CONOCO

ET AL

EAST MacKAY I-55

9211-C90-1-1

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

D.A. #1377

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: Conoco et al East Mackay I-55

Operator: Conoco Canada Limited — Drilling Program No.: N/A

Contractor: Atco/Equtak Drilling — Permit or Lease No.: EL 315 (formerly EA 233)

Drilling Rig or Unit: 76 — Estimated Well Cost: $3,200,000

Location-Unit: I — Section: 55 — Grid Area: 64°50', 125°30'

Coordinates: Lat.: North 64°44' 43.3084" — Long.: West 125°39' 44.0266"

Area: Fort Norman, N.W.T. — Field/Pool: Wildcat

Elevation-RT/KB: GR-253.6m KB-258m (ASL) — Seafloor: N/A (BRT)

Approx. Spud Date: January 8, 1988 — Estimated Days on Location: 35

Anticipated Total Depth: 2134m KB — Target Horizon(s): Hume, Bear Rock (Devonian)

UWI: 300I556450125300

EVALUATION PROGRAM

Ten-metre sample intervals: None

Five-metre sample intervals: 35m to TD

Canned sample intervals: ALL

Conventional cores at: Geologist's Discretion

Logs and Tests: DIFL-Sonic-SP-GR, CNL-LDT-GR-CAL-PE TD to 560m
VSP DST's may be run after logging

CASING AND CEMENTING PROGRAM

O.D	Weight	Grade	Setting Depth m KB Below Seafloor	Cementing Program (Volumes)
508mm	139.9 kg/m	H40,STC	0-35m	cement to surface (5.5 tonnes)
244.5mm	53.6 kg/m	K55,STC	0-560m	cement to surface (22 tonnes)
139.7mm	23.1 kg/m	K55,LTC	0-2000m	as required
139.7mm	25.3 kg/m	K55,LTC	2000-2134m	as required

B O P Equipment: Diverter on conductor while drilling surface hole
1 annular preventer - 21 mPa, 1 single gate preventer - 21 mPa, 2 single gate preventers - 34 mPa
1 choke manifold - 21 mPa

Other Information

Signed: [signature] — Title: Sr. Production Engineer

Date: January 4, 1988 — Company: Conoco Canada Limited

APPROVAL

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

Signed: [signature]
Engineering Branch

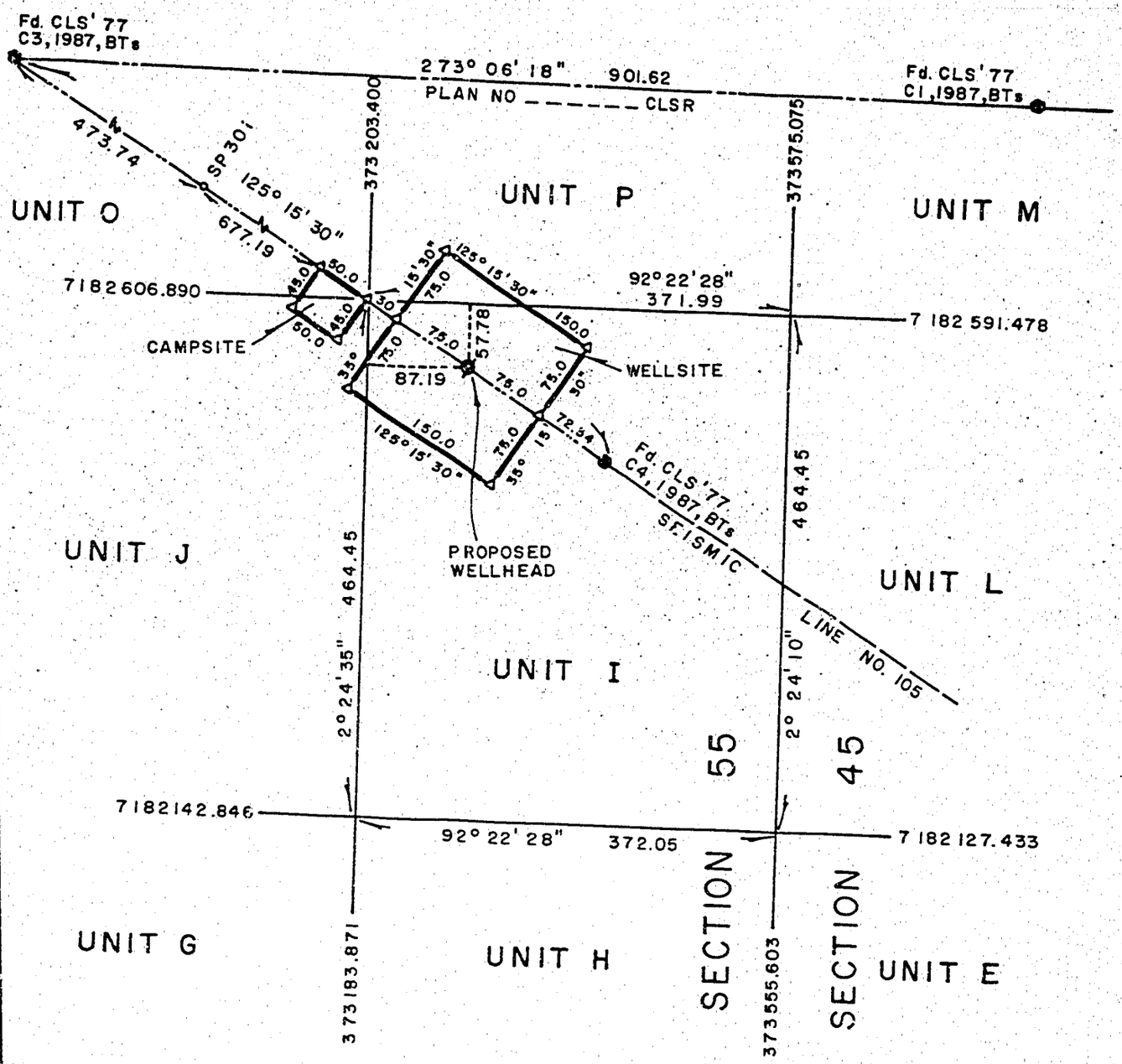
Date: 88-01-07

File: 9211-C90-1-1

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



N.T.S. MAP SHEET: 96 C/13	METRIC	NORTHWEST TERRITORIES

CONOCO CANADA LIMITED

PRELIMINARY SKETCH SHOWING WELL LOCATION

CONOCO ET AL EAST MACKAY I-55

UNIT I, SECTION 55, GRID AREA 64° 50', 125° 30'

CONOCO CANADA LIMITED

J.K. Schmidt

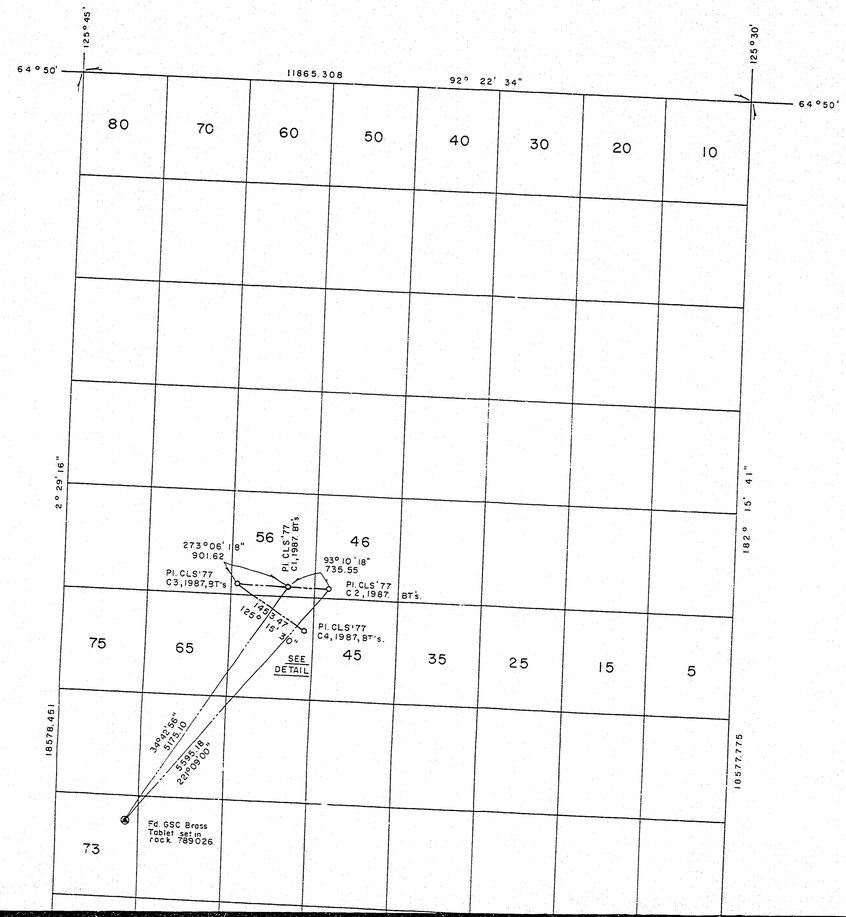
CERTIFIED CORRECT:
THIS 18th DAY OF DECEMBER, A.D. 1987.

D.M. Wynnyk
CANADA LANDS SURVEYOR

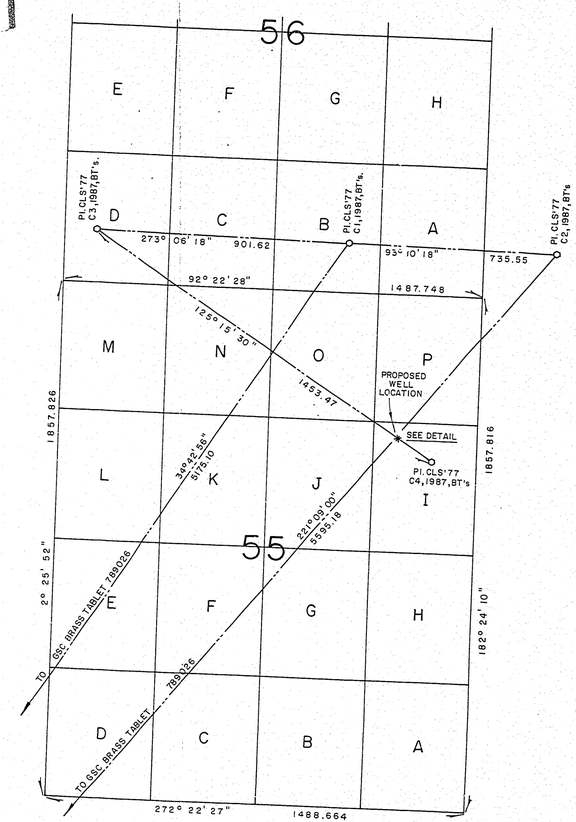
ELEVATION	GEOGRAPHIC CO-ORD'S.	U.T.M. CO-ORDINATES
ON GROUND AT WELLHEAD : 253.60	NORTH LATITUDE: 64°44'43.3084" (64.7453 6344°) WEST LONGITUDE: 125° 39' 44.0266" (125.66222961°)	NORTHING 7 182 545.55 EASTING: 373 288.09 CO-ORDINATES ARE COMPUTED FOR ZONE 10, CENTRAL MERIDIAN 123°W.

LEGEND	AREAS REQUIRED	
Survey Monument found ●	WELLSITE = 5.56 Acres 2.250 ha.	HOSFORD, IMPEY, WELTER AND ASSOCIATES LTD.
Survey Monument placed O	CAMPSITE = 0.56 Acres 0.225 ha.	P.O. BOX 1409, YELLOWKNIFE, X1A 2P1 NORTHWEST TERRITORIES
Traverse Station △	FUEL SITE = — Acres — ha.	
SCALE 1:5000	TOTAL = 6.12 Acres 2.475 ha	FILE NO. Y 87035-1 DATE: Dec 18/87 k. ck'd BG

1 OF



SECTION 55 - GRID
SCALE 1:10000



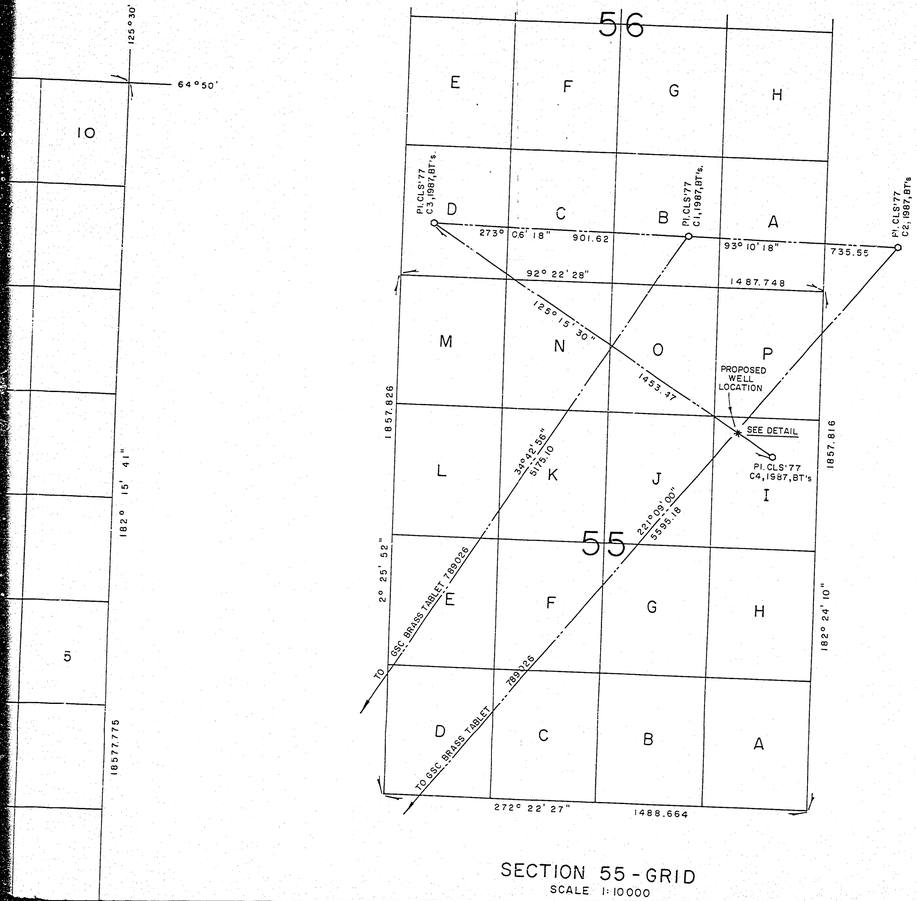
GEOGRAPHIC CO-ORDINATES ZONE 10 (123° W. LONG.)		
STATION	LATITUDE	LONGITUDE
789026	64° 42' 44.5592"	125° 43' 27.5970"
W/S	64° 44' 43.3084"	125° 39' 44.0266"

UTM CO-ORDINATES ZONE 10 (123° W) (NAD 1927)				
STATION	NORTHING	EASTING	ELEVATION	COMBINED FACTOR
789026	7 178 997.710	370 175.557	680.88	0.9996997
C1	7 183 250.408	373 122.056	239.92	0.9997594

OTTAWA COPY

9211-C(92)-17

2 OF



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PROVISIONAL

PLAN AND FIELD NOTES
OF SURVEY OF

PROPOSED EXPLORATORY WELL

CONOCO ET AL EAST MACKAY I-55

EXPLORATION AGREEMENT NO. 215

GRID AREA 64°50', 125°30' (QUAD. 96 C/13)

NORTHWEST TERRITORIES

CANADA OIL AND GAS LAND REGULATIONS

SCALE 1:50 000

0 500 1000 2000 3000 4000 5000 METRES

THIS SURVEY WAS EXECUTED DURING THE PERIOD OF
SEPTEMBER 25th TO DECEMBER 18th., A.D. 1987
BY AMBROSE J. WRZOSEK, C.L.S.
FOR CONOCO CANADA LIMITED

LEGEND

U.T.M. Coordinates are computed for Zone 10 (123° W. Longitude)
Bearings are astronomic, derived from Solar Observation, bearing 34°42'56" of the line between GSC Control Monument 789026 and placed Control Monument C1 and were confirmed by the bearing 305°15'20" on the line between placed monuments C4 and C3, derived from observation on Capella (∝ Aur) and are referred to 123° W. Long.
Distances shown in the traverse are measured distances, reduced to the horizontal at general ground level.

For the computation of coordinates, measured distances have been reduced to the UTM plan by multiplying them by an average combined factor. Co-ordinates for placed Control Monuments C1 and C2 were adjusted using the Compass Rule.

Geodetic Surveys of Canada (GSC) Control Monument found is shown thus ⊕
CLS '77 Post placed is shown thus ○
Traverse line is shown thus ———
Elevations were derived from GSC Monument 789026 and are Trigonometric.
CLS '77 Posts placed are marked with the appropriate Station numbers and the year, 1987.
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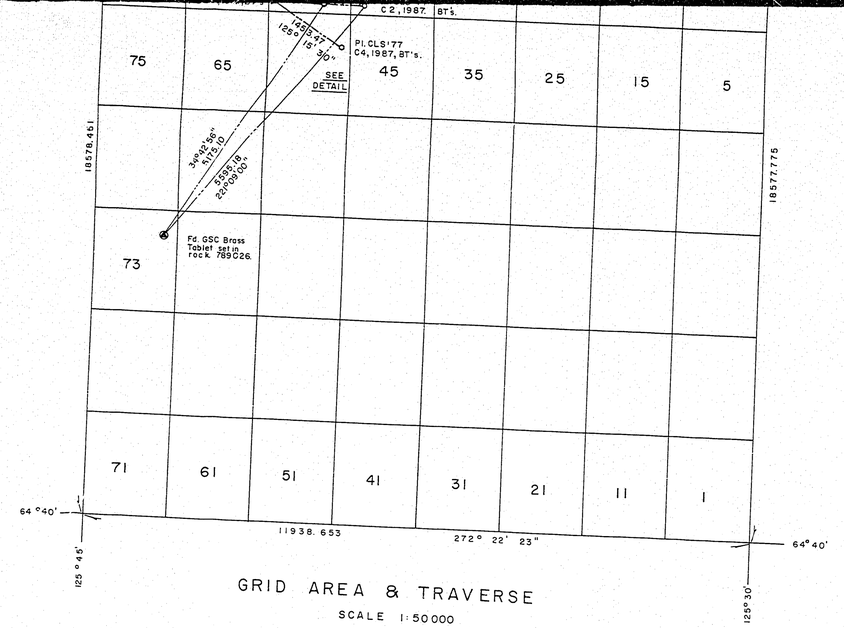
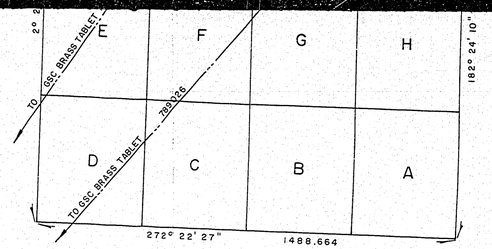
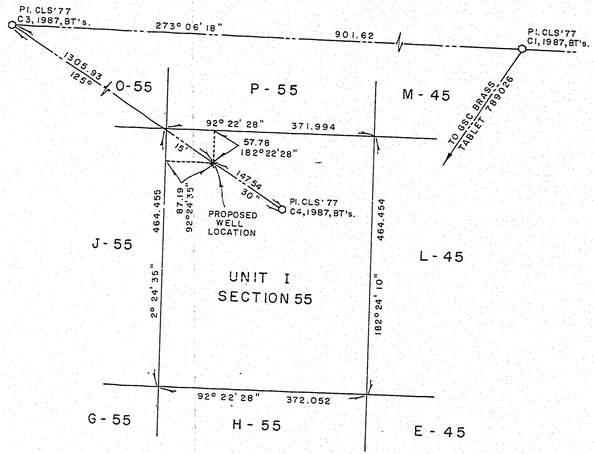
Co-ordinates for Station 789026 were retrieved from the Geodetic Surveys of Canada Data Bank on September 24th. 1987.



GRID AREA & TRAVERSE
SCALE 1:50000



SECTION 55 - GRID
SCALE 1:10000



DETAIL
UNIT I SECTION 55
SCALE 1:5000

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C2	7 183 209.717	373 856.308	233.45	0.9997581
C3	7 183 299.233	372 221.977	252.44	0.9997602
C4	7 182 460.403	373 408.529	252.90	0.9997564
W/S	7 182 545.549	373 288.086	253.60	0.9997567

OIL AND GAS GRID COORDINATES, NAD 1927					
	CORNER	GEOGRAPHIC		UTM ZONE 10, CM 123° W.	
		LATITUDE, N	LONGITUDE, W	NORTHING (m)	EASTING (m)
GRID AREA	NE	64° 50'	125° 30'	7 192 028.986	381 393.424
	NW	64° 50'	125° 45'	7 192 520.913	369 538.318
	SE	64° 40'	125° 30'	7 173 465.679	380 660.371
	SW	64° 40'	125° 45'	7 173 959.969	368 731.955
UNIT I SECTION 55	NE			7 182 591.478	373 575.075
	NW			7 182 606.890	373 203.400
	SE			7 182 127.433	373 555.603
	SW			7 182 142.846	373 183.871

BEARING TREES

C1

0.13 TAMARACK	14.41	307° 13'
0.12 TAMARACK	9.34	24° 39'
0.12 TAMARACK	12.14	62° 51'

C2

0.11 SPRUCE	13.12	310° 25'
0.10 SPRUCE	9.80	134° 32'
0.11 SPRUCE	5.86	213° 44'

C3

0.15 SPRUCE	16.39	210° 47'
0.12 TAMARACK	9.93	341° 28'
0.18 SPRUCE	12.32	69° 24'

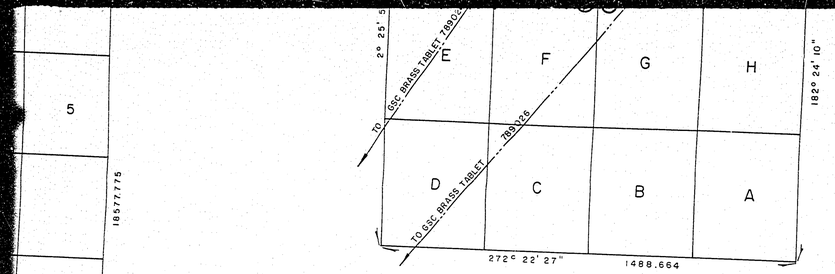
C4

0.18 TAMARACK	9.03	37° 29'
0.19 TAMARACK	14.80	146° 32'
0.19 SPRUCE	8.36	267° 28'

3 of

HOSFORD IMPEY WELTER & ASSOCIATES LTD.
P.O. BOX 1409 YELLOWKNIFE
NORTHWEST TERRITORIES

Drawn by: kgm 12/01/88	FILE NO.
Checked by: BE 13/01/88	Y87035-1



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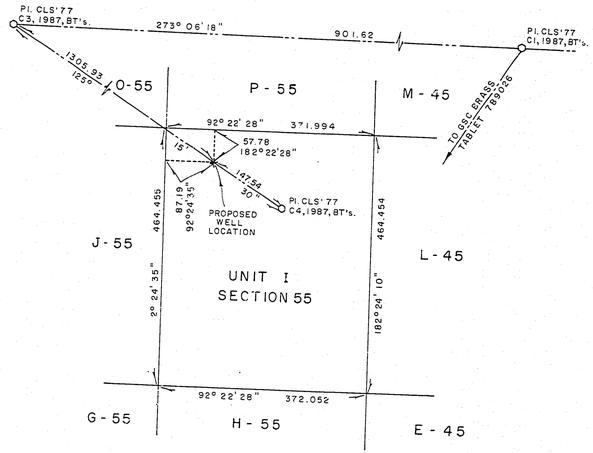

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I, Ambrose J. Wrzosek, of the City of Grande Prairie, in the Province of Alberta, Canada Lands Surveyor, make oath and say that I have, in my own proper person, according to law and the instructions of the Surveyor General of Canada Lands, faithfully and correctly executed the survey shown by this plan and field notes and that the said plan and field notes are correct and true to the best of my knowledge and belief.
SO HELP ME GOD.

SWORN before me at the City of Grande Prairie, in the Province of Alberta, this 22nd day of January, A.D. 1988.

Canada Lands Surveyor.

A.J. Wrzosek
Canada Lands Surveyor.

PROVISIONAL

4 of 4

FINAL WELL REPORT

CONOCO ET AL EAST MACKAY I-55

Prepared by John Schneider

March, 1988

A. INTRODUCTION

1. Summary

The well Conoco et al East Mackay I-55 was spudded January 11, 1988 and reached a total depth of 2165m on February 13, 1988. This was an exploratory well to evaluate the Cretaceous and Devonian aged formations. The rig Atco/Equatak 76, a conventional land rig, was used to drill this well.

The only problems encountered during the drilling operations were minor lost circulation at 740m and deviations of 4° to 5° from 1200m to 1700m. The wireline logs showed no evidence of oil or gas so no DST's were run and the well was plugged and abandoned. The rig was released on February 17, 1988. A map showing the location of the well is attached.

B. GENERAL DATA

1. Well Name: Conoco et al East Mackay I-55
   Unit I, Section 55, Grid Area 64°50', 125°?0'

   Exploration Agreement: EL 315 (formerly EA 233)

2. Location: Geographic Coordinates - North 64°44' 43.3084"
   - West 125°39' 44.0266"

3. Unique Well Identifier: 300I556450125300

4. Operator and Drilling Contractor:

Operator	Drilling Contractor
Conoco Canada Limited 3900, 205 - 5th Avenue S.W. Calgary, Alberta T2P 2V7	Atco/Equatak Drilling Ltd. 700, 800 - 6th Avenue S.W. Calgary, Alberta T2P 3G3

5. Drilling Unit: Atco/Equatak rig 76

6. Difficulties and Delays: None

C. SUMMARY OF DRILLING OPERATIONS

1. Elevations: KB - 259.8 m GR - 253.6 m

2. Total Depth: Driller - 2165 mKB Logger 2161.4 mKB

3. Date and Hour Spudded: 88-01-11 at 1100 hours

4. Date Drilling Completed: 88-02-13 at 0615 hours

5. Date of Rig Release: 88-02-17 at 1800 hours

6. Well Status: Abandoned

7. Hole Sizes and Depths:

Bit Size	Interval
660 mm	0 - 35 m
311 mm	35 - 560 m
222 mm	560 - 2165 m

8. Casing and Cementation Record: See Table 1

9. Sidetracked Hole: None

10. Drilling Fluid: See Table 2

11. Fishing Operations: None

12. Well Kicks: None

13. Formation Integrity Tests:

Depth	Fluid Density (kg/m^3)	Applied Pressure (kPa)	EMW (kg/m^3)	Last Casing Depth
610m	1000	3784	1633	556m

14. Time Distribution

Drilling	456.5
Reaming	28.5
Condition Mud, Circulate	29.5
Trips	149.6
Repair Rig	44.25
Deviation Survey	35.75
Wireline Logs	33
Run and Cement Casing	35
Nipple Up and Test BOP's	61
Drill Cement	5
Other	17.25
TOTAL	895

15. Deviation Survey: Attached

16. Abandonment Plugs:

Type	Depth	Fluid Between Plugs
6 tonnes 0:1:0 class G	2165 - 2065 m	Drilling Mud - 1130 kg/m^3
13 tonnes 0:1:0 class G	760 - 660 m	Drilling Mud - 1130 kg/m^3
5 tonnes 0:1:0 class G	570 - 540 m	Drilling Mud - 1130 kg/m^3
1.2 tonnes 0:1:0 class G	surface	

17. Composite Well Record: Submitted earlier.

D. GEOLOGY

1. Drill Cuttings, Cores, Lithology, Stratigraphic Column, Bio stratigraphic Column: Submitted earlier.

E. WELL EVALUATION

1. Downhole logs:

Date	Run Number	Type	Interval	Company
88-02-13	1	BHC-Sonic-GR	2161.4 - 555.3 m	Schlumberger
88-02-13	2	CNL-LDT-GR	2161.3 - 555.3 m	Schlumberger
		CNL-GR	555.3 - 0 m	Schlumberger
88-02-15	3	DLL	2157.0 - 555.3 m	Schlumberger
88-02-15	4	VSP	2155.0 - 556.0 m	Schlumberger

2. Other Logs: Deviation survey is enclosed.

3. Velocity Surveys: Submitted earlier.

4. Formation Stimulation: None

5. Formation and Production Test Results: None

TABLE 1 - CASING AND CEMENTATION RECORD

Casing Type	Interval	Size	Weight	Grade	Make	# of Jts	Thread	Date Set	Cement	Cement Top
Conductor	0 - 35 mm	508 mm	139.9	H40	VSS	3	BTC	88-01-12	12 tonnes permafrost	surface
Surface	0 - 556mm	244.5mm	53.6	K55	NKK	46	STC	88-01-17	15.4 tonnes permafrost 21 tonnes class G	surface

Table 2 - Drilling Fluid

Date	Depth (m)	Mud Type	Density (kg/m^3)	Viscosity (sec)	Water Loss (cc)
88-01-12	35	Gel/lime	1150	50	-
88-01-13	35	Gel/lime	1150	50	-
88-01-14	171	Gel chem	1155	45	33
88-01-15	350	Gel chem	1115	43	31
88-01-16	530	Gel chem	1200	40	16
88-01-17	560	Gel chem	1220	63	13
88-01-18	560	Gel chem	1210	43	-
88-01-19	600	water	1000	28	-
88-01-20	788	water	1040	29	-
88-01-21	960	Gel chem	1095	34	32
88-01-22	1070	Gel chem	1110	36	17
88-01-23	1150	Gel chem	1150	34	16
88-01-24	1197	Gel chem	1105	34	16
88-01-25	1230	Gel chem	1110	32	16
88-01-26	1267	Gel chem	1095	32	14
88-01-27	1291	Gel chem	1095	32	15
88-01-28	1305	Gel chem	1100	32	15
88-01-29	1341	Gel chem	1100	35	14
88-01-30	1370	Gel chem	1105	35	14
88-01-31	1426	Gel chem	1110	34	15
88-02-01	1473	Gel chem	1100	38	13
88-02-02	1483	Gel chem	1095	40	13
88-02-03	1583	Gel chem	1100	41	13
88-02-04	1691	Gel chem	1100	38	13
88-02-05	1719	Gel chem	1105	38	13
88-02-06	1731	Gel chem	1110	46	13
88-02-07	1847	Gel chem	1115	42	9.5
88-02-08	1909	Gel chem	1110	40	9.4
88-02-09	1931	Gel chem	1130	48	8.2
88-02-10	2023	Gel chem	1120	50	7.8
88-02-11	2078	Gel chem	1125	60	7.6
88-02-12	2164	Gel chem	1125	85	7.8
88-02-13	2165	Gel chem	1120	87	8
88-02-14	2165	Gel chem	1130	130	-
88-02-15	2165	Gel chem	1130	83	7.8
88-02-16	2165	Gel chem	1130	84	-

Table 3 - Deviation Surveys

Depth (m)	Deviation (°)	Depth (m)	Deviation (°)
20	1/2	1230	4 1/8
40	1/2	1260	4 1/8
69	1/2	1268	4 1/4
94	1/4	1278	4 7/8
131	1/2	1288	4 1/4
160	1/4	1297	4 1/8
190	1/4	1307	4 3/8
245	3/4	1316	4 5/8
274	7/8	1325	4 7/8
303	1 1/4	1336	5 1/8
360	3/4	1355	4 7/8
398	1 1/4	1364	5
427	1 1/2	1372	4 1/2
455	1	1383	4 3/4
484	1	1420	5 1/8
550	1	1431	4 7/8
577	1	1450	5
627	1	1469	5 7/8
694	1	1473	5 7/8
768	7/8	1484	5 3/4
835	1	1503	5 1/2
940	1 1/4	1522	4 3/4
997	1 5/8	1550	3 7/8
1045	2	1597	2 1/2
1079	2 1/8	1665	3 7/8
1103	2 1/8	1684	4
1133	3	1710	4 1/4
1160	3	1725	4
1171	3 1/8	1765	3
1184	3 1/2	1801	2
1193	3 3/4	1843	2 1/2
1200	3 1/8	1890	2 3/4
1210	4	1966	2 1/2
1219	4 1/8	2153	7

Table 4 - Bit Record

Bit No.	Size(mm)	Make	Type	Jets	In	Out	Metres	Hrs	Mph	(daN) WOB	RPM	Condition
1	311	Smith	SDI	open	0	35	35	4	9	3-4	120	2-1-I
2	660	HW	X3A	20-20-20	0	35	35	6 3/4	5	3-4	150	2-1-I
3	311	Smith	SDT	16-16-16	35	315	280	16 3/4	17	12-18	150	4-4-I
4	311	Smith	SDT	16-16-16	315	560	245	29 1/2	8	6-12	150	6-4-I
5	222	Smith	SDGH	11-11-11	560	788	228	18 1/2	12.3	15	180	7-3-I
6	222	Sec.	S82F	12-12-12	788	1080	292	39 3/4	7.3	9	130	2-5-I
7	222	Smith	SDGH	12-12-12	1080	1175	95	24 1/4	3.9	4-6	130	7-6-I
8	222	Sec.	S82F	12-12-12	1175	1291	116	58 1/2	2	1	90	
9	222	Smith	F2	12-12-12	1291	1475	184	94 1/8	2	1-2	90	4-5-I
10	222	Smith	F2	12-12-12	1475	1719	244	59 1/4	4.1	12	80/110	4-4-I
11	222	Smith	F2	12-12-12	1719	2165	446	108 1/2	4.1	17	80	8-6-1/8

canadian directional drilling services

DIVISION OF SPERRY-SUN OF CANADA LTD.

DIRECTIONAL DRILLING RECORD

COMPANY Conoco Canada Ltd. FIELD Conoco et al East MacKay JOB NO ______ SHEET 1 OF 2

WELL NAME ______ WELL NO. ______ FIELD ______

TYPE OF SURVEY Mag Multishot OBJECTIVE ______ DATE 5 Feb/88

SUPERVISOR [illegible] DECLINATION 28.9° East

Azimuth	Drift Angle	Direction of Deviation (Quadrant)	Measured Depth	Course Length	Average Drift Angle	Vert. Depth	T.V.D.	Vert. Section	Sect. Dif.	Course Div.	Average Drift Direction	D.D.	North	South	East	West	North	South	East	West	DOG LEG/30m
	0	0	557				557.00														
66.9	.75	N 66.9E	561.65				561.65						.01		.03		.03 m	along	N 66.90	E	4.84
58.9	1.25	N 58.9E	589.71				589.71						.24		.46		.52 m	along	N 62.19	E	.55
57.9	1.25	N 57.9E	617.82				617.81						.56		.98		1.13 m	along	N 60.19	E	.02
64.9	1.50	N 64.90E	646.67				646.65						.89		1.59		1.82 m	along	N 60.74	E	.31
73.9	1.50	N 73.90E	675.52				675.49						1.16		2.29		2.57 m	along	N 63.27	E	.24
66.9	1.50	N 66.90E	704.25				704.21						1.41		3.00		3.32 m	along	N 64.88	E	.19
69.9	1°	N 69.90E	733.12				733.07						1.64		3.59		3.94 m	along	N 65.39	E	.52
64.9	1	N 64.90E	761.44				761.39						1.83		4.04		4.44 m	along	N 65.62	E	.09
52.9	1	N 52.90E	790.07				790.02						2.09		4.47		4.93 m	along	N 64.94	E	.22
42.9	1	N 42.90E	818.92				818.86						2.43		4.84		5.41 m	along	N 63.38	E	.18
62.9	.75	N 62.90E	846.92				846.86						2.69		5.17		5.83 m	along	N 62.53	E	.42
68.9	1	N 68.9E	875.30				875.23						2.86		5.57		6.26 m	along	N 62.79	E	.28
67.9	1.25	N 67.9E	903.67				903.60						3.07		6.08		6.81 m	along	N 63.24	E	.27
67.9	1.25	N 67.9E	932.24				932.16						3.30		6.66		7.43 m	along	N 63.63	E	.01
61.9	1.25	N 61.90E	961.00				960.92						3.57		7.23		8.06 m	along	N 63.73	E	.14
62.90	1.5	N 62.90E	989.70				989.61						3.89		7.84		8.75 m	along	N 63.63	E	.26
78.9	1.5	N 78.90E	1018.64				1018.54						4.13		8.55		9.49 m	along	N 64.20	E	.43
67.9	1.75	N 67.90E	1047.59				1047.48						4.37		9.33		10.30 m	along	N 64.90	E	.41
72.9	1.75	N 72.90E	1076.45				1076.32						4.67		10.16		11.18 m	along	N 65.33	E	.16
69.9	2.25	N 69.90E	1104.89				1104.74						4.99		11.10		12.17 m	along	N 65.81	E	.54
69.9	2.75	N 69.90E	1133.60				1133.43						5.42		12.27		13.42 m	along	N 66.19	E	.52
69.9	3.25	N 69.90E	1162.29				1162.08						5.93		13.68		14.91 m	along	N 66.56	E	.52
67.9	3.50	N 67.90E	1190.65				1190.39						6.53		15.24		16.58 m	along	N 66.80	E	.29
69.9	3.50	N 69.90E	1219.59				1219.22						7.17		16.89		18.34 m	along	N 67.00	E	.13

canadian directional drilling services

DIVISION OF SPERRY-SUN OF CANADA LTD.

DIRECTIONAL DRILLING RECORD

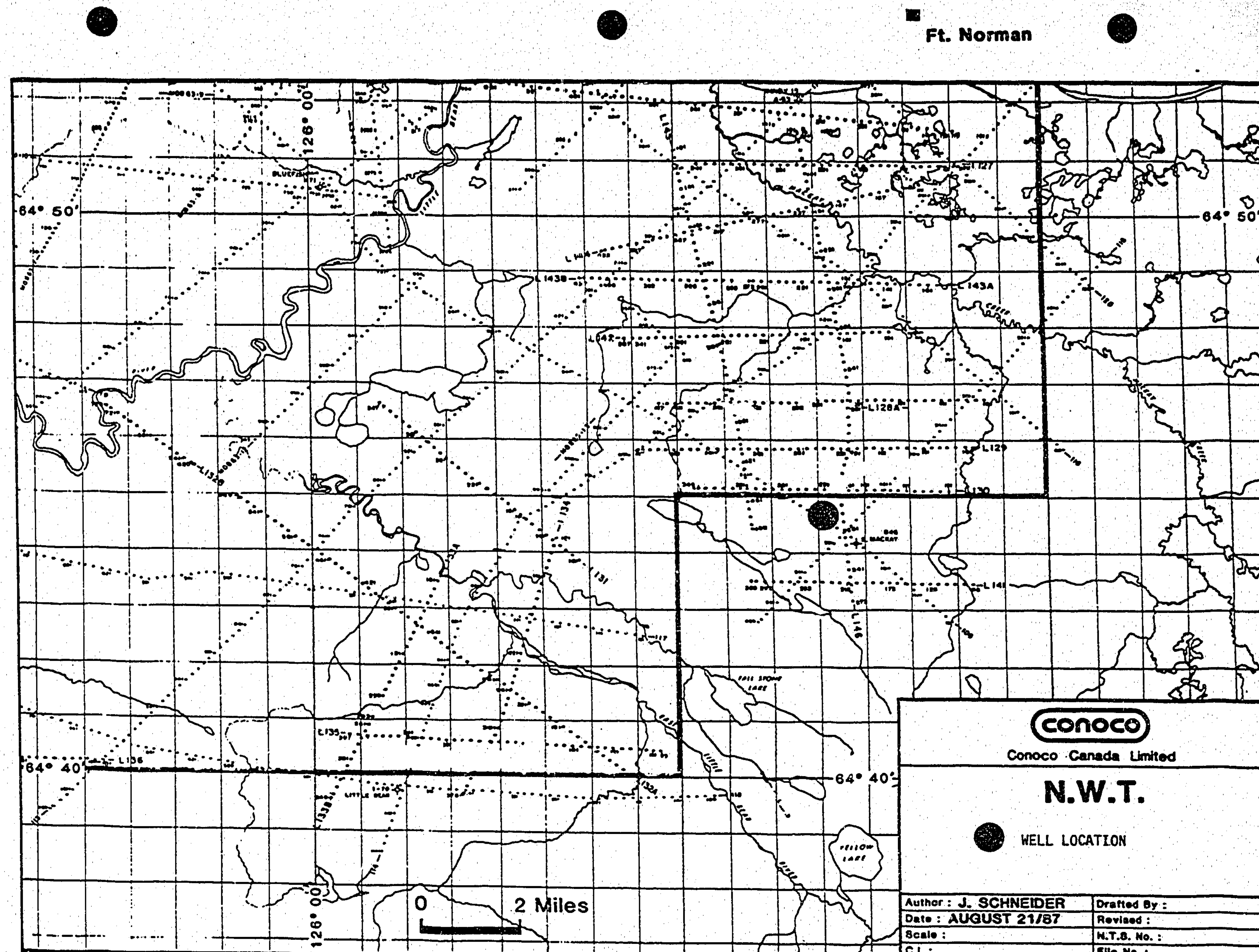
COMPANY: Conoco Canada Ltd. FIELD: Riviere et al East MacKay JOB NO. ____ SHEET 2 OF 2

WELL NAME: ____ WELL NO. ____ FIELD ____

TYPE OF SURVEY: Mag Multi-shot OBJECTIVE ____ DATE ____

SUPERVISOR: [illegible] DECLINATION: 28.9° East

Azimuth	Drift Angle	Direction of Deviation	Measured Depth	Course Length	Average Drift Angle	Vert. Depth	T.V.D.	Vert. Section	Sect. Dif.	Course Dev.	Average Drift Direction	D.D.	North	South	East	West	North	South	East	West	DOG LEG
70.90	4	N70.90E	1248.40				1248.02						7.80		18.60		20.23 m	along	N 67.32E		.52
74.90	4.5	N74.90E	1277.10				1276.64						8.42		20.70		22.34 m	along	N 67.36E		.61
74.90	5	N74.90E	1305.98				1305.42						9.04		23.01		24.72 m	along	N 68.54E		-.52
72.90	5	N72.90E	1334.84				1334.17						9.74		25.42		27.22 m	along	N 69.03E		.18
72.90	5	N72.90E	1363.36				1362.91						10.47		27.80		29.71 m	along	N 69.36E		.01
64.90	5	N64.90E	1391.91				1391.03						11.37		30.11		32.19 m	along	N 69.32E		.73
64.90	5.25	N64.90E	1419.82				1418.81						12.42		32.37		34.67 m	along	N 69.00E		.27
56.90	5.75	N56.90E	1448.48				1447.35						13.76		34.76		37.39 m	along	N 68.40E		.96
56.90	5.75	N56.90E	1477.00				1475.73						15.32		37.16		40.19 m	along	N 67.59E		.01
48.90	5.5	N48.90E	1505.62				1504.21						17.01		39.39		42.91 m	along	N 66.69E		.86
50.90	5.5	N50.90E	1534.46				1532.92						18.79		41.50		45.56 m	along	N 65.64E		.20
24.90	3	N24.90E	1563.77				1561.55						20.34		42.89		47.47 m	along	N 64.63E		3.24
329.90	2	N30.10W	1591.68				1590.04						21.45		42.95		48.01 m	along	N 63.47E		2.60
281.90	2.75	N78.10W	1620.53				1618.87						22.02		42.02		47.44 m	along	N 62.34E		2.13
267.90	3.75	S87.90W	1648.98				1647.24						22.13		40.42		46.09 m	along	N 61.30E		1.39
253.90	4.25	S73.90W	1677.56				1675.78						21.81		38.47		44.22 m	along	N 60.45E		1.15
257.90	4.5	S77.90W	1696.6				1694.84						21.45		37.96		42.82 m	along	N 59.93E		.62



Ft. Norman
64° 50'
126° 00'
64° 40'
L127
L143B
L143A
L142
L128A
L129
L130
L141
L146
L136
L135
L134
L131
0
2 Miles
Conoco
Conoco Canada Limited
N.W.T.
WELL LOCATION
Author : J. SCHNEIDER
Date : AUGUST 21/87
Scale :
C.I. :
Drafted By :
Revised :
N.T.S. No. :
File No. :

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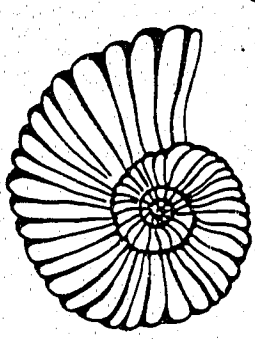

Stratech Services Ltd.

2612 - 13 Avenue N.W., Calgary, Alberta T2N 1L9 Telephone (403) 282-9804

CONOCO CANADA LIMITED

GEOLOGICAL REPORT

CONOCO ET AL EAST MACKAY I-55

I-55-64-50-125-30 (NWT)

Kory Koke, P. Geol.

CONOCO ET AL EAST MACKAY I-55

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CONOCO ET AL EAST MACKAY I-55
WELL DATA SUMMARY

OPERATOR:	CONOCO CANADA LIMITED
WELL NAME:	Conoco et al East Mackay I-55
WELL LOCATION:	I-55-64-50-125-30 (Northwest Territories, Canada)
COORDINATES:	64°44'43.3084" N lat., 125°39'44.0266" W long.
ELEVATIONS:	Ground: 253.60m Kelly Bushing: 259.80m
TOTAL DEPTH:	Drillers: 2165m 12 Feb/88, 06:20 hrs, Bear Rock FM Loggers: 2161.4m
SPUD DATE:	11 January, 1988, 10:00 hrs, Summit Creek? Formation
RIG RELEASE:	
CONTRACTOR:	Atco Equtak Drilling Division, Rig No. 76 (2600m)
SUPERVISION:	Drilling: R. Jones/A. Duperron Geological: K. Koke
LICENCE NUMBER:	DA 1377 (lease #EL 315, formerly lease #EA 233)
AFE NUMBER:	5B-20-0209
SAMPLE STUDY:	5 meter samples 35m to TD, total gas and chromatography 35m to TD.
HOLE SIZE:	Conductor Hole: 660mm Surface Hole: 311mm Main Hole: 222mm
CASING RECORD:	Conductor: 508mm 139.9kg/m H-40 landed @ 35m KB 12 Tonnes permafrost cement, good returns. Surface: 244.5mm 53.7kg/m K-55 landed @ 556m KB Lead 15,4 tonnes permafrost cement, Tail 21 tonnes G (0-1-0) 2% $CaCl_2$ Good returns.

(CONTINUED ON NEXT PAGE)

CONOCO ET AL EAST MACKAY I-55

WELL DATA SUMMARY

OPEN HOLE LOGS: Schlumberger

No. 1	BHCS-GR-CAL	2161.4-555.3m
No. 2	CNL-LDT-GR-CAL	2161.3-555.3m
No. 3	DILL-MSFL-GR	2157.0-555.3m
No. 4	VDL (Velocity Survey) tool @ 2157.0m	

DRILLING FLUIDS:

0-35m Gel-lime WT 1150m, VIS 50
35-560m Gel-chemical WT 1175, VIS 50, WL 20, pH 10, YP 4.0, Solids 3%
560-900m Flocculated water
900-2165m Gel-chemical WT 1115, VIS 35-60, WL 7-14, pH 9.0, YP 1-11, Solids 7%

CONOCO ET AL EAST MACKAY I-55

FORMATION TOPS

KB: 259.8m

FORMATION	SAMPLE DEPTH	SAMPLE SUBSEA	LOGS DEPTH	LOGS SUBSEA
Summit Creek?/E.Fork	0m	+260m	0m	+259.8m
Little Bear	691	-431	689.5	-427.9
Basal Little Bear	1046	-786	1046	-786.2
Slater River	1072	-812	1073	-813.2
Bituminous Zone	1317	-1057	1304.5	-1044.7
Radioactive Mkr.	1326	-1066		
"Sans Sault"	1358	-1098		
Detrital Chert	1383	-1123	1368	-1108.2
Imperial	1421	-1161	1422	-1162.2
Canol	1792	-1532	1788	-1528.2
Hume	1922	-1662	1919	-1659.2
Bear Rock	2119	-1859	2113	-1853.2
Total Depth	2165	-1905	2161.4	-1901.6

CONOCO ET AL EAST MACKAY I-55
DEVIATION SURVEYS

DEPTH	INCLINATION
20m	1/2 degrees
40	1/2
69	1/2
94	1/4
131	1/2
160	1/4
190	1/4
245	3/4
274	7/8
303	1&1/4
340	1
360	3/4
398	1&1/4
427	1&1/2
455	1
484	1
513	1
550	1
577	1
627	1
694	1
768	7/8
835	1
940	1&1/4
997	1&5/8
1045	2
1079	2&1/8

DEPTH	INCLINATION
1103m	2&1/8 degrees
1133	3
1160	3
1171	3&1/8
1184	3&1/2
1193	3&3/4
1200	3&7/8
1210	4
1219	4&1/8
1230	4&1/8
1239	4
1250	4
1260	4&1/8
1268	4&1/4
1278	4&7/8
1288	4&1/4
1297	4&1/8
1307	4&3/8
1316	4&5/8
1325	4&7/8
1336	5&1/8
1355	4&7/8
1364	5
1373	4&1/2
1383	4&3/4
1420	5&1/8
1431	4&7/8

DEPTH	INCLINATION
1450m	5 degrees
1469	5&7/8
1473	5&7/8
1484	5&3/4
1503	5&1/2
1522	4&3/4
1550	3&7/8
1597	2&1/2
1665	3&7/8
1684	4
1710	4&1/4
1697	4&1/2(S78W)
1725	4(S83W)
1765	3(N80W)
1811	2(N42W)
1843	2&1/2(N1W)
1890	2&3/4(N1W)
1966	2&1/2(N6W)
2153	7(N19E)

CONOCO ET AL EAST MACKAY I-55

BIT RECORD

BIT NO.	SIZE	TYPE	SERIAL NO.	DEPTH IN	DEPTH OUT	PROGRESS	HOURS	FOB (1000 daN)	RPM	PP (1000 kPa)	CONDITION T/B/G
1	311mm	SDT	XF8992	0m	35m	35m	4	3-4	120	0.5	2-1-I
2	660	X3A	RT1247	0	35	35	6&3/4	3-4	150	0.5	2-1-I
3	311	SDT	XF8993	35	315	280	16&3/4	12-18	150	6	4-4-I
4	311	SDT	XF8995	315	560	245	29&1/2	6-12	150	6	6-4-I
5	222	SDGH	K21761	560	788	228	18&1/2	15	140	10	7-3-I
6	222	S82F	361512	788	1080	292	39&3/4	8-15	120-140	7-9	2-5-I
7	222	SDGH	K21753	1080	1175	95	24&1/4	4-13	130-140	9.5	7-6-I
8	222	S82F	361306	1175	1291	116	58&1/2	1-6	90-130	7.8-9.5	1-5-I
9	222	F2	XF8906	1291	1475	184	94&1/2	1-11	50-125	7.8	4-5-I
10	222	F2	XF8921	1475	1719	244	59&1/4	12-17	60-110	7.8-8.5	4-4-I
11	222	F2	XF8922	1719	2165	446	108&1/2	12-17	50-95	8.5-9.0	8-6-0(1/8)

CONOCO ET AL EAST MACKAY I-55

DAILY WELL HISTORY

DATE	DAY NO.	DEPTH @0600	MUD PROPERTIES WEIGHT kg/m3	VIS sec.	W.L. ml.	pH	DAILY OPERATIONS
			SPUD 11 January, 1988, 10:00 hrs				
12 Jan	01	35m	1150	50	gel-lime		Pilot 311mm and ream to 660mm hole.
13	02	35					Run and cement 508mm conductor pipe.
14	03	171	1155	45	32.6	11.0	Head up and drill 311mm hole.
15	04	350	1115	43	31.4	10.0	Drill 311mm hole and trip for bit.
16	05	530	1200	40	15.8	9.5	Drill 311mm hole.
17	06	560	1220	63	12.6	9.0	Drill 311mm hole and run 244.5mm casing.
18	07	560	1210	43			Cement casing and head up stack.
19	08	600	1000	28	floc water		Head up stack and drill 222mm hole.
20	09	788	1040	29			Drill 222mm hole.
21	10	960	1095	34	31.6	10.5	Trip for bit and drill 222mm hole.
22	11	1070	1110	36	17.2	10.0	Drill 222mm hole.
23	12	1150	1150	34	15.8	9.0	Trip for bit and drill 222mm hole.
24	13	1197	1105	34	16.2	9.0	Drill 222mm hole and trip for bit.
25	14	1230	1110	32	15.6	9.5	Drill 222mm hole.
26	15	1267	1095	32	14.0	9.5	Drill 222mm hole.
27	16	1291	1095	32	15.0	9.5	Drill 222mm hole.
28	17	1305	1100	32	15.0	9.5	Trip for washed collars, change bit, drill 222mm.
29	18	1341	1100	35	13.9	9.5	Drill 222mm hole.
30	19	1370	1105	35	14.0	9.5	Drill 222mm hole.
31	20	1426	1110	34	15.0	9.5	Drill 222mm hole.

CONOCO ET AL EAST MACKAY I-55

DAILY WELL HISTORY

DATE	DAY NO.	DEPTH @0600	MUD PROPERTIES WEIGHT kg/m3	VIS sec.	W.L. ml.	pH	DAILY OPERATIONS
			SPUD 11 January, 1988, 10:00 hrs (Continued from previous page).				
01 Feb	21	1473m	1100	38	13.0	10.0	Drill 222mm hole.
02	22	1483	1095	40	13.0	9.0	Trip for bit and drill 222mm hole
03	23	1582	1100	41	13.0	9.0	Drill 222mm hole.
04	24	1691	1100	38	13.0	9.5	Drill 222mm hole.
05	25	1719	1105	38	13.0	9.5	Drill 222mm hole, repair kelly, trip for bit.
06	26	1731	1110	46	13.0	9.0	Run in hole and drill 222mm hole.
07	27	1847	1115	42	9,5	9.5	Drill 222mm hole.
08	28	1909	1110	46	9.4	9.5	Drill 222mm hole.
09	29	1931	1130	48	8.2	9.0	Ream to bottom and drill 222mm hole.
10	30	2023	1120	50	7.3	9.0	Work stuck pipe and drill 222mm hole
11	31	2078	1125	60	7.6	9.0	Drill 222mm hole.

CONOCO ET AL EAST MACKAY I-55
GEOLOGICAL SUMMARY

The Conoco et al East Mackay I55 well was drilled in early 1988 to evaluate a Devonian seismic rollover observed on a downthrown fault block near Mackay Ridge. Although some reservior quality rock was observed (especially in the sands of the Little Bear), no oil stain or gas detector anomalies were recorded during the drilling of this well. Sample evaluation was complicated by the presence of from 10 to 80% cavings in the cuttings. Drilling with flocculated water and high water loss mud combined with hole deviations of up to nearly 6 degrees exacerbated this cavings problem. During the last few drilling days, mud viscosities of up to 110 seconds per liter were required to prevent Devonian shales from sloughing. Viscosities of this magnitude can severely suppress gas detector response. Unfortunately, the Hume and Bear Rock Formations (primary and secondary objectives, respectively) contained little or no porosity and displayed no gas or oil shows.

SUMMARY OF FORMATIONS

SUMMIT CREEK?/EAST FORK FORMATIONS - Surface

A unique sequence of grey-green, grey, and medium brown very fine to medium grained glauconitic sandstones may be the equivalent of the Maastrichtian/Paleocene Summit Creek Formation. They are subangular, poorly sorted, argillaceous, and have poor porosity with no shows. Underlying this arenaceous package (at a depth of about 90m in the I-55 well) is the Cretaceous marine East Fork Formation, primarily composed of medium to light grey unconsolidated shale and clay stone. There are numerous bentonitic stringers, arenaceous forams, and beds of light to medium grey siltstone and sandstone in the lower half of this shale. Although some of these sands are unconsolidated in samples,

there was no evidence of reservoir grade porosity or hydrocarbon shows in this unit.

LITTLE BEAR FORMATION 691m

The Little Bear in the I-55 well is a mainly non-marine Cretaceous package composed of sandstone, siltstone, shale, and minor coal, interbedded. The sands are predominant and are mostly unconsolidated, especially near the top. The uppermost 15 to 20m of beds is a conglomeratic sandstone; medium grey to brown, fine to medium grained, abundant varicolored chert pebbles, subangular to subrounded, medium to well sorted, unconsolidated in samples, good porosity, no shows. This rock is undoubted of reservoir quality, and may be prospective where there is closure on the formation. A basal sandstone is also present in the I-55 well, apparently also without closure. Hydrocarbon shows were absent throughout.

SLATER RIVER FORMATION 1072m

This marine sequence of medium to dark grey shales is Lower Cretaceous in age. Although it encloses many stringers of medium to light grey very fine to fine grained sandstone and siltstone, no significant porosity was seen. The importance of this formation is related to the presence of about 45m of black bituminous shales near t· base. This material showed increaced gas readings of up to 40 units background. The presence of significant propanes and butanes indicates that this shale could be a source rock to a suitable closed reservoir. A few meters of non-bituminous shales and siltstones below the bituminous beds may be equivalent to the Cretaceous "Sans Sault" rocks found to the North.

CONOCO ET AL EAST MACKAY I-55
SUMMARY OF FORMATIONS

DETRITAL CHERT ZONE 1383m

In the I-55 well, about 50m of beds containing abundant tan chert directly overly the pre-Cretaceous/post-Devonian unconformity. Plastic black shales showing slickensides enclose boulders and grains of tan to white chert, tan dolomite, brown limestone, grey-green siltstone, and black bituminous shale. This package can be interpreted as Lower Cretaceous detrital beds derived from the erosion of Devonian and Ordovician rocks exposed on pre-Cretaceous highs. A possible source is the Franklin Mountain cherty beds penetrated directly below the Slater River Formation in the CANDEL DECKMG et al EAST MACKAY B-45 well. No porosity or hydrocarbon shows were noted in this zone.

IMPERIAL FORMATION 1421m (Profound unconformity)

In the I-55 well the Devonian Imperial Formation consists of an upper unit of medium grey-green calcareous siltstone overlying a much thinner package of grey-green non-calcareous shale. The Jungle Ridge limestone lentil appears to be removed by erosion in this area. Siltstone is the dominant lithology here, comprising the top 300m or so (about 80%) of the formation. The anomalously high silt content may be due to proximity to areas of high relief during Devonian time. This Formation appears to have no economic potential in the I-55 well.

CANOL FORMATION 1792m

In the I-55 well, the Canol consists of 130m of dark grey-brown to black, brittle, calcareous and siliceous organic rich shales. Gas background increased to the 20 to 40 unit range with abundant butanes and propanes. This Devonian marine shale can be considered a potential source rock to closed reservoirs in the region.

CONOCO ET AL EAST MACKAY I-55
SUMMARY OF FORMATIONS

HUME FORMATION 1922m

The primary objective of the I-55 well, the Hume consists herein of an upper zone of relatively clean bioclastic fossiliferous limestone underlain by a more argillaceous package of interbedded medium to dark brown or grey limestone, light to dark grey-brown marl, and light grey-green to black very calcareous shale. It was hoped that tectonic fracturing of the upper clean limestone unit combined with closure would create a commercial reservoir. In the I-55 well, however, neither significant porosity nor hydrocarbon shows were recorded.

BEAR ROCK FORMATION 2119m

The secondary objective of the I-55 well, the Devonian Bear Rock Formation is herein composed of tan to light grey microcrystalline calcareous dolomite and light grey and tan to medium brown microcrystalline dolomitic limestone. The presence of white to yellow-brown chalky calcareous aggregates at about 2150m may indicate the presence of interbedded anhydrite below this point. It is difficult in samples to determine the exact relationship between limestone and dolomite in the upper Bear Rock, but outcrop data indicates that the material is a brecciated dolomite with a matrix of microcrystalline dolomitic limestone. Although considerable porosity is present in the Bear Rock in some localities, no significant porosity or hydrocarbon shows were noted in the I-55 well.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

0-35m		Samples Missed. Drill conductor hole.
35-40	90%	Sandstone: medium grey-green, very fine to medium grained, poor sorting, subangular, frosted quartz, dark grey chert, glauconite, minor pink to clear feldspar, abundant mica, very argillaceous, friable, poor porosity to tight, no shows.
	10	Casing cement.
40-45	60	Sandstone: as above, poor porosity to tight, no shows.
	35	Shale: medium grey, sandy to silty, carbonaceous in part, blocky to earthy.
	5	Casing cement.
45-50	70	Sandstone: generally as above, most mediumn grey, friable, poor porosity to tight, no shows.
	30	Shale: as above.
50-55	60	Shale: as above, most very silty.
	35	Sandstone: as abovef, poor porosity to tight, no shows.
	5	Casing Cement.
55-60	70	Shale: medium grey to minor medium brown, blocky, earthy, silty, micaceous.
	30	Sandstone: medium grey-green, some medium brown, very fine (mostly) to medium grained, poor sorting, subangular, light to dark grey chert, frosted quartz, pink to clear feldspar, abundant mica, argillaceous, friable, poor porosity to tight, no shows.
60-65	85	Shale: as above, carbonaceous in part.
	15	Sandstone: as above, poor porosity to tight, no shows.
65-70	60	Shale: as above, grading to clay, most washes away.
	40	Sandstone: generally as above, very abundant black chert, some calcareous cement, poor porosity to tight, no shows.
70-75	50	Sandstone: medium grey to medium brown, very fine to fine grained, poor sorting, subangular, dark grey to dark brown chert, minor clear quartz, mica, very argillaceous, friable to hard, clay and minor calcareous cement, poor porosity to tight, no shows.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

70-75m		Continued from previous page.
	50%	Shale: medium grey to medium brown, blocky, commonly silty to sandy, carbonaceous in part, some slightly calcareous.
75-80	85	Shale: as above, most medium brown.
	15	Sandstone: as above, becoming very argillaceous, tight, no shows.
80-85	90	Shale: as above, some medium brown, commonly silty.
	10	Sandstone: as above, grading to argillaceous siltstone, tight, no shows.
85-90	65	Shale: medium grey to medium brown, earthy to blocky, most silty and sandy, carbonaceous in part.
	30	Sandstone: medium grey, very fine to medium grained, poor sorting, subangular, light to dark grey chert, frosted quartz, minor mica, carbonaceous in part, clay and calcareous cement, most argillaceous, friable, poor porosity to tight, no shows.
	5	Casing cement.
90-95	90	Shale: as above.
	10	Sandstone: as above, poor porosity to tight, no shows, caving in part.
95-100	98	Shale: as above, grading to unconsolidated mud.
	2	Sandstone: as above, tight, no shows, cavings.
100-105	95	Shale: as above.
	5	Cavings: medium grey sandstone.
105-110	85	Shale: medium grey, soft, earthy, grading to clay, minor micromicaceous, minor silty or sandy, abundant carbonaceous flakes, a few medium brown calcareous nodules.
	15	Sandstone: medium grey, very fine to fine grained, poor sorting, subangular, light grey to black chert, frosted quartz, argillaceous, clay cement, friable, most unconsolidated in samples, poor? porosity, no shows.
110-115	95	Shale: as above.
	5	Sandstone: generally as above, unconsolidated, minor dark grey chert pebbles, poor porosity?, no shows.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

115-120m	95%	Shale: as above, a few tan gypsum crystals.
	5	Shale: light grey-green, waxy, bentonitic.
120-125	100	Shale: medium grey, earthy, grading to clay, rarely sandy.
125-130	95	Shale: as above.
	5	Sandstone: light grey, medium to coarse grained, rare pebbles, poor sorting, subrounded, black to light grey-green chert, minor frosted quartz, unconsolidated in samples, poor? porosity, no shows.
130-135	100	Shale: medium grey, blocky, earthy, grading to clay, micaceous in part.
135-140	100	Shale: as above, no mica. basically clay.
140-145	100	Shale: light to medium grey or grey-brown, earthy, soft, basically clay.
145-150	100	Shale: minor mica.
150-155	100	Shale: as above.
155-160	100	Shale: medium to light grey, earthy to blocky, soft, basically near unconsolidated clay, minor carbonaceous flakes.
160-165	100	Shale: as above.
165-170	95	Shale: as above.
	5	Shale: light blue-grey, waxy, bentonitic.
170-175	100	Shale: medium to light grey, blocky to earthy, some micromicaceous, grading to unconsolidated clay.
175-180	100	Shale: as above, trace pyrite.
180-185	100	Shale: as above.
185-190	95	Shale: as above.
	5	Shale: light grey, waxy, bentonitic.
190-195	95	Shale: medium to light grey, blocky to earthy, soft, minor micromicaceous, trace carbonaceous flakes, grading to unconsolidated clay.
	5	Shale: light grey bentonitic type as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

195-200m	95%	Shale: medium to light grey, blocky to earthy, soft, minor micromicaceous, trace carbonaceous flakes, grading to unconsolidated clay.
	5	Shale: light grey bentonitic type as above.
200-205	100	Shale: as above, rarely silty, carbonaceous and micromicaceous stringers.
205-210	100	Shale: as above.
210-215	100	Shale: medium to light grey, earthy, soft, grading to clay, some carbonaceous and micaceous stringers.
215-220	100	Shale: as above.
220-225	100	Shale: as above, some micromicaceous.
225-230	100	Shale: as above, micromicaceous in part.
230-235	100	Shale: medium to light grey, soft, earthy, grading to unconsolidated clay, minor carbonaceous and micaceous flakes.
235-240	100	Shale: as above, some micromicaceous.
240-245	100	Shale: as above.
245-250	100	Shale: medium to light grey, soft, earthy, grading to unconsolidated clay, minor carbonaceous and micaceous flakes.
250-255	98	Shale: as above.
	2	Shale: light grey, waxy, bentonitic, thin stringers.
255-260	100	Shale: as above, trace calcite vein fillings.
	tr	Cavings: very coarse quartz/chert sand, unconsolidated.
260-265	100	Shale: as above.
265-270	100	Shale: medium to light grey, soft, earthy, grading to clay, minor bentonitic micaceous stringers with possible coccoliths?

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

270-275m	65%	Shale: as above, becoming more consolidated, some sandy, a few calcite vein fillings.
	30	Sandstone: medium grey, medium to very fine grained, poor sorting, subangular, dark grey-green to black chert, frosted quartz, mica, very argillaceous, grading to sandy shale, clay and calcareous cement, tight, no shows.
	5	Shale: light grey, waxy, bentonitic.
275-280	85	Shale: as above, micromicaceous, more consolidated, Inoceramus prisms.
	10	Sandstone: as above, tight, no shows.
	5	Shale: light grey bentonitic type as above.
280-285	90	Shale: medium grey, micromicaceous in part, earthy, common pelecypod fragments, Inoceramus prisms, one specimen Haplophragmoides sp.
	5	Sandstone: as above, tight, no shows, cavings?
	5	Shale: light grey, waxy, bentonitic.
285-290	90	Shale: as above, abundant carbonaceous flakes.
	5	Shale: light grey bentonitic type as above.
	5	Calcite: white, coxcomb vein fillings up to 3mm wide.
290-295	90	Shale: medium grey, earthy, soft, rarely sandy and micromicaceous stringers, Inoceramus prisms.
	5	Shale: bentonitic type as above.
	5	Calcite: vein fillings as above.
295-300	85	Shale: as above, commonly carbonaceous, some sandy.
	5	Shale: light grey bentonitic type as above.
	5	Calcite: vein fillings as above, some gypsum?
	5	Siltstone: medium grey, argillaceous, carbonaceous, sandy, grading to silty shale.
300-305	60	Shale: as above, commonly silty to sandy.
	20	Sandstone: medium grey, very fine to very coarse grained, minor small dark grey chert pebbles, poor sorting, subangular, very argillaceous to silty, dark grey chert, frosted quartz, carbonaceous, micaceous, fish remains, calcite and clay cement, tight, no shows.
	15	Calcite: and gypsum? light grey coxcomb vein fillings up to 2 or 3mm thick.
	5	Shale: light grey, bentonitic, waxy.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

305-310m	60%	Shale: as above, most very snayd and silty.
	20	Sandstone: as above, tight, no shows.
	10	Shale: light grey bentonitic type as above.
	10	Calcite: vein fillings as above, some gypsum may be present (sulphur smell on heating).
310-315	90	Shale: as above.
	10	Shale: bentonitic type as above.
315-320	90	Shale: medium grey, earthy, soft, grading to clay, scattered carbonaceous stringers, minor pelecypod fragments, a few calcite vein fillings.
	10	Shale: light grey, waxy, bentonitic, may be cavings.
320-325	90	Shale: as above, a few calcite vein fillings.
	5	Chert: dark grey to dark brown small pebbles, floating in shale?, or cavings?
	5	Shale: bentonitic type as above.
325-330	95	Shale: as above, trace Inoceramus.
	5	Shale: bentonitic type as above.
330-335	95	Shale: as above.
	5	Shale: bentonitic type as above.
335-340	95	Shale: medium grey, earthy to occasionally micro-micaceous, grading to clay, carbonaceous, trace pyrite.
	5	Shale: light grey to blue-grey, waxy, bentonitic, cavings in part?
340-345	100	Shale: as above, trace Inoceramus fragments.
345-350	100	Shale: as above, some carbonaceous.
350-355	98	Shale: as above, pelecypod fragments.
	2	Shale: light grey bentonitic type as above, cavings in part.
355-360	100	Shale: medium to light grey, earthy, soft, grading to mud, trace light grey bentonitic stringers, trace pyrite.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

360-365m	99%	Shale: as above.
	1	Shale: light grey, waxy, bentonitic, thin stringers.
365-370	95	Shale: as above, pelecypod fragments, trace medium brown ironstone nodules.
	5	Shale: bentonitic type as above.
370-375	95	Shale: as above.
	5	Chert: light to dark grey subrounded small pebbles, floating in shale?
375-380	90	Shale: medium grey, earthy to micromicaceous, blocky, commonly silty, carbonaceous, sandy in part.
	10	Siltstone: medium grey, argillaceous, sandy, floating light to dark grey coarse grained chert, thin stringers.
	tr	Shale: light blue-grey, waxy, bentonitic.
380-385	90	Shale: as above.
	5	Chert: light to dark grey chert/quartz sand, floating grains in shale, or cavings?
	5	Shale: light grey bentonitic type as above.
385-390	85	Shale: medium to light grey, earthy, soft, grading to mud, calcareous vein fillings.
	10	Shale: light grey, waxy, bentonitic.
	5	Chert: coarse grained sand as above, floating grains?, no shows.
390-395	90	Shale: as above.
	5	Chert: coarse sand as above.
	5	Shale: light grey bentonitic type as above.
395-400	70	Shale: as above, some becoming sandy to silty, abundant tan sideritic nodules and light grey calcareous vein fillings.
	25	Sandstone: medium to dark grey, medium to very coarse grained, abundant small pebbles, poor sorting, subangular to subrounded, dark grey-brown to black chert, frosted quartz, argillaceous, friable, carbonaceous and silty in part, clay and calcareous cement, poor porosity to tight, no shows.
	5	Shale: light grey bentonitic type as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

400-405m	40%	Sandstone: generally as above but very fine to very coarse grained, common small pebbles, commonly silty, poor porosity to tight, no shows.
	40	Shale: as above, very abundant (15%) light brown siderite nodules, most silty to sandy.
	20	Siltstone: medium to light grey, sandy, argillaceous, carbonaceous, calcareous.
405-410	50	Shale: as above, most very sandy to silty, very abundant (25%) light brown siderite nodules, one specimen Ammodiscus sp.
	25	Sandstone: as above, grading to silty shale, tight, no shows.
	25	Siltstone: as above.
410-415	50	Sandstone: medium grey, very fine to very coarse grained, poor sorting, subangular to subrounded, black, dark to light grey chert, frosted quartz, brown , grey, rarely yellow chert pebbles, silty to argillaceous, carbonaceous, clay and calcareous cement, tight, no shows.
	20	Siltstone: medium grey, sandy, argillaceous, carbonaceous, calcareous, common Haplophragmoides cf. gigas.
	20	Shale: medium grey, silty, blocky, carbonaceous.
	10	Siderite: medium brown, microcrystalline, argillaceous, nodules and stringers.
415-420	40	Sandstone: as above, tight, no shows.
	30	Siltstone: as above.
	15	Siderite: as above.
	15	Shale: as above, very silty.
420-425	45	Siltstone: as above.
	25	Sandstone: as above, tight, no shows.
	15	Siderite: as above, stringers and nodules.
	15	Shale: as above, very silty.
425-430	50	Siltstone: as above, very argillaceous and sandy, carbonaceous, grading to silty shale.
	25	Shale: as above, very silty.
	15	Sandstone: as above, grading to siltstone, tight, no shows.
	10	Siderite: nodules and stringers as above.

CONOCO ET AL EAST MACKAY I-55
SAMPLE DESCRIPTIONS

430-435m	50%	Shale: medium grey, blocky, earthy, most very silty, abundant medium brown sideritic nodules or stringers, common areanceous forams, Haplophragmoides cf. gigas
	30	Siltstone: medium grey, argillaceous, sandy, carbonaceous, slightly calcareous.
	20	Sandstone: medium grey, very fine to very coarse grained, common small pebbles, poor sorting, subangular to subrounded, silty to argillaceous, black, light to dark grey chert, frosted quartz, clay cement, tight, no shows.
435-440	40	Shale: as above, Bathysiphon sp., Haplophragmoides sp.
	30	Sandstone: as above, very argillaceous, most very fine grained, grading to sandy shale, tight, no shows.
	30	Siltstone: as above, very argillaceous and sandy.
440-445	40	Sandstone: as above, poor porosity to tight, no shows.
	30	Siltstone: as above, very sandy.
	30	Shale: as above, very silty.
445-450	50	Sandstone: medium grey, very fine to very coarse grained, scattered small pebbles, poor sorting, subangular to subrounded, light to dark grey and black chert, clear to frosted quartz, most very argillaceous and silty, clay and calcite cement, friable, commonly unconsolidated in samples, poor porosity to tight, no shows.
	30	Siltstone: medium grey, very snayd, very argillaceous, carbonaceous, some slightly calcareous.
	20	Shale: medium grey, earthy, blocky, silty to sandy, common Haplophragmoides sp., one Reophax sp., Bathysiphon sp.
450-455	40	Sandstone: as above, common pebbles, poor porosity to tight, no shows.
	30	Siltstone: as above, very sandy.
	30	Shale: as above, very silty.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

455-460m	60%	Sandstone: as above, most medium to fine grained, common small pebbles, friable, most unconsolidated in samples, poor? porosity, no shows.
	20	Shale: as above, common Haplophragmoides sp., contains stringers of light grey to white waxy bentonitic shale.
	20	Siltstone: as above.
460-465	50	Sandstone: as above, most medium to fine grained, unconsolidated in samples, poor? porosity, no shows.
	40	Shale: as above, very silty.
	10	Siltstone: as above.
465-470	80	Shale: medium grey, earthy, soft, grading to mud.
	20	Sandstone: as above, poor? porosity, no shows, cavings in part?
470-475	75	Shale: as above, commonly carbonaceous, silty, areanceous forams (Haplophragmoides sp.), tan sideritic nodules.
	25	Sandstone: medium to light grey, medium to fine grained, minor small pebbles, medium to well sorted, subangular to subrounded, dark grey to black chert, frosted quartz, argillaceous to silty, clay and calcareous cement, poor? porosity to tight, mostly unconsolidated in samples, no shows, may be partly or all cavings.
475-480	65	Shale: as above.
	35	Sandstone: as above, most medium grained, well sorted, unconsolidated in samples, poor? porosity, no shows, probably cavings.
480-485	60	Shale: as above.
	40	Sandstone: as above, medium grained, well sorted, unconsolidated in samples, poor? porosity, no shows, likely cavings.
485-490	70	Shale: medium grey, earthy to micromicaceous, most soft, grading to clay, some silty, carbonaceous in part.
	30	Sand: medium grey, medium grained, well sorted, subangular to subrounded, unconsolidated, no shows, probably cavings.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

490-495m	95%	Shale: as above.
	5	Sand: unconsolidated type as above, no shows, cavings.
495-500	85	Shale: as above, minor medium brown calcareous nodules.
	15	Sand: as above, cavings.
500-505	90	Shale: as above, rare light grey calcareous vein fillings, pyrite.
	10	Cavings: sand as above.
505-510	90	Shale: medium grey, earthy to micromicaceous, most soft, grading to clay, carbonaceous.
	10	Cavings: medium to coarse grained dark chert and quartz sand, scattered dark grey small chert pebbles.
510-515	85	Shale: as above, a few medium brown sideritic nodules.
	15	Cavings: as above.
515-520	80	Shale: as above, medium brown sideritic nodules, some becoming sandy to silty.
	20	Cavings: as above.
520-525	90	Shale: medium grey, earthy to micromicaceous, most soft, grading to mud, carbonaceous in part?
	10	Cavings: fine to very coarse grained medium to dark grey chert grains, scattered small pebbles.
525-530	90	Shale: as above, commonly pyritic.
	10	Cavings: as above, trace coal.
530-535	95	Shale: as above. trace forams.
	5	Cavings: as above.
535-540	80	Shale: as above, common medium brown sideritic nodules.
	10	Siltstone: medium grey, sandy, argillaceous, carbonaceous, slightly calcareous.
	10	Cavings: very fine to fine grained chert/quartz sand, very coarse grains and small pebbles of dark grey-brown chert, subrounded.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

540-545m	40%	Shale: as above, becoming very silty and blocky, abundant forams, mostly Haplophragmoides sp.
	35	Sandstone: light to medium grey, very fine to very coarse grained, poor sorting, subangular to subrounded, dark grey to dark brown chert with frosted quartz, argillaceous to silty, clay cement?, unconsolidated in samples, poor? porosity, no shows, may be cavings in part.
	20	Siltstone: as above.
	5	Cavings: very coarse grains and small subrounded pebbles.
545-550	40	Shale: generally as above, soft to very sandy and silty.
	40	Sandstone: generally as above , most unconsolidated, some well indurated, poor? porosity to tight, no shows.
	20	Siltstone: as above.
550-555	40	Shale: medium grey, blocky, most silty to sandy, carbonaceous in part, Haplophragmoides cf gigas.
	30	Sandstone: medium to dark grey, fine to medium grained, subangular, medium sorting, dark grey to dark brown and black chert with frosted quartz, friable, unconsolidated in sample, matrix of shale and siltstone, poor porosity?, no shows, cavings in part?
	30	Siltstone: medium to dark grey, argillaceous, sandy, carbonaceous, some calcareous.
555-560	50	Sandstone: generally as above, most very fine to fine grained, some to coarse grained, rather dirty and silty looking, poor sorting, subangular to subrounded, unconsolidated, good? porosity, no shows, may be cavings in part.
	30	Shale: as above.
	20	Siltstone: as above.
		244.5mm Surface Casing set at 556.0m KB
560-565	15	Shale: medium grey, micromicaceous, carbonaceous, commonly silty to sandy.
	10	Sandstone: light to medium grey, poor sorting, subangular, silty to argillaceous, clay cement, carbonaceous, friable, poor porosity, no shows.
	15	Cavings: light grey to white quartz sandstone, varicolored rubrounded chert grains and pebbles.
	60	Casing Cement.

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SAMPLE DESCRIPTIONS

565-570m	15	Shale: as above.
	5	Sandstone: as above, poor porosity, no shows.
	20	Cavings: fine to coarse grained chert/quartz sand, some varicolored chert grains and pebbles.
	60	Casing Cement.
570-575	15	Shale: as above.
	5	Sandstone: light grey to white, fine to very coarse grained, scattered small pebbles, subangular to subrounded, poor to medium sorting, mostly pure quartz, silica and kaolin cement, tight, no shows, likely cavings.
	15	Cavings: sand and pebbles as above.
	65	Casing cement.
575-580	5	Shale: medium grey, micromicaceous, carbonaceous, some silty.
	5	Sandstone: light grey to white type as above, tight, no shows, may be cavings.
	5	Cavings: medium to dark grey, black, some varicolored chert pebbles and grains in very fine to fine quartz/chert sand matrix, medium sorting, subrounded to subangular, good? porosity, no shows.
	85	Casing cement: pounded fine, water drilling.
580-585	15	Shale: as above, some very silty to sandy stringers.
	10	Sandstone: light grey to white type as above, most very coarse grained, tight, no shows, cavings in part.
	10	Cavings: chert pebbles in very fine to very coarse sandstone matrix, most unconsolidated, no shows.
	65	Casing cement.
585-590	25	Shale: medium grey, micromicaceous, carbonaceous, flaky to blocky and silty to sandy.
	5	Sandstone: light grey quartz type as above, no show.
	tr	Shale: light grey -green to m green, micromicaceous, waxy, bentonitic.
	10	Cavings: sand: light grey, medium to coarse grained, subangular to subrounded, medium to poor sorting, clear to frosted quartz with light to dark grey chert, a few floating varicolored dark grey and varicolored chert pebbles, no shows.
	60	Casing cement.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

590-595m	25%	Shale: medium grey type as above.
	5	Sandstone: light grey quartz type as above, tight, no shows, cavings?
	tr	Shale: green bentonitic type as above.
	15	Cavings: varicolored chert pebbles, white quartz sandstone fragments, metamorphic rock fragments, subangular to subrounded, poor sorting, matrix of fine to very coarse grained quartz/chert sand, unconsolidated, no shows.
	55	Casing cement.
595-600	20	Shale: medium grey type as above.
	tr	Shale: green bentonitic type as above.
	10	Sandstone: light grey to white, very fine to very coarse grained, medium sorting, subangular to sub-rounded, pure quartz, silica cement, tight, no shows, likely cavings.
	15	Cavings: pebbles and sand as above, no shows, some grains are embedded in casing cement.
	55	Casing cement.
600-605	25	Shale: medium grey type as above.
	15	Sandstone: light grey quartz type as above, poor porosity, no shows, likely cavings.
	15	Cavings: pebbles and sand as above, no shows.
	45	Casing cement.
605-610	5	Shale: medium grey, micromicaceous, flaky, carbonaceous.
	10	Cavings: very fine to very coarse grained light grey to white quartz sandstone, medium to coarse chert sand, no shows.
	85	Casing cement, pounded to dust, water drilling.
610-615	20	Shale: as above, some silty.
	10	Cavings: as above.
	70	Casing cement.
615-620	25	Shale: as above.
	5	Cavings: as above.
	70	Casing cement, pounded to dust, hole not cleaning.
620-625	10	Shale: medium grey, micromicaceous in part, flaky to blocky, common silty stringers.
	10	Cavings: medium to coarse grained sand, white quartz sand, scattered varicolored chert pebbles.
	80	Casing cement.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

625-630m	50%	Shale: as above, trace pyrite.
	10	Cavings: as above.
	40	Casing cement.
630-635	40	Shale: as above.
	5	Cavings: as above.
	55	Casing cement.
635-640	45	Shale: medium to dark grey, micromicaceous to earthy, flaky, carbonaceous in part, commonly silty, some medium brown sideritic stringers.
	15	Shale: light grey-green, micromicaceous, waxy, bentonitic.
	5	Cavings: medium to coarse grained sand and chert pebbles.
	5	Bit metal.
	30	Casing cement.
640-645	70	Shale: most as above, some medium grey-brown to red-brown, sideritic, hard stringers.
	5	Shale: light grey-green bentonitic type as above.
	5	Cavings: as above.
	20	Casing cement.
645-650	60	Shale: medium to dark grey, micromicaceous to blocky, sandy to silty in part, carbonaceous, trace coal stringers.
	5	Shale: light grey-green bentonitic type as above.
	5	Cavings: as above.
	30	Casing cement.
650-655	Sample missed, no material coming over shaker.	
655-660	Sample missed.	
660-665	25	Shale: medium to dark grey, blakc, micromicaceous, some carbonaceous, silty in part, some red-brown, sideritic.
	10	Cavings: very fine to coarse grained quartz/chert sand.
	65	Casing cement.
665-670	55	Shale: as above, mostly black.
	10	Cavings: as above.
	35	Casing cement.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

670-675m	40%	Shale: as above.
	5	Shale: light grey-green, waxy, bentonitic.
	10	Cavings: as above.
	45	Casing cement.
675-680	25	Shale: medium to dark grey, black, micromicaceous in part, some carbonaceous, some silty.
	10	Shale: light grey-green bentonitic type as above.
	5	Cavings: fine grained quartz/chert sand.
	60	Casing cement: mostly pounded to medium to fine grained powder, water drilling, hole not cleaning.
680-685	20	Shale: grey type as above.
	5	Shale: light grey-green bentonitic type as above.
	5	Cavings: as above.
	70	Casing cement.

LITTLE BEAR 691m

685-690	80	Sandstone: medium grey salt and pepper, fine to medium grained, well sorted, angular (crushed grains) to subangular, black, light grey to white, yellow to dark brown chert with clear to frosted quartz, may contain pulverized pebbles, unconsolidated, good porosity, no shows.
	10	Shale: as above.
	10	Casing cement.
690-695	90	Sandstone: as above, good porosity, no shows.
	10	Cavings: casing cement, dark grey shale.
695-700	50	Sandstone: as above. unconsolidated, good porosity, no shows.
	40	Conglomerate: medium brown, varicolored cher pebbles, red, yellow, brown, grey-green, light to dark grey, clear, pounded to shards (water drilling), may have matrix of fine to medium grained sand, unconsolidated, good porosity, no shows.
	10	Cavings: as above.
700-705	60	Sandstone: gnerally as above but medium brown, rusty, unconsolidated in samples, good? porosity, no shows.
	30	Conglomerate: as above, good porosity, no shows.
	10	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

705-710m	90%	Sandstone: light to medium grey salt and pepper, fine to medium grained, medium sorted, angular to subangular, light to dark grey, black, minor varicolored chert with frosted quartz, common chert pebbles, unconsolidated in samples, good porosity, no shows.
	10	Cavings: casing cement and grey shale.
710-715	95	Sandstone: light grey salt and pepper, fine to very fine grained, medium sorting, angular to subangular, light to dark grey chert with frosted quartz, minor chert pebbles, unconsolidated in samples, good porosity, no shows.
	5	Shale: light to medium grey, micromicaceous, silty, waxy.
715-720	95	Sandstone: as above, good porosity, no shows.
	5	Shale: as above.
720-725	70	Sandstone: generally as above but fine to medium grained, medium sorting, minor chert pebbles, unconsolidated in samples, good porosity, no shows.
	15	Shale: medium grey, micromicaceous, carbonaceous, flaky, silty in part.
	15	Casing cement.
725-730	65	Sandstone: fine to medium grained as above, scattered chert pebbles, most grey, minor varicolored, unconsolidated, good porosity, no shows.
	15	Shale: as above.
	20	Casing cement.
730-735		Sample missed, not enough material over shaker.
735-740	25	Sandstone: medium grey, fine grained, medium sorting, subangular, dark grey to black chert with frosted quartz, trace clay cement, unconsolidated, good porosity, no shows.
	25	Shale: medium to dark grey, micromicaceous, silty in part, carbonaceous.
	10	Siltstone: medium to dark grey, sandy, argillaceous, carbonaceous in part.
	40	Casing cement.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

740-745m	40%	Sandstone: generally as above, very fine to fine grained, unconsolidated, good porosity, no shows.
	25	Shale: as above.
	10	Siltstone: as above.
	25	Casing cement.
745-750	75	Sandstone: as above, 10% of sample is small light to dark grey chert pebbles, unconsolidated, good porosity, no shows.
	20	Shale: as above.
	5	Siltstone: as above.
750-755	95	Coal: clean to minor slightly argillaceous.
	3	Lost circulation material.
	2	Shale: as above.
755-760	50	Sandstone: medium grey salt and pepper, medium to very fine grained, medium sorting, subangular, common chert pebbles, light to dark grey, black, minor yellow and green chert, frosted quartz, unconsolidated, good porosity, no shows.
	35	Shale: dark grey to black, micromicaceous, carbonaceous, some silty.
	10	Siltstone: medium grey, argillaceous, sandy, carbonaceous.
	5	Coal: as above.
760-765	40	Sandstone: generally as above but fine to medium grained, no pebbles, unconsolidated, good porosity, no shows.
	35	Shale: dark grey to black, micromicaceous in part, vary carbonaceous.
	25	Coal: argillaceous to minor clean.
765-770	70	Sandstone: medium grey salt and pepper, medium to fine grained, well sorted, subangular, dark to light grey chert with clear to frosted quartz, unconsolidated, good porosity, no shows.
	25	Shale: black carbonaceous type as above.
	5	Coal: argillaceous.
770-775	75	Sadnstone: generally as above, most fine grained, unconsolidated, good porosity, no shows.
	15	Shale: medium grey to black, micromicaceous in part, carbonaceous, some silty.
	5	Siltstone: medium grey, carbonaceous, argillaceous, sandy.
	5	Coal: argillaceous.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

775-780m	60%	Shale: medium grey to black, micromicaceous in part, carbonaceous, some very bituminous with slickensides.
	25	Sandstone: as above, cavings in part, good porosity, no shows.
	15	Siltstone: as above.
780-785	70	Shale: as above, common slickensides.
	20	Siltstone: as above.
	10	Sandstone: as above, good porosity, no shows, cavings.
785-790	80	Shale: dark grey, blocky, carbonaceous, most silty to sandy, some waxy, bituminous, sheared, has slickensides.
	15	Siltstone: medium to dark grey, argillaceous, carbonaceous, sandy.
	5	Cavings: light grey sand, bentonitic shale, coal.
790-795	50	Shale: as above, most very silty, Inoceramus fragments, minor slickensides.
	40	Siltstone: as above.
	10	Cavings: as above.
795-800	50	Shale: as above, and medium to light brown, sandy, glauconitic, sideritic, very hard, abundant siderite stringers.
	30	Sandstone: medium grey, medium grained, subangular to subrounded, well sorted, dark grey to black, minor brown chert, frosted quartz, glauconite, common siderite cement, unconsolidated in part, tight to good porosity, no shows.
	20	Siltstone: as above, some light to medium brown, sideritic, very sandy.
800-805	30	Sandstone: medium to dark grey, very fine grained, subangular, poor sorting, very argillaceous and silty, clay cement, poor porosity to tight, no shows.
	30	Shale: dark grey to black, blocky, silty, tan to medium brown, blocky, sandy to silty, sideritic hard stringers.
	25	Siltstone: medium to dark grey, argillaceous, sandy, sideritic in part.
	15	Sandstone: medium grained type as above, cavings?, good porosity, no shows.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

805-810m	40%	Shale: as above.
	30	Sandstone: very fine grained as above, tight, no shows.
	20	Siltstone: as above, very sandy.
	10	Sandstone: unconsolidated medium grained type as above, no shows.
810-815	90	Sandstone: medium grey, very fine to medium grained, most very fine to fine, poor sorting, subangular, light to dark grey chert, some mica, frosted quartz, friable, some kaolin cement, poor porosity to good porosity, no shows.
	10	Shale: as above, some sideritic stringers.
815-820	90	Sandstone: as above, poor porosity to tight, no shows.
	10	Shale: dark grey, micromicaceous, blocky to hard, tan sideritic stringers.
820-825	60	Sandstone: as above, poor porosity to tight, no shows.
	40	Shale: as above, commonly silty, some waxy, bituminous, slickensides.
825-830	95	Sandstone: medium grey, very fine to fine grained, poor sorting, subangular, silty, clay, silica, and minor ferruginous cement, poor porosity, no shows.
	5	Shale: as above.
830-835	90	Sandstone: medium grey salt and pepper, fine to medium grained, medium sorting, subangular, black to light grey chert, clear to frosted quartz, minor silica and clay cement, most unconsolidated, friable, good porosity, no shows.
	10	Shale: as above, some slickensides.
835-840	90	Sandstone: generally as above, subangular, poor sorting, some argillaceous to silty stringers, fair porosity, no shows.
	10	Shale: dark grey to black, most waxy, bituminous, slickensides.
840-845	95	Sandstone: generally as above, subangular, poor to medium sorted, argillaceous to silty in part, fair to good porosity, no shows.
	5	Shale: as above, slickensides.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

845-850m	95%	Sandstone: medium grey salt and pepper, very fine to medium grained, most medium to fine grained, subangular, poor sorting, silty and argillaceous in part, frosted to clear quartz, light to dark grey chert, carbonaceous, silica overgrowth cement, friable, fair to good porosity, no shows.
	5	Shale: as above, slickensides, likely cavings.
850-855	90	Sandstone: generally as above, most medium grained, subangular, medium sorting, friable, good porosity, no shows.
	10	Shale: dark grey to black, micromicaceous to waxy, common slickensides.
855-860	85	Sandstone: generally as above buf very fine to medium grained, subangular, poor sorting, commonly very silty, friable to hard, fair to poor porosity, no shows.
	15	Shale: as above.
860-865	90	Sandstone: medium grey, fine grained, well to medium sorting, subangular, clear quartz with minor dark grey chert, silica overgrowth, chert, and minor calcareous cement, friable to well indurated, poor to fair porosity, no shows.
	10	Shale: dark grey, micromicaceous in part, blocky.
865-870	95	Sandstone: generally as above but more friable, unconsolidated, good? porosity, no shows.
	5	Shale: as above.
870-875	80	Sandstone: generally as above but to very fine grained, subangular, medium to poor sorting, silty in part, commonly pyritic, friable to hard, poor to fair porosity, no shows.
	10	Siltstone: medium grey, sandy, argillaceous in part, abundant pyrite.
	10	Shale: as above.
875-880	70	Siltstone: medium to light grey, sandy, argillaceous, carbonaceous.
	20	Sandstone: medium grey salt and pepper, fine to medium grained, medium sorted, subangular, frosted quartz with dark grey to black chert, silica and clay cement, unconsolidated in samples, friable, poor? porosity, no shows.
	10	Shale: medium grey, micromicaceous in part, carbonaceous, silty in part.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

880-885m	90%	Siltstone: as above, grading in part to very fine grained sandstone, tight, no shows.
	10	Shale: as above.
885-890	85	Siltstone: as above, grading in part to very fine grained sandstone, tight, no shows.
	15	Sandstone: as above, cavings in part, no shows.
890-895	85	Siltstone: medium to light grey, sandy, clean to rarely argillaceous, carbonaceous, grading in part to very fine grained sandstone, tight, no shows.
	15	Shale: medium to dark grey, micromicaceous in part, silty in part, may be cavings.
895-900	50	Siltstone: as above, becoming very argillaceous, grading to silty shale.
	35	Shale: as above, some bituminous, waxy, common slickensides.
	15	Sandstone: medium grey, fine to medium grained, medium sorting, subangular, clear to frosted quartz with dark chert, unconsolidated, good porosity, no shows, may be cavings.
900-905	50	Sandstone: as above, unconsolidated, good? porosity, no shows.
	35	Shale: as above, rare slickensides.
	15	Siltstone: as above.
905-910	65	Shale: medium grey, micromicaceous to earthy, carbonaceous, some silty.
	20	Siltstone: medium grey, sandy, argillaceous, carbonaceous.
	15	Sandstone: as above, unconsolidated, good? porosity, no shows, cavings?
910-915	70	Siltstone: generally as above, samewhat cleaner, grading to very fine grained sandstone, tight, no shows.
	20	Sandstone: medium to light grey, fine to medium grained, medium sorting, subangular, light to dark grey chert, clear to frosted quartz, friable, unconsolidated in sample, may have siltstone matrix, fair? porosity, no shows.
	10	Shale: as above, cavings in part, tan sideritic nodules.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

915-920m	50%	Shale: as above, most very silty to sandy, tan sideritic stringers and nodules.
	40	Siltstone: as above, becoming very argillaceous.
	10	Sandstone: as above, fair? porosity, no shows, cavings?
920-925	70	Shale: medium to dark grey, micromicaceous to earthy, silty to sandy, common medium brown sideritic nodules and stringers.
	20	Siltstone: medium grey, argillaceous, sandy, carbonaceous, slightly calcareous.
	10	Sandstone: light grey, very fine to fine grained, medium sorting, subangular, unconsolidated, good? porosity, no shows, likely cavings.
925-930	70	Shale: as above, brown sideritic nodules, minor slickensides.
	30	Siltstone: as above, minor floating very fine to medium sand grains.
930-935	50	Shale: as above.
	50	Siltstone: as above, very sandy.
935-940	60	Shale: medium grey, earthy to micromicaceous, rare tan sideritic nodules, commonly silty, trace Inoceramus prisms.
	40	Siltstone: medium grey, argillaceous, sandy, some slightly carbonaceous.
940-945	70	Sandstone: light to medium grey, fine grained, well sorted, subangular, frosted quartz with light to dark grey or brown chert, friable, unconsolidated, good porosity, no shows.
	20	Siltstone: as above.
	10	Shale: as above.
945-950	65	Siltstone: medium tolight grey, argillaceous, sandy, trace mica, rarely carbonaceous, rarely slightly calcareous.
	20	Shale: medium grey, micromicaceous, silty in part.
	15	Sandstone: as above, good? porosity, no shows, likely cavings.
950-955	70	Siltstone: as above, some slightly calcareous.
	20	Shale: as above, very silty.
	10	Sandstone: as above, likely cavings.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

955-960m	70%	Shale: generally as above, some dark grey to black, common light brown sideritic nodules or stringers.
	30	Siltstone: as above, commonly slightly calcareous.
960-965	80	Siltstone: medium to light grey, clean to argillaceous, sandy, carbonaceous, some mica, slightly calcareous, grading in part to very fine grained sandstone, tight, no shows.
	20	Shale: medium to dark grey, blocky, commonly silty, medium brown sideritic nodules, abundant Inoceramus prisms.
965-970	50	Siltstone: as above.
	50	Shale: as above, commonly very silty.
970-975	60	Siltstone: as above, becoming very sandy with fine grained sand.
	40	Shale: as above, common Inoceramus fragments.
875-980	50	Sandstone: medium to light grey, fine grained, subangular, well sorted, light to medium grey or brown chert with frosted quartz, unconsolidated, good? porosity, no shows.
	40	Siltstone: medium to light grey, sandy, argillaceous, grading to sandstone, tight, no shows.
	10	Shale: medium grey, blocky, silty in part, sideritic nodules.
980-985	40	Siltstone: as above.
	40	Shale: as above, very silty.
	20	Sandstone: as above, becoming silty, less friable, poor porosity, no shows.
985-990	60	Siltstone: medium grey, argillaceous, sandy, carbonaceous, grading in part to very fine grained sandstone, tight, no shows.
	25	Shale: medium to light grey, blocky to earthy, silty, Inoceramus prisms.
	15	Sandstone: medium grey, very fine to fine grained, poor sorting, subangular, silty to argillaceous, clay with minor calcareous cement, poor porosity to tight, no shows.
990-995	45	Siltstone: as above.
	30	Sandstone: as above, poor porosity, no shows.
	25	Shale: as above, some light brown sideritic nodules.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

995-1000m	50%	Siltstone: as above.
	25	Sandstone: as above, poor porosity, no shows, abundant fine grained unconsolidated chert/quartz sand, good? porosity, no shows.
	25	Shale: as above.
1000-1005	50	Siltstone: as above, very sandy.
	30	Shale: as above, very silty.
	20	Sandstone: as above, very fine to fine grained, poor sorting, subangular, poor? to fair? porosity, unconsolidated in part, no shows.
1005-1010	40	Siltstone: medium grey, argillaceous, carbonaceous, calcareous, sandy, grading to sandstone, trace floating yellow to brown chert pebbles.
	30	Sandstone: medium grey, very fine grained, poor sorting, subangular, silty, carbonaceous, argillaceous, calcareous and siliceous cements, tight, no shows.
	30	Shale: medium grey, micromicaceous in part, carbonaceous in part, medium brown sideritic nodules.
1010-1015	40	Sandstone: as above, some floating chert pebbles, poor porosity, no shows.
	30	Siltstone: as above.
	30	Shale: as above.
1015-1020	35	Siltstone: as above, very sandy.
	40	Shale: as above, very silty.
	20	Sandstone: generally as above, some to fine grained, poor porosity to tight, no shows.
	5	Bit metal.
1020-1025	45	Siltstone: as above, grading to sandstone, tight, no shows.
	30	Shale: as above.
	25	Sandstone: generally as above, some to fine grained, poor porosity to tight, no shows.
1025-1030	60	Siltstone: medium grey-brown, argillaceous to clean, sandy, grading in part to very fine grained sandstone, tight, no shows.
	40	Shale: medium grey, silty to sandy, blocky to earthy, minor medium brown sideritic nodules.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1030-1035m	70%	Shale: as above, most very silty.
	30	Siltstone: as above.
1035-1040	50	Sandstone: light grey, fine grained, well sorted, subangular, frosted quartz with minor grey to black chert, unconsolidated in sample, good? porosity, no shows.
	25	Siltstone: as above.
	25	Shale: as above.
1040-1045	80	Shale: dark grey, earthy to blocky, firm, minor medium brown sideritic nodules, commonly silty.
	20	Siltstone: medium to dark grey, argillaceous in part, most sandy.

BASAL LITTLE BEAR SAND 1046m

1045-1050	85	Sandstone: light grey, fine grained, well sorted, subangular, friable, clear quartz with minor white, light to medium grey chert, rare chert overgrowth cement, unconsolidated, good porosity, no shows.
	15	Shale: as above.
1050-1055	85	Sandstone: as above, but most medium grained, well sorted, friable, subangular, most unconsolidated, good porosity, no shows.
	15	Shale: medium grey-brown, waxy, bituminous, carbonaceous, abundant slickensides.
1055-1060	90	Sandstone: generally as above, most fine to medium grained, well sorted, subangular, friable, unconsolidated, good porosity, no shows.
	10	Shale: as above, becoming silty.
1060-1065	90	Sandstone: light grey, fine grained, well sorted, subangular, clear quartz with minor light to dark grey chert, silica overgrowth cement, good porosity, no shows.
	10	Shale: medium to dark grey, grey-brown, rare grey-green, micromicaceous in part, some silty, some waxy with slickensides, bituminous in part, grey-green type may be bentonitic.
1065-1070	65	Sandstone: as above, good porosity, no shows.
	20	Shael: as above, trace tan sideritic stringers, carbonaceous.
	15	Siltstone: medium grey, sandy, argillaceous, carbonaceous in part, very slightly calcareous.

CONOCO ET AL EAST MACKAY I-55
SAMPLE DESCRIPTIONS

SLATER RIVER 1072m

1070-1075m	55%	Sandstone: as above, good porosity, no shows, mostly unconsolidated sand cavings.
	25	Shale: as above, some bentonitic, some slickensides.
	20	Siltstone: as above, very sandy, grading to very fine grained sandstone, tight, no shows.
1075-1080	70	Shale: medium to dark grey, earthy to blocky, slightly carbonaceous in part, some silty, minor medium brown sideritic nodules.
	15	Siltstone: medium grey, argillaceous, carbonaceous, sandy, grading in part to very fine grained sandstone, tight, no shows.
	15	Cavings: mostly unconsolidated fine grained sand, likely cavings, some may be floating in siltstone or shale, bit metal.
1080-1085	75	Shale: as above, Inoceramus prisms, one calcareous foram.
	20	Siltstone: as above.
	5	Cavings: as above.
1085-1090	70	Shale: as above, Inoceramus prisms.
	30	Siltstone: as above, some very sandy.
	tr	Shale: medium grey-green, waxy, bentonitic.
1090-1095	50	Shale: medium to dark grey, blocky, most silty, some medium brown sideritic nodules.
	25	Sandstone: medium grey, fine to very fine grained, medium sorting, subangular, frosted quartz, dark chert, silty in part, most unconsolidated in sample, may have siltstone or argillaceous matrix, tight?, no shows.
	25	Siltstone: medium grey, argillaceous, sandy.
	tr	Shale: medium to dark grey, blocky, most silty, some medium brown sideritic nodules.
1095-1100	60	Shale: as above, Inoceramus fragments, ironstone nodules.
	30	Siltstone: as above, grading to tight very fine grained sandstone, tight,no shows.
	10	Sandstone: generally as above, becoming well indurated with silica cement, poor porosity to tight, no shows.
	tr	Shale: grey-green type as above with slickensides.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1100-1105m	45%	Shale: medium to dark grey, blocky to micromica-ceous, silty to sandy, carbonaceous in part, trace Inoceramus prisms.
	40	Siltstone: medium grey, argillaceous to clean, sandy.
	10	Sandstone: light grey, very fine to fine grained, medium sorted, subangular, frosted quartz with dark chert, silty in part, clay cement, poor porosity to tight, no shows.
	5	Shale: light to medium grey-green, waxy, micaceous, bentonitic, slickensides.
1105-1110	60	Siltstone: as above.
	40	Shale: as above.
	tr	Shale: grey-green to brown type as above, slickensides.
1110-1115	60	Siltstone: as above.
	30	Shale: grey type as above.
	5	Sandstone: as above, poor porosity, no shows, cavings?
	5	Shale: grey-green to brown type as above, slick-ensides.
1115-1120	50	Shale: grey type as above.
	40	Siltstone: generally as above, some calcareous.
	10	Sandstone: as above, some calcareous, poor porosity to tight, no shows, cavings in part.
	tr	Shale: waxy type as above, with slickensides.
1120-1125	45	Shale: medium to dark grey, micromicaceous to earthy, commonly silty, Inoceramus fragments, Haplophragmoides sp., minor stringers of medium green waxy shale with slickensides.
	40	Siltstone: light grey to medium grey, argillaceous, sandy, some slightly calcareous.
	15	Sandstone: light grey, very fine to fine grained, poor sorting, subangular, frosted quartz with dark chert, silty in part, clay, silica, rare calcareous cement, poor porosity to tight, no shows.
1125-1130	20	Sandstone: as above, poor porosity to tight, no shows.
	40	Shale: as above
	40	Siltstone: as above, some calcareous.
1130-1135	75	Shale: as above, Inoceramus.
	20	Siltstone: as above.
	5	Sandstone: as above, tight, no shows.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1135-1140m	80%	Shale: mediuj to dark grey, earthy to blocky, trace Inoceramus, slightly carbonaceous in part.
	10	Sandstone: as above, poor porosity to tight, no shows, cavings?
	10	Siltstone: medium grey, argillaceous to clean, sandy, slightly carbonaceous.
1140-1145	60	Shale: dark to medium grey, earthy to micromicaceous, commonly silty, rare medium green to brown, waxy, bentonitic stringers.
	20	Sandstone: medium grey, very fine grained, subangular, poor sorting, silty to argillaceous, clay and siliceous cement, tight, no shows.
	20	Siltstone: medium grey, sandy, argillaceous, carbonaceous.
1145-1150	65	Shale: as above.
	25	Sandstone: as above, tight, no shows.
	10	Siltstone: as above.
1150-1155	70	Shale: as above.
	15	Sandstone: as above, cavings in part.
	15	Siltstone: as above.
1155-1160	50	Siltstone: medium to light grey, argillaceous to clean, sandy, carbonaceous.
	40	Shale: medium grey, earthy to micromicaceous, carbonaceous in part, trace Inoceramus.
	10	Sandstone: as above, tight, no shows, cavings.
1160-1165	70	Shale: as above, mostly dark grey to black.
	15	Siltstone: as above.
	15	Cavings: very fine to medium grained sandstone and unconsolidated sand, green to brown waxy bentonitic shale.
1165-1170	60	Shale: as above, some slickensides.
	30	Siltstone: as above, most very sandy, some slightly calcareous.
	10	Cavings: as above.
1170-1175	50	Siltstone: medium grey, sandy, clean to argillaceous, carbonaceous.
	40	Shale: medium to dark grey, earthy to micromicaceous, some silty, some carbonaceous.
	10	Cavings: fine grained sand, coal.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1175-1180m	30%	Sandstone: medium grey, very fine grained, poor sorting, subangular, frosted quartz with minor dark chert, carbonaceous, argillaceous and silty in part, siliceous cement, tight, no shows.
	30	Siltstone: as above.
	30	Shale: as above.
	10	Cavings: as above, most light grey fine grained unconsolidated sand.
1180-1185	50	Siltstone: as above, grading in part to very fine grained sandstone, tight, no shows.
	30	Shale: as above.
	20	Sandstone: as above, tight, no shows.
1185-1190	60	Siltstone: medium to light grey, argillaceous, sandy, carbonaceous.
	30	Shale: medium to dark grey, micromicaceous to earthy, carbonaceous in part, silty in part.
	10	Cavings: light grey fine to meidum grained sand, unconsolidated, trace coal.
1190-1195	50	Siltstone: as above, garding to very fine grained sandstone, tight, no shows.
	35	Shale: as above, trace Inoceramus, trace tan sideritic nodules.
	10	Sandstone: medium grey, very fine grained, poor sorting, subangular, silty, carbonaceous, silica cement, tight, no shows.
	5	Cavings: as above.
1195-1200	50	Siltstone: medium to light grey, very sandy, clean to argillaceous, carbonaceous, micaceous.
	50	Shale: medium to dark grey, blocky, most silty, minor dark brown sideritic nodules.
1200-1205	55	Shale: as above.
	30	Siltstone: as above, very sandy.
	15	Sandstone: light grey, fine to very fine grained, medium sorting, subangular, silty in part, clear quartz with white to grey chert, silica overgrowth cement, some unconsolidated, poor porosity, no snows, likely stringers in shale or siltstone.
1205-1210	70	Shale: as above.
	15	Sandstone: as above, tight, no shows, stringers.
	15	Siltstone: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1210-1215m	60%	Shale: medium to dark grey, blocky, carbonaceous in part, some silty.
	30	Siltstone: medium to light grey, sandy, argillaceous, carbonaceous.
	10	Sandstone: as above, a few white to tan chert pebbles, poor porosity to tight, no shows, thin stringers.
1215-1220	60	Shale: as above.
	20	Sandstone: light grey, very fine to fine grained, medium sorting, subangular, clear quartz with minor light colored chert, rare pebbles, silica overgrowth cement, carbonaceous in part, well indurated to unconsolidated, poor porosity to tight, no shows, thin stringers in shale and siltstone, cavings in part?
	20	Siltstone: as above.
1220-1225	50	Shale: as above.
	40	Siltstone: as above.
	10	Sandstone: as above, tight, no shows.
1225-1230	60	Shale: as above.
	30	Siltstone: as above, tnin bedded.
	10	Sandstone: as above, thin stringers.
1230-1235	75	Shale: medium to dark grey, earthy to micromicaceous, carbonaceous in part, some silty to sandy.
	20	Siltstone: medium to light grey, argillaceous, sandy, carbonaceous, thin stringers.
	5	Sandstone: light to medium grey, very fine grained, poor sorting, subangular, silty to argillaceous, rare chert pebbles, clay with minor calcareous cement, tight, no shows, thin stringers.
1235-1240	65	Shale: as above, brown siderite stringers.
	25	Siltstone: as above, some slightly calcareous.
	10	Sandstone: generally as above, to medium grained, very argillaceous to silty, rare coarse chert grains and pebbles, tight, no shows, thin stringers.
1240-1245	75	Shale: as above.
	20	Siltstone: as above, very slightly calcareous.
	5	Sandstone: as abovea, poor porosity to tight, no shows, thin stringers or cavings.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1245-1250m	80%	Shale: dark grey to black, blocky to micromicaceous, some silty.
	20	Siltstone: medium to light grey, sandy, argillaceous in part, carbonaceous, thin stringers.
1250-1255	70	Shale: as above, rare Inoceramus fragments.
	30	Siltstone: as above.
1255-1260	60	Shale: as above.
	30	Siltstone: as above.
	10	Sandstone: light grey, very fine grained, subangular, poor sorting, silty, carbonaceous, silica with minor clay cement, tight, no shows, thin stringers.
1260-1265	65	Shale: dark grey to black, micromicaceous to blocky, some silty.
	20	Siltstone: medium to light grey, argillaceous to clean, carbonaceous, sandy.
	15	Sandstone: as above, tight, no shows, thin stringers.
1265-1270	80	Shale: as above, trace light grey, waxy, bentonitic.
	20	Siltstone: as above.
1270-1275	75	Shale: dark grey to black, micromicaceous, flaky to blocky, rarely silty.
	25	Siltstone: medium to light grey, sandy, argillaceous, carbonaceous, thin stringers.
1275-1280	70	Shale: as above, trace Inoceramus fragments, trace sideritic nodules.
	30	Siltstone: generally as abovea, some small chert grains and pebbles embedded, grading in part to very fine grained sandstone, tight, no shows.
1280-1285	80	Shale: as above.
	15	Siltstone: as above.
	5	Sandstone: medium grey, very fine grained, poor sorting, subangular, silty, argillaceous, carbonaceous, tight, no shows, thin stringers.
1285-1290	85	Shale: as above, rarely silty.
	15	Siltstone: as above, thin stringers.
	tr	Sandstone: as above, tight, no shows, thin stringers in shale.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1290-1295m	50%	Shale: dark grey to black, micromicaceous, flaky.
	40	Siltstone: medium to light grey, sandy, argillaceous to clean, carbonaceous, cavings in part.
	10	Cavings: very fine to fine grained light grey unconsolidated sand, trace chert pebbles, trace coal, trip sample.
1295-1300	60	Shale: as above.
	30	Siltstone: as above.
	5	Sandstone: light grey, very fine to fine grained, poor sorting, subangular, silty to argillaceous, silica cement, tight, no shows, thin stringers.
	5	Cavings: as above.
1300-1305	70	Shale: dark grey to black, micromicaceous, flaky, medium brown carbonaceous sideritic nodules or stringers.
	30	Siltstone: medium grey to medium brown, sandy, argillaceous, carbonaceous, sideritic in part.
	tr	Cavings: light grey sand, coal.
1305-1310	70	Shale: as above, common sideritic nodules.
	20	Siltstone: as above.
	10	Cavings: as above.
1310-1315	80	Shale: as above, sideritic nodules.
	20	Siltstone: as above, very sandy.

BITUMINOUS SHALE ZONE 1317m

1315-1320	85	Shale: dark grey to black, micromicaceous, flaky, some black to dark brown, blocky, bituminous, fish remains, minor slickensides, some light grey, waxy, bentonitic stringers.
	5	Siltstone: medium to light grey, carbonaceous, argillaceous, sandy, may be stringers.
	10	Cavings: light grey sand and tight sandstone.
1320-1325	95	Shale: as above, most black, bituminous, faint milky cut in solvent, common slickensides, trace interbedded light grey waxy bentonitic shale.
	tr	Marl: dark grey-brown, calcareous, bituminous, may be calcareous nodules or stringers.
	5	Cavings: light grey sandstone and siltstone as above, no shows.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

LOWER SLATER RIVER RADIOACTIVE MARKER 1326m

1325-1330m	95%	Shale: black to dark grey-brown, micromicaceous in part, some earthy, slightly calcareous, bituminous, minor dark brown fish remains and dark grey-brown calcareous nodules.
	5	Cavings: light grey siltstone and sandstone.
1330-1335	90	Shale: as above, minor slickensides.
	10	Cavings: as above.
1335-1340	90	Shale: dark grey to black, micromicaceous, most flaky, rarely bituminous, blocky, stringers of light grey waxy bentonitic shale.
	10	Siltstone: light to medium grey, sandy,argillaceous, carbonaceous, thin stringers in shale.
1340-1345	75	Shale: generally as above, some slightly calcareous, stringers of light grey waxy bentonitic shale.
	20	Siltstone: generally as above, most calcareous, grading in part to very fine grained sandstone, tight, no shows.
	5	Cavings: light grey sand, light grey waxy bentonitic shale.
1345-1350	70	Shale: as above, some slightly calcareous, trace coccoliths?
	25	Siltstone: as above.
	5	Cavings: as above.
1350-1355	60	Shale: dark grey to black, micromicaceous to earthy, bituminous in part, some slightly calcareous, minor slickensides.
	25	Siltstone: medium to dark grey, sandy, carbonaceous, argillaceous, thin stringers, most calcareous.
	15	Cavings: coal, light grey waxy bentonite, light grey sand.
1355-1360	60	Shale: generally as above, most dark grey, blocky, silty, rarely calcareous.
	40	Siltstone: as above, becoming very argillaceous, sandy, trace coccoliths.
1360-1365	60	Siltstone: dark grey, argillaceous, sandy, calcareous, some carbonaceous.
	40	Shale: dark grey, blocky, most silty, some slightly calcareous.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1365-1370m	50%	Shale: as above.
	40	Siltstone: as above, very sandy.
	10	Sandstone: medium to dark grey, very fine to medium grained, poor sorting, subangular, silty to argillaceous, rare white to dark brown chert pebbles, carbonaceous, mostly frosted quartz with minor dark brown or black chert, calcite and clay cement, tight, no shows, thin stringers.
1370-1375	45	Siltstone: as above, becoming very sandy.
	40	Shale: as above.
	15	Sandstone: generally as above, common light grey, white, tan angular chert fragments and pebbles, tight, no shows.
1375-1380	65	Shale: dark to medium grey, micromicaceous to earthy, some silty.
	20	Siltstone: dark grey to dark brown, argillaceous, sandy, carbonaceous, floating white chert pebbles, calcareous.
	15	Sandstone: medium to dark grey-brown, very fine to fine grained, poor sorting, subangular, frosted quartz with light grey, tan, white chert, minor angular pebbles, argillaceous to silty, carbonaceous, calcite and clay cement, tight, no shows.

DETRITAL ZONE (Derived from paleozoic high) 1383m

1380-1385	65	Shale: as above, most very silty.
	20	Siltstone: as above.
	10	Sandstone: as above, tight, no shows.
	5	Chert: tan, breccia, silicified dolomite boulders or pebbles, dolomitic in part, floating in shale?
1385-1390	45	Chert: buff to dark brown, cryptocrystalline, slightly dolomitic, origin from silicified dolomite, thin bedded in part? to mainly angular boulders, tight, no shows.
	5	Dolomite: light to medium brown, rare buff or dark brown, cryptocrystalline, argillaceous in part, most very siliceous, grading to chert, possible brecciated textures, tight, no shows.
	30	Shale: black, dark grey-brown, blocky, siliceous in part, some slightly dolomitic, minor slickensides.
	20	Cavings: grey to black shale, grey siltstone and sandstone.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1390-1395m	45%	Chert: as above, angular fragments, grading in part to siliceous dolomite, tight, no shows.
	40	Shale: as above, shows flat or irregular boundaries with chert indicating some thin interbedding and mostly large angular chert fragments enclosed by shale, abundant slickensides.
	5	Dolomite: as above, tight, no shows, clasts in breccia.
	10	Cavings: as bove.
1395-1400	50	Chert: as above, large angular boulders and irregular beds within shale.
	35	Shale: as above, mostly black, plastic, slickensides, some boudinage?, a few enclosed very coarse quartz grains.
	5	Calcite: white very coarse grained vein fillings.
	5	Siltstone: light grey-green, calcareous, argillaceous, mica flakes.
	5	Dolomite: as above, very siliceous, tight, no shows, fragments in shale.
1400-1405	45	Shale: black to dark brown, blocky, siliceous in part, abundant slickensides, most plastic, some rounded grains or pellets.f
	30	Chert: dark brown to buff, dolomitic in part, silicified dolomite, angular fragments in breccia.
	10	Dolomite: buff to dark brown, cryptocrystalline to microcrystalline, siliceous, slightly argillaceous in part, grading to chert, tight, no shows, angular fragments in breccia.
	10	Limestone: light grey, light brown to dark brown, dolomitic, siliceous, tight, no shows, fragments in breccia, some white coarse crystalline calcite vein fillings associated.
	5	Siltstone: medium brown to medium grey-green, argillaceous, calcareous, mica flakes, carbonaceous in part.
1405-1410	45	Shale: generally as above, most black, plastic, minor slickensides, some enclosed visible subangular chert and shale fragments.
	35	Chert: as above, rarely pinkish.
	15	Limestone: dark brown to buff, microcrystalline, argillaceous, siliceous, tight, no shows, some white coarse crystalline calcite may be cement of breccia.
	5	Dolomite: as above, tight, no shows, fragments in breccia.

CONOCO ET AL EAST MACKAY I-55
SAMPLE DESCRIPTIONS

1410-1415m	45%	Shale: black, dark grey-brown, rounded intraclasts, appears bituminous, may represent fragments of Canol shale in braccia.
	35	Chert: as above, subangular to angular large fragments in breccia.
	15	Limestone: as above, tight, no shows, fragments in breccia.
	5	Dolomite: as above, very siliceous, grading to chert, tight, no shows, fragments in breccia.
	tr	Siltstone: medium grey-green, argillaceous, micaceous, calcareous, carbonaceous.
1415-1420	55	Shale: as above, common slickensides.
	20	Chert: dark to light brown, white, cryptocrystalline, slightly dolomitic in part, origin silicified dolomite, tight, no shows, fragments in breccia.
	15	Limestone: light grey to light or dark brown, microcrystalline, siliceous in part, dolomitic in part, slightly argillaceous, trace crinoids, brachiopods, tight, no shows, fragments in breccia.
	10	Dolomite: dark to light brown, cryptocrystalline, siliceous, slightly argillaceous in part, silicified to chert in part, tight, no shows, fragments in breccia.
	tr	Siltstone: as above, fragments in shale breccia.
		IMPERIAL? 1421m
1420-1425	40	Shale: black, blocky, appears bituminous, abundant slickensides, intraclasts, encloses fragments of chert, dolomite, limestone in a breccia.
	15	Limestone: as above, some dark brown, appears nodular to fragmental, tight, no shows.
	15	Chert: fragments as above.
	10	Dolomite: as above, tight, no shows.
	5	Siltstone: medium grey-green, sandy, argillaceous, calcareous, mica flakes.
	15	Cavings: grey shale, siltstone, and sandstone.
1425-1430	35	Shale: as above.
	20	Siltstone: medium grey-green to rare medium grey or brown, argillaceous, sandy, carbonaceous, micaceous, slightly calcareous in part.
	10	Limestone: as above, tight, no shows, nodular or detrital, cavings in aprt.
	10	Chert: as above, detrital, cavings in part.
	5	Dolmite: as above, detrital, tight, no shows.
	20	Cavings: as above, abundant coal.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1430-1435m	45%	Shale: black type as above, and some dark grey, micromicaceous, flaky.
	35	Siltstone: as above.
	20	Cavings: grey shale, siltstone, sandstone, some brown limestone, dolomite, and chert.
1435-1440	60	Siltstone: light to medium grey-green, argillaceous, sandy, micaceous, calcareous in part, carbonaceous in part.
	15	Calcite: white, coarse crystalline, vein fillings.
	25	Cavings: as above, including black slickensided shale.
1440-1445	70	Siltstone: as above, most slightly calcareous.
	5	Calcite: as above, vein fillings.
	25	Cavings: as above.
1445-1450	60	Siltstone: medium grey-green to medium grey, very slightly calcareous, argillaceous, carbonaceous, mica flakes.
	20	Shale: medium to dark grey, silty, carbonaceous, micromicaceous in part.
	20	Cavings: grey to black shale, minor brown dolomite, chert, and limestone fragments.
1450-1455	50	Siltstone: as above.
	20	Shale: as above.
	30	Cavings: as above, including some light grey very fine grained tight sandstone.
1455-1460	50	Siltstone: as above.
	20	Shale: as above.
	30	Cavings: as above.
1460-1465	60	Siltstone: light to medium grey-green, argillaceous, sandy in part, calcareous, abundant mica flakes, carbonaceous in part.
	20	Shale: medium grey to grey-green, micromicaceous in part, blocky to flaky, commonly silty.
	20	Cavings: grey shale, tan dolomite, limestone, and chert.
1465-1470	75	Shale: dark grey, micromicaceous in part, flaky to blocky, some silty, trace mica.
	10	Siltstone: generally as above, most medium grey, sandy, calcareous to non-calcareous.
	15	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1470-1475m	40%	Siltstone: medium to light grey-green, argillaceous, calcareous, micaceous.
	30	Shale: as above.
	30	Cavings: black shale, tan chert, grey shale and sandstone, grey siltstone, calcite vein fillings.
1475-1480	50	Siltstone: as above.
	20	Shale: as above.
	30	Cavings: as above, including black shale pellets or rounded grains.
1480-1485	70	Siltstone: as above.
	15	Shale: as above.
	15	Cavings: as above, including abundant white coarse crystalline calcite vein fillings.
1485-1490	80	Siltstone: medium to light grey-green, argillaceous, mica flakes, carbonaceous, slightly calcareous, some grading to silty shale.
	10	Shale: medium grey, micromicaceous in part, some silty, flaky to blocky.
	10	Cavings: tan chert, buff dolomite and limestone, black shale, etc.
1490-1495	.0	Siltstone: as above.
	20	Shale: as above.
	10	Cavings: as above.
1495-1500	80	Siltstone: as above, some very argillaceous.
	15	Shale: as above, some very silty.
	5	Cavings: as above.
1500-1505	85	Siltstone: medium grey-green, argillaceous, mica flakes, carbonaceous in part, slightly calcareous, scattered white calcite veins.
	5	Shale: medium to dark grey, micromicaceous, flaky.
	10	Cavings: black shale, brown chert, dolomite, and limestone.
1505-1510	80	Siltstone: as above.
	10	Shale: as above.
	10	Cavings: as above.
1510-1515	75	Siltstone: as above.
	15	Shale: as above.
	10	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1515-1520m	75%	Siltstone: medium grey-green, argillaceous, abundant mica flakes, calcareous, slightly carbonaceous, rare white calcite vein fillings.
	15	Shale: medium to dark grey, some micromicaceous, flaky, some blocky, silty.
	10	Cavings: black shale, brown chert and dolomite.
1520-1525	70	Siltstone: as above.
	20	Shale: as above, some dark grey-brown, silty.
	10	Cavings: as above.
1525-1530	80	Siltstone: as above.
	15	Shale: as above.
	5	Cavings: as above.
1530-1535	75	Siltstone: medium grey-green, blocky, argillaceous, slightly calcareous, abundant mica flakes, carbonaceous in part.
	15	Shale: dark grey, micromicaceous, fissile.
	10	Cavings: black plastic shale.
1535-1540	80	Siltstone: as above.
	15	Shale: as above.
	5	Cavings: as above.
1540-1545	75	Siltstone: as above.
	20	Shale: as above.
	5	Cavings: as above.
1545-1550	70	Siltstone: medium grey-green, argillaceous, carbonaceous, very slightly calcareous in part, blocky, abundant mica flakes, rare coarse crystalline calcite white vein fillings.
	25	Shale: medium to dark grey, micromicaceous in part, some silty, blocky.
	5	Cavings: black plastic shale, minor chert and limestone fragments.
1550-1555	75	Siltstone: as above.
	20	Shale: as above.
	5	Cavings: as above.
1555-1560	80	Siltstone: as above.
	15	Shale: as above.
	5	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1560-1565m	75	Siltstone: medium grey-green, blocky, slightly calcareous, carbonaceous in part, abundant mica flakes, trace pyrite, trace coarse crystalline white calcite vein fillings.
	20	Shale: medium to dark grey, micromicaceous and fissile to blocky and silty.
	5	Cavings: black plastic shale, brown chert and limestone breccia fragments.
1565-1570	80	Siltstone: as above, rarely sandy.
	15	Shale: as above, trace pyrite.
	5	Cavings: as above.
1570-1575	70	Siltstone: as above.
	20	Shale: as above, some becoming grey-green.
	10	Cavings: as above.
1575-1580	60	Siltstone: medium grey-green, blocky, argillaceous, mica flakes, rare slightly calcareous, carbonaceous in part.
	40	Shale: dark grey to medium grey-green, most micromicaceous, some very silty, grading to argillaceous siltstone.
	tr	Cavings: black plastic shale, brown limestone and chert fragments.
1580-1585	70	Siltstone: as above, becoming very argillaceous.
	30	Shale: as above, grading to siltstone.
	tr	Cavings: as above.
1585-1590	60	Siltstone: as above.
	35	Shale: as above.
	5	Cavings: as above.
1590-1595	80	Siltstone: medium grey-green, very argillaceous, slightly calcareous, micromicaceous, rarely carbonaceous, grading to silty shale.
	20	Shale: medium grey-green, micromicaceous, very silty, calcareous, grading to argillaceous siltstone.
	tr	Cavings: black plastic shale, brown chert and llimestone fragments.
1595-1600	75	Siltstone: as above.
	20	Shale: as above.
	5	Cavings: as above.
1600-1605	80	Siltstone: as above.
	15	Shale: as above.
	5	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55
SAMPLE DESCRIPTIONS

1605-1610m	85%	Siltstone: medium grey-green, argillaceous, mica flakes, calcareous, carbonaceous in part, scattered coarse grained white calcite crystals, likely vein fillings.
	15	Shale: dark grey to medium grey-green, micromicaceous, flaky to blocky and silty.
	tr	Cavings: black plastic shale, brown limestone and chert fragments.
1610-1615	80	Siltstone: as above.
	15	Shale: as above.
	5	Cavings: as above.
1615-1620	70	Siltstone: as above.
	30	Shale: as above, most medium grey-green, very silty.
	tr	Cavings: as above.
1620-1625	70	Siltstone: medium grey-green, rare medium grey, argillaceous, carbonaceous in part, very slightly calcareous in part, common mica flakes, grading in part to silty shale.
	25	Shale: medium grey-green to dark grey, micromicaceous in part, flaky to blocky and silty.
	5	Cavings: black plastic shale, brown limestone and chert fragments.
1625-1630	80	Siltstone: as above.
	20	Shale: as above.
	tr	Cavings: as above.
1630-1635	80	Siltstone: as above.
	15	Shale: as above.
	5	Cavings: as above.
1635-1640	80	Siltstone: medium grey-green, argillaceous, carbonaceous in part, calcareous, mica flakes, grading in part to silty shale, trace white calcite vein fillings.
	15	Shale: medium grey-green to dark grey, micromicaceous, silty and blocky to fissile and blocky.
	5	Cavings: black shale, brown limestone and chert.
1640-1645	60	Siltstone: as above.
	35	Shale: as above, very silty.
	5	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1645-1650m	70%	Siltstone: as above, very argillaceous.
	30	Shale: as above, very silty.
	tr	Cavings: as above.
1650-1655	60	Siltstone: medium grey-green, very argillaceous, slightly calcareous, abundant mica flakes, carbonaceous in part.
	35	Shale: medium grey-green, blocky, most very silty, rarely dark grey, micromicaceous.
	5	Cavings: black shale, brown limestone and chert.
1655-1660	75	Siltstone: as above.
	20	Shale: as above, some dark grey.
	5	Cavings: as above.
1660-1665	60	Siltstone: as above, becoming very argillaceous.
	35	Shale: as above, very silty in part.
	5	Cavings: as above.
1665-1670	70	Siltstone: medium grey-green, argillaceous, slightly calcareous, carbonaceous in part, rarely sandy, coarse white calcite vein fillings.
	25	Shale: medium grey-green to occasionally dark grey, blocky and silty to micromicaceous and flaky
	5	Cavings: black shale, brown to white chert, brown limestone fragments.
1670-1675	70	Siltstone: as above, very argillaceous.
	20	Shale: as above, very silty.
	10	Cavings: as above.
1675-1680	50	Siltstone: as above.
	40	Shale: as above, most medium grey-green, silty, rare slickensides.
	10	Cavings: as above.
1680-1685	60	Siltstone: medium grey-green, argillaceous, carbonaceous in part, very slightly calcareous, abundant mica flakes, rare coarse white calcite crystals, vein fillings with siltstone adhering.
	35	Shale: medium grey-green to medium grey, blocky and silty to minor micromicaceous and flaky.
	5	Cavings: black shale, brown limestone and chert fragments.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1685-1690m	50%	Siltstone: as above.
	45	Shale: as above, very silty.
	5	Cavings: as above.
1690-1695	65	Siltstone: as above.
	30	Shale: as above, very silty.
	5	Cavings: as above.
1695-1700	50	Shale: medium grey-green to minor medium grey, micromicaceous in part, most blocky, very silty, rare slickensides.
	40	Siltstone: medium grey-green, very argillaceous, very slightly calcareous, carbonaceous in part, abundant mica flakes.
	10	Cavings: black shale, chert/shale breccia.
1700-1705	70	Siltstone: as above.
	25	Shale: as above, very silty, rare slickensides.
	5	Cavings: as above.
1705-1710	50	Siltstone: as above, very argillaceous in part.
	45	Shale: as above, very silty, grading to argillaceous siltstone.
	5	Cavings: as above.
1710-1715	Sample missed (trip).	
1715-1720	60	Shale: dark to medium grey, micromicaceous, flaky, fissile, minor slickensides.
	30	Siltstone: medium grey-green, argillaceous, mica flakes, calcareous, carbonaceous in part.
	10	Cavings: black shale, brown limestone and chert, light grey sand.
1720-1725	70	Shale: as above, common slickensides, cavings in part?
	25	Siltstone: as above.
	5	Cavings: as above.
1725-1730	65	Shale: as above, cavings in part.
	30	Siltstone: as above, most very argillaceous.
	5	Cavings: as above.
1730-1735	60	Shale: medium grey-green to medium grey, blocky and silty to micromicaceous and flaky, abundant slickensides.
	35	Siltstone: medium grey-green, argillaceous, calcar-

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1730-1735m	Continued from previous page.	
		eous, mica flakes, carbonaceous in part.
	5%	Cavings: black shale, brown limestone and chert.
1735-1740	70	Shale: as above, slickensides.
	30	Siltstone: as above.
	tr	Cavings: as above.
1740-1745	Sample missed.	
1745-1750	75	Shale: medium grey-green to medium grey, micromicaceous, most flaky, abundant slickensides.
	25	Siltstone: medium grey-green, argillaceous, carbonaceous in part, calcareous, mica flakes, thin stringers.
	tr	Cavings; black shale, brown chert and limestone.
1750-1755	85	Shale: as above.
	15	Siltstone: as above.
	tr	Cavings: as above.
1755-1760	90	Shale: as above, most medium grey-green.
	10	Siltstone: as above.
	tr	Cavings: as above.
1760-1765	95	Shale: medium grey-green, micromicaceous, flaky to splintery, occasionally mottled with medium grey, minor slickensides.
	5	Siltstone: medium grey-green, calcareous, argillaceous, thin stringers.
1765-1770	95	Shale: as above, common slickensides.
	5	Siltstone: as above.
1770-1775	95	Shale: as above, slickensides.
	5	Siltstone: as above, thin stringers.
1775-1780	95	Shale: medium grey-green, micromicaceous, flaky to splintery.
	5	Siltstone: medium grey-green, argillaceous, calcareous, carbonaceous in part, thin stringers.
1780-1785	95	Shale: generally as above, becoming mottled with grey-brown, common slickensides.
	5	Siltstone: as above, thin stringers or cavings.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1785-1790m	95%	Shale: generally as above, some becoming dark grey to black, some blocky, bituminous, minor slickensides.
	5	Siltstone: as above.
		CANOL SHALE 1792m
1790-1795	90	Shale: dark grey-brown to black, blocky, earthy, bituminous in part, some slightly calcareous.
	10	Cavings: grey green shale and siltstone.
1795-1800	95	Shale: as above, very slightly calcareous in part.
	5	Cavings: as above.
1800-1805	95	Shale: as above, very slightly calcareous, some becoming siliceous?
	5	Cavings: as above.
1805-1810	95	Shale: dark grey-brown to black, earthy, bituminous, slightly calcareous in part, becoming siliceous in part, rare calcareous white specks.
	tr	Chert: dark brown with light grey spots, thin stringers.
	5	Cavings: medium grey-green shale and siltstone.
1810-1815	95	Shale: as above, rare slickensides.
	5	Cavings: as above.
1815-1820	95	Shale: as above, becoming very dark, mostly black, siliceous in part, common white calcite vein fillings, minor calcareous white specks and slickensides, trace pyrite.
	5	Cavings: as above.
1820-1825	95	Shale: dark brown to black, earthy, bituminous, brittle and siliceous, very slightly calcareous, grading in part to chert, white calcite vein fillings.
	tr	Chert: dark brown thin stringers in shale.
	5	Cavings: grey-green siltstone and shale.
1825-1830	Sample missed.	
1830-1835	95	Shale: as above.
	5	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1835-1840m	95%	Shale: dark brown to black, earthy, slightly calcareous, blocky, bituminous, some siliceous, scattered white calcite fracture fillings.
	5	Cavings: grey-green shale and siltstone.
1840-1845	98	Shale: as above.
	2	Cavings: as above.
1845-1850	95	Shale: as above.
	5	Cavings: as above.
1850-1855	95	Shale: dark brown to black, earthy, blocky, calcareous, bituminous, some slightly siliceous, rare slickensides.
	2	Marl: dark brown, calcareous, thin bituminous stringers.
	3	Cavings: grey-green shale and siltstone.
1855-1860	95	Shale: as above, trace pyrite.
	tr	Marl: as above.
1860-1865	95	Shale: as above, common white calcite vein fillings.
	tr	Marl: as above.
	5	Cavings: as above.
1865-1870	95	Shale: dark brown to black, blocky, earthy and bituminous, calcareous, white calcite fracture fillings, rare slickensides.
	tr	Marl: dark brown, calcareous, bituminous, thin stringers.
	5	Cavings: grey-green shale and siltstone.
1870-1875	60	Shale: as above, becoming very calcareous, white calcite vein fillings.
	25	Marl: as above, thin stringers.
	15	Cavings: as above.
1875-1880	80	Shale: as above, common slickensides.
	10	Marl: as above.
	10	Cavings: as above, abundant slickensides, may be light grey-green shale from bottom?, or hole unloading?
1880-1885	85	Shale: dark brown to dark grey, micromicaceous to earthy, bituminous in part, calcareous to non-calcareous, common slickensides.
	10	Marl: dark brown, calcareous, bituminous, thin stringers.
	5	Cavings: grey-green shale and siltstone.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1885-1890m	85%	Shale: generally as above, some black, common white calcite vein fillings, trace pyrite.
	10	Marl: dark brown, calcareous, bituminous, thin stringers.
	5	Cavings: grey-green shale and siltstone.
1890-1895	90	Shale: as above, becoming less calcareous.
	5	Marl: as above, thin stringers.
	5	Cavings: as above.
1895-1900	95	Shale: dark grey-brown to dark grey, micromicaceous and splintery to minor blocky and earthy, bituminous in part, rarely calcareous, abundant slickensides, may be cavings in part.
	5	Cavings: grey-green shale and siltstone.
1900-1905	Sample missed.	
1905-1910	80	Shale: as above, large chunks, likely mostly cavings, abundant slickensides.
	20	Cavings: as above.
1910-1915	75	Shale: dark brown to black, earthy and blocky, most bituminous, slightly calcareous, some calcareous white specks, minor white calcite vein fillings.
	tr	Marl: dark brown, calcareous, bituminous, thin stringers.
	25	Cavings: grey-green shale and minor siltstone, light grey sandstone.
1915-1920	70	Shale: as above, most fairly calcareous, some siliceous.
	5	Marl: as above.
	25	Cavings: as above.
	HUME LIMESTONE 1922m	
1920-1925	70	Shale: as above, most bituminous, common calcareous white specks and white calcite vein fillings.
	15	Marl: as above, some has calcareous white specks.
	5	Limestone: buff to medium brownl mottled, microcrystalline to cryptocrystalline matrix, clean, bioclastic with brachiopods, crinoids, and possible stromatoporoid fragments to 1 or 2mm, minor white to tan chert stringers, rare stylolites and calcite filled fractures, tight, no shows.
	10	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1925-1930m	35%	Limestone: as above, framework 30-40%, fossil fragments to 5 or 6mm, no chert, tight, no shows.
	65	Cavings: brown to black bituminous shale, grey-green shale and siltstone.
1930-1935	75	Limestone: generally as aobve, most cryptocrystalline to microcrystalline, massive, framework 10-20%, tight, no shows.
	25	Cavings: as above.
1935-1940	80	Limestone: buff to light brown, rare medium brown mottled, cryptocrystalline to microcrystalline, clean, most massive, rare stromatoporoids, stylolites, minor white calcite fracture fillings, tight, no shows.
	20	Cavings: dark brown to black bituminous shale, grey-green shale and siltstone.
1940-1945	90	Limestone: as above, minor crinoid fragments, framework 20-30%, tight, no shows.
	10	Cavings: as above.
1945-1950	90	Limestone: generally as above, some mottled with medium to dark brown, framework 20-30%, tight, no shows.
	10	Cavings: as above.
1950-1955	90	Limestone: buff to light brown, commonly mottled with medium to dark brown, cryptocrystalline to microcrystalline, most clean, minor bioclastic stringers with crinoids and stromatoporoids?, framework average 20-30%, stylolites, tight, no shows.
	10	Cavings: brown to black bituminous shale, grey-green siltstone and shale.
1955-1960	85	Limestone: as above, rare brachiopods, crinoids, framework 15%, minor fractures healed with sparite, tight, no shows.
	15	Cavings: as above.
1960-1965	90	Limestone: as above, framework 20%, tight, no shows.
	10	Cavings: as above.
1965-1970	85	Limestone: buff to medium brown mottled, microcrystalline, clean, generally massive, pellets?, minor stringers or very fine to fine grained crinoid fragments, framework 10-20%, stylolites, tight, no shows.
	15	Cavings: brown to black bituminous shale, grey-green siltstone and shale.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

1970-1975m	90%	Limestone: as above, crinoid fragments to medium grained, framework 20%, tight, no shows.
	10	Cavings: as above.
1975-1980	90	Limestone: generally as above, becoming medium to dark brown and argillaceous in part, tight, no shows.
	10	Cavings: as above.
1980-1985	90	Limestone: buff to dark brown mottled, microcrystalline, argillaceous in part, thin bedded, minor ostracods, brachiopods, framework 10%, stylolites, partly interbedded with marl, tight, no shows.
	10	Marl: dark brown, calcareous, earthy, bituminous in part, thin interbeds.
1985-1990	65	Limestone: as above, framework 10%, becoming very argillaceous in part, tight, no shows.
	15	Marl: as above, thin bedded.
	15	Shale: medium grey-green, micromicaceous, calcareous, thin bedded.
	5	Cavings: dark brown to black bituminous shale, grey-green non-calcareous shale and siltstone.
1990-1995	70	Limestone: as above, argillaceous to clean, thin bedded, tight, no shows.
	10	Shale: as above.
	10	Marl: as above.
	10	Cavings: as above.
1995-2000	65	Limestone: light grey, buff, light to medium brown, microcrystalline, argillaceous to clean, thin bedded, tight, no shows.
	20	Shale: medium grey-green to dark brown, micromicaceous, calcareous.
	10	Marl: dark brown to dark grey, calcareous, blocky, thin bedded.
	5	Cavings: black to dark brown bituminous shale, grey-green siltstone and shale.
2000-2005	55	Limestone: as above, becoming very argillaceous in part, grading in part to marl, thin bedded, tight, no shows.
	30	Shale: as above, and some dark grey, micromicaceous, splintery, calcareous to non-calcareous.
	10	Marl: as above.
	5	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

2005-2010m	50%	Limestone: as above, becoming very argillaceous in part, grading in part to marl, thin bedded, tight, no shows.
	35	Shale: as above, and some dark grey, micromicaceous, calcareous, splintery.
	10	Marl: as above, rare brachiopods.
	5	Cavings: as above.
2010-2015	40	Shale: dark brown to dark grey, light to medium grey-green, micromicaceous, calcareous, bituminous in part, grading in part to marl.
	35	Limestone: light grey to medium grey, buff to light brown, microcrystalline, argillaceous, some slightly silty, framework 10%, thin bedded, tight, no shows.
	15	Marl: light to dark grey-brown, calcareous, blocky, silty in part, common brachiopod fragments.
	10	Cavings: black bituminous shale.
2015-2020	Sample missed (stuck for 5 hours).	
2020-2025	15	Limestone: as above, becoming very argillaceous, tight, no shows.
	15	Shale: as above.
	5	Marl: as above.
	65	Cavings: black bituminous Canol shale, grey-green non-calcareous Imperial shale.
2025-2030	20	Shale: as above.
	10	Limestone: as above, very argillaceous, tight, no shows.
	10	Marl: as above.
	60	Cavings: as above, mostly grey-green non-calcareous shale.
2030-2035	25	Limestone: buff to light brown, medium to dark brown mottled, microcrystalline, argillaceous to rarely clean, minor pellets, ostracods, and crinoid fragments, framework 10-20%, thin bedded, tight, no shows.
	10	Marl: medium grey to medium brown, calcareous, blocky, grading to argillaceous limestone.
	10	Shale: medium grey-green, micromicaceous, calcareous.
	55	Cavings: grey-green non-calcareous shale and siltstone, black to dark brown bituminous shale.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

2035-2040m	35%	Limestone: generally as above, framework 30%, most clean, tight, no shows.
	20	Shale: as above.
	10	Marl: as above.
	35	Cavings: as above.
2040-2045	30	Limestone: as above, very argillaceous, common crinoids, framework 30%, tight, no shows.
	20	Marl: as above, some silty.
	20	Shale: as above.
	30	Cavings: as above.
2045-2050	25	Limestone: buff to light grey, medium to dark brown mottled, microcrystalline, argillaceous, thin bedded, minor brachiopods, crinoids, framework 20%, tight, no shows.
	25	Marl: light to medium grey or brown, calcareous, blocky, some silty, grading to argillaceous limestone, brachiopods.
	25	Shale: medium grey-green, micromicaceous, calcareous.
	25	Cavings: dark grey toblack and medium grey-green non-calcareous shale.
2050-2055	45	Limestone: as above, thin bedded, argillaceous to clean, minor crinoids, brachiopods, framework 10-20%, tight, no shows.
	25	Shale: as above.
	20	Marl: as above.
	10	Cavings: as above.
2055-2060	40	Shale: as above, and some medium to dark grey, micromicaceous, calcareous, flaky.
	30	Marl: as above.
	25	Limestone: as above, thin stringers, framework 10%, tight, no shows.
	5	Cavings: as above.
2060-2065	55	Shale: medium grey-green, dark brown -grey, micromicaceous in part, flaky to blocky, very calcareous, some slightly bituminous.
	15	Limestone: buff to dark brown, microcrystalline, argillaceous, rare crinoid fragments, framework 10%, thin stringers, tight, no shows.
	15	Marl: medium grey to grey-green, calcareous, blocky, grading in part to argillaceous limestone.
	15	Cavings: dark grey to black, grey-green non-calcareous shale, common slickensides.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

2065-2070m	20%	Marl: as above, some silty?
	15	Limestone: as above, thin stringers, tight, no shows.
	50	Shale: as above, and some black, flaky, non-calcareous, bituminous.
	15	Cavings: as above.
2070-2075	45	Shale: as above, some silty.
	25	Limestone: as above, argillaceous to clean, tight, no shows.
	20	Marl: as above, silty in part.
	10	Cavings: as above.
2075-2080	50	Shale: medium grey-green, some dark grey-brown to black, micromicaceous, calcareous, some slightly silty.
	25	Limestone: buff, light to medium grey-brown, microcrystalline, argillaceous to minor clean, rare scattered fossil fragments, framework 10-20%, thin bedded, tight, no shows.
	20	Marl: medium grey-green to grey-brown, calcareous, blocky, grading to argillaceous limestone.
	5	Cavings: grey-green to black non-calcareous shales.
2080-2085	50	Limestone: as above, clean to argillaceous, most thin bedded, minro bioclastic stringers, tight, no shows.
	25	Shale: as above.
	20	Marl: as above.
	5	Cavings: as above.
2085-2090	70	Limestone: as above, most argillaceous, thin bedded, framework 20-30%, tight, no shows.
	15	Marl: as above, some slightly silty.
	15	Shale: as above, cavings in part?
	tr	Cavings: as above.
2090-2095	70	Limestone: buff to light brown, some dark brown mottled, most microcrystalline, minor stringers of crinoids, brachiopod fragments, pellets, stromatoporoid? fragments, massive? to thin bedded, tight, no shows.
	15	Shale: dark brown to black, some grey-green, calcareous, blocky, grading to marl.
	15	Marl: medium brown to medium grey, calcareous, brachiopods, blocky, grading to calcareous shale.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

2095-2100m	75%	Limestone: as above, clean to argillaceous, minor stringers of pellets or oolites?, tight, no shows.
	15	Shale: as above.
	10	Marl: as above.
2100-2105	50	Limestone: generally as above, becoming very argillaceous, framework 10-20%, tight, no shows.
	35	Marl: as above.
	10	Shale: as above.
	5	Cavings: non-calcareous grey-green to black shale.
2105-2110	45	Shale: medium to dark grey-brown, black, micromicaceous, very calcareous, grading to marl.
	30	Marl: medium to dark grey-brown, calcareous, blocky, grading to argillaceous limestone.
	20	Limestone: light grey, light to dark brown, microcrystalline to cryptocrystalline, argillaceous, bioclastic in part with crinoids, brachiopods, pellets, framework 40%, thin bedded, tight, no shows.
	5	Cavings: grey-green to boack non-calcareous shale.
2110-2115	45	Marl: as above.
	30	Limestone: as above, most dark colored, very argillaceous, framework 20%, tight, no shows.
	20	Shale: as above.
	5	Cavings: as above.

BEAR ROCK DOLOMITE 2119m

2115-2120	40	Limestone: as above, most dark colored, framework 10-20%, very argillaceous, tight, no shows.
	30	Marl: asa bove.
	25	Shale: as above.
	5	Cavings: as above.
2120-2125	35	Dolomite: tan to light grey, microcrystalline, calcareous, some chalky, grading in part to dolomitic limestone, thin bedded, generally tight, trace poor pinpoint porosity, no shows.
	30	Limestone: as above, tight, no shows.
	20	Marl: as above, cavings.
	15	Shale: as above, mostly cavings.
2125-2130	35	Limestone: tan, light grey, medium to dark brown, microcrystalline, dolomitic, slightly argillaceous in part, grading to calcareous dolomite in part,

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

2125-2130m		Continued from previous page.
		thin bedded?, or brecciated dolomite with matrix of dolomitic limestone?, tight, no shows.
	25	Dolomite: buff to medium brown, microcrystalline to trace very fine crystalline, some very calcareous, thin bedded? or brecciated?, tight, no shows.
	40	Cavings: calcareous grey to brown shale and marl, grey-green shale, brown limestone.
2130-2135	50	Limestone: as above, most tan, very dolomitic, tight, no shows.
	40	Dolomite: as above, tight, no shows.
	10	Cavings: as above.
2135-2140	65	Dolomite: as above, very calcareous, tight, no shows.
	20	Limestone: as above, slightly argillaceous in part, cavings in part?, tight, no shows.
	15	Cavings: as above.
2140-2145	75	Dolomite: tan, light grey-brown, light grey, microcrystalline to minor very fine crystalline, very calcareous, grading in part to dolomitic limestone, slightly anhydritic?, thin bedded? or brecciated?, tight, no shows.
	10	Limestone: tan to light grey, microcrystalline, dolomitic, thin bedded, tight, no shows.
	15	Cavings: grey-green to black calcareous shale, brown marl and limestone.

BEAR ROCK "ANHYDRITE" ZONE 2150m

2145-2150	80	Dolomite: generally as above, commonly very calcareous, anhydritic?, some fractures filled with sparry calcite, thin bedded or brecciated, tight, no shows.
	10	Limestone: as above, very dolomitic, tight, no shows.
	tr	Anhydrite: white chalky aggregates of calcium carbonate formed by reaction of anhydrite with treated mud?, NOTE: anhydrite not actually seen, inferred only by slow drilling times and these chalky aggregates.
	10	Cavings: as above.

CONOCO ET AL EAST MACKAY I-55

SAMPLE DESCRIPTIONS

2150-2155m	60%	Dolomite: as above, very calcareous, slightly anhydritic in part?, tight, no shows.
	25	Limestone: as above, very dolomitic, tight, no shows.
	tr	Anhydrite?: as above, turned to chalk by reaction with treated mud.
	15	Cavings: as above.
2155-2160	50	Dolomite: as above, some very anhyldritic?, trace brown chert, brecciated? textures, tight, no shows.
	40	Limestone: light brown to dark grey, microcrystalline, argillaceous in part, anhydritic?, dolomitic, brecciated?, tight, no shows.
	tr	Anhydrite?: inferred only from presence of a few chalky white calcite aggregates possibly formed by reaction of anhydrite with treated mud.
	10	Cavings: as above.
2160-2165	30	Dolomite: tan to medium brown, microcrystalline to rarely very fine crystalline, calcareous, anhydritic?, thin bedded and brecciated, tight, no shows.
	30	Limestone: tan to dark brown, microcrystalline, argillaceous in part, slightly anhydritic in part, very dolomitic, brecciated textures?, tight, no shows.
	tr	Anhydrite?: white amorphous calcareous aggregates, some have yellow to brown concentric reaction rims, possibly products of reaction of anhydrite with treated mud.
	40	Cavings: brown limestone, grey to grey-green calcareous shale and marl.

TOTAL DEPTH 2165m (Bear Rock) 12 Feb/88, 06:20 hrs

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

D.A. 1377

				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: Conoco et al East Mackay I-55 Area: Fort Norman

Grid Area: 64-50-125-30 Field/Pool: Wildcat

Permit or Lease No.: EL 315 Final Coordinates: Lat.: N64°44' 43.3084" Long: W 125°39' 44.0266"

Drilling Unit: Atco/Equatak 76 Elevations-RT/KB: 259.8 m SF/GL: 253.6 m

Spud Date: 1988 01 11 Rig Released: 1988 02 17 Total Depth: 2165 mKB

CASING AND CEMENTING

O.D.:	Weight:	Grade:	Depth Set:	Cement and Additives:
508 mm	139.9 kg/m	H40	35m	12 tonnes permafrost
244.5 mm	53.6 kg/m	K55	556mKB	15.4 tonnes permafrost and 21 tonnes class G + 2% CaCl2

PLUGGING PROGRAM

Approval of the following program was obtained by (person) John Schneider from (person) Kem Singh of the Canada Oil and Gas Lands Administration by means of verbal approval on February 15 1988.

Type of Plug:	Interval:	Felt:	Cement and Additives:
#1	2165-2065m	no	6 tonnes 0:1:0 class G
#2	760-660 m	9000daN	13 tonnes 0:1:0 class G
#3	570-540 m	9000daN	5 tonnes 0:1:0 class G
#4	surface	no	1.2 tonnes 0:1:0 class G

Lost Circulation/Overpressure Zones: Lost circulation at 740 m

Equipment left on Seafloor (Describe): None

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

Cores: Type: None Intervals:

Other Downhole Completion/Suspension Equipment: None

CERTIFICATION

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

Signed: J.C. Schneider P. Eng. Title: Sr. Production Engineer

Name: John Schneider Date: 88-03-17

Acknowledged by: L. O'Donnell
Engineering Branch

Date: 89-04-05

File: 9211-C90-1-1

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

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9211-090-17

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SCHLUMBERGER OF CANADA
CALGARY LOG INTERPRETATION CENTER
24TH FLOOR, MONENCO PLACE
801 6th Avenue SW
Calgary, Alberta T2P 3W2
(403) 231-9600

1 of

VERTICAL SEISMIC PROFILE

COMPOSITE LOGS

Company: CONOCO CANADA LIMITED

Well Name: EAST MACKAY I-55

Field: WILDCAT

Location: North: 64 44 43.3084 N
West: 125 39 44.0266 W

Province: N.W.T.

ELEVATIONS DATA:

Permanent Datum: GL — Elevations Measured In: METRES

Seismic Reference Datum (SRD): 500 METRES A.S.L. — SRD Elevation: 500.00

Logs Measured From: KB — Drilling Measured From: KB — Water/Mud Line Depth:

Kelly Bushing (KB): 260.80 — Drill Floor (DF): 260.5 — Ground Level (GL): 253.60

ACQUISITION DATA:

Run Number:	1
Date:	15-FEB-1988
Total Depth:	2165 M
Bit Size:	222 MM
Casing Size:	244.5 MM
Tool Type:	SAT
Source Type:	1KG GEOGEL
Engineer:	DOWNEY
Witness:	SCHNEIDER
CSU Software:	30.4
Logging Unit:	243
District:	EDMONTON

1 KG GEOGEL CHARGES - AVG AZIMUTH 61, AVG DISTANCE 72 M
13 M WATER FILLED SHOT HOLES - SURFACE ELEV 253.6 M

PROCESSING DATA:

Processing Job Reference: 37898 — Processing Date: 29-FEB-1988

Log Analyst: D.E. KONARSKI — Processing Software Baseline: 16.5.X1

VERTICAL VSP PROCESSING

1D COMPONENT ONLY

VSP, SYNTHETIC SEISMOGRAMS AND LOGS

REVERSE POLARITY

REFERENCE DATUM : 500.0 METRES A.S.L.
ACOUSTIC IMPEDANCE : FROM SONIC ONLY
SYNTHETIC SAMPLING RATE : 1 MSEC

POLARITY CONVENTION:

NORMAL POLARITY: AN INCREASE OF ACOUSTIC IMPEDANCE APPEARS AS A WHITE TROUGH.

THIS IS SEG NORMAL POLARITY, WHEN A COMPRESSIONAL SOURCE IS USED

GAMMA
0 TO

SONIC
500

PRESS
-0.2

SYNTH
ZERO

SYNTH
VSP W

100 M
VSP W

VSP U

SAME
AS FO

VSP D
WAVE

2 of

GAMMA RAY
0 TO 150 AP

150.000 GAPI

0.000 GAPI

SONIC TRANSIT TIMES
500 TO 100 MICRO-SEC/M.

100.000 US/M

500.000 US/M

PRESSURE REFLECTION COEFFICIENT
-0.2 TO 0.2

0.200

-0.200

SYNTHETIC SEISMOGRAM
ZERO PHASE RICKER : 35 HERTZ

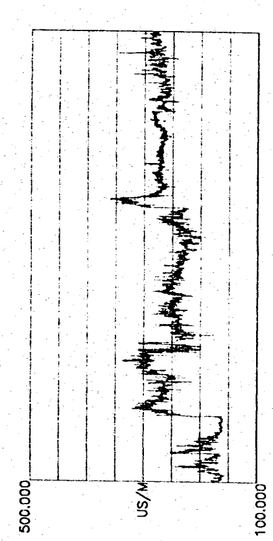
SYNTHETIC SEISMOGRAM
VSP WAVESHAPED

100 MSEC CORRIDOR
VSP WAVESHAPED

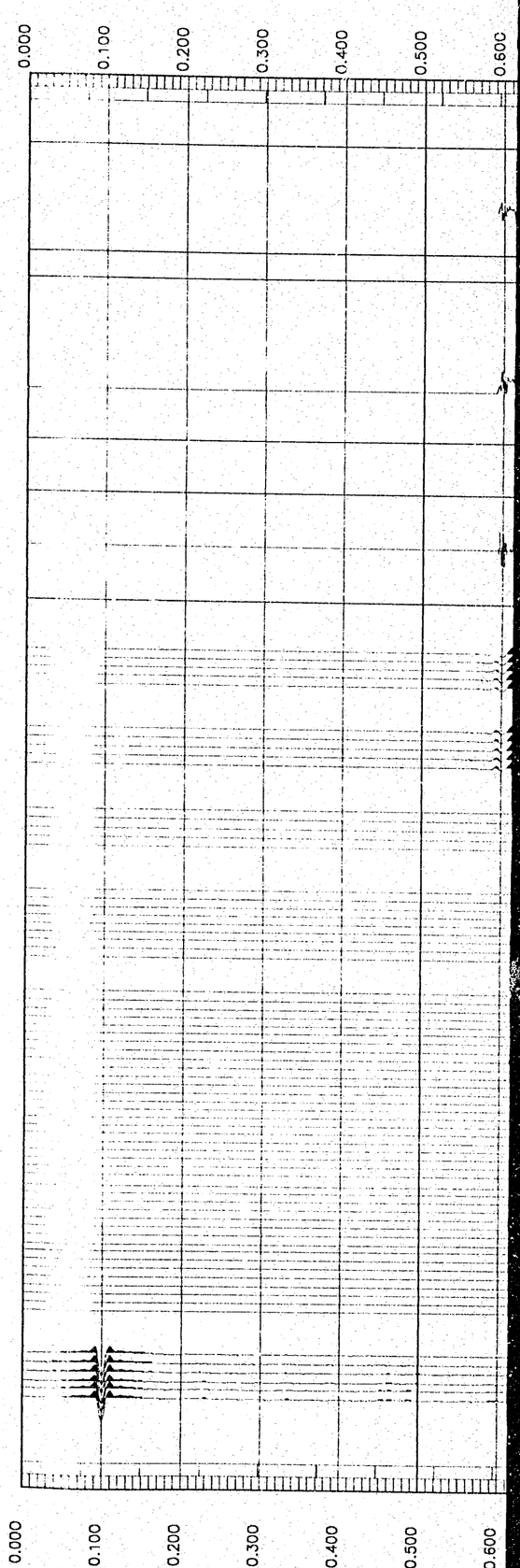
VSP UPGOING WAVESHAPED

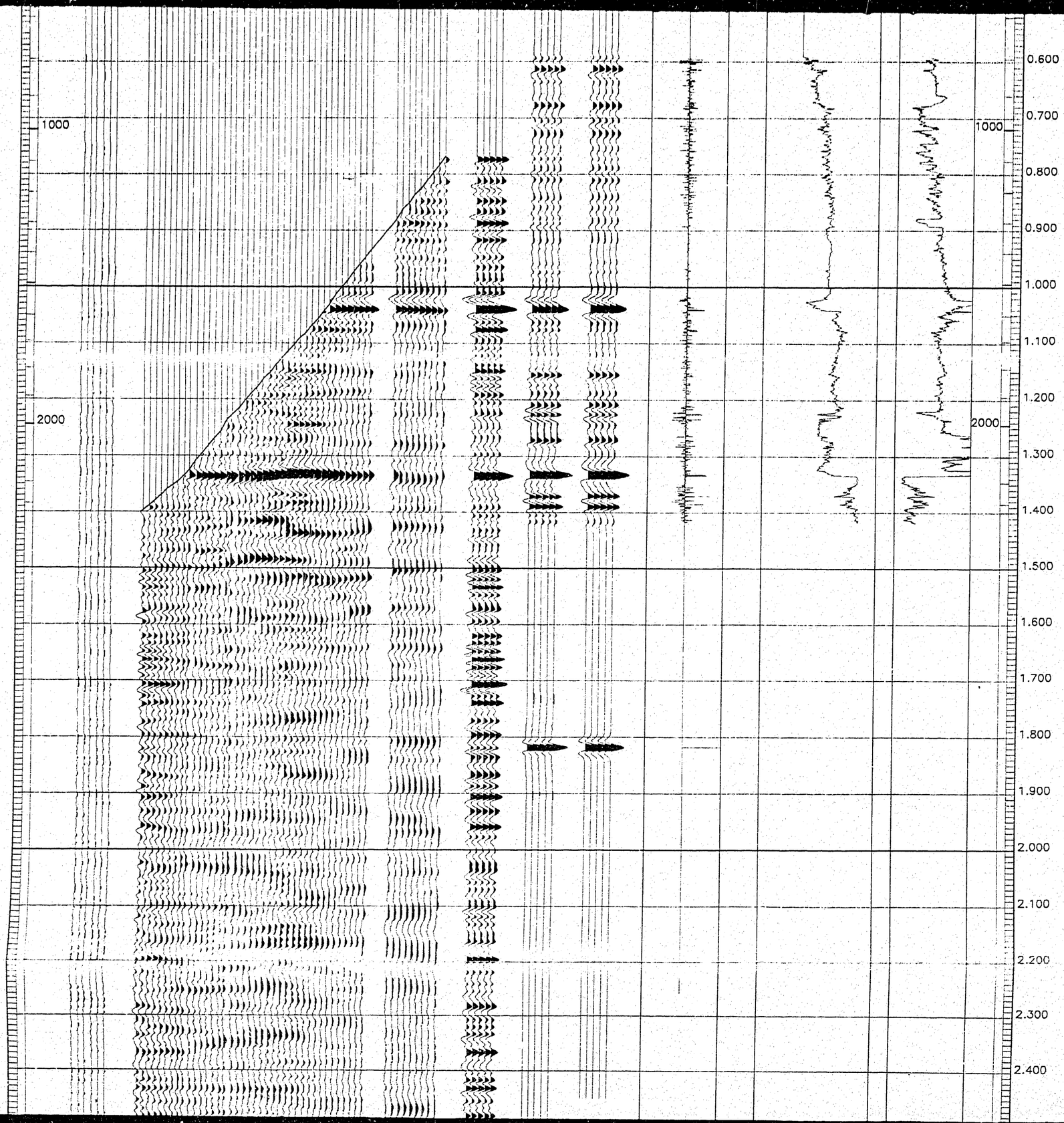
SAME DISPLAY POLARITY
AS FOR THE DOWNGOING

VSP DOWNGOING
WAVESHAPED

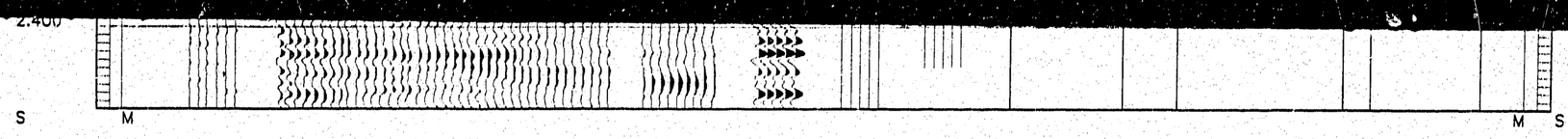


RAW DEPTH
M




0.600
0.700
1000
0.800
0.900
1.000
1.100
1.200
2000
1.300
1.400
1.500
1.600
1.700
1.800
1.900
2.000
2.100
2.200
2.300
2.400

3 of



VSP, SYNTHETIC SEISMOGRAMS AND LOGS
NORMAL POLARITY

REFERENCE DATUM : 500.0 METRES A.S.L.
ACOUSTIC IMPEDANCE : FROM SONIC ONLY
SYNTHETIC SAMPLING RATE : 1 MSEC

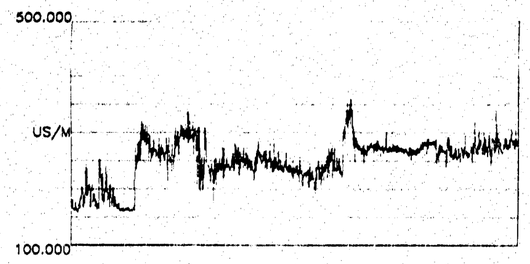
POLARITY CONVENTION:

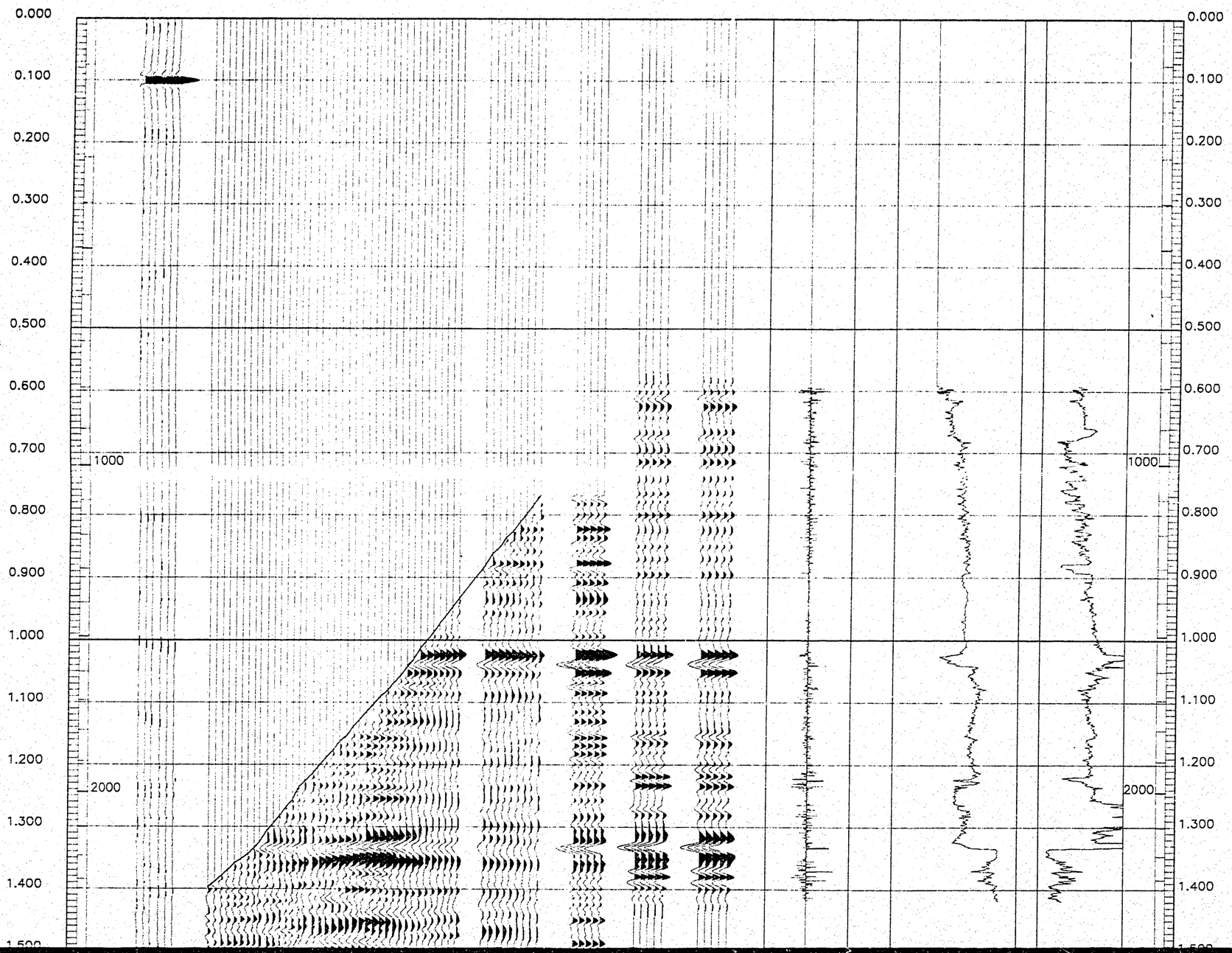
NORMAL POLARITY: AN INCREASE OF ACOUSTIC IMPEDANCE
APPEARS AS A WHITE TROUGH.
THIS IS SEG NORMAL POLARITY,
WHEN A COMPRESSIONAL SOURCE IS USED

GAMMA RAY 0 TO 150 API		150.000 GAPI 0.000 GAPI
SONIC TRANSIT TIMES 500 TO 100 MICRO-SEC/M.		100.000 US/M 500.000 US/M
PRESSURE REFLECTION COEFFICIENT -0.2 TO 0.2		0.200 -0.200
SYNTHETIC SEISMOGRAM ZERO PHASE RICKER : 35 HERTZ		
SYNTHETIC SEISMOGRAM VSP WAVESHAPED		
100 MSEC CORRIDOR VSP WAVESHAPED		0.0 0.0 1.000
VSP UPGOING WAVESHAPED SAME DISPLAY POLARITY AS FOR THE DOWNGOING		845.0 900.0 950.0 975.0 1000.0 1050.0 1150.0 1200.0 1250.0 1275.0 1300.0 1325.0 1350.0 1375.0 1400.0 1425.0 1450.0 1475.0 1500.0 1525.0 1550.0 1575.0 1600.0 1625.0 1650.0 1675.0 1700.0 1725.0 1750.0 1775.0 1800.0 1825.0 1850.0 1875.0 1900.0 1925.0 1950.0 1975.0 2000.0 2025.0 2050.0 2100.0
VSP DOWNGOING WAVESHAPED		1825.0 1850.0 1875.0 1900.0 1925.0 1950.0

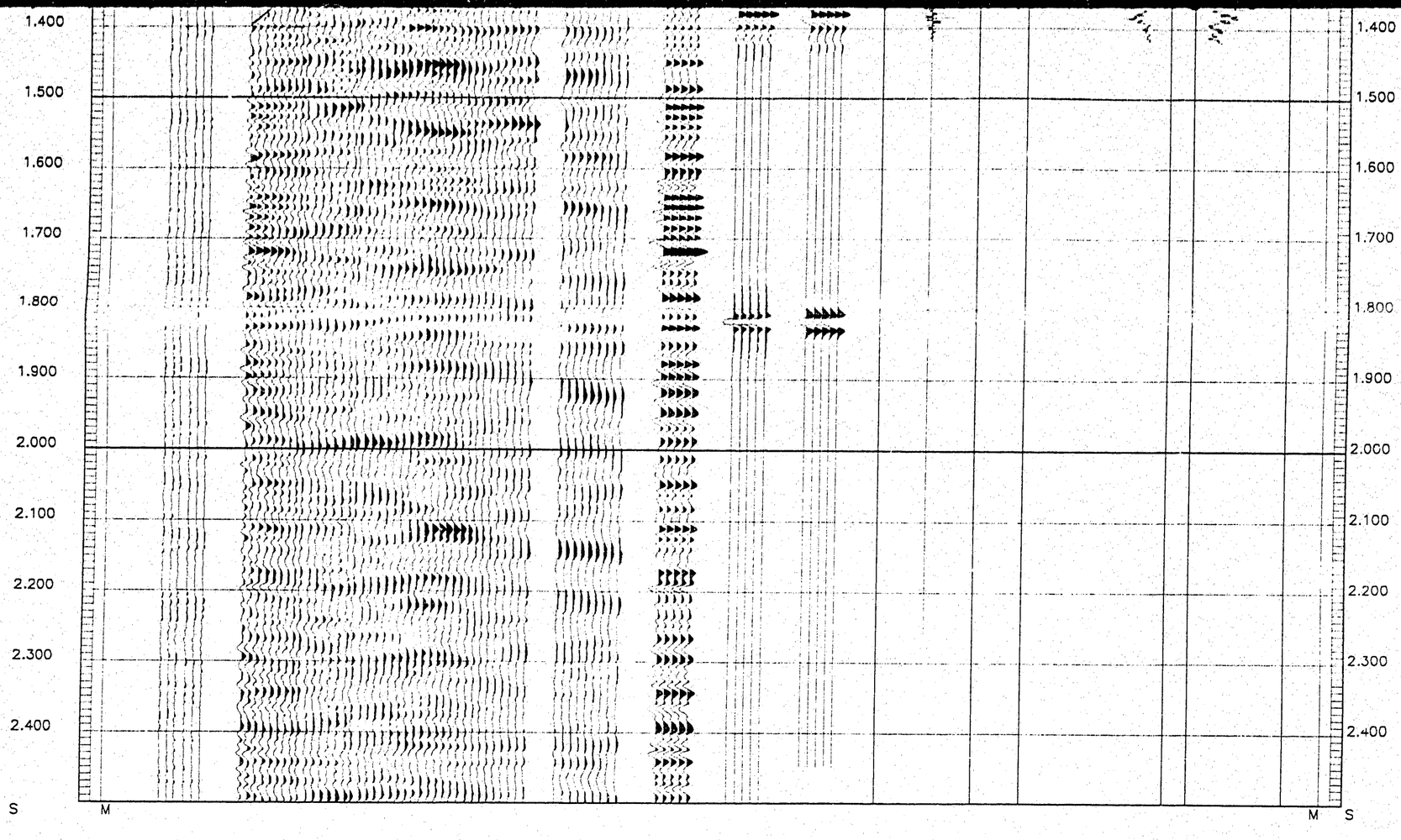
500.000

RAW DEPTH
M


500.000
US/M
100.000


0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
1000
0.800
0.900
1.000
1.100
1.200
2000
1.300
1.400
1.500

5 of



6 of

```
** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **

** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **

** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **

** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **

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** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **

** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **

** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **

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** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **

** STOP **  Time: 15:15:12.01  ** STOP **  CPU Time: 00:01:12.47  ** STOP **
```

7 of

```
** START **  File: $1$DUA11:[87724.FINAL]PRONMO.RAS;3   Date: 10-MAR-1988 15:15:51.40    ** START **
** START **  File: $1$DUA11:[87724.FINAL]PRONMO.RAS;3   Date: 10-MAR-1988 15:15:51.40    ** START **
** START **  File: $1$DUA11:[87724.FINAL]PRONMO.RAS;3   Date: 10-MAR-1988 15:15:51.40    ** START **
```

```
 888   7777   7777    222   4  4
8   8     7      7  2   2  4  4
8   8     7      7      2  4  4
 888     7      7      2   44444
8   8   7      7      2       4
8   8  7       7      2       4
 888   7       7      22222   4
```

```
PPPP   RRRR    000   N   N  M   M   000          RRRR    AAA    SSSS
PPPP   RRRR    000   N   N  M   M   000          RRRR    AAA    SSSS
P   P  R   R  0   0  N   N  MM MM  0   0         R   R  A   A  S
P   P  R   R  0   0  N   N  M M M  0   0         R   R  A   A  S
P   P  R   R  0   0  NN  N  M M M  0   0         R   R  A   A  S
PPPP   RRRR   0   0  N N N  M   M  0   0         RRRR   A   A   SSS
PPPP   RRRR   0   0  N N N  M   M  0   0         RRRR   A   A   SSS
P      R R    0   0  N  NN  M   M  0   0         R R    AAAAA      S
P      R R    0   0  N  NN  M   M  0   0         R R    AAAAA      S
P      R  R   0   0  N   N  M   M  0   0   ..    R  R   A   A      S
P      R  R   0   0  N   N  M   M  0   0   ..    R  R   A   A      S
P      R   R   000   N   N  M   M   000    ..    R   R  A   A  SSSS
P      R   R   000   N   N  M   M   000    ..    R   R  A   A  SSSS
```

```
 888   7777   7777    222   4  4
8   8     7      7  2   2  4  4
8   8     7      7      2  4  4
 888     7      7      2   44444
8   8   7      7      2       4
8   8  7       7      2       4
 888   7       7      22222   4
```

```
** START **  File: $1$DUA11:[87724.FINAL]PRONMO.RAS;3   Date: 10-MAR-1988 15:15:51.40    ** START **
** START **  File: $1$DUA11:[87724.FINAL]PRONMO.RAS;3   Date: 10-MAR-1988 15:15:51.40    ** START **
** START **  File: $1$DUA11:[87724.FINAL]PRONMO.RAS;3   Date: 10-MAR-1988 15:15:51.40    ** START **
```

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[redacted] STACKS

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24TH FLOOR, MONENCO PLACE
801 6th Avenue SW
Calgary, Alberta T2P 3W2
(403) 231-9600

1 of

VERTICAL SEISMIC PROFILE

Company: CONCCO CANADA LIMITED

Well Name: EAST MACKAY I-55

Field: WILDCAT

Location: North: 64 44 43.3084 N
West: 125 39 44.0266 W

Province: N.W.T.

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Permanent Datum: GL — Elevations Measured In: METRES

Seismic Reference Datum (SRD): 500 METRES A.S.L — SRD Elevation: 500.00

Logs Measured From: KB — Drilling Measured From: KB — Water/Mud Line Depth:

Kelly Bushing (KB): 250.80 — Drill Floor (DF): 250.5 — Ground Level (GL): 253.60

ACQUISITION DATA:

Run Number:	1
Date:	15-FEB-1988
Total Depth:	2165 M
Bit Size:	222 MM
Casing Size:	244.5 MM
Tool Type:	SAT
Source Type:	1KG GEOGEL
Engineer:	DOWNEY
Witness:	SCHNEIDER
CSU Software:	30.4
Logging Unit:	243
District:	EDMONTON

1 KG GEOGEL CHARGES - AVG AZIMUTH 61, AVG DISTANCE 72 M
13 M WATER FILLED SHOT HOLES - SURFACE ELEV 253.6 M

PROCESSING DATA:

Processing Job Reference: 87898 — Processing Date: 29-FEB-1988

Log Analyst: D.E. KONARSKI — Processing Software Baseline: 16.6X1

VERTICAL VSP PROCESSING

1D COMPONENT ONLY

PROCESSING SEQUEN

RAW STACKS

Median stacking of the shots from the vert
after manual selection

PREPROCESSED Z STACKS

INPUT : RAW Z STACKS
BAND PASS FILTER: 5-120 hertz, zero phas
18-36 db/octave
NORMALIZATION : Amplitudes at each level
RMS value in a window of 1
40 milliseconds before P ar
GAIN FUNCTION : T**1.7
NO STATIC SHIFT : NONE

VELOCITY FILTER : WAVEFIELD

MEDIAN P DOWNGOING

INPUT : PREPROCESSED Z STACKS
MEDIAN FILTER :
11 level median filter to enhance downgoing, after fre
of downgoing waves steered by first P arrival times
BAND PASS FILTER: 6-100 hertz, zero phase
18-36 db/octave

PREPROCESSED STACKS MINUS DOWNGO

The median P downgoing waves are subtracted from t
to create a difference file.
A An F-K filter was applied to the difference file t
up-going shear mode conversions.

MEDIAN UPGOING

INPUT : PREPROCESSED Z STACKS r
MEDIAN FILTER :
7 levels median filter to enhance upgoing after freque
of upgoing waves along a slope of -1.0 the first P arr
BAND PASS FILTER: 6-100 hertz, zero phase
18-36 db/octave

WAVESHAPING

INPUT : MEDIAN P DOWNGOING and
WIENER FILTER : A Wiener filter designed
LEVEL is applied to both th
MEDIAN UPGOING
Input : 2000 msec of downgoing, starting
Desired ouput : Impulse response of a sixth ord
Butterworth filter 6-75 hertz
Lags of desired output : 1000 msec
Filter duration : 1000 msec
White noise : 0.01
BAND PASS FILTER: 5-120 hertz, zero phase
18-36 db/octave
OUTPUTS : WAVESHAPED DOWNGOING
Mute of waveshaped upgoing to the first arrival tre

CORRIDOR STACKS

INPUT : WAVESHAPED UPGOING
WINDOW : A 100 msec window was us
OUTPUTS : Summed corridor stack

EQUENCE

m the vertical component

KS

zero phase, sixth order Butterworth,
e
each level are normalized to the same
indow of 160 milliseconds, starting
before P arrival time.

EFIELD SEPARATION

Z STACKS

oing, after frequency domain alignment
rival times
zero phase, sixth order Butterworth
e

DOWNGOING
acted from the preprocessed Z stacks

ference file to remove down-going and

Z STACKS minus MEDIAN DOWNGOING

g after frequency domain alignment
he first P arrival slope.
zero phase, sixth order Butterworth,
e

GOING and MEDIAN UPGOING
designed on the median downgoing at EACH
to both the MEDIAN DOWNGOING and

oing, starting 80 msec before first break
f a sixth order zero phase

ec

zero phase, sixth order Butterworth,
e

OWNGOING and WAVESHAPED UPGOING
rst arrival transit time

GOING
dow was used
or stack

2 of 2

EXPLANATION OF PANELS

1. RAW STACKS

2. PREPROCESSED Z STACKS

3. MEDIAN P DOWNGOING

4. PREPROCESSED STACKS MINUS P DOWNGOING

5. PREPROCESSED STACKS MINUS P DOWNGOING
   After F-K filter

6. MEDIAN UPGOING
   An increase of acoustic impedance appears as the reverse of the MEDIAN P DOWNGOING

7. MEDIAN UPGOING
   An increase of acoustic impedance appears the same as the MEDIAN P DOWNGOING

8. WAVE SHAPED DOWNGOING

9. WAVE SHAPED UPGOING
   An increase of acoustic impedance appears as the reverse of the WAVESHAPED DOWNGOING

10. SUMMED CORRIDOR STACK
    An increase of acoustic impedance appears as the reverse of the WAVESHAPED DOWNGOING

11. WAVE SHAPED UPGOING
    An increase of acoustic impedance appears the same as the WAVESHAPED DOWNGOING

12. SUMMED CORRIDOR STACK
    An increase of acoustic impedance appears the same as the WAVESHAPED DOWNGOING

1. RAW STACKS

2. PREPROCESSED Z STAC

RAW DEPTH

0.000
0.100
0.200
0.300
0.400
0.500
0.600
0.700
0.800
0.900
1.000
1.100
1.200
1.300
1.400
1.500
1.600
1.700
1.800
1.900
2.000
2.100
2.200
2.300
2.400
2.500
S

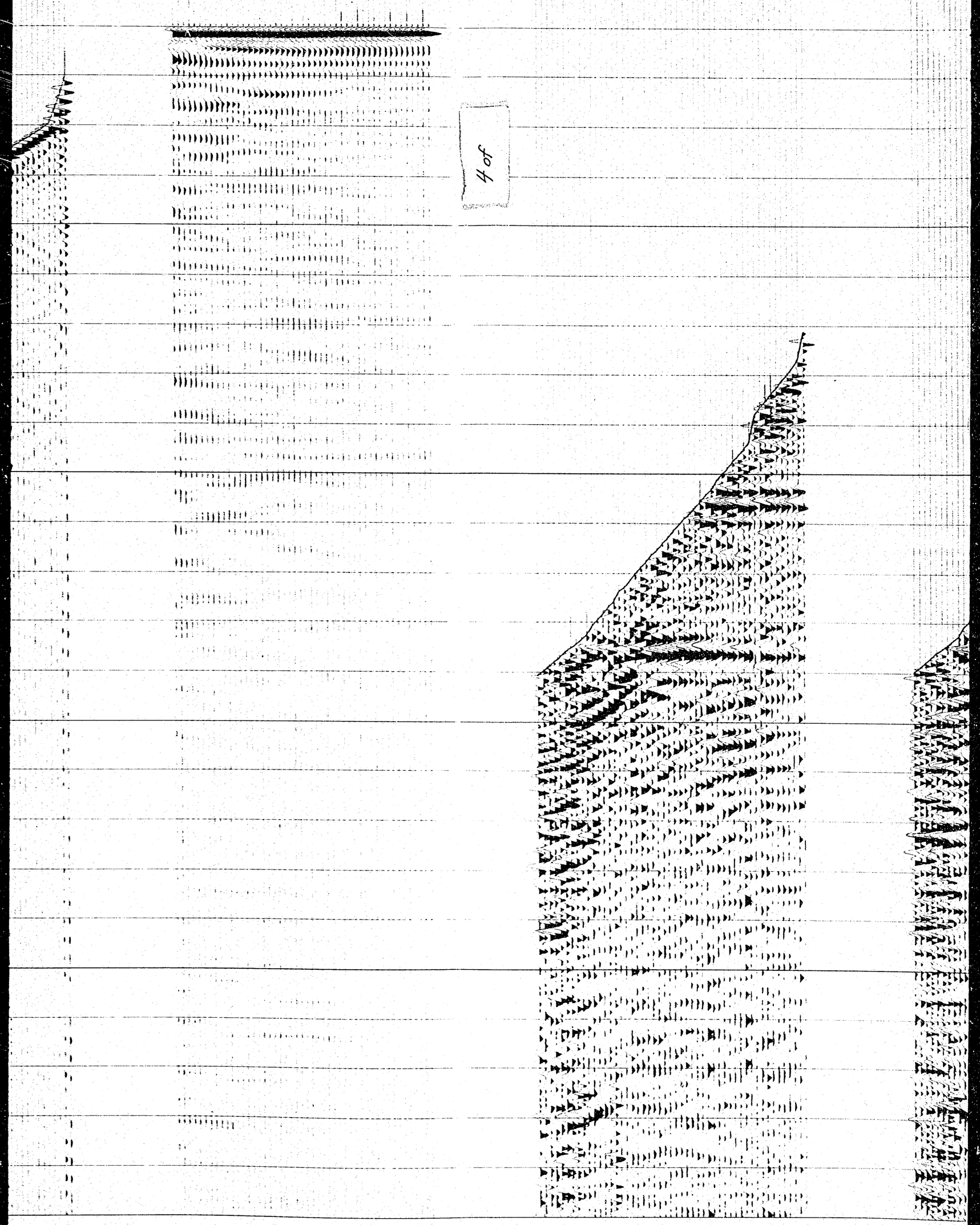
3 of

TACKS

3. MEDIAN P DOWNGOING

4. PREPROCESSED STACKS MINUS P DOWNGOING

5. PREP MINU

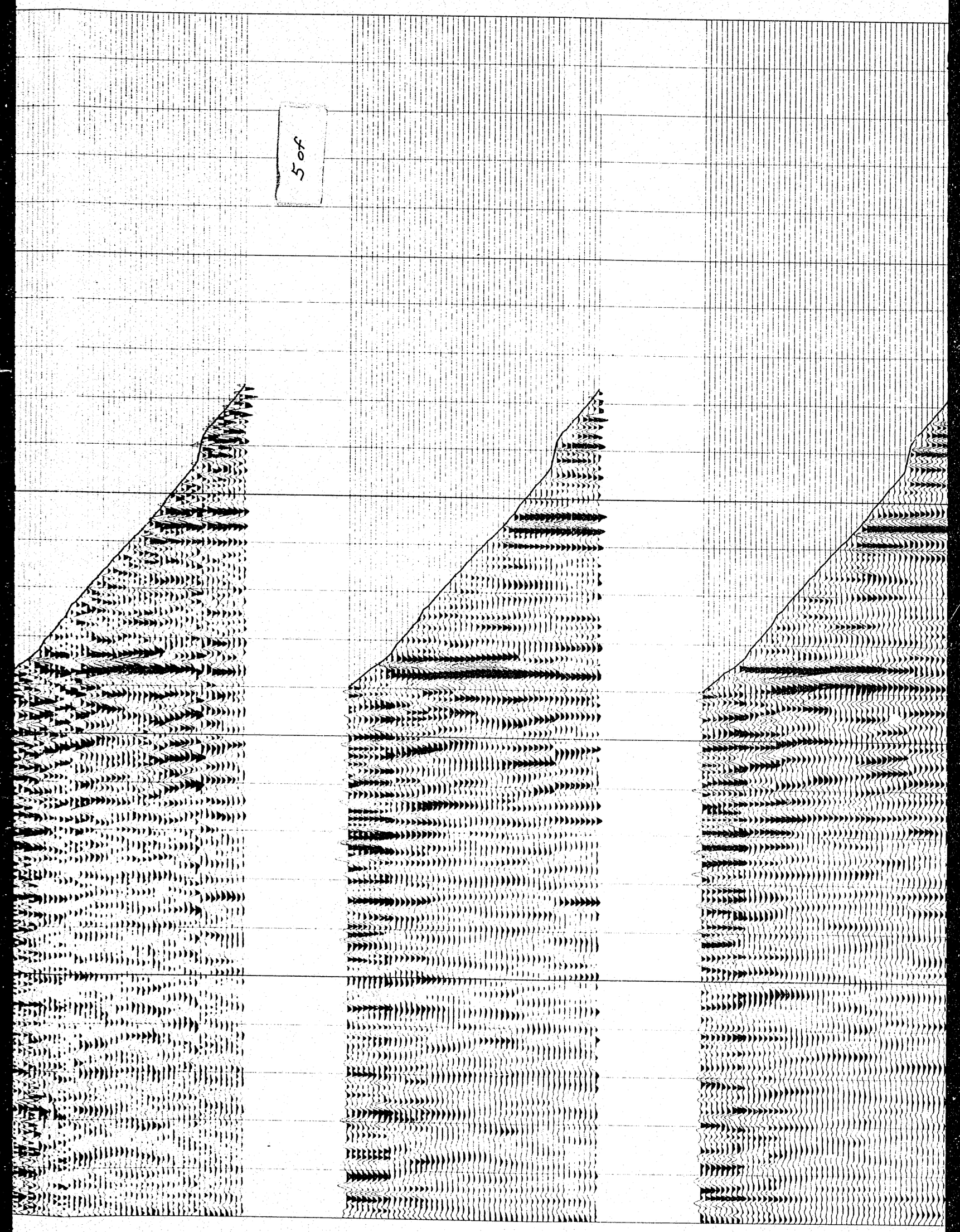


4 of

PREPROCESSED STACKS
MINUS P DOWNGOING

6. MEDIAN UPGOING

7. MEDIAN UPGOING

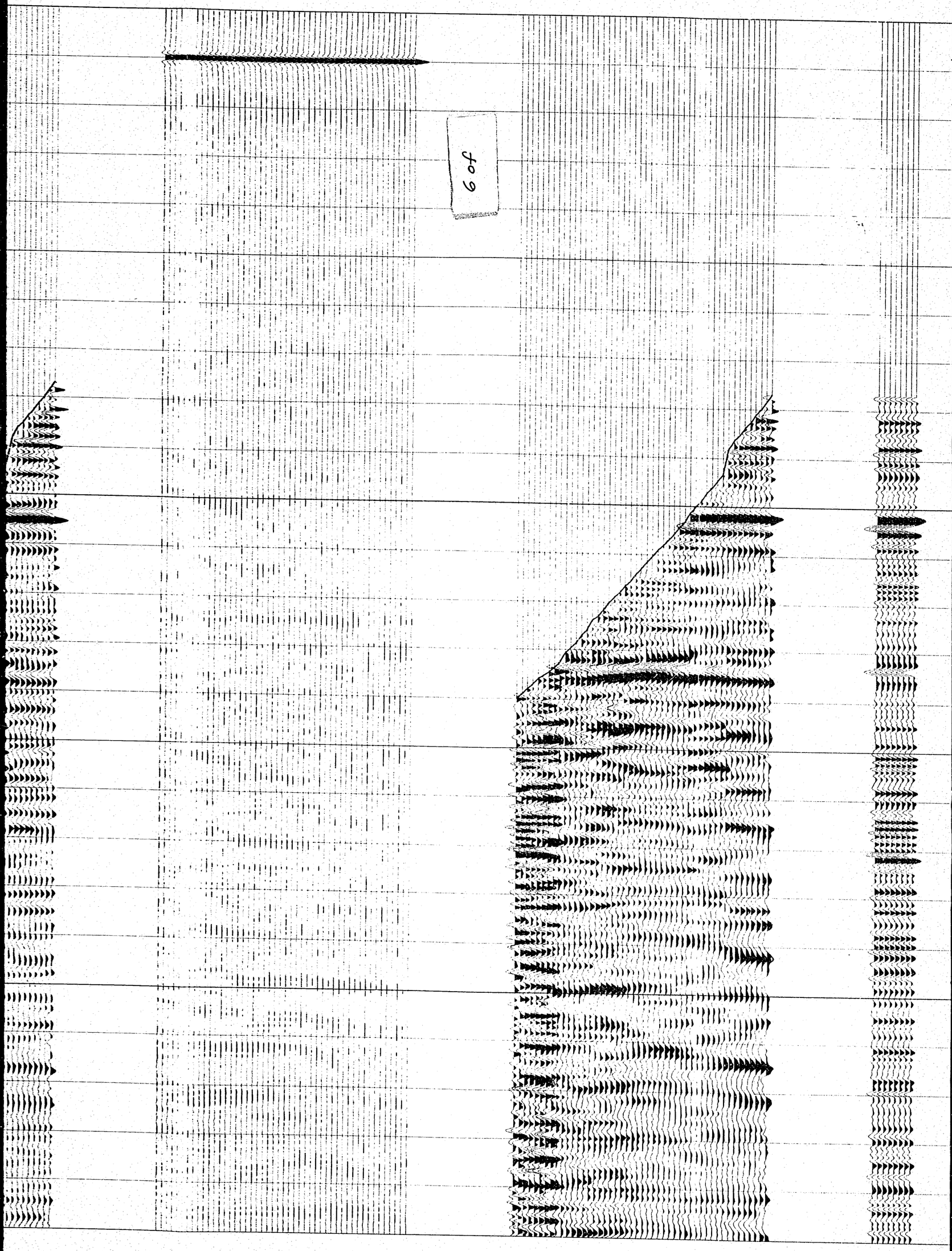


ING

8. WAVE SHAPED DOWNGOING

9. WAVE SHAPED UPGOING

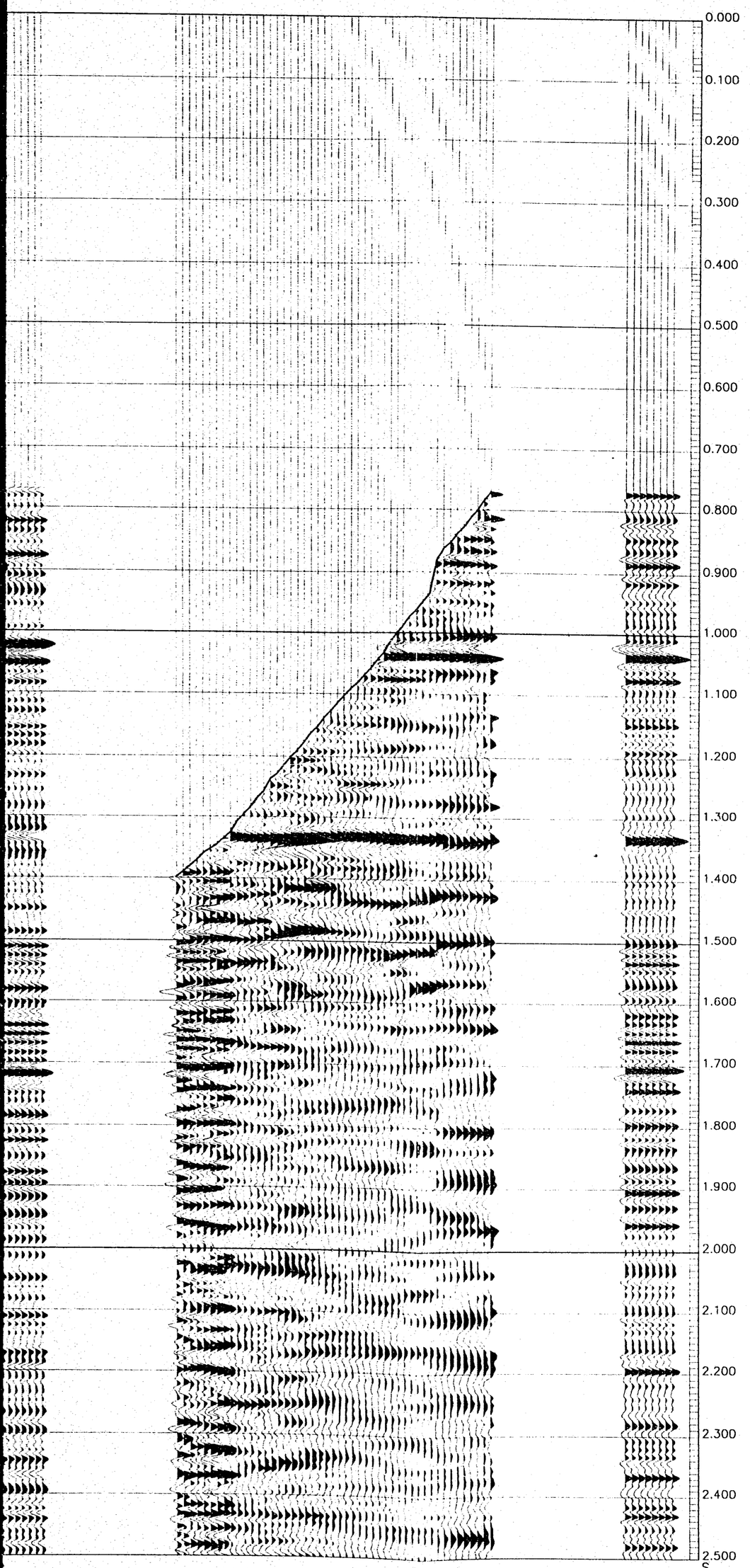
10. SUMM CORRIDOR S



SUMMED
OR STACK

11. WAVE SHAPED
UPGOING

12. SUMMED
CORRIDOR STACK



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