NSM

WINDY ISLAND A-53

9211-N9-1-3

D.A. # 1202

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

E.A.#: 215

Nova Scotia	☐	West Coast	☐	Exploratory	☒
Newfoundland	☐	Northern	☒	Development	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	Delineation	☐
				Service	☐

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: NSM Windy Island A-53

Operator: NSM Resources Ltd. | Drilling Program No.: N/A

Contractor: Peter Bawden Drilling | Permit or Lease No.:

Drilling Rig or Unit: One | Estimated Well Cost: 2,250,000

Location-Unit: A Section: 53 | Grid Area: 65-00-125-30

Coordinates: Lat.: 64° 52' 03" N | Long.: 125° 39' 47" W

Area: Northwest Territories | Field/Pool: Exploration

Elevation-RT/KB: 102 M (ASL) | ~~Seafloor~~: GRD 98 M (BRT)

Approx. Spud Date: 85-01-15 | Estimated Days on Location: 25

Anticipated Total Depth: 1935 m KB | Target Horizon(s): Ronning

UWI: 300A536500125300

EVALUATION PROGRAM

Ten-metre sample intervals: NONE

Five-metre sample intervals: 20 MKB to T.D.

Canned sample intervals: All (10 m intervals)

Conventional cores at: 1527 KB (est.)

Logs and Tests: DIL-SP, BHCS-GR-C, CNL-FDC, Surf. to T.D.

CASING AND CEMENTING PROGRAM

O.D.	Weight:	Grade	Setting Depth K.B. ~~Below Seafloor~~	Cementing Program (Volumes)
508	.375 W.T.	Line Pipe	15M	7t Permafrost to Surface
339	81.1 kg/m	K55	125	17t Permafrost to Surface
244	53.6 kg/m	J55	500	29t to surface
114	15.6 kg/m	J55	1600	
114	17.3 kg/m	J55	1935	43t to suface

B.O.P. Equipment: 1 annular, 2 single gate, 21 mPa

Other Information: Permafrost casing (339mm) will be set in a competent formation 2t approximately 125m.

Signed: [signature] Title: VICE-PRESIDENT

Date: OCT. 1/84 Company: NSM RESOURCES LTD.

APPROVAL

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

Signed: [signature]

Engineering Branch

Date: Jan 8 85

File: 9211-N9-1-3

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

D.A. # 1202

E.A. # 215

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

				Well Status	
Nova Scotia	☐	West Coast	☐	Suspended	☐
Newfoundland	☐	Northern	☒	Completed	☐
Gulf of St. Lawrence	☐	Hudson Bay	☐	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: NSM Windy Island A-53 Area: Ft. Norman

Grid Area: 65 -00 -125 -30 Field/Pool: Wildcat

Permit or Lease No.: N/A Final Coordinates: Lat.: 64°52' 00.585" Long: 125° 39' 37.489"

Drilling Unit: Peter Rawden Rig #1 Elevations RT/KB: 115.87 GF/GL: 110.64

Spud Date: 85-01-16 Rig Released: 85-02-10 Total Depth: 1500m

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
339.7	81.1 kg/m	J55	129	24.4 tonnes Arctic set
244.5	53.6 kg/m	K55	509	29 tonnes Oilwell Class "G"

PLUGGING PROGRAM

Approval of the following program was obtained by (person) Robert G. Lock from (person) Kem Singh of the Canada Oil and Gas Lands Administration by means of telephone on February 7 1985.

Type of Plug:	Interval:	Felt:	Cement and Additives:
Open Hole	1500m-1400m	no	6.3 tonnes Oilwell Class "G"
Open Hole	1065m- 965m	952	8 tonnes Oilwell "G"
Open Hole	640m- 490m	490	16 tonnes Oilwell "G"+2%CaCl²
in surface casing	242m-surface	circulated	12.6 tonnes Oilwell "G"

Lost Circulation/Overpressure Zones: over pressured water zone at 590m

Equipment left on Seafloor (Describe): N/A

Provision for Re-entry (Describe and attach sketch): N/A

Cores: Type: None Cut Intervals: N/A

Other Downhole Completion/Suspension Equipment: N/A

CERTIFICATION

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

Signed: F.T. Nadir P. Eng. Title: CONSULTANT

Name: F.T. NADIR Date: 13 MARCH 1985

Acknowledged by: [signature] Engineering Branch

Date: 2 April 1985

File: 9211-N9-1-3

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

ACTION SLIP

WELL HISTORY REPORTS

Project No: 9211-N9-1-3

The following action has been taken:

Receipt acknowledged ✓

Well Card made ✓

Reports for review list edited ✓

Reports labelled ✓

Confidential sections removed:

(micro) Paleontological .....

Palynological .....

OR Source Rock Analyses .....

Geochemical analyses .....

Other .....

Land Management Memo ✓

REVIEW AND APPROVAL ~~made~~ by:

ENGINEERING BRANCH 85-08-10

RESOURCE MANAGEMENT W. J. WARD 85 08 23

ENVIRONMENTAL PROT. .....

MAKE COMMENTS ON ATTACHED SHEET

PROJECT NUMBER 9211-N9-1-3

COMPANY NSM RESOURCES LTD.

REPORT TITLE well history

COMMENTS:

ENGINEERING BRANCH

ENVIRONMENTAL PROTECTION BRANCH

RESOURCE EVALUATION BRANCH

FINAL WELL REPORT

NSM WINDY ISLAND A-53

Operated By

NSM RESOURCES LTD.

Report Submitted June 1985

R. Locke

TABLE OF CONTENTS

VOLUME 1

VOLUME 2

TEXT

A. INTRODUCTION

i) Summary

Well - NSM Windy Island A-53
Operator - NSM Resources Ltd.
Drilling Contractor - Peter Bawden Drilling Rig #1

The well was an onshore well drilled for hydrocarbons with the primary objective being the Ronning formation at a prognosed depth of 1525m.

A 660 mm hole was drilled to 15 m by a ratholing machine and 508 mm conductor pipe was set and cemented to surface. The rotary rig was moved in and rigged up. The well was spudded in on January 15th and 444.5 mm hole was drilled to 129m, 340 mm casing was run at this depth and cemented to surface.

The well was then headed up with 254 mm, 21000 kPa BPO's consisting of single gate rams, double gate rams and annular preventer. The shoe joint was drilled out and drilled to a depth of 509 m with a 311 mm bit. At this point the open hole was logged and 244.5 mm casing was run and cemented to surface.

The shoe joint was drilled out with a 222 mm bit and drilled to a depth of 419 m where a formation leak off test was run. Drilling resumed to a depth of 1500 m, 62 m into the Saline River. No cores were cut.

Due to a pre-cretaceous uplift the Devonian formations and the upper Silurian were eroded away. The Saline River was contacted much higher than prognosticated causing the well to be terminated at a shallower depth.

Four drillstem tests were run at different intervals with no indications of hydrocarbons. The well was abandoned and the rig released February 10, 1985.

ii) See Attachment #1.

B. GENERAL DATA

i) NSM Windy Island A-53

ii) Well location 64^{o}-52'-00.585"N 125^{o}-39'-37.489"W

iii) N/A

iv) Operator - NSM Resources Ltd.
300, 555 - 4th Avenue S.W.
Calgary, Alberta
T2P 3E7

Drilling Contractor - Peter Bawden Drilling Ltd.
2750, 400 - 4th Avenue S.W.
Calgary, Alberta
T2P 0J4

v) N/A

vi) N/A

vii) N/A

viii) N/A

ix) N/A

C. SUMMARY OF DRILLING OPERATIONS

i) Ground elevation 98 m
K.B. elevation 103.23 m

ii) Total depth 1500 m
Plugged back depth - zero metres

iii) Spudded at 03:00 hrs January 16, 1985

iv) Reached T.D. at 21:45 hrs February 3, 1985

v) Rig released at 04:00 hrs February 10, 1985

vi) Well status - abandoned

vii) Hole size

		Depth
Conductor hole	- 660mm	15 m
Perma frost hole	- 444.5mm	129 m
Surface hole	- 311mm	509 m
Mainhole	- 222mm	1500 m

viii) Casing & cementing record

1) Perma frost casing
340mm 81.1 kg/m J55 U.S. Steel, 11 Jts - 8 Rd. ST&C
January 17, 1985 set at 129m
Cemented to surface with 23.4 tonnes of Arctic set cement

2) Surface Casing
244.5mm, 53.37 kg/m, J-55 Ipsco, 89 Jts, 8 Rd, LT&C
January 23, 1985 set at 509m
Cemented to surface with 29 tonnes Class "G" cement, neat

ix) N/A

x) Gel chemical drilling fluid system - see Attachment #2

xi) None necessary

xii) At 604m it was noted the well was flowing. Well was shut in, no casing pressure shown. Mud weight was raised from 1090 kg/m3 to 1160 kg/m3 by the addition of barite. Prior to additions of barite it was noted that the mud was water cut with no increase in salinity which would denote a fresh water flow.

xiii) A formation leak off test was run after drilling 10m below the surface casing string at 419m. Mud weight 1060 kg/m3. Applied pressure 5387 kPa. Gradient 20.78.

xiv) Time Distribution - See Attachment #3

xv) Deviation survey - See Attachment #4

xvi) Abandonment plugs

Plug #1 - 1500m-1400m, 6.3 tonnes Oilwell Class "G" cement
Plug #2 - 1065m- 956m, 8 tonnes Oilwell Class "G" cement
Plus #3 - 640m- 490m, 16 tonnes Oilwell Class "G" cement plus 2% $CaCl_2$
Plug #4 - 242m to surface, 12.6 tonnes Oilwell Class "G" cement

xvii) Composite well record - See Attachment #5 and #6

D. GEOLOGY

i) Drill Cuttings

Samples caught at 5m intervals from 300m to T.D.
Samples: To be sent to I.S.P.G., Calgary
(After construction)
Vialed Cuttings: Ashley's Data Storage, Calgary
To be sent to I.S.P.G., Calgary

ii) No cores cut

iii) Lithology

Sample Descriptions: Attachment #7

iv) Stratigraphic Column:

Formation Tops
Unit Description and Evaluation: Attachment #8

E. WELL EVALUATION

i) Downhole Logs - Computalog Gearhart Ltd.

Run #1 - Jan. 21, 1985

CDL - CNS	129.0 - 504.8m	
BCS	129.0 - 496.5m	Volume 1 Pocket
DIL	129.0 - 506.2m	

Run #2 - Feb. 4, 1985

CDL - CNS	509 - 1498.0m	
BCS	509 - 1490.0m	Volume 2 Pocket
DIL	509 - 1498.5m	

ii) Other Logs

Gas Detection Log
(also showing lithology, porosity, etc.)Volume 1 Pocket
Mud Temperature Log

iii) No velocity surveys run (exemption granted)

iv) Formation stimulation - none

v) Formation and production testing

Drillstem Tests: Attachment #9

APPENDICES TO WELL HISTORY REPORT

i) No oil or gas recoveries
Water analyses: Attachment #10

ii) No cores cut

iii) No production testing
Drillstem tests: Attachment #9

iv) Petrological reports - None

v) Paleontological reports - None

vi) Palynological reports - None

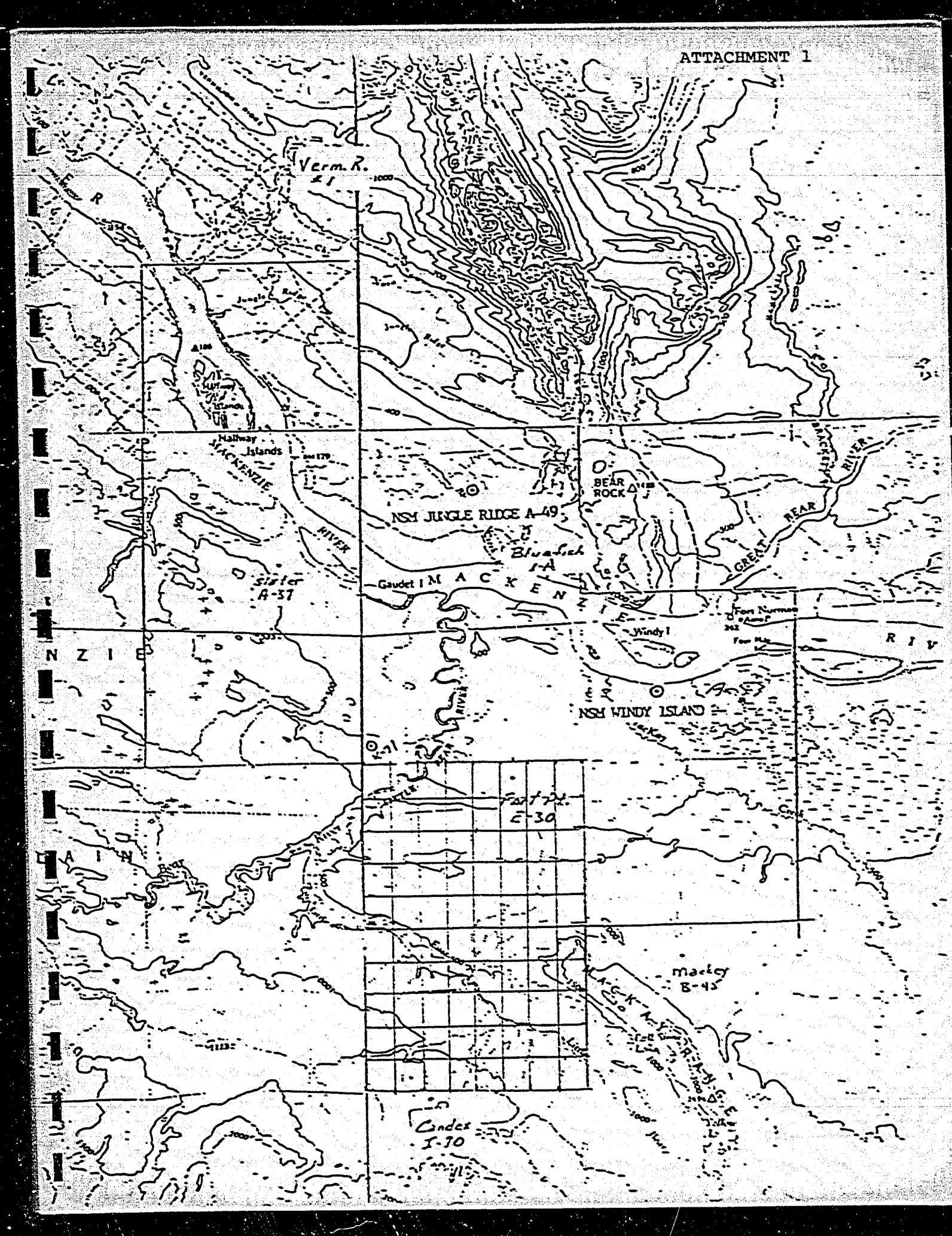
vii) Geochemical reports - None

viii) Age determinations - None

ix) Processed Logs
Laserlog: Volume 1 Pocket

x) Deviation and drill records - See Attachment #4

ATTACHMENT 1



DRILLING FLUID PROPERTIES

DATE	TIME	DEPTH (m)	WEIGHT (kg/m³)	FUNNEL VISCOSITY (sec)	PLASTIC VISCOSITY (mPa·s)	YIELD POINT (Pa)	GEL STRENGTH (Pa)	FLUID LOSS (cm³)	SAND CONTENT (% sand)	pH	Pm/Mf	CHLORIDE (mg/L)	CALCIUM (mg/L)	SOLID CONTENT (% solids)	OIL CONTENT (% oil)		
JAN 23/85	1600	396	1160	43	5	7.5	5/10	15	.0025	9	.3/1.4	500	80	.09	0		
JAN 24	0730	464	1120	38	4	3.5	4/11	20	.0025	9	.3/1.4	500	80	.06	0		
JAN 22	0715	509	1140	61	10	10	6/12	17	.0025	9.5	.3/1.4	500	80	.08	0		
JAN 24	1500	515	1000	27		WATER				9.5	.3/1.4	300	40		0		
JAN 25	0730	613	1090	44	10	5	3/6	15	TR	10	1.3/3.2	300	TR	.05	0		
JAN 26	0730	709	1160	47	11	5	1.5/4	13	.0025	10	1/2.2	300	TR	.09	0		
JAN 27	0730	848	1140	42	10	5	1/5	12.5	.0025	9.5	.2/1	500	TR	.07	0		
JAN 28	0730	978	1155	40	10	4	1/4	11.2	.0025	9.5	.45/1	500	TR	.09	0		
JAN 29	0730	1040	1155	40	8	3.5	2/7	11	.0025	10.5	.6/3.6	500	0	.09	0		
JAN 30	0730	1195	1170	42	10	4	1/5	10.8	.0025	10	1.3/2.4	500	0	.10	0		
JAN 31	0730	1245	1140	39	7	3	1/5	13.2	.0025	10	.8/1.6	500	0	.08	0		
Feb 1	0700	1326	1140	42	10	4.5	3/10	11.2	.0025	11	.9/1.6	500	0	.08	0		
Feb 2	0730	1384	1130	40	10	4.5	1.5/5	13.6	.0025	10	.6/1.2	500	0	.07	0		
Feb 3	0630	1457	1150	52	11	5	1.5/6	12	.0025	10	.6/1.3	500	0	.08	0		
Feb 3	2230	1500	1150	47	12	5	3/13	13.2	.0025	11	.4/2.3	500	0	.08	0		
Feb 4	1445	1500	1150	51	14	7	3/9	12.2	.0025	10	.5/1	500	TR	.08	0		

301, 602 - 11th AVENUE S.W., CALGARY, ALBERTA T2R 1J8
PHONE 266-7383

PROTEC MUD SERVICE LTD.

ATTACHMENT 3

DRILLING RIG TIME BREAKDOWN

DATE	DRILL	SURVEY	TRIP	RS&BOP	REPAIRS	LOG	TEST	NIPPLE UP	CEMENT	CIRC	MISC	MISC	MISC
85-01-16	9.75	.75	6.25	.50	3.75						W.O.C.	Casing	
85-01-17	1.00		1.25		.75			7.00	1.50	.50	4.00	8.00	Pressu
85-01-18								24.00					Test
85-01-19	16.00	.25	3.00	.50				3.00					1.2
85-01-20	23.25	.50		.25							Ream		
85-01-21	11.50	.25	5.50	.50		4.75				1.00	.50		
85-01-22			4.25	.25	1.50	7.00			1.75	3.00		6.25	
85-01-23								22.25	.75		Leak off test		1.0
85-01-24	9.50		1.25		2.00			6.00			1.50	Mix Mud	3.7
85-01-25	16.50	.25	4.00	.50								2.75	
85-01-26	21.25	.25	2.00	.50									
85-01-27	22.75	.75		.50								C.T.B.	
85-01-28	19.00	.50	3.75	.50								.25	
85-01-29	22.50	.25		.50						.75			
85-01-30	23.00	.50		.50									
85-01-31	22.50	.75		.75									
85-02-01	19.75	.25	3.50	.50									
85-02-02	19.50	1.25	2.75	.50									
85-02-03	20.50	1.00		.50						2.00	Handle Tools		
85-02-04			8.50			7.75				4.00	3.75		
85-02-05			8.00				13.25				2.75	Mix Mud	Fill Pipe
85-02-06			4.75		Wait On		5.00			6.00	5.25	2.00	1.0
85-02-07			8.75	.25	Cementers		2.25		2.00	6.25	4.50	W.O.C.	T.O.R.
85-02-08			5.75						3.00		7.25	3.00	5.0
85-02-09					*16.50				1.50		2.00		4.0
85-02-10											*16.50		4.0
TOTAL	278.25	7.00	73.25	7.50	7.00	19.50	20.50	62.25	10.50	23.50	48.00	22.25	20.0

R.S. & B.O.P's - Rig Service & Blow Out Preventers

C.T.B. - Clean to Bottom

[redacted]

POSITEC DRILLING CONTROLS (CANADA) LTD. DISPLACEMENT CALCULATION Page: 1
NSM WINDY ISLAND MULTI-SHOT A53-65-00-125-30
Job Number: 10010 Spud Date: 01-02-85
Current Time: 10:52:51 Current Date: 12-02-85

Stn	M.Depth	Drift	Azmth	TVD	N/S Lat	E/W Dep	VSectn	ClsDisp	ClsAz	DgLgSv
0	509.00	0.0	0.0	509.00	0.00 N	0.00 E				
1	513.00	1.0	263.0	513.00	0.00 S	0.03 W	-0.02	0.03	263.0	7.50
2	542.00	1.0	265.0	542.00	0.06 S	0.54 W	-0.34	0.54	263.9	0.04
3	571.00	1.3	268.0	570.99	0.09 S	1.11 W	-0.72	1.11	265.3	0.27
4	600.00	1.3	268.0	599.98	0.11 S	1.74 W	-1.15	1.74	266.3	0.00
5	629.00	1.5	298.0	628.97	0.05 N	2.39 W	-1.73	2.39	271.3	0.78
6	658.00	1.3	298.0	657.97	0.38 N	3.00 W	-2.39	3.03	277.2	0.26
7	687.00	1.3	302.0	686.96	0.70 N	3.55 W	-3.00	3.62	281.1	0.09
8	716.00	1.5	293.0	715.95	1.01 N	4.17 W	-3.66	4.29	283.7	0.34
9	745.00	1.8	295.0	744.94	1.35 N	4.92 W	-4.43	5.10	285.3	0.27
10	774.00	2.0	310.0	773.92	1.86 N	5.71 W	-5.35	6.00	288.1	0.57
11	803.00	2.0	311.0	802.91	2.52 N	6.48 W	-6.36	6.95	291.2	0.04
12	832.00	2.8	318.0	831.88	3.37 N	7.33 W	-7.56	8.06	294.7	0.83
13	861.00	3.0	333.0	860.85	4.56 N	8.14 W	-8.98	9.33	299.3	0.82
14	890.00	2.5	323.0	889.81	5.74 N	8.86 W	-10.33	10.56	302.9	0.72
15	919.00	2.5	313.0	918.78	6.68 N	9.70 W	-11.58	11.78	304.5	0.45
16	948.00	2.5	333.0	947.76	7.67 N	10.45 W	-12.82	12.97	306.3	0.90
17	977.00	2.5	2.0	976.73	8.87 N	10.72 W	-13.85	13.91	309.6	1.29
18	1006.00	2.0	38.0	1005.71	9.90 N	10.39 W	-14.34	14.35	313.6	1.52
19	1035.00	2.3	43.0	1034.69	10.72 N	9.69 W	-14.43	14.44	317.9	0.32
20	1064.00	3.0	61.0	1063.66	11.50 N	8.63 W	-14.24	14.38	323.1	1.14
21	1093.00	3.3	68.0	1092.62	12.18 N	7.21 W	-13.71	14.15	329.4	0.47
22	1122.00	3.5	68.0	1121.57	12.81 N	5.62 W	-13.04	14.00	336.3	0.26
23	1151.00	4.3	69.0	1150.50	13.53 N	3.80 W	-12.26	14.06	344.3	0.78
24	1180.00	5.0	77.0	1179.41	14.20 N	1.57 W	-11.15	14.29	353.7	1.02
25	1209.00	5.0	83.0	1208.30	14.64 N	0.92 E	-9.70	14.67	3.6	0.54
26	1238.00	5.5	88.0	1237.17	14.84 N	3.56 E	-7.98	15.26	13.5	0.70
27	1267.00	6.5	88.0	1266.01	14.95 N	6.59 E	-5.91	16.34	23.8	1.03
28	1296.00	7.8	98.0	1294.79	14.73 N	10.17 E	-3.23	17.90	34.6	1.82
29	1325.00	8.0	97.0	1323.52	14.21 N	14.11 E	-0.08	20.03	44.8	0.30
30	1354.00	8.3	98.0	1352.23	13.68 N	18.17 E	3.18	22.75	53.0	0.30
31	1391.00	9.5	93.0	1388.78	13.15 N	23.85 E	7.57	27.24	61.1	1.19
32	1439.00	11.0	92.0	1436.02	12.78 N	32.38 E	13.86	34.81	68.5	0.94
33	1485.00	12.5	117.0	1481.08	10.37 N	41.21 E	21.81	42.49	75.9	3.43
34	1500.00	12.5	117.0	1495.72	8.89 N	44.10 E	24.90	44.99	78.6	0.00

Calculations are done by the method of Minimum Radius of Curvature.
All distances are measured with respect to the top of the hole.
Vertical Section is calculated along the Target line at 135.0 degrees Azimuth.
Dog Leg Severity is in degrees per 30.

DRILLING RECORDS

A DIVISION OF CANAMERA EQUITIES LTD.

WELL NAME NSM WINDY ISLAND A-53 64°52'00.585"N 125°39'37.499"W

CONTRACTOR Peter Bawden RIG NO. 1 T.D. 1500 M

SPUD January 16, 1985 RIG RELEASE February 10, 1985 ROTATING HOURS 261± T.D.

EQUIPMENT

DWKS. MODEL EMSCO GB500

PUMP D500 191 x 406mm

PUMP C750 184 x 381mm

DRILL PIPE SIZE 114mm

MUD SERVICE COMPANY Protec Mud Service

TYPE OF DRILLING FLUID

Gel Caustic	0	M	TO 129	M
Gel Chemical	129	M	TO 1500	M
		M	TO	M

ADDITIONAL INFORMATION

Well flowing at 604m-Mix mud (2½ Hrs.). Well flowing at T.D.-Kill flow (10 Hrs.).

Maximum Deviation 12½° S53E at 1485m.

TOTAL TIME ——— CONTRACT TIME ——— ROTATING TIME ———

BREAKS ——— REMARKS ———

CASING

SIZE	WEIGHT	GRADE	TONNES RUN CSG.	CSG.	W.O.C.
508mm					
339.7mm	72	K	74.4	8	46½
244.5mm	53.6	K	29	8½	36½

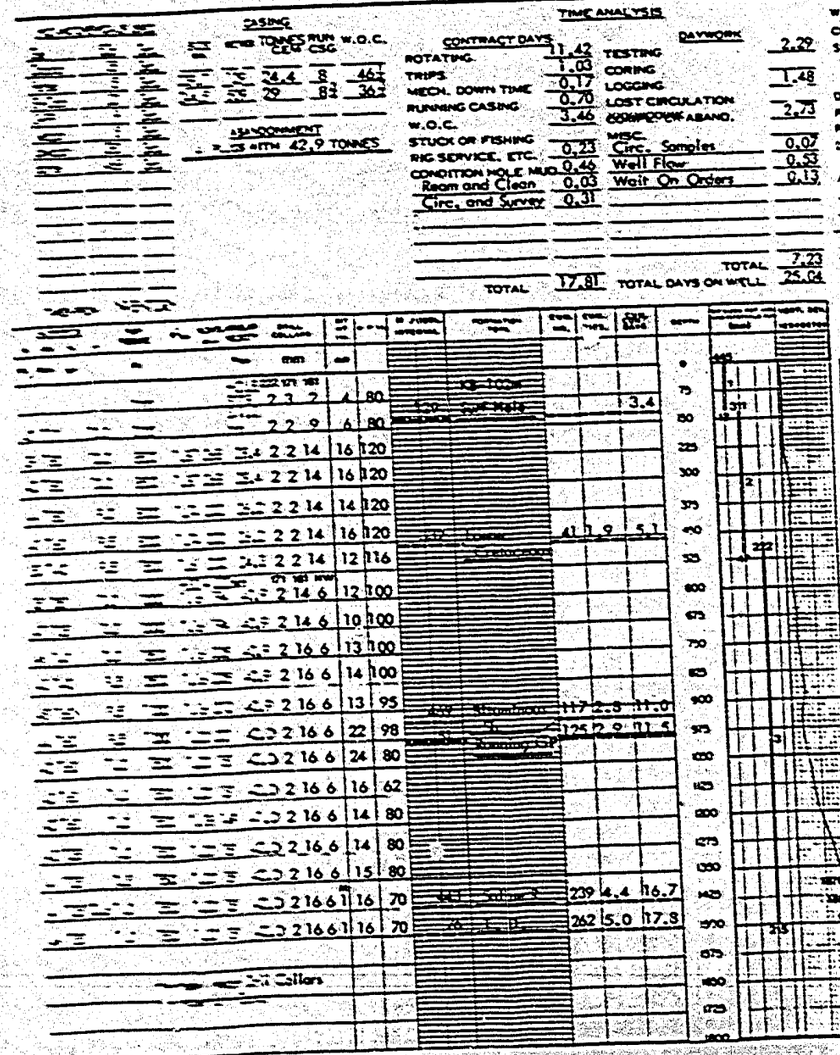
EQUIPMENT

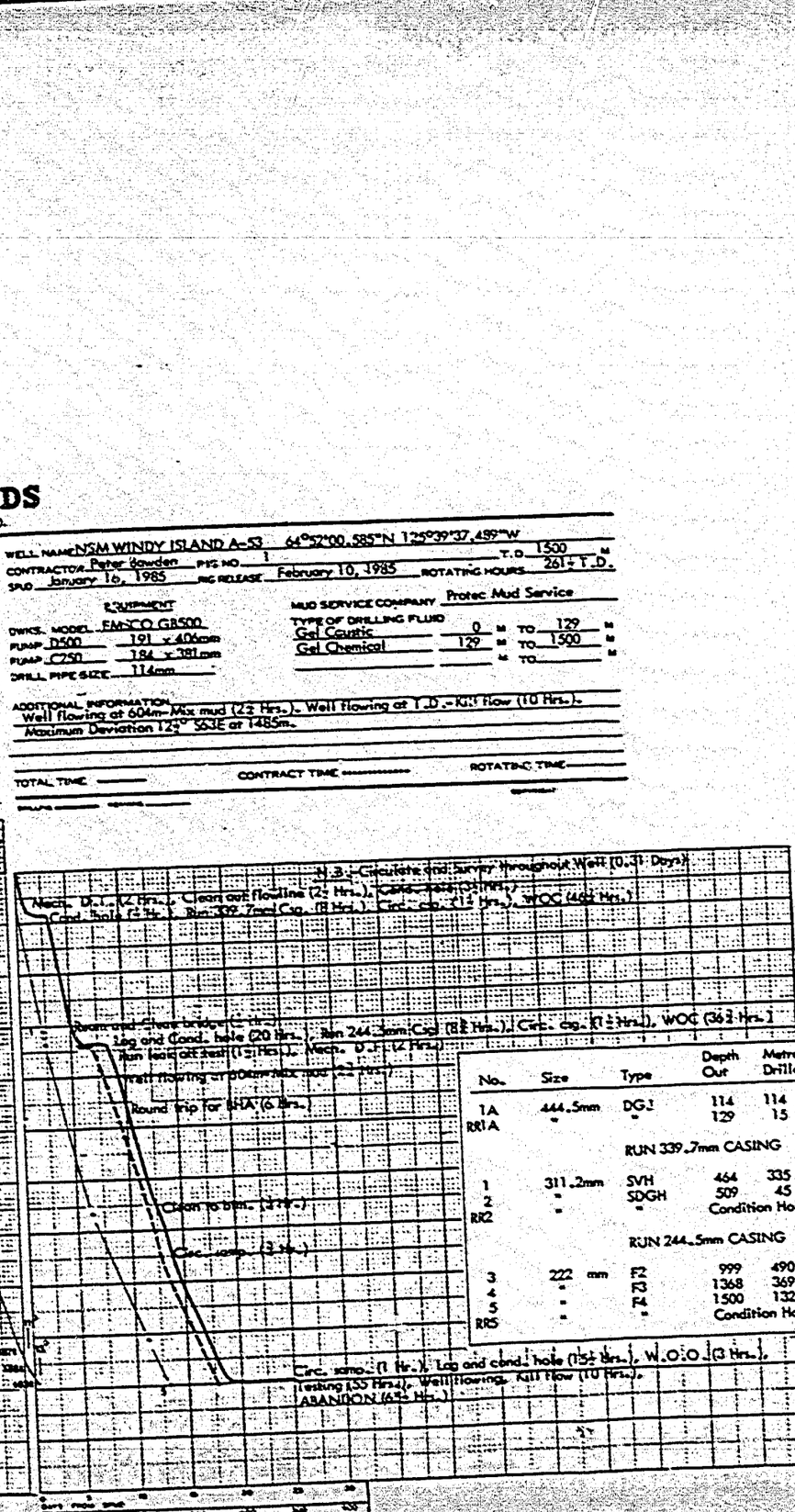
Shoe @ 1485m with 42.9 TONNES

TIME ANALYSIS

CONTRACT DAYS		DAYWORK	
ROTATING	11.42	TESTING	2.29
TRIPS	1.03	CORING	1.48
MECH. DOWN TIME	0.17	LOGGING	
RUNNING CASING	0.70	LOST CIRCULATION	
W.O.C.	3.46	COMPLETION/ABAND.	2.73
STUCK OR FISHING	0.23	MISC.	
RIG SERVICE, ETC.	0.23	Circ. Samples	0.07
CONDITION HOLE MUD	0.46	Well Flow	0.55
Ream and Clean	0.03	Wait On Orders	0.13
Circ. and Survey	0.31		
TOTAL	17.81	TOTAL	7.23
		TOTAL DAYS ON WELL	25.04

No.	Size	Type	Depth Out	Metres Drilled	Hrs.	Cum. Hrs.	Bit Cond.
1A	444.5mm	DGJ	114	114	11½		
RR1A	"	"	129	15	1	12½	1-1-1
		RUN 339.7mm CASING					
1	311.2mm	SVH	464	335	41½		
2	"	SDGH	509	45	6	47½	
RR2	"	"	Condition Hole				
		RUN 244.5mm CASING					
3	222 mm	F2	999	490	80½	128	2-4-1
4	"	F3	1368	369	93½	221½	4-4-1
5	"	F4	1500	132	40	261½	1-2-1
RR5	"	"	Condition Hole				





BIT NO.	DEPTH OUT	BHA'S AT BIT RUNS	
1A	114mm	1 Bit	?
		1 Bit Sub	0.83
		1 XO	0.62
		2-222mm. D.C.'s	16.76
		1 Bell Sub	0.55
		3-171mm D.C.'s	27.12
		1 XO	0.53
		2-160mm D.C.'s	18.25
		1 XO	0.66
RR1A	129m	1 Bit	?
		1 Bit Sub	0.83
		1 XO	0.62
		2-222mm D.C.'s	16.76
		1 Bell Sub	0.55
		2-171mm D.C.'s	18.22
		1 XO	0.53
		9-160mm D.C.'s	81.76
		1 XO	0.66
1	464m.	1 Bit	0.25
		1 Sub	0.85
		1 Shock Sub	2.30
		2-222mm D.C.'s	16.76
		1 Non Rot. Stab	2.24
		1 Bell Sub	0.55
		2-171mm D.C.'s	18.27
		1 XO	0.66
		14-161mm D.C.'s	128.08
		1 XO	0.66
2	509m.	Same As Above	
3	999m	1 Bit	0.25
		1 Bit Sub	1.22
		1 Shock Sub	2.38
		2-171mm D.C.'s	18.27
		1 XO	0.53
		16-161mm D.C.'s	144.43
		1 XO	0.66
		6 HW	54.05
4	1368m	Same As Above	
5	1500m	1 Bit	0.25
		1 Bit Sub	1.22
		1 Monel	8.59
		1 Shock Sub	2.38
		2-171mm D.C.'s	18.27
		1 XO	0.53
		16-161mm D.C.'s	144.43
		1 XO	0.60
		6 HW	54.05

WESTERN ROCK BIT COMPANY LIMITED

BIT RECORD — METRIC

NEW T1 T2 T3 T4 T5 T6 T7 T8 — DEGREE OF TOOTH DULLNESS

Page 1 of 1

Province	Field	Canada	LSD	Section	Township	Range W	(2) Operator	Elev.	Mud Type
NWT							NSM RESOURCES	102	To Gel-Chem

Location	(1) Contractor	Rig No.	Rig Make & Type	Tool Pusher	Special Additives
Windy Island A-53	BRADEN	1	See Emsco	Jack Clements	To M. To M.

	No.	O.D.	I.D.
DRILL	1 2	171	
COLLARS	2	16 - 161.	

TOOL JOINTS	Make	Size	Type	O.D.
1		114.3	XH	158
2				

Year / Month / Day Time 00:00 to 24:00

Spudded	85 / 11 / 16	03:00
Set Surface	85 / 011 / 17	
Under Surface	85 / 011 / 20	
Under Inter.	/ /	
Completion	/ /	
Release	/ /	

PUMPS — Type
1. Emsco DSco-5½
2. National C-250 5½

Field Salesman

Stockpoint — Stkpt. Code

Lost Circulation Depths

Key Seat Depths

Other Remarks - Reaming, Re-Drilling, Etc.
Water flow 60# - density 1130 D hold

Lic. Formation: Ark
Lic. Depth: 1934

(1) (2) (3)	No.	Size	Make	Type	Jets	Serial	Depth Out	Metre Drilled	Hours	Accum. Hours	Dull Cond T	B	G	No. of DC	Force Wt. on Bit daN	R.P.M.	Vert. Dev.	Pump Pres.	No. 1 Spm	Liner	No. 2 Spm	Liner	Mud Density	Vis
	1A	444	Smith	2GH	3(15)	AT9555	129	129	10.75	10.75	1	1	I	13	6	80	½	3000	60	165			1110	42
	1B	311	Smith	5JH	3(14)	EB2307	464	335	41.0	41	7	4	I	18	16	135/105	1½	8500	58	165			1140	53
	2B	311	Smith	5JGH	3(11)	XC4331	509	45	6	47	2	1	1	—	—	—	1	—	—	—			—	—
	1C	222	✓	F2	3(7.9)	DB2783	999	490	80.75	88.75	2	4	I	18	13/13	95	2½	11500	52	139			1160	53
	2C	222	✓	F3	3(9.5)	EN2999	1368	369	95¼	176	4	4	I	18	13/15	85/105	8½	7500	54	139			1140	42
	3	222	✓	F4	3(9.5)	CP9616	1500	132	40	216	1	3	E	18	16	70	12A	3500	50	139			1150	47

R.R. - Rerun — Rem - Remained

ATTACHMENT 6

ATTACHMENTS
7 & 8

SAMPLE DESCRIPTIONS

300 m — Shale, 100%, medium gray, blocky, very sandy, loose, unconsolidated clays and sand grains, soft, trace white to gray-white, well rounded chert concretions

305 m — Shale, 40%, as above, very sandy, Sandstone, 60%, gray, occasional clear quartz, very fine grained, rounded, well sorted, clay cement and matrix, very friable, unconsolidated

310 m — Shale, 40%, as above, very sandy, Sandstone, 60%, as above, very friable, clay cement and matrix

315 m — Shale, 40%, light gray-brown to dark gray, blocky, arenaceous, unconsolidated, soft, trace white, bentonitic ?, sandy shale, Sandstone, 60%, gray-brown, very fine grained predominantly, well rounded, well sorted, clay cement and matrix, very friable, unconsolidated, minor chert concretions

320 m — Shale, 30%, as above, probably thin lenses and laminations in argillaceous sandstone, Sandstone, 70%, gray-brown, very fine grained, well rounded, well sorted, clay cement and matrix, very friable, unconsolidated

325 m — Shale, 30%, medium gray, blocky, sandy, unconsolidated, soft, Sandstone, 70%, as above, very friable, high solids in mud system:

330 m — Shale, 20%, as above, Sandstone, 80%, gray-brown, speckled black with carbonaceous flakes, very fine grained, subrounded to rounded, well sorted, clay cement and matrix, very friable, 10-12% porosity, unconsolidated predominantly

335 m — Shale, 20%, as above, Sandstone, 80%, as above

340 m — Shale, 20%, as above, Sandstone, 80%, gray-brown, clear and frosted quartz, gray and black argillite grains,occasionally black, carbonaceous flakes, very fine grained, subrounded to well rounded, well sorted, clay cement and matrix, very friable, loose,unconsolidated, trace 10-12% porosity

345 m — Shale, 20%, medium to dark gray, blocky, slightly carbonaceous in part, arenaceous, soft, Sandstone, 80%, as above, clay cement and matrix, very friable

350 m — Shale, 20%, as above, lenses and laminations in friable sandstone, Sandstone, 80%, as above, very friable

Sample Descriptions

355 m — Shale, 30%, as above, lenses and laminations in friable sandstone, Sandstone, 70%, as above, very friable, trace chert concretions

360 m — Shale, 20%, as above, trace coarse grained, clear and rose, quartz grains, abundant siderite, Sandstone, 80%, gray-brown, quartz, abundant argillite grains, very fine grained predominantly, subrounded to rounded, well sorted, clay cement and matrix, very friable, up to 12% porosity, occasional sideritic cement

365 m — Sandstone, 100%, gray-brown, clear and frosted quartz, gray to black chert grains, very fine to fine grained, subangular to well rounded, clay cement and matrix, very friable, slightly sideritic in part

370 m — Shale, 20%, medium to dark gray, blocky to fissile, carbonaceous flakes throughout, soft, occurring as lenses and laminations in sandstone; Sandstone, 80%, as above, trace chert concretions, trace arkosic grains, trace light brown, micro crystalline limestone

375 m — Shale, 20%, as above, abundant pyrite, shards of black chert, Sandstone, 80%, as above, slightly coarser with trace fine to medium quartz grains

380 m — Shale, 20%, as above, Sandstone, 80%, gray-black, clear and frosted quartz, gray and black chert grains, very fine to fine grained, subangular to well rounded, partly calcareous cement, argillaceous, tite, friable, shale lenses and laminations throughout, coarse chert pebbles throughout

385 m — Sandstone, 100%, as above, predominantly fine grained, very friable, abundant chert

390 m — Sandstone, 100%, white, slightly salt and pepper, clear and frosted quartz, gray, black and white chert grains, fine grained predominantly, angular to rounded, well sorted, slight calcareous cement, 10-14% porosity, very friable, minor shale lenses and laminations

395 m — Sandstone, 100%, as above, trace medium to coarse grained, chert grains, subrounded fragments

400 m — Sandstone, 100%, as above predominantly, becoming very fine grained with clay cement and matrix, shale lenses and laminations throughout

405 m — Shale, 30%, medium to dark gray, blocky, occasional carbonaceous flakes, very arenaceous, soft, Sandstone, 70%, as above, very cherty

410 m — Shale, 30%, as above, trace pyrite, Sandstone, 70%, gray-white, clear and frosted quartz, gray and black chert grains, very fine to fine grained, angular to rounded, well sorted, partly calcareous, clay cement and matrix, tite to 12% porosity, very friable, trace coarse chert grains, trace arkosic grains, occasionally glauconitic, shale lenses and laminations throughout

Sample Descriptions

415 m — Shale, 40%, dark gray, blocky, carbonaceous flakes throughout, arenaceous, hard, Sandstone, 60%, as above, carbonaceous in part

420 m — Shale, 40%, as above, Sandstone, 60%, gray-white, quartz, chert, very fine to medium grained in part, angular to rounded, medium sorted, slightly calcareous, clay cement matrix, up to 12% porosity, friable, shale lenses and laminations throughout

425 m — Shale, 20%, as above, Sandstone, 80%, gray-brown, gray, silty to fine grained, occasionally medium grained, subangular to rounded, well sorted predominantly, slightly calcareous, clay cement and matrix, tite to 12% porosity, very friable, trace coarse grained, black, rounded, chert shards throughout, trace siderite

430 m — Shale, 40%, dark gray, blocky, carbonaceous flakes throughout, occasional trace bitumen on fractured planes, arenaceous, soft to firm, abundant siderite, Sandstone, 60%, as above, clay lenses and laminations throughout

435 m — Shale, 30%, as above, carbonaceous flakes throughout, abundant siderite, trace light brown, crypto crystalline dolomite, Siltstone, 10%, gray-brown, slightly calcareous, very argillaceous, sandy in part, hard, Sandstone, 60%, gray-white, speckled black, clear, frosted quartz, gray and black chert grains, abundant carbonaceous flakes, very fine to fine grained, subangular to rounded, well sorted predominantly, slightly calcareous, clay cement, tite to 10% porosity, clay lenses and laminations throughout, trace pyrite

440 m — Shale, 10%, as above, abundant siderite, Sandstone, 90%, as above, loose, unconsolidated in sample, very friable, extremely cherty, trace pyrite

445 m — Shale, 20%, as above, abundant siderite, Sandstone, 80%, gray-white to gray-brown, quartz, chert grains, very fine to fine grained, subangular to well rounded, well sorted, calcareous cement, argillaceous throughout, very friable, tite to 10% porosity, multi-colored chert grains throughout, trace coarse grained, well rounded chert pebbles

450 m — Shale, 30%, medium to dark gray, blocky, carbonaceous flakes throughout, arenaceous, firm, with abundant siderite, trace pyrite, Sandstone, 70%, gray-white to gray-brown, as above, abundant coarse grained, well rounded chert pebbles

455 m — Shale, 30%, as above, trace siderite, Sandstone, 70%, gray-white, speckled black, quartz, chert grains, very fine to fine grained, subangular to well rounded, well sorted, calcareous clay cement, very friable, up to 10% porosity, very pyritic, abundant coarse, well rounded chert pebbles

460 m — Shale, 40%, medium to dark gray, blocky, slightly carbonaceous, with carbonaceous flakes throughout, arenaceous, firm, minor siderite, Sandstone, 60%, gray-white, clear and frosted quartz, multi-colored

Sample Descriptions

chert grains, black, carbonaceous flakes, very fine to fine grained, subangular to well rounded, well sorted, calcareous, clay cement, tite to 10%. porosity, very friable, pyritic throughout, clay lenses and laminations, carbonaceous, trace coarse, well rounded chert pebbles

465 m — Shale, 10%, as above, Sandstone, 90%, white, clear quartz, black chert grains, orange arkosic grains, medium to coarse grained, angular to rounded, loose, unconsolidated, with no evidence of cement

470 m — Sandstone, 100%, white, clear and frosted quartz, black chert grains, orange arkosic grains, medium grained predominantly, angular to rounded, well sorted, siliceous, silty cement, tite, very friable, trace coarse, well rounded chert pebbles

475 m — Sandstone, 100%, as above, with gray-brown quartz and chert, silty to fine grained, subangular to rounded, well sorted, slight calcareous clay cement, tite to 8% porosity, very friable, (possibly matrix sand ?)

480 m — Sandstone, 100%, white, clear and frosted quartz, black predominantly and multi-colored chert grains, orange arkosic grains, medium grained predominantly, occasionally coarse grained, well sorted, siliceous, silty cement, very friable, abundant gray-brown, with argillaceous cement, as above

485 m — Sandstone, 100%, 50%, white, multi-colored, medium grained predominantly, as above, 50%, gray to gray-brown, quartz, chert grains, very fine to fine grained, subangular to rounded, well sorted, partly calcareous clay cement, tite to 10%, grading to siltstone throughout, with clay lenses and laminations, trace carbonaceous flakes

490 m — Shale, 20%, medium gray, blocky, carbonaceous flakes throughout, arenaceous, soft to firm, probably occurring as lenses and laminations throughout sandstone, Sandstone, 80%, white, clear quartz, black chert grains, orange arkosic grains, very fine to medium grained, angular to rounded, poor sorted, partly calcareous, clay cement and matrix, tite to 10% porosity, very friable in coarser sections, shale laminations and lenses throughout, trace coarse, well rounded black chert pebbles

495 m — Shale, 20%, as above, Sandstone, 80%, gray-white predominantly, clear and frosted quartz, multi-colored chert grains, very fine to fine grained, rounded predominantly, well sorted, calcareous clay cement and matrix, tite, occasional ironstone

500 m — Sandstone, 100%, as above in part, multi-colored, quartz, chert and arkosic grains, fine to medium grained, angular to rounded, medium sorted, loose, unconsolidated in sample, trace pyrite, trace mica

505 m — Sandstone, 100%, as above in part, predominantly gray-white, quartz, chert grains throughout, very fine to fine grained, angular to rounded, well sorted, slightly calcareous clay cement, matrix, very friable, loose in sample

Sample Descriptions

509 m — Shale, 20%, medium gray, blocky, slightly carbonaceous, arenaceous, firm, trace pyrite, Sandstone, 80%, as above, predominantly silty to fine grained, with clay cement and matrix, shale lenses and laminations throughout

Set Surface Casing

515 m — Sandstone, 20%, loose, unconsolidated grains, as above, Cement, 80%

520 m — Sandstone, 100%, white, clear and frosted quartz, gray and black chert grains, very fine grained, subangular to subrounded, well sorted, loose, unconsolidated, no trace of cement

525 m — Sandstone, 20%, as above, loose, unconsolidated, Cement, 80%, from casing

530 m — Poor sample - clay balls and cement

535 m — Sandstone, 80%, white, clear and frosted quartz, very fine to fine grained, gray and black chert grains, subangular to subrounded, well sorted, loose, unconsolidated in sample, Cement and clay balls, 20%

540 m — Sandstone, 80%, as above, minor chert grains throughout, Chert, 20%, white, gray, brown, multi-colored, fragmental, medium to coarse grained

545 m — Sandstone, 100%, white, frosted quartz, gray and black chert grains, very fine to fine grained, abundant medium grained chert grains, subangular to rounded, medium sorted, slightly siliceous cement, tite, very friable, abundant chert fragments, multi-colored, metasomatic limestone and dolomite replacement, trace porous, brown dolomite, trace white, siliceous mudstone, with hematite stringers, trace kaolinite

550 m — Sandstone, 80%, white, clear and frosted quartz, gray and black chert grains, very fine to fine grained, subangular to subrounded, well sorted, siliceous cement, very friable, loose, unconsolidated in sample, Chert, 20%, multi-colored, massive in part, trace brown, dolomitic chert, occasional leached porosity

555 m — Sandstone, 60%, as above, loose, unconsolidated in sample, trace siliceous cement, very friable, Chert, 40%, as above, massive, multi-colored

560 m — Sandstone, 100%, as above, slight siliceous cement, tite, very friable

565 m — Sandstone, 60%, brown-white, frosted quartz, multi-colored chert grains, very fine to fine grained, subangular to rounded, well sorted, slight siliceous cement, tite, friable, Chert, 40%, multi-colored fragments, trace black with white inclusions, trace metasomatic limestone and dolomite replacement

570 m — Sandstone, 70%, as above, abundant kaolinite, trace glauconite, Chert, 30%, as above

Sample Descriptions

575 m — Sandstone, 100%, white, with brown-white clay traces throughout, quartz and chert, very fine grained, well rounded predominantly, well sorted, partly siliceous cement, tite, very friable, trace chert shards

580 m — Sandstone, 60%, as above, trace pyrite, Chert, 40%, multi-colored fragments

585 m — Sandstone, 50%, as above, trace glauconite, trace pyrite, Chert, 50%, multi-colored fragments, trace limestone and dolomite replacement

590 m — Sandstone, 50%, white, occasionally brown-white, quartz, chert, very fine and fine grained, rounded predominantly, well sorted, partly siliceous, partly kaolinitic cement, tite, very friable, trace gray-black, bituminous siltstone, trace bitumen, Chert, 30%, as above, Coal, 20%, black, shaly in part, vitreous in part, (poor lignite)

595 m — Sandstone, 60%, white, gray-white, quartz and chert grains, very fine to fine grained, occasionally medium grained, subangular to rounded, well sorted, slight siliceous cement, tite or loose in sample, very friable, abundant pyrite, Chert, 30%, as above, Coal, 10%, very shaly

600 m — Sandstone, 90%, as above, very fine to medium grained, abundant pyrite, Chert, 10%, as above

605 m — Sandstone, 100%, white, clear quartz predominantly, gray and black chert grains, very fine to fine grained, fine grained predominantly, subangular to rounded, well sorted, loose, unconsolidated in sample

610 m — Sandstone, 100%, white, clear and frosted quartz, gray and black chert grains, predominantly fine grained, occasionally medium grained, angular to rounded, medium sorted, siliceous cement, trace pyrite in pore spaces, loose, unconsolidated in sample, abundant multi-colored chert fragments, possibly chert conglomerate with sandstone matrix

615 m — Sandstone, 100%, as above, predominantly very fine grained sandstone, abundant chert fragments, trace pyrite

620 m — Sandstone, 100%, white, clear and frosted quartz, very fine to fine grained, subangular to rounded, medium sorted, siliceous cement, 10% porosity, very friable, occasionally pyritic, abundant chert, trace very fine quartz grains on sides of chips, quartz overgrowths, abundant siderite in sample

625 m — Shale, 50%, dark gray, blocky, very silty, occasionally sandy, firm, Sandstone, 50%, as above, loose, unconsolidated in sample

630 m — Sandstone, 70%, white, slightly salt and pepper, clear, frosted quartz, gray, green, blue-black chert grains, very fine to fine grained, predominantly, occasionally coarse chert grains, angular to rounded, poor sorted in part, tite to 18% porosity, very friable, abundant chert fragments, abundant pyrite, Siderite, 10%, brown, crypto crystalline,

Sample Descriptions

occasionally silty, dense, Siltstone, 20%, gray-white, salt and pepper, sandy, slightly siliceous, argillaceous, friable

635 m — Missed Sample - bypass below sample chute

640 m — Sandstone, 90%, as above, abundant silt sized particles throughout sample, probably drilled solids being carried throughout mud system, as weighting up was done with drilled solids and barite, Shale, 10%, dark gray-green, fissile, slightly waxy lustre, hard, trace pyrite

645 m — Shale, 20%, as above, also dark gray, blocky to fissile, slightly carbonaceous, arenaceous, firm, trace siderite, siltstone, trace, gray-white, salt and pepper, slightly siliceous, argillaceous, sandy, hard to friable, Sandstone, 80%, gray-white, occasional clear quartz, chert grains predominantly, very fine to fine grained, with medium to coarse grained throughout, angular to rounded, poor sorted in part, siliceous cement, tite to 10% matrix porosity, trace pyrite, abundant chert fragments

650 m — Shale, 20%, as above, very arenaceous in part, abundant siltstone, as above, trace gray-green shale, as above, Sandstone, 80%, white in part, with clear and frosted quartz, predominantly multi-colored chert grains, fine grained predominantly, medium to coarse grained throughout, angular to rounded, poor sorted in part, siliceous cement, tite to 10%, porosity, very friable, trace pyrite, trace chert fragments

655 m — Sandstone, 100%, as above, abundant siltstone, trace pyrite

660 m — Shale, 40%, dark gray, blocky, slightly carbonaceous, very arenaceous, firm, Siltstone, 20%, dark gray, slightly siliceous, sandy, argillaceous, firm to friable, Sandstone, 40%, as above, predominantly loose, unconsolidated in sample

665 m — Shale, 70%, as above, abundant sand grains and chert fragments throughout sample, Siltstone, 30%, as above, grading to sandstone, in part

670 m — Shale, 50%, dark gray, blocky, slightly carbonaceous, very silty, occasionally sandy, firm, Siderite, 20%, brown, crypto crystalline, dense, Siltstone, 30%, brown tinge, gray-white, slightly sideritic, argillaceous, sandy, firm

675 m — Shale, 10%, as above, Siderite, 20%, as above, Siltstone, 20%, as above, Sandstone, 50%, white, clear quartz, multi-colored chert grains, very fine to fine grained, subangular to rounded, well sorted, loose, unconsolidated in sample

680 m — Shale, 20%, dark gray, blocky, arenaceous, with silty and sand laminations, firm, trace pelecypod fragments, Siderite, 20%, as above, Siltstone, 30%, gray-white, occasionally dark gray, slightly sideritic, argillaceous, sandy, firm, Sandstone, 30%, loose, unconsolidated grains, as above

Sample Descriptions

685 m — Shale, 20%, as above, abundant fossil fragments, mostly pelecypod fragments, Sandstone, 80%, white, clear quartz predominantly, very fine grained, subrounded to rounded, well sorted, abundant gray chert grains, fine to medium grained, rounded, well sorted, loose, unconsolidated in sample

690 m — Shale, 20%, as above, abundant fossil fragments, Sandstone, 80%, as above, slight siliceous cement, 10-16% intergranular porosity, very friable, with occasional medium grained chert grains, trace bitumen

695 m — Shale, 10%, as above, Siderite, 30%, brown, crypto crystalline, silty, dense, Sandstone, 60%, white, clear and frosted quartz predominantly, multi-colored chert grains throughout, very fine to fine grained, subangular to rounded, well sorted, loose, unconsolidated in sample, abundant siltstone, with sideritic cement

700 m — Siderite, 10%, as above, Siltstone, 20%, gray-white, slightly siliceous, argillaceous, very sandy, friable, Sandstone, 70%, as above

705 m — Siderite, 10%, as above, Shale, 10%, dark gray, slightly carbonaceous, silty, firm, abundant fossil fragments, Siltstone, 20%, as above, Sandstone, 60%, white, clear and frosted quartz, multi-colored chert grains, very fine to fine grained, subangular to rounded, well sorted, loose, unconsolidated in sample, trace medium to coarse grained chert grains

710 m — Shale, 20%, as above, trace fossil fragments, Siltstone, 40%, gray-white, slightly salt and pepper, siliceous in part, very sandy, argillaceous, friable, Sandstone, 40%, as above, abundant medium to coarse chert grains

715 m — Shale, 30%, as above, arenaceous, Siltstone, 40%, as above, Sandstone, 30%, predominantly medium to coarse grained, probably cavings

720 m — Shale, 30%, dark gray, blocky, slightly carbonaceous, arenaceous, firm, Siderite, 20%, brown, crypto crystalline, dense, Siltstone, 30%, dark gray, very argillaceous, sandy, firm, Sandstone, 20%, dark gray, fine grained, quartz, chert, subangular to rounded, medium sorted, siliceous, clay cement and matrix

725 m — Shale, 40%, as above, occasionally dark gray-green to black, fissile, marine shale, abundant fossil fragments, pelecypod, Siderite, 20%, as above, Siltstone, 20%, as above, occasional trace glauconite, Sandstone, 20%, as above, dark gray, clay cement and matrix

730 m — Shale, 30%, as above, probably as interbedded sand, shale and silt, Siltstone, 40%, as above, very argillaceous, trace siderite, Sandstone, 30%, dark gray to gray-white, very fine to medium grained, quartz, chert, subangular to rounded, medium sorted, partly siliceous, clay cement and matrix, tite, occasional glauconite

735 m — Shale, 50%, dark gray predominantly, blocky, slightly carbonaceous,

Sample Descriptions

very arenaceous, firm, trace pyrite, abundant siderite, Siltstone, 30%, as above, occasionally sandy, Sandstone, 20%, as above, abundant chert fragments

740 m — Shale, 60%, as above, abundant siderite, trace pyrite, trace fossil fragments, Siltstone, 20%, as above, Sandstone, 20%, as above, abundant chert

745 m — Shale, 80%, dark gray, blocky, slightly carbonaceous, arenaceous, sandstone and siltstone laminations throughout, firm, abundant siderite, trace pyrite, trace fossil fragments, pelecypod predominantly, Siltstone, 10%, gray-white, sandy, argillaceous, hard, Sandstone, 10%, dark gray to gray-white, very fine to medium grained, subangular to rounded, medium sorted, clay cement, tite, abundant chert fragments

750 m — Shale, 90%, as above, arenaceous, Sandstone, 10%, as above, cavings

755 m — Shale, 100%, dark gray, blocky, silty in part, carbonaceous, firm, trace pyrite, abundant sandstone and siltstone (cavings)

760 m — Shale, 100%, as above, sandstone and siltstone throughout

765 m — Shale, 100%, dark gray, blocky, arenaceous, siltstone laminations, firm to hard

770 m — Shale, 100%, as above, trace bitumen on fractured planes, abundant siltstone and sandstone, trace ironstone and chert

775 m — Shale, 90%, as above, trace coal, Sandstone, 10%, gray, quartz and chert grains, very fine grained predominantly, rounded, well sorted, partly siliceous, clay cement and matrix, tite, trace chert fragments

780 m — Shale, 60%, dark gray, blocky, slightly carbonaceous, arenaceous in part, siltstone laminations, firm, Siltstone, 20%, gray-white, partly sideritic, argillaceous, hard, trace bitumen throughout, occasional glauconite, Sandstone, 20%, as above, very friable, occasionally medium grained, trace bitumen

785 m — Shale, 30%, as above, trace pyrite, Sandstone, 70%, gray-white, slightly salt and pepper, quartz and chert grains, very fine to fine grained, silty throughout, subangular to rounded, well sorted, partly sideritic, clay cement and matrix, tite, occasional glauconite, trace bitumen

790 m — Shale, 30%, dark gray, blocky, slightly carbonaceous, arenaceous, firm, Sandstone, 70%, as above, very argillaceous, with clay laminations and lenses throughout

795 m — Shale, 40%, as above, Sandstone, 60%, gray-white, slightly salt and pepper, quartz and chert grains, very fine to fine grained, occasional medium chert grains, subangular to rounded, well sorted, partly sideritic, clay cement and matrix, tite, trace bitumen, clay lenses throughout, occasional glauconite

Sample Descriptions

800 m — Shale, 20%, as above, abundant siderite, trace pyrite, Sandstone, 80%, as above, grading to siltstone throughout

805 m — Shale, 30%, dark gray, blocky, slightly carbonaceous, micro micaceous, arenaceous, firm, trace siderite, trace pyrite, Sandstone, 70%, gray-white, slightly salt and pepper, quartz and chert grains, very fine to fine grained, occasional medium chert grains, subangular to rounded, well sorted, clay cement and matrix, tite, trace glauconite, trace bitumen

810 m — Shale, 30%, as above, abundant bituminous shale grading to shaly coal, trace dark gray-green, fissile, waxy lustre, hard, Sandstone, 70%, as above, tite, abundant glauconite

815 m — Shale, 30%, dark gray-brown, blocky, carbonaceous in part, grading to shaly coal, arenaceous, firm, abundant siderite, Sandstone, 70%, white, salt and pepper, brownish tinge, quartz predominantly, very fine to fine grained, angular to rounded, well sorted, partly sideritic, argillaceous, tite, abundant chert fragments

820 m — Shale, 20%, as above, dark gray-brown to dark gray-green, Sandstone, 80%, as above, abundant chert, gray, blue, white, brown, green, fragmental

825 m — Shale, 30%, as above, abundant pyrite, Sandstone, 70%, as above, sideritic, argillaceous, tite

830 m — Shale, 40%, dark gray, blocky, carbonaceous, arenaceous in part, firm, probably occurring as lenses and laminations in sandstone, Sandstone, 60%, gray-white, slightly salt and pepper, silty to very fine grained, subrounded, well sorted, siliceous cement, tite, argillaceous, trace shale lenses and laminations

835 m — Shale, 50%, as above, Sandstone, 50%, as above, trace chert fragments

840 m — Shale, 50%, dark gray, blocky, occasionally silty, carbonaceous flakes throughout, micro micaceous, firm, abundant pyrite, Sandstone, 50%, brown-white, slightly salt and pepper, very fine grained, silty throughout, subangular to rounded, well sorted, slight sideritic cement, tite, argillaceous, probably stringers and thin beds in shale

845 m — Shale, 30%, as above, abundant coal, black, vitreous, Sandstone, 70%, as above, trace medium to coarse chert grains, scattered throughout sandstone

850 m — Shale, 40%, as above, abundant pyrite, Sandstone, 60%, gray-white, slight brownish tinge, quartz predominantly, very fine grained, subrounded to rounded, gray to black chert grains, medium grained, angular, well sorted, chert grains scattered throughout, slight sideritic cement, argillaceous, tite, occasional glauconite

855 m — Shale, 40%, dark gray to dark gray-brown, blocky, slightly silty, silt laminations, firm, abundant siderite, Sandstone, 60%, as above, very silty throughout

Sample Descriptions

860 m — Shale, 60%, as above, occasionally silty, trace pyrite, Sandstone, 40%, as above, silty throughout, medium to coarse chert grains, abundant chert fragments

865 m — Shale, 40%, dark gray to dark gray-brown, blocky, slightly carbonaceous, occasionally silty, firm, Sandstone, 60%, gray-white, brownish tinge, quartz, very fine grained, silty throughout, subrounded to rounded, gray-black chert grains, medium to coarse grained, subangular, well sorted, with scattered chert grains, sideritic cement, tite, argillaceous in part, with clay lenses and laminations, abundant chert fragments

870 m — Shale, 30%, as above, arenaceous in part, Sandstone, 70%, as above, very silty

875 m — Shale, 30%, as above, trace black, very carbonaceous, Sandstone, 70%, as above, occasionally fine grained, silty throughout

880 m — Shale, 20%, dark gray-brown, blocky, arenaceous, very sideritic, hard, trace siderite, trace pyrite, Sandstone, 80%, gray-white, with brownish tinge, quartz, silt to fine grained, subrounded, well sorted, with coarse, blue, black chert pebbles throughout, sideritic cement, tite, very argillaceous

885 m — Shale, 30%, as above, abundant siderite, with trace sideritic siltstone, trace pyrite, Siltstone, 20%, brown-white, gray-white, slight to very sideritic, sandy, argillaceous, hard, Sandstone, 50%, as above, occasional coarse chert grains

890 m — Shale, 40%, dark gray to dark gray-brown, arenaceous in part, brown siderite flecks throughout, firm to hard, abundant siderite, abundant pyrite, trace siltstone, as above, Sandstone, 60%, brown-white, slightly salt and pepper, quartz predominantly, very fine grained, silty throughout, subangular to rounded, well sorted, with coarse, multi-colored chert grains, pebbles throughout, sideritic cement, tite, argillaceous, occasional bituminous laminations

895 m — Shale, 40%, as above, abundant siderite, trace pyrite, trace fossil fragments, Sandstone, 60%, as above, abundant chert fragments, grading to siltstone in part

900 m — Shale, 30%, as above, Siltstone, 40%, brown, white, gray-white, slightly to very sideritic, sandy throughout, argillaceous, hard, Sandstone, 30%, as above

905 m — Sample Missed

910 m — Shale, 40%, dark gray, blocky, even textured, sideritic, firm, occasionally silty, abundant siderite, Siltstone, 40%, as above, sandy, Sandstone, 20%, as above

Sample Descriptions

915 m — Shale, 60%, as above in part, dark gray, fissile, micro micaceous, carbonaceous, firm, Siltstone, 40%, gray-white, slightly sideritic in part, very argillaceous, sandy, hard

920 m — Shale, 90%, dark gray, fissile, carbonaceous, micro micaceous, occasional silty section, minor pyrite inclusions, firm, Siltstone, 10%, as above

925 m — Shale, 90%, as above, abundant siderite, Siltstone, 10%, as above

930 m — Shale, 70%, as above, Siderite, 20%, brown, Siltstone, 10%, as above

935 m — Shale, 100%, black, fissile, very carbonaceous, bituminous in part, hard to brittle

940 m — Shale, 100%, black to dark gray-brown, fissile, bituminous, with white, siliceous inclusions, hard

945 m — Shale, 100%, as above

950 m — Shale, 100%, as above, black predominantly, trace gray-blue, siliceous, mudstone with pyrite inclusions

955 m — Shale, 100%, black, blocky, bituminous, white specks throughout, hard, occasional pyrite

960 m — Shale, 100%, black, occasionally dark gray-brown, fissile, slight metallic lustre, bituminous, hard to brittle, minor pyrite

965 m — Shale, 100%, as above, trace siliceous mudstone with pyrite inclusions

970 m — Shale, 100%, black predominantly, dark gray-brown in part, blocky to fissile, bituminous, occasionally arenaceous, hard to brittle

975 m — Shale, 100%, as above, arenaceous

980 m — Shale, 20%, as above, Dolomite, 80%, gray-white, buff, crypto crystalline, calcareous, dense, minor pyrite inclusions

985 m — Dolomite, 100%, as above, trace assumable vuggy porosity, trace pin point porosity on vug linings, trace dead oil, trace gray-brown stain in linings, gold fluorescence, very slow white, cut, probably residual oil

990 m — Dolomite, 100%, white to buff, stained green in part, crypto crystalline predominantly, calcareous, dense, trace white, secondary crystallization, trace dead oil, trace pyrite inclusions, trace light brown stain in occasionally fine crystalline dolomite, gold fluorescence, slow white cut, trace 3% crystalline porosity

995 m — Dolomite, 100%, as above, trace pink and green stained dolomite, slight gypsiferous with trace very fine selenite crystals

Sample Descriptions

999 m — Dolomite, 100%, white to buff, crypto crystalline, calcareous, dense, gypsiferous throughout, trace very fine selenite crystals, trace pyrite, trace pink and green stain

1005 m — Shale, 30%, cavings, Siltstone, 20%, cavings, Dolomite, 50%, as above, trace pyrite

1010 m — Dolomite, 100%, white to buff, stained green in part, crypto crystalline, gypsiferous, calcareous, dense, minor pyrite inclusions

1015 m — Dolomite, 100%, as above, trace vuggy porosity, with dolomite rhombs on vug lining, occasional trace dead oil, trace light brown stain, gold fluorescence, very slow white cut (probably residual oil)

1020 m — Dolomite, 100%, white to light brown, crypto to micro crystalline, occasional red and green stain, dense, gypsiferous, trace pyrite, trace bitumen

1025 m — Dolomite, 100%, as above, occasionally very fine crystalline, calcareous, dense, trace pyrite, trace brown oil stain, gold fluorescence, slow white cut in very fine crystalline and chalky dolomite (cavings?)

1030 m — Dolomite, 100%, white to light brown, occasionally stained red and green, crypto to micro crystalline, calcareous, dense, abundant pyrite inclusions, trace oil stain in very fine crystalline dolomite, gold fluorescence, slow white cut

1035 m — Dolomite, 100%, as above, slightly silty in part, slightly argillaceous, trace pyrite

1040 m — Dolomite, 100%, brown-white, buff, brown, micro crystalline predominantly, occasionally crypto crystalline, slightly to very calcareous, dense, trace pyrite inclusions and laminations

1045 m — Dolomite, 100%, as above, trace dead oil on fractured planes, occasionally green stain

1050 m — Dolomite, 100%, brown-white to buff, occasionally green stain, crypto to micro crystalline, calcareous, dense, minor pyrite inclusions, trace poor vuggy porosity, occasional trace bitumen

1055 m — Dolomite, 100%, as above, trace poor vuggy porosity, trace dolomite rhombs, secondary recrystallization in vugs, minor pyrite inclusions

1060 m — Dolomite, 60%, as above, abundant vuggy porosity, dead oil and bitumen on vug linings, Limestone, 40%, gray-white, micro crystalline, chalky texture, soft, dense

1065 m — Limestone, 100%, buff predominantly, occasionally brown, micro crystalline with coarse pellets throughout, slightly argillaceous, dense

1070 m — Limestone, 80%, buff to brown, crypto to micro crystalline, slightly

Sample Descriptions

argillaceous, chalky texture in part, dense, with occasional pyrite, Dolomite, 20%, green-white, micro crystalline, slightly calcareous, dense

1075 m — Limestone, 20%, as above, Dolomite, 80%, buff, white, occasionally stained green, crypto to micro crystalline, slightly to very calcareous, dense, with trace vuggy porosity, trace pyrite inclusions

1080 m — Limestone, 10%, as above, Dolomite, 90%, as above, evidense of vuggy porosity

1085 m — Dolomite, 100%, brown, white, green-white, micro to very fine crystalline, calcareous, dense to 3% intercrystalline porosity where very fine crystalline, evidence of vuggy porosity

1090 m — Dolomite, 100%, white to buff, as above, trace clear-white, secondary recrystallization in probable vugs, trace pyrite

1095 m — Dolomite, 100%, light brown, brown-white, clear, crypto to micro crystalline, calcareous, dense, trace pyrite

1100 m — Dolomite, 100%, as above, occasionally light gray-brown, micro crystalline, chalky limestone (cavings?)

1105 m — Dolomite, 100%, light brown-white, micro crystalline, very calcareous, limy in part, dense, evidence of vuggy porosity

1110 m — Dolomite, 100%, as above, occasionally very fine crystalline, trace vuggy porosity

1115 m — Dolomite, 100%, light brown to brown-white, crypto to micro crystalline, calcareous, dense, trace vuggy porosity, bitumen on vug linings or fractured planes, trace pyrite

1120 m — Dolomite, 100%, as above, micro crystalline predominantly, calcareous, dense, trace vuggy porosity

1125 m — Dolomite, 100%, brown-white to buff, crypto crystalline, calcareous, dense, trace vuggy porosity, light brown, very fine dolomite rhombs, trace pyrite

1130 m — Dolomite, 100%, as above, dense, trace limestone, white, micro crystalline, chalky, soft (cavings??)

1135 m — Dolomite, 100%, light brown-white, crypto to micro crystalline, trace limy in part, calcareous throughout, dense, minor pyrite

1140 m — Dolomite, 100%, as above, brown oil stain, in very fine crystalline dolomite, gold fluorescence, slow white cut

1145 m — Dolomite, 100%, as above, crypto crystalline predominantly, calcareous, dense

Sample Descriptions

1150 m Dolomite, 100%, brown to brown-white, buff, crypto crystalline predominantly, occasionally micro crystalline, calcareous, dense, minor pyrite

1155 m Dolomite, 100%, as above, occasionally light green stain

1160 m Dolomite, 100%, as above, abundant green stain throughout

1165 m Dolomite, 100%, as above in part, brown to brown-white, micro crystalline, occasionally chalky, very calcareous, soft, dense throughout

1170 m Dolomite, 100%, as above, occasionally brown, stained green-yellow in part, occasionally pink stain

1175 m Dolomite, 100%, brown-white, buff, occasionally stained pink, yellow-green, chocolate brown, crypto to micro crystalline, calcareous, occasionally chalky, limy section, dense, trace pyrite, colored dolomite appearing in laminations

1180 m Dolomite, 100%, as above, gray-white, slightly argillaceous in part, abundant pink,yellow and dark brown stain

1185 m Dolomite, 100%, brown-white, stained pinkish-brown throughout, crypto crystalline, calcareous, dense, trace white, flaky gypsiferous rock

1190 m Dolomite, 100%, as above, dense, predominantly brown-white, occasionally brown, abundant colored dolomite

1195 m Dolomite, 100%, yellow-green predominantly, brown-white, occasional pink stain, crypto crystalline predominantly, calcareous, dense, trace light green shale

1200 m Dolomite, 100%, as above, becoming red in part

1205 m Dolomite, 100%, light brown to yellow-green, trace red, crypto to micro crystalline, calcareous, dense, trace vuggy porosity, trace selenite crystals

1210 m Dolomite, 80%, as above, Limestone, 20%, mottled light to dark brown, white, micro crystalline, chalky matrix with coarse oolites throughout, dense, trace clear-white, fine crystalline dolomite, up to 10% porosity, secondary crystalline from vugs, trace dark brown stain, gold fluorescence, white cut

1215 m Dolomite, 100%, white to buff, crypto crystalline, slightly calcareous, dense, trace selenite crystals

1220 m Dolomite, 40%, as above, Limestone, 60%, mottled light and dark brown, stained red and green throughout, oolites in a micro crystalline matrix, dense

1225 m Dolomite, 60%, gray-white to light brown, crypto crystalline predominantly,

Sample Descriptions

calcareous, dense, slightly argillaceous in part, Limestone, 40%, mottled light and dark brown, oolitic and pelletal, with micro crystalline matrix, dense, occasionally stained red and yellow

1230 m Dolomite, 70%, light gray-white to light brown, crypto crystalline, argillaceous, calcareous, dense, Shale, 30%, medium gray, blocky to fissile, calcareous, grading to dolomitic marlstone in part, hard

1235 m Shale, 50%, as above, dolomitic throughout, Dolomite, 50%, as above, trace limestone, as above

1240 m Dolomite, 100%, as above in part, light brown, micro crystalline, calcareous, dense, very argillaceous in part, silty

1245 m Shale, 20%, dark gray, fissile, dolomitic, hard, Dolomite, 80%, gray-white, gray-brown, light brown, crypto to micro crystalline, slightly to very argillaceous, calcareous, dense

1250 m Dolomite, 100%, as above, trace chert fragments

1255 m Dolomite, 100%, dark gray, gray-white, occasionally dark brown, crypto crystalline predominantly, calcareous, micro crystalline in part, argillaceous throughout, dense

1260 m Dolomite, 100%, as above, trace brown, micro crystalline, calcareous, dense, abundant yellow stain

1265 m Dolomite, 100%, as above predominantly, becoming light brown, micro crystalline, very calcareous, argillaceous, silty, dense

1270 m Dolomite, 100%, light brown, micro crystalline in part, dark brown, stained red and yellow, crypto crystalline, calcareous, dense, trace fracturing with clear, white dolomite recrystallization in fractures

1275 m Dolomite, 100%, as above, trace white, micro crystalline, soft, gypsiferous, dense, trace chert fragments, brown, gray, white

1280 m Dolomite, 100%, light brown, buff, occasionally gray-white to brown, trace reddish stain, crypto to micro crystalline, calcareous, slightly argillaceous in part, dense

1285 m Dolomite, 100%, as above, trace chert fragments, trace yellow, pale green stain

1290 m Shale, 20%, medium to dark gray, fissile, waxy, dolomitic, hard, Dolomite, 80%, light brown, stained red and yellow, occasionally gray-white, crypto to micro crystalline, calcareous, argillaceous in part, dense

1295 m Shale, 20%, as above, Dolomite, 80%, light brown, stained yellow predominantly, micro crystalline, very calcareous, silty, dense, gray-white, micro crystalline, calcareous, argillaceous, grading dolomitic marlstone in part, dense

Sample Descriptions

1300 m — Shale, 10%, light to medium gray, fissile, waxy, dolomitic, hard, Dolomite, 90%, light brown, stained yellow predominantly, trace red stain, occasionally gray-white, crypto to micro crystalline, slightly silty in part, slightly argillaceous in part, calcareous, dense

1305 m — Shale, 20%, as above, Dolomite, 80%, as above, abundant gray-white, slightly argillaceous

1310 m — Dolomite, 100%, light brown to gray-white, crypto to micro crystalline, slightly silty, slightly argillaceous, calcareous, dense

1315 m — Shale, 10%, dark gray, fissile, waxy, dolomitic, hard, Dolomite, 90%, as above, occasionally silty, trace clear, white, dolomite crystals

1320 m — Shale, 20%, dark gray-green, blocky to fissile, dolomitic, hard, Dolomite, 80%, light brown to gray-white, crypto to micro crystalline, slightly silty in part, slightly argillaceous in part, slightly to very calcareous, dense

1325 m — Shale, 30%, as above, Dolomite, 70%, as above

1330 m — Dolomite, 100%, as above in part, light brown to yellow, red, micro crystalline, calcareous, slightly silty in part, dense

1335 m — Shale, 20%, light gray-green, stained red in part, fissile, waxy, dolomitic, brittle, Dolomite, 80%, light brown to yellow, reddish, red-brown, micro crystalline, slightly silty, calcareous, dense, abundant clear calcite crystals

1340 m — Shale, 10%, as above, Dolomite, 90%, as above, trace dark gray, nodular fragments

1345 m — Shale, 30%, light gray to gray-green, occasionally stained red and yellow, fissile, waxy, dolomitic, hard, Dolomite, 70%, as above, slightly to very calcareous, trace dark gray-brown, nodular fragments

1350 m — Shale, 40%, as above, Dolomite, 60%, light brown, yellow, micro crystalline, calcareous, slightly silty, dense, trace calcite filled vuggy porosity, trace dark gray, coarse fragments in light brown, micro crystalline matrix

1355 m — Shale, 50%, light to dark gray, gray-green, fissile, waxy, slightly to very dolomitic, hard, Dolomite, 50%, light gray-brown to buff, crypto to micro crystalline, calcareous, dense, slightly argillaceous, trace gray-white, micro to crypto crystalline limestone, very argillaceous, dense

1360 m — Shale, 40%, as above, trace pyrite nodules, Dolomite, 60%, as above, grading to limestone in part, very calcareous throughout

1367 m — Shale, 30%, as above, Dolomite, 70%, as above in part, light brown, micro crystalline, very silty, very calcareous, dense

Sample Descriptions

1375 m — Shale, 30%, dark gray to gray-green, occasionally pale green, fissile, waxy, dolomitic, hard, Dolomite, 70%, light brown, gray-white, crypto to micro crystalline, slightly silty in part, slightly argillaceous in part, dense, abundant clear calcite

1380 m — Shale, 30%, as above, trace pyrite, Dolomite, 70%, light brown, in part as above, gray-white, micro crystalline, slightly calcareous, very silty, dense

1385 m — Shale, 40%, dark gray-green predominantly, fissile, waxy, dolomitic, hard, Dolomite, 60%, light brown, micro to very fine crystalline in part, calcareous, very silty in part, dense, dolomite, gray-white to gray, crypto crystalline, calcareous, argillaceous, dense

1390 m — Shale, 20%, as above, Limestone, 30%, gray-white, gray, micro to crypto crystalline, very argillaceous, slightly dolomitic, dense, Dolomite, 50%, as above, very calcareous in part

1395 m — Shale, 20%, dark gray-green, occasionally light gray, fissile, waxy, dolomitic, brittle in part, with trace pyrite inclusions, Limestone, 20%,as above, Dolomite, 60%, light brown predominantly, micro crystalline, very silty, very calcareous, dense

1400 m — Shale, 40%, as above, dark gray predominantly, Limestone, 40%, gray-white to dark gray, micro crystalline, chalky, grading to crypto crystalline, argillaceous throughout, occasional grading to marlstone, dense, Dolomite, 20%, as above

1405 m — Shale, 20%, as above, Limestone, 50%, as above predominantly, brown, crypto crystalline, dense, Dolomite, 30%, as above, very argillaceous in part

1410 m — Shale, 30%, medium gray, dark gray-green, fissile, waxy, dolomitic, hard to brittle, Limestone, 20%, as above, Dolomite, 50%, dark gray, gray-white, light brown, crypto crystalline predominantly, calcareous, argillaceous, dense, trace red stain

1415 m — Shale, 10%, as above, Limestone, 60%, brown-white to gray-white, crypto crystalline predominantly, occasionally micro crystalline, chalky, argillaceous, dense, Dolomite, 30%, as above

1420 m — Dolomite, 60%, light brown-white, gray-white, micro crystalline, crypto crystalline, slightly argillaceous, calcareous, silty, dense, Limestone, 40%, as above, very dolomitic

1425 m — Dolomite, 70%, as above, Limestone, 30%, gray-white, micro crystalline, chalky, argillaceous, dense

1430 m — Dolomite,100%, as above, abundant selenite crystals, trace clear, white, calcite crystals

1435 m — Dolomite, 80%, gray-white, crypto crystalline, calcareous, occasionally

Sample Descriptions

micro crystalline, dense, Shale, 10%, red, fissile, silty, hard, Siltstone, 10%, red-white, sandy, dolomitic, hard

1440 m — Shale, 50%, red, green, chocolate brown, fissile, dolomitic, hard, Siltstone, 10%, as above, Dolomite, 40%, as above, brown

1445 m — Shale, 40%, as above, Dolomite, 60%, brown, gray-white, stained green and red in part, crypto crystalline, micro crystalline in part, slightly calcareous, dense, trace clear, white calcite

1450 m — Shale, 40%, as above, Dolomite, 60%, as above

1455 m — Shale, 30%, red, green, dark gray, blocky to fissile, occasionally silty, dolomitic, hard, Dolomite, 70%, brown, gray-white, dark gray, crypto crystalline predominantly, occasionally micro crystalline, slightly calcareous, argillaceous, dense

1460 m — Shale, 60%, as above, very silty, grading to siltstone throughout, Dolomite, 40%, as above, occasionally stained green and red

1465 m — Shale, 20%, as above, trace siltstone, Dolomite, 80%, gray-white, brown, dark brown, reddish brown, crypto crystalline predominantly, micro crystalline or gypsiferous throughout, slightly calcareous, dense, trace clear calcite crystals

1470 m — Shale, 40%, red predominantly, red-white, blocky, silty, gypsiferous, hard, Dolomite, 60%, as above

1475 m — Shale, 20%, as above, grading to siltstone, Dolomite, 80%, brown, gray-white, reddish, crypto crystalline in part, lithographic, limy in part, silty throughout, dense

1480 m — Shale, 50%, as above, very silty, gypsiferous in part, Dolomite, 50%, gray-white, occasionally stained red, micro crystalline, silty, slightly argillaceous, dense

1485 m — Shale, 30%, red-green, blocky to fissile, gypsiferous, silty, hard, Siltstone, 20%, gray-white, dolomitic, gypsiferous, sandy, hard, Dolomite, 50%, as above, very silty

1490 m — Shale, 50%, as above, Siltstone, 20%, as above, white, chalky, gypsiferous matrix, Dolomite, 30%, as above, very silty

1495 m — Shale, 40%, as above, very silty throughout, Siltstone, 30%, as above, dolomitic, gypsiferous, Dolomite, 30%, as above, very silty

1500 m — Shale, 50%, red, dark gray-green, green, blocky to fissile, very silty, grading to siltstone in part, hard, Siltstone, 30%, red, red-white, gray-white, dolomitic, white, chalky, gypsiferous, matrix, hard, Dolomite, 20%, as above, very silty

FORMATION TOPS

Formation	Sample	E-Log	Subsea	Thickness
Lower Cretaceous	461	-	-	
Bituminous Shale	930	930	- 826.77	50 m
Ronning Group	980	981	- 877.77	444 m
Saline River	1428	1424	- 1320.77	
TD	-	1500	- 1396.77	

UPPER CRETACEOUS

The Upper Cretaceous consists of quartz and chert grains, silt to fine grained in size, in a clay cement and matrix. There are clay lenses and laminations throughout. The shales are arenaceous and friable.

Conclusion: The sands are porous in some places. There is little or no permeability due to clays throughout the sands. These clay lenses and laminations probably affect porosity as well. There are no hydrocarbon shows in this section and no reservoir potential.

LOWER CRETACEOUS

The Lower Cretaceous is a medium grained, arkosic, cherty sandstone at the top, grading down to a very fine to fine quartzose sandstone with fine to coarse grained chert grains scattered throughout. Clays make up the majority of cementing materials with lenses and laminations throughout. The shales are slightly carbonaceous, arenaceous and firm with increasing induration deeper in the formation. There are siderite concretions and sideritic sands and silts in the base of this section.

Conclusion: The only positive sign in the Lower Cretaceous with regards to reservoir potential, is a sand between 590 and 600m. Samples from this section are loose and unconsolidated but later samples show a clean water sand, quartzose, with up to 15% porosity. This section of well flowed fresh water with between 50 and 75 psi on the B.O.P's when shut in. A mud weight of 1130 Kg/m^3 was required to kill it and hold it in check. There are traces of porosity in various places in the section, but clays affect the Lower Cretaceous as they did the Upper Cretaceous. Permeability is extremely limited as most of the sands have a clay cement and matrix. The Lower Cretaceous has no hydrocarbon reservoir potential.

BITUMINOUS SHALE

The Bituminous Shale is, as its name applies, bituminous in the upper section, with interbedded, highly carbonaceous shales in the base. There are traces of pyrite and white siliceous inclusions throughout. The base is arenaceous in part.

Conclusion: The Bituminous Shale has no reservoir potential although it is an excellent source rock.

RONNING GROUP

The Ronning Group is the designated goal in this well. Upon drilling through the Bituminous Shale, there appeared to be more scalp to the Windy Island uplift than was planned on.There was no Bear Rock formation and none of the finely crystallized dolomite anticipated at the top of the Ronning. The upper Ronning consists of white to buff dolomites, with apparent traces of vuggy porosity. The dolomites are basically crypto crystalline and occasionally gypsiferous. There are traces of pale green stain throughout and traces of pyrite. The next section is a light brown to buff, pelletal and oolitic limestone, with a micro crystalline matrix. From 1073-1123m, there appears to be a good porous section with micro and crypto crystalline sections, followed by a tite, dense section to 1170m. Here the dolomites start to become multi colored with pink and yellow-green stain throughout. This section continues until about 1225 m where light brown, micro to crypto crystalline, silty dolomites interbedded with gray-white, argillaceous dolomites. The silty dolomites are extremely calcareous. There are thin, gray-green, dolomites scattered throughout to the base of the Ronning with occasional traces of chert. From 1390-1428m, a limestone appears in the base. This occasionally grades to marly lime and back to an argillaceous dolomite.

Conclusion: The Ronning Group has two potential zones of interest. The first of the zones is at the top of the Ronning.. There is evidence of good vuggy porosity with excellent drilling breaks and traces of secondary dolomite crystals in the samples. There are traces of gold-brown staining, between these grains, gold fluorescence, and very slow white cut. The oil appears to be residual and immovable. There were also no shows from either the gas detector or the fluoroscope. Both zones should be checked very carefully on logs before decisions on testing be made. The rest of the Ronning Group shows no hydrocarbon reservoir potential.

SALINE RIVER

The Saline River consists of red and green shales, gypsiferous in part and silty with dolomite stringers throughout. From 1475m to TD, the Saline River is a red and white siltstone, with varying degrees of shale and gypsum throughout. Salt was anticipated and none was encountered.

Conclusion: The Saline River itself has no reservoir potential. At the top of the formation, between 1425-1428m, is a good drilling break with secondary dolomite rhombs and selenite crystals in the samples. If source rock can be found in other areas, perhaps the transition to the Saline will become a zone of interest.

ATTACHMENT
9

ATTACHMENT 9

NORTHSTAR DRILLSTEM TESTERS

WELL NAME NSM Windy Island A53-65-00-125-30 TICKET NO. 1615 D.S.T. NO. 1

DATE 85/02/04
Formation: Ronning
Type of Test Straddle

COMPANY	NSM Resources Ltd.		
WELL NAME	NSM Windy Island		
WELL LOCATION	A53-65-00-125-30	DST. 1	
INTERVAL	1073-1083m.	TOTAL DEPTH	1500.00 m.
KELLY BUSHING	103.23 m.	GR. ELEVATION	98.00 m.
NET PAY	m.		

RECORDER DATA (all measurement are 'si')

Preflow	10 MINS
Initial Shut In	60 MINS
Second Flow	90 MINS
Final Shut In	180 MINS

	kPa	kPa	kPa	kPa
A. Init. Hyd.	12088			
B. First Flow		625	453	
B1. Final Flow		594	522	
C. Init. Shut		12110	12095	
D. Init. Flow	721	713	680	
E. Final Flow	1956	1771	1939	
F. Final Shut	12012	12031	11991	
G. Final Hyd.				

	Inside	Outside	Outside
Recorder	7418	10959	10960
Range	22753	23097	23442
Clock	48	24	24
Depth	1064.00	1074.00	1074.00

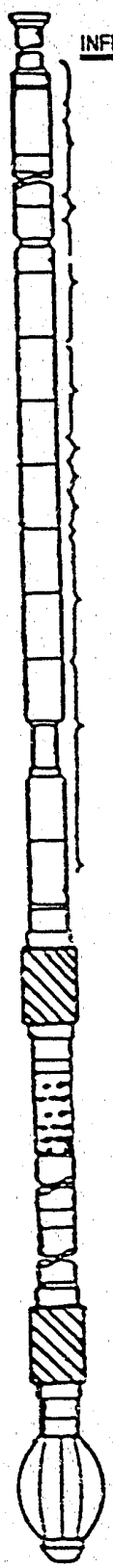
RECOVERY

Total Fluid 170m of 84m in D.C. and 86m in D.P
170m of mud.

REMARKS & BLOW DESCRIPTION

Preflow: Weak air blow. 8 cm in pail.
Second Flow: Weak air blow throughout.

TEST Misrun



INFLATE

Reversing Sub	0.30
D.P.	0.30
Drill Collars	
R.T.V.	1.73
Spacer	0.45
Reciprocating Joint	1.70
Recorder #7418	1.47
Jars	2.40
Safety Joint	0.65
Pump	0.86
Screen	1.34
Deflate	0.90
Screen	
ABOVE INTERVAL 13.98	
Packer	1.78
Depth = 1073.00	
Perfs	
Stub	0.86
Recorder #10959 & #10960	1.70
Spacing	7.20
Stub	0.42
Depth = 1083.18	
TOTAL INTERVAL 10.18	
Packer	1.86
Drag Spring	1.09
TOTAL TEST TOOL 27.01	
Total Depth = 1500.00	
CUSTOMER REP. Max Stoppler	
TESTER Lance White	

NORTHSTAR DRILLSTEM TESTERS

HOLE AND TEST DESCRIPTION

Time Started	22:15Hr.
Time on Bottom	00:51Hr.
Time Open	01:50Hr.
Time Pulled	07:35Hr.
Time Out	10:00Hr.
Tool Weight	2000 daN
Weight Set On Packer	9000 daN
Weight Pulled Loose	40000 daN
Initial String Weight	30000 daN
Unseated String Weight	32000 daN
Bottom Choke	19.05 mm
Hole Size	222 mm
Drill Collar I.D.	61.00 mm
Drill Pipe I.D.	75.00 mm
Drill Collar Length	83.38 m
Drill Pipe Length	980.31 m

MUD DATA

Mud Type	Gel Chem	
Weight	1150	kg/m^3
Viscosity	51	S/L
Water Loss	12.20	cm^3
Filter Cake	2.00	mm
Mud Drop	Nil	m
Amount of Fill		m
Bottom Hole Temp.		C
Porosity %		
Hole Condition	Good	

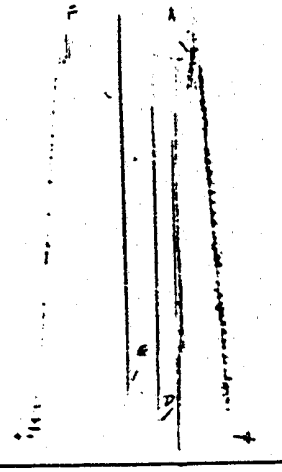
GAS RECOVERY MEASURED WITH

Time mins.	Orifice mm	Pressure Kpa	H2O mm	Rate M3/D

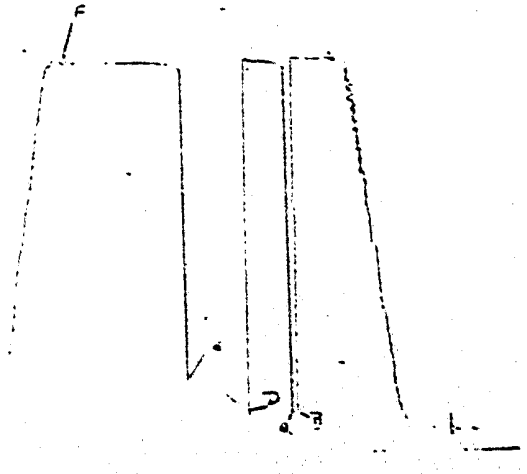
NORTHSTAR DRILLSTEM TESTERS

NSM Windy Island A53-65-00-125-30 T.#1615 DST.#1

Recorder #7418



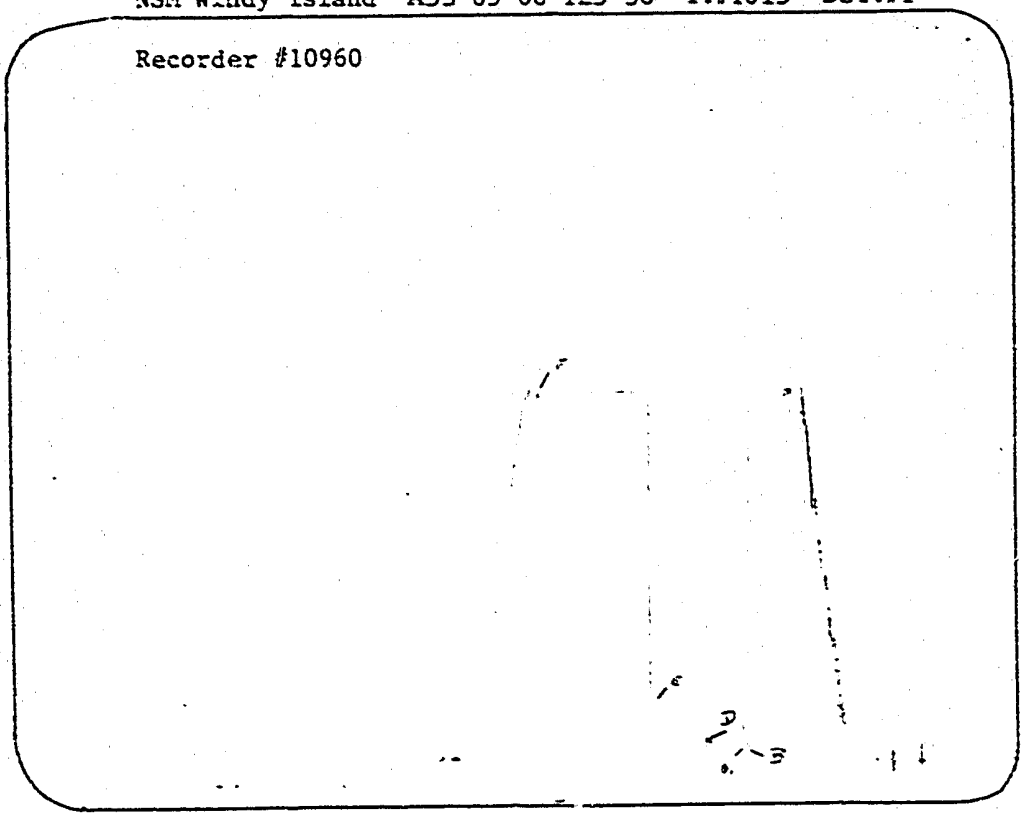
Recorder #10959



NORTHSTAR DRILLSTEM TESTERS

NSM Windy Island A53-65-00-125-30 T.#1615 DST.#1

Recorder #10960



NORTHSTAR DRILLSTEM TESTERS

WELL NAME NSM Windy Island A53-65-00-125-30 TICKET NO. 1616 D.S.T. NO. 2

DATE 95/02/05
Formation: Ronning
Type of Test Straddle

COMPANY	NSM Resources Ltd.		
WELL NAME	NSM Windy Island		
WELL LOCATION	A53-65-00-125-30	DST. 2	
INTERVAL	982.5-987.5m.	TOTAL DEPTH	1500.00 m.
KELLY BUSHING	103.23 m.	GR. ELEVATION	98.00 m.
NET PAY	m.		

RECORDER DATA (all measuresent are 'si')

Preflow	10 MINS
Initial Shut In	60 MINS
Second Flow	60 MINS
Final Shut In	120 MINS

	kPa	kPa	kPa	kPa
A. Init. Hyd.				
B. First Flow		690	325	
Bl. Final Flow		625	370	
C. Init. Shut	10749	11083	10920	
D. Init. Flow	507	706	474	
E. Final Flow	511	675	557	
F. Final Shut	10658	11024	10830	
G. Final Hyd.				

	Inside	Outside	Outside
Recorder	7418	10959	10960
Range	22753	23097	23442
Clock	48	24	24
Depth	973.50	983.50	983.50

RECOVERY

Total Fluid 30m of 30m in D.C. and 0m in D.P
30m of mud.

REMARKS & BLOW DESCRIPTION

Preflow: Weak air blow.
Second Flow: Weak air blow. Dead in 40 minutes.

TEST Misrun

INFLATE

Reversing Sub	0.30
D.P.	0.30
Drill Collars	
R.T.V.	1.73
Spacer	0.45
Reciprocating Joint	1.70
Recorder #7418	1.47
Jars	2.40
Safety Joint	0.65
Pump	0.56
Screen	1.34
Deflate	0.90
Screen	
ABOVE INTERVAL 15.88	
Packer	1.78
Depth = 982.50	
Stub	0.56
Recorder #10959 & #10960	1.70
Spacing	2.10
Stub	0.42
Depth = 987.58	
TOTAL INTERVAL 5.08	
Packer	1.36
Drag Spring	1.09
TOTAL TEST TOOL 21.42	
Total Depth = 1500.00	
CUSTOMER REP. Max Stoppler	
TESTER Lance White	

NORTHSTAR DRILLSTEM TESTERS

HOLE AND TEST DESCRIPTION

Time Started	21:00Hr.
Time on Bottom	00:10Hr.
Time Open	00:20Hr.
Time Pulled	10:00Hr.
Time Out	12:45Hr.
Tool Weight	2000 daN
Weight Set On Packer	9000 daN
Weight Pulled Loose	15000 daN
Initial String Weight	31000 daN
Unseated String Weight	31000 daN
Bottom Choke	19.05 mm
Hole Size	222 mm
Drill Collar I.D.	61.00 mm
Drill Pipe I.D.	75.00 mm
Drill Collar Length	83.36 m
Drill Pipe Length	1008.48 m

MUD DATA

Mud Type	Gel Chem	
Weight	1150	kg/m^3
Viscosity	51	S/L
Water Loss	12.20	cm^3
Filter Cake	2.00	mm
Mud Drop	Nil	m
Amount of Fill		m
Bottom Hole Temp.		C
Porosity %		
Hole Condition	Good	

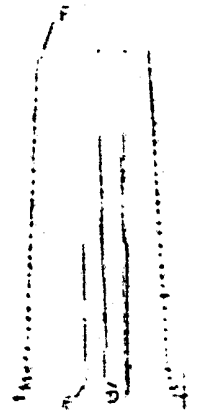
GAS RECOVERY MEASURED WITH

Time	Orifice	Pressure	H2O	Rate
mins.	mm	Kpa	mm	M3/D

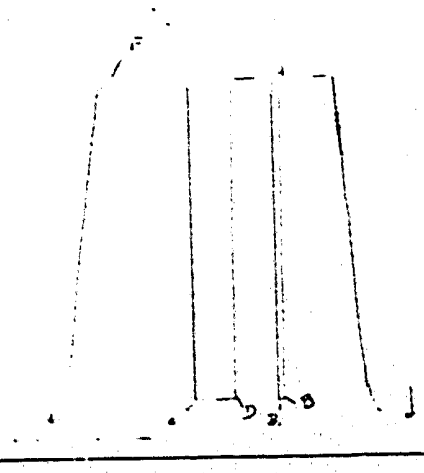
NORTHSTAR DRILLSTEM TESTERS

NSM Windy Island A53-65-00-125-30 T.#1616 DST.#2

Recorder #7418



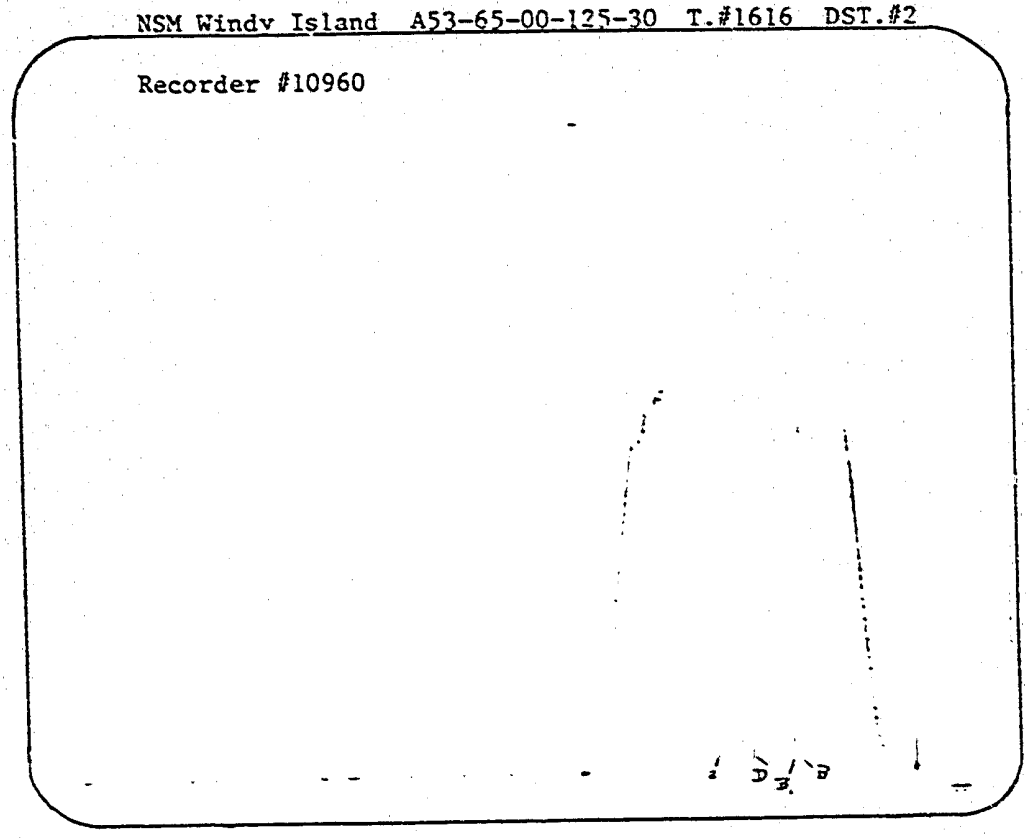
Recorder #10959



NORTHSTAR DRILLSTEM TESTERS

NSM Windy Island A53-65-00-125-30 T.#1616 DST.#2

Recorder #10960



NORTHSTAR DRILLSTEM TESTERS

WELL NAME NSM Windy Island A53-65-00-125-30 TICKET NO. 1617 D.S.T. NO. 3

DATE 85/02/06
Formation: Ronning
Type of Test Straddle

COMPANY	NSM Resources Ltd.		
WELL NAME	NSM Windy Island		
WELL LOCATION	A53-65-00-125-30	DST. 3	
INTERVAL	1100-1105m.	TOTAL DEPTH	1500.00 m.
KELLY BUSHING	103.23 m.	GR. ELEVATION	99.00 m.
NET PAY	m.		

RECORDER DATA (all measurement are 'si')

Preflow	10 MINS
Initial Shut In	10 MINS
Second Flow	MINS
Final Shut In	MINS

	kPa	kPa	kPa	kPa
A. Init. Hyd.				
B. First Flow		894	545	
B1. Final Flow		918	602	
C. Init. Shut				
D. Init. Flow				
E. Final Flow				
F. Final Shut				
G. Final Hyd.		13448	13377	

	Inside	Outside	Outside
Recorder	7418	10959	10960
Range	22753	23097	23442
Clock	48	24	24
Depth	1091.00	1101.00	1101.00

RECOVERY

Total Fluid m of m in D.C. and m in D.P

REMARKS & BLOW DESCRIPTION

Preflow: Weak air blow.
Well began to flow on initial shut in. Tool was pulled l ~e and bar was dropped to reverse circulate and kill well.

TEST Misrun

INFLATE

Reversing Sub	0.30
D.P.	0.30
Drill Collars	
R.T.V.	1.73
Spacer	0.45
Reciprocating Joint	1.70
Recorder #7418	1.47
Jars	2.40
Safety Joint	0.65
Pump	0.86
Screen	1.34
Deflate	0.90
Screen	
ABOVE INTERVAL 13.89	
Packer	1.78
Depth m 1100.00	
Stub	0.86
Recorder #10959 & #10960	1.70
Spacing	2.10
Stub	0.42
Depth m 1105.08	
TOTAL INTERVAL 5.08	
Packer	1.86
Drag Spring	1.09
TOTAL TEST TOOL 21.91	
Total Depth m 1500.00	
CUSTOMER REP. Max Stoopler	
TESTER Lance White	

NORTHSTAR DRILLSTEM TESTERS

HOLE AND TEST DESCRIPTION

Time Started	21:00Hr.
Time on Bottom	00:10Hr.
Time Open	00:20Hr.
Time Pulled	10:00Hr.
Time Out	12:45Hr.
Tool Weight	2000 daN
Weight Set On Packer	8000 daN
Weight Pulled Loose	15000 daN
Initial String Weight	31000 daN
Unseated String Weight	31000 daN
Bottom Choke	19.05 mm
Hole Size	222 mm
Drill Collar I.D.	61.00 mm
Drill Pipe I.D.	75.00 mm
Drill Collar Length	83.38 m
Drill Pipe Length	1008.48 m

MUD DATA

Mud Type	Gel Chem	
Weight	1150	kg/m^3
Viscosity	51	S/L
Water Loss	12.20	cm^3
Filter Cake	2.00	mm
Mud Drop	Nil	m
Amount of Fill		m
Bottom Hole Temp.		C
Porosity %		
Hole Condition	Good	

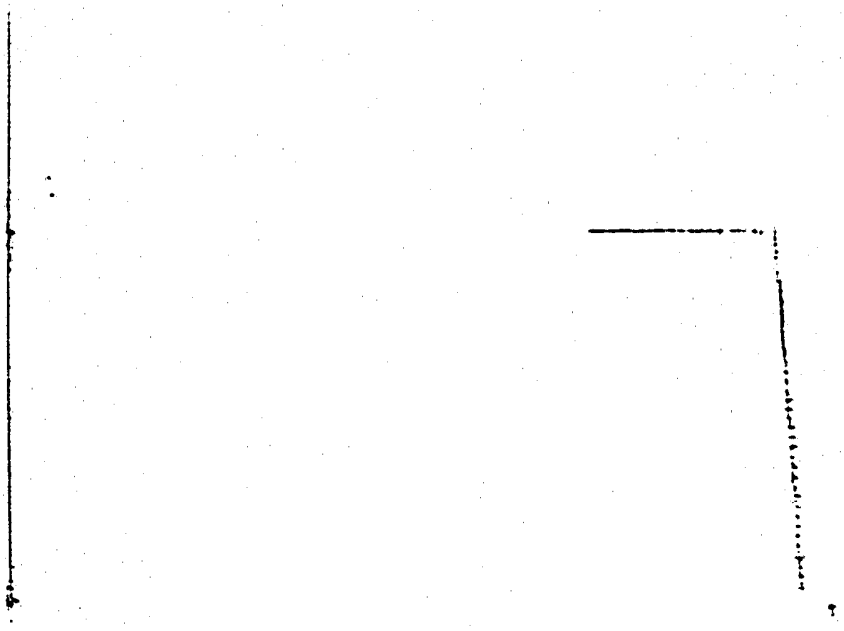
GAS RECOVERY MEASURED WITH

Time	Orifice	Pressure	H2O	Rate
mins.	mm	Kpa	mm	M3/D

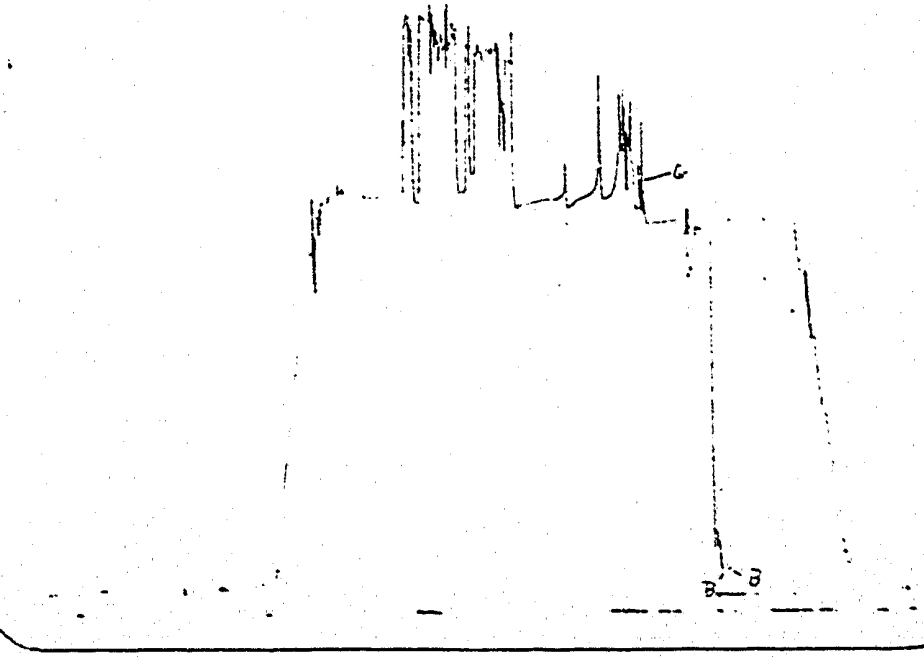
NORTHSTAR DRILLSTEM TESTERS

NSM Windy Island A53-65-00-125-30 T.#1617 DST.#3

Recorder #7418



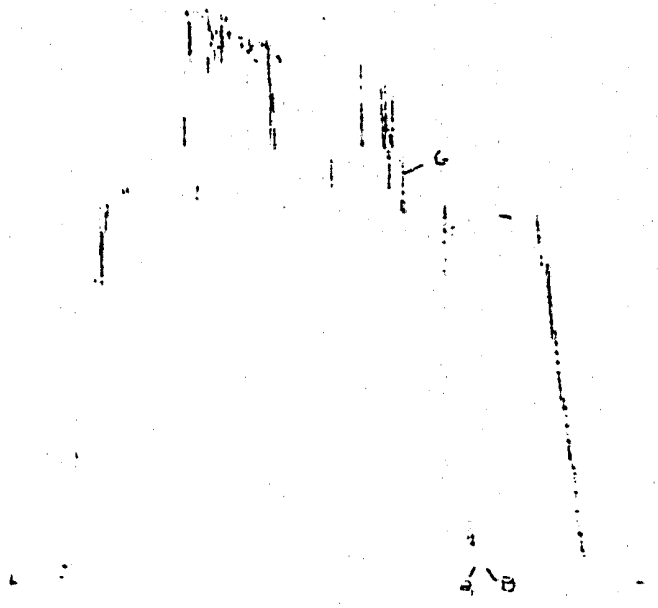
Recorder #10959



NORTHSTAR DRILLSTEM TESTERS

NSM Windy Island A53-65-00-125-30 T.#1617 DST.#3

Recorder #10960



NORTHSTAR DRILLSTEM TESTERS

DATE 85/02/07
Formation: Ronning
Type of Test Straddle

COMPANY	NSM Resources Ltd.		
WELL NAME	NSM Windy Island		
WELL LOCATION	A53-65-00-125-30	DST. 4	
INTERVAL	1100-1125m.	TOTAL DEPTH	1500.00 m.
KELLY BUSHING	103.23 m.	GR. ELEVATION	98.00 m.
NET PAY	m.		

RECORDER DATA (all measurement are 'si')

Preflow	10 MINS
Initial Shut In	60 MINS
Second Flow	90 MINS
Final Shut In	180 MINS

	kPa	kPa	kPa	kPa
A. Init. Hyd.	12435	12482	12446	
B. First Flow		1700	1470	
B1. Final Flow		2187	2465	
C. Init. Shut	12431	12315	12274	
D. Init. Flow	2700	3255	2982	
E. Final Flow	9791	9856	9916	
F. Final Shut	11525	11572	11558	
G. Final Hyd.	12387	12386	12361	

	Inside	Outside	Outside
Recorder	7418	10959	10960
Range	22753	23097	23442
Clock	48	24	24
Depth	1091.00	1101.00	1101.00

RECOVERY

Total Fluid 980m of 56m in D.C. and 924m in D.P
980m of salt water

REMARKS & BLOW DESCRIPTION

Preflow: Fair air blow, increasing to strong.
Packers skidded when setting down to open for second flow. Pumped for for 15 minutes. Packers held on second attempt.
Second Flow: Strong blow decreasing gradually after 20 minutes.

TEST Successful

INFLATE

Reversing Sub	0.30
D.P.	0.30
Drill Collars	
R.T.V.	1.73
Spacer	0.45
Reciprocating Joint	1.70
Recorder #7418	1.47
Jars	2.40
Safety Joint	0.65
Pump	0.86
Screen	1.34
Deflate	0.90
Screen	
ABOVE INTERVAL 13.88	
Packer	1.78
Depth @ 1100.00	
Stub	0.86
Recorder #10959 & #10960	1.70
Spacing	2.10
Xo Sub	0.30
D.P.	19.48
Xo Sub	0.30
Stub	0.42
Depth @ 1125.18	
TOTAL INTERVAL 25.16	
Packer	1.86
Drag Spring	1.09
TOTAL TEST TOOL 22.51	
Total Depth @ 1500.00	
CUSTOMER REP. Max Stoppler	
TESTER Lance White	

WELL NAME NSM Windy Island A53-65-00-125-30 TICKET NO. 1618 D.S.T. NO. 4

NORTHSTAR DRILLSTEM TESTERS

HOLE AND TEST DESCRIPTION

Time Started	16:30Hr.
Time on Bottom	19:00Hr.
Time Open	20:00Hr.
Time Pulled	02:05Hr.
Time Out	06:00Hr.
Tool Weight	2000 daN
Weight Set On Packer	8000 daN
Weight Pulled Loose	45000 daN
Initial String Weight	30000 daN
Unseated String Weight	35000 daN
Bottom Choke	19.05 mm
Hole Size	222 mm
Drill Collar I.D.	61.00 mm
Drill Pipe I.D.	75.00 mm
Drill Collar Length	56.31 m
Drill Pipe Length	1036.36 m

MUD DATA

Mud Type	Gel Chem	
Weight	1150	kg/m^3
Viscosity	51	S/L
Water Loss	12.20	cm^3
Filter Cake	2.00	mm
Mud Drop	Nil	m
Amount of Fill		m
Bottom Hole Temp.		C
Porosity %		
Hole Condition	Good	

GAS RECOVERY MEASURED WITH

Time	Orifice	Pressure	H2O	Rate
mins.	mm	Kpa	mm	M3/D

NORTHSTAR DRILLSTEM TESTERS

WELL NAME NSM Windy Island DST 4

Interval 1100 - 1125 metres Recorder #10959 at 1101 metres Ticket # 1618

INITIAL SHUT-IN CUMULATIVE PRODUCING TIME= 10.0 minutes

TIME	T+DeltaT / DeltaT	psig	psig^2 10^6	kPa	kPa^2 10^6
0.0		317.2	0.101	2187	4.783
6.0	2.67	1788.5	3.199	12331	152.054
12.0	1.83	1796.4	3.227	12386	153.413
18.0	1.56	1801.4	3.245	12420	154.256
24.0	1.42	1804.0	3.254	12438	154.704
30.0	1.33	1805.0	3.258	12445	154.878
36.0	1.28	1805.0	3.258	12445	154.878
42.0	1.24	1804.0	3.254	12438	154.704
48.0	1.21	1804.0	3.254	12438	154.704
54.0	1.19	1804.0	3.254	12438	154.704
60.0	1.17	1809.3	3.274	12475	155.626

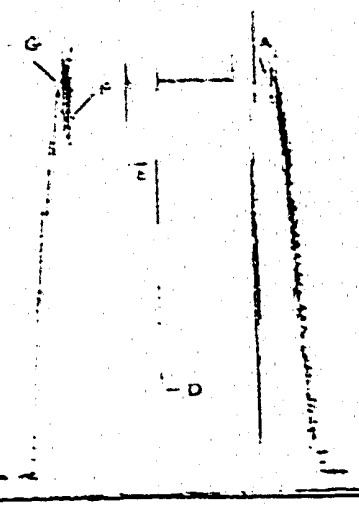
FINAL SHUT-IN CUMULATIVE PRODUCING TIME= 100.0 minutes

TIME	T+DeltaT / DeltaT	psig	psig^2 10^6	kPa	kPa^2 10^6
0.0		1429.5	2.043	9850	97.141
10.0	9.33	1657.9	2.749	11431	130.668
20.0	5.17	1654.3	2.737	11406	130.097
30.0	3.78	1655.2	2.740	11412	130.234
40.0	3.08	1655.2	2.740	11412	130.234
50.0	2.67	1652.6	2.731	11394	129.823
60.0	2.25	1655.6	2.741	11415	130.302
70.0	2.11	1657.5	2.747	11428	130.599
80.0	2.00	1657.5	2.747	11428	130.599
90.0	1.83	1657.9	2.749	11431	130.668
100.0	1.77	1657.9	2.749	11431	130.668
110.0	1.71	1658.5	2.751	11435	130.759
120.0	1.67	1658.5	2.751	11435	130.759
130.0	1.63	1657.2	2.746	11426	130.553
140.0	1.59	1657.2	2.746	11426	130.553
150.0	1.56	1657.2	2.746	11426	130.553

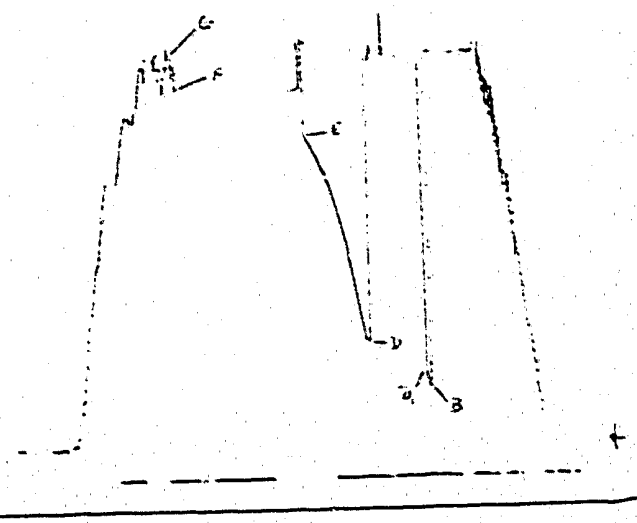
NORTHSTAR DRILLSTEM TESTERS

NSM Windy Island A53-65-00-125-30 T.#1618 DST.#4

Recorder #7418



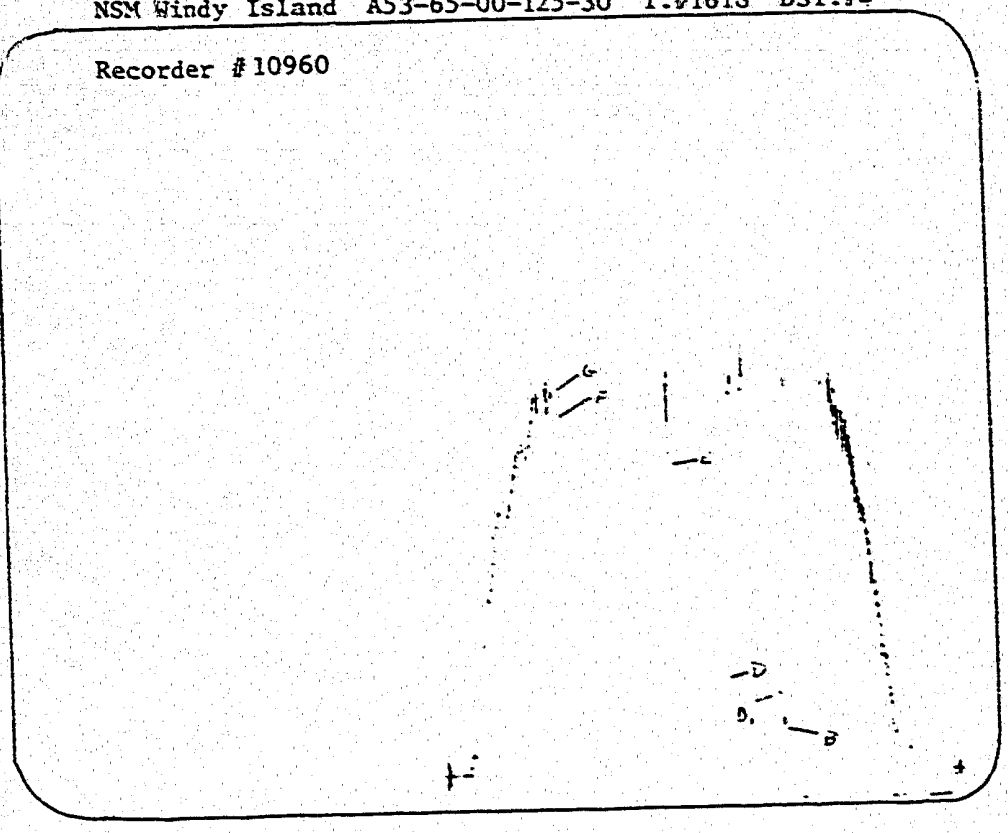
Recorder #10959



NORTHSTAR DRILLSTEM TESTERS

NSM Windy Island A53-65-00-125-30 T.#1618 DST.#4

Recorder #10960



ATTACHMENT 10

GEOTECH Analytical

NSM WINDY ISLAND

A53-65-00-30

Water Analysis

Prepared for

NSM RESOURCES LTD.

FILE 85-AS-5114

ORIGINAL

MARCH 04, 1985

tti GEOTECHnical resources ltd
4500 - 5th STREET N.E. CALGARY, ALBERTA T2E 7C3 (403) 230-4128
TELEX 03-825879

tti **GEOTECHnical resources ltd.**

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5114

LABORATORY NUMBER: 5114-W1

CONTAINER IDENTITY:

WATER ANALYSIS

OPERATORS NAME: NSM RESOURCES LTD

SAMPLE LOCATION:

WELL NAME: NSM WINDY ISLAND A53 — A53-65-00-30

KB ELEVATIONS: 103.23 GRD: 96.00

FIELD OR AREA:

POOL OR ZONE: RONNING

NAME OF SAMPLER:

COMPANY: NORTHSTAR

TEST RECOVERY: 30 m MUD

TEST TYPE: DST NO. 2

MULTIPLE RECOVERY:

TEST INTERNAL FROM: 982.5 TO 987.5

PERFORATIONS FROM: TO:

SAMPLING POINT: TOP OF TOOL

AMT. AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

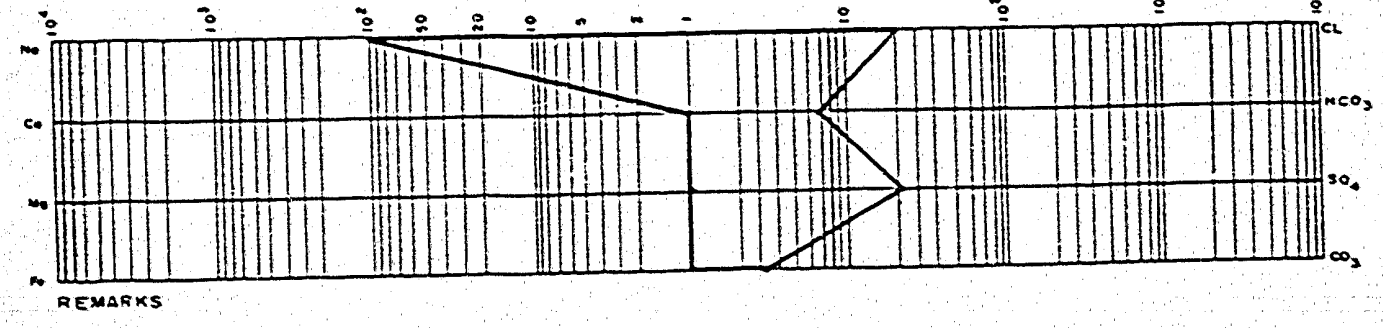
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE kPa					
TEMPERATURE (°C)					

DATE SAMPLED Y – M – D H:M	DATE RECEIVED Y – M – D	DATE ANALYZED Y – M – D	ANALYST
85-02-06	85-02-22	85-02-28	KJ/HD

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	27	g/m^3
TOTAL ALKALINITY	539	g/m^3
SALINITY	0.14	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	3.97	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* No Temperature Data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

FILE NUMBER: 85AS5114

LABORATORY NUMBER: 5114-W1

OPERATOR'S NAME: NSM RESOURCES LTD

WELL NAME: NSM WINDY ISLAND A53

LOCATION: A53-65-00-30

SAMPLING POINT: TOP OF TOOL

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	2320	0.49	100
K	28.0	0.01	0.7
Ca	1.40	0.00	0.07
Mg	4.96	0.00	0.41
Ba	0.080	0.00	0.001
Sr	3.26	0.00	0.07
Fe	< 0.03		
Mn			
Al			
Si			
B	0.910		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	744	0.16	20
Br			
I	< 1.00		
F			
HCO_3	466	0.10	7
CO_3	94.1	0.02	3.1
OH	0.000	0.00	0.000
SO_4	1050	0.22	21
H_2S			
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	4711

SPECIFIC GRAVITY	REFRACTIVE INDEX (RI)
at 15°C	1.347 at 25°C

OBSERVED pH	RESISTIVITY (Rw) Ω·m
8.83 at 25°C	0.762 at 25°C

REDOX POTENTIAL (E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS:

ttl GEOTECHnical resources ltd.

4500 - 5th STREET N.E., CALGARY, ALBERTA T2E 7C3

(403) 230-4128

GEOTECH Analytical

FILE NUMBER: 85AS5114

LABORATORY NUMBER: 5114-H2

WATER ANALYSIS

CONTAINER IDENTITY:

OPERATOR'S NAME: NSM RESOURCES LTD

SAMPLE LOCATION:

WELL NAME: NSM WINDY ISLAND A53 A53-65-00-30

ELEVATIONS KB: 103.23 GRD: 96.00

FIELD OR AREA:

POOL OR ZONE: RONNING

NAME OF SAMPLER:

COMPANY: NORTHSTAR

TEST RECOVERY:

TEST TYPE: DST NO. 4

MULTIPLE RECOVERY:

TEST INTERVAL FROM: 1100 TO 1125

PERFORATIONS FROM: TO:

SAMPLING POINT: TOP OF TOOL

AMT AND TYPE OF CUSHION:

MUD RESISTIVITY (Ω/m):

PUMPING: FLOWING: GAS LIFT: SWAB:

WATER: m^3/d OIL: m^3/d GAS: $10^3 m^3/d$

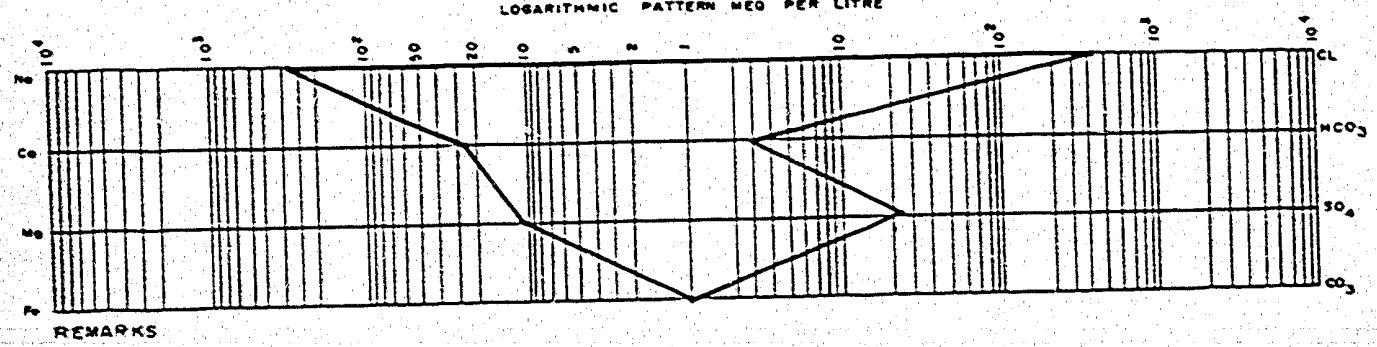
	SEPARATOR	TREATER	RESERVOIR	SAMPLED	RECEIVED
GAUGE PRESSURE kPa					
TEMPERATURE (°C)					

DATE SAMPLED Y - M - D H:M	DATE RECEIVED Y - M - D	DATE ANALYZED Y - M - D	ANALYST
85-02-09	85-02-22	85-02-28	KW/DH

SUMMARY DATA

TOTAL HARDNESS AS $CaCO_3$	1958	g/m^3
TOTAL ALKALINITY	154	g/m^3
SALINITY	2.76	%
SATURATION INDEX	*	
STABILITY INDEX	*	
CORROSION TENDENCY	148.06	

LOGARITHMIC PATTERN MEQ PER LITRE



REMARKS

* No Temperature Data

WATER ANALYSIS

DETAILED REPORT

GEOTECH Analytical

OPERATOR'S NAME	NSM RESOURCES LTD
WELL NAME	NSM WINDY ISLAND A53
LOCATION	A53-65-00-30
SAMPLING POINT	TOP OF TOOL

FILE NUMBER: 85AS5114

LABORATORY NUMBER: 5114-W2

CATIONS

ION	g/m³	MASS FRACTION	MEQ/L
Na	8500	0.33	369
K	68.0	0.00	1.7
Ca	528	0.02	26
Mg	144	0.01	11
Ba	0.110	0.00	0.002
Sr	31.1	0.00	0.7
Fe	6.85	0.00	0.37
Mn			
Al			
Si			
B	1.43		
U			
Th			

ANIONS

ION	g/m³	MASS FRACTION	MEQ/L
Cl	15300	0.59	433
Br			
I	< 1.00		
F			
HCO_3	187	0.01	3
CO_3	0.000	0.00	0.000
OH	0.000	0.00	0.000
SO_4	1080	0.04	22
H_2S			
PO_4			

TOTAL SOLIDS (g/m³)

EVAPORATED AT 110°C	EVAPORATED AT 180°C
AT IGNITION	CALCULATED
	25846

SPECIFIC GRAVITY	REFRACTIVE INDEX (Rf)
@ 15°C	1.352 @ 25°C

OBSERVED pH	RESISTIVITY (Rw) Ω·m
7.95 @ 25°C	0.240 @ 25°C

REDOX POTENTIAL (E_h)	DISSOLVED O_2
	g/m³

TOTAL METALS

METAL	g/m³
Fe	
Mn	

REMARKS: