failed)
- Remove jets from bit (RR #20)
- RIH and dry hole with air

1984-04-17

- Dry hole with air
- Drill ahead to 963 m - lost circulation
- Drill ahead blind to 978 m - regained circulation
- Drill ahead to 981 m - lost returns
- Drill ahead to 985 m - regained circulation
- POH
- RIH with open ended drillpipe
- Prepare to spot cement Plug #1 for lost circulation

1984-04-18

- Spot lost circulation Plug #1 (8.0 tonnes Class G + 25 kg Celloflakes)
- POH
- WOC
- RIH WITH Bit #21 (HW J04)
- Fill hole with water - wouldn't hold
- Polish Plug #1 962-967 m
- POH
- RIH open ended
- Pump lost circulation Plug #2 (7.5 tonnes Class G + 11 kg Celloflakes)
- POH
- WOC

1984-04-19

- WOC
- RIH to 623 m circulate bottoms up, well holding fluid
- RIH, tagged cement plug @ 961 m
- Drill out cement with Bit #21
- Drill ahead to 994 m
- POH for bit
- RIH with Bit #22 (HW J-44)
- Drill ahead to 995 m

1984-04-20

- Drill ahead to 1040 m

1984-04-21

- Drill 216 mm hole to 1091 m

1984-04-22

- Drill 216 mm hole to 1134 m

1984-04-23

- Drill 216 mm hole to 1143 m
- POH for bit

- RIH with Bit #23 (HW J-44)
- Drill ahead with new Bit #24 to 1162 m

1984-04-24

- Drill 216 mm hole to 1200 m

1984-04-25

- Drill 216 mm hole to 1233 m

1984-04-26

- Drill 216 mm hole to 1233 m
- Circulate sample
- Run 13 stand wiper trip
- POH to log
- Log with Schlumberger Run #3 CNL-FDC-GR-CAL 1233-900 m
- RIH with Bit #24 HW J-33
- Drill ahead to 1235 m

1984-04-27

- Drill ahead to 1278 m

1984-04-28

- Drill ahead to 1309 m
- Control drill ahead to 1313 m

1984-04-29

- Drill 216 mm hole to 1344 m

1984-04-30

- Drill 216 mm hole to 1374 m
- POH for bit

1984-05-01

- POH for bit
- RIH with Bit #25 (HW J-33)
- Drill ahead to 1401 m

1984-05-02

- Drill 216 mm hole to 1436 m

1984-05-03

- Drill 216 mm hole to 1444.5 m
- Trip for Core #1 and run wiper trip (bit 1 1/2" undergauge)

1984-05-04

- RIH with Bit #26 (HW J-55)
- Drill to 1449 m
- POH - Make up core barrel and RIH with Bit #27
- Cut Core #1 to 1450 m

1984-05-05

- Cut Core #1 to 1451.1m
- Trip out and Recover Core #1
- RIH with Bit #28 HW J-77
- Drill to 1452 m

1984-05-06

- Drill 216 mm hole to 1472 m

1984-05-07

- Drill 216 mm hole to 1505 m

1984-05-08

- Drill 216 mm hole to 1509 m
- Trip out for bit
- RIH with Bit #29 HW J-77
- Drill 216 mm hole to 1531 m

1984-05-09

- Drill 216 mm hole to 1560 m

1984-05-10

- Drill 216 mm hole to 1567 m
- Trip for bit
- RIH with Bit #30 HW J-77
- Drill 216 mm hole to 1585 m

1984-05-11

- Drill 216 mm hole to 1614 m

1984-05-12

- Drill 216 mm hole to 1628 m
- Trip for bit
- RIH with Bit #31 Reed
- Drill 216 mm hole to 1636 m

1984-05-13

- Drill 216 mm hole to 1663 m

1984-05-14

- Drill 216 mm hole to 1680 m

1984-05-15

- Drill 216 mm hole to 1687.8 m
- Trip out to Cut Core #2
- Run in with Bit #32 Chris. C-40
- Cut Core #2 1687.8 to 1693.0 m

1984-05-16

- Cut Core #2 to 1695.2 m
- Trip out and recover core
- Run in with Bit #33 HW J-77
- Drill 216 mm hole to 1699 m

1984-05-17

- Drill 216 mm hole to 1716 m TD
- Trip out to log
- Log hole

1984-05-18

- Logging with Schlumberger
- WOO

1984-05-19

- Pull intermediate casing
- Run plugs

1984-05-20

- Run cement plugs
- Seal plugs
- Rig released at 24.00 hours.

CASING SUMMARY

Surface Casing

Ran 11 jts. 340 mm 101 kg/m K-55 BT&C surface casing. Cemented by Dowell with 23.3 tonnes of Arctic Set. Landed at 135.0 m. Plug down at 1984-03-22 at 05.00 hours with 2.2 m³ cement returns to surface.

Intermediate Casing

Ran 71 jts. 244 mm K-55 and SOO 95, 8 rd, LT&C_r Rge.3, 59.5 and 64.7 kg/m intermediate casing. Cemented by Dowell with 16 tonnes Class G with .5% T.I. (Stage 1) and 15 tonnes Class G with .5% T.I. (Stage 2). Landed at 900.00 m. Plug down at 1984-04-10 at 15.40 hours with no cement returns to surface. External casing packer at 130.24 m would not inflate. Upper stage cement absorbed into formation. Casing slips set at top of string to stabilize casing. Annulus cement top at around 589 m.

ABANDONMENT PROGRAM

Plug #1

Interval: 1610-1710
Cemented with 6 tonnes Class G

Plug #2

Interval: 1150-1300
Cemented with 11.2 tonnes Class G

Plug #3

Interval: 800-1000
Cemented with 11.8 tonnes Class G

GEOLOGICAL SUMMARY

PCI Sammons H-55 was drilled as an exploration well to further evaluate hydrocarbon potential in Cambrian and Proterozoic sands in the Norman Wells area. The well was situated about 60 kilometers down river from the town of Norman Wells on the southwest flank of the Imperial Anticline in the Imperial Hills area. Geological control for the area was very poor with the nearest well of equivalent stratigraphic depth being some 40 kilometers distant. Geological interpretation of the play was reliant upon surface mapping done by the Geological Survey of Canada and also seismic interpretation. Due to the lack of wells drilled in the area and the subsequent lack of velocity profiles of the formations, seismic information was questionable.

At 46 m KB after drilling glacial till the first competent formation was encountered. Upon examination it was determined that we were drilling the Middle Devonian Hume formation. The upper part of the Hume in this well consisted of light to dark brown micritic to very fine granular, argillaceous limestone. Porosity throughout this zone was tight to very poor and was occasionally bitumen plugged or engrained with bitumen. Shale partings were common throughout. The lower part of the Hume consisted of limestone similar to the Upper Hume, interbedded with thick bands and beds of dark grey brown to black, occasionally bituminous shale.

The Bear Rock formation was encountered at a depth of 137 m. Immediately upon penetration, lost circulation was experienced. After combatting lost circulation for about two days, it was decided to set surface casing at 135 meters. Casing was set and drilling continued with stiff foam and air. The upper 45 meters of the Bear Rock consisted of medium to dark brown cryptocrystalline to fine crystalline dolomite. Porosity was poor to good throughout the zone and bitumen and live oil staining were observed. Bands of weak gold fluorescence were observed accompanied by a fast yellow/green, massive cut. From about 174 to 184 meters the Bear Rock consisted of a medium to dark brown, micritic to very fine granular limestone. Poor to good intergranular and vuggy porosity was observed in this zone along with traces of yellow/green cut fluorescence. The lower part of the Bear Rock consisted of inter-bedded anhydrite and Sabkha type dolomites. Porosity was very poor in these crypto-crystalline to very fine crystalline dolomite bands and no hydrocarbon shows were observed. The anhydrite beds were almost indistinguishable optically from the dolomite beds in the lower Bear Rock, probably due to the high concentrations of anhydrite cement in the dolomite.

The Ronning Group showed at 432 meters in samples as a light to medium brown cryptocrystalline to very fine crystalline dolomite. Porosity shows were very poor to occasionally fair and included intercrystalline, vuggy and fracture types of porosity. One minor show of live oil staining was observed near the top of the formation. Occasional bands of fracture porosity were encountered and total lost circulation of air and foam drilling fluids was experienced. From 490 to 540 meters, sporadic returns to surface were experienced and sample quality through this interval was questionable. From 540 meters to 800 meters total lost circulation was experienced and no samples were returned to surface. Spot samples were recovered at 800 meters, 810 meters, 865 meters and 887 meters. Again sample quality was poor due to the sporadic returns. At 900 meters, it was decided that logs would be run and consequently intermediate casing was set at this depth.

After drilling out of intermediate casing, good returns to surface were once again recovered. The Ronning at this depth occurred as a white to light grey cryptocrystalline, tight dolomite. Again at 927 meters, 958 meters, 961 meters, 967 meters and 973 meters, lost circulation zones were encountered while drilling with water. Fracture porosity was the probable cause of these lost circulation zones. Two cement plugs were then run to seal off these zones.

From 986 meters to F.T.D. lost circulation was not experienced again.

The lower part of the Ronning Group consisted mainly of a tight, light to dark grey/brown dolomite, with minor anhydrite pockets and bands. No hydrocarbon shows were observed throughout the lower Ronning.

The top of the Saline River was picked from samples at 1232 meters when bands of bright green shale were encountered, however thin bands of dull green/grey shale were observed from 1188 meters on. The Saline River formation consisted of interbeds of green shale, anhydrite and cream to dark brown tight anhydritic dolomite. No shows were observed in the Saline River.

At 1303 meters a white to medium grey very fine to medium grained quartzitic sandstone was encountered. The sand was very well cemented with silica and contained some secondary gypsum. Occasional thin bands and pockets of a tan to medium brown tight dolomite were also observed in samples. Further studies will be needed to determine which formation this is. We believe this to be the top of the Proterozoic (Upper Katherine formation). Interbeds of sandstone, dolomite and minor shales continued from then until 1448 meters. At 1449 meters, it was decided that a core should be cut. Core #1 was cut from 1449-1452.1 m. Core #1 consisted of very fine to fine grained very well cemented sandstone. From 1452.1 to 1594 meters samples showed as a tight silt to coarse grained sandstone. The sandstone was very hard and well cemented with silica and occasionally cemented with minor siderite. Occasionally thin bands of shale were observed. From 1594 to 1604 meters samples showed a medium to dark red brown, quartzose sandstone. The siltstone was tight, very hard and very well cemented with silica and siderite. An abrupt change occurs at 1604 meters from siltstone to a dark greenish/black to black metaquartzite. This may be the top of the Lower Katherine formation. Accessory minerals observed in this zone were chlorite, biotite and magnetite and occasional kaolinite. This zone from 1604 to 1638 meters appears to have been exposed to some extremes of heat and pressure and has been metamorphosed, resulting in the crystallization of the accessory minerals. This metaquartzite is also highly magnetic.

From 1638 to 1676 meters, a quartzitic siltstone shows in samples. Once again, the silt is very hard and well cemented with silica and siderite.

From 1676 to 1688 meters, an altered sandstone was encountered. Sand grains were fine grained and rounded with abundant biotite and pyrite. The sand was very hard and tight.

Core #2 was cut from 1687.8-1695.2 meters and consisted of a very fine grained quartzitic sandstone with common bands of red and green shales.

From 1695 to 1710 meters (F.T.D.) samples showed as quartzitic sandstone with minor accessory minerals of pyrite and muscovite. The sand was very fine to fine grained, subangular and hard, with abundant silica cement. Occasional thin bands of

shale were also present.

The well was drilled to a total depth of 1710 meters. The bottom hole formation was Proterozoic aged sandstone (possibly Lower Katherine).

Drilling was stopped 300 meters high to prognosed F.T.D. due to the occurrence of possible metamorphosed sediments and the fact that the Proterozoic sediments came in high. Logs were run and the decision to abandon the hole was made.

FORMATION TOPS

<u>FORMATION</u>	<u>SAMPLE</u>		<u>LOG</u>	
	<u>Depth</u>	<u>Subsea</u>	<u>Depth</u>	<u>Subsea</u>
Middle Devonian				
Hare Indian	-	-	-	-
Hume	46	+335.51	48	+333.51
Lower Devonian				
Bear Rock	137	+244.51	135	+246.51
Siluro-Ordovician				
Ronning Group	432	-50.49	425	-43.49
Cambrian				
Saline River	1232	-850.49	1188	-806.49
Mount Cap	-	-	1302	-920.49
Mount Clark	-	-	-	-
Proterozoic				
Upper Katherine	1303?	-921.49?	1342	-960.49
Lower Katherine	1604?	-1222.49?	-	-
F.T.D.	1710		1710	

SAMPLE DESCRIPTIONS

<u>Depth (m)</u>	<u>Description</u>
7-46	Recent Sediments, Fluvio-glacial Till
HUME +335.51 m	
46-50	<u>Limestone</u> ; medium to dark brown, occasionally white to light brown, micritic, argillaceous, slightly bituminous to bituminous, trace of calcite veining, tight to very poor porosity; occasional partings of <u>Shale</u> ; dark grey to black, blocky, calcareous, bituminous
50-55	<u>Limestone</u> ; light to dark brown mottled, micritic, calcite cement, argillaceous, slightly bituminous to bituminous, trace of disseminated pyrite, tight to very poor porosity, minor shale partings a/a
55-60	<u>Limestone</u> ; light grey/brown-medium brown, micritic, slightly argillaceous, slightly bituminous in part, calcite cement, tight to very poor porosity, minor shale partings a/a
60-70	<u>Limestone</u> ; light to dark brown, mottled, micritic, calcite cement, argillaceous to very argillaceous, slightly bituminous to bituminous, tight to very poor porosity, minor black calcareous bituminous shale partings a/a
70-80	<u>Limestone</u> ; a/a with minor bands of <u>Shale</u> ; black, blocky, calcareous, bituminous, common ostracods
80-90	INTERBEDS of <u>Limestone</u> ; light to medium grey, dark brown, micritic to very fine granular, calcite cement, argillaceous to very argillaceous, slightly bituminous, tight to very poor porosity; and <u>Shale</u> ; medium to dark grey/brown, occasionally black, blocky, calcareous, occasionally bituminous, micromicaceous in part, trace of ostracods.
90-100	<u>Limestone</u> ; light grey/brown, micritic to very fine granular, argillaceous, bituminous in part, calcite cement, tight to very poor porosity with bands and beds of <u>Shale</u> ; a/a
100-110	<u>Limestone</u> ; light to medium grey/brown, micritic to very fine granular, argillaceous, slightly bituminous, calcite cement, tight to very poor porosity, with minor bands of <u>Shale</u> ; medium to dark grey-brown, occasionally black, blocky, calcareous, occasionally bituminous
110-113	<u>Limestone</u> ; light grey, micritic, calcite cement, slightly argillaceous in part, tight, trace of ostracods, trace of dark brown limestone

<u>Depth (m)</u>	<u>Description</u>
113-116	<u>Shale</u> ; light grey, blocky, slightly calcareous, micromicaceous, trace of disseminated pyrite, trace of black bituminous shale
116-127	<u>Shale</u> ; a/a with occasionally bands of <u>Limestone</u> ; light grey, dark brown, micritic, calcite cement, slightly argillaceous in part, slightly bituminous in part, tight
127-130	<u>Limestone</u> ; light to medium grey/brown, micritic, slightly argillaceous to argillaceous, calcite cement, slightly bituminous in part, tight
130-137	<u>Limestone</u> ; light to dark brown, micritic, calcite cement, slightly argillaceous to argillaceous, bituminous in part, tight to very poor porosity, trace of ostracods, and minor beds of <u>Shale</u> ; dark grey/brown to black, blocky slightly calcareous, slightly micromicaceous, bituminous
BEAR ROCK +244.51	
137-138	<u>Dolomite</u> ; medium to dark brown, very fine crystalline, argillaceous, bituminous, minor calcite veining, fair intercrystalline porosity.
138-143	Bypassing Shaker - lost circulation material in mud system
143-145	<u>Dolomite</u> ; medium to dark brown, crypto-very fine crystalline, anhedral to subhedral, calcite veining, slightly argillaceous to argillaceous, slightly bituminous in part, poor to fair intercrystalline porosity.
145-152	<u>Dolomite</u> ; medium to dark brown, limy to very limy, cryptocrystalline to very fine crystalline, anhedral, calcite cement, slightly argillaceous, trace of bitumen, very poor to poor intercrystalline porosity, trace of ostracods.
152-155	<u>Dolomite</u> ; medium to dark brown, very fine crystalline, sucrosic texture in part, anhedral to subhedral, minor calcite veining, slightly argillaceous, poor to fair intercrystalline porosity (up to 10%) <u>abundant live oil staining</u> , abundant golden fluorescence, strong fast massive yellow/green cut.
155-159	<u>Dolomite</u> ; medium brown, cryptocrystalline to very fine crystalline, anhedral to subhedral, minor calcite veining, slightly argillaceous, poor intercrystalline porosity, <u>trace of live oil staining</u> , trace of weak gold fluorescence, fast weak yellow/green massive cut.
159-165	<u>Dolomite</u> ; medium to dark brown, crypto-very fine crystalline, anhedral-subhedral, slightly argillaceous to argillaceous, poor to fair intercrystalline porosity, common <u>live oil staining</u> , common gold fluorescence, fast yellow green massive cut.

<u>Depth (m)</u>	<u>Description</u>
165-171	<u>Dolomite</u> ; medium to dark brown, cryptocrystalline to fine crystalline, anhedral to subhedral, slightly argillaceous, fair intergranular and microvug porosity, <u>trace of live oil staining</u> , trace of weak gold fluorescence, fast weak yellow green massive cut.
171-174	<u>Dolomite</u> ; medium to dark brown, cryptocrystalline to fine crystalline, anhedral to euhedral, slightly argillaceous to argillaceous, fair to good intercrystalline and vuggy porosity, <u>trace of shows a/a</u>
174-176	<u>Limestone</u> ; medium to dark brown, micritic to very fine granular, calcite cement and crystals, argillaceous to very argillaceous, fair to good intergranular and vuggy porosity, <u>trace of shows a/a</u>
176-182	<u>Limestone</u> ; dark brown, micritic to very fine granular, calcite cement, argillaceous, slightly bituminous, poor intergranular porosity, trace of vuggy porosity, trace of yellow/green cut fluorescence, minor anhydrite.
182-191	INTERBEDS of <u>Dolomite</u> ; dark brown, cryptocrystalline to very fine crystalline, calcite cement in part, anhydrite cement in part, slightly argillaceous to argillaceous, poor to fair intercrystalline and minor vuggy porosity, trace of cut fluorescence; and bands and pockets of <u>Anhydrite</u> ; white to dark brown, mottled, massive to sucrosic, translucent in part.
191-203	INTERBEDS of mainly <u>Anhydrite</u> ; white to dark brown, mottled, translucent in part, fibrous in part, massive, and <u>Dolomite</u> ; dark brown, cryptocrystalline to very fine crystalline, anhydrite cement in part, slightly argillaceous to argillaceous, poor to fair intercrystalline and minor vug porosity.
203-215	INTERBEDS of <u>Anhydrite</u> ; a/a and <u>Dolomite</u> ; a/a with minor thin bands of black, bituminous, anhydritic shales
215-233	INTERBEDS of <u>Anhydrite</u> ; white to dark brown, mottled, translucent in part, fibrous in part, and common bands and beds of <u>Dolomite</u> ; medium to dark brown, cryptocrystalline to fine crystalline, abundant anhydrite cement, slightly argillaceous to argillaceous, poor intercrystalline porosity
233-265	INTERBEDS of <u>Dolomite</u> ; medium grey, medium to dark brown, cryptocrystalline to very fine crystalline, abundant anhydrite cement, slightly argillaceous to argillaceous, very poor intercrystalline porosity and <u>Anhydrite</u> ; white to dark brown, medium grey, mottled in part, translucent in part, fibrous in part, occasional partings of <u>Shale</u> ; medium grey, blocky, dolomitic, anhydritic

<u>Depth (m)</u>	<u>Description</u>
265-270	<u>Dolomite</u> ; light to medium brown, cryptocrystalline to very fine crystalline, occasionally dark brown, minor anhydrite cement slightly argillaceous, anhydrite pockets, poor intercrystalline porosity, with minor bands of <u>Anhydrite</u> ; light to medium brown, occasionally medium grey, translucent, fibrous in part
270-295	<u>Anhydrite</u> ; a/a with common bands and beds of <u>Dolomite</u> ; a/a
295-306	INTERBEDS of <u>Dolomite</u> ; medium to dark brown, cryptocrystalline, anhydrite cement, slightly argillaceous to argillaceous, very poor intercrystalline porosity; and <u>Anhydrite</u> ; white to dark brown, translucent in part, fibrous in part
306-316	INTERBEDDED <u>Dolomite</u> ; medium to dark brown, cryptocrystalline to very fine crystalline, anhydrite cement, argillaceous, bituminous in part, very poor intercrystalline porosity, and <u>Anhydrite</u> ; white to dark brown, fibrous in part, translucent in part.
316-320	<u>Dolomite</u> ; medium to dark brown, cryptocrystalline to very fine crystalline, anhydrite cement, argillaceous, bituminous in part, poor intercrystalline porosity, <u>trace of live oil staining</u> , trace of weak good fluorescence, slow weak yellow massive cut.
320-330	INTERBEDDED <u>Dolomite</u> ; light to dark brown, cryptocrystalline, anhydrite cement, argillaceous, very poor intercrystalline porosity; and <u>Anhydrite</u> ; white to dark brown, fibrous in part, translucent in part.
330-345	INTERBEDS of <u>Dolomite</u> ; a/a <u>Anhydrite</u> ; a/a
345-376	INTERBEDDED <u>Anhydrite</u> ; white to dark brown, translucent in part, greasy lustre, fibrous in part; and <u>Dolomite</u> ; medium to dark brown, cryptocrystalline to very fine crystalline, anhydrite cement, slightly argillaceous, very poor inter-crystalline porosity.
376-389	<u>Dolomite</u> ; medium to dark brown, cryptocrystalline to very fine crystalline, anhydrite cement, argillaceous, very poor inter-crystalline porosity, with minor bands of <u>Anhydrite</u> ; white to dark brown, translucent in part, greasy lustre, fibrous in part.
389-395	<u>Anhydrite</u> ; light to dark brown, sucrosic in part, translucent in part, greasy lustre, fibrous in part, with occasional bands of <u>Dolomite</u> ; a/a
395-401	<u>Dolomite</u> ; medium to dark brown, cryptocrystalline to very fine crystalline, anhydrite cement, argillaceous, very poor intercrystalline porosity, <u>trace of live oil staining</u>

<u>Depth (m)</u>	<u>Description</u>
401-406	<u>Anhydrite</u> ; light to dark brown, greasy lustre, translucent, sucrosic in part
406-410	<u>Dolomite</u> ; medium brown, cryptocrystalline-very fine crystalline, anhydrite cement and pockets, slightly argillaceous trace of bituminous partings, poor intercrystalline porosity, trace of vuggy porosity.
410-413	<u>Anhydrite</u> ; a/a
413-417	<u>Dolomite</u> ; medium to dark brown, cryptocrystalline to very fine crystalline, anhydrite cement, argillaceous, very poor intercrystalline porosity
417-420	<u>Anhydrite</u> ; a/a, rhombohedral pseudomorphs
420-422	<u>Dolomite</u> ; a/a
422-424	<u>Anhydrite</u> ; a/a
424-429	<u>Dolomite</u> ; medium to dark brown, cryptocrystalline to very fine crystalline, anhydrite cement, slightly argillaceous to argillaceous, very poor intercrystalline porosity.
429-432	<u>Anhydrite</u> ; white to dark brown, greasy lustre, sucrosic in part, fibrous in part, translucent
RONNING GROUP -50.49	
432-435	<u>Dolomite</u> ; medium brown, cryptocrystalline to very fine crystalline, trace of anhydrite cement, subhedral to occasionally euhedral, slightly argillaceous, very poor intercrystalline porosity, trace of vuggy porosity, trace of fracture porosity, possibly leached in part, trace of stylolites, trace of anhydrite and gypsum
435-445	<u>Dolomite</u> ; light to medium brown, cryptocrystalline to very fine crystalline, anhedral to euhedral, trace of anhydrite cement, dolomite cement, slightly argillaceous in part, poor to fair intercrystalline and vug porosity, minor fracture porosity, <u>trace of live oil staining</u> , trace of stylolites, trace of anhydrite and gypsum (anhydrite cement diminishing with depth)
445-462	<u>Dolomite</u> ; medium brown, cryptocrystalline to very fine crystalline, occasionally fine crystalline, occasionally euhedral, dolomite cement, occasional anhydrite pockets, slightly argillaceous in part, poor intercrystalline vuggy and fracture porosity, trace of <u>shale</u>
462-488	<u>Dolomite</u> ; tan to medium brown, grey/brown, cryptocrystalline to very fine crystalline, occasionally fine to coarse crystalline (in vugs) sucrosic in part, anhydrite cement in part, dolomite cement, slightly argillaceous in part, poor intercrystalline porosity, poor to

<u>Depth (m)</u>	<u>Description</u>
478-488	fair vuggy porosity
488-490	<u>Dolomite</u> ; medium brown, cryptocrystalline to very fine crystalline, fine to coarse dolomite rhombohedrons in vugs and fractures, <u>sucrosic</u> in part, dolomite cement, trace of anhydrite cement, argillaceous, good intercrystalline vuggy and fracture porosity.
490-495	NO RETURNS TO SURFACE.
495-505	<u>Dolomite</u> ; light brown, cryptocrystalline to very fine crystalline, trace of anhydrite cement, dolomite cement, <u>sucrosic</u> in part, slightly argillaceous, poor intercrystalline porosity, trace of <u>dead oil</u> staining
505-516	NO RETURNS TO SURFACE.
516-520	<u>Dolomite</u> ; light brown, light grey, cryptocrystalline, occasionally fine crystalline, dolomite cement, slightly argillaceous, very poor intercrystalline porosity (sample quality is questionable due to intermittent returns to surface).
520-535	NO RETURNS TO SURFACE
535-540	<u>Dolomite</u> ; light brown, light grey/brown, cryptocrystalline to fine crystalline, occasionally medium crystalline occasionally euhedral, dolomite cement, slightly argillaceous in part, poor to fair intercrystalline and vuggy porosity.
540-646	NO RETURNS TO SURFACE
646-800	NO RETURNS TO SURFACE
-800	SPOT RETURNS TO SURFACE <u>Dolomite</u> ; white to light grey brown, cryptocrystalline to very fine crystalline, trace of disseminated pyrite, slightly argillaceous in part, tight, (poor sample)
-810	SPOT SAMPLE due to intermittent returns to surface <u>Dolomite</u> ; a/a
-864	SPOT SAMPLE <u>Dolomite</u> ; light grey, medium brown, cryptocrystalline to fine crystalline, slightly argillaceous in part, poor intercrystalline and trace of vuggy porosity, trace of oil staining, trace of anhydrite, trace of light grey waxy shale.
-888	SPOT SAMPLE due to intermittent returns to surface <u>Dolomite</u> ; tan to medium brown, cryptocrystalline to fine crystalline, argillaceous in part, poor porosity, trace of light grey waxy shale.

<u>Depth (m)</u>	<u>Description</u>
900-917	<u>Dolomite</u> ; white to light grey, cryptocrystalline, anhedral, massive, slightly silty in part, tight (poor sample; abundant cement contamination)
917-929.7	<u>Dolomite</u> ; white to light grey, light brown, cryptocrystalline, occasionally very fine crystalline, anhedral, slightly silty in part, slightly argillaceous in part, tight (poor samples due to cement contamination)
929.4-929.6	NO SAMPLES (LOST RETURNS TO SURFACE) PROBABLE FRACTURE ZONE
929.6-931	<u>Dolomite</u> ; a/a
931-942	<u>Dolomite</u> ; white to light brown, light grey, cryptocrystalline to very fine crystalline, anhedral to subhedral, dolomite cement, sucrosic in part, trace of pyrite inclusions, poor intercrystalline porosity
942-957	<u>Dolomite</u> ; white to medium grey, grey/brown, cryptocrystalline to very fine crystalline, massive, occasionally sucrosic, anhedral to subhedral, dolomite cement, occasional calcite cement, slightly argillaceous, very poor intercrystalline porosity, trace of fracture porosity
957-958	LOST CIRCULATION. NO RETURNS TO SURFACE.
958-960	<u>Dolomite</u> ; tan-light grey/brown, cryptocrystalline to very fine crystalline, occasionally fine to medium crystalline, dolomite cement, sucrosic in part, slightly argillaceous, anhedral to subhedral, trace of pyrite inclusions, poor intercrystalline porosity, minor vuggy or fracture porosity.
(960-985)	SPORADIC RETURNS TO SURFACE.
-972	SPOT SAMPLE
	<u>Dolomite</u> ; tan to light grey/brown, cryptocrystalline to medium crystalline, occasionally coarse crystalline, anhedral to euhedral dolomite cement, common pyrite inclusions, slightly argillaceous, poor to fair intercrystalline porosity, common vuggy and fracture porosity.
-985	SPOT SAMPLE
	<u>Dolomite</u> ; tan to medium brown, light grey, cryptocrystalline to fine crystalline, dolomite cement, occasionally coarse crystalline, common pyrite inclusions, anhedral to subhedral, slightly argillaceous in part, poor to fair intercrystalline porosity, common vug and fracture porosity, trace <u>shale</u> ; red, blocky dolomitic.

<u>Depth (m)</u>	<u>Description</u>
985-1002	<u>Dolomite</u> ; white to cream, occasionally grey/brown, cryptocrystalline to very fine crystalline, anhedral to subhedral, slightly silty in part, very slightly argillaceous in part, tight to very poor intercrystalline porosity, trace of disseminated pyrite inclusions.
1002-1016	<u>Dolomite</u> ; white to dark grey/brown, cryptocrystalline to very fine crystalline, occasionally fine crystalline, anhedral to subhedral, slightly argillaceous to argillaceous in part, slightly silty in part, tight to very poor intercrystalline porosity, occasional medium to dark grey dolomitic <u>shale</u> partings.
1016-1028	<u>Dolomite</u> ; tan to dark grey/brown, cryptocrystalline to very fine crystalline, occasionally fine crystalline, anhedral to subhedral, slightly argillaceous to very argillaceous, slightly silty in part, tight to very poor intercrystalline porosity, trace of pyrite inclusions, occasional dark grey dolomitic <u>shale</u> partings.
1028-1032	<u>Dolomite</u> ; white to light brown, light grey, cryptocrystalline to very fine crystalline, occasionally fine crystalline, anhedral to subhedral, dolomite cement, slightly argillaceous in part, tight to very poor porosity (intercrystalline)
1032-1037	<u>Dolomite</u> ; white-medium brown, medium grey, cryptocrystalline to fine crystalline, anhedral to subhedral, rare euhedral crystals, dolomite cement, slightly argillaceous to argillaceous in part, tight to very poor intercrystalline and trace of vuggy porosity, trace of medium grey dolomitic <u>shale</u> partings
1037-1047	<u>Dolomite</u> ; light to medium brown, light grey, cryptocrystalline to very fine crystalline, dolomite cement, trace of anhydrite cement, euhedral, argillaceous to very argillaceous in part, hard, (silicified in part), trace of disseminated pyrite, tight, with occasional partings of <u>Shale</u> ; green, blocky, hard, dolomite, pyrite, trace of brown chert
1047-1058	<u>Dolomite</u> ; white to medium brown, grey/brown, cryptocrystalline to very fine crystalline, dolomite cement, anhydrite cement, anhedral, occasionally subhedral, argillaceous to very argillaceous in part, hard, (silicified in part) tight to very poor porosity, minor partings of <u>Shale</u> ; medium to dark grey, blocky, dolomitic, trace of brown chert
1058-1067	<u>Dolomite</u> ; white to medium brown, slightly limy, cryptocrystalline, trace of calcite cement, trace of anhydrite cement, slightly silicified in part, slightly argillaceous to argillaceous, tight, with minor partings of <u>Shale</u> ; medium to dark grey, blocky, dolomitic

<u>Depth (m)</u>	<u>Description</u>
1067-1070	<u>Dolomite</u> ; medium grey/brown, cryptocrystalline, trace of calcite cement, trace of anhydrite cement, anhedral, slightly argillaceous hard, tight.
1070-1082	<u>Dolomite</u> ; tan to medium grey/brown, cryptocrystalline, common calcite cement, trace of anhydrite cement, anhedral, slightly argillaceous to argillaceous in part, hard, tight
1082-1107	<u>Dolomite</u> ; tan to dark brown, occasionally white, cryptocrystalline to very fine crystalline, occasionally fine crystalline, dolomite cement, trace of calcite cement in part, common anhydrite cement in part, clean to argillaceous, slightly silty in part, tight to very poor intercrystalline porosity; occasional laminae or pockets of <u>Anhydrite</u> ; white, massive, sucrosic in part, soft; and occasional partings of <u>Shale</u> ; dark grey brown, blocky, dolomitic, slightly bituminous
1107-1124	<u>Dolomite</u> ; tan to dark brown, occasionally white to light grey, cryptocrystalline to fine crystalline, dolomite cement, trace of calcite cement in part, common anhydrite cement in part, clean to very argillaceous, slightly silty in part, tight to poor intercrystalline and microvug porosity, common pockets of <u>Anhydrite</u> ; white, massive, sucrosic in part, soft, occasional partings of <u>Shale</u> ; grey/green, black, blocky, dolomitic, slightly bituminous in part
1124-1143	<u>Dolomite</u> ; tan to dark brown, occasionally white to light grey, cryptocrystalline to fine crystalline, trace of anhydrite cement in part, trace of calcite cement in part, clean to very argillaceous, tight to very poor porosity (intercrystalline and microvug) occasional pockets and laminae of <u>Anhydrite</u> ; white, massive, sucrosic in part, soft; occasional partings of <u>Shale</u> ; black, blocky, slightly bituminous, dolomitic in part.
1143-1161	<u>Dolomite</u> ; tan-dark grey/brown, white to light grey, cryptocrystalline, dolomite cement, trace of anhydrite cement, trace of calcite cement, clean to very argillaceous, tight, occasional pockets or laminae of <u>Anhydrite</u> ; white, massive, soft; and occasional partings of <u>Shale</u> ; black, blocky, dolomitic in part, bituminous in part
1161-1176	<u>Dolomite</u> ; tan to dark grey, grey/brown, grey/green, cryptocrystalline to microcrystalline, trace of anhydrite cement, dolomite cement, trace of calcite cement, argillaceous to very argillaceous, hard, tight, with occasional pockets and laminae of <u>Anhydrite</u> ; white to light grey, massive, slightly argillaceous; and occasional partings of <u>Shale</u> ; grey/green, black, blocky, dolomitic in part, slightly bituminous in part.

<u>Depth (m)</u>	<u>Description</u>
1176-1188	<u>Dolomite</u> ; light grey/brown to dark grey/brown, cryptocrystalline to microcrystalline, dolomite cement, trace of anhydrite cement in part, trace of calcite cement, argillaceous to very argillaceous, hard, tight, with occasional pockets and laminae of <u>Anhydrite</u> ; white to light grey, massive, slightly argillaceous in part, soft; and occasional partings of <u>Shale</u> ; grey/green, black, blocky, dolomitic in part, slightly bituminous in part.
1188-1199	<u>Dolomite</u> ; tan to dark grey/brown, cryptocrystalline to very fine crystalline, dolomite cement, trace of anhydrite cement, trace of calcite cement, argillaceous to very argillaceous, tight; and occasional pockets and laminae of <u>Anhydrite</u> ; white to light grey, massive, fibrous in part, slightly argillaceous in part, and occasional partings of <u>Shale</u> ; black, blocky, dolomitic in part, bituminous in part, trace of <u>Chert</u> ; angular fragments, white to brown (silicified dolomite)
1199-1216	<u>Dolomite</u> ; tan to dark grey/brown, grey/green, cryptocrystalline to microcrystalline, trace of anhydrite cement, argillaceous to very argillaceous, silty in part, tight, occasional pockets and laminae of <u>Anhydrite</u> ; white to light grey, massive, soft, slightly argillaceous; and occasional bands of <u>Shale</u> ; grey/green, blocky dolomitic, hard; grades to argillaceous dolomite; trace of angular chert fragments.
1216-1224	<u>Dolomite</u> ; tan to dark grey/brown, cryptocrystalline to microcrystalline, trace to common anhydrite cement, argillaceous to very argillaceous, tight; occasional pockets and laminae of <u>Anhydrite</u> ; white to light grey, massive, soft, slightly argillaceous; and occasional bands of <u>Shale</u> ; grey/green, blocky, dolomitic, hard, grades to argillaceous dolomite; traces of angular chert fragments.
1224-1229	'A' TYPE <u>Dolomite</u> 95%; a/a 'B' TYPE <u>Dolomite</u> 5%; white to light grey, cryptocrystalline, trace of calcite cement, abundant very fine to fine grained quartz grains, occasional medium grains, occasional medium grained, silica, ooliths?, argillaceous in part, tight, grades to sandstone in part (1% of total sample); minor pockets and laminae of <u>Anhydrite</u> ; a/a and occasional bands of <u>Shale</u> ; a/a, trace of chert.
1229-1230	85% 'A' Type <u>Dolomite</u> 15% 'B' Type <u>Dolomite</u> (sandy) Minor <u>Anhydrite</u> and <u>Shale</u> ; a/a, trace <u>Chert</u> , <u>Sandstone</u>
1230-1231	70% 'A' Type <u>Dolomite</u> 30% 'A' Type <u>Dolomite</u>

<u>Depth (m)</u>	<u>Description</u>
1231-1232	90% 'A' type Dolomite 10% 'B' type Dolomite Minor <u>Anhydrite</u> and <u>Shale</u> ; a/a, trace <u>Chert</u> , <u>Sandstone</u>
1232-1233	75% 'A' type Dolomite 15% 'B' type Dolomite 10% <u>Shale</u> ; bright to medium green, waxy, splintery (non dolomitic) minor <u>Anhydrite</u> a/a, trace <u>sandstone</u>
SALINE RIVER -850.49	
1232-1244	Finely Interbedded <u>Dolomite</u> ; cream to medium brown, cryptocrystalline, abundant anhydrite cement, silty and sandy in part, slightly argillaceous to argillaceous, trace of disseminated pyrite, tight; and <u>Shale</u> ; medium green, blocky, slightly dolomitic, common disseminated pyrite, waxy in part; and <u>Anhydrite</u> ; white to tan, soft, massive, occasionally sucrosic, trace of <u>sandstone</u>
1244-1259	Finely Interbedded <u>Dolomite</u> ; cream to dark brown, cryptocrystalline, common to abundant anhydrite cement, trace of pyrite inclusions, tight; and <u>Shale</u> ; a/a and <u>shale</u> ; medium to dark brown, blocky, very dolomitic, grades to very argillaceous dolomite; and <u>Anhydrite</u> ; white to light grey, soft, slightly argillaceous, massive, occasionally sucrosic
1259-1273	Finely Interbedded <u>Dolomite</u> ; cream to dark brown, cryptocrystalline, abundant anhydrite cement, slightly argillaceous to argillaceous, slightly silty in part, slightly sandy in part, tight; and <u>Shale</u> ; medium to dark green, dark brown, blocky, waxy in part, trace of disseminated pyrite, dolomitic in part, slightly anhydritic in part, and <u>Anhydrite</u> ; white to tan, soft, slightly argillaceous, massive, occasionally sucrosic
1273-1287	Finely Interbedded <u>Dolomite</u> ; tan to medium grey/brown, cryptocrystalline to microcrystalline, common to abundant anhydrite cement, sandy in part, argillaceous in part, tight; and <u>Shale</u> ; light to medium grey/green, blocky, slightly waxy in part, slightly dolomitic in part, slightly anhydritic in part, trace of disseminated in part; and <u>Shale</u> ; red, reddish brown, slightly dolomitic, slightly anhydritic in part, blocky, and <u>Anhydrite</u> ; a/a
1287-1292	Finely Interbedded <u>Dolomite</u> ; tan to dark brown, cryptocrystalline to very fine crystalline, common anhydrite cement, argillaceous in part, tight; and <u>Shale</u> ; grey/brown, red, dolomitic in part, blocky, anhydritic in part and <u>Anhydrite</u> ; a/a

<u>Depth (m)</u>	<u>Description</u>
1292-1303	Interbedded <u>Dolomite</u> ; tan to light grey/brown, cryptocrystalline, common anhydrite cement, argillaceous in part, sandy in part, tight, and <u>Shale</u> ; a/a, and <u>shale</u> ; dark brown to black, blocky, slightly dolomitic in part, slightly anhydritic in part, and <u>Anhydrite</u> ; white to tan, soft, slightly argillaceous, massive, occasionally sucrosic.
1301-1307	<u>Sandstone</u> ; white to medium grey/brown, quartzitic, very fine to medium grained, sub angular to angular, moderately sorted, silica cement, trace of dolomite cement, trace of anhydrite cement (secondary?), slightly argillaceous in part, poor intergranular porosity, with minor beds of <u>Dolomite</u> ; tan to medium brown, cryptocrystalline to micro-crystalline, anhydrite cement, argiliaceous to very argillaceous, sandy in part, tight, and <u>Shale</u> ; medium to dark grey/green, grey, dolomitic in part, waxy in part, slightly silty and sandy in part; and <u>Gypsum</u> ; white soft, chalky texture
1307-1333	<u>Sandstone</u> ; white to light grey, light grey/brown in part, quartzitic, very fine to medium grained, subangular to angular, moderately sorted, silica cement, quartz overgrowths, minor anhydrite and gypsum cement, trace of dolomite cement, slightly argillaceous, poor porosity; and occasional bands of <u>Shale</u> ; light to dark grey/green, light green, dark grey, waxy in part, slightly dolomitic in part, anhydritic in part, slightly silty and sandy in part and <u>Gypsum</u> ; white, soft, chalky texture.
1333-1343	<u>Sandstone</u> ; a/a interbedded with <u>Shale</u> ; light to medium grey/green, blocky, soft to moderately hard, anhydritic in part, slightly sandy in part, slightly dolomitic in part; and <u>Dolomite</u> ; tan to medium brown, cryptocrystalline to microcrystalline, anhydrite cement in part, slightly argillaceous to argiliaceous, silty in part, tight; and <u>Gypsum</u> ; white, soft, chalky texture.
1343-1350	<u>Sandstone</u> ; white to light grey, quartzitic, very fine to fine grained, occasionally medium grained, sub angular to angular, well sorted, silica cement, quartz overgrowths, trace of anhydrite or gypsum cement, tight to very poor porosity; with common bands of <u>Shale</u> ; light to dark green, grey/green, red, blocky, waxy in part, slightly dolomitic in part; and <u>Dolomite</u> ; light to medium grey, grey/brown, brown, cryptocrystalline to microcrystalline, trace of anhydrite or gypsum cement, silty in part, argillaceous, tight; and occasional bands and pockets of <u>Gypsum</u> ; white, soft, chalky texture, traces of chert and siltstone

<u>Depth (m)</u>	<u>Description</u>
1350-1355	<u>Sandstone</u> ; a/a with very minor banding of <u>Shale</u> ; a/a and <u>Dolomite</u> ; a/a and occasional bands and <u>Gypsum</u> ; a/a
1355-1365	<u>Sandstone</u> ; a/a with occasional bands of <u>Shale</u> ; green, grey/green, brown, chocolate colour, dark grey, blocky, waxy in part, dolomitic in part, pyrite inclusions; and <u>Gypsum</u> , white, soft, chalky texture; and very minor bands of <u>Dolomite</u> ; a/a
1365-1373	<u>Sandstone</u> ; white to light grey, quartzitic subangular to angular, well sorted, silica cement, abundant quartz overgrowths, trace of gypsum cement, tight, with occasional bands of <u>Shale</u> ; a/a; and occasional bands and pockets of <u>Gypsum</u> ; a/a; and minor bands and laminations of <u>Dolomite</u> ; light to medium grey, grey/brown, brown, cryptocrystalline to microcrystalline, trace of gypsum cement, clean to slightly argillaceous, tight.
1373-1381	<u>Sandstone</u> ; a/a with occasional bands of <u>Shale</u> ; light to medium grey, grey/green, black, chocolate brown, blocky, dolomitic in part, slightly waxy in part; and <u>Dolomite</u> ; tan to light grey/brown, cryptocrystalline to microcrystalline, trace of gypsum cement, silty in part, argillaceous in part, tight; and minor bands of <u>Gypsum</u> ; a/a
1381-1395	Interbeds of <u>Sandstone</u> ; a/a and <u>Dolomite</u> ; light to medium grey/brown, cryptocrystalline to microcrystalline, dolomite cement, slightly argillaceous, tight; with minor bands of <u>Shale</u> ; a/a; and very minor bands or laminations of <u>Gypsum</u> ; white, soft, chalky texture
1395-1415	<u>Sandstone</u> ; white to light grey, reddish brown, quartzitic, very fine to fine grained, occasionally medium grained, sub angular to angular, well sorted, abundant silica cement, trace of common siderite cement, quartz overgrowths, tight, with minor bands of <u>Dolomite</u> ; a/a; and occasional bands and laminae of <u>Shale</u> ; a/a and <u>Gypsum</u> a/a
1415-1430	<u>Sandstone</u> ; white to light grey, commonly reddish brown, quartzitic, very fine to fine grained, occasional medium grains, subangular to angular, well sorted, abundant silica cement, quartz overgrowths, trace to common siderite cement, tight to very poor intergranular porosity; with minor bands of <u>Dolomite</u> ; light to medium grey/brown, cryptocrystalline to microcrystalline, dolomite cement, trace of gypsum cement, silty in part, slightly argillaceous to argillaceous, tight; and occasional bands of <u>Shale</u> ; light to dark green, chocolate brown, blocky to sub fissile,

<u>Depth (m)</u>	<u>Descriptions</u>
	micromicaceous in part, slightly dolomitic in part, slightly waxy in part, slightly sandy in part; and minor <u>Gypsum</u> ; soft, white, chalky texture
1430-1449	<u>Sandstone</u> ; white to light grey, quartzitic, very fine to medium grained, occasionally coarse grained, subangular to angular, poorly sorted, abundant silica cement, abundant quartz overgrowths, trace of siderite cement, tight; and minor bands of <u>Dolomite</u> ; light to medium grey, light to medium brown, cryptocrystalline to microcrystalline, dolomite cement, slightly argillaceous to argillaceous, slightly sandy in part, tight; and occasional bands of <u>Shale</u> ; light to dark grey, chocolate brown, subfissile, splintery, slightly dolomitic in part, slightly sandy in part, trace of pyrite inclusions; with minor amounts of <u>gypsum</u> ??
Note:	Sandstones, dolomites and shales appear possibly to have been exposed to high temperatures and have been slightly altered?
1449-1452.1	SEE DETAILED CORE DESCRIPTION, Core #1
1452.1-1463	<u>Sandstone</u> ; white to occasionally light grey, clear and opaque quartz grains, trace to common red-brown siderite speckles, very fine to fine grained, rounded, well sorted, very hard, silica and siderite cement, tight, no shows. Trace <u>gypsum</u> , white, soft
1463-1480	<u>Sandstone</u> ; white to occasionally light grey, clear and opaque quartz grains, very fine to fine grained, rounded, well sorted, very hard, silica cement, trace siderite cement, occasionally trace calcite cement, tight, no shows; also with <u>Gypsum</u> ; 5%, white soft <u>Shale</u> ; 5%, medium green to red brown, fissile, splintery, moderately hard, silty, micromicaceous
1480-1486	<u>Sandstone</u> ; white, a/a, with <u>Gypsum</u> 5%; white, soft, and with <u>Dolomite</u> ; trace, light to medium grey, cryptocrystalline, moderately hard, trace anhydrite cement, tight, no shows
1486-1500	<u>Sandstone</u> ; white, a/a with <u>Gypsum</u> ; 5%, white soft
1500-1503	<u>Sandstone</u> ; 85%, white, clear and opaque quartz grains, very fine to fine grained, rounded, well sorted, very hard, silica cement, trace siderite cement, tight, no shows, with <u>Shale</u> ; 5%, light to medium green to occasionally red brown, fissile to subfissile, silty; and with <u>Dolomite</u> ; 5% medium grey to light grey, cryptocrystalline, slightly anhydritic, tight, no shows; also with <u>Gypsum</u> ; 5%, white soft

<u>Depth (m)</u>	<u>Description</u>
1503-1513	<u>Sandstone</u> ; white, a/a, with <u>Gypsum</u> ; 5%, white, soft, with <u>Shale</u> ; trace, light to medium green, fissile, silty, occasionally grey and red-brown.
1513-1522	<u>Sandstone</u> ; white, clear and opaque quartz grains, trace lithic fragments, very fine to medium grained, rounded, well sorted, very hard, silica cement, tight, no shows, with <u>Gypsum</u> ; 5%, white soft also with <u>Dolomite</u> ; trace, light to dark grey, crypto to microcrystalline, silty, calcareous in part, tight, no shows and with <u>Shale</u> ; trace, medium green, fissile, micromicaceous, slightly silty.
1522-1547	<u>Sandstone</u> ; white, clear and opaque quartz grains, trace lithic fragments, very fine to fine grained, occasionally coarse grained, rounded to subrounded, well sorted, very hard, silica cement, tight, no shows, with minor amounts of <u>Gypsum</u> and <u>Anhydrite</u> 5%, white, soft
1547-1567	<u>Sandstone</u> ; white, clear and opaque quartz grains, trace lithic fragments, trace feldspar, very fine to fine grained, occasionally medium grained, rounded to subrounded, well sorted, very hard, silica cement, tight, no shows, occasionally very patchy siderite cement, with minor bands of <u>Anhydrite-Gypsum</u> ; white soft
1567-1571	<u>Sandstone</u> ; white to light grey, clear and opaque quartz grains, trace to common, red brown siderite speckles, trace lithic fragments, very fine to fine grained, occasionally coarse grained, subrounded to rounded, well sorted, very hard, silica cement, tight, no shows, with minor bands of <u>Dolomite</u> ; light grey to light grey green, crypto to microcrystalline, slightly anhydritic, silty, tight, no shows; also with minor bands of <u>Shale</u> ; medium green, fissile to subfissile, sandy, silty, micaceous in part
1571-1578	<u>Sandstone</u> ; white to light grey, becoming pinkish grey, quartzose, spotty to common becoming abundant red-brown siderite speckles, trace lithic fragments, fine to medium grained, rounded, well sorted, becoming slightly argillaceous, very siliceous, siderite cement, very hard, tight to very poor becoming poor intergranular porosity (trace to 5%), no shows; interbedded with <u>Anhydrite-Gypsum</u> ; 10%, white, slightly sideritic, soft.
1578-1585	<u>Sandstone</u> ; becoming light red-brown, quartzose, very heavy red-brown siderite speckles, very fine to fine grained, rounded, moderately to well sorted, silty, very siliceous and sideritic, tight, no shows; interbedded with <u>Gypsum-Anhydrite</u> ; 10%, white to pinkish, soft; also with <u>Claystone</u> ; approx. 20%, red (not seen in samples but appears to be

<u>Depth (m)</u>	<u>Description</u>
	in mud)
1585-1594	<u>Sandstone</u> ; 65%, light pinkish grey to light red-brown to light olive green, quartzose, abundant red-brown siderite speckles, silt to very fine grained, rounded, moderately sorted, argillaceous, very hard, silica and siderite cement, tight, no shows; interbedded with <u>Sandstone</u> ; 30%; white to light red-brown, quartzose, abundant siderite speckles, very fine grained, rounded, well sorted, very hard, silica and siderite cement, tight, no shows; also with <u>Anhydrite-Gypsum</u> ; trace to 5%, white to pink, soft, sandy, silty; also with <u>Claystone</u> ; (20%) red, not seen in samples
1594-1604	<u>Siltstone</u> ; medium to dark reddish brown, quartzose, sandy, very hard, silica and siderite cement, no shows
1604-1638	<u>Metaquartzite</u> ; dark greenish black to black to salt and pepper (mottled) quartzitic, occasionally very fine grained to coarse grained, siliceous, slightly calcareous, tight, no shows; Appears to have been altered and contains accessory minerals such as "chlorite" "biotite", and is very magnetic. 1615-1620 samples becoming coarser grained and crystals are very angular. Also with <u>Kaolinite</u> ; trace to 10%, white, soft, silty.
Note:	
1638-1644	<u>Siltstone</u> ; white to light grey to light green to pink, quartzose, occasionally very fine grained, very hard, silica cement, very slightly dolomitic, tight, no shows, also with <u>Dolomite</u> ; trace, light grey brown to light olive green, micro-crystalline, very hard, tight, no shows May have been metamorphosed into "Quartzite" and "Marble"
Note:	
1644-1665	<u>Siltstone</u> ("Quartzite"); light olive green, occasionally white and pink, quartzose occasionally very fine grained, extremely hard, siliceous, occasional dolomite cement, sideritic, tight, no shows; with minor amount of <u>Shale</u> ; (possibly 'slate'), light to medium olive green, occasionally red-brown, blocky to platy, very hard, waxy
1665-1675	<u>Siltstone</u> ("Quartzite"); white, occasionally light grey to light olive green, quartzose, occasionally very fine grained, very hard, siliceous, sideritic, occasionally very slightly dolomitic, no shows; with minors amount of <u>Shale</u> (slate); light to medium green to light grey, blocky, occasionally platy, very hard.
1675-1680	<u>Sandstone</u> ; (Quartzite-Gneiss); salt and pepper, quartz, biotite, abundant pyrite, fine grained, rounded, well sorted, very hard, siliceous, tight, no shows - occasional dark bands (increase in biotite)

<u>Depth (m)</u>	<u>Description</u>
1680-1685	<u>Sandstone</u> ; (Quartzite-Gneiss) 85%, salt and pepper to light grey, quartzose, biotite, abundant pyrite, fine grained, rounded to subrounded, well sorted, very hard, silica cement, siderite cement, occasionally friable, tight, no shows; interbedded with <u>Siltstone</u> "Quartzite" 15%, light olive green to light grey, silt to very fine grained, very hard, silica cement, slightly sideritic, tight, no shows; and with minor amounts of <u>Shale</u> (slate); medium olive, blocky to platy, very hard.
1685-1786.8	<u>Sandstone</u> (Quartzite); 90%, white to light grey, silt to very fine grained, rounded, well sorted, very hard, silica cement, trace pyrite, slightly sideritic, trace muscovite, tight, no shows, with minor interbeds of <u>Shale</u> (slate) 10%; medium olive green, platy, very hard, micro-micaceous, may be 'phyllite'.
1676.8-1695.2	SEE DETAILED CORE DESCRIPTION, Core #2 Cut 7.4 m Recovered 6.5 m
1695.2-1710	<u>Quartzite</u> ; white to light grey, trace lithic fragments, pyrite, and muscovite, very fine to fine grained, occasionally silty, subangular, poor to moderately sorted, very hard, siliceous, tight, no shows, with minor interbeds (15%) of <u>Shale</u> ; medium green to maroon, subfissile to fissile, hard, trace pyrite, trace muscovite.
T.D. 1710 m	

CORE DESCRIPTION

Core No. 1 1449.0-1452.1 Proterozoic

Coring Times: (mins./1/5 meter)

16,24,29,22,21; 19,33,38,30,26; 41,37,36,58,59; 37

Depth (m)	Description
1449-1449.45	0.45 <u>Sandstone</u> ; white to light grey, clear and opaque, quartz grains, fine to medium to occasionally coarse grained, subrounded to rounded, well sorted, very hard, silica cement, patchy siderite cement, tight, no shows
1449.45-1450.17	0.72 <u>Sandstone</u> ; a/a, becoming very fine to fine grained interbedded (mm) with 2% <u>sandstone</u> , light grey, quartzose, clear and opaque quartz grains, 5% orange feldspar grains, trace lithic fragments, very fine to fine grained, subrounded to rounded, moderately sorted, silty, moderately hard, silica and trace siderite cement, trace intergranular porosity, no shows; convolute bedding
1450.17-1450.8	0.63 <u>Sandstone</u> ; white to light grey, clear and opaque quartz grains, heavy red-brown speckles (siderite), very fine to fine to occasionally medium grained, rounded, well sorted, very hard, silica cement, tight, no shows, interbedded with 2% <u>sandstone</u> , light buff grey, a/a
1450.8-1451.3	0.5 <u>Sandstone</u> ; white to light grey, clear and opaque quartz grains, trace red-brown siderite speckles, very fine to fine grained, occasionally medium grained, subrounded to rounded, well sorted, very hard, silica cement, tight, no shows; interbedded with 2% <u>sandstone</u> ; light buff grey, a/a
1451.3-1452.03	0.73 <u>Sandstone</u> ; white to light grey, clear and opaque quartz grains, very fine to medium grained, rounded to occasionally subangular, well sorted, very hard, silica cement, tight, no shows; with <u>Sandstone</u> 2%, light buff grey, a/a; convolute bedding.

Core No.2 1687.8-1695.2 Proterozoic

Coring Times: Mins./.20 metres

22; 12,5,2,11,12; 20,16,18,12,15; 12,10,11,11,11; 12,14,15,16,14; 7,6,21,14,18; 19,16,17,16,16; 20,19,10,31,29; 35

<u>Depth(m)</u>	<u>Description</u>
1687.8-1688.2	0.4 <u>Quartzite</u> ; light grey to light green, silt to fine grained, abundant muscovite, subangular to subrounded, poorly sorted, very hard, silica cement, tight, no shows; interbedded with <u>shale</u> (up to 0.1m); medium green, very hard, micaceous, platy (subfissile), waxy.
1688.2-1689.5	1.3 <u>Quartzite</u> ; light grey to light green, silt to very fine grained, subangular to subrounded, poorly sorted, slightly argillaceous, silica cement, very hard, tight, no shows; with very thin argillaceous bands (up to 1 mm)
1689.5-1689.9	0.4 <u>Quartzite</u> ; becoming medium greenish grey, silt to very fine grained, subangular to subrounded, poorly sorted, becoming moderately argillaceous, very hard, silica cement, tight, no shows
1689.9-1691.8	1.9 <u>Quartzite</u> ; light grey, trace disseminated pyrite, silt to very fine grained, subangular to subrounded, poorly sorted, very hard, silica cement, tight, no shows; with minor <u>shale</u> laminations (up to 1 mm) medium green, very hard, platy, waxy, silty.
1691.8-1692.3	0.5 <u>Shale</u> ; medium green, very hard, platy, silty, micaceous (muscovite) grading to <u>Quartzite</u> at 1692.05; medium green to light grey, silt, argillaceous, micaceous (muscovite) very hard, siliceous; grading to very fine to medium grained at 1692.15 m; light grey green, subrounded, poorly sorted, very hard, siliceous, tight, no shows
1692.3-1693.05	0.75 <u>Shale</u> ; medium green, very hard, platy, silty, micaceous (muscovite) with minor interbeds of <u>Quartzite</u> (1 mm in size) light grey to medium green, trace muscovite, very fine to fine grained, poorly sorted, slightly argillaceous, very hard, siliceous, tight, no shows.
1693.05-1693.7	0.65 <u>Quartzite</u> ; light grey to light green, trace muscovite, very fine grained, poorly sorted, argillaceous, very hard, siliceous, tight, no shows; interbedded and laminated with <u>shale</u> (mm-cm), medium green, hard, platy, subfissile, silty.
1693.7-1694.3	0.6 <u>Shale</u> ; maroon, hard, fissile, to subfissile, trace pyrite.

Note: 0.9 m of core not recovered

Core begins as a "quartzite" with minor interbeds of "shale", becoming "shale" to "silty shale" with minor "quartzite" interbeds and finally grades to a maroon "shale" for the final 0.6 meters.