257001

T / 15 P

DUROON BASIN
TASMANIA

BRIDGE BASS 1990
SEISMIC SURVEY

FINAL REPORT

OR - 261

257002

FINAL REPORT

1990 BRIDGE BASS SEISMIC SURVEY

TASMANIAN EXPLORATION PERMIT T/15P

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July 1991

FINAL REPORT
1990 BRIDGE BASS SEISMIC SURVEY
TASMANIAN EXPLORATION PERMIT T/15P

by
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Bridge Oil Limited

TABLE OF CONTENTS

SUMMARY

I INTRODUCTION
Ia Joint Venture Participation List
Ib Bridge Bass 1990 Seismic Survey Rationale
Ic Geo-tectonic History
Id Bathymetry

II DATA ACQUISITION
IIa Recording Parameter Selection.
IIb Contractor Selection
IIc Navigation Quality Control
IId Line Intersection Listing

III DATA PROCESSING
IIIa Contractor Selection
IIIb Parameter Selection and Testing

IV INTERPRETATION
IVa Base Maps
IVb Interpretive Maps

V CONCLUSIONS

VI REFERENCES

FIGURES

1. Permit Location Map
2. Standard Data Processing Flow
3. T/15P Bathymetric Map

ENCLOSURES

1. T/15P Shotpoint Base Map(southern area) Scale: 1:100,000.
2. T/15P Shotpoint Base Map (all data) Scale: 1:250,000.
3. Comparison Processing Standard (line BB90-194)
4. Comparison Processing Non-Standard (line BB90-194)

TABLES

1. Line Lntersection Listing

LIST OF APPENDICES:

I Final Operations Report (2-D Marine Seismic Survey by Halliburton Geophysical Services Inc.

II Navigation report - M/V Magnificent Creek by Halliburton Geophysical Services Inc.

III Seismic Data Processing Report by Digital Exploration

IV Supervision Report by Austral Geophysical Consultants Pty Ltd

V Bark Sub-basin Seismic Data Interpretation Report by R Pickering

VI Seismic Stratigraphic Analysis of T/15P (including a seismic data interpretation report for the Anderson and Boobyalla Sub-basins) by D W Edgerley.

SUMMARY

The Bridge Bass 1990 Seismic Survey recorded 1103 surface km of multifold marine seismic data in November of 1990 in the southern half of the Tasmanian exploration permit T/15P. The survey was designed to detail existing leads for drillsite selection in the Bark Sub-basin and to infill and extend the data grid in the Boobyalla Sub-basin.

Recent work conducted by Bridge Oil has greatly improved the hydrocarbon prospectivity of the permit. Analysis of side wall cores and drill cutting samples from Durroon-1 have confirmed a relationship between the Durroon Mudstone of Durroon-1 and the Golden Beach Formation of the Otway and Gippsland Basins. This relationship has been translated into a revised interpretation of the sediments that directly overly the Otway Group in the three sub-basins of the Durroon Basin (Baillie and Pickering, 1991).

This survey has provided increased control in the Bark Sub-basin where fault dependent structural traps associated with large volumes of near-by source rock are interpreted to exist. The bulk of the programme was recorded in the Boobyalla Sub-basin where large north plunging structural anticlines are interpreted. The availability of source rock to these features is unknown.

Bridge Oil has adopted a unique depositional model for this part of the Bass Strait that incorporates the following ideas:

- the Otway Group was deposited in a linear southward dipping depression. (Edgerley and Taylor, 1990)

- the eastern half of Tasmania, the Bassian Rise and the islands of the Furneaux Group were probably buried under 3 to 4 km of sediments Otway time. (Dumitru *et al*, 1991)

- Uplift and subsequent erosion of these sediments from 100 to 80 Ma provided the material infill for the sub-basins.

- The sediments of 100 to 80 Ma are related to the Golden Beach Formation of the Kippers Gas Field in the Gippsland Basin. (Morgan, 1991; Lowry, 1987)

- There is scant evidence that indicates there may have been one of more marine incursions into the Durroon Basin during the Tasman Rift period. (Morgan, 1991)

- The Boobyalla Sub-basin under went extension during the late stages of the Tasman Rift period. (Edgerley, Appendix VI this report)

Most of the interpreted leads discussed in this report require further definition in order to classify them as valid drilling targets. Approximately 360 km of new seismic data are required to achieve this status.

I INTRODUCTION

This report discusses the major phases of the Bridge Bass 1988 Seismic Survey (Fig 1); its purpose, data recording, data processing, and data interpretation. The data recording and processing work was carried out by Western Geophysical who have prepared and submitted reports that describe the work. These reports are appended. Two way time structure contour maps of the major geologic horizons have been drawn to demonstrate present day time structural configuration over the report area. These maps are appropriately discussed in this report.

Ia Joint Venture Participation List

The joint venture participants of record at the time of recording are listed below:

BRIDGE OIL LIMITED	84.657%
CLUFF OIL (PACIFIC) LTD	7.006%
PEKO OIL LTD	5.211%
WEAVER OIL & GAS CORP	3.126%
	100.000%

Ib Bridge Bass 1990 Seismic Survey Rationale

The programme was recorded with Halliburton Geophysical Services seismic recording vessel MV Magnificent Creek. The data were processed by Digital Exploration (Digicon). The client representative on board the recording vessel was Austral Geophysical Services. Each company has submitted a detailed report on the services provided. These reports are attached to this report as Appendices I, II, III and IV respectively.

Those data covering the Bark Sub-basin were interpreted by Bridge Oil Limited. A report concerning the interpretation of these data is attached as Appendix V.

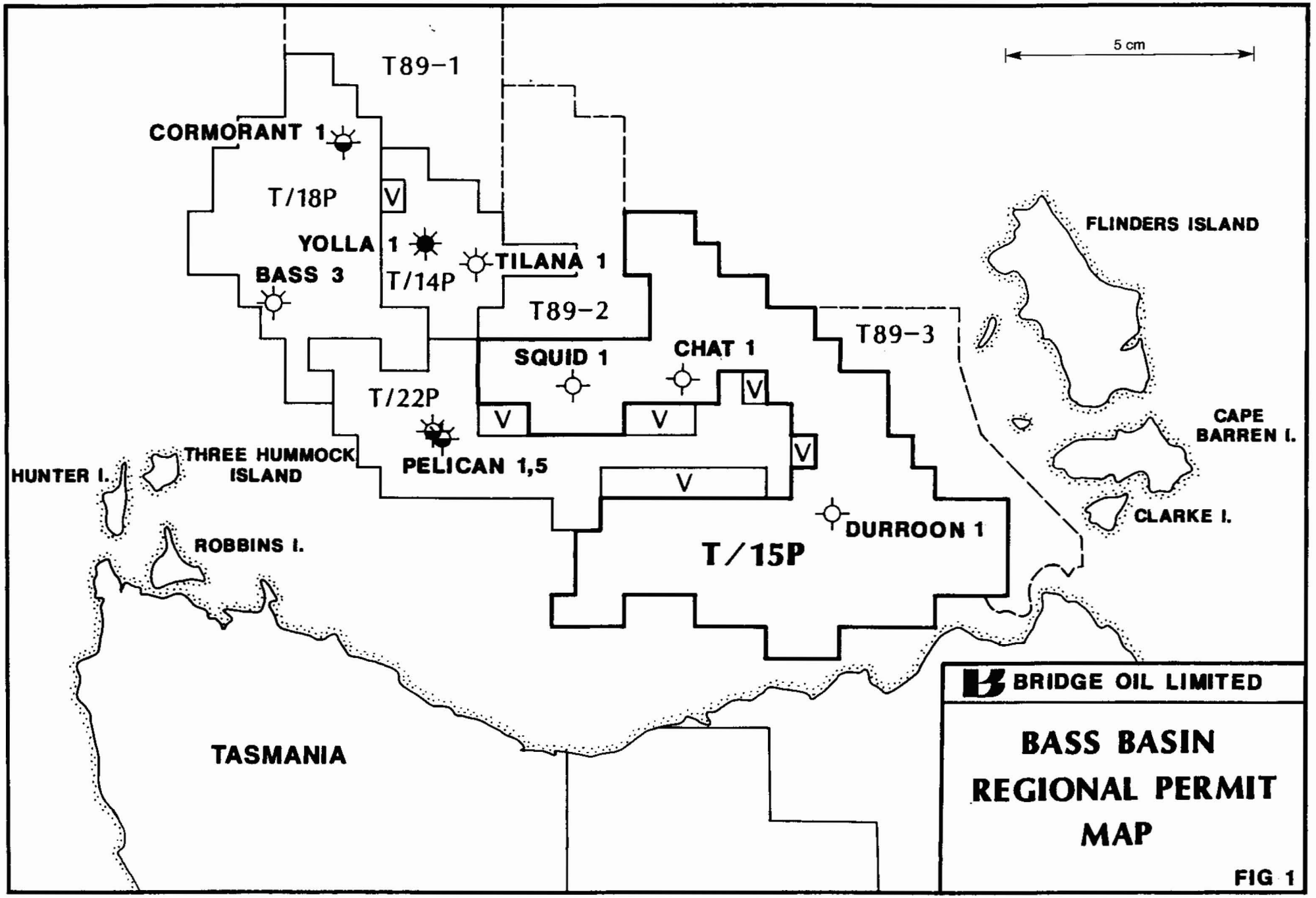
Those data covering the two most eastern of the sub-basins that make up the Durroon Basin (Anderson and Boobyalla) were interpreted under contract by D W Edgerley of Petroconsultants Australasia Pty Ltd. This report is attached as Appendix VI.

Ic Geo-tectonic History

The geo-tectonic history of the Durroon Basin, and hence the area covered by this report is comprehensively discussed by D W Edgerley in Appendix VI of this report.

Id Bathymetry

A bathymetric map of the survey area is included as Figure 3. The sea floor apparently dips gently toward the northwest. There may be some surface expression of deeper strutuctural features on the map. Sea floor topography is expected to have minimal static effect on sub-surface structural features.


5 cm
T89-1
CORMORANT 1
T/18P
V
YOLLA 1
TILANA 1
BASS 3
T/14P
T89-2
T89-3
SQUID 1
CHAT 1
T/22P
V
V
V
V
PELICAN 1,5
THREE HUMMOCK ISLAND
HUNTER I.
ROBBINS I.
DURROON 1
T/15P
FLINDERS ISLAND
CAPE BARREN I.
CLARKE I.
TASMANIA
BRIDGE OIL LIMITED
BASS BASIN REGIONAL PERMIT MAP
FIG 1

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The data input to this map were taken directly from the seismic section header panels and manually input to the digital plotting system.

II DATA ACQUISITION

Data acquisition was by the Halliburton Geophysical Services seismic recording vessel M/V Magnificent Creek. The recording history of the programme is shown in the following table:

RECORDING RECORD:

The following tabulates the production record of the MV Magnificent Creek during this survey. The percentage of time spent in each area (Production, line changes, contractor down-time and weather down-time) is accepted as being normal conditions for this part of the Bass Strait.

		production	non-recording hours			
DATE:	km	hrs	line chng	ctr	weather	total
NOV						
9	0.0	0.00	0.0	13.0	0.0	13.0
10	0.0	0.00	0.0	4.8	19.2	24.0
11	20.6	1.98	1.4	0.0	20.7	24.0
12	86.7	9.30	5.6	0.0	9.1	24.0
13	121.1	12.15	8.1	3.8	0.0	24.0
14	114.1	11.55	3.8	8.6	0.0	24.0
15	134.1	13.37	5.1	0.9	4.7	24.0
16	30.2	3.47	0.0	9.0	11.6	24.0
17	69.9	7.90	5.2	1.8	9.1	24.0
18	138.2	14.35	7.3	2.4	0.0	24.0
19	139.0	14.18	7.6	2.2	0.0	24.0
20	162.6	16.45	7.6	0.0	0.0	24.0
	1114.5	114.4	53.4	56.3	74.2	298.0
		38.4%	17.8%	18.9%	24.9%	100.%

RATE/DAY: 85.7 km/day
RATE/HR: 3.7 km/hr

IIa Recording Parameter Selection

The 480 channel recording streamer of the seismic recording vessel M/V Magnificent Creek was utilised to ensure that adequate subsurface coverage was recorded at shallow depths. in order to achieve this aim the cable was configured such that 60 of the 240 channels utilised were spaced at 6.25 m group intervals. The remaining 180 channels were spaced at 12.5 m group intervals. A 7.5% reduction in subsurface redundancy was considered a minor loss in order that the larger objective of recording high redundancy shallow data be realised. Appendix I provides complete documentation of the recording system used during this survey.

IIb Contractor Selection

The contract to record this survey was offered to every recording company operating in Australian waters and was made subject to two conditions; that of availability and cost. Halliburton Geophysical Services proved to be most economical for reasons of mobilisation costs.

IIc Navigation Quality Control

Halliburton Geophysical Services have provided a complete report on all navigational aspects of the survey in Appendix II.

IId Line Intersection Listing

Table 1 provides a line intersection listing by shotpoint.:

III DATA PROCESSING

IIIa Contractor Selection

The data processing contract for this survey was let on the basis of a sealed bid system. Digital Exploration Ltd (Digicon) was awarded the contract on the basis of cost and turn around time of a finished product. A complete report on the data processing phase is provided by Digicon in Appendix III.

IIIb Parameter Selection and Testing

Exhaustive testing procedures were conducted throughout the data processing phase in order to ensure as high a quality product as the time constraints would allow. A standard processing flow is included as Fig 2.

Because of the non-standard cable configurations utilised during this survey one line (BB90-194) was processed as follows:

- Apply adjacent trace summation to the 6.25 m groups to obtain a standard 12.5 m group interval across the cable (this method is S.O.P.)(Encl 3).

- Process as a 480 trace cable with 200 alternate dead traces to simulate a 480 channel cable with no adjacent trace summation (Encl 4).

Comparison of the final migrated stacks of each version indicates that minimal data corruption visibly occurred as a result of this processing 'short-cut'.

IV INTERPRETATION

IVa Base Maps

Two base maps are provided in this report:
T/15P Shotpoint Base Map (southern area)
T/15P Shotpoint Base Map (all data)

IVb Interpretive Maps

Interpretive maps for the following horizons may be located in Appendices VI (Boobyalla and Anderson Sub-basins by DW Edgerley) and V (Bark Sub-basin by R Pickering)

Demon's Bluff TWT SCM
Paleocene TWT SCM
Durroon Megasequence TWT SCM
Otway Group TWT SCM
Strathroy Block Prospect TWT SCM

V CONCLUSIONS

It can be concluded that this survey exceeded its original objectives in that further leads were detailed, at least two drillable locations have been mapped in the Boobyalla and Bark Sub-basins. Several new leads and/or inferred leads have also been mapped in the Boobyalla Sub-basin.

It can also be concluded that further increases in prospectivity will be realised by recording data over the inferred leads that have been mapped in the Boobyalla Sub-basin.

VI REFERENCES

Baillie P., and Pickering R., (1991). 'Tectonic evolution of the Durroon Basin, Tasmania'. Exploration Geophysics (1991) **22**, 13-18.

Dumitru T.A, Hill K.C., Coyle D.A., Duddy I.R., Foster D.A, Gleadow A.J.W., Green P.F., Kohn B.P., Laslett G.M., O'Sullivan A.J. 'Fission track Thermochronology: Application to continental rifting of South-eastern Australia'. APEA (1991) **31**, 131-142.

Edgerley, D.W., Taylor, J. (1990). 'Seismic interpretation and basin analysis; Bass Basin T/15P' unpublished report for Bridge Oil Limited

Lowry, D., 1987. 'A New Play in the Gippsland Basin'. APEA **27** (1), 164-172.

Morgan R., 1991. 'New Palynology of the Durroon Mudstone'. Unpublished report for Bridge Oil Limited;.

Table 1:

line at SP	ties line	at sp
BB90-175		
590.71	20-14	2465.22
140.72	BB85-20	540.68
172.47	BB85-7	951.77
512.93	BB88-158	166.51
709.24	BB88-159	555.31
806.62	BB88-160	552.85
1005.00	BB88-161	380.65
1087.47	BB88-162	1885.88
215.79	BB90-178	627.37
319.73	BB90-179	225.80
417.75	BB90-180	621.44
573.28	BB90-181	722.54
641.59	BB90-182	227.11
756.98	BB90-183	227.41
862.33	BB90-184	870.92
961.02	BB90-185	250.26
1042.57	BB90-186	602.93
1160.59	BB90-191	642.91
1344.05	BB90-192A	1585.82
423.56	BMR88-306	565.14
1166.99	BMR88-307	1916.90
220.39	WB82-31	744.08
365.92	WB82-33	1541.56
916.45	WB82-34	346.75
1247.95	WB82-35	836.66
1061.61	WB82-43	533.69
BB90-176		
930.00	20-14	2336.53
1027.80	BB88-158	325.11
829.60	BB88-159	395.62
733.57	BB88-160	392.62
519.18	BB88-161	219.11
433.88	BB88-162	2048.13
1214.57	BB90-179	393.16
1120.04	BB90-180	453.07
963.93	BB90-181	553.68
893.48	BB90-182	397.08
785.67	BB90-183	397.67
671.99	BB90-184	699.91
572.75	BB90-185	422.05
481.44	BB90-186	430.66
354.11	BB90-191	468.88
171.96	BB90-192A	1761.07
1136.63	BMR88-306	452.23
397.79	BMR88-307	2031.99
1263.28	WB82-33	1345.03
612.61	WB82-34	174.54
782.42	WB82-43	174.24
BB90-176A		

Table 1:

line at SP	ties line	at sp
1383.64	BB85-20	696.52
1316.29	BB90-178	461.01
1255.24	WB82-33	1345.25
BB90-177		
603.72	20-14	2276.17
134.75	BB85-20	770.10
496.09	BB88-158	398.99
694.91	BB88-159	322.16
790.00	BB88-160	319.57
1011.14	BB88-161	146.77
1097.87	BB88-162	2120.56
197.97	BB90-178	380.39
311.00	BB90-179	472.91
404.11	BB90-180	374.21
560.61	BB90-181	474.47
631.58	BB90-182	475.59
736.53	BB90-183	476.42
853.52	BB90-184	621.67
953.80	BB90-185	499.65
1049.11	BB90-186	352.98
1180.88	BB90-191	391.17
374.42	BMR88-306	399.49
1114.94	BMR88-307	2083.32
217.37	WB82-33	1251.79
915.54	WB82-34	95.94
603.10	WB82-43	11.13
BB90-178		
650.59	BB85-7	999.44
627.37	BB90-175	215.79
461.01	BB90-176A	1316.29
380.39	BB90-177	197.97
319.28	BMR88-308	878.68
138.69	HB75A-227A	915.89
342.64	HB75A-228	1209.70
722.41	HB75A-229	463.41
237.24	WB81-19	691.18
254.82	WB81-20	504.29
344.26	WB82-33	1209.63
BB90-179		
313.15	BB88-168	983.52
225.80	BB90-175	319.73
393.16	BB90-176	1214.57
472.91	BB90-177	311.00
556.05	BMR88-308	802.73
712.03	HB75A-227A	961.20
511.22	HB75A-228	1251.92
130.83	HB75A-229	501.12
677.40	WB81-19	823.28
561.65	WB81-20	378.09

Table 1:

line at SP	ties line	at sp
303.80	WB82-33	1449.14
BB90-180		
916.10	BB85-21	385.19
768.45	BB85-24	414.71
532.59	BB88-168	893.80
621.44	BB90-175	417.75
453.07	BB90-176	1120.04
374.21	BB90-177	404.11
577.00	BMR88-306	535.49
277.16	BMR88-308	742.78
135.79	HB75A-227A	993.96
337.82	HB75A-228	1286.42
716.56	HB75A-229	538.04
124.68	WB81-19	920.36
314.22	WB81-20	279.53
853.02	WB82-29	242.14
711.43	WB82-33	1648.55
BB90-181		
631.80	BB88-168	748.16
820.34	BB88-169	989.05
722.54	BB90-175	573.28
553.68	BB90-176	963.93
474.47	BB90-177	560.61
344.22	BMR88-308	639.10
238.29	HB75A-227A	1053.36
437.23	HB75A-228	1345.48
819.28	HB75A-229	596.26
144.65	WB81-19	1095.23
460.15	WB81-20	111.14
835.79	WB82-29	55.60
BB90-182		
801.82	20-14	2035.62
319.44	BB88-168	683.29
130.84	BB88-169	926.80
227.11	BB90-175	641.59
397.08	BB90-176	893.48
475.59	BB90-177	631.58
621.13	BMR88-308	591.00
712.23	HB75A-227A	1080.92
510.47	HB75A-228	1371.99
130.76	HB75A-229	620.91
841.78	WB81-19	1178.47
460.98	WB82-43	43.36
BB90-183		
320.25	BB88-168	578.63
130.89	BB88-169	813.90
227.41	BB90-175	756.98
397.67	BB90-176	785.67
476.42	BB90-177	736.53

Table 1:

line at SP	ties line	at sp
641.98	BMR88-308	523.89
711.66	HB75A-227A	1116.03
887.98	WB81-19	1277.19
399.61	WB82-43	170.33
BB90-184		
776.82	BB88-168	476.31
965.65	BB88-169	720.51
870.92	BB90-175	862.33
699.91	BB90-176	671.99
621.67	BB90-177	853.52
433.78	BMR88-308	437.70
391.26	HB75A-227A	1163.91
141.04	WB81-19	1432.90
760.44	WB82-43	301.75
BB90-185		
344.94	BB88-168	383.09
156.14	BB88-169	627.85
250.26	BB90-175	961.02
422.05	BB90-176	572.75
499.65	BB90-177	953.80
706.82	BMR88-308	371.68
729.55	HB75A-227A	1201.94
BB90-186		
506.22	BB88-168	301.11
696.36	BB88-169	555.84
602.93	BB90-175	1042.57
430.66	BB90-176	481.44
352.98	BB90-177	1049.11
125.06	BMR88-308	298.91
126.33	HB75A-227A	1242.84
593.26	WB82-43	512.72
BB90-187		
134.91	20-14-A	4201.22
542.40	BB90-190	125.04
700.07	BB90-191	2948.42
885.21	BB90-193	148.97
1071.65	BB90-196	996.84
1237.33	BB90-199A	347.14
1336.19	BB90-201	2197.44
1429.25	BB90-202A	404.20
1525.37	BB90-203	1015.27
1671.60	BB90-204	451.01
1698.45	BB90-205	1506.71
481.04	BMR88-306	2096.02
1250.75	BMR88-307	380.34
BB90-188		
2283.74	20-14-A	3975.80

Table 1:

line at SP	ties line	at sp
1976.35	BB88-159	2440.44
1883.28	BB90-190	428.22
1716.91	BB90-191	2643.67
1522.50	BB90-193	454.82
1335.37	BB90-196	691.11
1163.06	BB90-199A	653.98
1052.94	BB90-201	1888.99
955.74	BB90-202A	713.78
861.30	BB90-203	706.48
711.32	BB90-204	761.69
947.94	BB90-205	1131.59
1998.86	BMR88-306	1889.72
1231.82	BMR88-307	586.51
BB90-189		
BB90-189A		
2421.35	20-14-A	3809.56
2134.85	BB88-159	2231.96
1933.46	BB88-162	215.46
1760.68	BB88-163	1033.05
1375.25	BB88-165	1503.43
1212.37	BB88-166	110.77
973.49	BB88-167	125.16
2030.85	BB90-190	649.01
1856.89	BB90-191	2424.11
1657.42	BB90-193	673.62
1469.12	BB90-196	473.12
1422.91	BB90-197	1650.75
1337.12	BB90-198	133.03
1291.50	BB90-199A	873.97
1174.94	BB90-201	1671.79
1073.49	BB90-202A	931.23
979.61	BB90-203	490.53
829.14	BB90-204	976.62
828.72	BB90-204A	976.57
1250.38	BB90-205	867.28
2955.86	BMR88-302	3868.11
2189.00	BMR88-306	1743.37
1428.61	BMR88-307	730.68
BB90-190		
974.40	BB88-174	458.78
125.04	BB90-187	542.40
428.22	BB90-188	1883.28
649.01	BB90-189A	2030.85
1142.56	BMR88-310	966.06
1218.34	WB82-40	17.31
BB90-191		
543.89	BB88-168	186.23
735.00	BB88-169	450.48
918.71	BB88-170	239.26

Table 1:

line at SP	ties line	at sp
1094.59	BB88-171	453.04
1429.33	BB88-172	1130.33
1539.78	BB88-173	625.47
2094.21	BB88-174	630.59
642.91	BB90-175	1160.59
468.88	BB90-176	354.11
391.17	BB90-177	1180.88
2948.42	BB90-187	700.07
2643.67	BB90-188	1716.91
2424.11	BB90-189A	1856.89
618.34	BMR88-307	1933.23
132.93	BMR88-308	200.65
1236.44	BMR88-309	2031.06
1903.03	BMR88-310	841.69
1852.66	WB82-40	211.32
1282.09	WB82-41	1031.21
693.27	WB82-43	641.93
BB90-192		
1314.09	BB88-170	413.04
1146.91	BB88-171	277.08
793.51	BB88-172	972.49
680.36	BB88-173	776.90
136.71	BB88-174	756.05
1371.10	BB90-192A	1371.25
413.17	BB90-205	120.27
934.21	BMR88-307	1480.46
1028.88	BMR88-309	2152.12
344.65	BMR88-310	745.86
380.90	WB82-40	360.42
936.85	WB82-41	853.62
BB90-192A		
1495.28	BB88-169	277.60
1585.82	BB90-175	1344.05
1761.07	BB90-176	171.96
1371.25	BB90-192	1371.10
1438.13	WB82-43	844.00
BB90-193		
1008.52	BB88-174	827.22
148.97	BB90-187	885.21
454.82	BB90-188	1522.50
673.62	BB90-189A	1657.42
BB90-194		
1128.51	BB88-171	182.33
765.23	BB88-172	868.23
650.43	BB88-173	884.34
118.24	BB88-174	879.75
232.96	BB90-205	313.71
467.22	BMR88-307	1183.94

Table 1:

line at SP	ties line	at sp
1029.79	BMR88-309	2223.27
341.23	BMR88-310	663.61
1140.49	WB82-36	519.29
362.80	WB82-40	484.01
904.49	WB82-41	746.35
BB90-195		
317.73	BB88-170	621.88
315.18	WB82-43	1087.43
BB90-195A		
482.35	BB88-171A	667.86
848.68	BB88-172	766.42
965.08	BB88-173	983.38
1490.60	BB88-174	962.27
1490.90	BB90-205	452.84
1487.60	BMR88-307	956.09
555.70	BMR88-309	2304.64
1252.07	BMR88-310	593.87
1243.18	WB82-40	581.22
716.69	WB82-41	632.22
563.78	WB82-42	26.08
BB90-196		
133.89	BB88-174	1004.48
996.84	BB90-187	1071.65
691.11	BB90-188	1335.37
473.12	BB90-189A	1469.12
192.19	BB90-205	523.07
306.27	BMR88-307	839.27
BB90-197		
317.59	BB88-171A	578.55
673.32	BB88-172	674.93
791.53	BB88-173	1074.23
1308.12	BB88-174	1055.63
1650.75	BB90-189A	1422.91
1434.38	BB90-205	603.97
1667.91	BMR88-307	719.46
361.14	BMR88-309	2369.83
1050.34	BMR88-310	519.94
1061.43	WB82-40	680.46
545.71	WB82-41	535.30
393.21	WB82-42	122.70
BB90-198		
1106.86	BB88-172	594.28
987.46	BB88-173	1154.83
476.68	BB88-174	1136.22
133.03	BB90-189A	1337.12
241.18	BB90-205	734.77
748.13	BMR88-310	454.56

Table 1:

line at SP	ties line	at sp
724.87	WB82-40	767.68
1229.06	WB82-41	450.14
1384.39	WB82-42	210.34
BB90-198A		
1453.81	BB88-171A	496.79
1437.65	BMR88-309	2426.97
1384.10	WB82-42	209.66
BB90-199A		
1219.58	BB88-174	1177.86
347.14	BB90-187	1237.33
653.98	BB90-188	1163.06
873.97	BB90-189A	1291.50
925.47	BB90-205	804.06
402.84	BMR88-307	417.26
BB90-200		
1094.28	BB88-171A	411.30
756.48	BB88-172	506.61
637.36	BB88-173	1242.67
135.55	BB88-174	1226.20
1110.91	BMR88-309	2487.95
416.16	BMR88-310	385.42
383.60	WB82-40	864.03
876.94	WB82-41	356.92
1030.58	WB82-42	301.36
BB90-201		
379.84	BB88-171A	304.93
708.81	BB88-172	412.48
827.07	BB88-173	1333.16
1323.03	BB88-174	1299.67
2197.44	BB90-187	1336.19
1888.99	BB90-188	1052.94
1671.79	BB90-189A	1174.94
1761.96	BB90-205	977.53
321.05	BMR88-309	2564.52
1021.44	BMR88-310	316.42
1072.60	WB82-40	950.22
590.84	WB82-41	251.01
434.79	WB82-42	413.29
BB90-202A		
2206.16	BB88-171A	190.78
1887.02	BB88-172	303.35
1771.15	BB88-173	1440.72
1283.11	BB88-174	1400.29
404.20	BB90-187	1429.25
713.78	BB90-188	955.74
931.23	BB90-189A	1073.49
722.62	BB90-205	1120.63

Table 1:

line at SP	ties line	at sp
2301.93	BMR88-309	2647.13
1603.15	BMR88-310	233.17
1535.14	WB82-40	1062.15
2002.35	WB82-41	132.60
BB90-203		
136.17	BB88-174	1487.81
1015.27	BB90-187	1525.37
706.48	BB90-188	861.30
490.53	BB90-189A	979.61
809.46	BB90-205	1256.57
BB90-204		
451.01	BB90-187	1671.60
761.69	BB90-188	711.32
976.62	BB90-189A	829.14
482.81	BB90-205	1467.98
BB90-204A		
1334.70	BB88-174	1631.44
976.57	BB90-189A	828.72
BB90-205		
399.87	BB88-164	351.59
678.93	BB88-165	1359.46
452.47	BB88-174	962.03
1506.71	BB90-187	1698.45
1131.59	BB90-188	947.94
867.28	BB90-189A	1250.38
120.27	BB90-192	413.17
313.71	BB90-194	232.96
452.84	BB90-195A	1490.90
523.07	BB90-196	192.19
603.97	BB90-197	1434.38
734.77	BB90-198	241.18
804.06	BB90-199A	925.47
977.53	BB90-201	1761.96
1120.63	BB90-202A	722.62
1256.57	BB90-203	809.46
1467.98	BB90-204	482.81
455.40	BMR88-307	952.49
194.40	BMR88-310	713.73
220.96	WB82-36	1291.15
158.91	WB82-40	385.85
1671.79	BB90-189A	1174.94
1761.96	BB90-205	977.53
321.05	BMR88-309	2564.52
1021.44	BMR88-310	316.42
1072.60	WB82-40	950.22
590.84	WB82-41	251.01
434.79	WB82-42	413.29

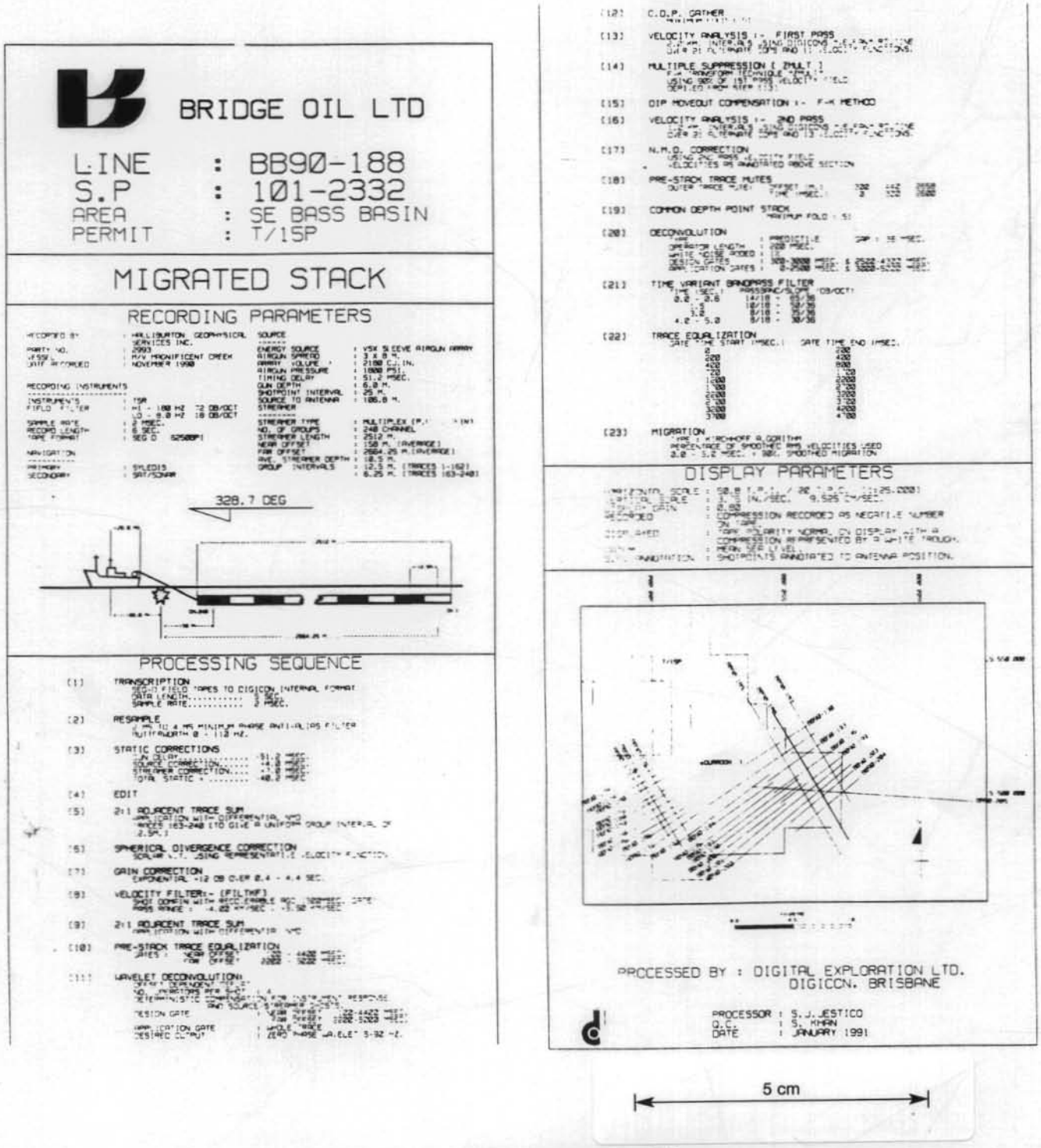
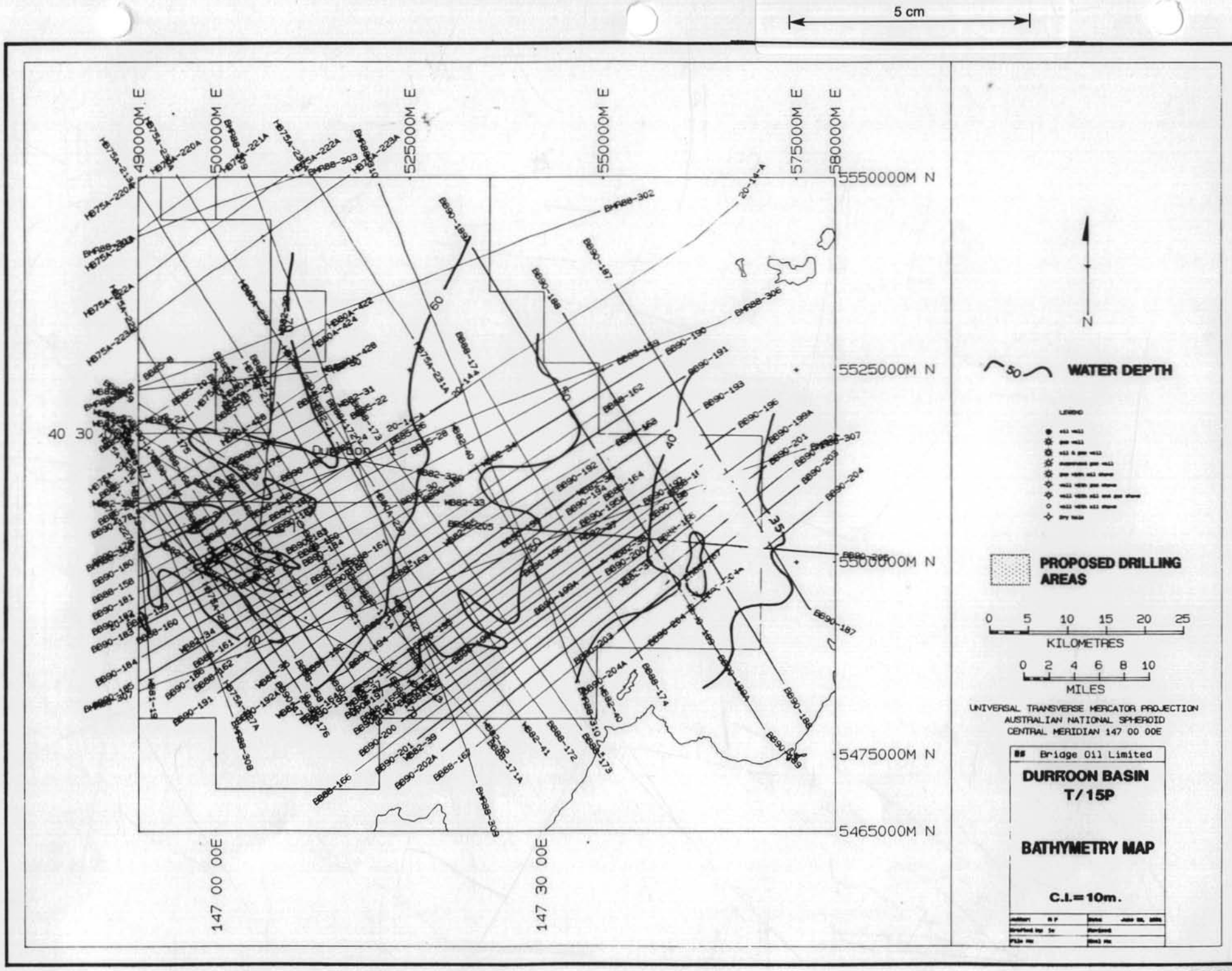


FIG. 2: Standard Data Processing Flow



257022

FIGURE 3

257023

FINAL OPERATIONS REPORT

2-D MARINE SEISMIC SURVEY

CLIENT : BRIDGE OIL LTD

CONTRACTOR : HALLIBURTON GEOPHYSICAL SERVICES INC.

VESSEL : M/V MAGNIFICENT CREEK

AREA : T/15P

DATES : 11 - 21 NOVEMBER 1990

TABLE OF CONTENTS

SECTION		TITLE	PAGE
I		INTRODUCTION	1
	i.	Introduction	2
	ii.	Survey Vessel	3
	iii.	Key Personnel	4
	iv.	Key Survey Parameters	5
II		INSTRUMENTS	6
	I	THEORY OF OPERATION	6
	i.	Digital Fibre Optic Streamer	7
	ii.	Streamer Control System	8
	iii.	Field Computer System III	10
	iv.	Configurable Marine System III	11
	v.	990 Navigation System	12
	vi.	Streamer Tracking System III	14
	vii.	Energy Source	15
	II	INSTRUMENT DETAILS and DISCUSSIONS	17
	i.	Digital Streamer Details	18
	i(a)	Discussion	19
	ii.	Recording System Details	20
	ii(a)	Discussion	21
	iii.	CMS III 980B Option Details	22
	iii(a)	Discussion	23
	iv.	990 Navigation System Details	24
	iv(a)	Discussion	25
	v.	Streamer Tracking System III Details	26
	v(a)	Discussion	27
	vi.	Fathometer Details	28
	vi(a)	Discussion	29
	vii.	Multi-Trace Plotter Details	30
	vii(a)	Discussion	31
	viii.	Streamer Depth Control Network Details	32
	viii(a)	Description	33
	viii(b)	Discussion	35
	ix.	Energy Source Details	36
	ix(a)	Discussion	37
	x.	Tiger II System Details	38
	xi.	Tiger II System Description	39

257025

TABLE OF CONTENTS

SECTION		TITLE	PAGE
III		NAVIGATION	40
	I	SYSTEM DESCRIPTION	40
	i.	SYLEDIS System Description	41
	II	SYSTEM DETAILS and DISCUSSIONS	42
	i.	SYLEDIS System Details	43
	ii.	Base Station Details	44
	iii.	Spheroid Details	45
	iv.	System Calibration	46
	v.	Navigation Discussion	47
	vi.	Navigation Tape Summary	48
IV		OPERATIONS	49
	i.	Operations Discussion	50
	ii.	Survey Statistics	51
	iii.	Shipment Details	52

TABLE OF CONTENTS

APPENDIX	TITLE
A	Daily Line Status Log
B	Numerical Line Summary
C	Inventory of Digital Field Tapes

PLATE NO	TITLE
1	Streamer Control System Diagram
2	Field Computer System III Diagram
3	Streamer Electronics Module
4	Antennae Location Diagram
5	Airgun Array Diagram
5 A	Spread and Offset Diagram
5 B	Conventional Tow Array Diagram
6	Streamer Diagram
7	Location of Prospect
8	Fathometer Scale Diagram



SECTION I

INTRODUCTION



i. INTRODUCTION

A 2-D marine seismic survey was conducted by Halliburton Geophysical Services Inc. between the 11th and the 21st of November 1990. The survey was in permit area T/15P. The purpose of the following report is to provide the reader with an insight into methods and equipment used by H.G.S. to collect the data and also to highlight any problems that were encountered during the survey period.

Section I.ii consists of statistics of the Motor Vessel Magnificent Creek.

Section I.iii contains a list of key personnel involved with the operation and maintenance of instruments and equipment employed in collection of the data and also those responsible for the assurance of quality and integrity of data recorded.

Key survey parameters are outlined in section I.iv.

An overview of the instrumentation is detailed in section II, with section II.I containing a brief description of the theory of operation of Halliburton Geophysical Services' unique equipment. Section II.II involves both details and discussions of the instrumentation and equipment incorporated in onboard operation.

A brief description of the operating principles of the various navigation systems including base station data, system calibration and navigation tape summaries, is outlined in section III.I & III.II.

In the final section (IV) all aspects of operational procedures are provided and include shipment details and survey statistics.

Three appendices containing a daily line status log, a numerical line summary and an inventory of digital field tapes may be found following section IV.

A number of plates are attached to this report which illustrate various supplementary details involved with data collection, processing techniques and equipment.

ii. SURVEY VESSEL

M/V MAGNIFICENT CREEK

Flag ..... Australia

Homeport ..... Fremantle

Trade ..... Foreign-going

Owners ..... Finbar Marine

Call Sign ..... VJLC

Length ..... 57.90 metres L.O.A.

Breadth ..... 13.20 metres B.O.A.

Depth ..... 4.90 metres

Draft ..... 3.05 - 4.40 metres

Official No. 3553747A

Gross Tonnage ..... 1272.18 Tons

Nett Tonnage ..... 738.90 Tons

Main Engines ..... 4 x 1100 BHP Daihatsu PSH TC M-26D

Elec. Power ..... 2 x 250 KW KATO, 415V 50Hz

Load Line ..... LLoyds Register

iii. KEY PERSONNEL

Party Manager	S. Dowling
Systems Engineer	P. Wright
Quality Controllers	A. Edwards M. Wilson
Survey Operators	R. Stanley L. Ha G. Kennedy
System Operators	M. East P. Wright T. Moojen
Compressor Engineer	D. Waugh B. Cush
Source Mechanics	S. King A. Moses G. Stokes G. Constant
Navigation Support	B. Tuck
Master	D. Ridsdale
Vessel Supervisor	I. Taylor
Client Representative ...	F. Renton

iv. KEY SURVEY PARAMETERS

STREAMER PARAMETERS

Dual or Single	Single
Groups per Streamer	240
Streamer Spread	N/A
Group Interval	6.25 Metres
Streamer Trace Mixing	Traces 1-162 2:1
	Traces 163-240 1:1
Nominal Streamer Offset	160 Metres
Streamer Depth	10 Metres
Nominal Depth Monitor Interval	300 Metres
Streamer Tracking Yes/No	Yes
Nominal Compass Interval	300 Metres
Maximum Feather Angle Specification	10 Degrees
Bin Width	N/A

INSTRUMENT PARAMETERS

Sample Interval	2 msec.
Record Length	6 sec.
High Cut Filter	180 Hz @ 72 dB/Octave
Low Cut Filter	8 Hz @ 18 dB/Octave

SOURCE PARAMETERS

Array Volume	2180 cu. in.
Array Depth	6 Metres
Array Spread	3 x 8.3 Metres
Array Formation	Parallel
Tow Configuration	Conventional Tow
Number of Sub Arrays	4
Nominal Pressure	1800 PSI

NAVIGATION PARAMETERS

Shotpoint Interval	25 Metres
Line Begin Extension	-8 Shotpoints
Line End Extension (Note 1)	-43 Shotpoints
Primary Navigation	SYLEDIS
Secondary Navigation	Sat/Sonar
Spheroid	A.N.S.
Semi-Major Axis	6378160
Reciprocal of Flattening	298.25
Magnetic Declination (Correction)	12.5 Degrees East

NOTE 1: A half streamer length extension is automatically added to the end of each line in addition to any operator entered extension (see operations disc.).

SECTION II

INSTRUMENTS

PART I

THEORY OF OPERATION



i. DIGITAL FIBRE OPTIC STREAMER

The 480 Channel Digital Fibre Optic streamer consists of four major in water elements, Live Sections, Program Plugs, Streamer Electronic Modules (SEM) and Repeater Modules. The M/V Magnificent Creek's streamer is configured for 300 traces comprising 25 separate "clusters", each handling a group of twelve traces.

The three major components making up each "cluster" are a SEM positioned between a Live I and a Live II, with each Live section containing 12 separate 6.25 metre groups. Each group, or trace, contains 16 acceleration-cancelling "dish" type hydrophones. The Program Plug, positioned midway along every Live section, has a twofold function. Firstly it determines whether the Live section is a Live I or a Live II, dependent on which of the two types of plug is installed in the section. Secondly it determines the trace "mix" (1:1, 3:1 or 5:1) of the particular cluster. In the case of a 1:1 plug being installed, the live section acts both as a Live 1 and Live 2. The data fom the near six traces being associated with the SEM ahead of the section and the data from the six far traces being associated with the SEM immediately aft.

Signal processing in the streamer is performed by the SEMs. Each SEM receives six groups of analog data from the Live section in front of it (Live I) and six groups of analog data from the Live section behind it (Live II) to form a 12 group configuration. Signal processing consists of preamplification, filtering, multiplexing, gain ranging and analog to digital conversion. The analog data is always sampled by the SEM at a 1 millisecond sample rate and preamplified with a low noise charge amplifier. Each channel may be filtered with a choice of low-cut filters and then applied to a fixed 256 Hz, 72 dB/octave high-cut filter. It is then multiplexed, gain adjusted with a quaternary, instantaneous floating point amplifier and converted to digital form by a 14-bit plus sign, successive approximation, A/D converter. The digital data is added to the incoming data stream, from the previous SEM(s), for transmission by one of two optical fibres to the next SEM. Each optical fibre is capable of handling 252 seismic channels at 1 millisecond sample rate. Besides seismic data, four channels of SEM auxiliary data containing depth, test oscillator and DC offset information (one channel is grounded to provide further crossfeed isolation for the DC offset channel) are digitized and added to the data stream.

Configuration and control of the SEMs is provided by the streamer control system via the command bus. Power for the streamer is provided by the streamer power system via the power bus.



ii. DFOS STREAMER CONTROL SYSTEM

The DFOS-480 streamer control system is composed of several major functional blocks. They are the streamer interface, data I/O interface, signal processing, reproduce data, status processing and control functions.

The streamer interface allows the streamer control system to receive data from a conventional analog streamer or from a digital streamer. The streamer interface may also receive test data from a streamer test unit via optical fibre and simulated data patterns from a streamer simulator. The streamer interface sorts and distributes the input data onto two 8-bit input data buses.

The seismic data I/O interface (SIDIOP) receives raw data from the streamer interface via the input data bus, imbeds a timing signal into the data and pipelines serial data to the signal processing function. It receives the serial, filtered, data back from the signal processing function, converts it to parallel data, and passes it to one of the two data buses.

The signal processing function receives raw SEM data from the data I/O interface, prepares the data for the digital filters, applies digital high-cut and DC offset filters, converts the data back to serial form and transmits the data simultaneously to the recording system and data I/O function.

The reproduce data function allows the user to select input data received as raw, unfiltered data from the streamer interface and filtered data from the data I/O interface. It provides optional reproduce processing of selected input data and outputs to four display devices. Two multiplexed displays, each with 132 channel capacity, are provided to a dual channel oscilloscope for real time quality control of the entire streamer. The observer may select raw data from a portion of the streamer to be displayed with the same data channels of filtered data. Reproduce data is transmitted to a digital camera for a paper display of up to 128 data channels. Two user selectable, single trace display outputs are sent to a single-trace profiler. User configurable, high cut and low cut filters, specifically for single trace displays, may be selected. Seismic data or streamer noise data is output to a spectrum analyzer for real-time frequency domain analysis.

ii. DFOS STREAMER CONTROL SYSTEM Cont.

The status processing function receives status and error information from the streamer interface via parallel data bus. It stores an error threshold for each error type that is received from the control function. If any error threshold is exceeded, the control function is interrupted. The status and data bits are displayed on an LED display panel.

The control function allows operator commands and configuration to be input via video display terminal. It maintains the system software that controls the application of the configuration commands to the streamer interface, data I/O interface, reproduce data, streamer simulator and status processing functions via control bus. Configuration and control of the signal processing function are provided via a RS-232 serial link. The display terminal is also connected to the control function via the RS-232 interface.

The control function provides an interface to a Winchester hard-disk unit to facilitate storage and control of system software. A floppy disk unit is provided to back up the Winchester and download new software releases. A line printer provides hard copies of configuration disk files.



iii. FIELD COMPUTER SYSTEM III

The Field Computer System (FCSIII) provides trace sequential recording of up to 480 channels of seismic data at a 1 millisecond sample rate. It contains the necessary circuitry to receive, store, format, write to magnetic tape, digitally check and reproduce read-after-write records.

The FCSIII is divided into five major rack mounted subsystems plus peripherals. They are the Gould 32/2705 Computer, Gould I/O Expansion, Zitel Mass Memory, Amplifier Control and Read After Write Monitor / Digital Data Checker.

The recording system receives the seismic data from the Streamer Control System (SCS) via Ethernet links. The data may then be resampled to 2 or 4 milliseconds, if required, prior to formatting and demultiplexing. Trace headers are applied prior to writing data from mass memory to tape. The recorder initiates recording by first writing the record header and then pulling the seismic data on a trace by trace basis from mass memory and writing these in trace sequential format on tape. The mass memory stores data in one buffer while data is extracted from the other and recorded on tape.

Three 6250 BPI tape transports are utilised with the computer automatically switching transports when a tape is full or an error condition develops. These units operate in a fully read after write mode permitting quality checking of the data all the way to tape. The recorder selects, remultiplexes and displays two channels for scope display. A single read-after-write scope display of all channels being written to tape is also available.



iv. CONFIGURABLE MARINE SYSTEM

The Configurable Marine System (CMS III) is at the centre of data collection operations. Although the most visible function of the CMS III is survey control and navigation data recording, the system also collects and records data from a variety of sources.

The CMS III comprises a central Texas Instruments 980B mini computer networked to three TI 990 based sub-systems. Various peripheral systems are interfaced directly to the 980B computer, or to one of its 990 sub-systems.

The major functions of the 980B central computer are to record all non-seismic data on its peripheral tape transports, provide seismic line control, provide data to the ADL for real time quality control, provide selectable data over an eXternal Quality Control link (XQC) and drive a graphical plotter for vessel steering guidance.

The 980B computer has an operator interface provided by the 990 QC sub-system. The operator interface is used to enter line control and prospect level parameters. A subset of the data recorded to tape is routinely passed to the 990 QC and displayed on a VDU. The same data is passed to the automatic data logger (ADL) for quality control. Additionally, the 990 QC allows the operator to interrogate the 980B at any time for additional data.

A second 990 based sub-system is the 990 NAV system. Dedicated to navigation, the 990 NAV sub-system provides the 980B with filtered navigation data for use by the line control program, as well as raw data for recording on magnetic tape. The 990 NAV system is described more fully in a following section of this report.

The OBB/STS/TIGER system, another 990 based sub-system, comprises the final sub-system of the CMS III. This 990 mini computer runs under the DX10 multi-tasking operating system, which allows the computer to perform its three major tasks as though they were running on separate machines. The three functions are streamer tracking (STS), real-time binning (OBB), and Tiger II quality control. These three functions are also described more fully in a later section.



v. 990 NAVIGATION SYSTEM

The 990 NAV sub-system of the CMS III performs all navigation tasks. The system navigates in real-time from raw range data supplied by external radio positioning systems (RPS). The raw, unfiltered ranges are passed by the 990 NAV system to the 980B computer for recording on magnetic tape and for printing on the ADL printer. Filtered position and velocity data are also passed to the 980B for use by the line control program, resident within the 980B software.

The 990 NAV is configured with twelve 32 bit parallel interfaces, called multisensors. The multisensor interfaces provide the system with the capability of reading up to twelve ranges simultaneously. The 990 NAV system is also capable of using satellite, gyro and sonar data.

The 990 NAV navigation software comprises five major elements, these being range processing, system definition, multi-way fix computation, dead reckoning and fix/dead reckoning integration.

The range processing software is used to filter each range and derive a velocity for each range. Each range is processed independently, in accordance with a set of twelve masks entered by the operator. This allows filter characteristics to be individually tailored to each range, independently of the other ranges. The range processing software also produces statistical quality control data with respect to each range.

The system definition portion of the program allows the operator to define navigation systems. A system in 990 NAV terms is defined by selecting any combination of two to four ranges. The selected ranges are usually from the same physical navigation equipment, but a 990 NAV system could easily use four ranges from four different navigation systems, if required. Up to three such systems may be defined.

The filtered ranges are passed to the multi-way fix algorithm which generates fixes for each defined system, along with statistical quality control data. The range velocity data is passed to the dead reckoning routines, which compute filtered velocities and azimuths for each defined system.



v. 990 NAVIGATION SYSTEM Cont.

The operator defines the primary and secondary navigation sources from the previously defined systems by selecting a source for fixes, velocity and azimuth. Additionally, the operator may select GPS or Transit Satellite for a fix source, Sonar for velocity and Gyro for azimuth information. The primary and secondary navigation may use any combination of available sources.

The integration routines put the several separate routines together by integrating the available fixing sources and dead reckoning data. The integration software applies dead reckoning updates each second, to the last known position for the primary and secondary systems. At operator defined intervals, the dead reckoned position is updated by the selected fix source. Fix intervals may be as frequent as every few seconds, as is the case with RPS systems, or as infrequent as every few hours in the case of Transit Satellite fixing.

Quality control data from the 990 NAV system includes range variances, missed ranges, range spikes, fix circular error probability and fix residuals. Additionally, the 990 NAV computes the range C-O values from the primary position to all initialised base stations.

vi. STREAMER TRACKING SYSTEM III

The Streamer Tracking System (STS III) is a marine data gathering system that acquires and processes magnetic heading and streamer depth data from digital compasses and depth transducers located on the streamer. Processed data is displayed on video terminals, transmitted to the CMS III for recording on magnetic tape and written to the ADL to provide quality control in real time. Additional information relating to the attitude of the streamer is also recorded on magnetic tape. In the case of a 3-D survey, this information is combined with navigation data at post-processing to establish geographical co-ordinates of all parts of the streamer at each shotpoint in the survey.

A number of parameters are entered into the system prior to commencing the survey to define the streamer and source configuration. The parameters are used in real-time for streamer tracking and are also written to tape for post-processing. A maximum combination of twenty depth and heading sensors may be displayed at any given time. The key parameters are listed earlier in this report.



vii. ENERGY SOURCE

The sleeve gun array source incorporates a new concept in airgun design in that the shuttle is an external sleeve that produces a full 360 degree port. This allows a more efficient acoustical pulse than the traditional airgun.

Three chambers control the movement of the shuttle. These are the air spring return chamber, the firing chamber and the main chamber.

The air spring chamber is constantly fed by the air supply through the fill passage. It's purpose is twofold: first, it holds the shuttle closed when the gun is not firing and second, it provides a spring return, or recoil, to return the shuttle to its closed position.

The firing chamber controls the firing of the airgun. It is fed by a solenoid valve which is normally in the closed position. When an electrical pulse is sent to the solenoid valve the valve opens and supplies air to the firing chamber. This creates a force imbalance that opens the shuttle. Once the shuttle is completely open, small exhaust ports in the firing chamber dump the air pressure. Once this chamber and the main chamber have exhausted the shuttle returns to the closed position.

The main air chamber is exhausted very rapidly to create an explosion or acoustic blast. This chamber also contributes a majority of the opening force on the shuttle, causing the shuttle to open quickly. As soon as the firing chamber has moved the shuttle far enough to break the face seal between the shuttle and the chamber sleeve, the high pressure air rushes under the shuttle flange, thus exposing a much greater area to the chamber pressure. This is by far the greatest force acting on the shuttle.

After the shuttle has opened fully, there is no longer any pressure in the main chamber or the firing chamber. The pressure in the air spring chamber is sufficient to close the shuttle.

To ensure accurate timing, the sleeve gun incorporates a ring of magnets in the top of the shuttle. As the shuttle moves towards the timing coil, located in the cap of the gun, an electrical pulse is generated. This pulse is sent to the Texas Instruments Airgun Controllers where precise timing of each individual gun is controlled.

vii. ENERGY SOURCE Cont.

The energy source used on the M/V Magnificent Creek consisted of four sub-arrays with a total capacity of 2180 cubic inches. The sub-arrays were towed with a 8.3 metre spread between them. The distance from the stern of the vessel to the first gun of each sub-array was 70 metres.

Each sub-array includes two low pressure, open-ended air lines so that the depth could be monitored by means of static air pressure at all times. The arrays were ballasted with the use of plastic Norwegian buoys. This enabled the sub-arrays to ride at the contract specified depth, in this case six metres.

The Texas Instruments Airgun Controllers (TIGER II) monitored the firing of each airgun in each of the sub-arrays. Individual gun firing times were continuously controlled to give phasing within +/- 1 millisecond to ensure maximum pulse amplitude and front-to-back ratio.

The TIGER II also performed a quality control function by indicating with individual gun LED displays, the status of a gun if it was not operating correctly ie. a self-fire or no-fire. The airgun performances were logged on both the CMS navigation tape and printer log.



SECTION II

INSTRUMENTS

PART II

INSTRUMENT DETAILS AND DISCUSSIONS

i. DIGITAL STREAMER DETAILS

Length	2512.5 m.
Group Interval	6.25 m.
Live Section Length	75 m.
Stretch Section Length	50 m.
SEM Module Length	0.46 m.
Repeater Module Length	0.3 m.
Streamer Trace Mix	Traces 1-162 2:1 Traces 163-240 1:1
Hydrophones per Group	16
Hydrophone Interval	Linear, 1 phone / 0.3906 m.
Hydrophone Type	TI - ACR
No. of Stretch Sections	3 Front (150 m.) 1 Tail (100 m.)
Skin Type	Polyurethane
Location of Depth Transducers	In all SEMs and birds.
Location of Depth Controllers	1, 25, 49, 73, 97, 121, 145, 176, 224, Near Compass Section.
Near Group	240
Streamer Sensitivity	53.4 uv/ubar
Average Near Trace Offset ...	160 metres

i(a) DIGITAL STREAMER DISCUSSION

Three stretch sections were deployed between the vessel and the first active section to attenuate any front-end jerk and propeller generated noise bursts. One front-end stretch was weighted with lead to aid in front-end ballast. Another stretch section, along with approximately 200 metres of rope, was placed between the tailbuoy and the last active section to reduce tailbuoy induced noise bursts.

The streamer depth was maintained by correct ballasting and the use of Digicourse, model 396/02, compass/birds. Streamer depths were constantly monitored throughout the survey. The depth transducers were located in every SEM and Digicourse bird. The bird depths were displayed on the SCS operator's terminal and recorded on the observer's log.

ii. RECORDING SYSTEM DETAILS

Recording System	Field Computer System III
Software Version	HGS SYS 29
Tape Format	SEG D. 2.5 Byte Group Coded (8015) Recording 6250 b.p.i.
Tape Speed	125 i.p.s.
Channels On Tape	254 (includes 14 auxiliary)
Gain Control Mode	I.F.P.
Sample Interval	2 msec.
Record Length	6 sec.
Recording Delay	0 sec.
Preamplifer Gain	0.535 (Multiplication Factor)
Final Gain	88 dB
Dynamic Range	115 dB (referred to input noise)
Filters	Low Cut 8 Hz @ 18 dB/octave High Cut 180 Hz @ 72 dB/octave
Polarity	Positive pressure gives negative number on tape as per SEG convention
Selected Time Zero Source ...	Field Time Break

ii(a) RECORDING SYSTEM DISCUSSION

On completion of a seismic line, the first and last magnetic data tapes were partially replayed to ensure readability and data integrity. A record header was also decoded and analysed after every line as a confirmation of correct system set up and Q.C. data transfer to tape.

Any bad records encountered during a line were noted on the observer's log and checked after completing the line. Whenever the number of bad records exceeded that specified in the contract ie. more than eight consecutive, the line was terminated and continued at a later date with sufficient subsurface overlap.

iii. CMS III 980B OPTION DETAILS

Manufacturer ..... Texas Instruments

CMS III Control Computer 980B

Software Version ..... CMS 903.13

The following is a list of CMS III options and their 'IN USE' status during the survey.

Magnetic Tape Sub-System ..... Yes

Great Circle Navigation ..... No

Sonar Sub-System ..... Yes

Gyro Sub-System ..... Yes

Tiger II Sub-System ..... Yes

Streamer Tracking ..... Yes

CDP Steering ..... No

Offset Sensor ..... No

Fathometer Sub-System ..... Yes

Magnetometer Sub-System ..... No

Gravity Sub-System ..... No

XQC Sub-System ..... No

Time Reference ..... UTC

iii(a) CMS III DISCUSSION

No problems were encountered with the CMS III during the period of the survey.

iv. 990 NAVIGATION SYSTEM DETAILS

Manufacturer ..... Texas Instruments

Navigation Computer ..... TI 990

Software Version 3.4

Slot Assignments

Slot No.	Data	Format
1	Nav Range -	
2	Nav Range - Charmouth Hill	7 BCD - Status on Right
3	Nav Range - Hardwickes Hill	7 BCD - Status on Right
4	Nav Range - East Sandy	7 BCD - Status on Right
5	Nav Range - Stony Head	7 BCD - Status on Right
6	Nav Range -	
7	Nav Range -	
8	Nav Range -	
9	Nav Range -	
10	Nav Range -	

Spheroid In Use ..... A.N.S.

Semi-Major Axis 6378160

Reciprocal of Flattening 298.25

WGS-72 to ANS CONVERSION

Delta X 122

Delta Y 41

Delta Z ..... -146

These datum shift parameters were used solely to transform WGS-72 Transit Satellite fixes into the local datum.

iv(a) 990 NAVIGATION SYSTEM DISCUSSION

No problems were experienced with the 990 NAV system during the survey.

v. STREAMER TRACKING SYSTEM III DETAILS

Streamer Length	2512.5 m.
Number of Traces	240
Line Spacing	N/A
Bin Width	N/A
Specified Depth	10.0 m.
Specified Depth Range	+/- 1.5 m.
Max. Change In Heading Per 100 Metres	10.0 m.
Tow Point to Near BCU Distance	196 m.
Common Navigation Point (CNP) to Stern	30 m.
Stern to Airgun Distance (Centre)	70 m.
Tow Point to Near Group Distance (Centre)	237 m.
Tow Fixture Available	No
Wide Tow Option	No
**Steering Parameter (C/S/D)	CNP
Gyro Correction	0.0
Yaw Correction	0.0
Magnetic Declination	12.5 East

**Steering parameters:- C= centre of gravity
S= near trace surface position
D= distance from tow point

v(a) STREAMER TRACKING SYSTEM III DISCUSSION

No problems were encountered with the STS III during the period of the survey.

vi. FATHOMETER DETAILS

Manufacturer ..... Simrad

Model ..... EA

Water Velocity Value ..... 1498 m/sec.

Transducer Position ..... 2.4 m. forward
(with respect to CNP)

Draft Correction ..... 4.2 m.

Calibrated ..... May 1990

vi(a) FATHOMETER DISCUSSION

At a 50 shotpoint interval an event mark was logged to the fathometer strip chart with the relevant shotpoint number and water depth annotated alongside the mark. On any occasion where it became necessary to change the fathometer scale the shotpoint number and new scale would be annotated on the chart.

The fathometer was operational for all recorded seismic lines. Plate number 9, appended to this report, depicts all available scales on the Simrad EA.

vii. MULTI-TRACE PLOTTER DETAILS

Manufacturer	Plotter unit.....OYO Fastbox unit.....WESTREN (Transmitting rasterised data to the plotter.)
Model	OYO GS-622
Number of Channels	254
Plot Rate	2.5 in. per sec.
Timing line periods	Light Lines :- 20 msec Medium Lines :- 100 msec Heavy Lines :- 1 sec
Trace No. Annotation	Every 12 traces starting at #12
Display Mode	On Line :- Variable area with wiggle. Noise Strips :- Wiggle only
Traces per Inch	On Line :- 15 Noise Strips :- 15
Polarity	Positive pressure downbreak



vii(a) PLOTTER DISCUSSION

During normal on-line operation, plots were produced every 50 shotpoints. These records included a header label which contained the following information; UTC time, seismic tape reel number and Julian date. The fields available for shotpoint number, line number and crew number are currently not supported by the Westren software. The line number was manually entered into the comments field prior to starting each line.

Various parameters, including program gain and overall trace gain, were adjusted from time to time to provide the best display characteristics for the area.

viii. STREAMER DEPTH CONTROL NETWORK DETAILS

MANUFACTURER ..... Digicourse

MECHANICAL

Weight	2.8 Kg in seawater
Length	1.00 Metre
Mounting	Conventional bird collars

BATTERY

Cells	Four Lithium D cells
Life	3-4 weeks (dependant on use)

COMMUNICATIONS

Type	Serial FSK
Frequency	27 KHz
Data Rate	1200 bits/second

DIVING PLANE

Lift	20 Kg at 5 Kts and 15 degree wing angle
Airfoil	NASA 651-012 airfoil section
Aspect Ratio	2.0
Wing Span	48 cm
Surface Area	0.903 Sq. Metres

DEPTH SENSOR

Operating Range	0 to 61 Metres
Accuracy	+/- 0.15 Metres
Resolution	+/- 0.03 Metres

COMPASS

Resolution	0.3 degrees
Accuracy	0.5 degrees
Sampling	Selectable, 0.3 to 6 seconds
Averaging	Selectable, 0, 3, 7, 15, 31 samples

viii(a) STREAMER DEPTH CONTROL NETWORK DESCRIPTION

The Digiscan system, as used on the M/V Magnificent Creek, consists of a Model 293 Operator Station and modem board. Model 396 compass/depth controllers were attatched to the streamer at regularly spaced intervals. A brief description of each functional unit follows.

The model 293 operator station is a 16 bit mini-computer containing 192 Kilobytes of memory. It acts as the system controller for communications with the host computer, the units on the streamer (compass/depth controllers) and the Digiscan graphics package.

The modem board is an independent micro-processor based unit that physically resides within the 293 operator station. The modem board facilitates communication down the streamer in two modes; the 293 control mode and the modem control mode. In the 293 control mode the modem board is transparent on the streamer and the 293 communicates "directly" with an individual sensor. This mode requires the complete attention of the 293 operator station and thus it is reserved for initialization procedures, diagnostic routines and housekeeping functions. In the modem control mode the operator station instructs the modem board to collect data from several units on the streamer, continues to perform other functions during the communications phase and returns to retrieve a batch of data from the modem memory. System configuration parameters are stored in memory on the modem board while the system is powered down. Each modem board is dedicated to a single streamer, thus extra boards can be installed for additional streamers.

The Model 396 compass/depth controller is a micro-processor based depth controller device, externally mounted on the streamer. A Model 321 heading sensor (compass) is also contained within the body of the unit. This allows depth, temperature and heading data, plus depth keeping ability, to be derived from one externally mounted device.

Communications with a maximum of 63 devices occur over a single twisted pair transmission line, using traditional inductive coupling techniques in a 27KHz FSK communications link. Each live section within the streamer contains a communications coil, located 12.5 metres forward of the end coupling, over which a depth controller can be located.



viii(a) STREAMER DEPTH CONTROL NETWORK DESCRIPTION Cont.

Each unit supports a variety of functions, including:

- Setting streamer running depth
- Reporting current depth, heading and temperature
- Reporting battery usage in hours and minutes
- Reporting wing angle with a resolution of 0.01 degree

Using a seawater port in the tail, the controller monitors depth over a range of 0 to 61 metres, with a resolution of 0.03 metres. Once programmed with an operating depth, the controller operates autonomously to apply sufficient force to the externally mounted wings to control the streamer depth. In addition, the control algorithm parameters may be altered under software control to respond to changing environmental or operational conditions. These changes may be made while the controller is either in or out of the water. Emergency surface or emergency dive facilities are provided in the 293 operator station.



viii(b) STREAMER DEPTH CONTROL NETWORK DISCUSSION

During the survey, fourteen compass/birds were available. However the CMS III can only receive a maximum of twelve birds for inclusion in the automatic data logger. Streamer depths and heading were constantly monitored throughout the survey and recorded on the observer's log and automatic data log at regular intervals.

No problems were encountered with the Digicourse System or birds throughout this survey.

ix. ENERGY SOURCE DETAILS

2180 cu. in. Conventional Tow Sleeve Airgun Array

Operating Volume ..... 2180 cu. in.

Operating Pressure ..... 1800 p.s.i.

Operating Depth ..... 6.0 m. +/- 1.0 m.

Timing Control ..... Tiger II

Firing Delay ..... 51.2 msec.

Compressors ..... 2 Sullair (1 spare)
3 PB-44 (2 spare)

Distance from CNP ..... 97 m.
to Centre of Array

Distance from Stern ..... 67 m.
to Centre of Array



ix(a) ENERGY SOURCE DISCUSSION

Throughout this survey, the Conventional Tow Array was utilised with a spread of 25 metres between the two outer sub-arrays. The spread was measured by firing the first gun on each string. The pulse was recorded on a hydrophone attached to an adjacent gun string. The time difference between strings was recorded and the distance calculated accordingly. The distance from the stern of the vessel to the first gun of each sub-array was 60 metres.

The airguns were maintained by Halliburton Geophysical Services personnel on line changes, so that throughout the survey the airguns were operating within specifications. Whilst surveying, using 25 metre shotpoint intervals, two Sullair and three PB-44 compressors were utilised.



x. TIGER II SYSTEM DETAILS

Manufacturer ..... Texas Instruments

Model ..... TI 990

Number of Available Units 1

Maximum Channels per Unit 64

Channels In Use per Unit 64

Timing Delay ..... 51.2 msec.

Firmware Version ..... Ver. 1.3



xi. TIGER II SYSTEM DESCRIPTION

The Texas Instruments airgun Controller (TIGER II) is a micro-processor based unit that supervises all timing, firing and control functions for the airgun array.

The Tiger II monitors the shuttle pulse of each airgun and continuously adjusts individual gun firing times to synchronise the array to within a one millisecond standard deviation, thus ensuring optimum pulse amplitude and front to back ratio for the array.

A fire sequence is initiated on receipt of wire blast from the FCS. The Tiger II returns Field Time Break (FTB) to the recording instruments and fires the guns a nominal 51.2 Msec. later. When used with a digital streamer, the Tiger II synchronises FTB with the sample interval of the digital streamer data. This synchronisation function is called "multiplex streamer mode".

The Tiger II may be operated independently in stand-alone mode, or in computer mode via a link to the CMS III. Stand-alone mode enables all normal gun control functions to be implemented from the front panel keyboard. The airgun array is unaffected by the selection of stand-alone mode, insofar as performance is concerned, although performance monitoring is limited.

The computer mode link to the CMS III facilitates data logging of individual gun performance in real-time, as well as the production of graphically presented performance statistics at the end of the line.

SECTION III

NAVIGATION

PART I

SYSTEM DESCRIPTION



i. SYLEDIS SYSTEL DESCRIPTION

SYLEDIS is a range/range pulse system which consists of two or more fixed stations and a mobile station. The mobile station interrogates the fixed stations with a pulse train. When the fixed stations receive the interrogation, they respond with pulse trains of their own. By measuring the elapsed time from interrogation to response, the distance from the mobile station to the fixed station can be calculated.

SECTION III

NAVIGATION

PART II

SYSTEM DETAILS AND DESCRIPTIONS

i. SYLEDIS SYSTEM DETAILS

Secondary System	SYLEDIS
Type	Range - Range
Frequency	420 MHz
Antenna Height (above sea level)	15 m.
Antenna Location from Stern	29.79 m.
Antenna Location from Centreline	0.70 m. Port
Survey Company	Halliburton Geophysical Services, Inc.



ii. BASE STATION DETAILS

SYLEDIS

Station Name	Co-ordinates	Slot	Beacon	Elevation
Charmouth Hill	040 45 18.14 S 147 58 09.14 E	2	2	61 m.
Hardwickes Hill	040 52 01.51 S 147 37 41.85 E	3	3	121 m.
East Sandy	040 57 38.05 S 147 20 20.21 E	4	4	
Stoney Head	040 59 06.12 S 147 01 07.11 E	5	5	54 m.
Mount Williams	040 54 34.16 S 148 11 11.52 E	5	5	221 m.

MOBILE DELAY

	Red/Green
Charmouth Hill	228.0
Hardwickes Hill	228.8
East Sandy	227.9
Stoney Head	228.7
Mount Williams	228.7

The mobile coded red/green (#398) was used throughout the survey.

Propagation Velocity Factor = 1.0000

iii. SPHEROID DETAILS

Spheroid ..... A.N.S.

Semi-Major Axis 6378160

Reciprocal of Flattening 298.25

WGS-72 to ANS CONVERSION

Delta X 122.000

Delta Y 41.000

Delta Z ..... -146.000

iv. SYSTEM CALIBRATION

The delays inherent in the SYLEDIS chain were determined by operating the beacons and mobile units over a surveyed distance and comparing the SYLEDIS calculated values to the known length of the calibration range for each mobile/beacon combination.

For vessel positioning the SYLEDIS system delays for each base station were corrected for by the CMS III, however all data recorded on magnetic tape was uncorrected.

The navigation was proven by calculating three-way fixes in the survey area prior to the survey commencement. On the 19 November the base line between stations Charmouth Hill and Hardwickes Hill was crossed during a line change the results of which are tabled below.

Charmouth Hill / Hardwickes Hill SYLEDIS Baseline Crossing

Calculated distance	31335.25 m.
SYLEDIS observed distance	31331.35 m.
Delta	3.90 m.

v. NAVIGATION DISCUSSION

Throughout this survey, SYLEDIS was used as the primary navigation source. The system was provided and operated by Halliburton Geophysical Services personnel.

Signals from East Sandy became weak and unuseable during line BB90-179. Investigations by the navigation support crew showed the cause to be a leaning antenna tower. A shackle to one of the connecting support ropes had broken. The fault was rectified and the station was in use again before commencement of the following line.

To improve the navigation station angles for the eastern end of line BB90-205, SYLEDIS base Stoney Head was dismantled and re-erected on Mount Williams on 18 November.

vi. NAVIGATION TAPE SUMMARY

Nav. Tape No	Lines Inclusive	Dates Inclusive
0123	BB90-180 > BB90-180	11/11/90 > 11/11/90
0124	BB90-186 > BB90-179	12/11/90 > 13/11/90
0125	BB90-178 > BB90-195	13/11/90 > 14/11/90
0126	BB90-201 > BB90-200	14/11/90 > 15/11/90
0127	BB90-197 > BB90-191A	15/11/90 > 16/11/90
0128	BB90-194 > BB90-192A	17/11/90 > 18/11/90
0129	BB90-191B> BB90-202A	18/11/90 > 19/11/90
0130	BB90-203 > BB90-189A	19/11/90 > 20/11/90
0131	BB90-187 > BB90-190	20/11/90 > 21/11/90
0132	BB90-205 > BB90-205	21/11/90 > 21/11/90

END OF SHIPMENT 2993-011-MISC-90

SECTION IV

OPERATIONS

i. OPERATIONS DISCUSSION

The vessel arrived in the survey block on 9 November 1990 to commence streamer deployment and reconfiguration. Rough seas prevented production beginning on 10 November. The first line was surveyed on the afternoon of 11 November during a short break in the rough conditions.

The Client Representative requested that the streamer riding depth be increased to 11.5 metres for lines BB90-184, BB90-186, BB90-191, BB90-191A and BB90-194 to reduce the level of swell noise affecting the records.

On 14 November line BB90-195 was interrupted to allow the M/V Furneaux Explorer alongside. Two seismic personnel (one with a minor injury) transferred to the Explorer. One crew member was also transferred from the Explorer to the M/V Magnificent Creek to complement crews. Line BB90-195 was later completed with an appropriate data overlap.

Though the water depth in the survey area was generally thirty to sixty metres there were a few shallow patches. Line BB90-200 was terminated prematurely when the water depth came up to sixteen metres. One and a quarter kilometres of the southern end of the line was not surveyed. The southern end of line BB90-189 was terminated one hundred and twenty five metres early and line BB90-187 two thousand five hundred and fifty metres early.

All lines except BB90-180 and BB90-186 were surveyed so that the shotpoints began and ended at the preplotted coordinates plus adjustment for the antenna to near CDP distance. As per Client's request an end of line extension to bring the sub-surface coverage up to full fold at the end coordinates was omitted. This request was not received until after the survey of lines BB91-180 and BB90-186, hence the difference in convention.

ii. SURVEY STATISTICS

First Recording Day ..... 11 November 1990

Last Recording Day ..... 21 November 1990

Number of Lines 31

Total Kilometres 1114.025

Total Shotpoints 44561

iii. SHIPMENT DETAILS

Seismic shipment No. : 2993-011-MIS-90

Seismic data shipped to : Digicon
c/- Digicon House
54-56 Brookes Street
Bowen Hills
Brisbane 4006
Queensland
Attn: Sami Khan

Navigation shipment No. : 2993-008-SIN-90

Data shipped to : Halliburton Geophysical Services
Lam Soon Industrial Building
63 Hillview Avenue # 08-23
Singapore 2366

APPENDIX A

DAILY LINE STATUS LOG

DAILY LINE STATUS LOG

DATE	LINE NO	DIR	SHOTPOINTS	RECORDS	COMMENTS
11/11/90	BB90-180	061.4	101 - 925	101 - 925	COMPLETE
12/11/90	BB90-186	056.6	101 - 800	101 - 800	COMPLETE
	BB90-185	239.7	101 -1098	101 -1098	COMPLETE
	BB90-184	060.1	101 -1032	101 -1032	COMPLETE
	BB90-183	242.8	101 - 941	101 - 941	COMPLETE
13/11/90	BB90-182	240.4	101 - 900	101 - 900	COMPLETE
	BB90-181	061.2	101 - 866	101 - 864	COMPLETE
	BB90-179	240.0	101 - 756	101 - 756	COMPLETE
	BB90-178	062.2	101 - 778	101 - 777	COMPLETE
	BB90-175	147.8	101 -1412	101 -1412	COMPLETE
	BB90-176	328.1	101 - 740	101 - 740	M.S.P.
14/11/90	BB90-176	328.1	101 -1274	101 -1274	T.B.C.
	BB90-176A	328.1	1221-1448	1221-1448	COMPLETE
	BB90-177	148.1	101 -1296	101 -1295	COMPLETE
	BB90-195	053.5	101 - 471	101 - 471	T.B.C.
	BB90-201	051.6	101 -2391	101 -2391	COMPLETE
	BB90-199	233.2	101 - 267	101 - 267	T.B.R.
15/11/90	BB90-199A	233.2	101 -1273	101 -1270	COMPLETE
	BB90-200	233.6	101 -1379	101 -1373	COMPLETE
	BB90-197	053.6	101 -1696	101 -1694	COMPLETE
	BB90-198	233.2	101 -1320	101 -1320	T.B.C.
	BB90-202	050.6	101 - 162	101 - 162	T.B.R.
16/11/90	BB90-191	053.5	101 - 843	101 - 843	T.B.C.
	BB90-191A	053.5	781 -1420	781 -1420	T.B.C.
17/11/90	BB90-194	235.2	101 -1176	101 -1176	COMPLETE
	BB90-198A	233.4	1361-1658	1351-1658	COMPLETE
	BB90-195A	053.4	411 -1538	411 -1538	COMPLETE
	BB90-192	233.6	101 - 515	101 - 515	COMPLETE
18/11/90	BB90-192	233.6	516 -1447	516 -1444	T.B.C.
	BB90-192A	233.8	1361-1820	1361-1820	COMPLETE
	BB90-191B	056.6	1201-3018	1201-3017	COMPLETE
	BB90-193	234.7	101 -1066	101 -1066	COMPLETE
	BB90-196	054.7	101 -1150	101 -1150	COMPLETE
	BB90-202A	230.3	101 - 550	101 - 550	M.S.P.
19/11/90	BB90-202A	230.3	551 -2428	551 -2428	COMPLETE
	BB90-203	050.7	101 -1302	101 -1302	COMPLETE
	BB90-204	230.0	101 - 989	101 - 989	COMPLETE



DAILY LINE STATUS LOG

DATE	LINE NO	DIR	SHOTPOINTS	RECORDS	COMMENTS
19/11/90	BB90-204A	230.2	931 -1381	931 -1381	COMPLETE
	BB90-189	148.4	580 - 98	585 -1067	COMPLETE
20/11/90	BB90-189A	328.4	570 -3014	570 -3014	COMPLETE
	BB90-187	148.8	101 -2067	101 -2067	COMPLETE
	BB90-188	328.7	101 -2332	101 -2332	COMPLETE
	BB90-190	238.1	101 - 695	101 - 695	M.S.P.
21/11/90	BB90-190	238.1	696 -1266	696 -1266	COMPLETE
	BB90-205	094.2	101 -3458	101 -3458	COMPLETE

COMPLETION OF BRIDGE OIL LTD BASS 2D T/15P SEISMIC SURVEY

APPENDIX B

NUMERICAL LINE SUMMARY

NUMERICAL LINE SUMMARY

DATE	LINE NO.	DIR	SP RANGE	PROCESS SP RANGE	CHARGEABLE SP RANGE	CHG KMS	COMMENTS
13/11/90	BB90-175	147.81	101 -1412	101 -1412	101 -1412	32.800	COMPLETE
13/11/90	BB90-176	328.1	101 -1276	101 -1274	101 -1274	29.350	T.B.C.
14/11/90	BB90-176A	328.1	1221-1448	1221-1448	1267-1448	4.550	COMPLETE
14/11/90	BB90-177	148.1	101 -1296	101 -1296	101 -1296	29.900	COMPLETE
13/11/90	BB90-178	062.2	101 - 778	101 - 778	101 - 778	16.950	COMPLETE
13/11/90	BB90-179	240.0	101 - 756	101 - 756	101 - 756	16.400	COMPLETE
11/11/90	BB90-180	061.4	101 - 925	101 - 925	101 - 925	20.625	COMPLETE
13/11/90	BB90-181	061.2	101 - 866	101 - 866	101 - 866	19.150	COMPLETE
13/11/90	BB90-182	240.4	101 - 900	101 - 900	101 - 900	20.000	COMPLETE
12/11/90	BB90-183	242.8	101 - 941	101 - 941	101 - 941	21.025	COMPLETE
12/11/90	BB90-184	060.1	101 -1032	101 -1032	101 -1032	23.300	COMPLETE
12/11/90	BB90-185	239.7	101 -1098	101 -1098	101 -1098	24.950	COMPLETE
12/11/90	BB90-186	056.6	101 - 800	101 - 800	101 - 800	17.500	COMPLETE
20/11/90	BB90-187	148.8	101 -2067	101 -2067	101 -2067	49.175	COMPLETE
20/11/90	BB90-188	328.7	101 -2332	101 -2332	101 -2332	55.800	COMPLETE
19/11/90	BB90-189	148.4	580 - 98	580 - 98	580 - 98	12.200	COMPLETE
19/11/90	BB90-189A	328.4	570 -3014	570 -3014	596 -3014	60.475	COMPLETE
20/11/90	BB90-190	238.1	101 -1266	101 -1266	101 -1266	29.150	COMPLETE
16/11/90	BB90-191	053.5	101 - 851	101 - 843	101 - 843	18.575	T.B.C.
16/11/90	BB90-191A	053.5	781 -1420	781 -1260	844 -1260	10.425	T.B.C.
18/11/90	BB90-191B	056.6	1201-3018	1201-3018	1261-3018	43.950	COMPLETE
17/11/90	BB90-192	233.6	101 -1447	101 -1413	101 -1413	32.825	T.B.C.
18/11/90	BB90-192A	233.8	1361-1820	1361-1820	1414-1820	10.175	COMPLETE

NUMERICAL LINE SUMMARY

DATE	LINE NO.	DIR	SP RANGE	PROCESS SP RANGE	CHARGEABLE SP RANGE	CHG KMS	COMMENTS
18/11/90	BB90-193	234.7	101 -1066	101 -1066	101 -1066	24.150	COMPLETE
17/11/90	BB90-194	235.2	101 -1176	101 -1176	101 -1176	26.900	COMPLETE
14/11/90	BB90-195	053.5	101 - 471	101 - 471	101 - 471	9.275	T.B.C.
17/11/90	BB90-195A	053.4	411 -1538	411 -1538	472 -1538	26.675	COMPLETE
18/11/90	BB90-196	054.7	101 -1150	101 -1150	101 -1150	26.250	COMPLETE
15/11/90	BB90-197	053.6	101 -1696	101 -1696	101 -1696	39.900	COMPLETE
15/11/90	BB90-198	233.2	101 -1320	101 -1320	101 -1320	30.500	T.B.C.
17/11/90	BB90-198A	233.4	1361-1658	1361-1658	1421-1658	05.950	COMPLETE
14/11/90	BB90-199	233.2	101 - 267				T.B.R.
15/11/90	BB90-199A	233.2	101 -1273	101 -1273	101 -1273	29.325	COMPLETE
15/11/90	BB90-200	233.6	101 -1379	101 -1379	101 -1379	31.975	COMPLETE
14/11/90	BB90-201	051.6	101 -2391	101 -2391	101 -2391	57.275	COMPLETE
15/11/90	BB90-202	050.6	101 - 162	-			T.B.R.
18/11/90	BB90-202A	230.3	101 -2428	101 -2428	101 -2428	58.200	COMPLETE
19/11/90	BB90-203	050.7	101 -1302	101 -1302	101 -1302	30.050	COMPLETE
19/11/90	BB90-204	230.0	101 -1016	101 - 989	101 - 889	19.725	COMPLETE
19/11/90	BB90-204A	230.2	931 -1381	931 -1381	990 -1381	9.800	COMPLETE
21/11/90	BB90-205	094.2	101 -3458	101 -3458	101 -3458	83.950	COMPLETE

COMPLETION OF BRIDGE OIL LTD BASS 2D T/15P SEISMIC SURVEY

APPENDIX C

INVENTORY OF DIGITAL FIELD TAPES

FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
11/11/90	10830	BB90-180	101 - 197	101 - 197	01
	10831	BB90-180	198 - 302	198 - 302	
	10832	BB90-180	303 - 407	303 - 407	
	10833	BB90-180	408 - 512	408 - 512	
	10834	BB90-180	513 - 617	513 - 617	
	10835	BB90-180	618 - 722	618 - 722	
	10836	BB90-180	723 - 827	723 - 827	
	10837	BB90-180	828 - 925	828 - 925	
12/11/90	10838	BB90-186	101 - 200	101 - 200	
	10839	BB90-186	201 - 305	201 - 305	
	10840	BB90-186	306 - 410	306 - 410	02
	10841	BB90-186	411 - 515	411 - 515	
	10842	BB90-186	516 - 620	516 - 620	
	10843	BB90-186	621 - 725	621 - 725	
	10844	BB90-186	726 - 800	726 - 800	
	10845	BB90-185	101 - 200	101 - 200	
	10846	BB90-185	201 - 201	201 - 201	
	10847	BB90-185	202 - 306	202 - 306	
	10848	BB90-185	307 - 411	307 - 411	
	10849	BB90-185	412 - 516	412 - 516	
	10850	BB90-185	617 - 621	617 - 621	03
	10851	BB90-185	622 - 726	622 - 726	
	10852	BB90-185	727 - 831	727 - 831	
	10853	BB90-185	832 - 936	832 - 936	
	10854	BB90-185	937 -1041	937 -1041	
	10855	BB90-185	1042-1098	1042-1098	
	10856	BB90-184	101 - 201	101 - 200	
	10857	BB90-184	202 - 202	201 - 201	
	10858	BB90-184	203 - 307	202 - 306	
	10859	BB90-184	308 - 412	307 - 411	
	10860	BB90-184	413 - 517	412 - 516	04
	10861	BB90-184	518 - 622	517 - 621	
	10862	BB90-184	623 - 727	622 - 726	
	10863	BB90-184	728 - 832	727 - 831	
	10864	BB90-184	833 - 937	832 - 936	
	10865	BB90-184	938 -1032	937 -1031	
	10866	BB90-183	101 - 200	101 - 200	
	10867	BB90-183	201 - 305	201 - 305	
	10868	BB90-183	306 - 410	306 - 410	
	10869	BB90-183	411 - 515	411 - 515	



FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
12/11/90	10870	BB90-183	516 - 620	516 - 620	05
	10871	BB90-183	621 - 725	621 - 725	
	10872	BB90-183	726 - 830	726 - 830	
	10873	BB90-183	831 - 935	831 - 935	
	10874	BB90-183	936 - 941	936 - 941	
	10875	BB90-182	101 - 204	101 - 204	
	10876	BB90-182	205 - 305	205 - 305	
	10877	BB90-182	306 - 406	306 - 406	
	10878	BB90-182	407 - 507	407 - 507	
	10879	BB90-182	508 - 608	508 - 608	
	10880	BB90-182	609 - 709	609 - 709	06
	10881	BB90-182	710 - 810	710 - 810	
	10882	BB90-182	811 - 900	811 - 900	
	10883	BB90-181	101 - 200	101 - 200	
	10884	BB90-181	201 - 305	201 - 305	
	10885	BB90-181	306 - 410	306 - 410	
	10886	BB90-181	411 - 515	411 - 515	
	10887	BB90-181	516 - 620	516 - 620	
	10888	BB90-181	621 - 726	621 - 725	
	10889	BB90-181	727 - 832	726 - 830	
	10890	BB90-181	833 - 866	831 - 864	07
	10891	BB90-179	101 - 200	101 - 200	
	10892	BB90-179	201 - 305	201 - 305	
	10893	BB90-179	306 - 410	306 - 410	
	10894	BB90-179	411 - 515	411 - 515	
	10895	BB90-179	516 - 620	516 - 620	
	10896	BB90-179	621 - 725	621 - 725	
	10897	BB90-179	726 - 756	726 - 756	
	10898	BB90-178	101 - 200	101 - 200	
	10899	BB90-178	201 - 306	201 - 305	
	10900	BB90-178	307 - 411	306 - 410	08
	10901	BB90-178	412 - 516	411 - 515	
	10902	BB90-178	517 - 621	516 - 620	
	10903	BB90-178	622 - 726	621 - 725	
	10904	BB90-178	727 - 778	726 - 777	
	10905	BB90-175	101 - 200	101 - 200	
	10906	BB90-175	201 - 305	201 - 305	
	10907	BB90-175	306 - 410	306 - 410	
	10908	BB90-175	411 - 515	411 - 515	
	10909	BB90-175	516 - 620	516 - 620	

FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
13/11/90	10910	BB90-175	621 - 725	621 - 725	09
	10911	BB90-175	726 - 830	726 - 830	
	10912	BB90-175	831 - 935	831 - 935	
	10913	BB90-175	936 -1040	936 -1040	
	10914	BB90-175	1041-1145	1041-1145	
	10915	BB90-175	1146-1250	1146-1250	
	10916	BB90-175	1251-1355	1251-1355	
	10917	BB90-175	1356-1411	1356-1411	
	10918	BB90-176	101 - 200	101 - 200	
	10919	BB90-176	201 - 201	201 - 201	
	10920	BB90-176	202 - 306	202 - 306	10
	10921	BB90-176	307 - 411	307 - 411	
14/11/90	10922	BB90-176	412 - 516	412 - 516	
	10923	BB90-176	517 - 621	517 - 621	
	10924	BB90-176	622 - 726	622 - 726	
	10925	BB90-176	727 - 831	727 - 831	
	10926	BB90-176	832 - 936	832 - 936	
	10927	BB90-176	937 -1041	937 -1041	
	10928	BB90-176	1042-1146	1042-1146	
	10929	BB90-176	1147-1251	1147-1251	
	10930	BB90-176	1252-1274	1252-1274	11
	10931	BB90-176A	1221-1320	1221-1320	
	10932	BB90-176A	1321-1425	1321-1425	
	10933	BB90-176A	1426-1448	1426-1448	
	10934	BB90-177	101 - 201	101 - 200	
	10935	BB90-177	202 - 306	201 - 305	
	10936	BB90-177	307 - 411	306 - 410	
	10937	BB90-177	412 - 516	411 - 515	
	10938	BB90-177	517 - 621	516 - 620	
	10939	BB90-177	622 - 726	621 - 725	
	10940	BB90-177	727 - 831	726 - 830	12
	10941	BB90-177	832 - 936	831 - 935	
	10942	BB90-177	937 -1041	936 -1040	
	10943	BB90-177	1042-1145	1041-1146	
	10944	BB90-177	1146-1251	1147-1250	
	10945	BB90-177	1252-1296	1251-1295	
	10946	BB90-195	101 - 200	101 - 200	
	10947	BB90-195	201 - 305	201 - 305	
	10948	BB90-195	306 - 410	306 - 410	
	10949	BB90-195	411 - 471	411 - 471	

FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
14/11/10	10950	BB90-201	101 - 200	101 - 200	13
	10951	BB90-201	201 - 305	201 - 305	
	10952	BB90-201	306 - 410	306 - 410	
	10953	BB90-201	411 - 515	411 - 515	
	10954	BB90-201	516 - 620	516 - 620	
	10955	BB90-201	621 - 725	621 - 725	
	10956	BB90-201	726 - 830	726 - 830	
	10957	BB90-201	831 - 935	831 - 935	
	10958	BB90-201	936 -1040	936 -1040	
	10959	BB90-201	1041-1145	1041-1145	
	10960	BB90-201	1146-1250	1146-1250	14
	10961	BB90-201	1251-1355	1251-1355	
	10962	BB90-201	1356-1460	1356-1460	
	10963	BB90-201	1461-1565	1461-1565	
	10964	BB90-201	1566-1670	1566-1670	
	10965	BB90-201	1671-1775	1671-1775	
	10966	BB90-201	1776-1880	1776-1880	
	10967	BB90-201	1881-1985	1881-1985	
	10968	BB90-201	1986-2090	1986-2090	
	10969	BB90-201	2091-2195	2091-2195	
	10970	BB90-201	2196-2300	2196-2300	15
	10971	BB90-201	2301-2391	2301-2391	
	10972	BB90-199	101 - 200	101 - 200	
	10973	BB90-199	201 - 265	201 - 265	
15/11/90	10974	BB90-199A	101 - 200	101 - 200	
	10975	BB90-199A	201 - 305	201 - 305	
	10976	BB90-199A	306 - 410	306 - 410	
	10977	BB90-199A	411 - 515	411 - 515	
	10978	BB90-199A	516 - 620	516 - 620	
	10979	BB90-199A	621 - 725	621 - 725	
	10980	BB90-199A	726 - 832	726 - 830	16
	10981	BB90-199A	833 - 937	831 - 935	
	10982	BB90-199A	938 -1042	936 -1040	
	10983	BB90-199A	1043-1145	1041-1148	
	10984	BB90-199A	1146-1253	1149-1250	
	10985	BB90-199A	1254-1273	1251-1270	
	10986	BB90-200	101 - 200	101 - 200	
	10987	BB90-200	201 - 305	201 - 305	
	10988	BB90-200	306 - 410	306 - 410	
	10989	BB90-200	411 - 515	411 - 515	

FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
15/11/90	10990	BB90-200	516 - 620	516 - 620	17
	10991	BB90-200	621 - 725	621 - 725	
	10992	BB90-200	726 - 830	726 - 830	
	10993	BB90-200	831 - 935	831 - 935	
	10994	BB90-200	936 -1040	936 -1040	
	10995	BB90-200	1041-1145	1041-1145	
	10996	BB90-200	D.N.P.	D.N.P.	
	10997	BB90-200	1149-1253	1147-1251	
	10998	BB90-200	D.N.P.	D.N.P.	
	10999	BB90-200	D.N.P.	D.N.P.	
	11000	BB90-200	1260-1364	1254-1358	18
	11001	BB90-200	1365-1379	1359-1373	
	11002	BB90-197	101 - 200	101 - 200	
	11003	BB90-197	201 - 307	201 - 305	
	11004	BB90-197	308 - 412	306 - 410	
	11005	BB90-197	413 - 517	411 - 515	
	11006	BB90-197	518 - 622	516 - 620	
	11007	BB90-197	623 - 727	621 - 725	
	11008	BB90-197	728 - 832	726 - 830	
	11009	BB90-197	833 - 937	831 - 935	
	11010	BB90-197	938 -1042	936 -1040	19
	11011	BB90-197	1043-1147	1041-1145	
	11012	BB90-197	1148-1252	1146-1250	
	11013	BB90-197	1253-1357	1251-1355	
	11014	BB90-197	1358-1462	1356-1460	
	11015	BB90-197	1463-1567	1461-1565	
	11016	BB90-197	1568-1672	1566-1670	
	11017	BB90-197	1673-1696	1671-1694	
	11018	BB90-198	101 - 200	101 - 200	
	11019	BB90-198	201 - 305	201 - 305	
	11020	BB90-198	306 - 410	306 - 410	20
	11021	BB90-198	411 - 515	411 - 515	
	11022	BB90-198	516 - 620	516 - 620	
	11023	BB90-198	621 - 725	621 - 725	
	11024	BB90-198	726 - 830	726 - 830	
	11025	BB90-198	831 - 935	831 - 935	
	11026	BB90-198	936 -1040	936 -1040	
	11027	BB90-198	1041-1145	1041-1145	
	11028	BB90-198	1146-1250	1146-1250	
	11029	BB90-198	1251-1355	1251-1355	

FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
15/11/90	11030	BB90-198	1356-1420	1356-1420	21
	11031	BB90-202	D.N.P.	D.N.P.	
16/11/90	11032	BB90-191	101 - 200	101 - 200	
	11033	BB90-191	201 - 305	201 - 305	
	11034	BB90-191	306 - 410	306 - 410	
	11035	BB90-191	411 - 515	411 - 515	
	11036	BB90-191	516 - 620	516 - 620	
	11037	BB90-191	621 - 725	621 - 725	
	11038	BB90-191	726 - 830	726 - 830	
	11039	BB90-191	831 - 843	831 - 843	
	11040	BB90-191A	781 - 880	781 - 880	22
	11041	BB90-191A	881 - 985	881 - 985	
	11042	BB90-191A	986 -1090	986 -1090	
	11043	BB90-191A	1091-1195	1091-1195	
	11044	BB90-191A	1196-1300	1196-1300	
	11045	BB90-191A	D.N.P.	D.N.P.	
	11046	BB90-191A	D.N.P.	D.N.P.	
17/11/90	11047	BB90-194	101 - 200	101 - 200	
	11048	BB90-194	201 - 305	201 - 305	
	11049	BB90-194	306 - 410	306 - 410	
	11050	BB90-194	411 - 515	411 - 515	23
	11051	BB90-194	516 - 620	516 - 620	
	11052	BB90-194	621 - 725	621 - 725	
	11053	BB90-194	726 - 830	726 - 830	
	11054	BB90-194	831 - 935	831 - 935	
	11055	BB90-194	936 -1040	936 -1040	
	11056	BB90-194	1041-1145	1041-1145	
	11057	BB90-194	1146-1176	1146-1176	
	11058	BB90-198A	1361-1460	1361-1460	
	11059	BB90-198A	1461-1565	1461-1565	
	11060	BB90-198A	1565-1658	1566-1658	24
	11061	BB90-195A	411 - 510	411 - 510	
	11062	BB90-195A	511 - 615	511 - 615	
	11063	BB90-195A	616 - 720	616 - 720	
	11064	BB90-195A	721 - 825	721 - 825	
	11065	BB90-195A	826 - 930	826 - 930	
	11066	BB90-195A	931 -1035	931 -1035	
	11067	BB90-195A	1036-1140	1036-1140	
	11068	BB90-195A	1141-1245	1141-1245	
	11069	BB90-195A	1246-1350	1246-1350	

FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
17/11/90	11070	BB90-195A	1351-1455	1351-1455	25
	11071	BB90-195A	1456-1538	1456-1538	
	11072	BB90-192	101 - 200	101 - 200	
	11073	BB90-192	201 - 305	201 - 305	
	11074	BB90-192	306 - 325	306 - 325	
	11075	BB90-192	326 - 430	326 - 430	
18/11/90	11076	BB90-192	431 - 535	431 - 535	
	11077	BB90-192	536 - 640	536 - 640	
	11078	BB90-192	641 - 745	641 - 745	
	11079	BB90-192	746 - 850	746 - 850	
	11080	BB90-192	851 - 875	851 - 875	26
	11081	BB90-192	876 - 980	876 - 980	
	11082	BB90-192	981 -1085	981 -1085	
	11083	BB90-192	1086-1190	1086-1190	
	11084	BB90-192	1191-1295	1191-1295	
	11085	BB90-192	1296-1400	1296-1400	
	11086	BB90-192	1401-1447	1401-1444	
	11087	BB90-192A	1361-1460	1361-1460	
	11088	BB90-192A	1461-1565	1461-1565	
	11089	BB90-192A	1566-1670	1566-1670	
	11090	BB90-192A	1671-1775	1671-1775	27
	11091	BB90-192A	1776-1820	1776-1820	
	11092	BB90-191B	1201-1300	1201-1300	
	11093	BB90-191B	1301-1317	1301-1317	
	11094	BB90-191B	1318-1422	1318-1422	
	11095	BB90-191B	1423-1527	1423-1527	
	11096	BB90-191B	D.N.P.	D.N.P.	
	11097	BB90-191B	1530-1334	1529-1633	
	11098	BB90-191B	1635-1739	1634-1738	
	11099	BB90-191B	1740-1844	1739-1843	
	11100	BB90-191B	1845-1949	1844-1948	28
	11101	BB90-191B	1950-2054	1949-2053	
	11102	BB90-191B	2055-2159	2054-2158	
	11103	BB90-191B	2160-2264	2159-2263	
	11104	BB90-191B	2265-2369	2264-2368	
	11105	BB90-191B	2370-2474	2369-2473	
	11106	BB90-191B	2475-2579	2474-2578	
	11107	BB90-191B	2580-2684	2579-2683	
	11108	BB90-191B	2685-2789	2684-2788	
	11109	BB90-191B	2790-2894	2789-2893	



FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
18/11/90	11110	BB90-191B	2895-2999	2894-2998	29
	11111	BB90-191B	3000-3018	2999-3017	
	11112	BB90-193	101 - 200	101 - 300	
	11113	BB90-193	201 - 305	201 - 305	
	11114	BB90-193	306 - 410	306 - 410	
	11115	BB90-193	411 - 515	411 - 515	
	11116	BB90-193	516 - 620	516 - 620	
	11117	BB90-193	621 - 650	621 - 650	
	11118	BB90-193	651 - 755	651 - 755	
	11119	BB90-193	756 - 860	756 - 860	
	11120	BB90-193	861 - 965	861 - 965	30
	11121	BB90-193	966 -1066	966 -1066	
	11122	BB90-196	101 - 200	101 - 200	
	11123	BB90-196	201 - 305	201 - 305	
	11124	BB90-196	306 - 410	306 - 410	
	11125	BB90-196	411 - 515	411 - 515	
	11126	BB90-196	516 - 620	516 - 620	
	11127	BB90-196	621 - 725	621 - 725	
	11128	BB90-196	726 - 830	726 - 830	
	11129	BB90-196	831 - 935	831 - 935	
	11130	BB90-196	936 -1040	936 -1040	31
	11131	BB90-196	1041-1145	1041-1145	
	11132	BB90-196	1146-1150	1146-1150	
	11133	BB90-202A	101 - 200	101 - 200	
	11134	BB90-202A	201 - 305	201 - 305	
	11135	BB90-202A	306 - 410	306 - 410	
	11136	BB90-202A	411 - 515	411 - 515	
19/11/90	11137	BB90-202A	516 - 620	516 - 620	
	11138	BB90-202A	621 - 725	621 - 725	
	11139	BB90-202A	726 - 830	726 - 830	
	11140	BB90-202A	831 - 935	831 - 935	32
	11141	BB90-202A	936 -1040	936 -1040	
	11142	BB90-202A	1041-1145	1041-1145	
	11143	BB90-202A	1146-1250	1146-1250	
	11144	BB90-202A	1251-1355	1251-1355	
	11145	BB90-202A	1356-1460	1356-1460	
	11146	BB90-202A	1461-1565	1461-1565	
	11147	BB90-202A	1566-1670	1566-1670	
	11148	BB90-202A	1671-1683	1671-1683	
	11149	BB90-202A	1684-1788	1684-1788	

FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
19/11/90	11150	BB90-202A	1789-1893	1789-1893	33
	11151	BB90-202A	1894-1998	1894-1998	
	11152	BB90-202A	1999-2103	1999-2103	
	11153	BB90-202A	2104-2208	2104-2208	
	11154	BB90-202A	2209-2313	2209-2313	
	11155	BB90-202A	2314-2418	2314-2418	
	11156	BB90-202A	2419-2428	2419-2428	
	11157	BB90-203	101 - 200	101 - 200	
	11158	BB90-203	201 - 305	201 - 305	
	11159	BB90-203	306 - 410	306 - 410	
	11160	BB90-203	411 - 515	411 - 515	34
	11161	BB90-203	516 - 620	516 - 620	
	11162	BB90-203	621 - 725	621 - 725	
	11163	BB90-203	726 - 830	726 - 830	
	11164	BB90-203	831 - 935	831 - 935	
	11165	BB90-203	936 -1040	935 -1040	
	11166	BB90-203	1041-1145	1041-1145	
	11167	BB90-203	1146-1250	1146-1250	
	11168	BB90-203	1251-1302	1251-1302	
	11169	BB90-204	101 - 200	101 - 200	
	11170	BB90-204	201 - 305	201 - 305	35
	11171	BB90-204	306 - 410	306 - 410	
	11172	BB90-204	411 - 515	411 - 515	
	11173	BB90-204	516 - 620	516 - 620	
	11174	BB90-204	621 - 725	621 - 725	
	11175	BB90-204	726 - 830	726 - 830	
	11176	BB90-204	831 - 935	831 - 935	
	11177	BB90-204	936 -1017	936 -1017	
	11178	BB90-204A	931 -1030	931 -1030	
	11179	BB90-204A	1031-1135	1031-1135	
	11180	BB90-204A	1136-1240	1136-1240	36
	11181	BB90-204A	1241-1345	1241-1345	
	11182	BB90-204A	1346-1381	1346-1381	
	11183	BB90-189	580 - 481	585 - 684	
	11184	BB90-189	480 - 376	685 - 789	
	11185	BB90-189	375 - 271	790 - 894	
	11186	BB90-189	270 - 166	895 - 999	
	11187	BB90-189	165 - 98	1000-1067	
	11188	BB90-189A	570 - 668	570 - 668	
	11189	BB90-189A	669 - 773	669 - 773	



FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
19/11/90	11190	BB90-189A	774 - 878	774 - 878	37
	11191	BB90-189A	879 - 983	879 - 983	
	11192	BB90-189A	984 -1088	984 -1088	
	11193	BB90-189A	1089-1193	1089-1193	
	11194	BB90-189A	1194-1298	1194-1298	
	11195	BB90-189A	1299-1403	1299-1403	
20/11/90	11196	BB90-189A	1404-1508	1404-1508	
	11197	BB90-189A	1509-1613	1509-1613	
	11198	BB90-189A	1614-1718	1614-1718	
	11199	BB90-189A	1719-1823	1719-1823	
	11200	BB90-189A	1824-1928	1824-1928	38
	11201	BB90-189A	1929-2033	1929-2033	
	11202	BB90-189A	2034-2138	2034-2138	
	11203	BB90-189A	2139-2243	2139-2243	
	11204	BB90-189A	2244-2348	2244-2348	
	11205	BB90-189A	2349-2453	2349-2453	
	11206	BB90-189A	2454-2558	2454-2558	
	11207	BB90-189A	2559-2663	2559-2663	
	11208	BB90-189A	2664-2768	2664-2768	
	11209	BB90-189A	2769-2873	2769-2873	
	11210	BB90-189A	2874-2978	2874-2978	39
	11211	BB90-189A	2979-3014	2979-3014	
	11212	BB90-187	101 - 200	101 - 200	
	11213	BB90-187	201 - 305	201 - 305	
	11214	BB90-187	306 - 410	306 - 410	
	11215	BB90-187	411 - 515	411 - 515	
	11216	BB90-187	516 - 620	516 - 620	
	11217	BB90-187	621 - 725	621 - 725	
	11218	BB90-187	726 - 830	726 - 830	
	11219	BB90-187	831 - 935	831 - 935	
	11220	BB90-187	936 -1040	936 -1040	40
	11221	BB90-187	1041-1145	1041-1145	
	11222	BB90-187	1146-1250	1146-1250	
	11223	BB90-187	1251-1355	1251-1355	
	11224	BB90-187	1356-1460	1356-1460	
	11225	BB90-187	1461-1865	1461-1865	
	11226	BB90-187	1566-1670	1566-1670	
	11227	BB90-187	1671-1775	1671-1775	
	11228	BB90-187	1776-1880	1776-1880	
	11229	BB90-187	1881-1985	1881-1985	

FIELD TAPE INVENTORY

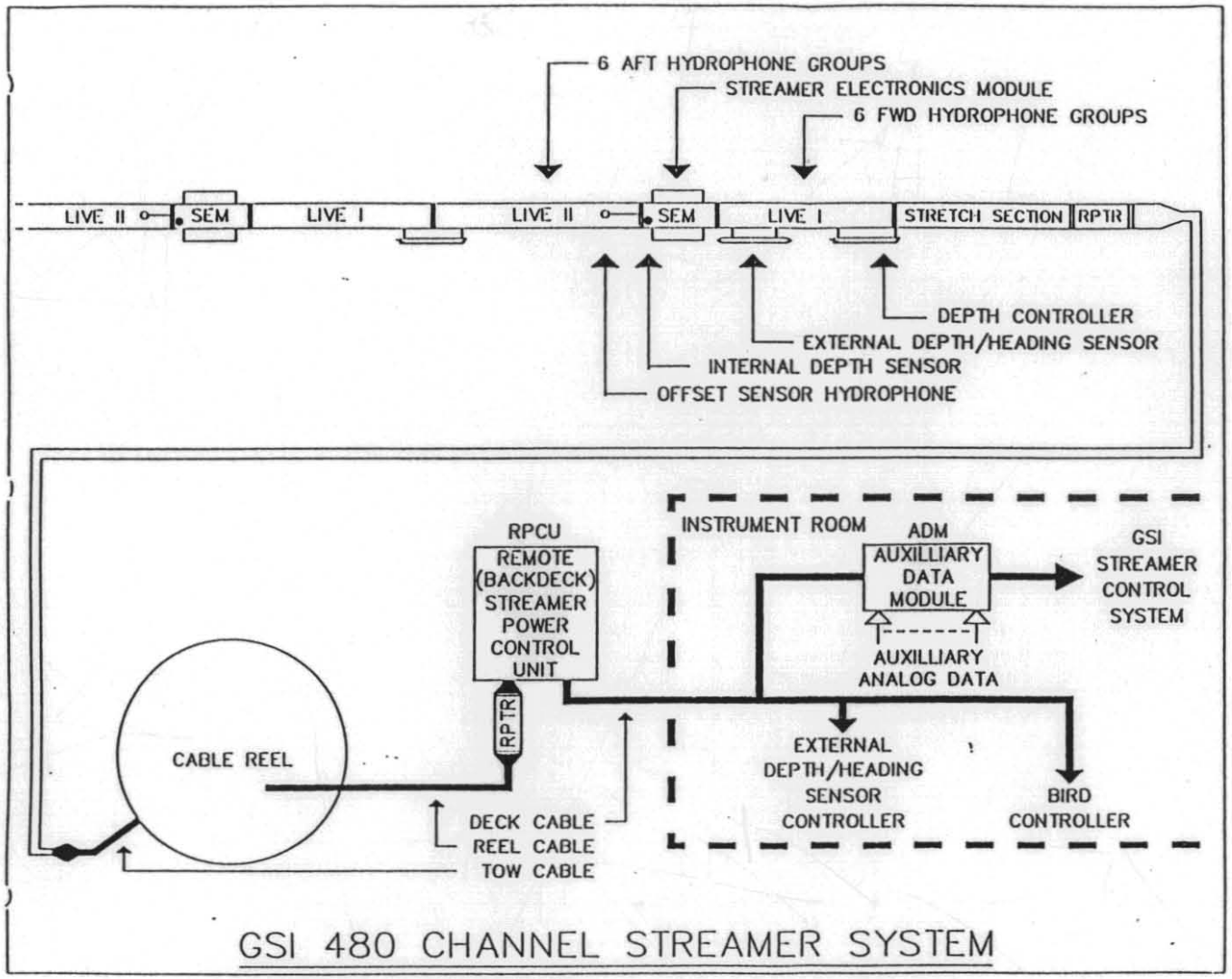
DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
20/11/90	11230	BB90-187	1986-2067	1986-2067	41
	11231	BB90-188	101 - 200	101 - 200	
	11232	BB90-188	201 - 305	201 - 305	
	11233	BB90-188	306 - 410	306 - 410	
	11234	BB90-188	411 - 515	411 - 515	
	11235	BB90-188	516 - 620	516 - 620	
	11236	BB90-188	621 - 725	621 - 725	
	11237	BB90-188	726 - 830	726 - 830	
	11238	BB90-188	831 - 935	831 - 935	
	11239	BB90-188	936 -1040	936 -1040	
	11240	BB90-188	1041-1145	1041-1145	42
	11241	BB90-188	1146-1250	1146-1250	
	11242	BB90-188	1251-1355	1251-1355	
	11243	BB90-188	1356-1460	1356-1460	
	11244	BB90-188	1461-1565	1461-1565	
	11245	BB90-188	1566-1670	1566-1670	
	11246	BB90-188	1671-1775	1671-1775	
	11247	BB90-188	1776-1880	1776-1880	
	11248	BB90-188	1881-1985	1881-1986	
	11249	BB90-188	1986-2090	1986-2090	
	11250	BB90-188	2091-2195	2091-2195	43
	11251	BB90-188	2196-2200	2196-2200	
	11252	BB90-188	2201-2332	2201-2332	
	11253	BB90-190	101 - 200	101 - 200	
	11254	BB90-190	201 - 305	201 - 305	
	11255	BB90-190	306 - 410	306 - 410	
	11256	BB90-190	411 - 515	411 - 515	
	11257	BB90-190	516 - 620	516 - 620	
	11258	BB90-190	621 - 725	621 - 725	
21/11/90	11259	BB90-190	726 - 830	726 - 830	
	11260	BB90-190	831 - 935	831 - 935	44
	11261	BB90-190	936 -1040	936 -1040	
	11262	BB90-190	1041-1145	1041-1145	
	11263	BB90-190	1146-1250	1146-1250	
	11264	BB90-190	1251-1266	1251-1266	
	11265	BB90-205	101 - 200	101 - 200	
	11266	BB90-205	201 - 305	201 - 305	
	11267	BB90-205	306 - 410	306 - 410	
	11268	BB90-205	411 - 515	411 - 515	
	11269	BB90-205	516 - 620	516 - 620	

FIELD TAPE INVENTORY

DATE	TAPE NO	LINE NO	SP RANGE	RECORDS	BOX
21/11/90	11270	BB90-205	621 - 725	621 - 725	45
	11271	BB90-205	726 - 830	726 - 830	
	11272	BB90-205	831 - 935	831 - 935	
	11273	BB90-205	936 -1040	936 -1040	
	11274	BB90-205	1041-1145	1041-1145	
	11275	BB90-205	1146-1250	1146-1250	
	11276	BB90-205	1251-1355	1251-1355	
	11277	BB90-205	1356-1460	1356-1460	
	11278	BB90-205	1461-1565	1461-1565	
	11279	BB90-205	1566-1670	1566-1670	
	11280	BB90-205	1671-1775	1670-1775	46
	11281	BB90-205	1776-1880	1776-1880	
	11282	BB90-205	1881-1985	1881-1985	
	11283	BB90-205	1986-2090	1986-2090	
	11284	BB90-205	2091-2195	2091-2195	
	11285	BB90-205	2196-2300	2196-2300	
	11286	BB90-205	2301-2405	2301-2405	
	11287	BB90-205	2406-2510	2406-2510	
	11288	BB90-205	2511-2615	2511-2615	
	11289	BB90-205	2616-2720	2616-2720	
	11290	BB90-205	2721-2825	2721-2825	47
	11291	BB90-205	2826-2930	2826-2930	
	11292	BB90-205	2931-3035	2931-3035	
	11293	BB90-205	3036-3140	3036-3140	
	11294	BB90-205	3141-3245	3141-3245	
	11295	BB90-205	3246-3350	3245-3350	
	11296	BB90-205	3351-3455	3351-3455	
	11297	BB90-205	3456-3458	3456-3458	

COMPLETION OF BRIDGE OIL LTD BASS 2D T/15P SEISMIC SURVEY

GSI-709



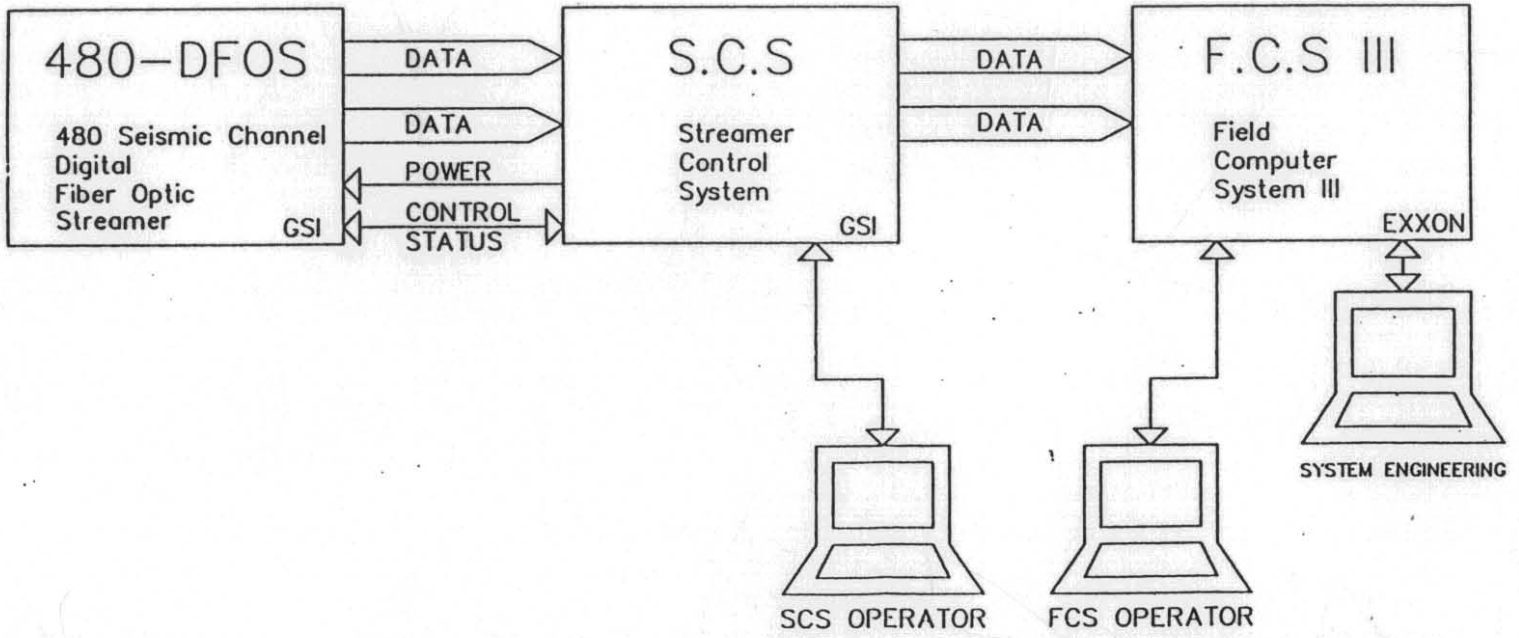
GSI 480 CHANNEL STREAMER SYSTEM

PLATE 1

STREAMER CONTROL SYSTEM

257098

GSI-709



GSI 480 CHANNEL DIGITAL FIBER-OPTIC STREAMER SYSTEM

PLATE 2

FCS III DIAGRAM

257099

GSI-709

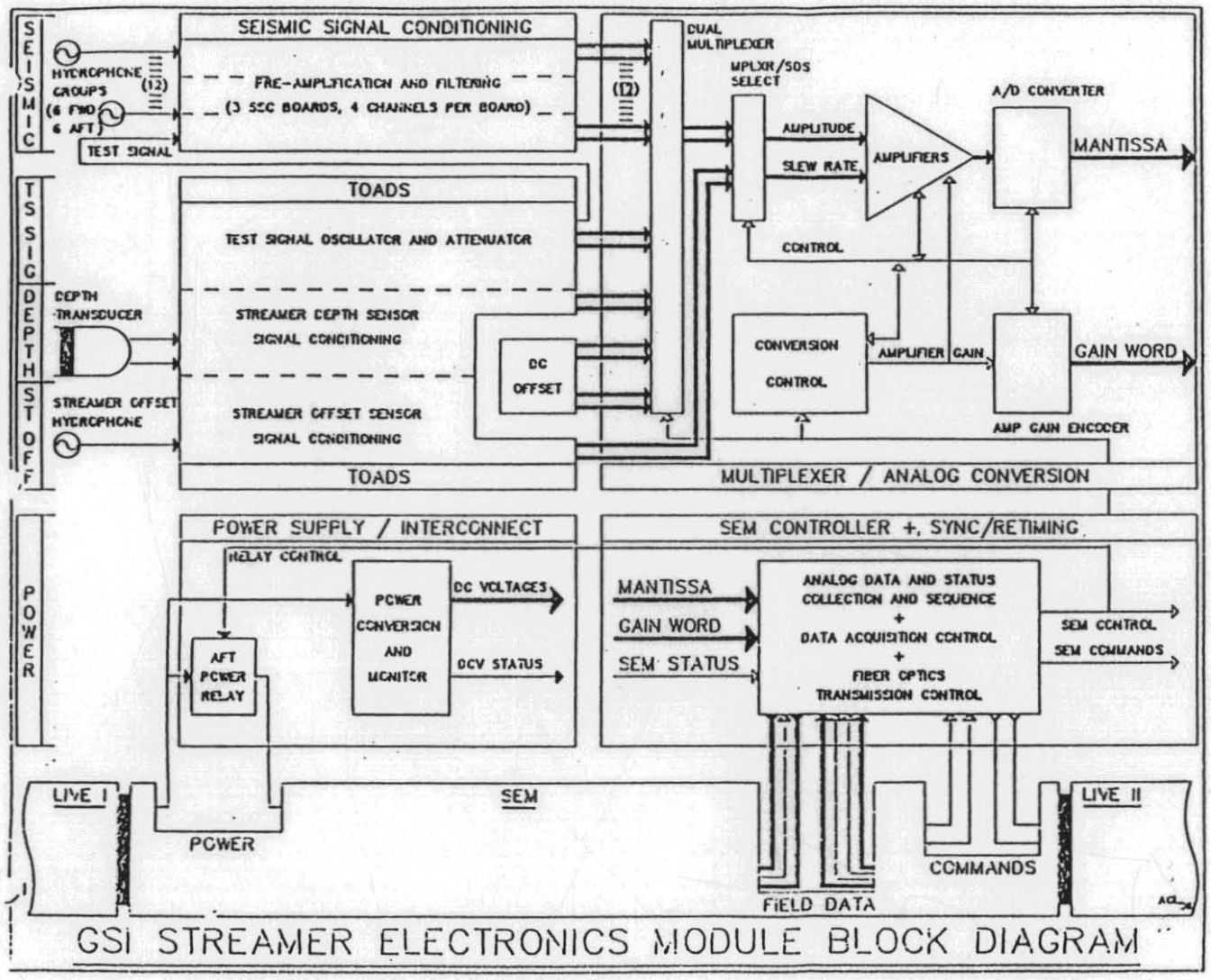


PLATE 3

STREAMER ELECTRONICS MODULE

257100

257101

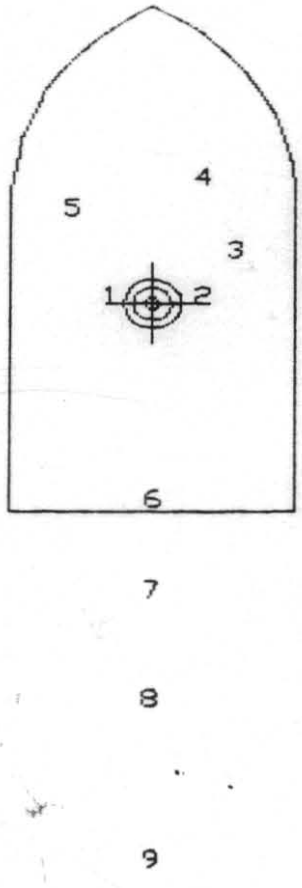
PLATE #4

M/V MAGNIFICENT CREEK

ANTENNAE LOCATION DIAGRAM

CLIENT: BRIDGE OIL LTD. AREA: T/15P

DATE: 11 NOV. 1990 - 22 NOV. 1990



KEY

LOCATION	OFFSET FROM CNP	
	X (+ STB)	Y (+ FWD)
CNP	0.00 m	0.00 m
1 PRIMARY SYLEDIS ANTENNA	-0.70 m	0.00 m
2 SECONDARY SYLEDIS ANTENNA	0.70 m	0.00 m
3 TRANSIT SATELLITE ANTENNA	1.00 m	2.50 m
4 FATHOMETER TRANSDUCER	3.17 m	2.40 m
5 SONAR TRANSDUCER	-2.98 m	2.49 m
6 CENTRE-STERN	0.00 m	- 29.79 m
7 CENTRE OF SOURCE	0.00 m	- 106.79 m
8 NEAR COMPASS	0.00 m	- 225.42 m
9 CENTRE OF NEAR GROUP	0.00 m	- 266,79 m

NB: THE COMMON NAV POINT (CNP) IS THE REFERENCE POINT FOR SHOT CONTROL.

5 cm

257102

PLATE #5

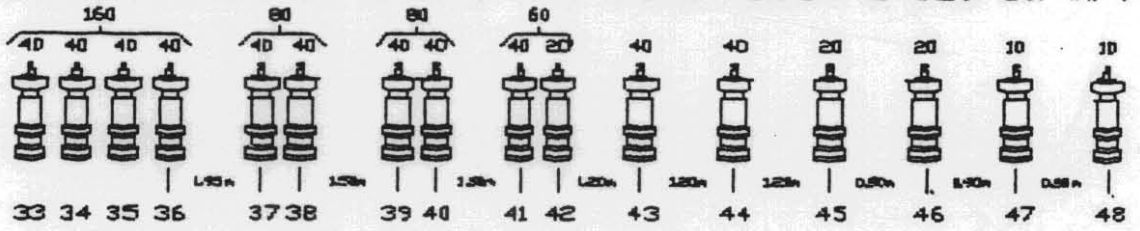
M/V MAGNIFICENT CREEK

2180 CUBIC-INCH SLEEVE AIRGUN ARRAY

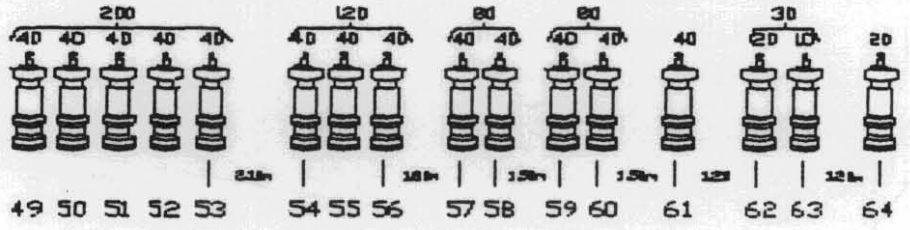
CLIENT: BRIDGE OIL LTD.

DATE: NOVEMBER - DECEMBER 1990

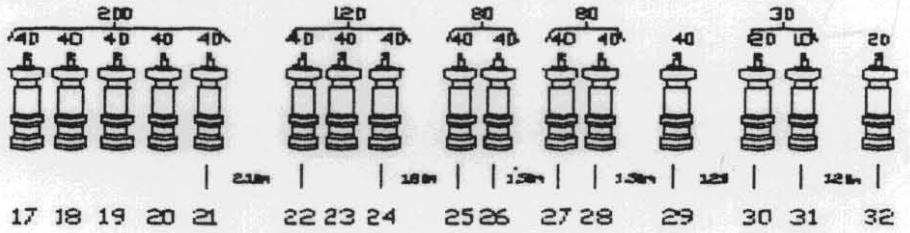
STARBOARD OUTER STRING (16 GUNS 13.95m @ 520 cu in.)



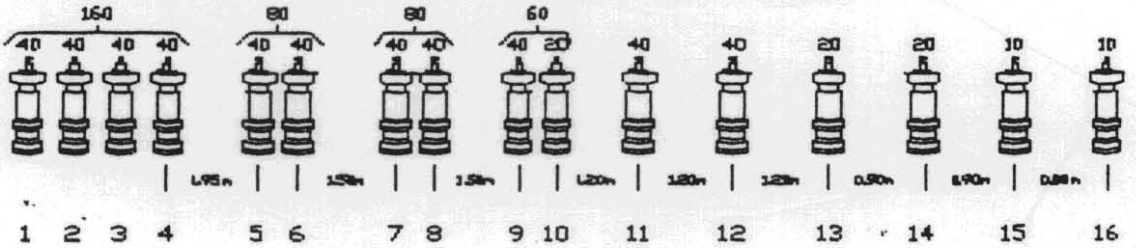
STARBOARD INNER STRING (16 GUNS 13.35m @ 570 cu in.)

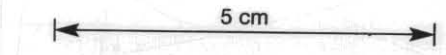


PORT INNER STRING (16 GUNS 13.35m @ 570 cu in.)



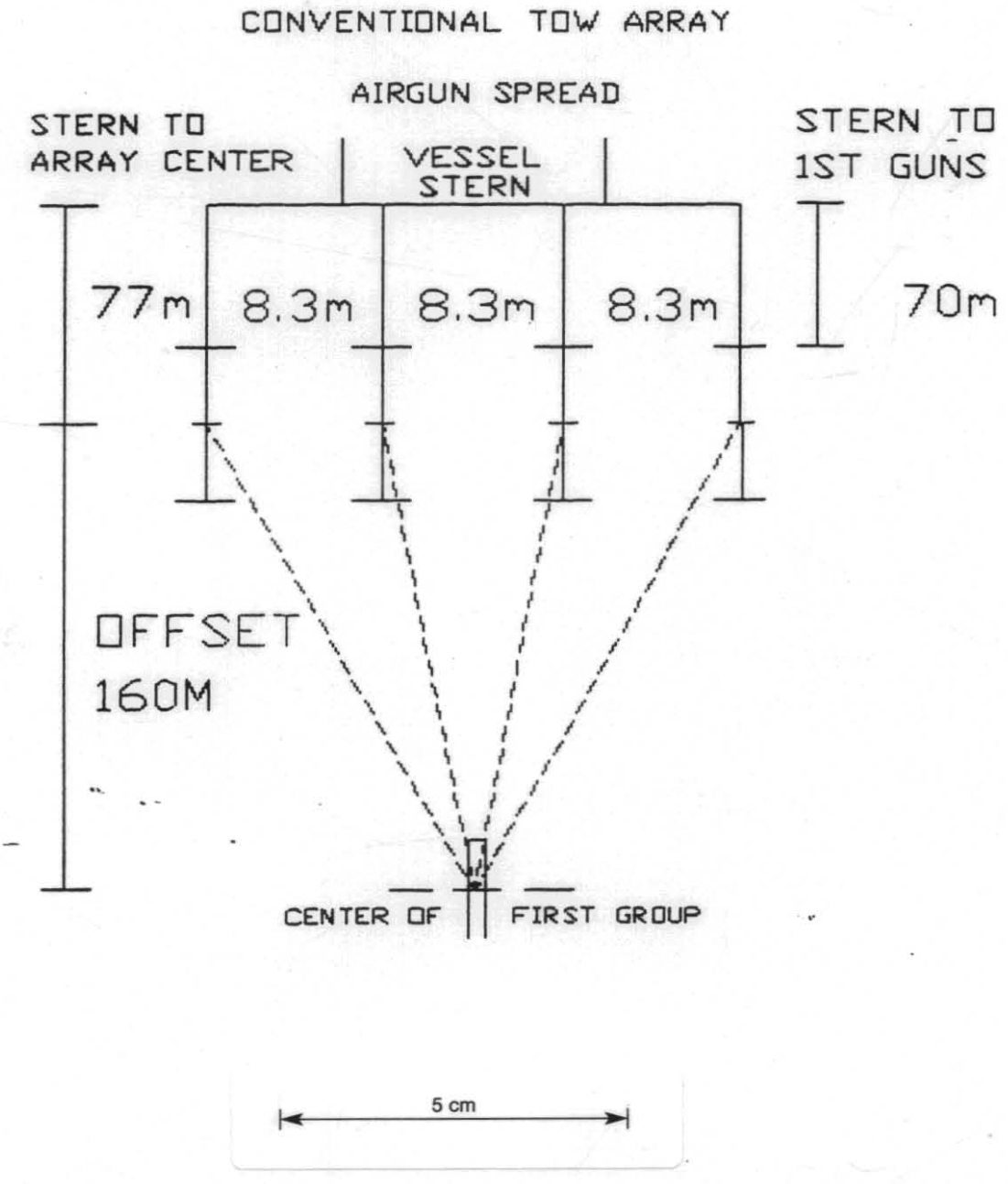
PORT OUTER STRING (16 GUNS 13.95m @ 520 cu in.)





257103

PLATE #5A
M/V MAGNIFICENT CREEK
SPREAD AND OFFSET DIAGRAM
CLIENT: BRIDGE OIL LTD.
DATE: NOVEMBER - DECEMBER 1990



257104

PLATE #5B

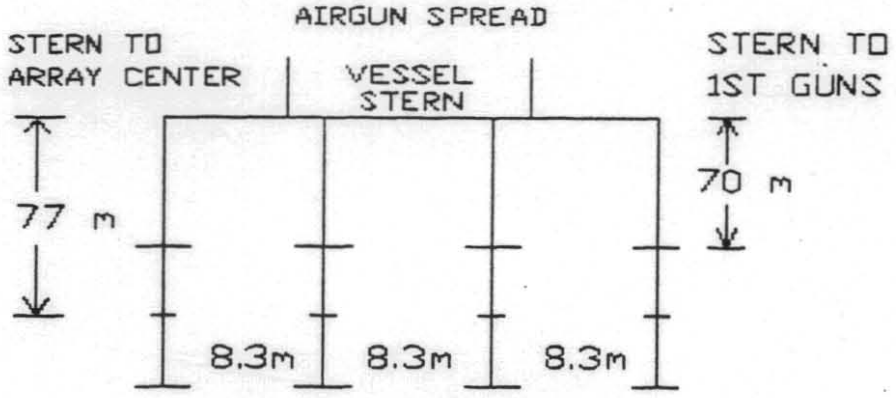
M/V MAGNIFICENT CREEK

2180 CUBIC-INCH SLEEVE AIRGUN ARRAY

CLIENT: BRIDGE OIL LTD.

DATE: NOVEMBER - DECEMBER 1990

CONVENTIONAL TOW ARRAY

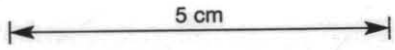


NOTES

1. GUN SIZE IN CUBIC INCHES
2. CENTERLINE TO CENTERLINE SPACING OF ALL COALESCED GUNS IS 0.495m
3. PREDICTED AVERAGE PERFORMANCE PER SUB-ARRAY
   Pα=25 BAR-M (P-P, 0-250 Hz)
   TOTAL APPROXIMATE 100 BAR-M
4. DEPTH INDICATORS ARE SITUATED WITH GUNS # 2,15,18,31,34,47,50,63.

ARRAY CLUSTER COMPOSITION

2 X 200	2 X 30
2 X 160	6 X 40 SINGLE
~~2 X 120~~	6 X 20 SINGLE
8 X 80	4 X 10 SINGLE
2 X 60	



257105

PLATE #6

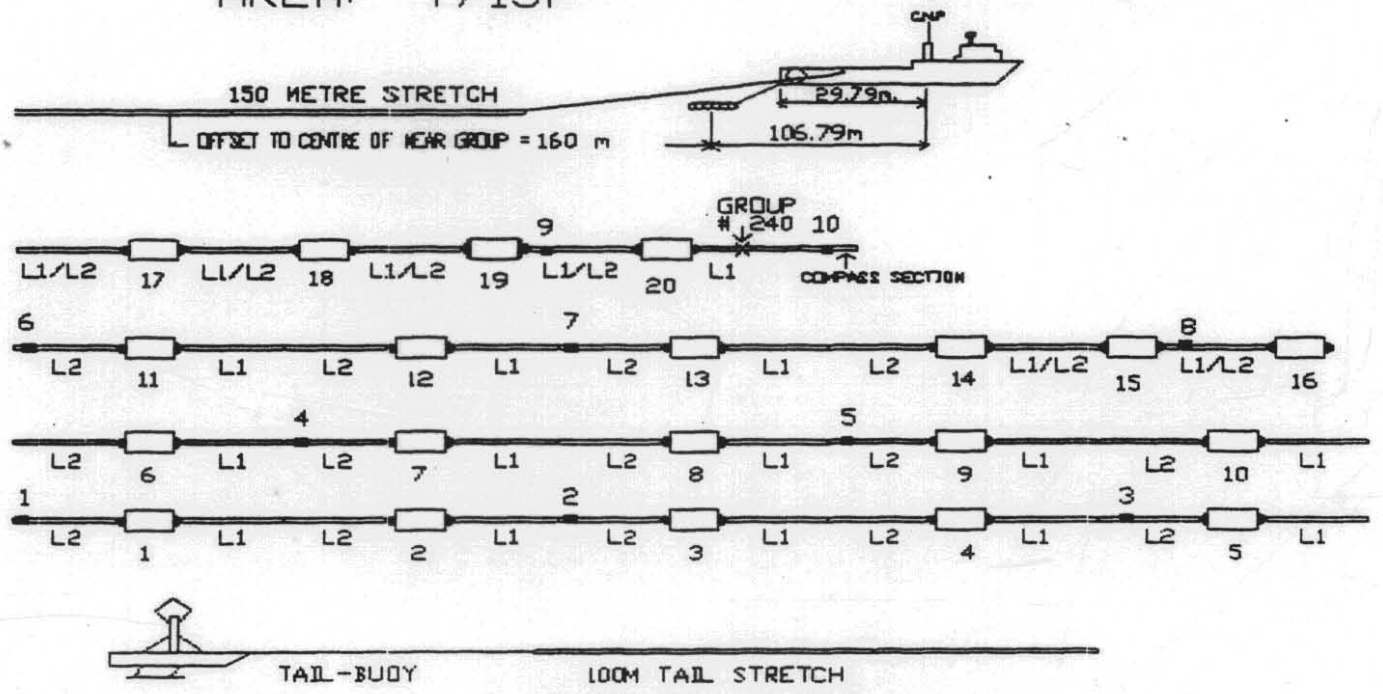
M/V MAGNIFICENT CREEK

H.G.S. 240 TRACE STREAMER

CLIENT: BRIDGE OIL LTD.

DATE: NOVEMBER - DECEMBER 1990

AREA: T/15P



KEY

■ : DEPTH COMPASS LOCATION (BIRD)

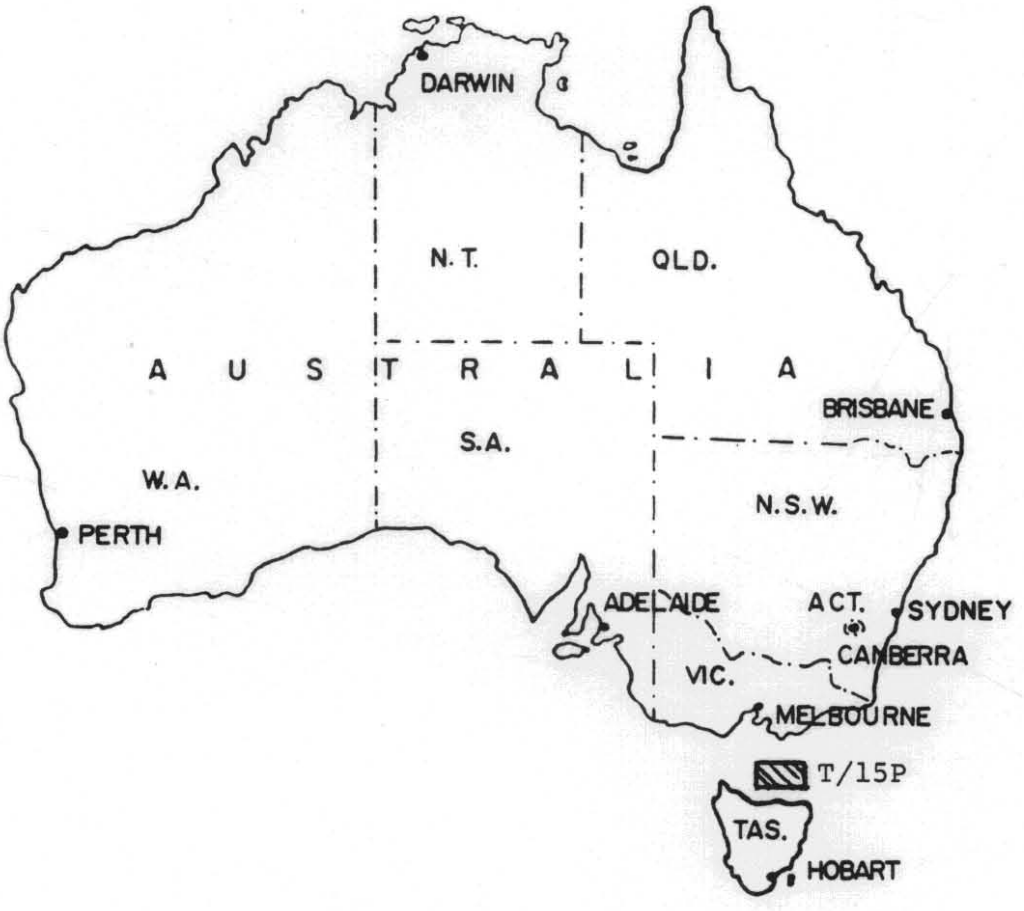
⬭ : STREAMER ELECTRONIC MODULE (SEM)

NOTES

1. GROUPS 1-162 ARE 12.5 METRES LONG
2. GROUPS 163 -240 ARE 6.25 METRES LONG
3. THE CENTRAL NAV. POINT IS THE POSITION THAT ALL ANTENNAE ARE REFERENCED TO i.e: A SHOT OCCURS WHEN THE C.N.P. IS OVER THE PREPLOTTED SHOTPOINT COORDINATE

5 cm

PLATE 7



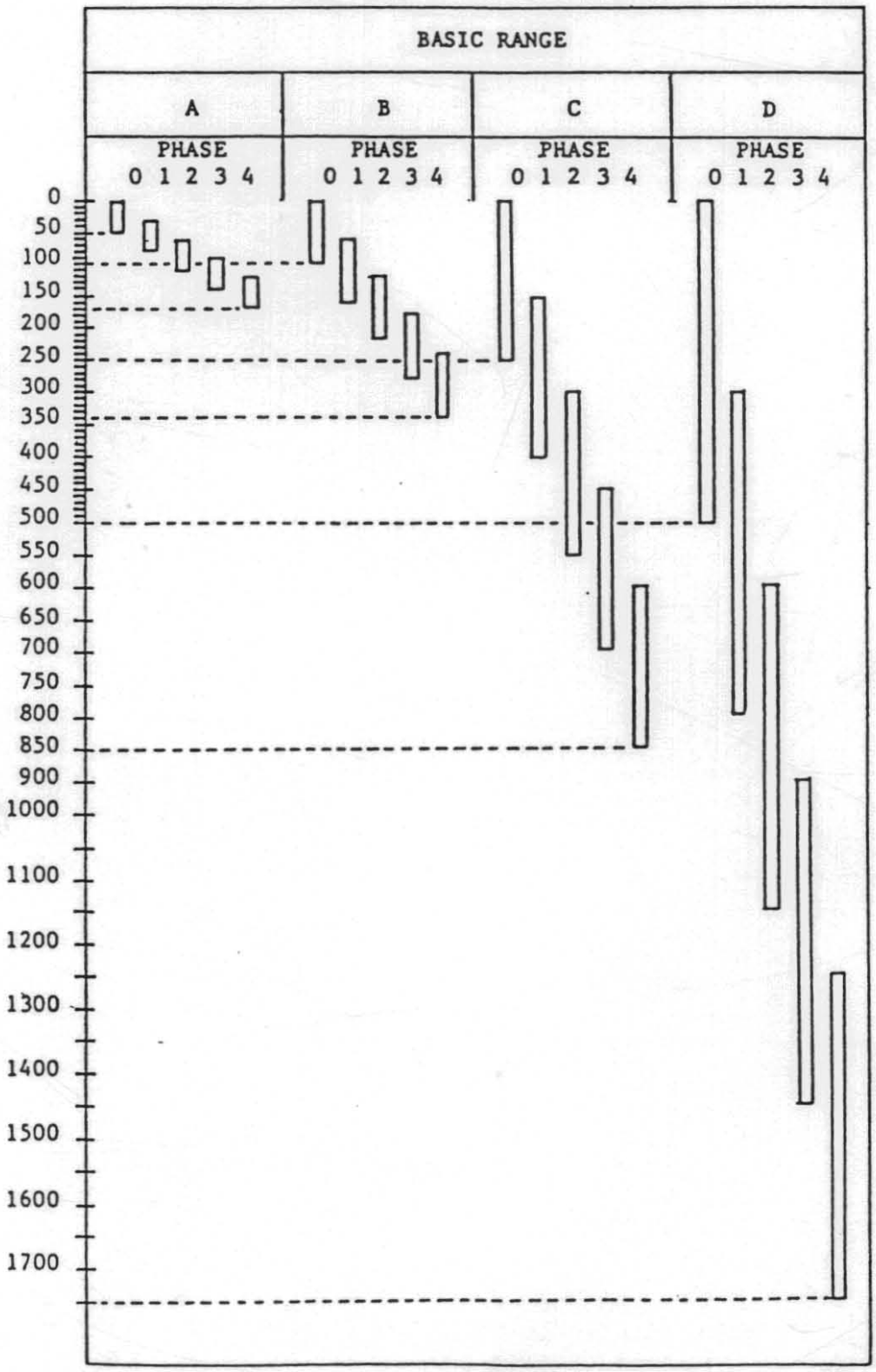
LOCATION OF PROSPECT

GSI—709

257107

PLATE 8

SIMRAD MODEL EA FATHOMETER SCALE



GSI—709

5 cm

257108

NAVIGATION REPORT

M/V MAGNIFICENT CREEK

FOR

THE BRIDGE OIL COMPANY LIMITED

WESTPAC PLAZA

60 MARGARET ST

SYDNEY NSW 2000

BY

HALLIBURTON GEOPHYSICAL SERVICES, INC.

64 BUCKINGHAM DRIVE

WANGARA 6065

SURVEY DATE: Sunday 11-11-1990 to Wednesday 21-11-1990

257109

This report to be read in conjunction with

Final Operations Report

Marine Seismic Survey

Permit T 15 P

257110

TABLE OF CONTENTS

SECTION	TITLE	PAGE
A	Introduction	1
B	Survey Discussion	5
C	Theory of Navigation SYLEDIS discussion	7
D	Calibration Procedure & Results	11
E	Field Navigation Operation Summary	32
F	Base Station Descriptions	35
G	Mapping Parameters	56

PERSONNEL

Navigation Supervisor	:	Bryan Field
Navigation Administrators:		Bruce Tuck Larry Williams
Client Representative	:	Frank Renton
Party Manager	:	Steve Dowling

SECTION A

INTRODUCTION

Halliburton Geophysical Services, Inc. provided a SYLEDIS radio positioning system to conduct a survey for the Bridge Oil Company of Australia in permit area T15P, in the North Tasmanian Region of Australia.

Aboard M/V Magnificent Creek the SYLEDIS was interfaced to the CMS III (Configurable Marine System). The CMS is a fully integrated, real time instrumentation system for controlling and monitoring the navigation and survey functions necessary to meet the high accuracy requirements of marine geophysical exploration needs. The CMS was specifically designed by Geophysical Services Inc. to meet these needs.

The CMS III is designed around Texas Instruments model 980 and 990 microcomputers. One of the major responsibilities of the CMS is to provide an integrated navigation capability for seismic line control. The real-time multisensor navigation function, incorporated in the CMS, derives positional data from a variety of sources; including satellite, sonar, gyro-compass, range/range and hyperbolic radio positioning systems interfaced directly to the CMS hardware.

As well as providing for the magnetic tape recording of data for off-line post processing, the system performs automatic line and shot control based on distance measured equal shotpoint spacing along the great circle path between the required endpoints of a seismic line. In addition to the navigation function of the CMS, the system also includes the capabilities related to streamer tracking, airgun array monitoring and control as well as automatic data logging.

The basic vessel navigation subsystems functions of the CMS include integrated multirange radio positioning system navigation and a GEONAV (GEOdetic NAVigation) integrated satellite navigation system capability.

The integrated multi-range radio positioning system function of the CMS allows for the integration of up to a maximum of 12 multi-system range/range and/or hyperbolic range readings. Raw range readings are recorded on tape for each shotpoint for application in post processing. In addition, vessel velocity component computations, based on the rate of change of range readings are calculated and applied to the continuous line and shot control of the CMS for accurate steering of the vessel and on the desired seismic line.

In order to maintain continuous positional accurate quality control, the CMS automatically performs absolute multi-range position fixes at operator selective intervals of up to a maximum of 99 seconds to ensure that the inherent real-time accuracy of the primary radio navigation system(s) configuration is maintained.

The GEONAV integrated satellite navigation function periodically establishes its absolute geographical location from information transmitted by satellites of the U.S. Navy Navigation Satellite System (TRANSIT). The continuous path of travel of the vessel, between satellite fixes, is computed by a dead reckoning system consisting of a velocity measurement system (VMS). The VMS can derive its velocity information from either an integrated radio positioning system or from a four beam doppler sonar compensated for the pitch and roll of the vessel and for variations in the propagation velocity of sound in water. The VMS consists of a gyrocompass externally compensated for the location and dynamics of the vessel.

The CMS is capable of providing a continuous primary system position derived from any available combination of fix, velocity and azimuth systems as well as a secondary system derived from satellite fixes combined with the primary system dead reckoning inputs. The designated primary inputs serve as navigation inputs to the line control routines. The primary and secondary system positions are output to magnetic tape at each shotpoint, along with the raw navigation data from all initialised systems. All of the navigation calculations are performed using a geodetic co-ordinate system defined in terms of latitudes and longitudes.

The actual spheroid and datum employed by the line control program is under operator control. Co-ordinate trans-formations from a satellite datum position to the local datum is performed automatically.

The CMS provides for Automatic Data Logging (ADL) on magnetic tape of the survey parameters required to process the seismic data, thereby eliminating human error. The ADL data is recorded on magnetic tape at the shotpoint interval. An interface between the CMS and the seismic recording system allows the CMS system to read and record the seismic record, reel number and tape at the shotpoint interval along with related navigation data and additional data from auxiliary equipment such as gravity, magnetics, streamer tracking and fathometer systems. An extender header device allows the CMS system to transfer the shotpoint number, Greenwich Mean Time (GMT), and Julian date for recording in the extended header of the seismic record thereby providing for a redundant cross check in data processing between the seismic and navigation data.

SECTION B

SURVEY DISCUSSION

A SYLEDIS system comprising 2 mobiles and 4 beacons was calibrated over a short baseline between Beechford 341/050 and Stony Head ST868 and an in-situ calibration performed from Beechford. The in-situ results did not confirm the short baseline results, so both calibrations were performed again in the presence of Bridge Oils client representative, confirming the short baseline results. Three way fixes performed by m/v Magnificent Creek further confirmed these results.

Four stations were deployed to give coverage for this survey, one being moved from Stony Head to Mt William later in the survey to aid coverage. All stations were on shore and powered by batteries, being kept charged by thermo-electric generators employing bottled gas.

A navigation manager, assisted by an administrator were provided by Halliburton Geophysical Services to deploy and maintain the shore stations for the duration of the survey. a The SYLEDIS equipment performed very well for the survey and a daily log is contained in this report.

SECTION C

THEORY OF SYLEDIS NAVIGATION DISCUSSION

The title SYLEDIS is derived from "SYstem LEger de measure de DIStances", a system manufactured in France by Sercel S.A. SYLEDIS is a multi-user, range/range or hyperbolic geometry, pulse navigation and positioning system utilising a mobile interrogator and two or more beacon stations at known fixed locations. The system determines distances from each fixed beacon station to the mobile unit by conversion of transmission time of an R.F.pulse at a given frequency into metres. The operating frequency for SYLEDIS is selected from the 420-450 Mhz frequency band. With its filter, 99% of the energy generated is within a 2.5 Mhz (+/- 1.25) bandwidth. Making use of pulse compression, the SYLEDIS can radiate a high energy at low peak power. For practical application, the SYLEDIS carrier frequency is phase modulated according to a (time limited) pseudo-random code, as follows:-

- number of elements of the pseudo-random series:

$N=2^7-1=127$

-interval between elements (short pulse equivalent):

T=0.52 sec.

-digit/phase equivalent:

0/0,1/11

-duration of the pseudo-random series:

T=127x0.52=66.666 microseconds

-distance equivalent:

10km

-number of random series transmitted:

40,80 or 160

-total pulse length:

2.66,5.33 or 10.66 microseconds

The advantages of short pulses exist in this pseudo-random code. Pulse compression affords an increased energy content and hence, an increased range for a limited peak power. Ranges that can be expected from the system are 80-100 km for detailed work or close grid and up to 200 km for large grid programs, dependant on weather and other conditions affecting propagation. Network precision of SYLEDIS is +/- 5 metres out to ranges of 80-100 km, after which it degrades somewhat as the range increases. Optimum system performance is dependant on proper selection of station sites, antennas and network geometry. Station sites should be adjacent to the shore. Transmission over dense foliage will degrade signal strength thus reducing range and accuracy.

SYLEDIS works in a time sharing mode. Each beacon or mobile of a network, in turn, uses the same transmitting frequency and the same receiving frequency. One time slot lasts 5.33 milliseconds and there can be up to 30 slots. One of the transmitters must synchronise all the internal clocks of all other elements of the network. As they need not be accurate, the synchronisation pulse is a mere carrier with the same shape as the coded pulses. Such a time sharing system is very flexible. The sync. signal can be transmitted by any mobile or beacon according to the decision of the manager of the network. In the range/range mode of operation the SYLEDIS network can be utilised with 4 separate mobile units.

The SYLEDIS fixed station consists of a SYLEDIS beacon with power supply and antennae as required for ranges or pattern of the program (see illustration for SYLEDIS system). Mobile installation of SYLEDIS is an interrogator which consists of the transmission and receiving sections plus electronics providing readouts, data access and capability for setting calibration.

BASE STATIONS

STATION NAME : Charmouth Hill

Antenna type : Celwave Omnidirectional

Cable : 1 x 30m FSJ4-50 "Superflex"

Other : 10m "Texas" tower

STATION NAME : Hardwickes Hill

Antenna type : Celwave Omnidirectional

Cable : 1 x 30m FSJ4-50 "Superflex"

Other : 10m "Texas" tower

STATION NAME : East Sandy Point

Antenna Type : Celwave Omnidirectional

Cable : 1 x 30m FSJ4-50 "Superflex"

Other : 10m "Texas" tower

STATION NAME : Stony Head

Antenna Type : Celwave Omnidirectional

Cable : 1 x 30m FSJ4-50 "Superflex"

Other : 10m "Texas" tower

STATION NAME : Mt William

Antenna Type : Celwave Omnidirectional

Cable : 1 x 30m FSJ4-50 "Superflex"

Other : 7m "Texas" tower

SECTION D

CALIBRATION PROCEDURE AND RESULTS

SYLEDIS is a distance measuring device which calculates the delay created by propagation of a signal, from a transmitter to a receiver and back, this delay being directly proportional to the distance travelled.

Incorporated in this value are the delays incurred while the signals travel through system components and is processed within the system. To eliminate these, a calibration procedure is performed to evaluate their magnitude and compensate for them in order to display and output exact range readings.

Within the SYLEDIS mobile the time measurement card is responsible for compensation of this delay. Located on the card are rotary switches which may be set to an equivalent delay. Alternatively, an equal distance may be entered into the onboard navigation computer which will be subtracted from the range read out of the unit. This latter method is utilised for a better monitoring of values used. These delays are considered constant for a calibrated signal.

The suggested calibration procedure is to choose a range of approximately 3-10 km, ie. short enough that the propagation velocity variations may be considered negligible. The systematic delays are calculated and compensated for accordingly.

After installation of base stations a mobile may be placed at a convenient base station and the in situ baselines measured. This method has the added benefit of confirming base station co-ordinates. Alternatively baselines may be crossed by the vessel to check distances.

For both cases any errors between calculated and observed distances may be categorised as a random error.

BEECHFORD CALIBRATION RANGE

A SYLEDIS chain was calibrated on 3 November 1990 in the Beechford area over a known distance (7403.504 metres) between Beechford 341/050 and a 1.46m offset from Stony Head ST868 and repeated on 8 November 1990. A clear line of sight near water exists between these points.

7 metre towers were erected at each point, with mobiles installed at Beechford 341/050 and beacons at Stony Head ST868.

No permission was obtained to use the marker at Beechford as it is on public land and permission to occupy Stony Head was obtained from Major Ian Steele of 6th Military Barracks, Anglesea Barracks, Hobart, 7001.

A further, in situ calibration was performed on 8 November 1990 to confirm both the delay values and the positioning of the base stations.

SHORT BASELINE CALIBRATION RANGE

GEOPHYSICAL SERVICE INC

INVERSE GEODETIC COMPUTATION AUSTRALIAN SPHEROID

	LATITUDE	LONGITUDE
STANDPOINT: Beechford 050	41 01 46.7298 S	146 57 11.6711 E
FOREPOINT : Stony Head	40 59 06.1657 S	147 01 07.2254 E

DISTANCE IN METRES : 7404.964 -1.46 = 7403.504

FORWARD AZIMUTH FROM NORTH : 48 02 22.2599

BACK AZIMUTH FROM NORTH : 227 59 47.6995

INVERSE GEODETIC COMPUTATION AUSTRALIAN SPHEROID

	LATITUDE	LONGITUDE
STANDPOINT: Beechford 050	41 01 46.7298 S	146 57 11.6711 E
FOREPOINT : East Sandy	40 57 38.0543 S	147 20 20.2060 E

DISTANCE IN METRES : 33348.093

FORWARD AZIMUTH FROM NORTH : 76 49 38.7180

BACK AZIMUTH FROM NORTH : 256 34 27.8445

SHORT BASELINE CALIBRATION RANGE

GEOPHYSICAL SERVICE INC

INVERSE GEODETIC COMPUTATION AUSTRALIAN SPHEROID

	LATITUDE	LONGITUDE
STANDPOINT: Beechford 050	41 01 46.7298 S	146 57 11.6711 E
FOREPOINT : Hardwick Off	40 52 01.5140 S	147 37 41.8541 E

DISTANCE IN METRES : 59637.827

FORWARD AZIMUTH FROM NORTH : 72 36 04.2075

BACK AZIMUTH FROM NORTH : 252 09 31.5053

INVERSE GEODETIC COMPUTATION AUSTRALIAN SPHEROID

	LATITUDE	LONGITUDE
STANDPOINT: Beechford 050	41 01 46.7298 S	146 57 11.6711 E
FOREPOINT : Charmouth Off	40 45 18.1397 S	147 58 09.1601 E

DISTANCE IN METRES : 90886.256

FORWARD AZIMUTH FROM NORTH : 70 43 40.4248

BACK AZIMUTH FROM NORTH : 250 03 46.0441

STATION NAME: Beechford 341/050

LATITUDE : 41 deg 01 min 46.7098 sec S

LONGITUDE : 146 deg 57 min 11.6711 sec E

NORTHING : 545 7934.949 Metres

EASTING : 496069.326 Metres

ELEVATION : 18.81 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid

STATION NAME: Beechford 341/050

LOCATION: Approximately 20km east of Georgetown, in a small hamlet, alongside Geale Street, on a grassy verge.

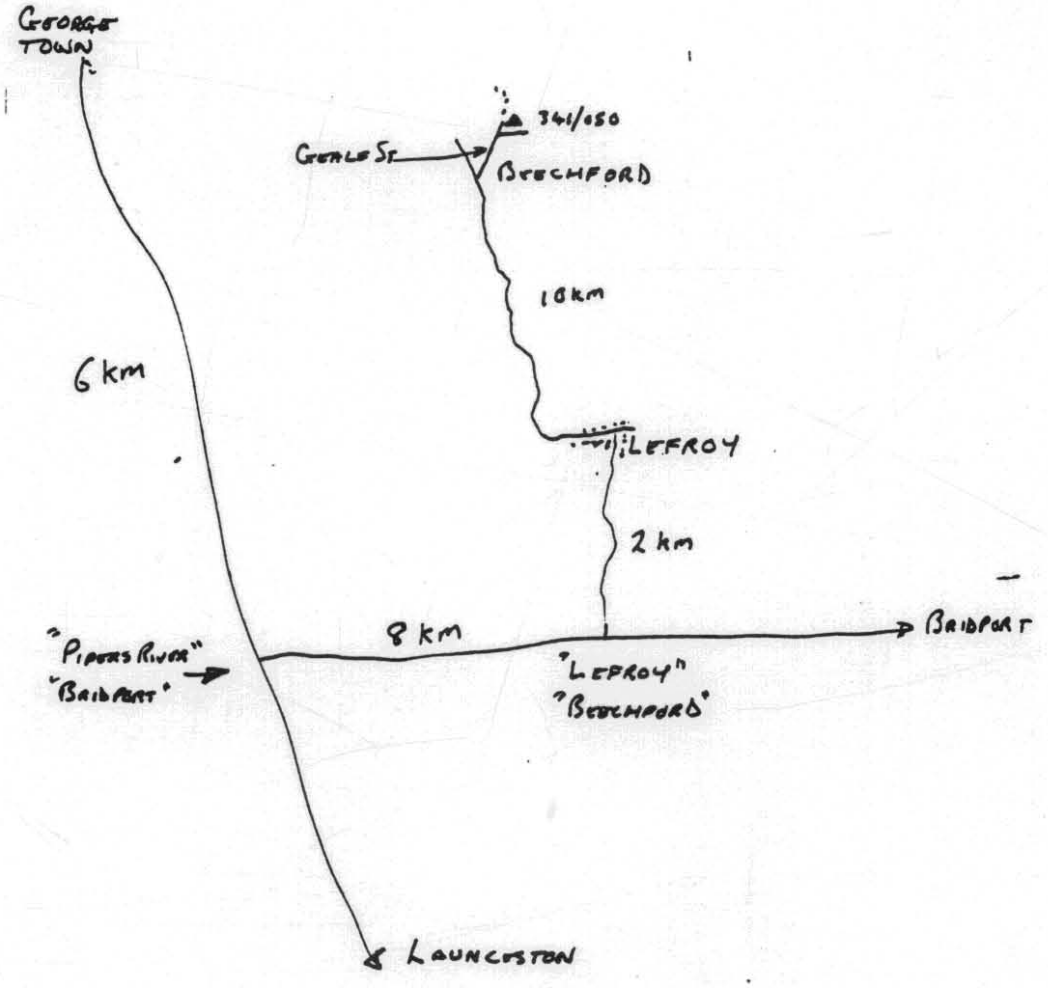
ACCESS : From Georgetown, proceed east to Beechford, turn right on Geale St and proceed to where the road drops away and becomes a track. The mark is 10m further, on the right, 5m from the house to the right.

MARKER : A brass lands disc, at ground level, set in concrete, unmarked. A steel star picket with a lands tag stamped "341" and "050" is used as a witness post.

GENERAL : Permission to occupy this site is unnecessary as it is sited on public land.

This mark is useful for short baseline calibration only, a restricted vista and easy access make it unsuitable as a base station.

Beechford 341/050 STATION DESCRIPTION



GSI-709

LANDS DEPARTMENT TASMANIA

Station Number and Name 341/050 BEECHFORD

Original Station Established by: Lands Dept: Tasmania — Date: 23.9.1982

Existing Station Plotted by: Lands Dept: Tasmania — Date: 12.5.1983

Reference Books: Lands: 8341;

Colonial Location — State: Tasmania — Land District: Dorset

Parish — Other Locations

Nature and Locality Details — Particulars of station marking and instrument

STATION MARK: Brass Lands Disc at ground level in concrete sub-surface mark is 1.1m long steel star bar 0.384m below brass disc.

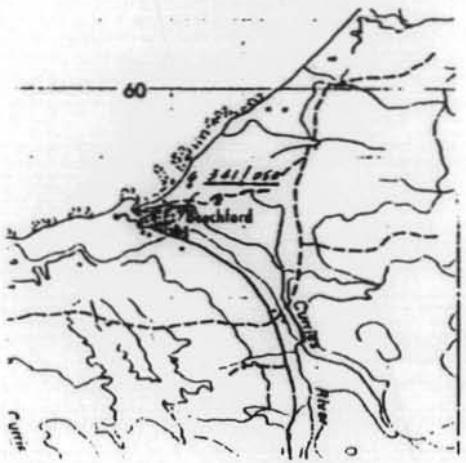
Above mark replaces original steel star placed on 23.9.1982 and is 0.063m higher than original steel star bar.

RECORDS: Nil

REFERENCE MARKS: (1) Three 1.8m long steel star bars in concrete at ground level.

(2) Red steel star marker bar in concrete.

ACCESS: Drive on access by 2/4x4 vehicle. See map section below.



SOUTH EAST: T45
LAUNCESTON: T45 — Map Number SF 55-4 — Scale 250,000

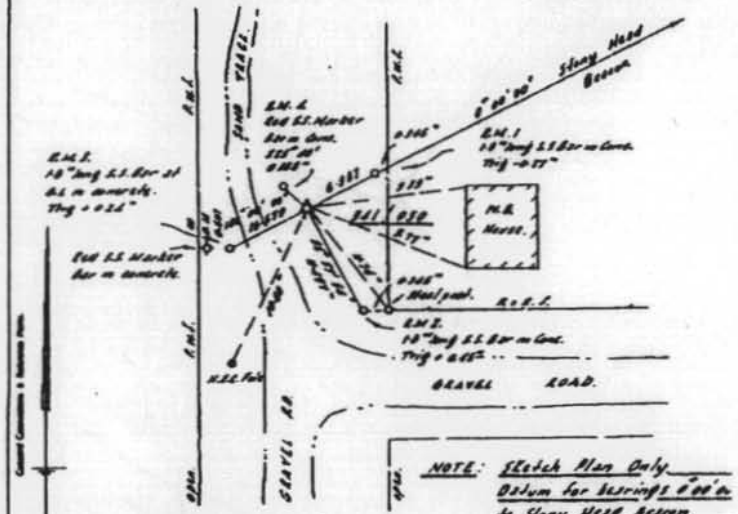
TASMAN: — Map Number 8715 — Scale 100,000

RECTANGULAR COORDINATES: In Metres on the Australian Map Grid — DATUM: Australian Geodetic Datum 1966 — Order FOURTH

GRID BEARING + ADJ AZIMUTH + CONVERGENCE — HEIGHTS: In Metres on the Australian Height Datum (Provisional) — Order TRIG

BEECHFORD	341/050		SECTION	S 341	SERIAL	2
SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
41 01 46.7298	146 57 11.4711	55	496069.326	5457934.949	-0 01 50.50	18.81

TO	SERIAL	ADJ AZIMUTH	ADJ LENGTH
SYDNEY HEAD	ST 86 1	48 02 22.23	7494.964
	341/300 1	206 36 45.66	370.781



STATION LAST VISITED 12.5.-* — 29.9.83

Plans Identification: Y64, BEECHFORD, SHT 2, 1:25000, 77.1.27
PRECISE TEXT FOR SURVEYGRAPHIC PURPOSES.

Certified true of survey/plan drawn: A.B. — Issue No. & Date: 11.5.83

-19-

2571130

5 cm

STATION NAME: Stony Head

LATITUDE : 40 deg 59 min 06.1657 sec S

LONGITUDE : 147 deg 01 min 07.2254 sec E

NORTHING : 5462887.008 Metres

EASTING : 501570.850 Metres

ELEVATION : 89.91 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid

STATION NAME: Stony Head ST868

LOCATION: Approximately 4.5km WNW of Lullworth (20km ENE of George Town on a rocky prominent headland, within the boundaries of the 6th Military District firing range.

ACCESS : From the East Tamar Hwy, take the Bridport turnoff proceed east for 22km. Turn left at the Lullworth and Weymouth turnoff (700m past Pipers River Roadhouse) and follow the road for 9.2km to a left turn, marked Lullworth. Take this road for 5km to Lullworth, turning right at the T junction and left 100m downhill, at the beach.

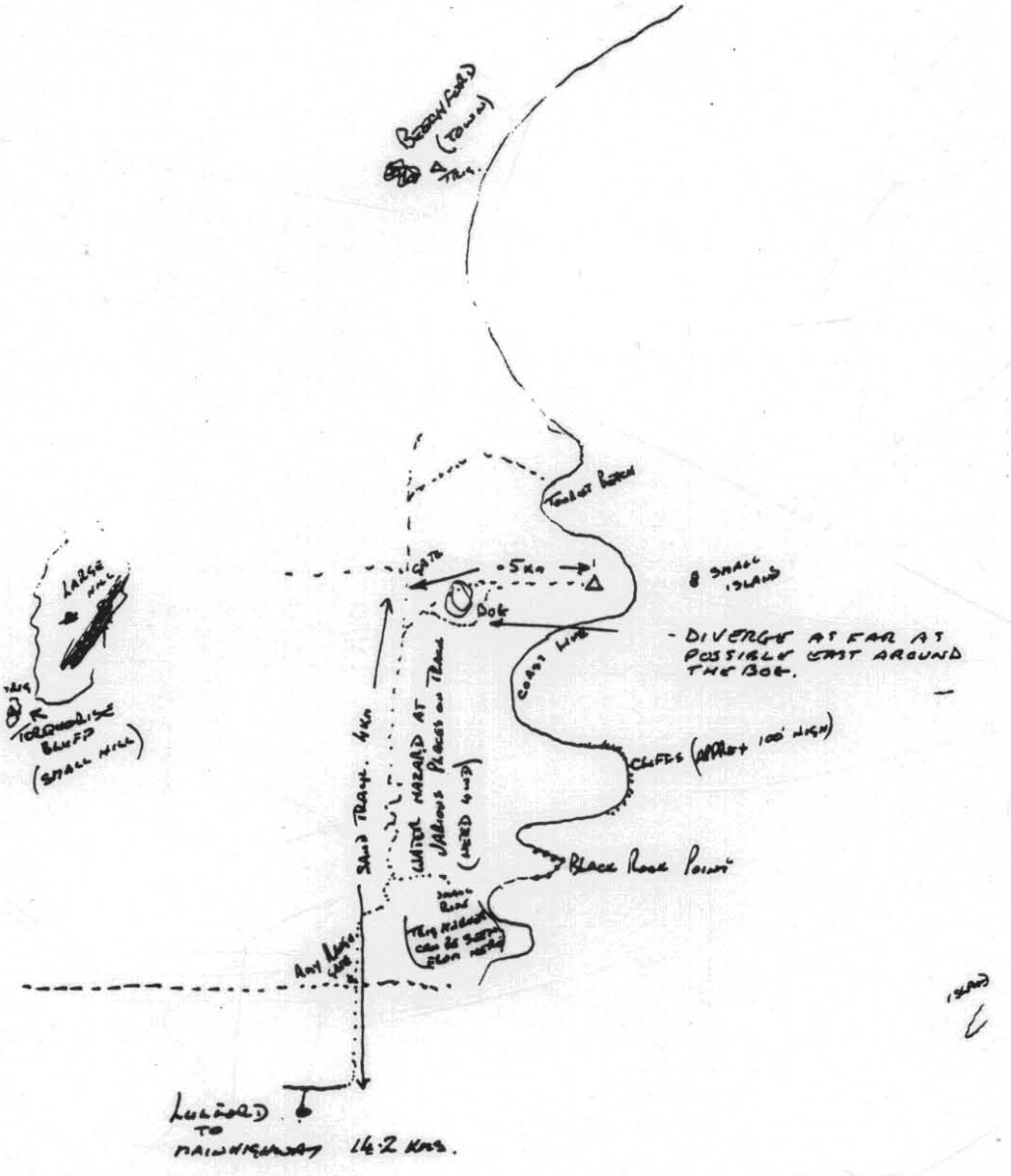
Follow the dirt road around the beach for 500m to a launching ramp and parking area, at this area turn 120deg left uphill on the left one of two tracks. Follow this track due west for 3.5 to 4km, using any side tracks past mud and sand bogs until an old fence is encountered near the base of Stony Head. Turn right and proceed 100m to where a large bog across the track is visible. Stop here and circle the bog to the east, keeping at least 50m from the mud crossing. From here follow the track up Stony Head for 1km to the steel quad beacon.

MARKER : A green brass ST plaque, stamped ST868, set in concrete.
A black steel quad beacon is sited directly over the mark.

GENERAL : Permission to occupy this site was obtained,in writing from:- Major Ian Steele
6th Military Barracks
Anglesea Barracks
Hobart 7001
Ph 002 212216

Stony Head ST868 STATION DESCRIPTION

APPROX DIST. FROM LULFORD - TRIG 4.5 K
FROM BEEFORD - TRIG 7 K.



GSI-709

STATION SUMMARY

CATEGORY A

LANDS DEPARTMENT TASMANIA

Station Number and Name: S.T. 868 STONY HEAD

Original Station Established by: Lands Dept: Tasmania — Date: Jan 1960

Existing Station Marked by: Lands Dept: Tasmania — Date: 16.9.1976

Reference Stations: Lands: A12/37; A13/58; A21/53; T39/40; M8/46; M24/37; S0048; S276; S341;

Cadastral Location — State: Tasmania — Land District: Dorset

Parish — Allotment/Section

Access and Locality Sketch — Particulars of station marking and location

STATION MARK: Brass ST mark (numbered 868) in concrete block. New mark is 0.05m. above old mark.

BLAZE: Galvanised iron quad and black discs beacon. Base of discs are 2.876m. above new ST mark. Centre of discs are 3.29m. above mark.

REFERENCE MARKS: (1) Three steel star bars at ground level in concrete.

(2) Galvanised nail in concrete in centre of pipe in concrete at ground level on top of old dirt mound. The galvanised pipe is the bottom section of old eccentric pipe and discs beacon, now destroyed.

ACCESS: Drive on access by 4WD vehicle. See map section below.

NOTE: This station is located on the Eastern side of the Stony Head Army Firing Range. Permission to enter should be obtained from the Department of Army prior to entry and caution exercised whilst in the trig station area.

MAP: S.T. 868 Stony Head

NORTH EASY: TAS

Map Name: LAUNCESTON: TAS — Map Number: SE 55-4 — Scale: 250,000

Map Name: NINTH ISLAND: TAS — Map Number: 8316 — Scale: 100,000

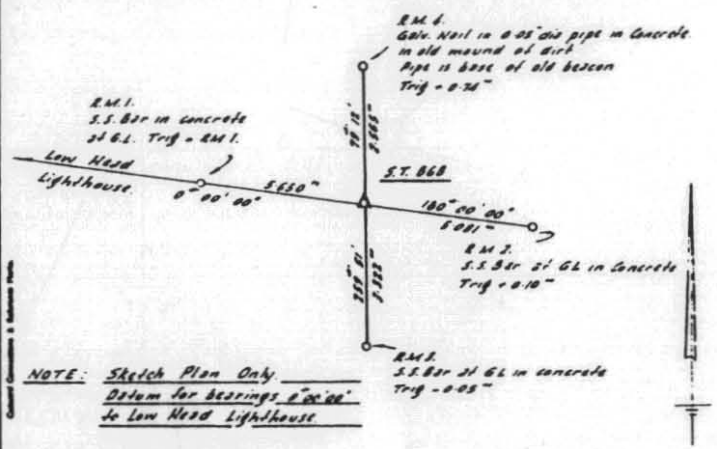
RECTANGULAR COORDINATES: In Metres on the Australian Map Grid — DATUM: Australian Geodetic Datum 1966 — Order: THIRD

GRID BEARING + ADJ AZIMUTH + CONVERGENCE — HEIGHTS: In Metres on the Australian Height Datum (Tasmania) — Order: TRIG

STONY HEAD — AT 868 — SECTION TAS 82 — SERIAL 52

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
40 59 06.1657	147 01 07.2254	55	501570.850	5462887.008	+0 90 46.09	89.91

SEE ANNEXURE FOR INFORMATION FROM S.T.868



NOTE: Sketch Plan Only
Datum for bearings 0° 00' 00" is Low Head Lighthouse

Station last visited: 16-8-82

Printer Identification:

Compiled by or examined by	Issue No.	Date					
A.B.	1	21-9-76	23-9-76	3.8.81	6-10-82	26-11-82	27-6-83

-23-

25/134

GSI

DATE 08/11/90

CLIENT: Bridge Oil PROSPECT: T 15 P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CAL. RANGE: 341/050-ST868 RANGE DISTANCE: 7403.504m
MOBILE SERIAL NUMBER: 552 INTERROGATE SLOT: 1
ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427081 khz
CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3	4	5
SERIAL NO	436	868	871	893
ANT. TYPE	Omni	Omni	Omni	Omni
CABLE	30mFSJ4-50	30mFSJ4-50	30mFSJ4-50	30mFSJ4-50
COLOUR CODE	Yellow	Orange	Green	Blue
AGC LEVEL	7.5	7.8	8.0	7.8
READINGS 1	7637.6	7636.6	7637.6	7638.3
2	7.0	6.2	7.3	8.2
3	7.3	6.3	7.3	8.2
4	7.5	6.4	7.9	8.4
5	7.1	6.2	7.5	8.3
6	6.9	6.2	7.7	8.1
7	7.6	6.3	7.5	8.0
8	7.6	6.6	7.6	8.1
9	7.5	6.3	7.7	8.3
10	7.2	6.2	7.5	8.2
11	7.8	6.5	7.5	8.2
12	7.6	6.7	7.7	8.1
13	7.6	6.6	7.6	8.1
14	7.5	6.5	7.6	8.1
15	7.8	6.6	7.9	8.2
16	7.2	6.4	7.7	8.2
17	7.9	6.6	7.8	8.1
18	7.8	6.3	7.6	8.1
19	7.6	6.1	7.4	8.2
20	7.8	6.4	7.5	8.3
AVERAGE	7637.5	7636.4	7637.6	7638.19
RANGE DIST.	7403.5	7403.5	7403.5	7403.5
DELAY	234.0	232.9	234.1	234.7

PERSONNEL PRESENT : F.Renton (client), B.Tuck, A.Edwards, L.Ha, L.Williams, P.Wright (HGS)
WEATHER CONDITIONS: Fine, Light Wind
COMMENTS :

DATE 08/11/90

CLIENT: Bridge Oil PROSPECT: T 15 P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CAL. RANGE: 341/050-ST868 RANGE DISTANCE: 7403.504m
MOBILE SERIAL NUMBER: 398 INTERROGATE SLOT: 1
ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427081 khz
CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3	4	5
SERIAL NO	436	868	871	893
ANT. TYPE	Omni	Omni	Omni	Omni
CABLE	30mFSJ4-50	30mFSJ4-50	30mFSJ4-50	30mFSJ4-50
COLOUR CODE	Yellow	Orange	Green	Blue
AGC LEVEL	8.0	7.8	8.3	8.8
READINGS 1	7631.6	7632.1	7631.0	7631.8
2	1.6	2.3	0.7	2.0
3	1.1	2.2	1.0	2.2
4	1.6	2.1	1.0	2.2
5	1.4	2.4	1.0	2.4
6	1.6	2.1	1.1	2.5
7	1.4	2.0	1.1	2.2
8	1.4	2.0	1.2	2.2
9	1.4	2.3	1.1	2.4
10	1.2	2.3	1.2	2.2
11	1.7	2.0	1.1	2.2
12	1.7	2.4	1.1	2.2
13	1.6	2.4	1.1	2.2
14	1.2	2.7	1.1	2.2
15	1.6	2.2	1.1	2.1
16	1.6	2.5	1.1	2.4
17	1.4	2.4	1.2	1.6
18	1.6	2.4	1.4	2.4
19	1.2	2.4	1.1	1.7
20	1.2	2.3	1.1	2.6
AVERAGE	7631.5	7632.28	7631.11	7632.19
RANGE DIST.	7403.5	7403.5	7403.5	7403.5
DELAY	228.0	228.8	227.9	228.7

PERSONNEL PRESENT : F.Renton (client), B.Tuck, A.Edwards, L.Ha, L.Williams, P.Wright (HGS)
WEATHER CONDITIONS: Fine, Light Wind
COMMENTS :

DATE 08/11/90

CLIENT: Bridge Oil PROSPECT: T 15 P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CALIBRATION RANGE: 341/050 to - ST770o/s, ST357o/s, WGS88, and ST868o/s
MOBILE SERIAL NUMBER: 398 INTERROGATE SLOT: 1
ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427061.2khz
CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3	4	5
SERIAL NO	436	868	871	893
ANT. TYPE	Omni	Omni	Omni	Omni
CABLE	30m FSJ4-50	30m FSJ4-50	30m FSJ4-50	30m FSJ4-50
COLOUR CODE	Yellow	Orange	Green	Blue
AGC LEVEL	3.3	4.7	4.2	7.8
READINGS 1	91115.6	59878.4	33585.5	7632.9
2	5.1	9.3	5.0	2.8
3	6.8	9.2	4.8	2.9
4	4.9	9.4	4.5	2.6
5	4.8	9.3	4.2	2.8
6	4.7	9.0	6.2	2.7
7	4.8	9.2	5.1	2.6
8	5.0	9.2	7.0	2.7
9	5.8	8.9	6.1	2.8
10	4.5	9.3	5.0	2.8
11	5.7	8.9	4.2	2.4
12	5.1	8.6	5.1	2.5
13	5.7	8.6	6.8	2.7
14	7.0	9.1	5.5	2.9
15	6.7	9.4	5.5	3.0
16	6.4	8.7	5.0	2.8
17	4.6	8.9	4.3	2.9
18	5.2	8.9	6.0	2.6
19	5.9	9.1	7.6	3.1
20	7.0	9.5	5.7	3.1
AVERAGE	91115.57	59879.05	33585.46	7632.78
RANGE DIST.	90886.26	59637.83	33348.09	7403.5
DELAY	229.3	241.2	237.4	229.3

PERSONNEL PRESENT : F.Renton, B.Tuck, L.Williams, P.Wright
WEATHER CONDITIONS: Cool, Light Breeze
COMMENTS : .....

DATE 08/11/90

CLIENT: Bridge Oil PROSPECT: T 15 P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CALIBRATION RANGE: 341/050 to - ST770o/s, ST357o/s,WGS88, and ST868o/s
MOBILE SERIAL NUMBER: 552 INTERROGATE SLOT: 1
ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427061.2khz
CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO		2	3	4	5
SERIAL NO		436	868	871	893
ANT. TYPE		Omni	Omni	Omni	Omni
CABLE		30m FSJ4-50	30m FSJ4-50	30m FSJ4-50	30m FSJ4-50
COLOUR CODE		Yellow	Orange	Green	Blue
AGC LEVEL		4.0	4.8	4.7	7.5
READINGS	1	91124.3	59879.6	33599.5	7638.0
	2	4.3	80.4	599.5	7.8
	3	4.5	83.3	601.8	8.4
	4	5.6	83.9	600.2	7.9
	5	4.5	81.5	599.2	7.7
	6	4.8	80.7	600.5	7.8
	7	5.1	79.8	598.9	8.0
	8	5.1	82.5	595.7	8.0
	9	5.6	83.1	597.6	7.9
	10	3.7	81.9	598.7	8.0
	11	3.1	82.1	600.8	8.3
	12	4.1	83.5	600.6	7.8
	13	4.7	83.1	598.3	8.1
	14	4.9	81.7	600.0	7.9
	15	3.8	81.4	598.2	7.9
	16	3.1	84.6	599.4	8.1
	17	4.0	81.0	597.9	8.3
	18	3.9	82.3	598.8	8.1
	19	3.7	81.6	600.2	7.8
	20	3.6	83.6	598.7	7.9
AVERAGE		91124.32	59881.98	33599.23	7637.99
RANGE DIST.		90886.26	59637.83	33348.09	7403.5
DELAY		238.1	244.2	251.1	234.5

PERSONNEL PRESENT : F.Renton, B.Tuck, L.Williams, P.Wright
WEATHER CONDITIONS: Cool, Light Breeze
COMMENTS : .....

DATE 08/11/90

CLIENT: Bridge Oil PROSPECT: T 15 P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CALIBRATION RANGE: 341/050 to WGS88
MOBILE SERIAL NUMBER: 398 INTERROGATE SLOT: 1
ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427061.2khz
CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3	4
SERIAL NO	436	868	871
ANT. TYPE	Omni	Omni	Omni
CABLE	30m FSJ4-50	30m FSJ4-50	30m FSJ4-50
COLOUR CODE	Yellow	Orange	Green
AGC LEVEL	4.6	4.2	4.5
READINGS 1	33591.2	33592.6	33585.8
2	1.3	3.1	4.9
3	1.9	4.0	5.8
4	2.7	5.1	7.8
5	4.0	4.2	6.8
6	0.8	1.2	7.4
7	1.9	4.2	7.3
8	3.8	2.8	8.4
9	1.7	3.7	8.6
10	2.2	4.8	7.5
11	0.8	3.7	6.9
12	2.5	4.1	5.4
13	2.3	3.8	7.0
14	1.2	4.3	8.5
15	0.6	4.5	8.0
16	5.3	4.3	7.7
17	3.5	2.7	9.6
18	2.5	3.7	7.9
19	3.6	3.3	6.5
20	1.2	4.0	7.3
AVERAGE	33592.25	33593.71	33587.26
RANGE DIST.	33348.09	33348.09	33348.09
DELAY	244.2	245.6	239.2

PERSONNEL PRESENT : F.Renton, B.Tuck, L.Williams, P.Wright
WEATHER CONDITIONS: Cool, Light Breeze
COMMENTS : .....

DATE 08/11/90

CLIENT: Bridge Oil PROSPECT: T 15 P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CALIBRATION RANGE: 341/050 to WGS88
MOBILE SERIAL NUMBER: 552 INTERROGATE SLOT: 1
ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427061.2khz
CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3	4
SERIAL NO	436	868	871
ANT. TYPE	Omni	Omni	Omni
CABLE	30m FSJ4-50	30m FSJ4-50	30m FSJ4-50
COLOUR CODE	Yellow	Orange	Green
AGC LEVEL	4.6	4.8	4.7
READINGS 1	33589.5	33607.2	33603.6
2	8.7	7.7	2.4
3	7.2	6.0	3.3
4	90.9	7.3	3.8
5	6.7	6.4	3.3
6	9.3	6.9	2.6
7	9.2	5.7	3.1
8	8.0	5.5	3.2
9	7.5	6.8	2.4
10	4.6	6.3	3.6
11	7.6	6.1	2.0
12	9.2	5.6	4.4
13	9.2	5.2	3.0
14	8.8	5.7	4.2
15	7.3	6.5	3.0
16	4.7	5.3	3.6
17	8.6	6.1	3.2
18	8.0	6.4	3.4
19	9.2	5.8	2.7
20	5.8	7.6	3.8
AVERAGE	33587.96	33606.31	33603.23
RANGE DIST.	33348.09	33348.09	33348.09
DELAY	239.9	258.2	255.1

PERSONNEL PRESENT : F.Renton, B.Tuck, L.Williams, P.Wright
WEATHER CONDITIONS: Cool, Light Breeze
COMMENTS : .....

DATE 08/11/90

CLIENT: Bridge Oil PROSPECT: T 15 P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CALIBRATION RANGE: 341/050 to ST357 o/s
MOBILE SERIAL NUMBER: 398 INTERROGATE SLOT: 1
ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427061.2khz
CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3
SERIAL NO	436	868
ANT. TYPE	Omni	Omni
CABLE	30m FSJ4-50	30m FSJ4-50
COLOUR CODE	Yellow	Orange
AGC LEVEL	4.5	4.9
READINGS 1	59875.2	59873.5
2	5.9	3.6
3	5.9	3.3
4	5.5	3.0
5	5.8	3.3
6	6.1	2.8
7	6.5	3.2
8	6.0	3.0
9	6.0	3.1
10	6.0	2.9
11	6.2	2.5
12	6.9	2.9
13	6.6	2.8
14	6.5	2.9
15	6.7	2.9
16	6.6	3.5
17	6.8	2.6
18	6.5	2.6
19	6.8	2.8
20	7.2	2.5
AVERAGE	59876.29	59872.99
RANGE DIST.	59637.83	59637.83
DELAY	238.5	235.2

PERSONNEL PRESENT : F.Renton, B.Tuck, L.Williams, P.Wright
WEATHER CONDITIONS: Cool, Light Breeze
COMMENTS : .....

DATE 08/11/90

CLIENT: Bridge Oil PROSPECT: T 15 P

HGS SYLEDIS SYSTEM CALIBRATION RESULTS

CALIBRATION RANGE: 341/050 to ST357 o/s
MOBILE SERIAL NUMBER: 552 INTERROGATE SLOT: 1
ANTENNA TYPE: Celwave Omni SYSTEM FREQUENCY: 427061.2khz
CABLE: 30m FSJ4-50 + 2m RG214 Pigtail

BEACON NO	2	3
SERIAL NO	436	868
ANT. TYPE	Omni	Omni
CABLE	30m FSJ4-50	30m FSJ4-50
COLOUR CODE	Yellow	Orange
AGC LEVEL	5.0	4.6
READINGS 1	59878.8	59878.8
2	8.4	9.2
3	8.3	9.3
4	8.3	8.2
5	8.5	8.8
6	8.0	9.8
7	7.9	9.1
8	8.0	8.9
9	9.0	9.2
10	8.0	9.3
11	8.4	8.8
12	8.2	9.1
13	8.3	8.7
14	8.3	9.8
15	8.5	8.5
16	8.6	9.0
17	8.1	9.1
18	7.8	8.8
19	9.1	9.1
20	8.9	8.8
AVERAGE	59878.37	59879.02
RANGE DIST.	59637.83	59637.83
DELAY	240.5.	241.2

PERSONNEL PRESENT : F.Renton, B.Tuck, L.Williams, P.Wright
WEATHER CONDITIONS: Cool, Light Breeze
COMMENTS : .....

SECTION E

FIELD NAVIGATION OPERATION SUMMARY

3-11 Performed 2 x 4 calibration, beacon 6 found to be unusable.

4-11 Scouted stations, installed beacon 4 at East Sandy.

5-11 Installed tower at Charmouth, installed beacon 5 at Stony head.

6-11 Installed beacon 3 on an offset at Hardwickes Hill, beacon 2 at Charmouth.

7-11 Performed an in-situ calibration at Beechford 341/050, ranges to East Sandy and Hardwickes hill busted badly. Discussed the problem with Frank Renton, Bryan Field and Steve Dowling, deciding on another in-situ calibration. On recalibrating, found that beacons 3 and 4 busted again by different degrees. On discussion of these results it was decided to re-perform both the short baseline and in-situ calibrations. Demobilised beacons 2, 3 and 4.

8-11 Performed short baseline calibration, confirming the original short baseline results. Performed in-situ calibration with a combination of beacons at East Sandy and Hardwickes Hill, satisfying us that the bust was caused by interference.

9-11 Installed mobiles on Magnificent Creek.

10-11 Arranged return of beacon 6 to Perth.

11-11 Vessel on prospect, navigation performing normally.

12-11 Vessel on prospect, navigation performing normally.

13-11 Had surveyor calculate the offset from Hardwickes Hill to beacon 3.
Informed by Magnificent Creek that beacon 5 signal strength down, found a shackle missing and the mast at an angle, restrung the mast.

14-11 After a call from Magnificent Creek, checked beacon 5 again, finding no problem.

15-11 After a call from Magnificent Creek, checked beacon 2, finding no problem.

16-11 Scouted Mt William, good coverage but very difficult to access, obtained permission from the ranger to use the local airstrip to load a helicopter and to occupy the site. Scouted Eddystone Point, some coverage of prospect, but not good.

17-11 Vessel on prospect, navigation performing normally.

18-11 Demobilised beacon 5 and remobilised on Mt William ,using two sling loads by helicopter.

19-11 Vessel on prospect, navigation performing normally.

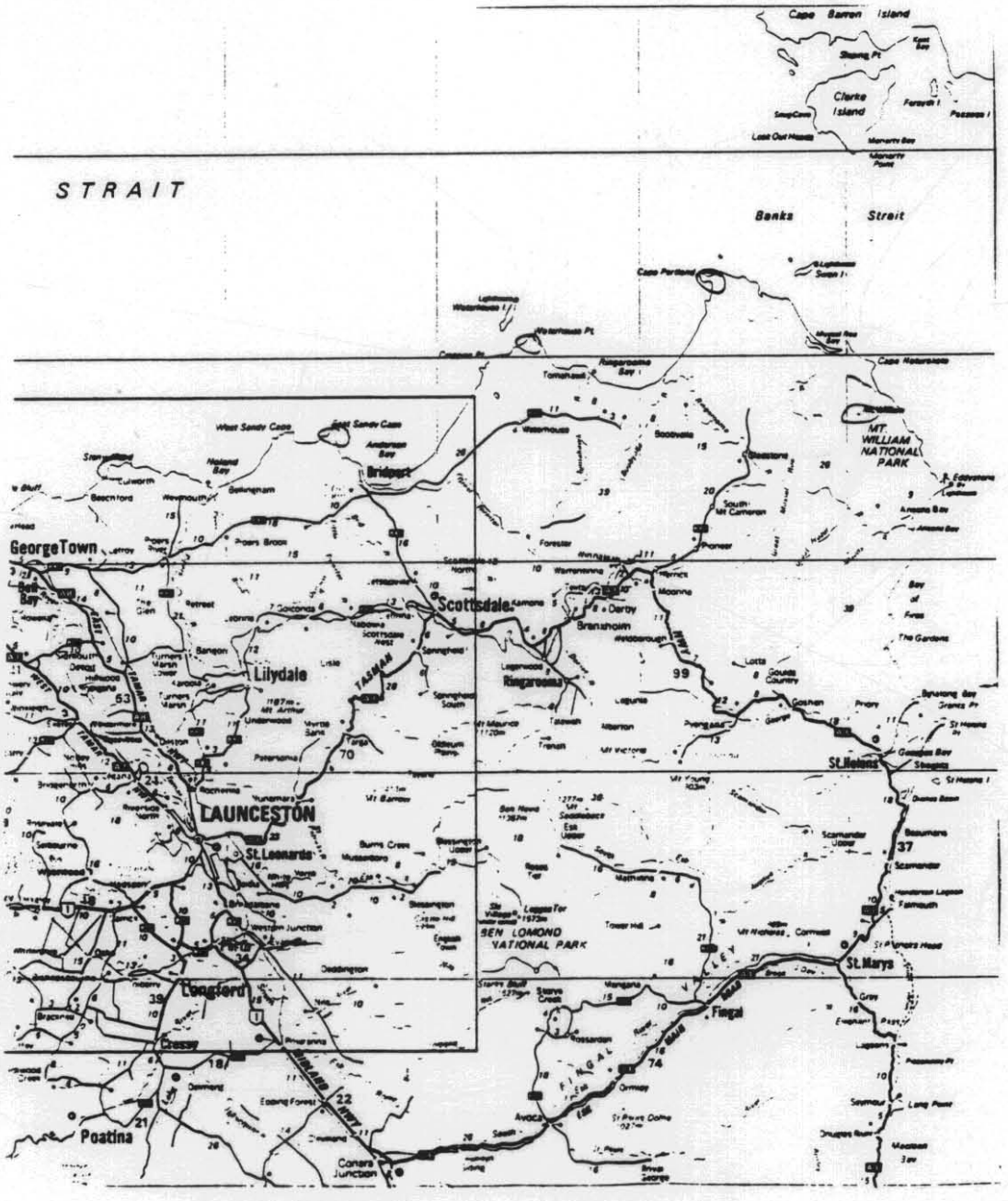
20-11 Vessel on prospect, navigation performing normally.

21-11 Beacon 3 (Hardwickes Hill) unstable, vessel using beacon 4, tested beacon 3 and power supply - all O.K. 1110-end of prospect, demobilised chain and returned to George Town.

SECTION F

BASE STATION DESCRIPTIONS

257147



GSI–709

5 cm

STATION NAME: Stony Head

LATITUDE : 40 deg 59 min 06.1657 sec S

LONGITUDE : 147 deg 01 min 07.2254 sec E

NORTHING : 5462887.008 Metres

EASTING : 501570.850 Metres

ELEVATION : 89.91 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid

STATION NAME: Stony Head ST868

LOCATION: Approximately 4.5km WNW of Lullworth (20km ENE of George Town on a rocky prominent headland, within the boundaries of the 6th Military District firing range.

ACCESS : From the East Tamar Hwy, take the Bridport turnoff and proceed east for 22km. Turn left at the Lullworth and Weymouth turnoff (700m past Pipers River Roadhouse) and follow the road for 9.2km to a left turn, marked Lullworth. Take this road for 5km to Lullworth, turning right at the T junction and left 100m downhill, at the beach. Follow the dirt road around the beach for 500m to a launching ramp and parking area, at this area turn 120deg left uphill on the left one of two tracks. Follow this track due west for 3.5 to 4km, using any side tracks past mud and sand bogs until an old fence is encountered near the base of Stony Head. Turn right and proceed 100m to where a large bog across the track is visible. Stop here and circle the bog to the east, keeping at least 50m from the mud crossing. From here follow the track up Stony Head for 1km to the steel quad beacon.

MARKER : A green brass ST plaque, stamped ST868, set in concrete.
A black steel quad beacon is sited directly over the mark.

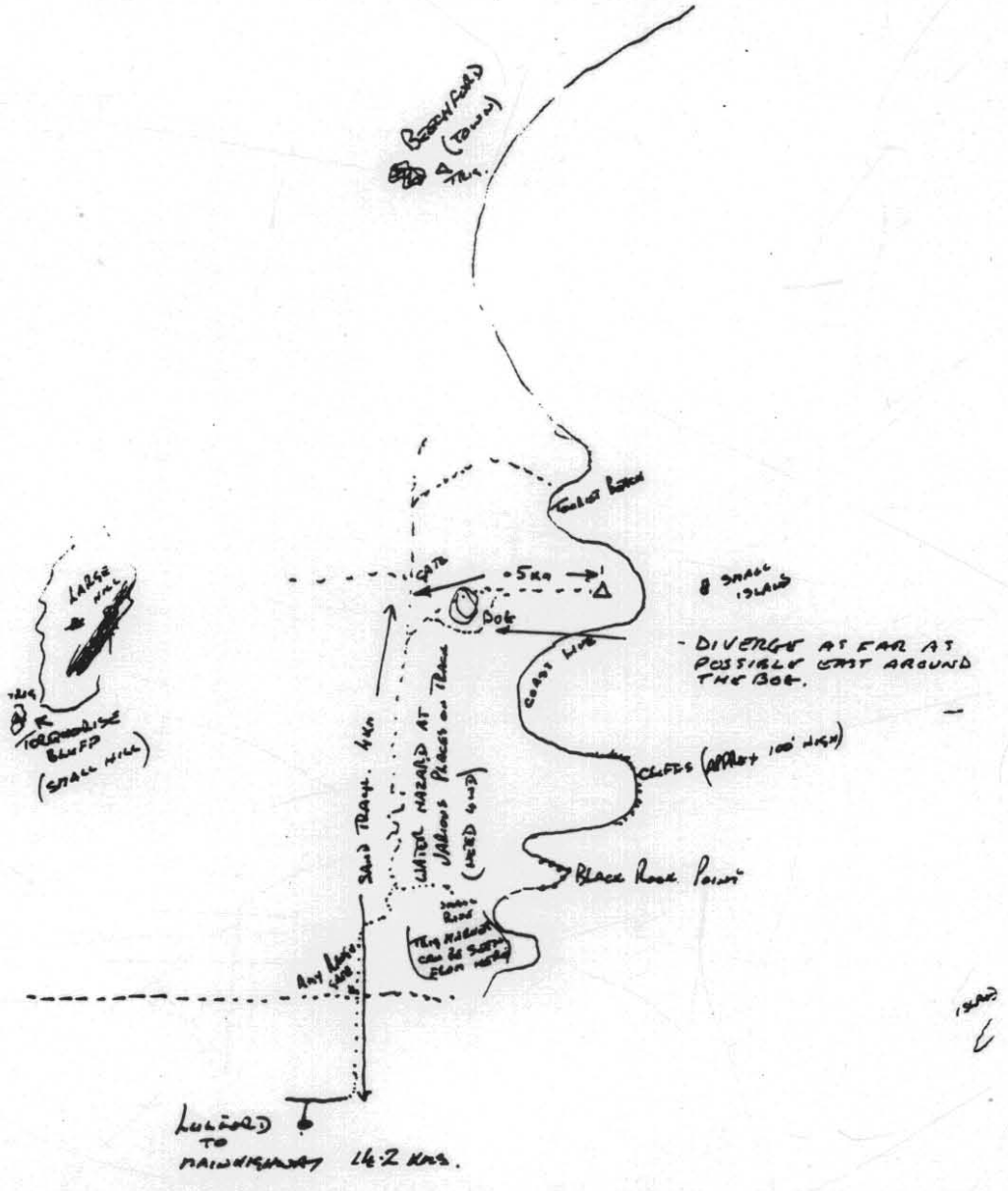
GENERAL : Permission to occupy this site was obtained,in writing from:- Major Ian Steele 6th Military Barracks
Anglesea Barracks
Hobart 7001
Ph 002 212216

The tower was offset 1.46m at 225deg magnetic, or 213deg true from the mark, to avoid the beacon.

257150

Stony Head ST868 STATION DESCRIPTION

APPROX DIST. FROM LULFORD - TRIG 4.5 K
FROM BEECHFORD - TRIG 7 K.



GSI-709

STATION SUMMARY

CATEGORY A

LANDS DEPARTMENT TASMANIA

Station Number and Name: S.T. 868 STONY HEAD

Original Station Established by: Lands Dept: Tasmania	Date: Jan 1960	Map Name: NORTH EAST: TAS LAUNCESTON: TAS	Map Number: SK 55-4	Scale 1: 250,000
Existing Station Marked by: Lands Dept: Tasmania	Date: 16.9.1976	Map Name: NINTH ISLAND: TAS	Map Number: 8316	Scale 1: 100,000
Reference Books: Lands: A12/37; A13/58; A21/53; T39/40; M8/46; M24/37; S004B; S276; S341;		RECTANGULAR COORDINATES: In Metres on the Australian Map Grid DATUM: Australian Geodetic Datum 1966		Order: THIRD
		GRID BEARING = ADJ AZIMUTH + CONVERGENCE HEIGHTS: In Metres on the Australian Height Datum (Tasmania)		Order: TRIG

Cadastral Location: State: Tasmania Land District: Dorset

Parish: Allotment/Section:

Access and Locality Sketch: Particulars of station marking and beacon:

STATION MARK: Brass ST mark (numbered 868) in concrete block. New mark is 0.05m. above old mark.

BEACON: Galvanised iron quad and black discs beacon. Base of discs are 2.876m. above new ST mark. Centre of discs are 3.29m. above mark.

REFERENCE MARKS:
(1) Three steel star bars at ground level in concrete.
(2) Galvanised nail in concrete in centre of pipe in concrete at ground level on top of old dirt mound. The galvanised pipe is the bottom section of old eccentric pipe and discs beacon, now destroyed.

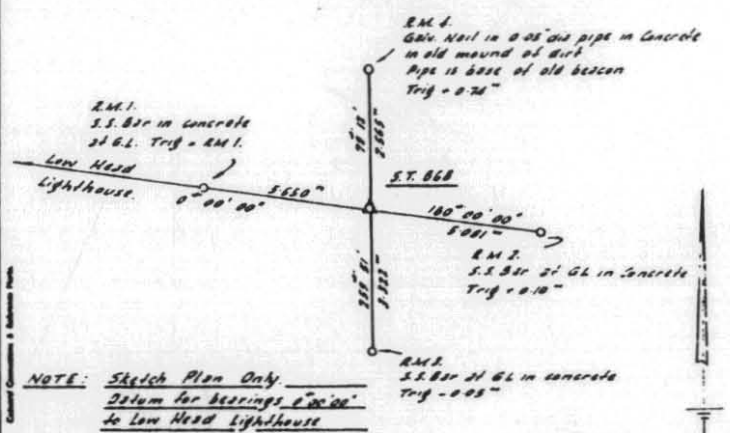
ACCESS: Drive on access by 4WD vehicle. See map section below.

NOTE: This station is located on the Eastern side of the Stony Head Army Firing Range. Permission to enter should be obtained from the Department of Army prior to entry and caution exercised whilst in the trig station area.

S.T. 868
Stony Head

STONY HEAD	ST 868	SECTION TAS 82	SERIAL 52				
SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
40 59 06.1657	147 01 07.2254	55	501570.850	5462887.008	+0 00 44.09	89.91

SEE ANNEXURE FOR INFORMATION FROM S.T.868



Station last visited 16-8-82

Photo Identification:

Certified free of construction errors: A.B. Issue No & Date: 21-9-76 24-9-79 3-8-81 6-10-82 26-11-82 27-5-8

-40-

257151

5 cm

STATION NAME: East Sandy WGS88

LATITUDE	:	40 deg 57 min 38.0543 sec S
LONGITUDE	:	147 deg 20 min 20.2060 sec E
NORTHING	:	5465548.860 Metres
EASTING	:	528525.100 Metres
ELEVATION	:	54 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid

STATION NAME: East Sandy WGS88

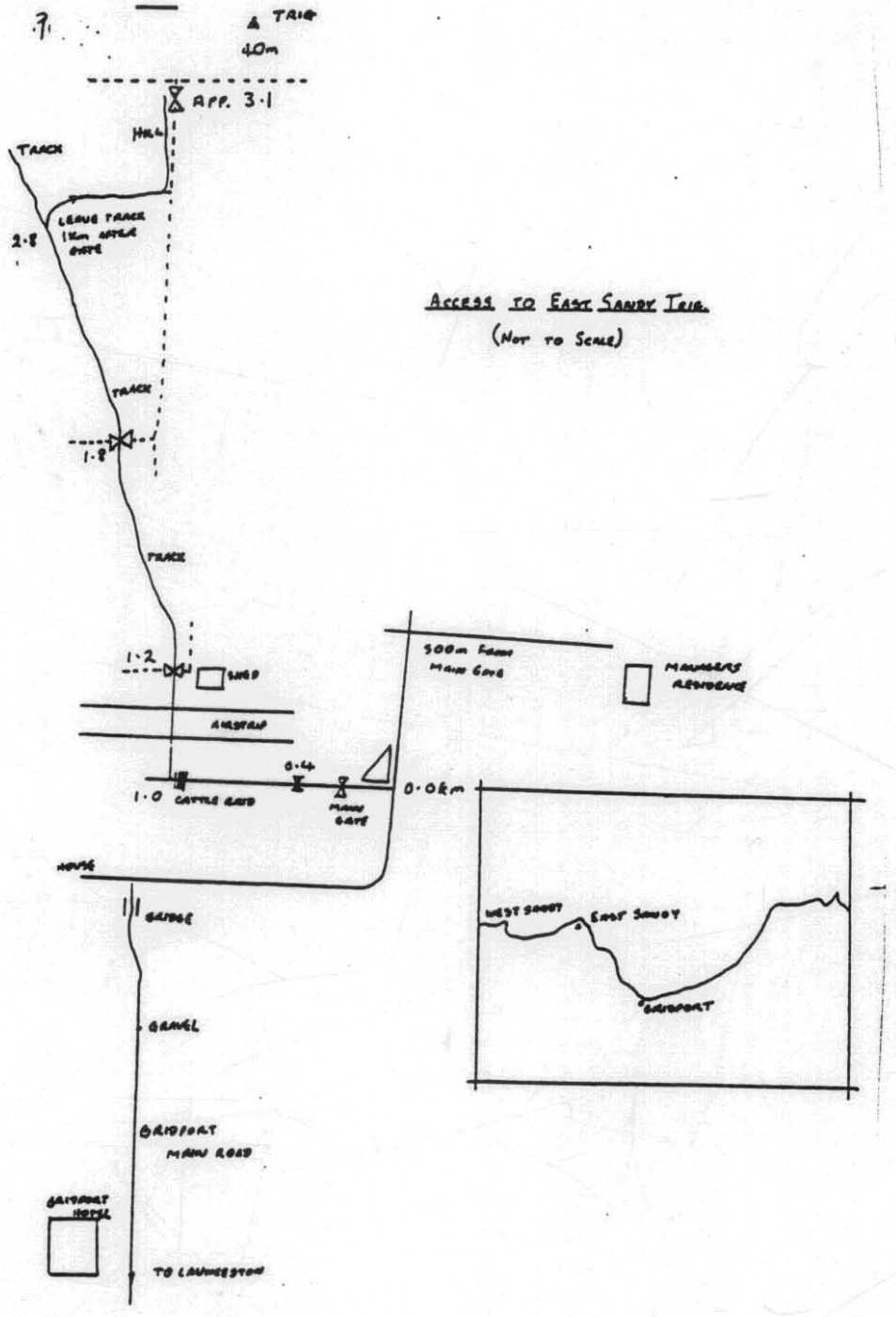
LOCATION: Approximately 10 km north/northwest of Bridport on a prominent sand dune on the seaward side of a wire boundary fence north of the property airstrip.

ACCESS : If after 5 pm call on Graham Moore at 39 Westwood St Bridport (1 km past pub) to obtain the gate key. From Bridport proceed for approximately 4. km along the main Rd to a bridge, followed by a "T" junction and turn right. Proceed for 2 km to a gate on the left, set back from the road.
From the gate drive 1km to a cattle grid and turn right across the airstrip to a gate adjacent to a small shed. From this gate drive to another gate along the fence line, from this gate drive WNW for 1 km and diverge back to the fenceline to avoid a large wet area. Follow the fence to the northeast corner and park, the mark is approximately 40m NNE of the fence junction.

MARKER : A 44 gallon drum filled with concrete,inscribed with "EAST SANDY" and "WGS 88". A steel spike protrudes from the centre of the concrete.

GENERAL : Permission to occupy this site was obtained,in writing from:- Graham Moore
39 Westwood St
Bridport
7262
Ph 003-561170
A key to the gate was obtained from Mr Moore when access was required after working hours.

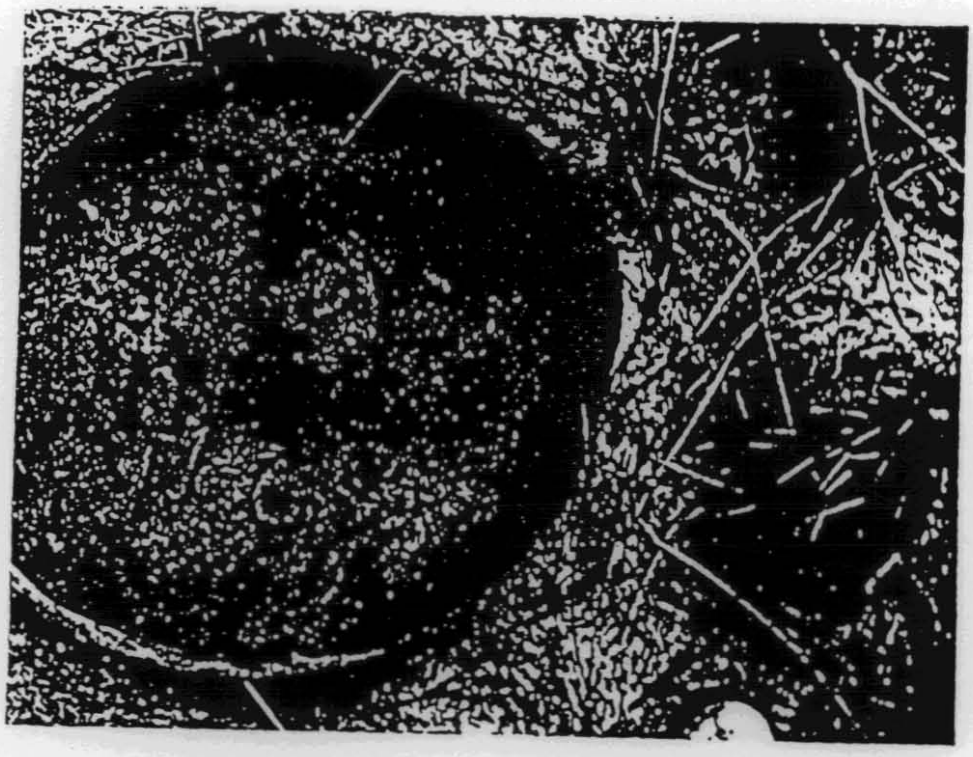
East Sandy WGS88 STATION DESCRIPTION



ACCESS TO EAST SANDY TRIG.
(NOT TO SCALE)

GSI—709

EAST SANDY MARKER



STATION NAME: Hardwickes Offset

LATITUDE : 40 deg 52 min 01.4207 sec S

LONGITUDE : 147 deg 37 min 42.0716 sec E

NORTHING : 5475794.54 Metres

EASTING : 552951.81 Metres

ELEVATION : 110.9 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid

STATION NAME: Hardwickes Offset

LOCATION: Approximately 24km east of Bridport on a flat area of sand, below and to seaward of the telecom tower at Hardwickes hill

ACCESS : From Bridport drive east 24km to a sign, pointing right, marked "Scottsdatle 33". Continue east for 4km, over a bridge to a left turn 100m after the bridge, marked "Waterhouse protected area". Turn here and follow thedirt road for 8km, to where, on the final ascent, aboom gate is encountered. From the boom gate, proceed 1.5km to a small car park 5m from the compound gates. The offset is 10m WNW of the car park.

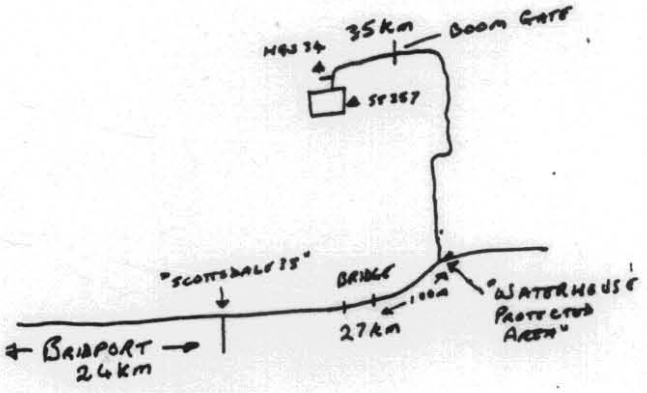
MARKER : A steel star picket, driven into the ground, with the top protuding 4cm above ground level.
A 1m steel star picket, with an aluminium tag bearing the inscription "HGS34" affixed is used as a witness post, 1m at 0deg from the offset

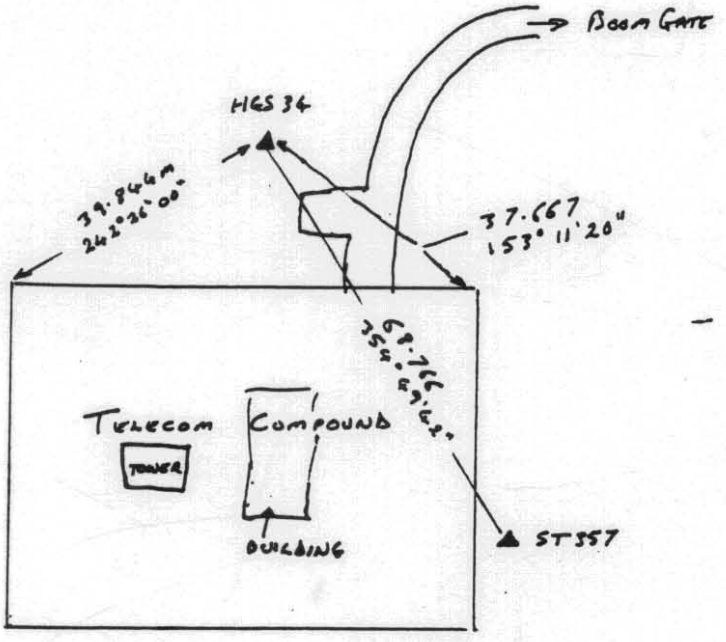
GENERAL : Permission to occupy this site was obtained, from:-
Dept Lands, Parks and Wildlife
Ph 003 561173

A key to the boom gate was obtained from here.
and kept for the duration of the survey.
survey.

The offset was installed 66.4m at 350deg true (337 deg magnetic) from the mark, ST357, to avoid obstructions.

Hardwickes Offset STATION DESCRIPTION





GSI-709

LANDS DEPARTMENT TASMANIA

Station Number and Name: S.T. 357. HARDWICKES HILL

Original Station Established by: Royal Australian Navy — Date: 1944 (approx)

Survey Station Marked by: Lands Dept: Tasmania — Date: 16.9.1981

Map Name: NORTH EAST: TAS — Map Number: — Scale 1:
Map Name: LAUNCESTON: TAS — Map Number: SK 55-4 — Scale 1: 250,000
Map Name: CAPE PORTLAND: TAS — Map Number: 8416 — Scale 1: 100,000

Reference Books: Lands: B191, T392, A161, M7, M22, M24, M45; 5192; C/53; 5004K; S345A1
RAINAP: 321; 328; 337

RECTANGULAR COORDINATES: In Metres on the Australian Map Grid — DATUM: Australian Geodetic Datum 1966 — Order: SECOND

GRID BEARING = ADJ AZIMUTH + CONVERGENCE — HEIGHTS: In Metres on the Australian Height Datum (Tasmania) — Order: TRIG

Coloured Locations: Item: Tasmania — Land District: Dorset

Parish — Allotment/Section

Names and Locality Sheets — Particulars of station marking and location

HARDWICKES HILL BT 357

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
40 52 03.4338	147 37 42.3465	55	552957.796	5475726.203	00 24 40.32	115.980

STATION MARK: R.A.N. Hydrographic plaque set in concrete.

BEACON: (1) Galvanised steel quad and black discs beacon cemented in position over mark. Bottom of discs are 2.58m. above mark, centre of discs are 3.04m. above mark.

(2) Eccentric Telecom Radio Tower.

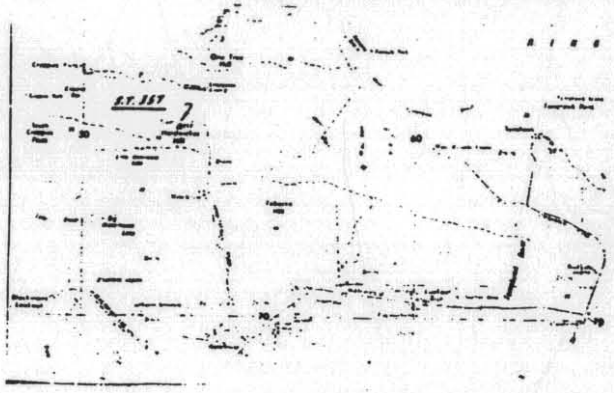
REFERENCE MARKS: (1) Two copper tubes set in concrete in rock outcrops. Stone pile over each.

(2) Two galvanised bolts cemented in rock outcrop. Stone pile over each mark.

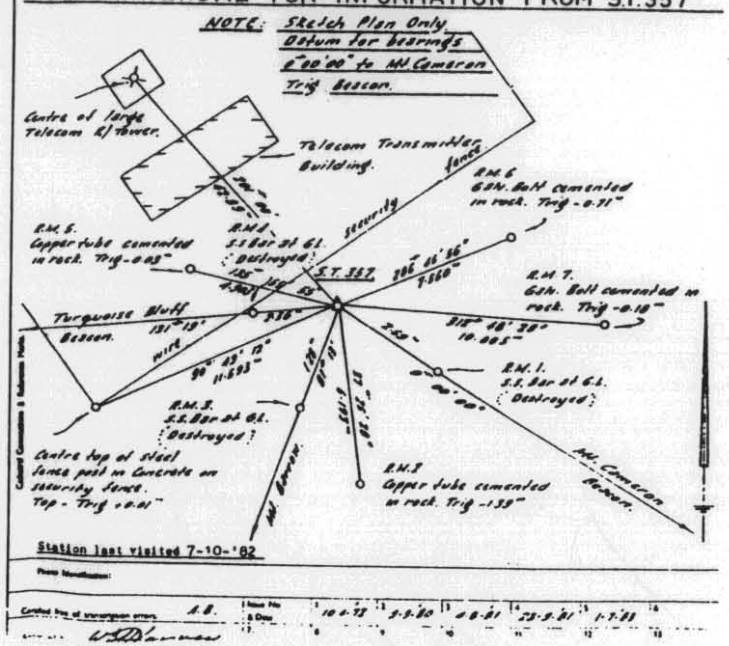
(3) Steel post top on security fence corner.

ACCESS: Drive on access by 2/4WD vehicle. See map section below.

NOTE: Previously placed reference marks numbers RM1, RM3, RM4 not located on 16.9.81 and are presumed destroyed.



SEE ANNEXURE FOR INFORMATION FROM S.T.357



-48-

2571139

5 cm

STATION NAME: Charmouth Hill ST770

LATITUDE : 40 deg 45 min 18.1031 sec S

LONGITUDE : 147 deg 58 min 09.1426 sec E

NORTHING : 5487969.041 Metres

EASTING : 581813.659 Metres

ELEVATION : 50.93 Metres

PROJECTION: Zone 55

Central Meridian 147 deg East

UTM Projection

Australian Geodetic Datum 66

Australian National Spheroid

STATION NAME: Charmouth hill ST770

LOCATION: Approximately 3km NNW of Hugh Mills' farm buildings, atop a grassy hill at the NW corner of Cape Portland.

ACCESS : From Bridport, proceed for approximately 59 km to Gladstone. From Gladstone store drive east over a bridge to a fork in the road at 2km. Turn left and follow a dirt road, taking a right turn at 20.5km, after passing through a small hamlet "Rushy Lagoon". At 22km take a left fork into Hugh Mills' property and notify anyone available of your intentions. From here continue straight ahead, through 3 gates (to 24km) and follow the track as it turns left and continues uphill through 2 gates to Charmouth Hill. The beacon is visible from the farm buildings onwards.

MARKER : A brass mushroom, set in concrete, at ground level, stamped "770". A steel quad beacon was situated directly above the mark.

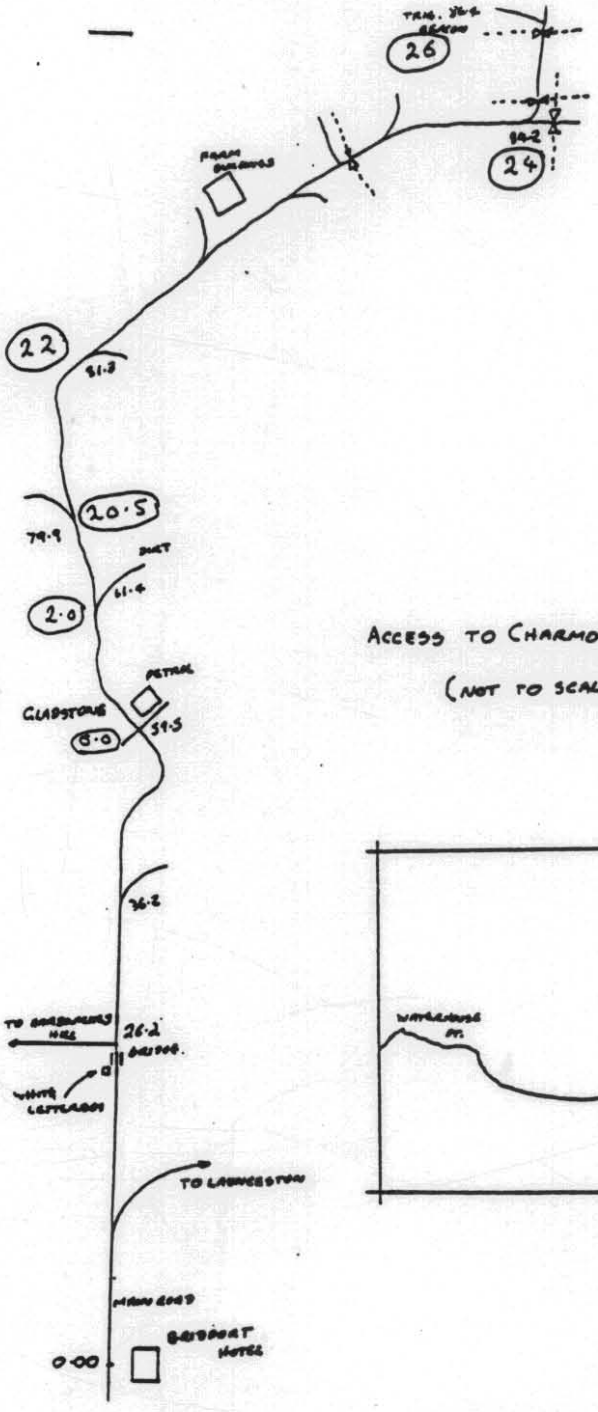
GENERAL : Permission to occupy this site was obtained from:

Hugh Mills
Charmouth
Cape Portland
Gladstone
Tasmania
Ph 003 572123

Either Mr Mills or one of his staff must be notified when visiting the site.

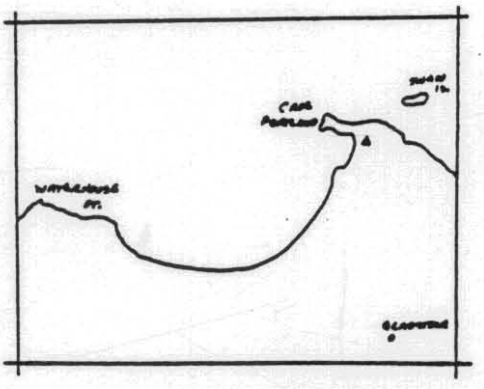
An offset of 1.2m at 160deg true (172deg magnetic) was used to avoid the beacon.

Charmouth Hill ST770 STATION DESCRIPTION



ACCESS TO CHARMOUTH HILL TRIG

(NOT TO SCALE)



GSI—709

LANDS DEPARTMENT TASMANIA

Survey Station and Name: S.T. 770 CHARMOUTH HILL

Original Beacon Established by: Lands Dept: Tasmania Date: Nov. 1962

Existing Beacon Marked by: Lands Dept: Tasmania Date: 7.1.1982

Reference Books: Lands: 5/44; 26/32; 27/1; 28/37; 220/19; 225/4; 227/15; 8004E; 5340; 5345A, B

Map Name: LAUNCESTON: TAS Map Number: SK 55-4 Scale: 250,000

Map Name: CAPE PORTLAND: TAS Map Number: 6216 Scale: 100,000

RECTANGULAR COORDINATES: In Metres on the Australian Map Grid DATUM: Australian Geodetic Datum 1966 Order: SECOND

GRID BEARING = ADJ AZIMUTH + CONVERGENCE HEIGHTS: In Metres on the Australian Height Datum (Tasmania) Order: THIRD

CHARMOUTH HILL ST 770 SECTION TASMANIA SERIAL 4·

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
40 45 18.1031	147 58 09.1424	55	581813.459	5487949.041	00 37 57.93	50.92 (AHD 79 51.01 449.82

Coloured Locations: State: Tasmania Land District: Dorset

Parish: Allotment/Section:

Action and Locality Sketch: Particulars of mission marking and location:

STATION MARK: Brass cheesehead ST 770, in concrete block, established on small rise in grassed paddock. Stones over.

BEACON: Galvanised iron quad and black discs beacon cemented in position over mark. Base of discs are 2.625m. above mark. Base of discs are 2.625m. above mark. Centre of discs are 3.05m. above mark.

REFERENCE MARKS: (1) Three 0.46m. long steel star bars at ground level in concrete, two of which are on line to distant trigs. Stone piles over each mark.

(2) One 0.54m. long galvanised iron pipe at ground level in concrete. Stone pile over mark.

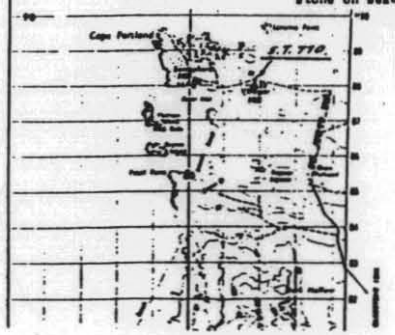
(3) Brass Lands Department disc in concrete at ground level marked as JMR Station No. 1 on 7.1.82.

(4) Two 0.90m. long steel star bars at ground level in concrete as reference marks to JMR Station No. 1.

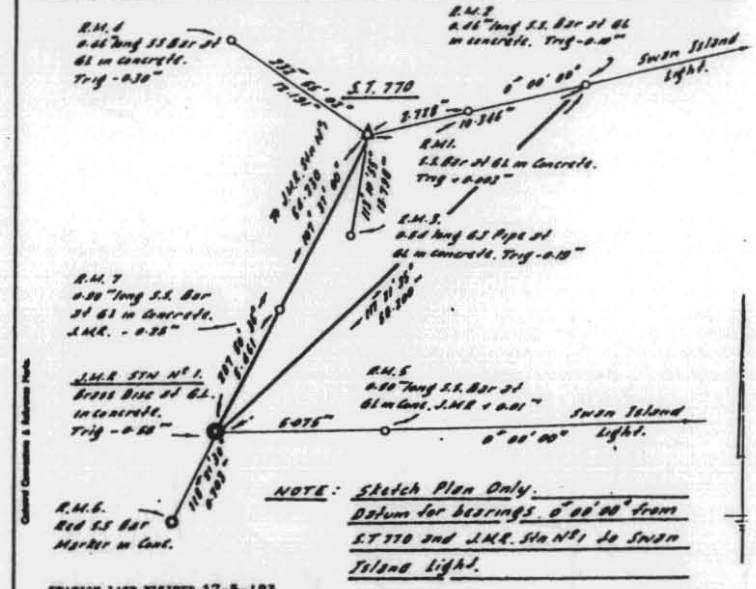
ACCESS: Drive on access by 4WD vehicle. See map section below.

OWNER: Mr. Hugh Mills,
Cape Portland,
Gladstone. Tas. Phone 003 572123

NOTE: Key to locked gate near homestead is under large stone on seaward and right hand side of gate.



SEE ANNEXURE FOR INFORMATION FROM S.T.770



STATION LAST VISITED 17-5-'83

Plans Manifestation: 7415/16 NORTH EAST PROJECT 1458 RUN: 2, 29.1.64
AREA IDENT ONLY.

Certified Plan of Description where:	H.B.	Issue No. & Date	1. 8-8-'77	2. 31-1-'79	3. 17-11-'81	4. 8-8-'82	5. 4-7-'83	6. 24-7-'8
		7.	8.	9.	10.	11.	12.	13.

5 cm

257163

STATION NAME: Mt William ST746

LATITUDE	:	40 deg 54 min 34.1642 sec S
LONGITUDE	:	148 deg 11 min 11.5157 sec E
NORTHING	:	5470596.925 Metres
EASTING	:	599926.947 Metres
ELEVATION	:	214.59 Metres

PROJECTION: Zone 55
Central Meridian 147 deg East
UTM Projection
Australian Geodetic Datum 66
Australian National Spheroid

STATION NAME: Mt William ST746

LOCATION: Approximately 20km ENE of Gladstone, atop Mt William, the highest peak in Mt William National Park. Mt William is approximately 5km inland, between Cape Naturaliste and Eddystone Point.

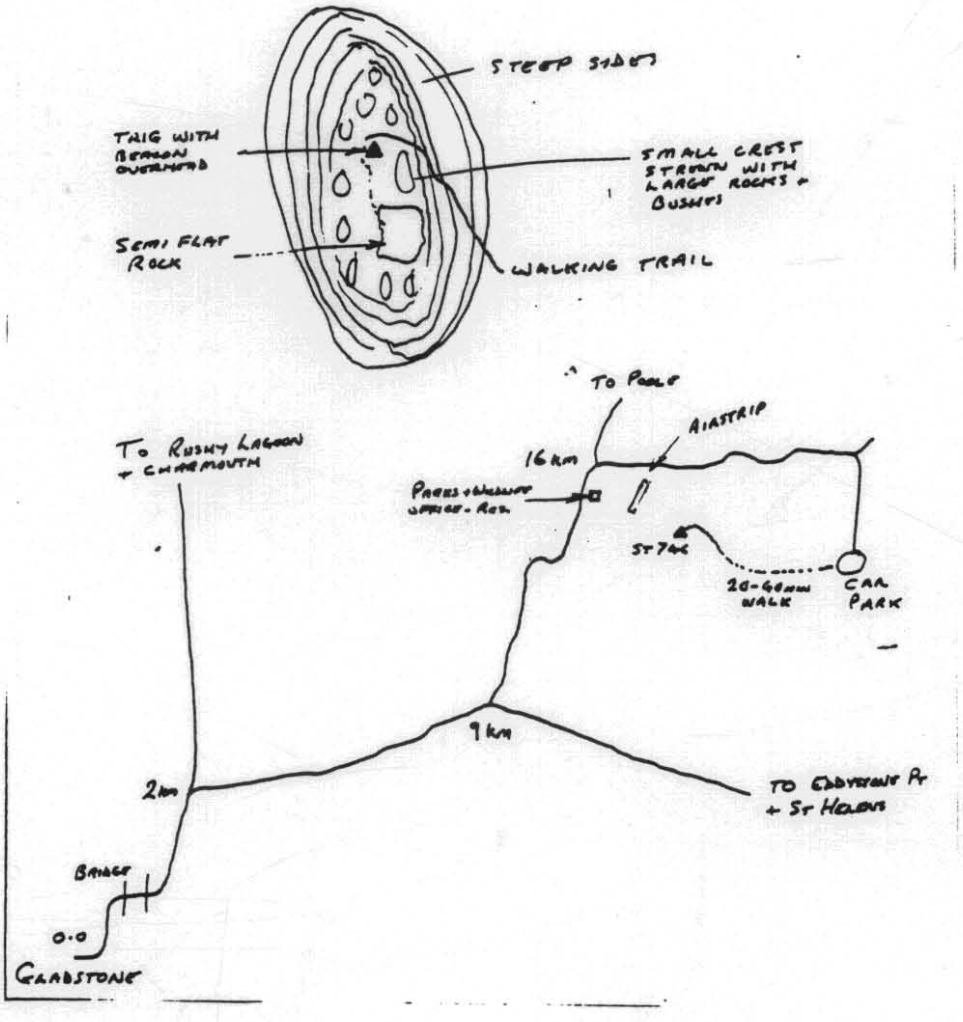
ACCESS : From Gladstone, Drive east for 2km, over a bridge and turn right at the fork indicated "Musselroe" and "Poole". Proceed for 7km to a left turn marked "Musselroe" and "Poole", follow this road for 7km and halt at the brick rangers building, on the right, just within the Mt William National Park. In 1990 the ranger was Brian Carson, inform him of your intentions. From here continue 1km to a right turn, Forrester Kangaroo Drive, follow this road for approximately 5km to a fork in the road with the sea visible ahead. Turn right and drive for 1.5km to a car park, from this car park "Mt William Walking Trail" must be walked to the summit of Mt William, 40mins walk or 20mins jog up and 20+mins down. A helicopter may be loaded (with permission) at the airstrip, 500m along Forrester Kangaroo Drive from Musselroe Rd, 2km NW of Mt William.

MARKER : A copper tube, set in concrete within a gal pipe at ground level. A steel quad beacon is sited directly above the mark.

GENERAL : Permission to occupy this site was obtained from:-

B.J.(Brian) Carson
Ranger
Mt William National Park
Ph 003 572108

Mt William ST746 STATION DESCRIPTION



SURVEY STATION SUMMARY

DEPARTMENT OF LANDS, PARKS AND WILDLIFE TASMANIA

Station Number and Name: ST 746 WILLIAM MT

Original Station Established by: Forestry Commission — Date: Nov 1962

Station Alternated by: Department of Lands — Date: 9 Nov 1979

Map Name: SWAN ISLAND	Map Number: 8516	Scale:	100,000
Map Name: MUSSELROE	Map Number: 8847	Scale:	25,000

MARK: Copper tube cemented in galvanised pipe and set in concrete at G.L.

BEACON: Galvanised Quad beacon with black discs. Beacon cemented in position over ST 746 on 26/11/1987. Base of discs is 3.086 metres above ST 746. Centre of discs is 3.85 metres above mark.

REFERENCE MARKS: RM 1 is a drill hole in rock.
RMs 2 and 3 are copper tubes cemented in rock.
RMs 4, 5, 6 are drill holes in granite to accomodate T2 tripod over mark.

LOCALITY: On Mt William , in Mt William National Park.

ACCESS: Drive by 2WD vehicle on park road to park at end of road, then 15min walk on marked walking track to trig station. See map section below.

HEIGHT INFORMATION: ST 746 WILLIAM MT — **HEIGHT: 214.89**

DATUM: Aust Height Datum (Tas) 1979
DETERMINED BY: Trigonometric heighting
DERIVED FROM: Least squares adjustment, HTG.

HORIZONTAL INFORMATION: ST 746 WILLIAM MT

SOUTH LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE
40 54 34.1642	148 11 11.5157	55	599926.947	5470586.925	+0 46 37.60

DATUM: Australian Geodetic Datum 1966
Rectangular coordinates are metres on the Australian Map Grid 1966
DETERMINED BY: Triangulation/Trilateration
DERIVED FROM: Least squares adjustment, Lands TAS.
ORDER: Second

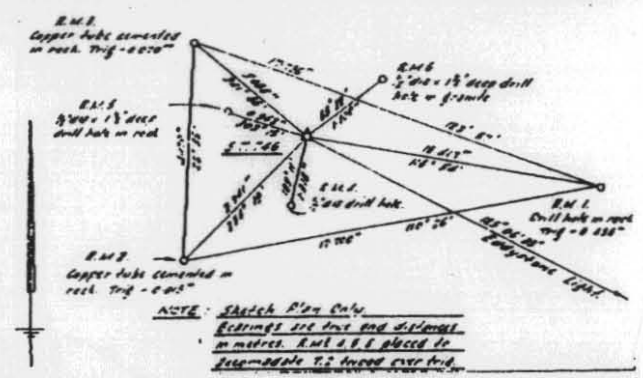
AZIMUTH AND DISTANCE INFORMATION: ST 746 WILLIAM MT

Azimuth + Convergence = Grid Bearing

To	Name	Number	Target	Azimuth	Sph. Dist.
CAMERON EAST MT	ST 358	BCN	248 19 28.86	52280.068
SWAN IS LH	ST 716	LH	345 17 28.26	20680.158
EDDYSTONE POINT LH	ST 571	LH	125 06 33.07	16444.154
CAPE NATURALISTE	ST 871	VIL	22 22 13.77	7281.117

SEE ANNEXURE FOR ADDITIONAL INFORMATION — YES ☐ NO ☐





Previous Plate Identifications (if available):						Survey Control Data Card Unique Station Identification Code Number: 11654M		
Surveyed from an Unmapped Area: A.S.M.	Trees Up to 5 Metres:	'81-5-28	'81-1-79	'82-5-83	'87-7-83	'88-9-88	'90-7-90	
Approved: Authorised	4-7-90	A.S.M.						

25716?

5 cm

SECTION G

MAPPING PARAMETERS

Prospect	: T 15 P
Spheroid	: Australian National Spheroid
Datum	: Australian Geodetic Datum 66
Central Meridian	: 147 Degrees East
Position Plotted	: Airgun
Scale	: 3D-1:10,000 2D+3D ON-100,000
Plotting Frequency	: Every 20th
Label Frequency	: Every 200th
Navigation Data Processed	: Halliburton Geophysical Services Lam Soon Industrial Building 63 Hillview Avenue, #08-23 Singapore 2366

257170

SEISMIC DATA PROCESSING REPORT

FOR

BRIDGE OIL LTD

S.E. BASS BASIN

AUSTRALIA

T/15P

1990 SURVEY

BY

DIGITAL EXPLORATION LIMITED

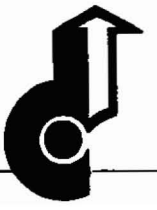
(A DIGICON COMPANY)

54-56 BROOKS STREET

BOWEN HILLS QUEENSLAND 4006

JUNE 1991

DPR016A



257171

TABLE OF CONTENTS

1.0 Introduction

2.0 Field Acquisition

3.0 Processing Sequence

- 3.1 TRANSCRIPTION AND RESAMPLE
- 3.2 STATIC CORRECTIONS
- 3.3 TRACE EDIT
- 3.4 2:1 ADJACENT TRACE SUM
- 3.5 TRUE AMPLITUDE RECOVERY
- 3.6 F-K FILTERING
- 3.7 2:1 ADJACENT TRACE SUM (Missing)
- 3.8 SIGNATURE DECONVOLUTION
- 3.9 COMMON DEPTH POINT [CDP] GATHER
- 3.10 VELOCITY SCAN ANALYSIS
- 3.11 MULTIPLE SUPPRESSION : ZMULT
- 3.12 DIP MOVEOUT CORRECTION (DMO)
- 3.13 SECOND PASS VELOCITY ANALYSIS
- 3.14 NORMAL MOVEOUT CORRECTION AND FRONT END MUTE
- 3.15 MUTE
- 3.16 FINAL STACK
- 3.17 DECONVOLUTION AFTER STACK
- 3.18 WAVE EQUATION MIGRATION (KIRCHHOFF ALGORITHM]
- 3.19 TIME VARIANT FILTER
- 3.20 TIME VARIANT SCALING
- 3.21 DISPLAY

4.0 PARAMETER TESTING

- 4. 1 GAIN RECOVERY TEST
- 4. 2 FILTER TEST
- 4. 3 F-K FILTER TESTS
- 4. 4 DECONVOLUTION BEFORE STACK TESTS ON SHOTS
- 4. 5 MULTIPLE ATTENUATION TESTS
- 4. 6 DECONVOLUTION AFTER STACK TESTS
- 4. 7 TAU-P FILTER TESTS
- 4. 8 FILTER TESTS
- 4. 9 SCALING TESTS
- 4.10 MIGRATION TESTS

5.0 DATA PROCESSING SYSTEM

APPENDIX I - Line Summary

APPENDIX II - SEGY Information



257172

1.0 INTRODUCTION

This report presents an account of the processing sequence and techniques used for processing seismic data acquired in the Bass Basin, T15/P for BRIDGE OIL LTD during the month of November 1990,and processed in the period between December 1990 and January 1991.

Approximately 1127.2km of MARINE data were recorded. The acquisition parameters used for the survey are described in Section 2.0.

The processing parameters, such as choice of optimum filters (deconvolution and band-pass), mutes, velocity analyses were established by Digicon in collaboration with BRIDGE OIL LTD. The processing sequence and parameters used are given in Section 3.0.



2.0 FIELD DATA ACQUISITION

The data was recorded by Halliburton Geophysical Services Inc. party 2993 (M/V Magnificent Creek) A brief summary of the acquisition parameters are as follows:

INSTRUMENT

Type	: Titan 1000
Filter	: 8/18 - 180/72
Record Length	: 6.0 seconds
Sample Interval	: 2.0 msec.
Tape Format	: SEGD

SOURCE

Type	: Airgun 2180 cu.in. array operating at 1800 P.S.I.
Source Interval	: 25 metres 1 pop per shotpoint
Source Depth	: 6 metres
Source to Antenna	: 106.8 metres

CABLE

No. of Channels	: 240
Group Interval	: 12.5 metres (traces 1-162) : 6.25 metres (traces 163-240)
Streamer Length	: 2512 metres - no mixing
Configuration	: OFF-END
Streamer Depth	: 10.5 metres average

NAVIGATION

Primary	: Syledis
Secondary	: Sat/Sonar



3.0 PROCESSING SEQUENCE

A brief description of the processes used in the processing sequence follows.

3.1 TRANSCRIPTION AND RESAMPLE

The field data recorded in SEGD was demultiplexed and converted to Digicon's internal 9 track trace sequential format. The output was to 5.0 seconds at 2 msec sample interval. The data was subsequently sub-sampled from 2 msec to 4 msec after an anti-alias filter was applied.

3.2 STATIC CORRECTIONS

(a) Airgun Timing Delay

Data recorded with H.G.S. instruments which have a timing delay of 51.2 ms. A static correction of -51.2 ms was applied, thus restoring the coincidence of shot and digital recording times.

(b) Source/Streamer Delay

A static correction of +11.0 ms was applied for the source/streamer delay, thus referencing the data to mean sea level.

3.3 TRACE EDIT

The Observers' Reports were studied for indications of bad shots, noisy or dead traces and reverse polarity traces. Such traces or shots were either whole trace edited or polarity reversed before the next stage of processing.

3.4 2:1 ADJACENT TRACE SUM

2:1 Adjacent trace sum was achieved with a partial moveout compensation using a regional velocity. In this instance only traces 163-240 were summed, resulting in a uniform group interval of 12.5 metres.

3.5 TRUE AMPLITUDE RECOVERY

The process of true amplitude recovery consists of the following basic steps.

First, the non-linear gain functions were removed. These are applied during the field recording to modulate the amplitudes of the data to within the dynamic range of the recording instruments and recorded on tape.



Second, correction for amplitude losses was made. These losses are due to the spherical spreading of the wavefront as it passes downward through the earth and is reflected back to the surface and is also a non-linear function with time or depth. Thus, as the amplitude of the recorded trace varies inversely with the radius of the advancing wavefront, each trace was multiplied by a function 'VT/2', where V is the seismic wave velocity and T is the two-way time.

Third, compensation for amplitude losses as a result of inelastic attenuation was also made. Each trace was multiplied by an exponential gain function expressed in Db/second.

For this survey, an exponential gain function of 4 Db/second was applied from 0.4 to 4.4 seconds and thereafter remained constant.

3.6 F-K FILTERING

When a two-dimensional fourier transform is applied to a seismic record, it is transformed from the time-offset (T-X) domain to the frequency-wavenumber (F-K) domain.

Seismic events in the T-X domain map to events radiating from the origin in the F-K domain and reach the wavenumber, or alias frequency, at a frequency given by the relationship: alias frequency = 500/dip ;where "dip" is the dip, in milliseconds per trace, of the event in the T-X domain.

Some coherent noise trains which appear at various times on the shot records can be isolated to some extent in the F-K domain.

In this data the main difference between the seismic signal and noise was one of apparent dip. Once the location of the noise in the F-K domain was established it was muted out prior to reverse transformation into the T-X domain for subsequent processing. For this data, an F-K filter was designed to preserve data in the dip range of -3.125 ms/trace to 2.273 ms/trace in the T-X domain (-4.0km/sec to 5.5km/sec).

3.8 SIGNATURE DECONVOLUTION

Digicon's preferred shot averaged deconvolution routine is DEFLAT. It designs and applies either a single operator, or a user specified number of offset dependent operators per input record. The routine is part deterministic and part statistical.

A source wavelet is estimated using manufacturer's instrument phase and amplitude response characteristics for given

recording filter settings. In the case of marine data it is also possible to include the shot and receiver ghost.

The data is analysed and a bandwidth selected which relates to the good signal to noise portion of the input data's spectrum. A bandwidth of 8Hz to 70Hz was selected for this dataset. Within this bandwidth the data is deconvolved using standard spiking deconvolution operators based on averaged autocorrelation functions.

Outside the selected bandwidth an all-pass dephasing filter is designed that will correct for the modelled wavelet's phase distortion.

The deterministic dephasing filter and spiking deconvolution operator are combined and applied to each input record.

The benefits of this approach are:

1. Spatial Stability

The stability of the output wavelet is improved as the input autocorrelation functions are averaged. If standard trace-by-trace deconvolution is applied noise can, especially in the case of spiking deconvolution, influence the design of the deconvolution operators.

2. Deterministic stability in wavelet design

The low frequency end of the spectrum often governs the shape of the deconvolved wavelet. By replacing this part of the spectrum with known amplitude and phase characteristics the deconvolution will be more stable in the presence of spatially variable low frequency noise, such as ground-roll, mud-roll etc.

For this survey the selected parameters were :

Number of operators per record	: 4
Percentage White Noise	: 0.1%
Operator Length	: 400 msec.
Number of Design Gates	: 1

Design Gates in msec.

Near trace	100 to 4400
Far Trace	2200 to 5000



Application Gates in msec.

Near trace	0 to 5000
Far Trace	0 to 5000

3.9 COMMON DEPTH POINT [CDP] GATHER

In this process the seismic traces along a line are sorted into a primary key sequence on the basis of common-depth-point and a secondary key of increasing offset distance within each 'CDP' group. For this project the data was gathered into common-mid-points with a fold (number of traces per CDP) of 51 and a CDP interval of 12.5 meters.

3.10 VELOCITY SCAN ANALYSIS

SVEL Discrete Velocity Analysis is a comprehensive velocity determination package. At each velocity analysis location the CDP gather records are normal move-out corrected with a range of velocities specified by the user. These gathers are then summed to observe the stack response. The module provides a display of the selected velocity control depth points showing;

a) Central CDP gather before correction for normal move-out

b) Normal move-out corrected central CDP gathers associated with their respective velocity fan functions

c) Display of the stack associated with the suite of selected velocity fan functions

A semblance function is computed across the stacked panels and displayed in graphical form for user reference. Based on the semblance values the program provides optional time-velocity picks which are displayed as a numerical listing and also imposed on the velocity time graph. This is positioned to the right of the actual data. Offset information displayed above each gather trace can be used to determine the required pre-stack mute pattern. The mute pattern used for the analysis is displayed on each normal move-out corrected gather record The above analyses were conducted every 2.0 Km.

3.11 MULTIPLE SUPPRESSION : ZMULT

ZMULT is a multiple attenuation process which is based on the separation of primary events from multiples utilising the F-K domain transform on common midpoint gathered data. Application of a normal moveout curve, which overcorrects the primaries and undercorrects the multiples, will move these events into



257178

different quadrants of the F-K domain. By zeroing the "multiple" quadrant, inverse transforming the data and removing the overcorrection velocity, the multiples are attenuated. Velocity analyses can be considerably improved by the application of this process.

3.12 DIP MOVEOUT CORRECTION (DMO)

The data was processed through Digicon's DIPCOGLX F-K domain Dip moveout routine which utilizes a logarithmic transformation of the time axis such that the DMO operator remains temporally as well as spatially stationary. The impulse response of the DIPCOGLX operator has been shown to be comparable to Hale's published algorithm. For further details refer to, "Dip moveout in the frequency-wavenumber domain", GEOPHYSICS VOL 52, No 12 (Dec 1987), pp 1718-1721.

The main benefits of including DMO in the processing sequence are;

1. Dip-independent stacking velocities

Stacking velocities after DMO are dip-independent, allowing both horizontal and dipping reflectors to be stacked with the same RMS velocity, ie. the RMS velocity associated with the horizontal event. Thus flat dip primary reflectors and steep dip events (such as fault plane reflections and diffraction limbs) may be optimumally stacked at the same time.

2. Removal of reflection point smear

Data recorded at a finite offset is transformed to zero offset thus eliminating reflection point smear.

Time varying multi-channel filters applied in the common-offset domain laterally shift the reflection points to their zero-offset position.

Improved signal/noise ratio results, as more signal energy may be stacked within a single velocity panel and reflector point dispersal for non-zero off set traces is removed. It was noted that the fault plane reflections and diffraction events were enhanced on the DMO stack.

3.13 SECOND PASS VELOCITY ANALYSIS

A second pass of velocity analyses were spaced at an average of 1.0 Km intervals, again with due regard to the geology. The better data quality at this stage produced more accurate picks and were used for the final stack.



257179

3.14 NORMAL MOVEOUT CORRECTION AND FRONT END MUTE

The stacking velocity functions derived from the final velocity analysis are used to compute the normal moveout [NMO] corrections to be applied to the traces in the final CDP gathers.

The NMO is performed assuming that the energy travels in a straight raypath and utilizes the following equation :

```
TT =  ( T0**2 +  (X**2/V**2 )) **0.5
```

where

TT = Total recorded travel time in seconds

X = Offset

T0 = Time of reflector at zero offset in seconds

V = RMS velocity

**N = raise to the power N

Velocity-time knee points are honoured on adjacent control points prior to interpolation of the temporal velocity field. The space variant velocity function is then derived by linear interpolation between control points.

3.15 MUTE

A front-end mute (or ramp) is applied to the shallow and far offset data to remove any undesirable, excess stretching after NMO application. As the start time of the mute is from zero time it will also remove non-compressional background noise recorded above the first breaks. The mute pattern is either determined from comparative pre-stack mute tests or from NMO corrected gathers.

The mute pattern applied to this survey is described below;

Offset	Time (in msec.)
300	0
440	300
2658	2600



257180

3.16 FINAL STACK

Stack is the summation of traces within each CDP producing a single stacked trace for each input gather record. The stack is normalised and mute zone compensated to account for the smaller number of live traces in the mute zone and for uneven fold of coverage. The data was recorded with a nominal fold of 51.

3.17 DECONVOLUTION AFTER STACK

Digicon's DECONA module uses the Wiener-Levinson algorithm to design filters which effectively extract the predictable signal from the total data spectrum. This algorithm assumes the input wavelets are minimum phase, the input reflectively spectrum is white and the wavelet is stationary across the inverse filter design window.

The objectives of predictive deconvolution are two fold and described below :

1a SPIKING MODE

In spiking mode (gap of one sample) the data's amplitude spectrum is whitened from 0Hz through to the Nyquist frequency. A percentage white noise is added to the spectrum prior to inverse operator design to maintain stability. A value of 1% white noise is considered normal, however the effective whitening is inversely proportional to the percentage of noise added.

1b. GAP MODE

A gap deconvolution operator will reduce the whitening effect of the deconvolution operator. The gap length can be taken as the second zero crossing from the peak value on the data's autocorrelation function thus avoiding changing the input wavelet's phase.

2. MULTIPLE ATTENUATION

The operator length is selected after studying the autocorrelation function. The combined length of the gap plus operator will attenuate multiple energy up to that period.

For this survey the selected parameters where :

White Noise Percentage : 1%

Gap Length : 36 msec.

Operator Length : 200 msec.



257181

Number of Design Gates : 2

Design Gates in msec.

Gate 1 300 to 3000

Gate 2 2500 to 4300

Application Gates in msec.

Gate 1 0 to 2500

Gate 2 3000 to 5000

3.18 WAVE EQUATION MIGRATION [KIRCHHOFF METHOD]

Seismic stack sections are representations of complex wave fields. Migration is the process which is used to simplify this representation. In general the fundamental effects of migration are :

a) Lateral displacement of dipping events to their correct locations

b) Collapsing of diffraction patterns to their associated point source origins

c) Reconstruction of buried foci

d) Improvement of major and minor fault delineations

e) Signal-to-noise improvements for coherent events in areas where most of the noise consists of diffraction arrivals

Input parameters to the program are;

1. R.M.S. stacking velocity field. This field can be dip corrected and/or modified by a user input percentage.

2. Sub-surface trace interval.

The input to the migration routine comprised the final stack. The migration velocities used were determined after a series of tests. The migration was performed using 90 percent smoothed stacking velocities.

3.19 TIME VARIANT FILTER

Application of a time variant filter will remove unwanted noise that lies outside the frequency range of the desired reflection

and diffraction data. The stacked data was filtered with a series of zero phase bandpass filters. These following filters were selected from a series of filter test panels:

Time (in msec.)	Low Freq/slope	High Freq/slope
0	14/18	65/36
600	14/18	65/36
1500	10/18	50/36
3000	8/18	35/36
4000	8/18	30/36
5000	8/18	30/36

3.26 TIME VARIANT SCALING

For display purpose, a multi-gated balance was applied to the data after filtering to bring the data to the desired amplitude level. The average absolute value (AABS) of the gate is computed and a scalar is applied to the centre point of the gate. This is repeated for each gate with the scalar interpolated between gate centres.

Gate Time Start (msec.)	Gate Time End (msec.)
0	200
200	400
400	800
700	1700
1200	2200
1700	2700
2200	3200
2700	3700
3200	4200
3700	4700

3.27 DISPLAY

The final stack and migrated data were plotted on film with the following parameters :

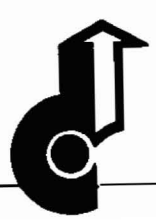
1. Vertical scale : 9.525 cm per second (3.75 in/sec.)
2. Horizontal scale : 20 traces per cm. (50.8 traces per in.) (1:25,000)
3. Display mode : Wiggle trace variable area
4. Display gain : 80%



5. Polarity : SEG Normal

6. Shotpoint Annotation : Antenna Position

Line intersections and stacking velocity functions were annotated above the data section. A sidelable display gives details of the processing sequence.



257184

4.0 PARAMETER TESTING

Initial tests such as gain tests, filter tests and F-K filter tests were carried out on shot records: BB90-191 SPT 1100 and 1750

4.1 GAIN RECOVERY TEST

A velocity function was used for spherical divergence correction and a time versus amplitude graph made on the resultant data. From this graph, an exponential gain function was derived and applied to the data.

Gains tested were :-
(1) 400 - 4400ms @3db/sec.
(2) 400 - 4400ms @4db/sec.
(3) 400 - 4400ms @5db/sec.

4.2 FILTER TEST

Several zero phase band pass filters were applied to a shot record after the application of gain recovery to ascertain the range of useful frequency present in the data.

Filter parameters tested were :-

(1)	OUT	- OUT	
(2)	OUT	- 7.5/30	HZ/DB PER OCT
(3)	5/24	- 10/30	HZ/DB PER OCT
(4)	7.5/24	- 15/30	HZ/DB PER OCT
(5)	10/24	- 20/30	HZ/DB PER OCT
(6)	12.5/24	- 25/30	HZ/DB PER OCT
(7)	15/24	- 30/30	HZ/DB PER OCT
(8)	20/30	- 40/48	HZ/DB PER OCT
(9)	25/30	- 50/60	HZ/DB PER OCT
(10)	30/30	- 60/60	HZ/DB PER OCT
(11)	35/40	- 70/72	HZ/DB PER OCT
(12)	40/48	- 80/72	HZ/DB PER OCT
(13)	50/60	- 100/72	HZ/DB PER OCT
(14)	60/60	- 120/72	HZ/DB PER OCT
(15)	70/72	- OUT	HZ/DB PER OCT
(16)	80/72	- OUT	HZ/DB PER OCT
(17)	90/72	- OUT	HZ/DB PER OCT

4.3 F-K FILTER TESTS

Dip ranges were selected from the shot records and their FK spectrum displays and were F-K filter tested with asymmetrical cuts in the pass mode as follows;



257185

(1) -4.167 to +2.778 ms/trace (3.0/4.5 km/sec.)
(2) -3.125 to +2.273 ms/trace (4.0/5.5 km/sec.)
(3) -2.500 to +1.923 ms/trace (5.0/6.5 km/sec.)

On examination of these test results, FK filter with a pass range of -3.125 ms/trace to 2.273 ms/trace was used to produce an initial stack.

4.4 DECONVOLUTION BEFORE STACK TESTS ON SHOTS

On inspection of tests conducted in steps 4.2 and 4.3, the decision to apply F-K filter before wavelet deconvolution was made. Desired output band limits were set to 5 - 90 HZ. Tests were carried out with and without conventional predictive deconvolution operators.

Parameters tested were :-
(1) DEFLAT only 5 - 90 HZ
(2) DEFLAT only 8 - 90 HZ
(3) DEFLAT with 24ms gap + 300ms active operator
(4) DEFLAT with 36ms gap + 300ms active operator
(5) DEFLAT with 48ms gap + 300ms active operator

4.5 MULTIPLE ATTENUATION TESTS

After decisions were made to the FK filter and Deconvolution before stack, line BB90-191A was tested using ZMULT, PMULT and WEMA with Initial stacks produced for each of these multiple attenuation processes.

These tests were carried out for the complete line SPT 781 - 1260.



257186

POST STACK TESTING

These tests were carried out for BB90-191A using SPT 825-925 and SPT 1000 - 1100.

4.6 DECONVOLUTION AFTER STACK TESTS

A selection of gap deconvolution and spectral whitening deconvolution was tested.

(1)	NO GAP DECON	
(2)	GAP DECON	12MS
(3)	GAP DECON	16MS
(4)	GAP DECON	24MS
(5)	GAP DECON	32MS
(6)	GAP DECON	48MS
(7)	GAP DECON	60MS
(8)	SPECTRAL	10/15 - 80/100HZ
(9)	SPECTRAL	8/10 - 45/70HZ
(10)	SPECTRAL	8/10 - 25/40HZ

4.7 TAU-P FILTER TESTS

Various addbacks were tested with a dip limit of +/-3ms/trace.

(1)	NO TAU-P
(2)	80% ADDBACK
(3)	70% ADDBACK
(4)	60% ADDBACK
(5)	50% ADDBACK

4.8 FILTER TESTS

Zero phase band pass filter tests were performed.

(1)	OUT-OUT
(2)	5 - 10 HZ
(3)	7.5 - 15 HZ
(4)	10 - 20 HZ
(5)	15 - 30 HZ
(6)	20 - 40 HZ
(7)	25 - 50 HZ
(8)	30 - 60 HZ
(9)	40 - 80 HZ
(10)	50 - 100 HZ
(11)	60 - OUT
(12)	70 - OUT
(13)	80 - OUT
(14)	90 - OUT
(15)	100 - OUT



257187

4.9 SCALING TESTS

Parameters tested were;

(1) No scaling
(2) AGC - 500 ms gate (applied sample by sample)
(3) AGC - 1000 ms gate (applied sample by sample)
(4) Multi-gate balance - single gate
(5) Multi-gate balance - nominally 1000 ms gate with (overlap = 500ms) expanding and overlapping (14 gates)
(6) Multi-gate balance - 500 ms gate (overlap = 250ms) 14 gates used
(7) Automatic balance - 300 ms gate (overlap = 150ms)

4.10 MIGRATION TESTS

Wide apperture (P.S.P.I.) and Kirchhoff methods were run on test line BB90-191A (complete line).

P.S.P.I. method was tested first with 80, 90, 100, 110 and 120 percent stacking velocities. Subsequently Kirchhoff method was tested using 70, 80, 90, and 100 percent velocities.

For production Kirchhoff method was used with 90 percent smoothed velocities.



257188

5.0 THE DATA PROCESSING SYSTEM

Digicon's installation in Brisbane is based on two Digital Equipment Corporation's VAX 8650's and one 11/780 computer. A brief description of the computers and peripheral devices is as follows :-

Main processing system		VAX 1	VAX 2
1) Computer system	:	8650	8650
	:	32 bit central processing unit with total of 32 remote input/output terminals allowing multi-user, multi-functional interactive capability.	
capacity (virtual memory)	:	32 MB	32 MB
operating system	:	DISCO	DISCO
2) Array processors (FPS 100)	:	4 units	4 units
Array processors (NMX 432) (High performance floating point array processor)	:	1 unit	1 unit
3) Disk storage system	:	3 units	3 units
capacity (each unit)	:	1.2 GB	1.23 GB
4) Magnetic tape drives	:	15 units	14 units
density	:	800 bpi, 1600 bpi and 6250 bpi	
5) Line printer	:	1 unit	1 unit
6) Display system	:	BENSON/VERSATEC Electrostatic plotters. (Resolution: 200 dots/inch) 2 units 36" plotter 1 unit 22" plotter	



257189

: 1 unit GEOSPACE FILM PLOTTER (Resolution : 508 dots/inch)

7) Digitiser : 2 units summagraphic digitising tables

- 1 unit TEKTRONIX graphics terminal and one hard copy unit

- 1 unit off-line ammonia printer

The DISCO system (Digicon's interactive seismic computer) is an extension of the Digicon's modular seismic data processing developed over many years. Being modular, the system is completely flexible allowing complete user control of the number and sequence of operations performed in any job. The DISCO seismic monitor assembles the selected modules in the specified order and controls the processing run.

Respectfully submitted,
Digital Exploration Limited

Steve Jestico
PROJECT LEADER

Teck C. Goh
MARINE PROCESSING SUPERVISOR

Dr. Nigel J. Fisher
TECHNICAL SERVICES MANAGER

Peter Kirk
GENERAL MANAGER

APPENDIX I

LINE SUMMARY

LINE	SHOT POINTS	KMS
BB90-175	101 - 1412	32.800
BB90-176	101 - 1274	29.350
BB90-176A	1221 - 1448	5.700
BB90-177	101 - 1296	29.900
BB90-178	101 - 778	16.950
BB90-179	101 - 756	16.400
BB90-180	101 - 925	20.625
BB90-181	101 - 866	19.150
BB90-182	101 - 900	20.000
BB90-183	101 - 941	21.025
BB90-184	101 - 1032	23.300
BB90-185	101 - 1098	24.950
BB90-186	101 - 800	17.500
BB90-187	101 - 2067	49.175
BB90-188	101 - 2332	55.800
BB90-189	580 - 98	12.075
BB90-189A	570 - 3014	61.125
BB90-190	101 - 1266	29.150
BB90-191	101 - 843	21.050
BB90-191A	781 - 1260	12.000
BB90-191B	1201 - 3018	45.450
BB90-192	101 - 1413	32.825
BB90-192A	1361 - 1820	11.500
BB90-193	101 - 1066	24.150
BB90-194	101 - 1176	26.900
BB90-195	101 - 471	9.275
BB90-195A	411 - 1538	28.200
BB90-196	101 - 1150	26.250
BB90-197	101 - 1696	39.900
BB90-198	101 - 1420	33.000
BB90-198A	1361 - 1658	7.450
BB90-199	101 - 1273	29.325
BB90-200	101 - 1379	31.975
BB90-201	101 - 2391	57.275
BB90-202	101 - 2428	58.200
BB90-203	101 - 1302	30.050
BB90-204	101 - 989	22.225
BB90-204A	931 - 1381	11.275
BB90-205	101 - 3458	83.950
	TOTAL	1127.2 KM



APPENDIX II

LISTING OF ARCHIVE TAPES OF RAW FINAL STACK AND MIGRATED STACK

Format = SEGY
Density = 6250 BPI
Record Length = 5 sec.
Sample Rate = 4 ms

Byte Information
LINETRC = Byte 1 - 4
CDP = Byte 21 - 24
LINE = Byte 45 - 48

N.B "CDP = (SPT X 2) + 2008
CDP 2210 Corresponds to shot point 101 as referenced to Antenna position.

1) CPT 2042 - Raw Final Stack

2) CPT 2044 - Migrated Stack

FILE NO	HEADER "LINE"	HEADER "REELTRC"	HEADER NOMINAL "CDP" SPT RANGE
1	175	1 - 2723	2096/2210 - 4818 101 - 1412
2	176	2724 - 5534	2096/2210 - 4906 101 - 1456
3	177	5535 - 8025	2096/2210 - 4586 101 - 1296
4	178	8026 - 9480	2096/2210 - 3550 101 - 778
5	179	9481 - 10891	2096/2210 - 3506 101 - 756
6	180	10892 - 12640	2096/2210 - 3844 101 - 925
7	181	12641 - 14271	2096/2210 - 3726 101 - 866
8	182	14272 - 15970	2096/2210 - 3794 101 - 900

3) CPT 1993 - Raw Final Stack

4) CPT 2045 - Migrated Stack



FILE NO	HEADER "LINE"	HEADER "REELTRC"	HEADER NOMINAL "CDP" SPT RANGE
1	183	1 - 1781	2096/2210 - 3876 101 - 941
2	184	1782 - 3744	2096/2210 - 4058 101 - 1032
3	185	3745 - 5839	2096/2210 - 4190 101 - 1098
4	186	5840 - 7338	2096/2210 - 3594 101 - 800
5	187	7339 - 11371	2096/2210 - 6128 101 - 2067
6	188	11372 - 15933	2096/2210 - 6658 101 - 2332

5) CPT 2022 - Raw Final Stack

6) CPT 1170 - Migrated Stack

FILE NO	HEADER "LINE"	HEADER "REELTRC"	HEADER NOMINAL "CDP" SPT RANGE
1	189	1 - 5821	2096/2210 - 8022 101 - 3014
2	190	5822 - 8252	2202/2210 - 4526 98 - 1266
3	191	8253 - 14187	2096/2210 - 8030 101 - 3018

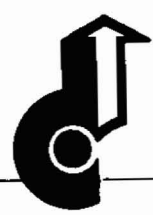
7) CPT 2040 - Raw Final Stack

8) CPT 2049 - Migrated Stack

FILE NO	HEADER "LINE"	HEADER "REELTRC"	HEADER NOMINAL "CDP" SPT RANGE
1	192	1 - 3539	2096/2210 - 5634 101 - 1820
2	193	3540 - 5570	2096/2210 - 4126 101 - 1066
3	194	5571 - 7821	2096/2210 - 4346 101 - 1176
4	195	7822 - 10796	2096/2210 - 5070 101 - 1538
5	196	10797 - 12995	2096/2210 - 4294 101 - 1150
6	197	12996 - 16282	2096/2210 - 5382 101 - 1696

9) CPT 2041 - Raw Final Stack

10) CPT 2048 - Migrated Stack



FILE NO	HEADER "LINE"	HEADER "REELTRC"	HEADER NOMINAL "CDP" SPT RANGE
1	198	1 - 3215	2096/2210 - 5310 101 - 1658
2	199	3216 - 5660	2096/2210 - 4540 101 - 1273
3	200	5661 - 8317	2096/2210 - 4752 101 - 1379
4	201	8318 - 12998	2096/2210 - 6776 101 - 2391

11) CPT 2023 - Raw Final Stack

12) CPT 2047 - Migrated Stack

FILE NO	HEADER "LINE"	HEADER "REELTRC"	HEADER NOMINAL "CDP" SPT RANGE
1	175	1 - 4755	2096/2210 - 6850 101 - 2428
2	176	4756 - 7258	2096/2210 - 4598 101 - 1302
3	177	7259 - 9919	2096/2210 - 4756 101 - 1381
4	178	9920 - 16734	2096/2210 - 8910 101 - 3458



257194

SUPERVISION REPORT

FOR THE 1990 BASS BASIN MARINE SEISMIC SURVEY

DATA ACQUISITION OPERATIONS

CONDUCTED BY BRIDGE OIL LIMITED

IN EXPLORATION PERMIT AREA T/14P

IN THE BASS BASIN OFFSHORE NORTHERN TASMANIA

START DATE: 9TH NOVEMBER, 1990

END DATE: 21ST NOVEMBER, 1990

COMPILED BY: FRANK S. RENTON

AUSTRAL GEOPHYSICAL CONSULTANTS PTY. LTD.,

16 ILFORD AVE.,
BUTTABA 2283,
NSW, AUSTRALIA

257195

CONTENTS

1.		INTRODUCTION	Page 2
2.		SURVEY SUMMARY	Page 4
	2.1	General	
	2.2	Instruments and Streamer	
	2.3	Quality Control and Ancillary	
	2.4	Energy Source	
	2.5	Navigation	
	2.6	Personnel	
	2.7	Vessel	
3.		SURVEY PROGRESS SUMMARY	Page 11
4.		DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS	Page 14
	4.1	General	
	4.2	Instruments and Streamer	
	4.3	Quality Control and Ancillary	
	4.4	Energy Source	
	4.5	Navigation	
	4.6	Personnel	
	4.7	Vessel	
5.		PRODUCTION	Page 25
	5.1	Daily Chargeable Production	
	5.2	Individual Line Production	
6.		SURVEY ACTIVITY	Page 32
	6.1	Daily Activity Reports	
	6.2	Survey Time Analysis	
	6.3	Downtime Analysis	
	6.4	Chargeable Time	
7.		SURVEY LINE LOGS	Page 49
8.		DAILY DIARY	Page 70

APPENDICES

A.	LINE END COORDINATES	Page 77
B.	SYLEDIS CALIBRATION RESULTS	Page 79
C.	SYLEDIS BASELINE CROSSING	Page 87

257196

1. INTRODUCTION

This report covers the marine seismic data acquisition operation conducted by Bridge Oil Limited in their exploration permit area T/14P of the northern coast of Tasmania in November 1990. The survey operations covered in this document began on the 9th of August, when the survey vessel departed Bell Bay for the survey area and ended on the 21st of November when the vessel returned to Bell Bay and offloaded the data.

The contractor chosen to acquire the seismic data was Halliburton Geophysical Services Incorporated. The vessel the contractor employed for the survey was the M.V.Magnificent Creek, a converted supply vessel.

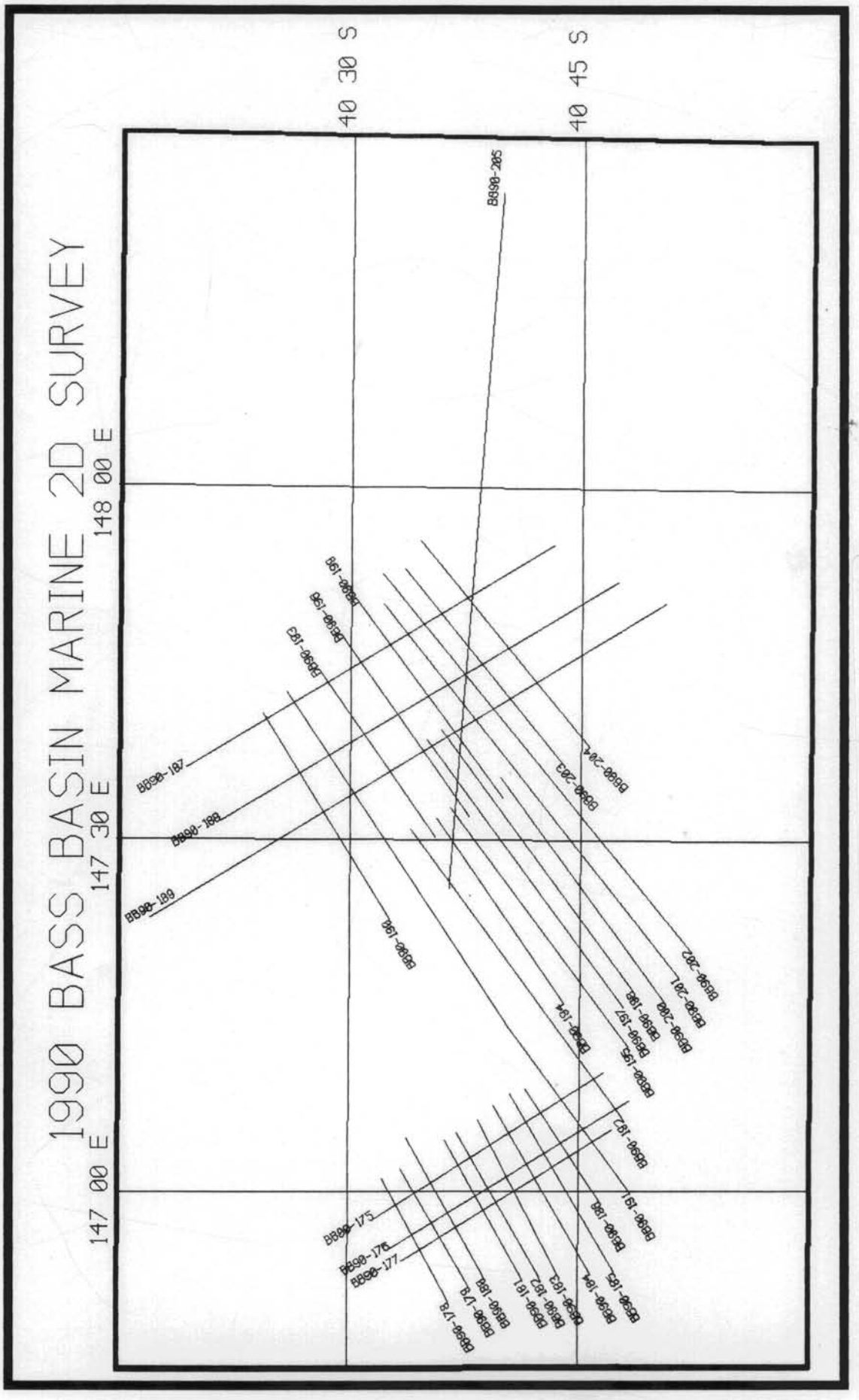
Austral Geophysical Consultants Pty. Ltd. was selected by the client to provide personnel to supervise and report on the data acquisition operations carried out by the contractor. Frank Renton was present on board for the duration of the survey.

This report contains a comprehensive record of the data collection operations along with detailed analyses of the production and activity times and the author's discussion and recommendations. Sections 1 - 4 contain summary information and sections 5 - 8 are the source of more detailed data.

The quality of the data acquired for the survey was of a reasonable standard matching the contractor's overall performance on what was not an easy survey. The data is expected to provide a sound basis for the processing and interpretation phases of the survey. The major delays during the survey were as a result of the weather in the survey area.

257197

FIGURE 1.1



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257198

2. SURVEY SUMMARY

2.1 General

Client	Bridge Oil Limited
Survey	1990 Bass Basin Marine Seismic
Type of Survey	2 Dimensional Marine Seismic
Contractor	Halliburton Geophysical Services
Fold	Nominal 50 fold
Surface Coverage	1114.025 kilometers

2.2 Instruments/Streamers

Instrument Type	Titan 1000
Manufacturer	Halliburton Geophysical Services
Channels Recorded	240 Seismic, 14 Auxiliary Seismic assigned as follows 1-162 as 12.5 meter groups 163-240 as 6.25 meter groups Auxiliary channels 1 Oscillator 2 Field Time Break 3 Summed Airgun Shuttle 4 Not Used 5 Port Outer (1) Array Hydrophone 6 Port Inner (17) Array Hydrophone 7 Stbd Inner (49) Array Hydrophone 8 Stbd Outer (33) Array Hydrophone 9-12 Not Used 14-15 Systems QC
Sample Rate	2 milliseconds
Record Length	6 seconds
Low Cut Filter	8 Hz/18 dB per octave
High Cut Filter	180 Hz/72 dB per octave
Tape Storage	StorageTek 1950 Tape Decks
Recorded Data Format	SEG D Demultiplexed, Code 8015
Recording Density	6250 bpi
Transport Speed	125 ips

Streamer - Type	Digital Multiplexed Marine
Mode of Operation	Continuous Tow
Manufacturer	Halliburton Geophysical Services
Strain Members	Kevlar
Group Length	12.5/6.25 meters
Hydrophones/Group	32/16
Group Centre to Centre	12.5/6.25 meters
Hydrophone Type	HGS dish, acceleration cancelling
Group Length	12.5/6.25 meters
Group Voltage Sensitivity	34.5 uV/uB +/-1.0 dB
Groups/Active Section	6/12
Streamer Power Source	160-290 volts AC at 1.5 Khz
Data Link	2 Optical Fibre Transmission Lines
Streamer Configuration	Single - 162 x 12.5 meter groups 78 x 6.25 meter groups
Active Streamer Length	2512.5 meters
Operating Depth	10.0 ± 1.5 meters
Streamer Location/Depth Control	Digicourse 293 CCU using Model 396 Integrated Compass/Depth Controller

257199

Remote Sub-Systems	Streamer Electronics Modules
Preamplifier Type	Differential Input Capacitive Charged Amplifier
Amplifier	Instantaneous Floating Point
Gain	0-84 dB in 12 dB Steps
A/D Converter	14 Data Bits Plus Sign Bit
Seismic Channels/SEM	12
Crossfeed Isolation	> 80 dB Between Any 2 Channels

2.3 Quality Control and Ancillary

Single Trace Displays	CITOH CI 600+ Plotter.
Echo Sounder	Simrad EA
Oscilloscope Display	Multiplexed 240 channels
Multiple Trace Plotter	OYO GS-622

2.4 Energy Source

Type	Tuned Sleevegun Array
Manufacturer	Halliburton Geophysical Services
Source Configuration	4 Subarrays of 16 Guns Each, Conventional Tow, separation as in Figure 2.1
Volume	2180 cubic inches
Source Output	100 Bar-meters
Primary to Bubble Ratio	13:1
Operating Pressure	2000 psi nominal
Operating Depth	6 meters
Synchronization	Tiger Airgun Controller
Shot Interval	25.00 meters
Compressor Air Supply	Sullair/LMF Compressors
Supply Capacity	5 x 300 scfm
Offset from Centre of Source to Centre of Near Group	Nominally 160 meters, in line

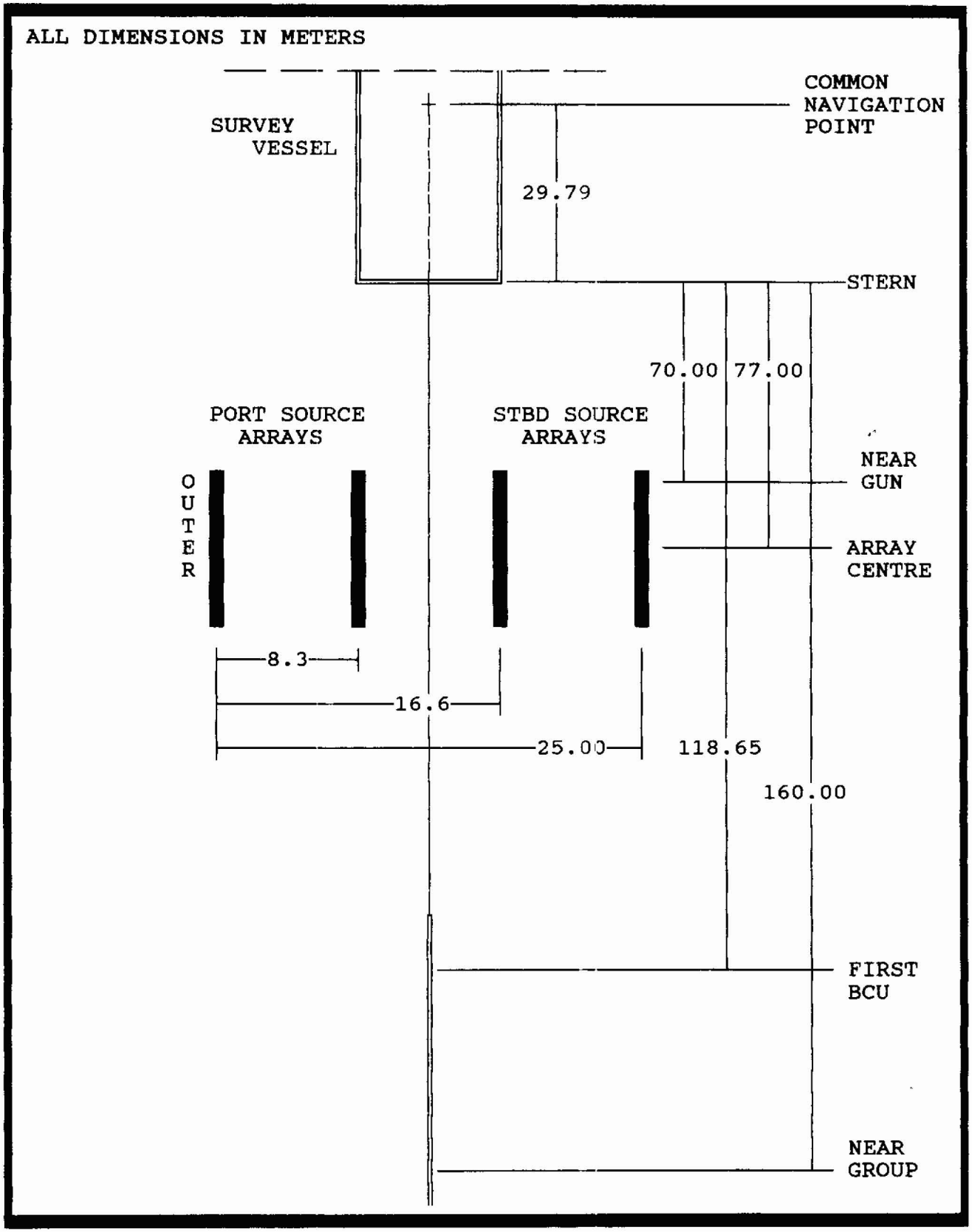
2.5 Navigation

Type	Syledis
Manufacturer	SERCEL
Operator	Halliburton Geophysical Services
Syledis Base Stations (AGD-66)	
Charmouth Hill	40°45'18.10"S 147°58'09.14"E 61m.
Hadwickes Hill	40°52'01.42"S 147°37'42.07"E 121m.
East Sandy	40°57'38.05"S 147°20'20.21"E 50m.
Stony Point	40°59'06.10"S 147°01'07.16"E 54m.
Mount William	40°54'34.16"S 148°11'11.52"E 221m.

Line Control System	CMS
Manufacturer	Halliburton Geophysical Services
Spheroid	Australian National
Semimajor Axis	6378160.0 meters
1/f	298.25
Local Datum	Australian Geodetic 1966

257200

SOURCE/STREAMER TOWING GEOMETRY FIGURE 2.1



NOTE 1. Offsets from Ref. Point.

	X(+ stbd)	Y(+ fwd)
Syledis antenna	-0.7 m.	0.0 m.
Secondary Syledis antenna	0.7 m.	0.0 m.
Transit System antenna	1.0 m.	2.5 m.
Echo Sounder Transducer	3.2 m.	2.4 m.

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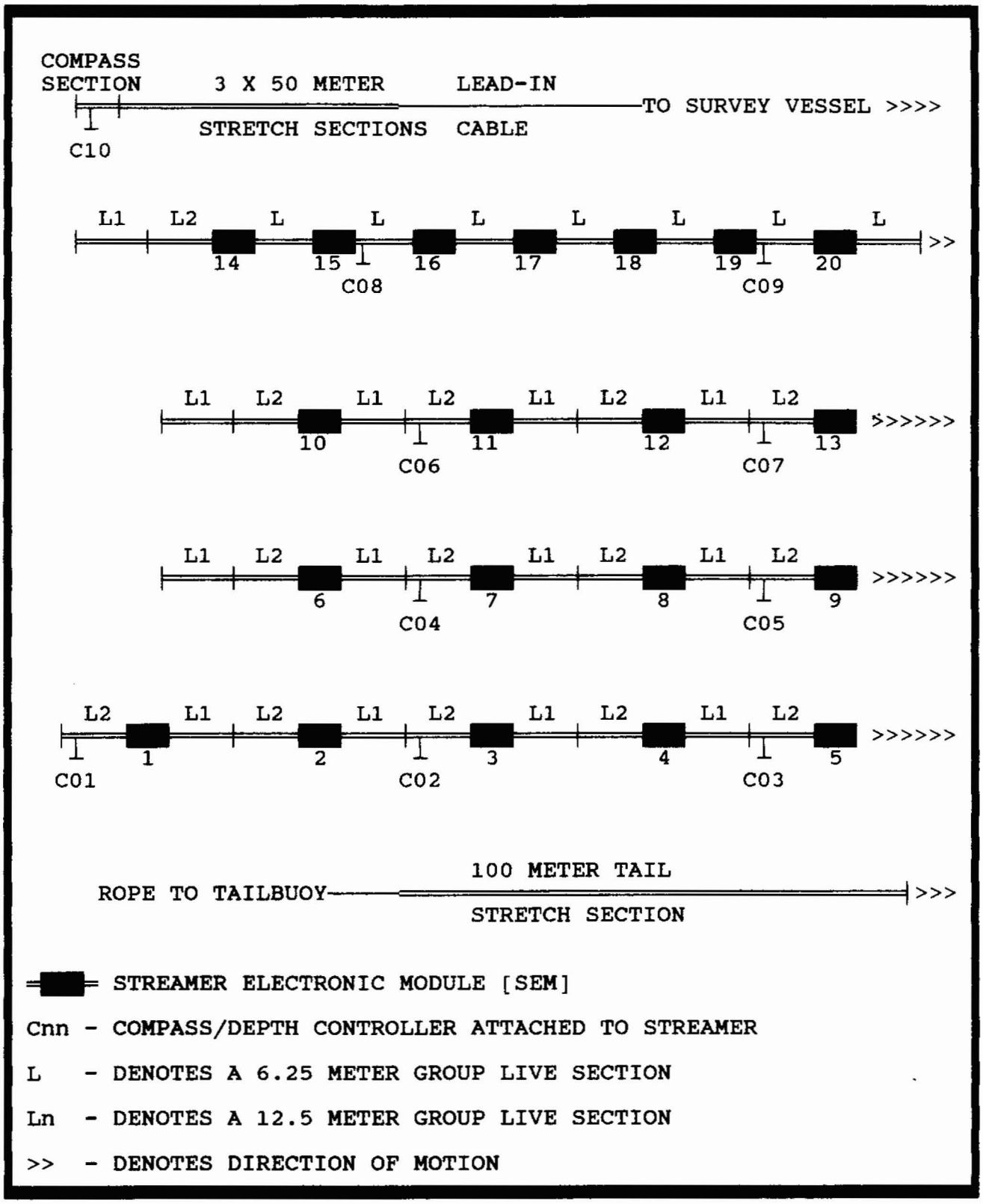
5 cm

257201

INDIVIDUAL 240 TRACE STREAMER DIAGRAM FIGURE 2.2

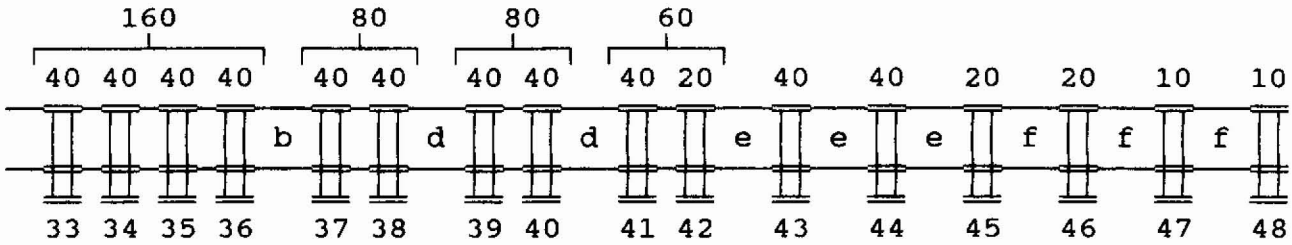


5 cm

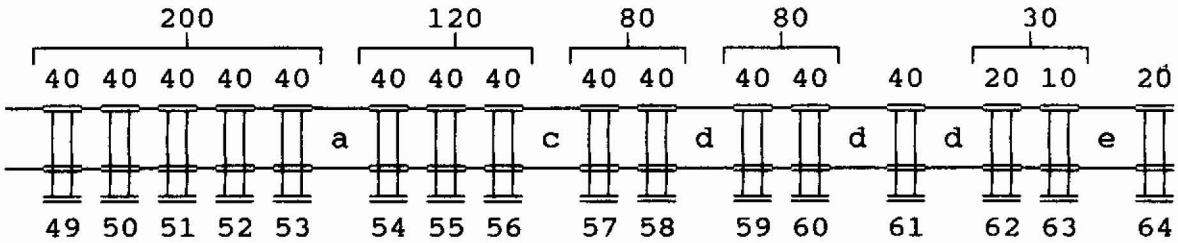
257202

2810 CUBIC INCH SLEEVE AIRGUN ARRAY FIGURE 2.3

STARBOARD OUTER GUNSTRING 13.95 METERS LONG, TOTAL VOLUME 520 c.i.

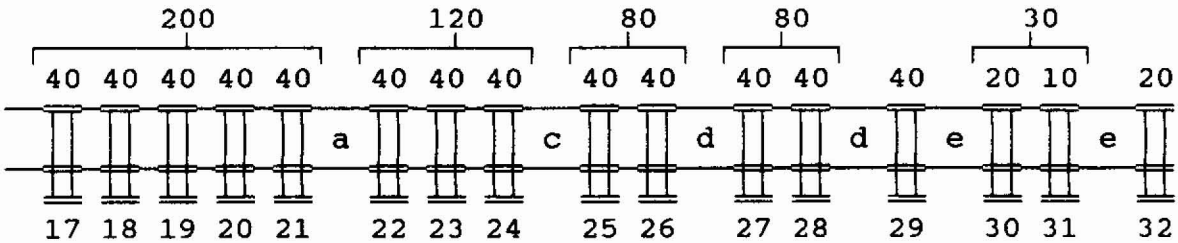


STARBOARD INNER GUNSTRING 13.35 METERS LONG, TOTAL VOLUME 570 c.i.

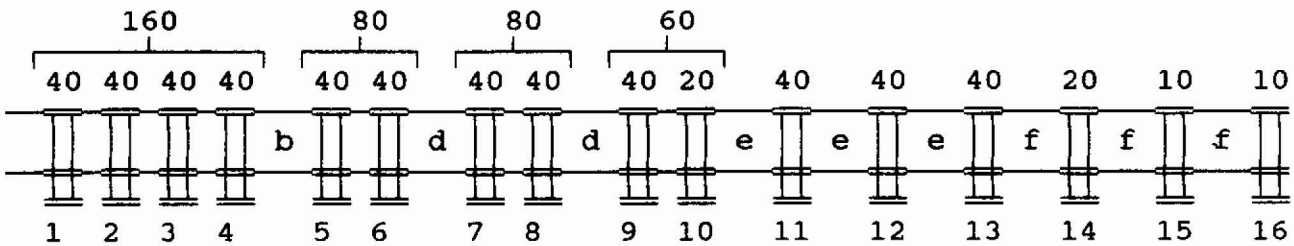


<<< TOWING DIRECTION

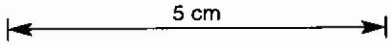
PORT INNER GUNSTRING 13.35 METERS LONG, TOTAL VOLUME 570 c.i.



PORT OUTER GUNSTRING 13.35 METERS LONG, TOTAL VOLUME 520 c.i.



SEPARATION DISTANCES IN METERS
a=2.1, b=1.95, c=1.8, d=1.5, e=1.2, f=0.9.



257203

2.6 Personnel

2.6.1 Seismic Personnel

Party Manager	Steve Dowling
Systems Engineer	Peter Wright
Quality Controllers	Archie Edwards Mike Wilson
Navigators	Russell Stanley (Off 14/11/90) Graeme Kennedy (On 14/11/90) Luc Ho
System Operators	Mike East Ted Moojen
Compressor Engineers	Dave Waugh Bob Cush (Off 14/11/90 with hand injury)
Source Mechanics	Allan Moses Greg Stokes Glen Constant Steve King
Client Representative	Frank Renton
Shore Personnel	Bruce Tuck (Navigation Support) Larry Williams (Crew Administration)

2.6.2 Marine Crew

Captain	Dick Ridsdale
Chief Officer	Jack Bolton
Chief Engineer	David Wu
First Engineer	Paul Varvelis
A.B.Seamen	Clayton Clarkson Pat Hogan Des Cox
Motorman	Steve Ryan
Chief Steward	Tom Daff
Second Steward	Pat Ford
Chief Cook	Peter Gruessler
Second Cook	Reece Baines

257204

2.7 Vessel

Name	Magnificent Creek
Owner	Finbar Marine Pty. Ltd.
Registry	Australian
Classification	Lloyds Register
Official Number	3553747A
Built/Converted to Seismic	1974/1984
Gross Tonnage	986.92 tonnes
Net Tonnage	484.46 tonnes
Length	57.9 meters
Beam	13.2 meters
Draft	3.05 -4.40 meters
Main Engines	4 x 1100 BHP, Diahatsu PSH TC M-26D
Bow Thruster	Kamewa VPP 300 BHP
Generators	2 x 250 KW, Kato 415 v, 50 Hz
Fuel Capacity	433,000 litres
Potable Water	222,000 litres
Accommodation	34
Radars	1 x JRC Colour Radar JMA-3710-6 1 x Furuno Model FR 711
Fathometers	Simrad EA Simrad EPB2N
Gyrocompass	Plath Navigat II Sperry MK 227
Autopilot	Decca Arkas Pilot 550
Speed Log	Electromagnetic, Walker EM 1
Radios	Sailor RT144C VHF Sailor VHF T1127/R1117 Sailor R501 2182 Khz Watch Keeper Codan 6801-S Mk 2B
Weather Facsimile Receiver	Koden FX7181
Call Sign	VJLC
Marisat Terminal	Magnavox MX-111
Marisat Telephone/Telex No.	0011 872 1543317/00 582 1543317
Marisat Facsimile No.	0011 872 1543342
Liferafts	4 x RFD 20, 20 man
Helicopter Capability	Yes
Radio	AWA TR235A

257205

3. SURVEY PROGRESS SUMMARY

257206

Friday 9th November

Survey vessel departed Bell Bay after arrival of the correct streamer plugs arrived. Travelled to open water and started streamer deployment. Worked on streamer for the remainder of the day.

Saturday 10th November

Completed streamer deployment in the early morning then spent the rest of the day standing by for weather. Wind westerly force 5-6 and sea state 5-6. Some minor streamer problems are rectified during weather standby.

Sunday 11th November

Weather abated sufficiently by midday to allow production on line 180 but seas increased towards the end of the line and after the line change no further work was possible as sea state increased again. Remainder of the day spent testing various line headings.

Monday 12th November

Resumed production late morning with line 186 and continued throughout the day with no major interruptions. Lines 185, 184 and 183 also completed. Streamer problem at SEM 12 with intermittent fault, necessitated streamer repair. Source arrays being recovered at midnight prior to streamer recovery.

Tuesday 13th November

Streamer recovered at the start of the day to replace SEM 13 and the live I, traces 145-156 intermittent SEM reset and trace 152 dead. Resumed production in the early morning and then completed lines 182, 181, 179, 178 and 175. Line 176 was still in production at midnight.

Wednesday 14th November

Line 176, in progress at the start of the day was terminated after a CMS failure. Line resumed and shot to completion but an operator error resulted in the overlap being 5 shotpoints short, leaving a slight loss of fold. Lines 176 and 177 completed and 195 started but terminated to allow the contractor to complete a personnel change over. Then line 201 completed and 199 started but terminated after a source controller failure. At midnight the vessel was circling to restart line 199. The contractor downtime for the personnel exchange had to be extended after the streamer and one gunstring became tangled.

Thursday 15th November

At the start of the day the survey vessel was circling to restart line 199A. That and lines 200, 197 completed. Then line 198 was shot in increasing weather and seas and had to be terminated because of swell noise on records. Attempted line 202 on reciprocal but again swell noise too great, so at the end of the day standing by for weather travelling to the south end of line 191.

257207

Friday 16th November

After starting the day on weather downtime, the swell dropped somewhat allowing production on line 191. This line was interrupted first for a source failure then for streamer transmission parity errors. After the second termination the weather and seas had increased again and no further production was possible. In the late afternoon time was taken to remove the extra lead in and replace the front stretches to rectify the parity problem. At midnight the survey vessel was standing by for weather to improve.

Saturday 17th November

Initially waiting for weather and when seas and calmed sufficiently to lost some time when the port gunstrings became entangled with the streamer and then each other. Lines 194, 198 and 195 completed and production on line 192 was continuing at midnight.

Sunday 18th November

Line 192 terminated after the Titan instrument mass memory failed. Line 192 completed as an A line then lines 191, 193, 196 all completed. At midnight on production on line 202A. Weather conditions best to date but there was still some swell noise at the end of line 196 as moderately strong easterly wind and seas developed. Also experienced the first high feather angle at the start of line 202A when 14.4° was measured at the start of line. This dropped steadily and by shotpoint 200 approximately was within 10°.

Monday 19th November

Line 202A was completed at the start of the day, then 203. Line 204 had to be terminated after a mass memory system failure and after a circle was completed as 204A. Lines 189 was shot in to sections the first starting 12 kilometers from the south east end and shooting into the beach. Line was about five shotpoints shorter than preplotted at inshore end. Then the vessel turned out and resumed the line shooting to the north west. Line 189A was in progress at the end of the day.

Tuesday 20th November

Line 189A, 187 and 188 completed and 190 in progress at midnight. This was the on and only full day of uninterrupted production in the whole survey. On the last ten kilometers of line 187 the feather angle rose slowly above 10° to the end of the line. At termination it was 13.8° but this was exaggerated by a port turn at the end of the line. This line was also terminated early to avoid hazardous waters and a late change in exit direction became necessary after craypots were spotted to the starboard of the line.

Wednesday 21 November

Line 190, in progress at the start of day, was completed then the final line of the survey 205 was shot. Line 205 was subject to some very persistent swell noise as the line progressed out of the shelter of the Furneaux Group of islands. After discussions with the client the line was continued to completion because there was virtually no prospect of the sea conditions improving in the near future.

257208

4. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

4.1	General	Page 15
4.2	Instruments and Streamer	Page 17
4.3	Quality Control and Ancillary	Page 20
4.4	Energy Source	Page 21
4.5	Navigation	Page 22
4.6	Personnel	Page 23
4.7	Vessel	Page 24

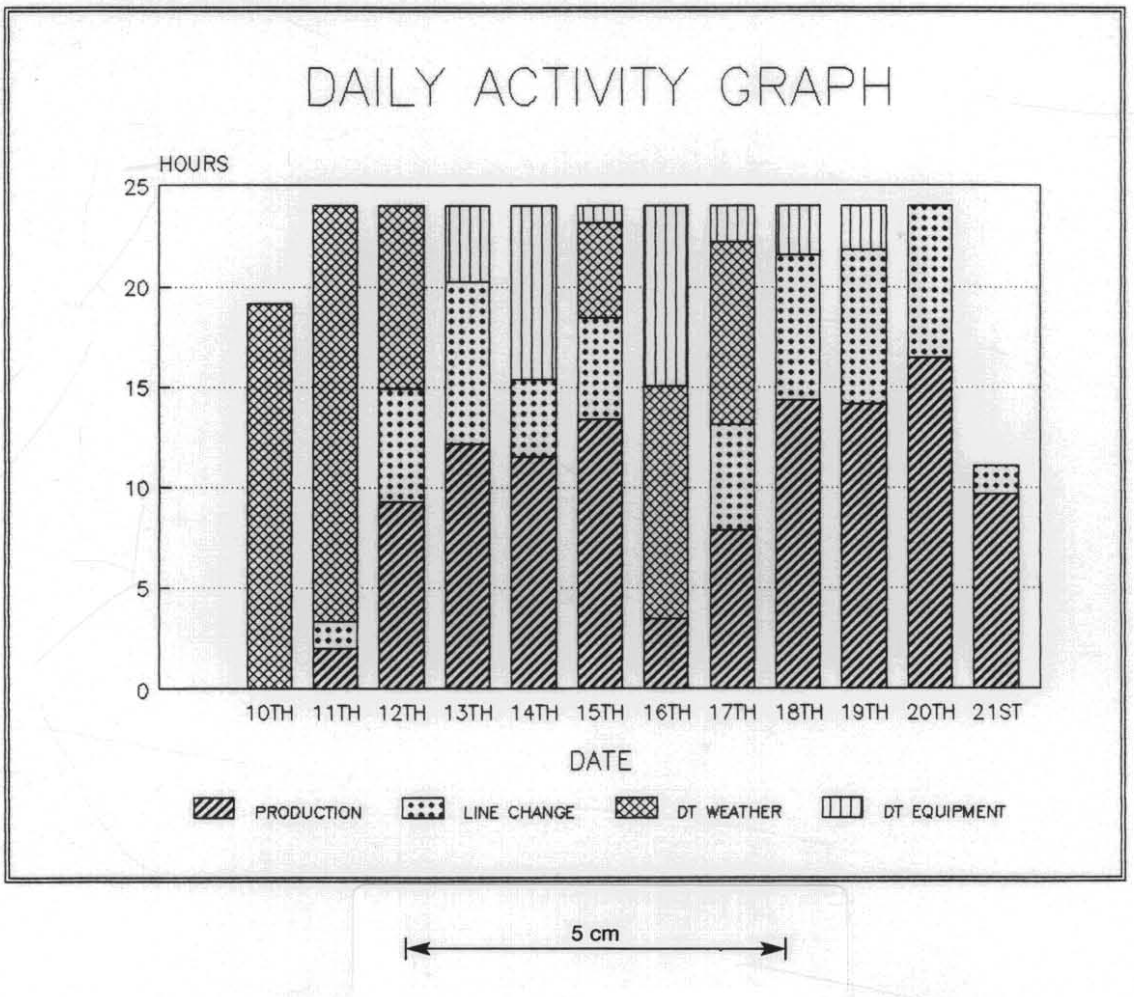
257209

4.1 GENERAL

Not untypically for this area, the predominant influence on both the survey progress and the overall data quality was the weather and sea conditions. Weather downtime accounted for approximately one quarter of the total survey time. Working economically into and out of the weather downtime periods also meant that some data was recorded with relatively consistent swell noise interference on the data. However to negate this interference would have led to an exponential increase in weather downtime. The frequency and severity of swell noise was of course emphasized on the near groups which were less immune to noise because of their shorter length. However the majority of data was recorded in reasonable weather conditions and the fold coverage is expected to more than compensate for swell noise in most cases.

Historically the decisions regarding interrupting the survey for bad weather has been base on the personal experience of the on board client's representative. As costs and weather downtime penalties increase however it becomes more and more critical that such decisions should be made in some other method than by observing the streamer on an oscilloscope. There are a number of commercially available processing systems which by their ability to stack data in the field, give a much more positive indication of the effect of swell noise interference. The same systems are equally useful in judging the effects of seismic interference and ship noise.

FIGURE 4.1.1



257210

Another point which is highlighted by a survey such as this, with long periods of weather downtime, is the absolute necessity of the contractors equipment operating reliably and consistently. This was not the case on this survey as on top of the weather downtime there was a non weather downtime figure of approximately ten percent. From this author's experience a figure of around half of this figure would be considered acceptable i.e. about ten percent of the total time for line change and online production. One decision the contractor made which influenced these figures detrimentally was to shut down operations, including the termination of line 195 to carry out a personnel transfer. The figure for lost time in this instance was further inflated by a gunstring/streamer tangle which occurred when trying to resume production.

Figure 4.1.1 illustrates the breakdown of the daily activities during the survey. From this diagram it can be seen that production was completed in two separate periods. The first from the 12th to the 15th and the second from the 17th to the 21st. Also illustrated however is the consistency of equipment failure, which occurred in one form or another on seven of the twelve survey dates covered.

Two fairly significant areas in the contract were highlighted by this survey and bear some further discussion. In common with most of today's marine seismic contracts, there was very little definition of the time at which standby charges became applicable. This is normally taken as the time at which the crew is in the survey area with all equipment deployed and operational, and was applied in this instance. However there can be complications and it would be more satisfactory if future contracts defined the time charges as being applicable after and only after the first acceptable shotpoint of production.

A second area which was lacking in true definition was the method of calculating the chargeable production. Again normal conventions were applied where chargeable kilometers were calculated from the number of shotpoints on a line times the shotpoint interval. However this also could be the source of some confusion and it is recommended that future contracts specifically define the method of calculation for chargeable production.

257211

4.2 INSTRUMENTS AND STREAMER

Figure 4.2.1 on the next page shows a very basic functional block diagram of the streamer/instrument system used by the contractor on the survey. The Titan system as used on this vessel still has what are basically the original design streamer electronic modules, and as such these have a limitation in that they have to be removed from the streamer to be fully tested.

Generally speaking, the performance of this system (in terms of reliability) has been very slowly improving. It still has some problems with failures and is not considered by this author as being the best system for operating in the prevailing weather conditions of this area.

The streamer hardware performance was reasonable during this survey with just over ten hours of streamer downtime being accumulated. The major faults which caused this downtime were the failure of SEM 13 on the 14th of November and the problem with streamer parity errors which developed on the 16th. This latter problem was rectified by removal of an additional lead in and the replacement of two stretch sections at the head of the streamer.

Initially the streamer had one dead trace 152, and on the 12th there were problems with traces 145-146 due to the failing SEM 13. Both these problem areas were removed during streamer work on the 13th an apart from the odd spiking trace, the only other trace problem was 160 which consistently failed the daily harmonic distortion tests from the 19th of November onwards.

Ambient streamer noise levels were reasonable on the whole with 2-3 microbars average noise proving the rule. There were of course some exceptions to this when swell noise bursts were predominant and also on line 198A when passing ship's noise inflated the figure. Of all the data recorded the worst problems with swell noise bursts were encountered on line 191, on the 16th, and line 205, on the 21st. In all instances, when weather conditions deteriorated and swell noise increased, the streamer was lowered to 11-12 meters depth to minimize the effects of swell noise.

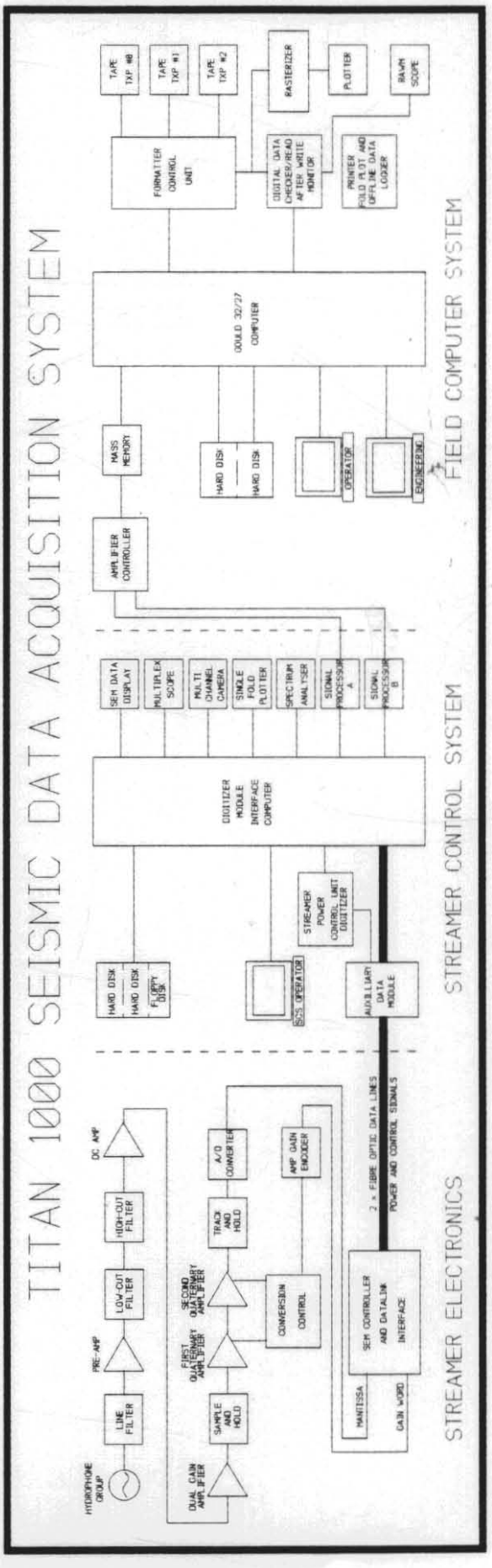
Streamer feather was very reasonable for the major portion of the survey. Lines 202A and 204 were both started with high feather angles but in both instances this reduced steadily to within the ten degree specification. Both these instances and that of the feather angle on the second part of line 187 were judged to be the result of localised current conditions and all were considered to be providing data which would possibly only be marginally improved by standing by for slack water, remembering the rate at which such standby time can be accumulated in such an area.

This streamer continues to suffer from random trace spiking during recording. Whenever possible the traces seen as subject to this problem were noted on the observer's log and so should be easily edited.

The use of 6.25 meter groups at the head of the streamer was the cause of some problems. The first was of course the reduced level of noise rejection on such a shorter group, this resulted in the front of the streamer exhibiting much higher noise levels and this was especially true in periods of heavy swell conditions.

257212

FIGURE 4.2.1



257213

Less important but a problem none the less was the inability of the contractor to supply the required number of 6.25 meter groups, namely 80, with 160 12.5 meter groups. The net result of this was a very uneven fold pattern for the survey, rather than a regular 10/40 fold, and is an area which the contractor could easily improve the streamer's capabilities.

Another careless and expensive oversight on the contractor's part was the fact that only on the day prior to sailing was the contract sighted by the personnel on the vessel, and only then was it realized that the streamer plugs required to use 6.25 meter groups were not available on board the vessel. Because of this a period of some 14 hours was spent waiting for the arrival of the plugs.

The only instrument problem which resulted in lost time was that of mass memory failure. This occurred on line 192 on the 18th and on line 204 on the 19th. In both instances the lines had to be terminated and restarted. This is a very difficult area to troubleshoot and really define the cause of such a problem, but it is to be hoped that the cause of this fault is found and rectified by the crew in the near future.

Another problem area was that of tape quality. This was not a serious problem during the survey, but there were several instances of tape related misfires on the 15th, 16th and 17th of November.

Overall the performance of the streamer/instruments was relatively good and the data quality, while of a mixed quality because of swell noise, was good for the vast majority of the survey.

257214

4.3 Quality Control and Ancillary

There were no faults or failures within this category which resulted in any downtime.

The only degradation of the survey data quality of any kind was the result of the performance of the echo sounder unit. This is and always has been a major problem area with this vessel in any sort of sea state and is thought to the result of aeration passing over the face of the transducer in heavy sea conditions. This results in the loss of digital tracking and water depths recording then becomes reliant on an analogue chart.

The inspection of monthly tests results and all daily tests showed no major instrument problems, and it is worth commenting that the contractor's personnel are now paying more and more attention to the instrument test results and their implications on the survey.

One especially nice output is the single trace section generated by the C ITOH plotter. This provides a very precise and generally clean quality control indicator on a shot to shot basis and tied with the multiple trace shot records taken periodically, gives good overall indication of data quality.

257215

4.4 Energy Source

Overall source performance was reasonable for the survey. Total downtime resulting from source failures was less than seven hours and was predominantly the result of power supply failures within the source firing control unit. After two instances of this problem on the 14th and 16th the power supply unit was replaced and no further failures occurred.

The remaining downtime was accumulated on the 17th when the gunstrings became entangled and caused a circle.

Of the line segments recorded only 180, 181, 191, 191A, 194 and 190 were started with a volume of less than 2180 cubic inches and this was the result in most instances of faults developing on the final run in to lines. There was some sort of gun failure on most lines but the minimum source volume at the end of any line was 2080 cubic inches at the end of line 180, on the first day of the survey.

Individual gun faults and problems were largely caused by air leaks and timing faults and a number of the timing faults were the result of crossfeed problems with sense signals rather than actual mechanical timing problems.

Compressor power was adequate for this array and shotpoint interval, and source pressure was within tolerance at all times.

One area which is long overdue for improvement is the monitoring of both source depths and source signatures. The present equipment employed by this contractor are both antiquated and unreliable to a very great extent.

The current feelings about the contractor's sleeve gun source are fairly mixed within the industry, but more and more people are seeing that there is a distinct lack of low frequency content in this particular source. Comparison of data sets acquired with sleeve gun sources and with "conventional" can show some quite dramatic differences and it is felt by this author that HGS will have to do something soon to improve the low frequency content of their source signature.

257216

4.5 Navigation

The range-range system used for the survey was Syledis. The performance of the system was of an acceptable standard during the course of the survey but there were some problem areas as well.

The initial calibration of the system was very reasonable over the short baseline range. However after the stations were deployed to their locations for the survey and in situ ranges were measured some significant inconsistencies were noted. Between the mobile reference station, Stony Point and Charmouth the results were reasonably consistent but the ranges measured to Hardwickes and East Sandy were not consistent at all.

The system calibration was repeated on the 8th of November and the same inconsistencies were noted but because the characteristics of the errors seen were not random but related to station location rather than beacon, it was concluded that there was some sort of localized interference, possibly caused by the Telecom installation at Hardwickes Hill. It was decided to accept the results measured apply a velocity factor of 1, and observe the results of the three way fixes on the survey.

Three way fix closures calculated throughout the survey were of a very high standard for the vast majority of the survey. Typically the CEP was 1-2 meters but a figure of less than 1 meter was also quite common.

On the evening of the 19th, after completion of line 189, the baseline between Charmouth and Hardwickes stations was measured. This showed an observed value for the baseline distance of 31331.35 meters compared with the computed 31335.25 meters, (see Appendix C) and was considered to be well within the capabilities of the system.

The only hardware failure problem with the base stations during the survey was the loss of signal from the Stony Point station on the 13th of November. This was the result of the loss of a tower guy which was in turn probably the result of a hurried initial installation.

Apart from this the only other navigation related downtime occurred on the 14th, when the CMS computer idled and line 176 was terminated.

As the survey got underway it rapidly became apparent that the station geometry, while quite adequate for the majority of the survey lines would have to be modified before production on the southern ends of lines 187-189, and on the eastern half of line 205, would be possible. This was achieved on the 18th of November when sufficient of the western portion of the survey had been completed to safely allow the moving of beacon 2 from Stony Point to Mt. William. With this station in place the geometry was considered good enough to complete the survey.

Some difficulties were experienced on lines 199A and 191B, with localized currents pushing the vessel off line. In all of these instances the line was regained as smoothly as possible and the overall effect on data quality is expected to be minimal.

In conclusion then, the navigation for the survey was well within industry standards, but care should be taken in any future calibrations of Syledis in this vicinity.

257217

4.6 PERSONNEL

This vessel has only just returned to Australian waters after a short period working in and around South East Asia. Fortunately the contractor has managed to retain the vast majority of the experienced personnel who were on the vessel when it left Australia.

There is a strong backbone of experience but the depth of experience is shallow in some areas. The first instance of this was the case of line 189 which was shot in two sections to maximize efficiency in good production conditions. The comprehension of the actual overlap achieved and the chargeable shotpoints was a little vague.

Another example of lack of understanding was when the crew decided to run both mobile Syledis receivers simultaneously. This can be done, but to avoid interference between mobiles, the synchronization pulse on one mobile has to be disabled. Because of a lack of basic experience with the system this was not done initially and it was not until the Syledis performance became very erratic that any thought was given to the matter.

The crew were professional, knowledgeable and worked very well together. There were no major accidents or safety practice infringements during the survey, although one crew member was sent ashore to have a minor laceration inspected. This accident occurred when a silencer on a compressed air bleed valve exploded and cut the small finger of the mechanics left hand, just at the middle knuckle. Had there not been a small vessel going ashore from the vessel that day it is doubtful whether the injured person would have been evacuated.

257218

4.7 VESSEL

The Magnificent Creek has returned to Australian waters in much the same state as she left in April of 1990. While the vessel appears to have been maintained reasonably well, she is without doubt starting to show signs of age. Also her size and power are both limiting the overall vessel capabilities. Although more than adequate for the work involved in this 2D survey, the latest demands for multiple sources and multiple streamers will not be satisfied fully by this vessel.

Accommodation on board the vessel, although clean and well maintained is a little cramped. There is insufficient space in the clients cabin to install a basic computer/printer set up, and this author spent much of the survey working in the instrument room. This is not always the best arrangement especially with regard to privacy and confidentiality.

Another major area of complaint is the noise levels within the instrument room itself, on board this vessel. The contractor makes no effort to mask the noise generated by the vacuum systems on the tape transports, from the rest of the instrument room. This results in an unacceptably high level of noise, especially when personnel are working in the environment for 12 hour shifts, and was further aggravated by a faulty transport, which only served to increase ambient noise levels.

In conclusion however, the survey was well within the vessel capabilities, and despite the problems already discussed, the boat remains a very acceptable platform for seismic data acquisition. It is still an intrinsically quiet vessel, with the minimum of propulsion noise under most working conditions.

257219

5. PRODUCTION

5.1 Daily Chargeable Production Page 26

5.2 Individual Line Production Page 29

257220

5.1 DAILY CHARGEABLE PRODUCTION

257221

DATE	LINE	DIR.	FSP	LSP	FCSP	LCSP	CHARGEABLE KILOMETERS	STATUS
90/11/11	BB90-180	061	101	925	101	925	20.625	Complete
					Total:		20.625	
90/11/12	BB90-186	057	101	800	101	800	17.500	Complete
	BB90-185	240	101	1,098	101	1,098	24.950	Complete
	BB90-184	060	101	1,032	101	1,032	23.300	Complete
	BB90-183	243	101	941	101	941	21.025	Complete
					Total:		86.775	
90/11/13	BB90-182	240	101	900	101	900	20.000	Complete
	BB90-181	061	101	866	101	864	19.150	Complete
	BB90-179	240	101	756	101	756	16.400	Complete
	BB90-178	062	101	778	101	778	16.950	Complete
	BB90-175	148	101	1,412	101	1,412	32.800	Complete
	BB90-176	328	101	740	101	740	16.000	Continuing
					Total:		121.300	
90/11/14	BB90-176	328	741	1,276	741	1,274	13.350	Terminated
	BB90-176A	328	1,221	1,448	1,267	1,448	4.550	Complete
	BB90-177	148	101	1,296	101	1,296	29.900	Complete
	BB90-195	054	101	471	101	471	9.275	Terminated
	BB90-201	052	101	2,391	101	2,391	57.275	Complete
					Total:		114.350	
90/11/15	BB90-199A	233	101	1,273	101	1,273	29.325	Complete
	BB90-200	233	101	1,379	101	1,379	31.975	Complete
	BB90-197	054	101	1,696	101	1,694	39.900	Complete
	BB90-198	233	101	1,420	101	1,420	33.000	Terminated
					Total:		134.200	
90/11/16	BB90-191	053	101	851	101	843	18.575	Terminated
	BB90-191A	053	781	1,420	844	1,260	10.425	Terminated
					Total:		29.000	
90/11/17	BB90-194	235	101	1,176	101	1,176	26.900	Complete
	BB90-198A	233	1,361	1,658	1,421	1,658	5.950	Complete
	BB90-195A	053	411	1,538	472	1,538	26.675	Complete
	BB90-192	233	101	515	101	515	10.375	Continuing
					Total:		69.900	
90/11/18	BB90-192	233	516	1,447	516	1,413	22.450	Terminated
	BB90-192A	233	1,361	1,820	1,414	1,820	10.175	Complete
	BB90-191B	057	1,201	3,018	1,261	3,018	43.950	Complete
	BB90-193	235	101	1,066	101	1,066	24.150	Complete
	BB90-196	055	101	1,150	101	1,150	26.250	Complete
	BB90-202A	230	101	550	101	550	11.250	Continuing
					Total:		138.225	

257222

DATE	LINE	DIR.	FSP	LSP	FCSP	LCSP	CHARGEABLE KILOMETERS	STATUS
90/11/19	BB90-202A	230	551	2,428	551	2,428	46.950	Complete
	BB90-203	051	101	1,302	101	1,302	30.050	Complete
	BB90-204	230	101	1,017	101	989	22.225	Terminated
	BB90-204A	230	931	1,381	990	1,381	9.800	Complete
	BB90-189	148	580	98	580	98	12.075	Incomplete
	BB90-189A	328	570	1,300	596	1,300	17.625	Continuing
						Total:	138.725	
90/11/20	BB90-189A	328	1,301	3,014	1,301	3,014	42.850	Complete
	BB90-187	149	101	2,067	101	2,067	49.175	Complete
	BB90-188	329	101	2,332	101	2,332	55.800	Complete
	BB90-190	238	101	1,266	101	695	14.875	Continuing
						Total:	162.700	
90/11/21	BB90-190	238	696	1,266	696	1,266	14.275	Complete
	BB90-205	094	101	3,458	101	3,458	83.950	Complete
						Total:	98.225	
						Total:	**1,114.025**	

257223

5.2 INDIVIDUAL LINE PRODUCTION

257224

LINE BB90	DIR.	FSP	LSP	FCSP	LCSP	TAPE NUMBER FIRST	LAST	CH.	KMS.	STATUS	DATE NOV.
175	148	101	1,412	101	1,412	10905	10917		32.800	Complete	13
176	328	101	1,276	101	1,274	10918	10930		29.350	Terminated	13
176A	328	1,221	1,448	1,267	1,448	10931	10933		4.550	Complete	14
177	148	101	1,296	101	1,296	10934	10945		29.900	Complete	14
178	062	101	778	101	778	10898	10904		16.950	Complete	13
179	240	101	756	101	756	10891	10897		16.400	Complete	13
180	061	101	925	101	925	10830	10837		20.625	Complete	11
181	061	101	866	101	864	10883	10890		19.150	Complete	13
182	240	101	900	101	900	10875	10882		20.000	Complete	13
183	243	101	941	101	941	10866	10874		21.025	Complete	12
184	060	101	1,032	101	1,032	10855	10865		23.300	Complete	12
185	240	101	1,098	101	1,098	10845	10855		24.950	Complete	12
186	057	101	800	101	800	10838	10844		17.500	Complete	12
187	149	101	2,067	101	2,067	11212	11230		49.175	Complete	20
188	329	101	2,332	101	2,332	11231	11252		55.800	Complete	20
189	148	580	98	580	98	11183	11187		12.075	Incomplete	19
189A	328	570	3,014	596	3,014	11188	11211		60.475	Complete	19
190	238	101	1,266	101	1,266	11253	11264		29.150	Complete	20
191	053	101	851	101	843	11032	11039		18.575	Terminated	16
191A	053	781	1,420	844	1,260	11040	11046		10.425	Terminated	16
191B	057	1,201	3,018	1,261	3,018	11092	11111		43.950	Complete	18
192	233	101	1,447	101	1,413	11072	11086		32.825	Terminated	17
192A	233	1,361	1,820	1,414	1,820	11087	11091		10.175	Complete	18
193	235	101	1,066	101	1,066	11112	11121		24.150	Complete	18
194	235	101	1,176	101	1,176	11047	11057		26.900	Complete	17
195	054	101	471	101	471	10946	10949		9.275	Terminated	14
195A	053	411	1,538	472	1,538	11061	11071		26.675	Complete	17
196	055	101	1,150	101	1,150	11122	11132		26.250	Complete	18
197	054	101	1,696	101	1,694	11002	11017		39.900	Complete	15
198	233	101	1,420	101	1,420	11018	11030		33.000	Terminated	15
198A	233	1,361	1,658	1,421	1,658	11058	11060		5.950	Complete	17
199A	233	101	1,273	101	1,273	10974	10985		29.325	Complete	15
200	233	101	1,379	101	1,379	10986	11001		31.975	Complete	15
201	052	101	2,391	101	2,391	10950	10970		57.275	Complete	14

257225

LINE BB90	DIR.	FSP	LSP	FCSP	LCSP	TAPE NUMBER FIRST	TAPE NUMBER LAST	CH. KMS.	STATUS	DATE NOV.
202A	230	101	2,428	101	2,428	11133	11156	58.200	Complete	18
203	051	101	1,302	101	1,302	11157	11166	30.050	Complete	19
204	230	101	1,017	101	989	11169	11177	22.225	Terminated	19
204A	230	931	1,381	990	1,381	11178	11182	9.800	Complete	19
205	094	101	3,458	101	3,458	11265	11297	83.950	Complete	21

Total: 1,114.025

257226

6. SURVEY ACTIVITY

6.1 Daily Activity Reports Page 33

6.2 Survey Time Analysis Page 46

6.3 Downtime Analysis Page 47

6.4 Chargeable Time Page 48

257227

6.1 DAILY ACTIVITY REPORTS

257228

ACTIVITY REPORT FOR THE 9TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
11.10	Mobilization	Travel	2.75	0.00
13.55	Mobilization	Streamer	10.08	0.00
		Total:	**12.83**	**0.00**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Mobilization	12.83	0.00
Total:	**12.83**	**0.00**

ACTIVITY REPORT FOR THE 10TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Mobilization	Streamer	4.83	0.00
4.50	Downtime	Weather	19.17	19.17
		Total:	**24.00**	**19.17**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	19.17	19.17
Mobilization	4.83	0.00
Total:	**24.00**	**19.17**

257229

ACTIVITY REPORT FOR THE 11TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Downtime	Weather	12.82	12.82
12.49	Production	BB90-180	1.98	0.00
14.48	Line change	To BB90-179	1.37	0.00
16.10	Downtime	Weather	7.83	7.83
		Total:	**24.00**	**20.65**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	20.65	20.65
Line change	1.37	0.00
Production	1.98	0.00
Total:	**24.00**	**20.65**

257230

ACTIVITY REPORT FOR THE 12TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Downtime	Weather	9.07	9.07
9.04	Production	BB90-186	1.83	0.00
10.54	Line change	To BB90-185	1.60	0.00
12.30	Production	BB90-185	3.17	0.00
15.40	Line change	To BB90-184	2.35	0.00
18.01	Production	BB90-184	2.25	0.00
20.16	Line change	To BB90-184	1.10	0.00
21.22	Production	BB90-183	2.05	0.00
23.25	Line change	To BB90-182	0.58	0.00
		Total:	**24.00**	**9.07**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	9.07	9.07
Line change	5.63	0.00
Production	9.30	0.00
Total:	**24.00**	**9.07**

257231

ACTIVITY REPORT FOR THE 13TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Line change	To BB90-182	1.00	0.00
1.00	Downtime	Streamer	3.80	0.00
4.48	Production	BB90-182	2.05	0.00
6.51	Line change	To BB90-181	1.15	0.00
8.00	Production	BB90-181	1.90	0.00
9.54	Line change	To BB90-179	1.40	0.00
11.18	Production	BB90-179	1.70	0.00
13.00	Line change	To BB90-178	1.50	0.00
14.30	Production	BB90-178	1.67	0.00
16.10	Line change	To BB90-175	1.67	0.00
17.50	Production	BB90-175	3.25	0.00
21.05	Line change	To BB90-176	1.33	0.00
22.25	Production	BB90-176	1.58	0.00
		Total:	**24.00**	**0.00**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	3.80	0.00
Line change	8.05	0.00
Production	12.15	0.00
Total:	**24.00**	**0.00**

257232

ACTIVITY REPORT FOR THE 14TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Production	BB90-176	1.30	0.00
1.18	Downtime	CMS	2.03	0.00
3.20	Production	BB90-176A	0.47	0.00
3.48	Line change	To BB90-177	1.33	0.00
5.08	Production	BB90-177	3.00	0.00
8.08	Line change	To BB90-195	1.18	0.00
9.19	Production	BB90-195	0.90	0.00
10.13	Downtime	Contractor	5.02	0.00
15.14	Production	BB90-201	5.88	0.00
21.07	Line change	To BB90-199	1.32	0.00
22.26	Downtime	Source	1.57	0.00
		Total:	**24.00**	**0.00**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	8.62	0.00
Line change	3.83	0.00
Production	11.55	0.00
Total:	**24.00**	**0.00**

257233

ACTIVITY REPORT FOR THE 15TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Downtime	Source	0.85	0.00
.51	Production	BB90-199A	2.95	0.00
3.48	Line change	To BB90-200	2.12	0.00
5.55	Production	BB90-200	3.15	0.00
9.04	Line change	To BB90-197	1.73	0.00
10.48	Production	BB90-197	3.90	0.00
14.42	Line change	To BB90-198	1.23	0.00
15.56	Production	BB90-198	3.37	0.00
19.18	Downtime	Weather	4.70	4.70
		Total:	**24.00**	**4.70**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	5.55	4.70
Line change	5.08	0.00
Production	13.37	0.00
Total:	**24.00**	**4.70**

257234

ACTIVITY REPORT FOR THE 16TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Downtime	Weather	2.72	2.72
2.43	Production	BB90-191	1.87	0.00
4.35	Downtime	Source	2.52	0.00
7.06	Production	BB90-191A	1.60	0.00
8.42	Downtime	Streamer	3.08	0.00
11.47	Downtime	Weather	4.33	4.33
16.07	Downtime	Streamer	3.38	0.00
19.30	Downtime	Weather	4.50	4.50
		Total:	**24.00**	**11.55**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	20.53	11.55
Production	3.47	0.00
Total:	**24.00**	**11.55**

257235

ACTIVITY REPORT FOR THE 17TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Downtime	Weather	9.08	9.08
9.05	Downtime	Source	1.80	0.00
10.53	Production	BB90-194	3.12	0.00
14.00	Line change	To BB90-198A	2.48	0.00
16.29	Production	BB90-198A	0.78	0.00
17.16	Line change	To BB90-198A	1.22	0.00
18.29	Production	BB90-195A	2.93	0.00
21.25	Line change	To BB90-192	1.52	0.00
22.56	Production	BB90-192	1.07	0.00
		Total:	**24.00**	**9.08**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	10.88	9.08
Line change	5.22	0.00
Production	7.90	0.00
Total:	**24.00**	**9.08**

257236

ACTIVITY REPORT FOR THE 18TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Production	BB90-192	2.37	0.00
2.22	Downtime	Instruments	2.40	0.00
4.46	Production	BB90-192A	1.18	0.00
5.57	Line change	To BB90-191B	2.43	0.00
8.23	Production	BB90-191B	4.60	0.00
12.59	Line change	To BB90-193	1.47	0.00
14.27	Production	BB90-193	2.40	0.00
16.51	Line change	To BB90-196	1.47	0.00
18.19	Production	BB90-196	2.73	0.00
21.03	Line change	To BB90-202	1.88	0.00
22.56	Production	BB90-202	1.07	0.00
		Total:	24.00	0.00

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	2.40	0.00
Line change	7.25	0.00
Production	14.35	0.00
Total:	**24.00**	**0.00**

257237

ACTIVITY REPORT FOR THE 19TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Production	BB90-202A	4.70	0.00
4.42	Line change	To BB90-203	3.07	0.00
7.46	Production	BB90-203	2.98	0.00
10.45	Line change	To BB90-204	1.22	0.00
11.58	Production	BB90-204	2.37	0.00
14.20	Downtime	Instrument	2.18	0.00
16.31	Production	BB90-204A	1.17	0.00
17.41	Line change	To BB90-189	2.13	0.00
19.49	Production	BB90-189	1.18	0.00
21.00	Line change	To BB90-189A	1.22	0.00
22.13	Production	BB90-189A	1.78	0.00
		Total:	**24.00**	**0.00**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Downtime	2.18	0.00
Line change	7.64	0.00
Production	14.18	0.00
Total:	**24.00**	**0.00**

257238

ACTIVITY REPORT FOR THE 20TH OF NOVEMBER

TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Production	BB90-189A	4.35	0.00
4.21	Line change	To BB90-187	2.32	0.00
6.40	Production	BB90-187	5.03	0.00
11.42	Line change	To BB90-188	2.68	0.00
14.23	Production	BB90-188	5.62	0.00
20.00	Line change	To BB90-190	2.55	0.00
22.33	Production	BB90-190	1.45	0.00
		Total:	**24.00**	**0.00**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Line change	7.55	0.00
Production	16.45	0.00
Total:	**24.00**	**0.00**

257239

ACTIVITY REPORT FOR THE 21ST OF NOVEMBER

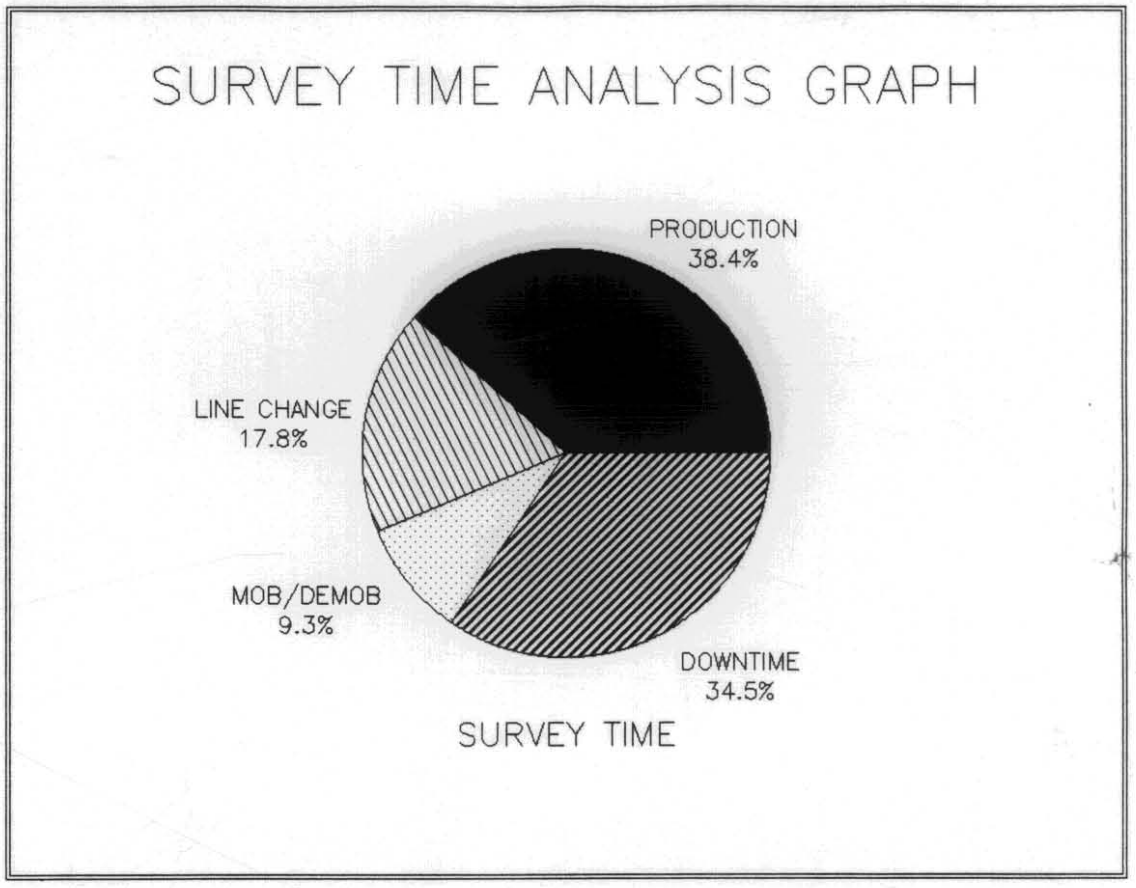
TIME	ACTIVITY	TYPE	HOURS	CHARGE
.00	Production	BB90-190	1.37	0.00
1.22	Line change	To BB90-205	1.40	0.00
2.46	Production	BB90-205	8.33	0.00
11.06	Mob/Demob	Source	0.43	0.00
11.32	Mob/Demob	Streamer	1.80	0.00
13.20	Mob/Demob	Travel	7.67	0.00
		Total:	**21.00**	**0.00**

ACTIVITY SUMMARY

ACTIVITY	HOURS	CHARGE
Line change	1.40	0.00
Mob/Demob	9.90	0.00
Production	9.70	0.00
Total:	**21.00**	**0.00**

257240

6.2 SURVEY TIME ANALYSIS

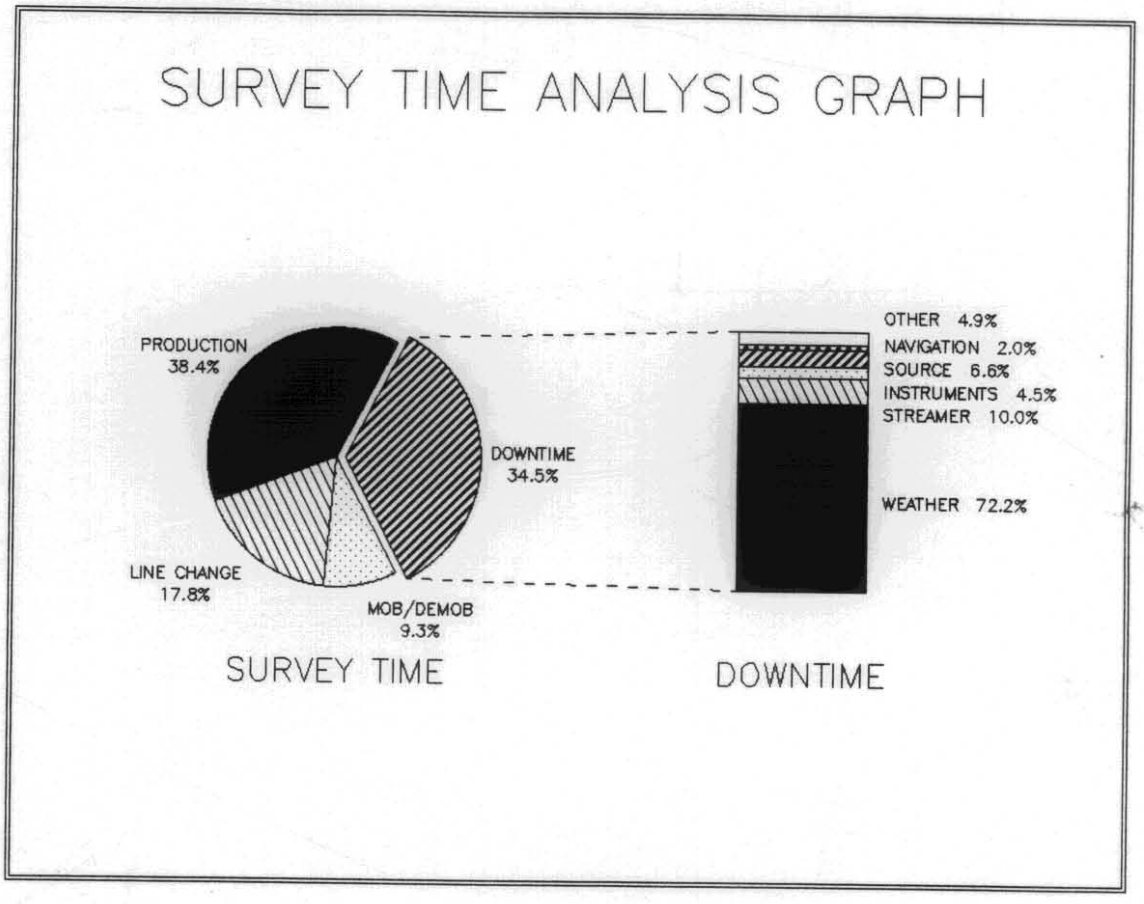


ACTIVITY	HOURS	%
Production	114.40	38.41
Line change	53.02	17.80
Mob/Demob	27.58	9.26
Downtime	102.85	34.53

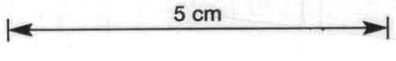
5 cm

257241

6.3 DOWNTIME ANALYSIS



ACTIVITY	HOURS	%
Weather	74.22	72.16
Streamer	10.26	9.98
Instruments	4.58	4.45
Source	6.74	6.55
Navigation	2.03	1.97
Other	5.02	4.88



257242

6.4 CHARGEABLE TIME

DATE	START	TYPE	END	HOURS	DETAIL
90/11/10	4.50	Weather	24.00	19.17	Streamer fully deployed and checked as far as possible. Sea state 5- 6, wind from west 30 knots, standing by for weather.
			Total:	19.17	
90/11/11	00.00	Weather	12.49	12.82	Maintaining 270° course, awaiting improvement in weather.
	16.10	Weather	24.00	7.83	Aborted the run in to line 179 because of excessive swell noise. Heading north to try line 175 from north to south.
			Total:	20.65	
90/11/12	00.00	Weather	9.04	9.07	Standing by for weather, travelling to the west end of line 186
			Total:	9.07	
90/11/15	19.18	Weather	24.00	4.70	Running to try line 202 to the north east.
			Total:	4.70	
90/11/16	00.00	Weather	2.43	2.72	Travelling to the south end of line 191 while waiting for sea conditions to moderate.
	11.47	Weather	16.07	4.33	Line resumption aborted on final run in because of excess swell noise. Circling once again to allow weather time to moderate.
	19.30	Weather	24.00	4.50	Streamer redeployed and checks good, standing by for weather again. Blowing WNW 5-6, sea state 5-6 also.
			Total:	11.55	
90/11/17	00.00	Weather	9.05	9.08	Standing by for weather, circling to run in to line 196 again
			Total:	9.08	
			Total:	**74.22**	

257243

7. SURVEY LINE LOGS

257244

ACTIVITY: PRODUCTION START: 17.50 END: 21.05 DATE: 90/11/13
LINE- BB90-175 STATUS: COMPLETE LINE DIRECTION: 148°

FSP: 101 File: 101 Tape No: 10905 Water Depth: 73 m. FCSP: 101
LSP: 1412 File: 1412 Tape No: 10917 Water Depth: 63 m. LCSP: 1412
Total Coverage: 32.800 kms Chargeable Coverage: 32.800 kms
Total bad traces: 0 Total gun failures: 2 Total misfires: 0

STREAMER
SOL Noise Av: 3.0 µbars Depth: 10.2 m. ± 0.2 Feather: 0.4 ° to port
EOL Noise Av: 2.4 µbars Depth: 10.3 m. ± 0.3 Feather: 1.2 ° to stbd
Comment: Feather remains very minimal

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1850 psi EOL Volume: 2140 ci
Comment: SP 162 gun 19 off, timing. SP 295 gun 19 on again. SP 633 gun 20 off, timing. Some crossfeed between 19 and 20 sense lines.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 67672.9 m. : 57495.8 m. : 50846.3 m.
SOL Antenna Position: 040 31 52.15 S: 146 57 48.56 E CEP: <1 meters
EOL Antenna Position: 040 46 50.56 S: 147 10 13.24 E CEP: <1 meters
Comment: Navigation closures very small.
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: NNE/4 Sea State: 3-4
GENERAL COMMENTS:

ACTIVITY: PRODUCTION START: 03.20 END: 03.48 DATE: 90/11/14
DETAIL: First chargeable shotpoint
LINE- BB90-176A STATUS: COMPLETE LINE DIRECTION: 328°

FSP: 1221 File: 1221 Tape No: 10931 Water Depth: 69 m. FCSP: 1267
LSP: 1448 File: 1448 Tape No: 10933 Water Depth: 74 m. LCSP: 1448
Total Coverage: 5.700 kms Chargeable Coverage: 4.550 kms
Total bad traces: 0 Total gun failures: 2 Total misfires: 0

STREAMER
SOL Noise Av: 2.5 µbars Depth: 10.4 m. ± 0.2 Feather: 2.6 ° to stbd
EOL Noise Av: 2.7 µbars Depth: 10.0 m. ± 0.3 Feather: 2.4 ° to stbd
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2140 ci
Comment: SP 1308 gun 21 off, timing. On again at SP 1333. SP 1371 gun 20 off timing.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 65117.0 m. : 52604.1 m. : 44588.9 m.
SOL Antenna Position: 040 35 19.26 S: 146 57 10.81 E CEP: <1 meters
EOL Antenna Position: 040 32 42.67 S: 146 55 02.78 E CEP: 1-2 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: NNW 4 Sea State: 3-4
GENERAL COMMENTS: Line complete but lacking full fold on overlap because of operator error.

257245

ACTIVITY: PRODUCTION START: 22.25 END: 01.18 DATE: 90/11/13
LINE- BB90-176 STATUS: TERMINATED LINE DIRECTION: 328°

FSP: 101 File: 101 Tape No: 10918 Water Depth: 61 m. FCSP: 101
LSP: 1276 File: 1276 Tape No: 10930 Water Depth: 70 m. LCSP: 1274
Total Coverage: 29.400 kms Chargeable Coverage: 29.350 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 0

STREAMER
SOL Noise Av: 2.3 µbars Depth: 10.4 m. ± 0.3 Feather: 6.4 ° to stbd
EOL Noise Av: 2.4 µbars Depth: 10.4 m. ± 0.2 Feather: 2.9 ° to stbd
Comment: Trace 29 fails daily HD test.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2140 ci
Comment: SP 964 gun 36 off, timing.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 42947.0 m. : 25019.0 m. : 22309.1 m.
SOL Antenna Position: 040 48 16.35 S: 147 07 42.88 E CEP: <1 meters
EOL Antenna Position: 040 34 50.55 S: 146 56 46.81 E CEP: <1 meters
Comment: Coordinates are for SP 1271 at EOL
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: NNE/4 Sea State: 3-4
GENERAL COMMENTS: Line terminated after CMS computer idled.

ACTIVITY: PRODUCTION START: 05.08 END: 08.08 DATE: 90/11/14
LINE- BB90-177 STATUS: COMPLETE LINE DIRECTION: 148°

FSP: 101 File: 101 Tape No: 10934 Water Depth: 73 m. FCSP: 101
LSP: 1296 File: 1295 Tape No: 10945 Water Depth: 67 m. LCSP: 1296
Total Coverage: 29.900 kms Chargeable Coverage: 29.900 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 9

STREAMER
SOL Noise Av: 2.7 µbars Depth: 10.2 m. ± 0.2 Feather: 0.2 ° to stbd
EOL Noise Av: 2.6 µbars Depth: 10.3 m. ± 0.3 Feather: 1.7 ° to stbd
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2140 ci
Comment: Tiger fault SPs 185 missed 186-192 bad records, edit. SP 165 source auto fire.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 70411.8 m. : 57985.8 m. : 48404.1 m.
SOL Antenna Position: 040 33 37.30 S: 146 54 07.51 E CEP: <1 meters
EOL Antenna Position: 040 47 18.62 S: 147 05 20.16 E CEP: <1 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report: See Energy Source comment
Wind Direction/Force: NNE/4 Sea State: 3-4
GENERAL COMMENTS:

257246

ACTIVITY: PRODUCTION START: 14.30 END: 16.10 DATE: 90/11/13
LINE- BB90-178 STATUS: COMPLETE LINE DIRECTION: 062°

FSP: 101 File: 101 Tape No: 10898 Water Depth: 70 m. FCSP: 101
LSP: 778 File: 777 Tape No: 10904 Water Depth: 72 m. LCSP: 778
Total Coverage: 16.950 kms Chargeable Coverage: 16.950 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 1

STREAMER
SOL Noise Av: 2.4 µbars Depth: 10.3 m. ± 0.3 Feather: 1.7 ° to stbd
EOL Noise Av: 2.9 µbars Depth: 10.2 m. ± 0.2 Feather: 2.2 ° to stbd
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2140 ci
Comment: SP 156 gun 19 off, timing.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point.
SOL Ranges: 72437.5 m. : 57461.4 m. : 44586.2 m.
SOL Antenna Position: 040 36 29.81 S: 146 50 38.59 E CEP: <1 meters
EOL Antenna Position: 040 32 13.13 S: 147 01 15.75 E CEP: <1 meters
Comment: SP 210-260 signal from Hardwicke rolling. Dropped and on two stations SP 234-268.
Navigation quality: Fair Overall Data Quality: Good
Misfire report: SP 220 NDR, navigation signals
Wind Direction/Force: NNE/4 Sea State: 3-4
GENERAL COMMENTS: Ships noise showing at reasonably high levels at EOL

ACTIVITY: PRODUCTION START: 11.18 END: 13.00 DATE: 90/11/13
LINE- BB90-179 STATUS: COMPLETE LINE DIRECTION: 240°

FSP: 101 File: 101 Tape No: 10891 Water Depth: 73 m. FCSP: 101
LSP: 756 File: 756 Tape No: 10897 Water Depth: 70 m. LCSP: 756
Total Coverage: 16.400 kms Chargeable Coverage: 16.400 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 3

STREAMER
SOL Noise Av: 2.8 µbars Depth: 10.2 m. ± 0.2 Feather: 0.0°
EOL Noise Av: 3.0 µbars Depth: 10.3 m. ± 0.3 Feather: 0.3 ° to port
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Charmouth, Hardwickes, East Sandy
SOL Ranges: 82604.6 m. : 61270.1 m. : 51915.7 m.
SOL Antenna Position: 040 33 31.73 S: 147 01 47.46 E CEP: <1 meters
EOL Antenna Position: 040 37 56.16 S: 146 51 43.35 E CEP: <1 meters
Comment: Lost signal from Stony Point station
Navigation quality: Good Overall Data Quality: Good
Misfire report: SPs 440,441,442 bad records, amplifier failure.
Wind Direction/Force: N/3-4 Sea State: 3-4
GENERAL COMMENTS:

257247

ACTIVITY: PRODUCTION START: 12.49 END: 14.48 DATE: 90/11/11
DETAIL: End of weather standby.
LINE- BB90-180 STATUS: COMPLETE LINE DIRECTION: 061°

FSP: 101 File: 101 Tape No: 10830 Water Depth: 69 m. FCSP: 101
LSP: 925 File: 925 Tape No: 10837 Water Depth: 71 m. LCSP: 925
Total Coverage: 20.625 kms Chargeable Coverage: 20.625 kms
Total bad traces: 0 Total gun failures: 3 Total misfires: 6

STREAMER

SOL Noise Av: 3.0 µbars Depth: 10.2 m. ± 0.1 Feather: 0.7 ° to stbd
EOL Noise Av: 5.0 µbars Depth: 10.3 m. ± 0.3 Feather: 1.5 ° to stbd
Comment: Swell bursts increasing in frequency and severity to EOL

ENERGY SOURCE

SOL Volume: 2160 ci @ Pressure: 1900 psi EOL Volume: 2080 ci
Comment: Gun 30 off SOL, airleak. SP 316 gun 12 off poor timing.
SP 373 gun 38 off airleak.

NAVIGATION

Stations in use: Hardwickes Hill, East Sandy and Stony Point
SOL Ranges: 68075.2 m. : 52358.8 m. : 39514.0 m.
SOL Antenna Position: 040 38 51.68 S: 146 52 42.37 E CEP: 1-2 meters
EOL Antenna Position: 040 33 30.80 S: 147 05 31.39 E CEP: <1 meters
Comment: Fix closure very reasonable.
Navigation quality: Good Overall Data Quality: Good
Misfire report: SPs 195,230,375 TEs on traces 145-7. SPs 178, 298 A/Fs
Wind Direction/Force: WSW/5 Sea State: 4
GENERAL COMMENTS: Data quality reasonable but intermittent swell bursts throughout.

ACTIVITY: PRODUCTION START: 08.00 END: 09.54 DATE: 90/11/13
LINE- BB90-181 STATUS: COMPLETE LINE DIRECTION: 061°

FSP: 101 File: 101 Tape No: 10883 Water Depth: 71 m. FCSP: 101
LSP: 866 File: 864 Tape No: 10890 Water Depth: 72 m. LCSP: 864
Total Coverage: 19.150 kms Chargeable Coverage: 19.150 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 2

STREAMER

SOL Noise Av: 2.7 µbars Depth: 10.3 m. ± 0.3 Feather: 2.7 ° to stbd
EOL Noise Av: 3.1 µbars Depth: 10.2 m. ± 0.2 Feather: 1.9 ° to stbd
Comment: Trace 29 marginally fails daily tests

ENERGY SOURCE

SOL Volume: 2160 ci @ Pressure: 1700 psi EOL Volume: 2160 ci
Comment: Gun 46 off at SOL airleak.

NAVIGATION

Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 66679.1 m. : 49530.0 m. : 35242.9 m.
SOL Antenna Position: 040 41 19.25 S: 146 52 37.00 E CEP: 1-2 meters
EOL Antenna Position: 040 36 19.53 S: 147 04 29.95 E CEP: 1-2 meters
Comment: Signal from Stony Point weak and erratic towards EOL.
Navigation quality: Fair Overall Data Quality: Good
Misfire report: SPs 711, 736 NDRs due to navigation signals Wind Direction/Force: W/4 Sea State: 3-4 GENERAL COMMENTS:

257248

ACTIVITY: PRODUCTION START: 04.48 END: 06.51 DATE: 90/11/13
LINE- BB90-182 STATUS: COMPLETE LINE DIRECTION: 240°

FSP: 101 File: 101 Tape No: 10875 Water Depth: 71 m. FCSP: 101
LSP: 900 File: 900 Tape No: 10882 Water Depth: 70 m. LCSP: 900
Total Coverage: 20.000 kms Chargeable Coverage: 20.000 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 2.9 µbars Depth: 10.2 m. ± 0.2 Feather: 1.0 ° to port
EOL Noise Av: 2.5 µbars Depth: 10.2 m. ± 0.2 Feather: 1.6 ° to port
Comment: Streamer performance improved.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1850 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 54006.4 m. : 43892.7 m. : 41126.2 m.
SOL Antenna Position: 040 37 11.26 S: 147 04 51.03 E CEP: 1-2 meters
EOL Antenna Position: 040 42 31.09 S: 146 52 31.28 E CEP: 1-2 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: W/3-4 Sea State: 3-4
GENERAL COMMENTS: Good quality line.

ACTIVITY: PRODUCTION START: 21.22 END: 23.25 DATE: 90/11/12
LINE- BB90-183 STATUS: COMPLETE LINE DIRECTION: 243°

FSP: 101 File: 101 Tape No: 10866 Water Depth: 71 m. FCSP: 101
LSP: 941 File: 941 Tape No: 10874 Water Depth: 71 m. LCSP: 941
Total Coverage: 21.025 kms Chargeable Coverage: 21.025 kms
Total bad traces: 4 Total gun failures: 0 Total misfires: 18

STREAMER
SOL Noise Av: 3.3 µbars Depth: 10.3 m. ± 0.3 Feather: 0.1 ° to stbd
EOL Noise Av: 2.9 µbars Depth: 10.4 m. ± 0.2 Feather: 1.4 ° to stbd
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 51316.2 m. : 40842.1 m. : 38803.4 m.
SOL Antenna Position: 040 38 35.44 S: 147 05 59.35 E CEP: <1 meters
EOL Antenna Position: 040 43 45.57 S: 146 52 42.84 E CEP: <1 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report: Edit traces 145-156 on SPs 106,124,138,261,328,362,379
382,386,401,408,419,472,473,474,480,482,555
Wind Direction/Force: W/4 Sea State: 3-4
GENERAL COMMENTS: Problem with SEM 15 reset.

257249

ACTIVITY: PRODUCTION START: 18.01 END: 20.16 DATE: 90/11/12
LINE- BB90-184 STATUS: COMPLETE LINE DIRECTION: 060°

FSP: 101 File: 101 Tape No: 10855 Water Depth: 70 m. FCSP: 101
LSP: 1032 File: 1031 Tape No: 10865 Water Depth: 69 m. LCSP: 1032
Total Coverage: 23.300 kms Chargeable Coverage: 23.300 kms
Total bad traces: 4 Total gun failures: 0 Total misfires: 1

STREAMER
SOL Noise Av: 2.7 µbars Depth: 10.2 m. ± 0.4 Feather: 1.5 ° to stbd
EOL Noise Av: 3.2 µbars Depth: 10.4 m. ± 0.2 Feather: 1.3 ° to stbd
Comment: Traces 146, 147 fail daily tests, 152 dead.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2180 ci
Comment: No major gun problems.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 63936.7 m. : 44309.3 m. : 27363.9 m.
SOL Antenna Position: 040 45 44.76 S: 146 53 09.16 E CEP: <1 meters
EOL Antenna Position: 040 39 27.77 S: 147 07 28.87 E CEP: <1 meters
Comment: Signals remain very good.
Navigation quality: Good Overall Data Quality: Good
Misfire report: SP 175 NDR. Traces 145-147 should be edited on all of the following SPs 125,156,268,340,378,429,656,658,757 811,869,926,983,995 because of TEs
Wind Direction/Force: W/5 Sea State: 4
GENERAL COMMENTS: Trace 29 Marginally fails daily tests also.

ACTIVITY: PRODUCTION START: 12.30 END: 15.40 DATE: 90/11/12
LINE- BB90-185 STATUS: COMPLETE LINE DIRECTION: 240°

FSP: 101 File: 101 Tape No: 10845 Water Depth: 67 m. FCSP: 101
LSP: 1098 File: 1098 Tape No: 10855 Water Depth: 70 m. LCSP: 1098
Total Coverage: 24.950 kms Chargeable Coverage: 24.950 kms
Total bad traces: 1 Total gun failures: 1 Total misfires: 0

STREAMER
SOL Noise Av: 5.0 µbars Depth: 11.6 m. ± 0.0 Feather: 1.6 ° to stbd
EOL Noise Av: 2.7 µbars Depth: 11.4 m. ± 0.8 Feather: 0.7 ° to stbd
Comment: Streamer run deeper to minimize swell noise. Trace 152 dead.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1950 psi EOL Volume: 2140 ci
Comment: SP 120 gun 55 off, airleak.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 46474.0 m. : 35955.6 m. : 36096.5 m.
SOL Antenna Position: 040 40 40.73 S: 147 08 13.06 E CEP: <1 meters
EOL Antenna Position: 040 47 25.85 S: 146 52 54.82 E CEP: <1 meters
Comment: Good 3 way fix results
Navigation quality: Good Overall Data Quality: Fair
Misfire report: Edit traces 145-7 on SPs 421,642,660,707,726,753,758 779,795,818,960. Transmission errors.
Wind Direction/Force: W/5 Sea State: 4
GENERAL COMMENTS: Line terminated without half streamer run out.

257250

ACTIVITY: PRODUCTION START: 09.04 END: 10.54 DATE: 90/11/12
DETAIL: Sea state easing slightly.
LINE- BB90-186 STATUS: COMPLETE LINE DIRECTION: 057°

FSP: 101 File: 101 Tape No: 10838 Water Depth: 69 m. FCSP: 101
LSP: 800 File: 800 Tape No: 10844 Water Depth: 67 m. LCSP: 800
Total Coverage: 17.500 kms Chargeable Coverage: 17.500 kms
Total bad traces: 1 Total gun failures: 1 Total misfires: 5

STREAMER
SOL Noise Av: 2.6 µbars Depth: 11.1 m. ± 1.1 Feather: 0.8 ° to port
EOL Noise Av: 2.8 µbars Depth: 10.4 m. ± 1.2 Feather: 1.9 ° to stbd
Comment: Streamer lowered to minimize swell noise. Trace 152 dead.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1850 psi EOL Volume: 2140 ci
Comment: SP 486 gun 3 off timing. SP 667 gun 19 off, on again SP 670

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 55258.8 m. : 36437.6 m. : 23951.4 m.
SOL Antenna Position: 040 46 21.73 S: 146 59 16.59 E CEP: 1-2 meters
EOL Antenna Position: 040 41 08.98 S: 147 09 37.99 E CEP: <1 meters
Comment: Closures remain very good
Navigation quality: Good Overall Data Quality: Fair
Misfire report: SP 281 A/F. SPs 722,774,795 TEs. SP 772 PE.
Wind Direction/Force: SW 4 Sea State: 4-5
GENERAL COMMENTS: Swell bursts persist, but otherwise good line.

ACTIVITY: PRODUCTION START: 06.40 END: 11.42 DATE: 90/11/20
LINE- BB90-187 STATUS: COMPLETE LINE DIRECTION: 149°

FSP: 101 File: 101 Tape No: 11212 Water Depth: 50 m. FCSP: 101
LSP: 2067 File: 2067 Tape No: 11230 Water Depth: 31 m. LCSP: 2067
Total Coverage: 49.175 kms Chargeable Coverage: 49.175 kms
Total bad traces: 1 Total gun failures: 1 Total misfires: 0

STREAMER
SOL Noise Av: 3.3 µbars Depth: 10.4 m. ± 0.2 Feather: 1.7 ° to port
EOL Noise Av: NA µbars Depth: 10.0 m. ± 0.6 Feather: 15.1° to stbd
Comment: Trace 160 fails HD test. Feather rose to >10° at SP 1654 but local current thro' straits make improvement unlikely except at slack water. Turning to port at EOL feather 13.8°.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1850 psi EOL Volume: 2140 ci
Comment: SP 132 gun 3 off, airleak.

NAVIGATION
Stations in use: Charmouth, East Sandy, Mt.William
SOL Ranges: 57041.4 m. : 74053.5 m. : 81652.8 m.
SOL Antenna Position: 040 19 36.29 S: 147 36 08.79 E CEP: <1 meters
EOL Antenna Position: 040 42 13.85 S: 147 54 18.34 E CEP: 1-2 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: ENE 2-3 Sea State: 2-3
GENERAL COMMENTS: Line terminated for shallows, just under 3 kilometers from
the end of line, considered complete.

257251

ACTIVITY: PRODUCTION START: 14.23 END: 20.00 DATE: 90/11/20
LINE- BB90-188 STATUS: COMPLETE LINE DIRECTION: 329°

FSP: 101 File: 101 Tape No: 11231 Water Depth: 33 m. FCSP: 101
LSP: 2332 File: 2332 Tape No: 11252 Water Depth: 48 m. LCSP: 2332
Total Coverage: 55.800 kms Chargeable Coverage: 55.800 kms
Total bad traces: 1 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 4.6 µbars Depth: 10.2 m. ± 0.2 Feather: 2.8 ° to stbd
EOL Noise Av: 2.7 µbars Depth: 10.4 m. ± 0.2 Feather: 0.4 ° to stbd
Comment: Trace 160 fails daily HD. Streamer not quite straight at SOL noise record because of turn on in shallows.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Charmouth, East Sandy, Mt.William
SOL Ranges: 9788.8 m. : 48507.5 m. : 30266.5 m.
SOL Antenna Position: 040 47 27.72 S: 147 51 59.04 E CEP: 2-3 meters
EOL Antenna Position: 040 21 39.95 S: 147 31 32.34 E CEP: 2-3 meters
Comment:
Navigation quality: Fair Overall Data Quality: Good
Misfire report:
Wind Direction/Force: E/3 Sea State: 2-3
GENERAL COMMENTS:

ACTIVITY: PRODUCTION START: 22.13 END: 04.21 DATE: 90/11/19
DETAIL: Completion of line shot on reciprocal heading.
LINE- BB90-189A STATUS: COMPLETE LINE DIRECTION: 328°

FSP: 570 File: 570 Tape No: 11188 Water Depth: 36 m. FCSP: 596
LSP: 3014 File: 3014 Tape No: 11211 Water Depth: 62 m. LCSP: 3014
Total Coverage: 61.125 kms Chargeable Coverage: 60.475 kms
Total bad traces: 1 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 3.5 µbars Depth: 10.4 m. ± 0.2 Feather: 2.5 ° to port
EOL Noise Av: 3.1 µbars Depth: 10.4 m. ± 0.2 Feather: 1.6 ° to stbd
Comment: Trace 160 fails daily harmonic distortion tests

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1790 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Charmouth, East Sandy, Mt.William
SOL Ranges: 17575.4 m. : 42747.8 m. : 39831.0 m.
SOL Antenna Position: 040 45 15.68 S: 147 45 49.84 E CEP: <1 meters
EOL Antenna Position: 040 17 05.62 S: 147 23 16.09 E CEP: 3-4 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: ESE 3 Sea State: 3
GENERAL COMMENTS: Line complete with overlap.

257252

ACTIVITY: PRODUCTION START: 19.49 END: 21.00 DATE: 90/11/19
DETAIL: Starting line at point 12 kilometers from southern end to shoot into the shallows.
LINE- BB90-189 STATUS: INCOMPLETE LINE DIRECTION: 148°

FSP: 580 File: 585 Tape No: 11183 Water Depth: 36 m. FCSP: 580
LSP: 98 File: 1067 Tape No: 11187 Water Depth: 20 m. LCSP: 98
Total Coverage: 12.075 kms Chargeable Coverage: 12.075 kms
Total bad traces: 1 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 2.5 µbars Depth: 10.3 m. ± 0.3 Feather: 0.2 ° to stbd
EOL Noise Av: N/A µbars Depth: 10.4 m. ± 0.2 Feather: 3.0 ° to stbd
Comment: Trace 160 fails daily tests. At SP 107 started turning off to port, hence EOL noise invalid sample.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Charmouth, East Sandy, Mt.William
SOL Ranges: 17702.0 m. : 42761.3 m. : 40031.3 m.
SOL Antenna Position: 040 45 08.64 S: 147 45 44.53 E CEP: 1-2 meters
EOL Antenna Position: 040 50 40.02 S: 147 50 16.57 E CEP: 2-3 meters
Comment: Offline by 72 meters at last shotpoint.
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: ESE/3 Sea State: 3
GENERAL COMMENTS: Southern end of line complete.

ACTIVITY: PRODUCTION START: 22.33 END: 01.22 DATE: 90/11/20
LINE- BB90-190 STATUS: COMPLETE LINE DIRECTION: 238°

FSP: 101 File: 101 Tape No: 11253 Water Depth: 43 m. FCSP: 101
LSP: 1266 File: 1266 Tape No: 11264 Water Depth: 54 m. LCSP: 1266
Total Coverage: 29.150 kms Chargeable Coverage: 29.150 kms
Total bad traces: 1 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 2.7 µbars Depth: 10.4 m. ± 0.2 Feather: 4.0 ° to stbd
EOL Noise Av: 2.9 µbars Depth: 10.4 m. ± 0.2 Feather: 2.2 ° to port
Comment: Trace 160 fails daily HD test

ENERGY SOURCE
SOL Volume: 2170 ci @ Pressure: 1800 psi EOL Volume: 2170 ci
Comment: Gun 47 off at SOL, airleak

NAVIGATION
Stations in use: Charmouth, East Sandy, Mt.William
SOL Ranges: 46017.1 m. : 67794.4 m. : 70640.6 m.
SOL Antenna Position: 040 24 31.56 S: 147 40 32.61 E CEP: <1 meters
EOL Antenna Position: 040 32 49.40 S: 147 23 01.51 E CEP: <1 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: E/3 Sea State: 2-3
GENERAL COMMENTS:

257253

ACTIVITY: PRODUCTION START: 02.43 END: 04.35 DATE: 90/11/16
LINE- BB90-191 STATUS: TERMINATED LINE DIRECTION: 053°

FSP: 101 File: 101 Tape No: 11032 Water Depth: 67 m. FCSP: 101
LSP: 851 File: 851 Tape No: 11039 Water Depth: 66 m. LCSP: 843
Total Coverage: 18.775 kms Chargeable Coverage: 18.575 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 2

STREAMER
SOL Noise Av: 3.0 µbars Depth: 11.7 m. ± 0.5 Feather: 5.8 ° to port
EOL Noise Av: 4.2 µbars Depth: 11.6 m. ± 0.4 Feather: 2.4 ° to port
Comment: Swell bursts and tow jerk continue to show on data

ENERGY SOURCE
SOL Volume: 2170 ci @ Pressure: 1850 psi EOL Volume: 2170 ci
Comment: Gun 15 off at SOL, airleak

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 53539.7 m. : 33487.5 m. : 20239.8 m.
SOL Antenna Position: 040 48 19.13 S: 147 00 05.32 E CEP: 1-2 meters
EOL Antenna Position: 040 42 17.56 S: 147 10 48.08 E CEP: 1-2 meters
Comment:
Navigation quality: Good Overall Data Quality: Fair
Misfire report: SPs 312 and 811 bad records.
Wind Direction/Force: NW/5 Sea State: 4-5
GENERAL COMMENTS: Line terminated for source controller failure.

ACTIVITY: PRODUCTION START: 07.06 END: 08.42 DATE: 90/11/16
LINE- BB90-191A STATUS: TERMINATED LINE DIRECTION: 053°

FSP: 781 File: 781 Tape No: 11040 Water Depth: 65 m. FCSP: 844
LSP: 1420 File: 1420 Tape No: 11046 Water Depth: 58 m. LCSP: 1260
Total Coverage: 16.000 kms Chargeable Coverage: 10.425 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 2

STREAMER
SOL Noise Av: 3.9 µbars Depth: 11.3 m. ± 0.3 Feather: 1.3 ° to port
EOL Noise Av: 4.2 µbars Depth: 11.4 m. ± 0.5 Feather: 3.7 ° to port
Comment: Swell bursts fairly consistent, trace 84 spiking.

ENERGY SOURCE
SOL Volume: 2170 ci @ Pressure: 1850 psi EOL Volume: 2170 ci
Comment: Gun 15 off at SOL, airleak.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 42991.3 m. : 31343.7 m. : 32683.1 m.
SOL Antenna Position: 040 42 51.11 S: 147 09 47.71 E CEP: 1-2 meters
EOL Antenna Position: 040 37 54.03 S: 147 19 05.17 E CEP: 1-2 meters
Comment: SP 1096 line dogleg taken.
Navigation quality: Good Overall Data Quality: Fair
Misfire report: SPs 1089,1090 bad records. RN 1091 no general header
Wind Direction/Force: WNW/4-5 Sea State: 4-5
GENERAL COMMENTS: Line terminated for streamer parity errors.

257254

ACTIVITY: PRODUCTION START: 08.23 END: 12.59 DATE: 90/11/18
LINE- BB90-191B STATUS: COMPLETE LINE DIRECTION: 057°

FSP: 1201 File: 1201 Tape No: 11092 Water Depth: 63 m. FCSP: 1261
LSP: 3018 File: 3017 Tape No: 11111 Water Depth: 43 m. LCSP: 3018
Total Coverage: 45.450 kms Chargeable Coverage: 43.950 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 2

STREAMER
SOL Noise Av: 3.0 µbars Depth: 10.3 m. ± 0.3 Feather: 0.5 ° to stbd
EOL Noise Av: 2.6 µbars Depth: 10.4 m. ± 0.2 Feather: 3.7 ° to stbd
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Charmouth, Hardwickes, East Sandy
SOL Ranges: 60770.9 m. : 38698.4 m. : 34305.7 m.
SOL Antenna Position: 040 39 32.58 S: 147 15 50.48 E CEP: 2-3 meters
EOL Antenna Position: 040 25 59.11 S: 147 42 40.31 E CEP: 1-2 meters
Comment: Offline more than 25 meters at SPs 1400 and 2120, currents.
Navigation quality: Good Overall Data Quality: Good
Misfire report: SP 1528 bad record, 1529 NDR.
Wind Direction/Force: SW 2-3 Sea State: 2-3
GENERAL COMMENTS: Line complete with overlap

ACTIVITY: PRODUCTION START: 04.46 END: 05.57 DATE: 90/11/18
LINE- BB90-192A STATUS: COMPLETE LINE DIRECTION: 233°

FSP: 1361 File: 1361 Tape No: 11087 Water Depth: 62 m. FCSP: 1414
LSP: 1820 File: 1820 Tape No: 11091 Water Depth: 64 m. LCSP: 1820
Total Coverage: 11.500 kms Chargeable Coverage: 10.175 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 3.1 µbars Depth: 10.4 m. ± 0.2 Feather: 0.2 ° to stbd
EOL Noise Av: 3.6 µbars Depth: 10.3 m. ± 0.3 Feather: 0.5 ° to port
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 38084.6 m. : 27136.5 m. : 32201.7 m.
SOL Antenna Position: 040 44 16.30 S: 147 12 47.65 E CEP: 1-2 meters
EOL Antenna Position: 040 47 55.89 S: 147 06 12.10 E CEP: 1-2 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: SW 2-3 Sea State: 2-3
GENERAL COMMENTS: Line complete with overlap.

257255

ACTIVITY: PRODUCTION START: 22.56 END: 02.22 DATE: 90/11/17
LINE- BB90-192 STATUS: TERMINATED LINE DIRECTION: 233°

FSP: 101 File: 101 Tape No: 11072 Water Depth: 49 m. FCSP: 101
LSP: 1447 File: 1444 Tape No: 11086 Water Depth: 63 m. LCSP: 1413
Total Coverage: 33.675 kms Chargeable Coverage: 32.825 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 2

STREAMER
SOL Noise Av: 3.5 µbars Depth: 10.9 m. ± 0.6 Feather: 2.0 ° to stbd
EOL Noise Av: 3.1 µbars Depth: 10.5 m. ± 0.2 Feather: 0.2 ° to stbd
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2140 ci
Comment: SP 1400 gun 53 off, timing.

NAVIGATION
Stations in use: Charmouth, Hardwickes, East Sandy
SOL Ranges: 43975.2 m. : 34655.0 m. : 46036.3 m.
SOL Antenna Position: 040 34 11.27 S: 147 30 45.78 E CEP: 1-2 meters
EOL Antenna Position: 040 44 57.70 S: 147 11 32.87 E CEP: 2-3 meters
Comment: At SOL vessel drifted offline to max. 50 meters.
Navigation quality: Good Overall Data Quality: Good
Misfire report: SPs 324,875 bad records, 325,876 no general headers
Wind Direction/Force: SW/2 Sea State: 2
GENERAL COMMENTS: Line terminated for mass memory errors.

ACTIVITY: PRODUCTION START: 14.27 END: 16.51 DATE: 90/11/18
LINE- BB90-193 STATUS: COMPLETE LINE DIRECTION: 235°

FSP: 101 File: 101 Tape No: 11112 Water Depth: 39 m. FCSP: 101
LSP: 1066 File: 1066 Tape No: 11121 Water Depth: 48 m. LCSP: 1066
Total Coverage: 24.150 kms Chargeable Coverage: 24.150 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 6

STREAMER
SOL Noise Av: 2.1 µbars Depth: 10.3 m. ± 0.3 Feather: 3.7 ° to port
EOL Noise Av: 3.0 µbars Depth: 10.4 m. ± 0.2 Feather: 2.1 ° to port
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2140 ci
Comment: SP 258 gun 55 off A/F. Records 206,248,250,251,252,254 A/Fs

NAVIGATION
Stations in use: Charmouth, Hardwickes, East Sandy
SOL Ranges: 37504.6 m. : 45073.2 m. : 63997.5 m.
SOL Antenna Position: 040 28 16.55 S: 147 44 02.41 E CEP: 1-2 meters
EOL Antenna Position: 040 35 47.03 S: 147 30 04.32 E CEP: 1-2 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report: See Energy source
Wind Direction/Force: SE 3 Sea State: 2-3
GENERAL COMMENTS:

257256

ACTIVITY: PRODUCTION START: 10.53 END: 14.00 DATE: 90/11/17
LINE- BB90-194 STATUS: COMPLETE LINE DIRECTION: 235°

FSP: 101 File: 101 Tape No: 11047 Water Depth: 49 m. FCSP: 101
LSP: 1176 File: 1176 Tape No: 11057 Water Depth: 57 m. LCSP: 1176
Total Coverage: 26.900 kms Chargeable Coverage: 26.900 kms
Total bad traces: 0 Total gun failures: 2 Total misfires: 0

STREAMER

SOL Noise Av: 3.9 µbars Depth: 11.2 m. ± 1.0 Feather: 3.9 ° to stbd
EOL Noise Av: 3.5 µbars Depth: 11.1 m. ± 0.5 Feather: 6.2 ° to stbd
Comment: Streamer purposely run deeper to minimize swell noise.

ENERGY SOURCE

SOL Volume: 2160 ci @ Pressure: 1880 psi EOL Volume: 2120 ci
Comment: Gun 32 off at SOL, O/C solenoid. SP 801 gun 34 off, airleak.

NAVIGATION

Stations in use: Hardwickes, East Sandy, Stony Point.
SOL Ranges: 31340.9 m. : 43558.3 m. : 61008.8 m.
SOL Antenna Position: 040 35 51.46 S: 147 31 38.51 E CEP: 1-2 meters
EOL Antenna Position: 040 44 07.94 S: 147 16 00.12 E CEP: <1 meters
Comment:
Navigation quality: Good Overall Data Quality: Fair
Misfire report:
Wind Direction/Force: W/4 Sea State: 4-5
GENERAL COMMENTS: Swell noise still noticeable on records.

ACTIVITY: PRODUCTION START: 09.19 END: 10.13 DATE: 90/11/14
LINE- BB90-195 STATUS: TERMINATED LINE DIRECTION: 054°

FSP: 101 File: 101 Tape No: 10946 Water Depth: 53 m. FCSP: 101
LSP: 471 File: 471 Tape No: 10949 Water Depth: 54 m. LCSP: 471
Total Coverage: 9.275 kms Chargeable Coverage: 9.275 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 0

STREAMER

SOL Noise Av: 2.6 µbars Depth: 10.4 m. ± 0.2 Feather: 0.6 ° to stbd
EOL Noise Av: 4.1 µbars Depth: 10.6 m. ± 0.3 Feather: 0.8 ° to port
Comment: Streamer noise at termination high.

ENERGY SOURCE

SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2180 ci
Comment:

NAVIGATION

Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 36480.3 m. : 20905.7 m. : 25947.4 m.
SOL Antenna Position: 040 48 13.57 S: 147 12 24.02 E CEP: 1-2 meters
EOL Antenna Position: 040 40 15.01 S: 147 17 42.33 E CEP: <1 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: WNW 4 Sea State: 3-4
GENERAL COMMENTS: Line terminated to transfer personnel.

257257

ACTIVITY: PRODUCTION START: 18.29 END: 21.25 DATE: 90/11/17
LINE- BB90-195A STATUS: COMPLETE LINE DIRECTION: 053°

FSP: 411 File: 411 Tape No: 11061 Water Depth: 51 m. FCSP: 472
LSP: 1538 File: 1538 Tape No: 11071 Water Depth: 44 m. LCSP: 1538
Total Coverage: 28.200 kms Chargeable Coverage: 26.675 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 2.2 µbars Depth: 11.1 m. ± 0.5 Feather: 2.1 ° to stbd
EOL Noise Av: 3.4 µbars Depth: 10.7 m. ± 0.2 Feather: 3.8 ° to port
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 31801.6 m. : 22801.7 m. : 33385.9 m.
SOL Antenna Position: 040 45 44.10 S: 147 16 49.72 E CEP: <1 meters
EOL Antenna Position: 040 36 38.65 S: 147 32 52.03 E CEP: 1-2 meters
Comment: SP 1268 replaced Stony with Charmouth in 3 way fix solution
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: SW/2-3 Sea State: 3
GENERAL COMMENTS: Line complete with overlap.

ACTIVITY: PRODUCTION START: 18.19 END: 21.03 DATE: 90/11/18
LINE- BB90-196 STATUS: COMPLETE LINE DIRECTION: 055°

FSP: 101 File: 101 Tape No: 11122 Water Depth: 44 m. FCSP: 101
LSP: 1150 File: 1150 Tape No: 11132 Water Depth: 37 m. LCSP: 1150
Total Coverage: 26.250 kms Chargeable Coverage: 26.250 kms
Total bad traces: 1 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 2.9 µbars Depth: 10.4 m. ± 0.2 Feather: 3.1 ° to stbd
EOL Noise Av: 5.0 µbars Depth: 10.0 m. ± 0.6 Feather: 5.1 ° to port
Comment: Swell noise evident on records towards EOL

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1850 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Charmouth, Hardwickes, East Sandy
SOL Ranges: 39462.4 m. : 27708.6 m. : 40500.5 m.
SOL Antenna Position: 040 37 47.99 S: 147 32 06.43 E CEP: 1-2 meters
EOL Antenna Position: 040 29 36.19 S: 147 47 15.69 E CEP: <1 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: NNW/3 Sea State: 3-4
GENERAL COMMENTS:

257258

ACTIVITY: PRODUCTION START: 10.48 END: 14.42 DATE: 90/11/15
LINE- BB90-197 STATUS: COMPLETE LINE DIRECTION: 054°

FSP: 101 File: 101 Tape No: 11002 Water Depth: 50 m. FCSP: 101
LSP: 1696 File: 1694 Tape No: 11017 Water Depth: 42 m. LCSP: 1694
Total Coverage: 39.900 kms Chargeable Coverage: 39.900 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 2

STREAMER
SOL Noise Av: 2.7 µbars Depth: 10.4 m. ± 0.2 Feather: 2.3 ° to stbd
EOL Noise Av: 2.3 µbars Depth: 10.4 m. ± 0.2 Feather: 2.6 ° to stbd
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 31886.3 m. : 19338.6 m. : 29538.7 m.
SOL Antenna Position: 040 47 53.21 S: 147 15 51.10 E CEP: <1 meters
EOL Antenna Position: 040 35 03.92 S: 147 38 34.91 E CEP: 1-2 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report: SPs 204,205 NDRs, streamer ground fault.
Wind Direction/Force: W/3-3 Sea State: 3
GENERAL COMMENTS:

ACTIVITY: PRODUCTION START: 15.56 END: 19.18 DATE: 90/11/15
LINE- BB90-198 STATUS: TERMINATED LINE DIRECTION: 233°

FSP: 101 File: 101 Tape No: 11018 Water Depth: 40 m. FCSP: 101
LSP: 1420 File: 1420 Tape No: 11030 Water Depth: 47 m. LCSP: 1420
Total Coverage: 33.000 kms Chargeable Coverage: 33.000 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 2.1 µbars Depth: 10.3 m. ± 0.3 Feather: 0.3 ° to stbd
EOL Noise Av: 4.6 µbars Depth: 10.6 m. ± 0.3 Feather: 3.1 ° to stbd
Comment: Trace 87 spiking occasionally.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1900 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Charmouth, Hardwickes, Stony Point
SOL Ranges: 31893.5 m. : 29665.4 m. : 47993.9 m.
SOL Antenna Position: 040 36 09.38 S: 147 39 10.03 E CEP: 2-3 meters
EOL Antenna Position: 040 46 47.55 S: 147 20 26.59 E CEP: 1-2 meters
Comment: SP1375 Charmouth replaced by East Sandy.
Navigation quality: Good Overall Data Quality: Fair
Misfire report:
Wind Direction/Force: W/3 rising to WNW/4-5 Sea State: 4-5
GENERAL COMMENTS: Swell noise increasing rapidly from SP 12000. Line terminated for excessive swell noise bursts on data.

257259

ACTIVITY: PRODUCTION START: 16.29 END: 17.16 DATE: 90/11/17
LINE- BB90-198A STATUS: COMPLETE LINE DIRECTION: 233°

FSP: 1361 File: 1361 Tape No: 11058 Water Depth: 49 m. FCSP: 1421
LSP: 1658 File: 1658 Tape No: 11060 Water Depth: 47 m. LCSP: 1658
Total Coverage: 7.450 kms Chargeable Coverage: 5.950 kms
Total bad traces: 0 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 7.9 µbars Depth: 10.7 m. ± 0.2 Feather: 0.9 ° to stbd
EOL Noise Av: 6.4 µbars Depth: 10.6 m. ± 0.3 Feather: 0.8 ° to stbd
Comment: At SOL and EOL data and noise records affected by ship noise from two different vessels.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1810 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 25660.7 m. : 21260.1 m. : 37145.8 m.
SOL Antenna Position: 040 46 17.48 S: 147 21 15.84 E CEP: <1 meters
EOL Antenna Position: 040 48 41.76 S: 147 17 01.77 E CEP: <1 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: WNW/4 Sea State: 3
GENERAL COMMENTS: Line complete with overlap.

ACTIVITY: PRODUCTION START: 00.51 END: 03.48 DATE: 90/11/15
LINE- BB90-199A STATUS: COMPLETE LINE DIRECTION: 233°

FSP: 101 File: 101 Tape No: 10974 Water Depth: 35 m. FCSP: 101
LSP: 1273 File: 1270 Tape No: 10985 Water Depth: 44 m. LCSP: 1273
Total Coverage: 29.325 kms Chargeable Coverage: 29.325 kms
Total bad traces: 0 Total gun failures: 2 Total misfires: 3

STREAMER
SOL Noise Av: 2.0 µbars Depth: 10.3 m. ± 0.3 Feather: 7.6 ° to port
EOL Noise Av: 2.4 µbars Depth: 10.3 m. ± 0.3 Feather: 0.3 ° to stbd
Comment: Trace 155 spiking occasionally.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1850 psi EOL Volume: 2100 ci
Comment: SP 267 gun 54 off, timing. SP 372 gun 8 off, timing.

NAVIGATION
Stations in use: Charmouth, East Sandy, Stony Point
SOL Ranges: 29534.1 m. : 65276.7 m. : 86850.2 m.
SOL Antenna Position: 040 30 43.35 S: 147 50 03.36 E CEP: 2-3 meters
EOL Antenna Position: 040 40 09.86 S: 147 33 27.92 E CEP: <1 meters
Comment: SP 768-783 dropped Charmouth. SP 1147 Charmouth replaced by Hardwickes. SP 1186 Hardwickes replaced by Charmouth again
Navigation quality: Poor Overall Data Quality: Good
Misfire report: SPs 764,766,1142 missed because of navigation quality
Wind Direction/Force: W/2 Sea State: 3
GENERAL COMMENTS: Offline by up to 48 meters SPS 1168-1226, currents?

257260

ACTIVITY: PRODUCTION START: 05.55 END: 09.04 DATE: 90/11/15
LINE- BB90-200 STATUS: COMPLETE LINE DIRECTION: 233°

FSP: 101 File: 101 Tape No: 10986 Water Depth: 44 m. FCSP: 101
LSP: 1379 File: 1373 Tape No: 11001 Water Depth: 15 m. LCSP: 1379
Total Coverage: 31.975 kms Chargeable Coverage: 31.975 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 9

STREAMER
SOL Noise Av: 2.4 µbars Depth: 10.4 m. ± 0.2 Feather: 2.3 ° to stbd
EOL Noise Av: 2.3 µbars Depth: 10.2 m. ± 0.5 Feather: 3.0 ° to stbd
Comment:

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1850 psi EOL Volume: 2140 ci
Comment: SP 400 gun 60 off, timing.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 22677.5 m. : 38894.1 m. : 59698.5 m.
SOL Antenna Position: 040 40 02.88 S: 147 35 10.71 E CEP: 2-3 meters
EOL Antenna Position: 040 50 16.62 S: 147 16 54.64 E CEP: 1-2 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report: SPs 1146,1254,1255 bad records, SPs 1147,1148,1256, 1257,1258,1259 NDRs, bad quality tapes suspected.
Wind Direction/Force: Variable/1 Sea State: 2-3
GENERAL COMMENTS: Line terminated for shallows, considered complete.

ACTIVITY: PRODUCTION START: 15.14 END: 21.07 DATE: 90/11/14
LINE- BB90-201 STATUS: COMPLETE LINE DIRECTION: 052°

FSP: 101 File: 101 Tape No: 10950 Water Depth: 36 m. FCSP: 101
LSP: 2391 File: 2391 Tape No: 10970 Water Depth: 35 m. LCSP: 2391
Total Coverage: 57.275 kms Chargeable Coverage: 57.275 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 0

STREAMER
SOL Noise Av: 2.6 µbars Depth: 10.4 m. ± 0.4 Feather: 1.6 ° to stbd
EOL Noise Av: 2.0 µbars Depth: 10.3 m. ± 0.3 Feather: 0.4 ° to stbd
Comment: Trace 87 spiking occasionally,

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2160 ci
Comment: SP 523 gun 46 off, timing.

NAVIGATION
Stations in use: Hardwickes, East Sandy, Stony Point
SOL Ranges: 27358.0 m. : 11908.0 m. : 28283.0 m.
SOL Antenna Position: 040 51 29.76 S: 147 18 24.33 E CEP: <1 meters
EOL Antenna Position: 040 32 12.48 S: 147 50 10.22 E CEP: 6-7 meters
Comment: SP 931 dropped Stony added Charmouth. SDs quite high at EOL
Navigation quality: Fair Overall Data Quality: Good
Misfire report:
Wind Direction/Force: W/4 Sea State: 3
GENERAL COMMENTS: Using Mobile 552 for Charmouth ranging. Gyro readings erratic throughout the line.

257261

ACTIVITY: PRODUCTION START: 22.56 END: 04.42 DATE: 90/11/18
LINE- BB90-202A STATUS: COMPLETE LINE DIRECTION: 230°

FSP: 101 File: 101 Tape No: 11133 Water Depth: 33 m. FCSP: 101
LSP: 2428 File: 2428 Tape No: 11156 Water Depth: 40 m. LCSP: 2428
Total Coverage: 58.200 kms Chargeable Coverage: 58.200 kms
Total bad traces: 0 Total gun failures: 1 Total misfires: 0

STREAMER
SOL Noise Av: 2.0 µbars Depth: 10.4 m. ± 0.2 Feather: 14.4° to stbd
EOL Noise Av: 2.2 µbars Depth: 10.4 m. ± 0.2 Feather: 0.1 ° to port
Comment: Feather reducing steadily at SOL, <10° at SP 203.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2140 ci
Comment: SP1254 gun 55 off, timing, SP1304 on again, SP 1322 off again

NAVIGATION
Stations in use: Hardwicke, Charmouth, East Sandy
SOL Ranges: 25567.7 m. : 42232.1 m. : 65372.5 m.
SOL Antenna Position: 040 32 18.65 S: 147 52 29.06 E CEP: <1 meters
EOL Antenna Position: 040 52 19.12 S: 147 20 38.59 E CEP: 1-2 meters
Comment: Hardwicke signal rolling just after SOL and replaced by newly operational Mt. William station at SP 261. Hardwicke replaced SP2038
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: E/4 Sea State: 3-4
GENERAL COMMENTS: Offset measurement erroneous in SOL water depths. Designated A line because attempted in WX downtime.

ACTIVITY: PRODUCTION START: 07.46 END: 10.45 DATE: 90/11/19
LINE- BB90-203 STATUS: COMPLETE LINE DIRECTION: 051°

FSP: 101 File: 101 Tape No: 11157 Water Depth: 36 m. FCSP: 101
LSP: 1302 File: 1302 Tape No: 11166 Water Depth: 35 m. LCSP: 1302
Total Coverage: 30.050 kms Chargeable Coverage: 30.050 kms
Total bad traces: 1 Total gun failures: 1 Total misfires: 0

STREAMER
SOL Noise Av: 3.5 µbars Depth: 10.4 m. ± 0.2 Feather: 0.6 ° to stbd
EOL Noise Av: 3.4 µbars Depth: 9.4 m. ± 1.2 Feather: 6.5 ° to port
Comment: Trace 160 failing daily harmonic distortion tests

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2140 ci
Comment: SP1232 gun 28 off, airleak.

NAVIGATION
Stations in use: Charmouth, Hardwickes, East Sandy
SOL Ranges: 30567.6 m. : 15387.3 m. : 34531.8 m.
SOL Antenna Position: 040 43 52.33 S: 147 36 41.09 E CEP: <1 meters
EOL Antenna Position: 040 33 33.90 S: 147 53 08.99 E CEP: 1-2 meters
Comment: SP 653 Hardwicke dropped, rolling signal, added Mt.William
Navigation quality: Fair Overall Data Quality: Good
Misfire report: Wind Direction/Force: E/3 Sea
State: 3 GENERAL COMMENTS:

257262

ACTIVITY: PRODUCTION START: 16.31 END: 17.41 DATE: 90/11/19
LINE- BB90-204A STATUS: COMPLETE LINE DIRECTION: 230°

FSP: 931 File: 931 Tape No: 11178 Water Depth: 39 m. FCSP: 990
LSP: 1381 File: 1381 Tape No: 11182 Water Depth: 37 m. LCSP: 1381
Total Coverage: 11.275 kms Chargeable Coverage: 9.800 kms
Total bad traces: 1 Total gun failures: 1 Total misfires: 0

STREAMER
SOL Noise Av: 2.5 µbars Depth: 10.4 m. ± 0.2 Feather: 3.0 ° to port
EOL Noise Av: 3.0 µbars Depth: 10.4 m. ± 0.2 Feather: 4.0 ° to port
Comment: Trace 160 failing both harmonic distortion daily tests.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2140 ci
Comment: SP 1144 gun 41 off, no fire.

NAVIGATION
Stations in use: Charmouth, East Sandy, Mt.William
SOL Ranges: 21073.7 m. : 44514.8 m. : 45042.1 m.
SOL Antenna Position: 040 41 52.99 S: 147 44 03.15 E CEP: 1-2 meters
EOL Antenna Position: 040 45 46.13 S: 147 37 54.07 E CEP: <1 meters
Comment:
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: ESE/3 Sea State: 2-3
GENERAL COMMENTS: Line complete with overlap

ACTIVITY: PRODUCTION START: 11.58 END: 14.20 DATE: 90/11/19
LINE- BB90-204 STATUS: TERMINATED LINE DIRECTION: 230°

FSP: 101 File: 101 Tape No: 11169 Water Depth: 37 m. FCSP: 101
LSP: 1017 File: 1017 Tape No: 11177 Water Depth: 39 m. LCSP: 989
Total Coverage: 22.925 kms Chargeable Coverage: 22.225 kms
Total bad traces: 1 Total gun failures: 0 Total misfires: 0

STREAMER
SOL Noise Av: 2.1 µbars Depth: 10.4 m. ± 0.2 Feather: 17.8° to stbd
EOL Noise Av: 2.5 µbars Depth: 10.4 m. ± 0.2 Feather: 1.9 ° to port
Comment: Avoiding craypots on run in left streamer feather high. At shotpoint 191 feather reduced to 10° and falling steadily. Trace 160 failing daily harmonic distortion tests.

ENERGY SOURCE
SOL Volume: 2180 ci @ Pressure: 1800 psi EOL Volume: 2180 ci
Comment:

NAVIGATION
Stations in use: Charmouth, East Sandy, Mt.William
SOL Ranges: 20282.0 m. : 65243.8 m. : 43278.6 m.
SOL Antenna Position: 040 34 41.21 S: 147 55 19.36 E CEP: <1 meters
EOL Antenna Position: 040 42 37.25 S: 147 42 52.66 E CEP: <1 meters
Comment: Hardwicke signal still unreliable
Navigation quality: Good Overall Data Quality: Good
Misfire report:
Wind Direction/Force: SE 3 Sea State: 2-3
GENERAL COMMENTS: Line terminated for instrument memory errors.

257263

ACTIVITY: PRODUCTION START: 02.46 END: 11.06 DATE: 90/11/21
DETAIL: Last line of survey
LINE- BB90-205 STATUS: COMPLETE LINE DIRECTION: 094°

FSP: 101 File: 101 Tape No: 11265 Water Depth: 52 m. FCSP: 101
LSP: 3458 File: 3458 Tape No: 11297 Water Depth: 37 m. LCSP: 3458
Total Coverage: 83.950 kms Chargeable Coverage: 83.950 kms
Total bad traces: 1 Total gun failures: 2 Total misfires: 0

STREAMER

SOL Noise Av: 3.8 µbars Depth: 10.4 m. ± 0.2 Feather: 3.4 ° to stbd
EOL Noise Av: 8.2 µbars Depth: 11.3 m. ± 1.4 Feather: 1.7 ° to stbd
Comment: Trace 160 fails daily HD test. Swell noise increased markedly at SP1945. Streamer lowered to 11.5 m. at SP2160 then to 12.5 m. at SP2440. Swell noise predominant on the data from SP 2000 to EOL.

ENERGY SOURCE

SOL Volume: 2180 ci @ Pressure: 1750 psi EOL Volume: 2100 ci
Comment: SP756 gun 51 off, timing. SP2604 gun 60 off, airleak.

NAVIGATION

Stations in use: Charmouth, East Sandy, Mt.William
SOL Ranges: 48310.1 m. : 39829.9 m. : 71978.3 m.
SOL Antenna Position: 040 36 40.20 S: 147 25 58.04 E CEP: 1-2 meters
EOL Antenna Position: 040 39 46.35 S: 148 25 19.44 E CEP: 1-2 meters
Comment: SP3157 replaced East Sandy with Hardwickes
Navigation quality: Good Overall Data Quality: Marginal
Misfire report:
Wind Direction/Force: ENE/4-5 Sea State: 3 increasing
GENERAL COMMENTS: Line completed in very heavy easterly swell

257264

8. DAILY DIARY

7/11/90

08.00		Depart Newcastle/Belmont airport for Launceston.
13.15		Arrive Launceston airport and hire car to travel to Bell Bay.
14.00		Arrive at survey vessel, docked in Bell Bay. Start vessel inspection and meet with party manager then shore administrator. Vessel is scheduled to depart at 18.00 hours.
17.00		Results of the first Syledis calibration show some very inexplicable results for the in situ range measurements. After discussion the decision is made to recalibrate tomorrow. HGS personnel depart to recover all four stations.

8/11/90

06.30		Depart the vessel to travel to the mobile end of the short range calibration.
07.15		Arrive in Beechford. HGS personnel start to configure mobile equipment at trig. marker 341/050 while others depart with base equipment to Stony Head.
09.07		Start Syledis calibration.
10.00		Telephone call from the party manager advising that the required streamer plugs to execute the 6.25 meter groups at the head of the streamer are not available on board the vessel.
16.00		Advised that sailing has been delayed until tomorrow morning to await the arrival of the streamer plugs.
17.00		Syledis calibration complete, results of in situ range measurements still showing strange results. Start to demobilize mobile station and return to the vessel. Decision to sail and observe the results of the 3 way fixes offshore in survey area. Suspect some localized interference during calibration along the coast.

9/11/90

07.15		Depart vessel to return hire car to Launceston then travel back with crew administrator Larry Williams who is travelling to collect the streamer plugs at the airport.
09.50		Return to the vessel, ready to sail.
11.10	Mob/Demob Travel	Depart Bell Bay and head out to the survey area.

257265

9/11/90

13.55	Mob/Demob	Streamer	Start to deploy streamer.
15.30			Replacing the live 1 section at SEM 2.
17.10			Streamer deployment delayed while repairs made to a burst hydraulic line.
18.00			Hydraulic line repaired, resume streamer deployment.
23.15			All live sections deployed.
23.50			Adding an additional stretch to the front end.

10/11/90

00.00	Mob/Demob	Streamer	50 meter stretch added to front of streamer
04.50	Downtime	Weather	Streamer fully deployed and checked as far as possible. Sea state 5- 6, wind from west 30 knots, standing by for weather.
09.30			Streamer being retrieved in unworkable weather to rectify intermittent fault.
14.15			Streamer repairs complete and streamer redeployed. Weather remains too bad to start survey. Wind 30-35 knots, sea state 5-6.
23.00			Sea and swell still unworkable on any heading, but signs of very slight improvement.

11/11/90

00.00	Downtime	Weather	Maintaining 270° course, awaiting improvement in weather.
05.15			Weather still appears to be improving, but swell noise on streamer still too high and consistent.
09.15			Weather continues to improve, all source arrays being deployed in preparation for possible production. Daily tests on streamer completed.
12.49	Production	BB90-180	End of weather standby.
14.48	Line change	To BB90-179	
16.10	Downtime	Weather	Aborted the run in to line 179 because of excessive swell noise. Heading north to try line 175 from north to south.
18.48			Aborted the run in to line 175, excessive swell noise persists. Running to the west end of 179.
22.25			Aborted run in to line 179, swell noise still excessive.

12/11/90

00.00	Downtime	Weather	Standing by for weather, travelling to the west end of line 186

257266

12/11/90

01.30			Aborted line 186 on final run in, excessive swell noise.
06.30			Weather and seas moderated slightly, heading to western end of line 186 again.
09.00			All depth controllers set to 11 meters to try to minimize swell noise.
09.04	Production	BB90-186	Sea state easing slightly.
10.54	Line change	To BB90-185	
12.30	Production	BB90-185	
15.40	Line change	To BB90-184	Line change extended to add weight to front of streamer.
15.50			Starboard inner gunstring on board for repair. Retrieving stretches to add more weight.
16.35			Starboard array and streamer redeployed, heading for line.
18.01	Production	BB90-184	
20.16	Line change	To BB90-184	
21.22	Production	BB90-183	
23.25	Line change	To BB90-182	

13/11/90

00.00	Line change	To BB90-182	Recovering source arrays to work on streamer
00.10			All gunstrings on board, starting to recover streamer to repair fault.
01.00	Downtime	Streamer	Changed out SEM 13, data transmission fault. #2032 out, #2040 in.
01.30			Changed out the Live I section at SEM 13, trace 152 dead. #364 out, #7795 in.
02.25			Streamer work delayed for repairs to hydraulic system.
02.40			Resumed deploying streamer.
03.30			Streamer deployed and daily tests run, only trace 29 fails the second part of the Harmonic distortion.
04.25			All airgun arrays redeployed.
04.45			Attempting to improve streamer noise by mismatching engine rpms.
04.48	Production	BB90-182	
06.51	Line change	To BB90-181	
08.00	Production	BB90-181	
09.54	Line change	To BB90-179	Recovering starboard outer array recovered for repairs.
11.18	Production	BB90-179	
13.00	Line change	To BB90-178	
13.05			Navigation support reports that Sandy tower had broken support guy and was leaning at angle. Repairs completed and station back in use.
14.30	Production	BB90-178	
16.10	Line change	To BB90-175	Port inner gunstring recovered for repairs
16.50			Port inner gunstring redeployed.

257267

13/11/90

17.50	Production	BB90-175	
21.05	Line change	To BB90-176	Recovering the port inner gunstring for repair
22.00			Port inner gunstring redeployed.
22.25	Production	BB90-176	

14/11/90

00.00	Production	BB90-176	
01.18	Downtime	CMS	Line terminated after CMS computer failure. Circling to restart line. Recovering the starboard inner gunstring for repairs.
02.00			Starboard inner gunstring redeployed. Test line to check out CMS completed.
03.12			Resume line 176 as BB90-176A, shooting overlap.
03.20	Production	BB90-176A	First chargeable shotpoint
03.48	Line change	To BB90-177	Recovering port inner gunstring.
04.15			Port inner gunstring redeployed.
05.08	Production	BB90-177	
08.08	Line change	To BB90-195	Recovering starboard outer gunstring for repair.
09.00			Starboard outer gunstring redeployed.
09.19	Production	BB90-195	
10.13	Downtime	Contractor	Line terminated to allow personnel transfer from small boat, Recovering port inner gunstring and bringing in port boom.
10.45			Port inner gunstring on deck and outer towed inboard, boom secured. Bob Cush who injured a hand during last line change will also be transferred to enable proper medical attention.
11.25			Transfer complete, Graeme Kennedy on, Russell Stanley and Bob Cush off, vessel Furneaux Explorer returning to shore, start to redeploy airguns.
11.50			All gunstrings deployed, heading for line BB90-201.
12.53			Run in to line aborted after discovering that the gunstring and streamer are entangled. Circling to untangle and try again.
15.14	Production	BB90-201	
21.07	Line change	To BB90-199	Recovering the starboard outer gunstring for repairs
22.05			Starboard outer gunstring redeployed.
22.26	Downtime	Source	Start of line BB90-199, direction 233°
22.51			Line terminated after TIGER power supply failure. Circling to restart.

15/11/90

00.00	Downtime	Source	Circling back to restart line 199
00.51	Production	BB90-199A	

257268

15/11/90

03.48	Line change	To BB90-200	Recovering starboard inner gunstring
04.45			Lost signal from Charmouth, notified shore support.
05.30			Starboard inner gunstring redeployed.
05.55	Production	BB90-200	
09.04	Line change	To BB90-197	Recovering the starboard inner gunstring.
10.25			Starboard inner gunstring redeployed.
10.48	Production	BB90-197	
14.42	Line change	To BB90-198	
15.56	Production	BB90-198	
19.18	Downtime	Weather	Running to try line 202 to the north east.
21.21			Start of line BB90-202
21.30			Line terminated, excessive swell noise on streamer at 11-12 meters depth. Heading to the south end of line 191 to allow weather time to moderate.

16/11/90

00.00	Downtime	Weather	Travelling to the south end of line 191 while waiting for sea conditions to moderate.
02.43	Production	BB90-191	
04.35	Downtime	Source	Circling to resume line 191,
07.06	Production	BB90-191A	
07.15			First chargeable shotpoint 844.
08.17			Last chargeable shotpoint 1420.
08.42	Downtime	Streamer	Line terminated for streamer parity errors. Circling to resume line. Recovering the port outer gunstring.
11.40			Port outer gunstring redeployed.
11.47	Downtime	Weather	Line resumption aborted on final run in because of excess swell noise. Circling once again to allow weather time to moderate.
14.10			Run in to resume line 191 aborted again because of swell noise.
16.07	Downtime	Streamer	Run in to line 191 again aborted start to recover source in and work on streamer parity error problem which is reoccurring.
17.00			All gunstrings onboard, start to recover streamer
18.00			Removing one steel leadin and replacing 2 fifty meter stretches with one one hundred meter stretch.
19.30	Downtime	Weather	Streamer redeployed and checks good, standing by for weather again. Blowing WNW 5-6, sea state 5-6 also.
21.40			Run in to line 196 aborted, swell noise.
23.20			Run in to line 194 aborted, swell noise.

257269

17/11/90

00.00	Downtime	Weather	Standing by for weather, circling to run in to line 196 again
01.00			Line 196 aborted on final run in because of excessive swell noise.
02.45			Line 194 aborted on final run in because of excessive swell noise.
04.40			Line 196 aborted on final run in because of excessive swell noise.
07.00			Line 194 aborted on final run in because of excessive swell noise.
08.30			Port outer gun buoy caught on streamer on run in to line 196.
08.55			Streamer clear of port outer gunstring.
09.05	Downtime	Source	Line 196 aborted because of inner/outer port gunstring tangle.
09.10			Port arrays untangled.
10.25			All gunstrings deployed.
10.53	Production	BB90-194	
14.00	Line change	To BB90-198A	Recovering port inner and starboard outer gunstrings for repairs.
16.29	Production	BB90-198A	
16.39			First shotpoint of new production, 1421.
17.16	Line change	To BB90-198A	
18.29	Production	BB90-195A	
21.25	Line change	To BB90-192	
22.56	Production	BB90-192	

18/11/90

00.00	Production	BB90-192	
02.22	Downtime	Instruments	Recovering starboard inner gunstring for repairs
04.25			Starboard inner gunstring redeployed.
04.46	Production	BB90-192A	
04.54			First shotpoint of new production
05.57	Line change	To BB90-191B	
08.23	Production	BB90-191B	
11.08			Helicopter on deck with pilot and 4 passengers. K.Skripp R.Pickering M.Waldo P.Boill
11.28			Stony Point switched off for move to Mount William.
12.59	Line change	To BB90-193	
14.27	Production	BB90-193	
16.51	Line change	To BB90-196	Recovering starboard inner gunstring.
18.19	Production	BB90-196	
21.03	Line change	To BB90-202	
22.56	Production	BB90-202A	
23.00			Received coordinates for the newly installed station at Mount William

19/11/90

00.00	Production	BB90-202A	
04.42	Line change	To BB90-203	Recovering starboard inner and port outer gunstrings
07.15			All gunstrings redeployed.

257270

19/11/90

07.46	Production	BB90-203	
10.45	Line change	To BB90-204	Recovering port inner gunstring
11.20			Approach to line 204 blocked by what looks like craypots. Cutting in to line with short run in to avoid the obstacles.
11.58	Production	BB90-204	
14.20	Downtime	Instrument	Line terminated for instrument memory fault, circling to resume line.
16.31	Production	BB90-204A	
17.41	Line change	To BB90-189	Recovering both starboard gunstrings.
19.49	Production	BB90-189	Starting line at point 12 kilometers from southern end to shoot into the shallows.
21.00	Line change	To BB90-189A	Circling to shoot second portion of line.
21.10			Results from measurement of the Charmouth/Hardwickes base line show an observed value of 31331.35 cf computed 31335.25 meters.
22.13	Production	BB90-189A	Completion of line shot on reciprocal heading.

20/11/90

00.00	Production	BB90-189A	
04.21	Line change	To BB90-187	Recovering the port inner gunstring.
06.15			Port inner gunstring redeployed.
06.40	Production	BB90-187	
11.42	Line change	To BB90-188	Recovering the port outer gunstring
14.23	Production	BB90-188	
20.00	Line change	To BB90-190	
22.33	Production	BB90-190	

21/11/90

00.00	Production	BB90-190	
01.22	Line change	To BB90-205	Recovering starboard outer gunstring
02.46	Production	BB90-205	Last line of survey
11.06	Mob/Demob	Source	Recovering all gunstrings
11.32	Mob/Demob	Streamer	Recovering streamer
13.20	Mob/Demob	Travel	Streamer on board, start transit back to Bell Bay for data drop.

257271

APPENDIX A - LINE END COORDINATES

LINE							
BB90-175	040°31'46.67"S	N	5513440 m.	040°46'44.70"S	N	5485737 m.
	146°57'44.11"E	E	496803 m.	147°10'08.12"E	E	514254 m.
BB90-176	040°32'48.70"S	N	5511525 m.	040°48'21.78"S	N	5482749 m.
	146°55'07.92"E	E	493130 m.	147°07'47.52"E	E	510954 m.
BB90-177	040°33'31.81"S	N	5510194 m.	040°47'12.72"S	N	5484883 m.
	146°54'02.98"E	E	491604 m.	147°05'15.10"E	E	507385 m.
BB90-178	040°36'32.84"S	N	5504605 m.	040°32'16.59"S	N	5512518 m.
	146°50'31.04"E	E	486630 m.	147°01'07.59"E	E	501590 m.
BB90-179	040°37'53.11"S	N	5502133 m.	040°33'28.61"S	N	5510297 m.
	146°51'50.88"E	E	488510 m.	147°01'54.90"E	E	502702 m.
BB90-180	040°38'54.23"S	N	5500250 m.	040°33'53.41"S	N	5509530 m.
	146°52'35.72"E	E	489566 m.	147°04'36.72"E	E	506507 m.
BB90-181	040°41'22.34"S	N	5495683 m.	040°36'22.64"S	N	5504929 m.
	146°52'29.53"E	E	489427 m.	147°04'21.91"E	E	506155 m.
BB90-182	040°42'27.99"S	N	5493659 m.	040°37'08.60"S	N	5503511 m.
	146°52'39.25"E	E	489658 m.	147°04'58.78"E	E	507020 m.
BB90-183	040°43'42.17"S	N	5491372 m.	040°38'32.38"S	N	5500926 m.
	146°52'51.13"E	E	489940 m.	147°06'06.92"E	E	508618 m.
BB90-184	040°45'48.24"S	N	5487485 m.	040°39'31.27"S	N	5499108 m.
	146°53'01.91"E	E	490198 m.	147°07'21.07"E	E	510357 m.
BB90-185	040°47'22.81"S	N	5484569 m.	040°40'37.72"S	N	5497057 m.
	146°53'02.82"E	E	490223 m.	147°08'19.33"E	E	511722 m.
BB90-186	040°46'24.35"S	N	5486378 m.	040°41'35.38"S	N	5495278 m.
	146°59'09.92"E	E	498826 m.	147°08'45.83"E	E	512341 m.
BB90-187	040°19'30.65"S	N	5535961 m.	040°43'22.52"S	N	5491579 m.
	147°36'04.56"E	E	551080 m.	147°55'06.45"E	E	577567 m.
BB90-188	040°21'45.90"S	N	5531831 m.	040°47 33.27"S	N	5483891 m.
	147°31'37.08"E	E	544743 m.	147°52'03.38"E	E	573196 m.
BB90-189	040°17'11.47"S	N	5540353 m.	040°50'39.94"S	N	5478160 m.
	147°23'20.45"E	E	533067 m.	147°50'12.82"E	E	570550 m.
BB90-190	040°32'45.77"S	N	5511547 m.	040°24'28.32"S	N	5526736 m.
	147°23'08.58"E	E	532661 m.	147°40'40.02"E	E	557510 m.
BB90-191A	040°48'23.24"S	N	5482712 m.	040°40'18.75"S	N	5497624 m.
	146°59'58.68"E	E	499969 m.	147°14'17.86"E	E	520140 m.
BB90-191B	040°40'18.75"S	N	5497624 m.	040°26'02.83"S	N	5523801 m.
	147°14'17.86"E	E	520140 m.	147°42'32.93"E	E	560148 m.
BB90-192	040°47'51.74"S	N	5483678 m.	040°34'07.41"S	N	5508974 m.
	147°06'19.13"E	E	508884 m.	147°30'52.61"E	E	543561 m.

257272

BB90-193	040°35'43.26"S	N	5506024 m.	040°28'12.73"S	N	5519777 m.
	147°30'12.08"E	E	542591 m.	147°44'09.34"E	E	562386 m.
BB90-194	040°44'04.23"S	N	5490664 m.	040°35'48.19"S	N	5505859 m.
	147°16'07.21"E	E	522686 m.	147°31'45.85"E	E	544794 m.
BB90-195	040°48'17.47"S	N	5482870 m.	040°36'42.31"S	N	5504182 m.
	147°12'17.20"E	E	517273 m.	147°32'44.62"E	E	546165 m.
BB90-196	040°37'52.24"S	N	5502032 m.	040°29'39.96"S	N	5517051 m.
	147°32'00.02"E	E	545104 m.	147°47'08.67"E	E	566585 m.
BB90-197	040°47'57.07"S	N	5483486 m.	040°35'07.86"S	N	5507040 m.
	147°15'44.25"E	E	522126 m.	147°38'27.14"E	E	554235 m.
BB90-198	040°48'37.24"S	N	5482241 m.	040°36'05.69"S	N	5505248 m.
	147°17'08.79"E	E	524103 m.	147°39'15.97"E	E	555393 m.
BB90-199	040°40'05.93"S	N	5497896 m.	040°30'39.63"S	N	5515172 m.
	147°33'34.75"E	E	547303 m.	147°50'10.34"E	E	570844 m.
BB90-200	040°50'37.69"S	N	5478531 m.	040°39'58.87"S	N	5498098 m.
	147°16'14.09"E	E	522810 m.	147°35'17.37"E	E	549714 m.
BB90-201	040°51'34.11"S	N	5476782 m.	040°32'16.81"S	N	5512177 m.
	147°18'17.94"E	E	525704 m.	147°50'02.88"E	E	570640 m.
BB90-202	040°52'14.75"S	N	5475516 m.	040°32'14.16"S	N	5512224 m.
	147°20'45.13"E	E	529145 m.	147°52'35.15"E	E	574223 m.
BB90-203	040°43'56.54"S	N	5490757 m.	040°33'38.41"S	N	5509620 m.
	147°36'34.67"E	E	551478 m.	147°53'02.06"E	E	574830 m.
BB90-204	040°45'42.00"S	N	5487491 m.	040°34'37.50"S	N	5507763 m.
	147°38'01.06"E	E	553481 m.	147°55'26.35"E	E	578204 m.
BB90-205	040°36'39.91"S	N	5504310 m.	040°39'45.91"S	N	5497695 m.
	147°25'49.51"E	E	536411 m.	148°25 10.84"E	E	620006 m.

257273

APPENDIX B - SYLEDIS CALIBRATION RESULTS

DATE	8TH NOVEMBER 1990			
CLIENT	BRIDGE OIL			
PROSPECT	T-15-P			
MOBILE SERIAL NO.	552			
INTERROGATE SLOT	1			
COLOUR CODE	BLUE/GREEN			
ANTENNA TYPE	CELWAVE OMNI			
CABLE	30 m. FSJ4-50 + 2 m. RG215 PIGTAIL			
CALIBRATION RANGE	341/050 TO ST868			
DISTANCE	7404.964-1.46 OFFSET = 7403.504 meters			
BEACON REPLY SLOT	2	3	4	5
SERIAL NO.	436	868	871	893
ANTENNA TYPE	OMNI	OMNI	OMNI	OMNI
CABLE TYPE	FSJ4-50	FSJ4-50	FSJ4-50	FSJ4-50
CABLE LENGTH	30 m.	30 m.	30 m.	30 m.
COLOUR CODE	YELLOW	ORANGE	GREEN	BLUE
START TIME	10.15	9.30	9.15	8.20
AGC	7.50	7.80	8.00	7.80
READINGS				
1	7,637.60	7,636.60	7,637.60	7,638.30
2	7,637.00	7,636.20	7,637.30	7,638.20
3	7,637.30	7,636.30	7,637.30	7,638.20
4	7,637.50	7,636.40	7,637.90	7,638.40
5	7,637.10	7,636.20	7,637.50	7,638.30
6	7,636.90	7,636.20	7,637.70	7,638.10
7	7,637.60	7,636.30	7,637.50	7,638.00
8	7,637.60	7,636.60	7,637.60	7,638.10
9	7,637.50	7,636.30	7,637.70	7,638.30
10	7,637.20	7,636.20	7,637.50	7,638.20
11	7,637.80	7,636.50	7,637.50	7,638.20
12	7,637.60	7,636.70	7,637.70	7,638.10
13	7,637.60	7,636.60	7,637.60	7,638.10
14	7,637.50	7,636.50	7,637.60	7,638.10
15	7,637.80	7,636.60	7,637.90	7,638.20
16	7,637.20	7,636.40	7,637.70	7,638.20
17	7,637.90	7,636.60	7,637.80	7,638.10
18	7,637.80	7,636.30	7,637.60	7,638.10
19	7,637.60	7,636.10	7,637.40	7,638.20
20	7,637.80	7,636.40	7,637.50	7,638.30
AVERAGE	7,637.495	7,636.400	7,637.595	7,638.185
STANDARD DEVIATION	0.280	0.173	0.163	0.096
MINUS CAL. DIST.	7,403.504	7,403.504	7,403.504	7,403.504
DELAY	233.991	232.896	234.091	234.681
PERSONNEL PRESENT	BRUCE TUCK, LARRY WILLIAMS, FRANK RENTON			
WEATHER CONDITIONS	LIGHT CLOUD COVER, WARM, NO WIND			
COMMENTS	RECALIBRATION, BEACON 6 NOT FUNCTIONING			
SYSTEM FREQUENCY	427.061 MHZ			

257274

DATE	8TH NOVEMBER, 1990			
CLIENT	BRIDGE OIL			
PROSPECT	T-15-P			
MOBILE SERIAL NO.	398			
INTERROGATE SLOT	1			
COLOUR CODE	RED/GREEN			
ANTENNA TYPE	CELWAVE OMNI			
CABLE	30 m. FSJ4-50 + 2 m. RG215 PIGTAIL			
CALIBRATION RANGE	341/050 TO ST868			
DISTANCE	7404.964-1.46 OFFSET = 7403.504 meters			
BEACON REPLY SLOT	2	3	4	5
SERIAL NO.	436	868	871	893
ANTENNA TYPE	OMNI	OMNI	OMNI	OMNI
CABLE TYPE	FSJ4-50	FSJ4-50	FSJ4-50	FSJ4-50
CABLE LENGTH	30 m.	30 m.	30 m.	30 m.
COLOUR CODE	YELLOW	ORANGE	GREEN	BLUE
START TIME	10.00	9.45	9.07	8.45
AGC	8.00	7.80	8.30	8.80
READINGS				
1	7,631.60	7,632.10	7,631.00	7,631.80
2	7,631.60	7,632.30	7,630.70	7,632.00
3	7,631.10	7,632.20	7,631.00	7,632.20
4	7,631.60	7,632.10	7,631.00	7,632.20
5	7,631.40	7,632.40	7,631.00	7,632.40
6	7,631.60	7,632.10	7,631.10	7,632.50
7	7,631.40	7,632.00	7,631.10	7,632.20
8	7,631.40	7,632.00	7,631.20	7,632.20
9	7,631.40	7,632.30	7,631.10	7,632.40
10	7,631.20	7,632.30	7,631.20	7,632.20
11	7,631.70	7,632.00	7,631.10	7,632.20
12	7,631.60	7,632.40	7,631.10	7,632.20
13	7,631.50	7,632.40	7,631.10	7,632.20
14	7,631.20	7,632.70	7,631.10	7,632.20
15	7,631.60	7,632.20	7,631.10	7,632.10
16	7,631.60	7,632.50	7,631.10	7,632.40
17	7,631.40	7,632.40	7,631.20	7,631.60
18	7,631.60	7,632.40	7,631.40	7,632.40
19	7,632.20	7,632.40	7,631.10	7,631.70
20	7,631.20	7,632.30	7,631.10	7,632.60
AVERAGE	7,631.495	7,632.275	7,631.090	7,632.185
STANDARD DEVIATION	0.233	0.181	0.126	0.248
MINUS CAL. DIST.	7,403.504	7,403.504	7,403.504	7,403.504
DELAY	227.991	228.771	227.586	228.681
PERSONNEL PRESENT	BRUCE TUCK, LARRY WILLIAMS, FRANK RENTON			
WEATHER CONDITIONS	LIGHT CLOUD COVER, WARM, NO WIND			
COMMENTS	RECALIBRATION, BEACON 6 NOT FUNCTIONING			
SYSTEM FREQUENCY	427.061 MHZ			

257275

DATE	8TH NOVEMBER, 1990		
CLIENT	BRIDGE OIL		
PROSPECT	T-15-P		
MOBILE SERIAL NO.	552		
INTERROGATE SLOT	1		
COLOUR CODE	BLUE/GREEN		
ANTENNA TYPE	CELWAVE OMNI		
CABLE	30 m. FSJ4-50 + 2 m. RG215 PIGTAIL		
CALIBRATION RANGE	341/050 TO EAST SANDY		
DISTANCE	33348.093 meters		
BEACON REPLY SLOT	2	3	4
SERIAL NO.	436	868	871
ANTENNA TYPE	OMNI	OMNI	OMNI
CABLE TYPE	FSJ4-50	FSJ4-50	FSJ4-50
CABLE LENGTH	30 m.	30 m.	30 m.
COLOUR CODE	YELLOW	ORANGE	GREEN
AGC	4.60	4.80	4.70
READINGS			
1	33,589.50	33,607.20	33,603.60
2	33,588.70	33,607.70	33,602.40
3	33,587.20	33,606.00	33,603.30
4	33,590.90	33,607.30	33,603.80
5	33,586.70	33,606.40	33,603.30
6	33,589.30	33,606.90	33,602.60
7	33,589.20	33,605.70	33,603.10
8	33,588.00	33,605.50	33,603.20
9	33,587.50	33,606.80	33,602.40
10	33,584.60	33,606.30	33,603.60
11	33,587.60	33,606.10	33,602.00
12	33,589.20	33,605.60	33,604.20
13	33,589.20	33,605.20	33,603.00
14	33,588.80	33,605.70	33,604.40
15	33,587.30	33,606.50	33,603.00
16	33,584.70	33,605.30	33,603.60
17	33,588.60	33,606.10	33,603.20
18	33,588.00	33,606.40	33,603.40
19	33,589.20	33,605.80	33,602.70
20	33,585.80	33,607.60	33,603.80
AVERAGE	33,588.000	33,606.305	33,603.230
STANDARD DEVIATION	1.583	0.728	0.596
MINUS CAL. DIST.	33,348.093	33,348.093	33,348.093
DELAY	239.907	258.212	255.137
PERSONNEL PRESENT	BRUCE TUCK, LARRY WILLIAMS, FRANK RENTON		
WEATHER CONDITIONS	OVERCAST, RAIN AND THUNDERSTORMS		
COMMENTS	READING TO BEACON 5 IN SITU 7638-9 meters		
SYSTEM FREQUENCY	427.061 MHZ.		

257276

DATE	8TH NOVEMBER, 1990		
CLIENT	BRIDGE OIL		
PROSPECT	T-15-P		
MOBILE SERIAL NO.	398		
INTERROGATE SLOT	1		
COLOUR CODE	RED/GREEN		
ANTENNA TYPE	CELWAVE OMNI		
CABLE	30 m. FSJ4-50 + 2 m. RG215 PIGTAIL		
CALIBRATION RANGE	341/050 TO EAST SANDY		
DISTANCE	33348.093 meters		
BEACON REPLY SLOT	2	3	4
SERIAL NO.	436	868	871
ANTENNA TYPE	OMNI	OMNI	OMNI
CABLE TYPE	FSJ4-50	FSJ4-50	FSJ4-50
CABLE LENGTH	30 m.	30 m.	30 m.
COLOUR CODE	YELLOW	ORANGE	GREEN
AGC	4.60	4.20	4.50
READINGS			
1	33,591.20	33,592.60	33,585.80
2	33,591.30	33,593.10	33,584.90
3	33,591.90	33,594.00	33,585.80
4	33,592.70	33,595.10	33,587.80
5	33,594.00	33,594.20	33,586.80
6	33,590.80	33,591.20	33,587.40
7	33,591.90	33,594.20	33,587.30
8	33,593.80	33,592.80	33,588.40
9	33,591.70	33,593.70	33,588.60
10	33,592.20	33,594.80	33,587.50
11	33,590.80	33,593.70	33,586.90
12	33,592.50	33,594.10	33,585.40
13	33,592.30	33,593.80	33,587.00
14	33,591.20	33,594.30	33,588.50
15	33,590.60	33,594.50	33,588.00
16	33,595.30	33,594.30	33,587.70
17	33,593.50	33,592.70	33,589.60
18	33,592.50	33,593.70	33,587.90
19	33,593.60	33,593.30	33,586.50
20	33,591.20	33,594.00	33,587.30
AVERAGE	33,592.250	33,593.705	33,587.255
STANDARD DEVIATION	1.228	0.871	1.138
MINUS CAL. DIST.	33,348.093	33,348.093	33,348.093
DELAY	244.157	245.612	239.162
PERSONNEL PRESENT	BRUCE TUCK, LARRY WILLIAMS, FRANK RENTON		
WEATHER CONDITIONS	OVERCAST, THUNDERSTORMS, RAIN		
COMMENTS	RANGE TO BEACON 5 IN SITU, 7633.0 meters		
SYSTEM FREQUENCY	427.061 MHZ		

257277

DATE	8TH NOVEMBER, 1990	
CLIENT	BRIDGE OIL	
PROSPECT	T-15-P	
MOBILE SERIAL NO.	552	
INTERROGATE SLOT	1	
COLOUR CODE	BLUE/GREEN	
ANTENNA TYPE	CELWAVE OMNI	
CABLE	30 m. FSJ4-50 + 2 m. RG215 PIGTAIL	
CALIBRATION RANGE	341/050 TO HARDWICKES OFFSET	
DISTANCE	59637.827 meters	
BEACON REPLY SLOT	2	3
SERIAL NO.	436	868
ANTENNA TYPE	OMNI	OMNI
CABLE TYPE	FSJ4-50	FSJ4-50
CABLE LENGTH	30 m.	30 m.
COLOUR CODE	YELLOW	ORANGE
AGC	5.00	4.60
READINGS		
1	59,878.80	59,878.80
2	59,878.40	59,879.20
3	59,878.30	59,879.30
4	59,878.30	59,878.20
5	59,878.50	59,878.80
6	59,878.00	59,879.80
7	59,877.90	59,879.10
8	59,878.00	59,878.90
9	59,879.00	59,879.20
10	59,878.00	59,879.30
11	59,878.40	59,878.80
12	59,878.20	59,879.10
13	59,878.30	59,878.70
14	59,878.30	59,879.80
15	59,878.50	59,878.50
16	59,878.60	59,879.00
17	59,878.10	59,879.10
18	59,877.80	59,878.80
19	59,879.10	59,879.10
20	59,878.90	59,878.80
AVERAGE	59,878.370	59,879.015
STANDARD DEVIATION	0.353	0.378
MINUS CAL. DIST.	59,637.827	59,637.827
DELAY	240.543	241.188
PERSONNEL PRESENT	BRUCE TUCK, LARRY WILLIAMS, FRANK RENTON	
WEATHER CONDITIONS	OVERCAST, RAIN SHOWERS, LIGHT WIND	
COMMENTS	RANGE TO BEACON 5 7638.6 meters	
SYSTEM FREQUENCY	427.061 MHZ	

257278

DATE	8TH NOVEMBER, 1990	
CLIENT	BRIDGE OIL	
PROSPECT	T-15-P	
MOBILE SERIAL NO.	398	
INTERROGATE SLOT	1	
COLOUR CODE	RED/GREEN	
ANTENNA TYPE	CELWAVE OMNI	
CABLE	30 m. FSJ4-50 + 2 m. RG215 PIGTAIL	
CALIBRATION RANGE	341/050 TO HARDWICKES OFFSET	
DISTANCE	59637.827 meters	
BEACON REPLY SLOT	2	3
SERIAL NO.	436	868
ANTENNA TYPE	OMNI	OMNI
CABLE TYPE	FSJ4-50	FSJ4-50
CABLE LENGTH	30 m.	30 m.
COLOUR CODE	YELLOW	ORANGE
AGC	4.50	4.90
READINGS		
1	59,875.20	59,873.50
2	59,875.90	59,873.60
3	59,875.90	59,873.30
4	59,875.50	59,873.00
5	59,875.80	59,873.30
6	59,876.10	59,872.80
7	59,876.50	59,873.20
8	59,876.00	59,873.00
9	59,876.00	59,873.10
10	59,876.00	59,872.90
11	59,876.20	59,872.50
12	59,876.90	59,872.90
13	59,876.60	59,872.80
14	59,876.50	59,872.90
15	59,876.70	59,872.90
16	59,876.60	59,873.50
17	59,876.80	59,872.60
18	59,876.50	59,872.60
19	59,876.80	59,872.80
20	59,877.20	59,872.50
AVERAGE	59,876.285	59,872.985
STANDARD DEVIATION	0.493	0.321
MINUS CAL. DIST.	59,637.827	59,637.827
DELAY	238.458	235.158
PERSONNEL PRESENT	BRUCE TUCK, LARRY WILLIAMS, FRANK RENTON	
WEATHER CONDITIONS	OVERCAST, RAIN AND LIGHT WINDS	
COMMENTS	RANGE TO BEACON 5 7631.6 meters	
SYSTEM FREQUENCY	427.061 MHZ	

257279

DATE	8TH NOVEMBER, 1990
CLIENT	BRIDGE OIL
PROSPECT	T-15-P
MOBILE SERIAL NO.	552
INTERROGATE SLOT	1
COLOUR CODE	BLUE/GREEN
ANTENNA TYPE	CELWAVE OMNI
CABLE	30 m. FSJ4-50 + 2 m. RG215 PIGTAIL
CALIBRATION RANGE	341/050 TO STATIONS IN SITU
DISTANCE	90,886.256 59,637.827 33,348.093 7,403.504

BEACON REPLY SLOT	2	3	4	5
SERIAL NO.	436	868	871	893
ANTENNA TYPE	OMNI	OMNI	OMNI	OMNI
CABLE TYPE	FSJ4-50	FSJ4-50	FSJ4-50	FSJ4-50
CABLE LENGTH	30 m.	30 m.	30 m.	30 m.
COLOUR CODE	YELLOW	ORANGE	GREEN	BLUE
AGC	4.00	4.80	4.70	7.50
READINGS				
1	91,124.30	59,879.60	33,599.50	7,638.00
2	91,124.30	59,880.40	33,599.50	7,637.80
3	91,124.50	59,883.30	33,601.80	7,638.40
4	91,125.60	59,881.90	33,600.20	7,637.90
5	91,124.50	59,881.50	33,599.20	7,637.70
6	91,124.80	59,880.70	33,600.50	7,637.80
7	91,125.10	59,879.80	33,598.90	7,638.00
8	91,125.10	59,882.50	33,595.70	7,638.00
9	91,125.60	59,883.10	33,597.60	7,637.90
10	91,123.70	59,881.90	33,598.70	7,638.00
11	91,123.10	59,882.10	33,600.80	7,638.30
12	91,124.10	59,883.50	33,600.60	7,637.80
13	91,124.70	59,883.10	33,598.30	7,638.10
14	91,124.90	59,881.70	33,600.00	7,637.90
15	91,123.80	59,881.40	33,598.20	7,637.90
16	91,123.10	59,884.60	33,599.40	7,638.10
17	91,124.00	59,881.00	33,597.90	7,638.30
18	91,123.90	59,882.30	33,598.80	7,638.10
19	91,123.70	59,881.60	33,600.20	7,637.80
20	91,123.60	59,883.60	33,598.70	7,637.90
AVERAGE	91,124.320	59,881.980	33,599.225	7,637.985
STANDARD DEVIATION	0.712	1.280	1.321	0.182
MINUS CAL. DIST.	90,886.256	59,637.827	33,348.093	7,403.504
DELAY	238.064	244.153	251.132	234.481

PERSONNEL PRESENT	BRUCE TUCK, LARRY WILLIAMS, FRANK RENTON
WEATHER CONDITIONS	OVERCAST, RAIN AND LIGHT WINDS
COMMENTS	
SYSTEM FREQUENCY	427.061 MHZ

257280

DATE	8TH N6VE0BER, 1990
CLIENT	BRIDGE OIL
PROSPECT	T-15-P
MOBILE SERIAL NO.	398
INTERROGATE SLOT	1
COLOUR CODE	RED/GREEN
ANTENNA TYPE	CELWAVE OMNI
CABLE	30 m. FSJ4-50 + 2 m. RG215 PIGTAIL
CALIBRATION RANGE	341/050 TO IN SITU
DISTANCE	90,886.256 59,637.827 33,348.093 7,403.504

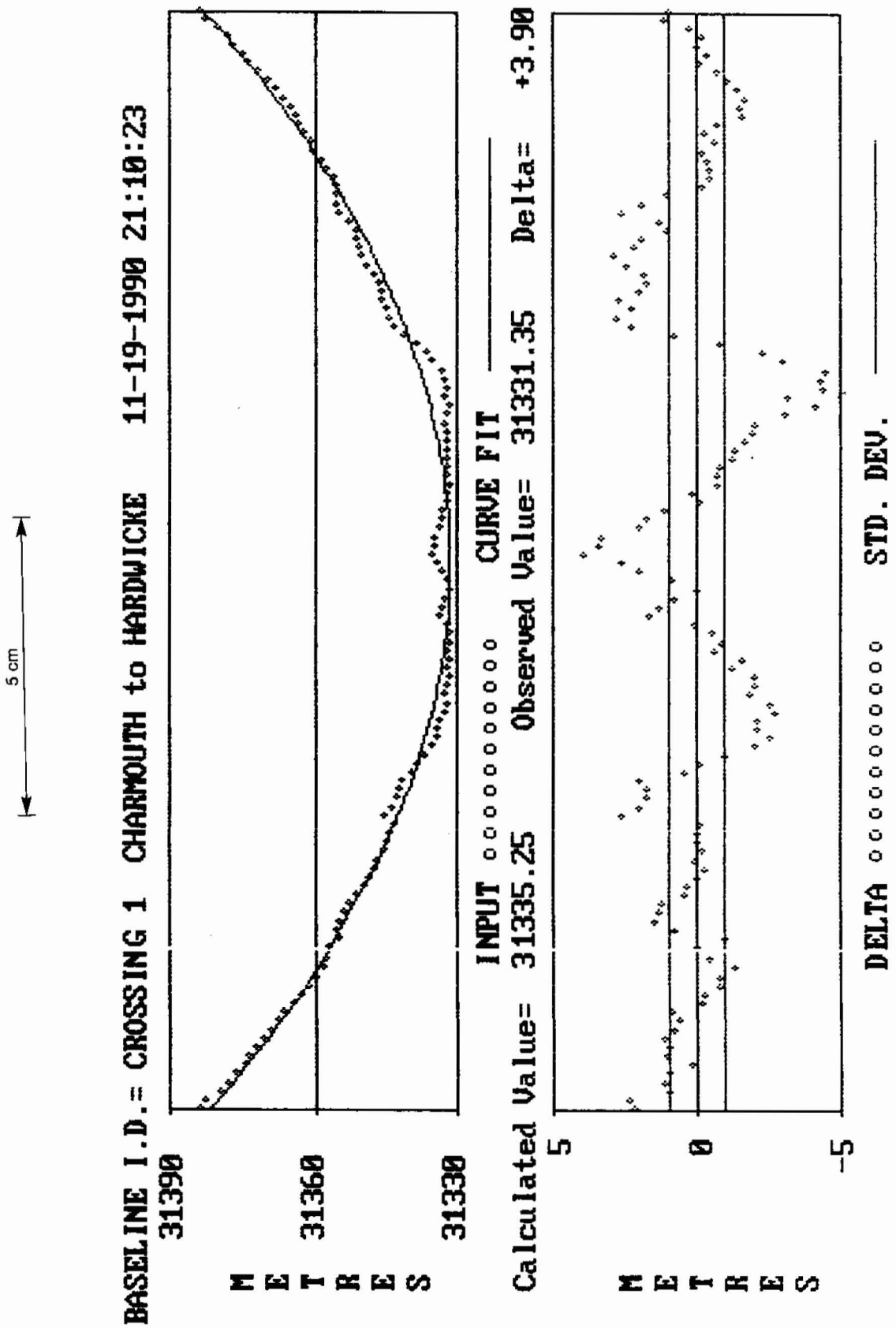
BEACON REPLY SLOT	2	3	4	5
SERIAL NO.	436	868	871	893
ANTENNA TYPE	OMNI	OMNI	OMNI	OMNI
CABLE TYPE	FSJ4-50	FSJ4-50	FSJ4-50	FSJ4-50
CABLE LENGTH	30 m.	30 m.	30 m.	30 m.
COLOUR CODE	YELLOW	ORANGE	GREEN	BLUE
AGC				
READINGS				
1	91,115.60	59,878.40	33,585.50	7,632.90
2	91,115.10	59,879.30	33,585.00	7,632.80
3	91,116.80	59,879.20	33,584.80	7,632.90
4	91,114.90	59,879.40	33,584.50	7,632.60
5	91,114.80	59,879.30	33,584.20	7,632.80
6	91,114.70	59,879.00	33,586.20	7,632.70
7	91,114.80	59,879.20	33,585.10	7,632.60
8	91,115.00	59,879.20	33,587.00	7,632.70
9	91,115.80	59,878.90	33,586.10	7,632.80
10	91,114.50	59,879.30	33,585.00	7,632.80
11	91,115.70	59,878.90	33,584.20	7,632.40
12	91,115.10	59,878.60	33,585.10	7,632.50
13	91,115.70	59,878.60	33,586.80	7,632.70
14	91,117.00	59,879.10	33,585.50	7,632.90
15	91,116.70	59,879.40	33,585.50	7,633.00
16	91,116.40	59,878.70	33,585.00	7,632.80
17	91,114.60	59,878.90	33,584.30	7,632.90
18	91,115.20	59,878.90	33,586.00	7,632.60
19	91,115.90	59,879.10	33,587.60	7,633.10
20	91,117.00	59,879.50	33,585.70	7,633.10
AVERAGE	91,115.565	59,879.045	33,585.455	7,632.780
STANDARD DEVIATION	0.811	0.296	0.917	0.181
MINUS CAL. DIST.	90,886.256	59,637.827	33,348.093	7,403.504
DELAY	229.309	241.218	237.362	229.276

PERSONNEL PRESENT	BRUCE TUCK, LARRY WILLIAMS, FRANK RENTON
WEATHER CONDITIONS	OVERCAST, RAIN AND LIGHT WINDS
COMMENTS	
SYSTEM FREQUENCY	427.061 MHZ

257281

APPENDIX C - SYLEDIS BASELINE CROSSING

257282


BASELINE I.D.= CROSSING 1 CHARMOUTH to HARDWICKE 11-19-1990 21:10:23
31390
31360
31330
METRES
INPUT oooooooooooo CURVE FIT
Calculated Value= 31335.25 Observed Value= 31331.35 Delta= +3.90
5
0
-5
METRES
DELTA oooooooooooo STD. DEV.
5 cm

257283

T/15P - TASMANIA

DURROON BASIN

BARK SUB-BASIN

BRIDGE BASS 1990 SEISMIC SURVEY

FINAL REPORT

APPENDIX V

257284

T/15P - TASMANIA
DURROON BASIN
BARK SUB-BASIN
BRIDGE BASS 1990 SEISMIC SURVEY
FINAL REPORT

Table of contents:

Summary

I Introduction

II Regional Setting

III Geological Setting

IV Geophysical Interpretations
 a The Otway Formation
 b The Durroon Megasequence

V Conclusions
 a General Conclusions
 b Conclusions Regarding Map Reliability

VI Recommendations

References

257285

Figures

1. T/15P Permit Location Map
2. Bark Sub-basin Stratigraphic Column
3. Postulated 100 Ma to 80 Ma Shorelines
4. Distribution of the Otway Group
5. Seismic tie to Durroon-1

Enclosures:

1.	T/15P Shotpoint Base Map (all data)	Scale: 1:100,000.
2.	Demon's Bluff TWT SCM	Scale: 1:100,000.
3.	Paleocene TWT SCM	Scale: 1:100,000.
4.	Otway Group TWT SCM	Scale: 1:100,000.
5.	Durroon Megasequence TWT SCM	Scale: 1:100,000.
6.	Structural Framework Map	Scale: 1:250,000

257286

SUMMARY

The Bridge Bass 1990 Seismic Survey recorded 1100 km of data in the Tasmanian Exploration permit T/15P in 1990. Three hundred kilometres of this data were recorded in the Bark Sub-basin and have subsequently been interpreted and incorporated into the existing data base. The resultant interpretation has produced one drillable prospect on the Strathroy Block and an enhancement of the perceived hydrocarbon prospectivity of the Bark Sub-basin.

The zones of common interest in the Bass and Gippsland Basins (Eocene - Paleocene) map as shallow featureless planes that exhibit a gentle north-westerly dip in the Bark Sub-basin. These zones are of minimal exploration interest in this area.

The Bark Sub-basin contains three unique structural entities or blocks herein named the Batman, Strathroy and Ross blocks. Rifting of the Australian and Antarctic crustal plates (ca 100 Ma) and the opening of the Tasman Sea (ca 80 Ma) has caused each block to have a unique shape.

The Ross Block is interpreted to be a partially developed elongate rotated half-graben containing a wedge of sediments (Durroon Megasequence) equivalent in age to the hydrocarbon bearing Golden Beach Megasequence of the Gippsland and Otway Basins. The Strathroy Block is interpreted to be an antithetically faulted basement horst block. The Batman Block is interpreted to be a collapsed anticline that owes its unique geometry to extension during the Otway Rift period and 'oblique extension' during the Tasman Rift period.

The exploration targets in the Strathroy and Batman Blocks are interpreted to be located within updip closures along up-thrown fault block rims. Targets in the Ross block are interpreted to be located in the fault dependent closures adjacent to the half-graben growth normal fault. The expected reservoir/seal configuration in this sub-basin is porosity in lacustrine Otway Formation sands sealed by Durroon Mudstones.

The Durroon Megasequence in this sub-basin is interpreted to dip and thicken from a thin veneer of Durroon Mudstone in the south to a complete Durroon Megasequence (Golden Beach equivalent) in the north. Thick (in excess of 2 seconds) source rocks of Golden Beach Megasequence age equivalence are expected to be found at depths in excess of 3 seconds some 7 to 10 km north of the area of interest. The interpretation of faults and fault trends suggest that there would be minimal resistance to migrating hydrocarbons.

A drillable prospect has been mapped on the Strathroy Block. This prospect is mapped as a faulted four way dip closure at Otway Formation levels some 5 km^2 in area. Maximum estimated vertical relief is calculated to be approximately 160 m (ave ~80 m).

Should closer surface control over this feature be warranted it is recommended that two lines parallelling line BB88-168 be recorded over this feature.

257287

I INTRODUCTION:

This report discusses the interpretation of 300 km of new seismic data that were recorded in the Bark Sub-basin of the Tasmanian exploration permit T/15P (Fig 1). Included in the report are detailed reports from the companies involved with data acquisition and processing. All aspects of the survey are discussed in the relative appendices attached hereto.

II REGIONAL SETTING:

The stratigraphy of the Bark Sub-basin is expected to be similar to the stratigraphy of Durroon-1 (Fig 2). The Bark Sub-basin is the westernmost of three sub-basins that comprise the Durroon Basin (Fig 1) as described by Baillie and Pickering (1991). This basin underwent deposition of the Otway Group in Late Cretaceous times, extension during the rifting of Australia from the Antarctic plate, uplift and erosion of the Lower Cretaceous Otway Group during the period 100 Ma to 80 Ma, possible marine incursion (Fig 3) in the early stages of rifting between the Lord Howe Rise and the Australian craton. The area experienced minor compression, uplift and erosion (post 80 Ma) as the Tasman Sea widened. The area of interest is located in approximately 75 m of water some 35 to 40 km from the north coast of Tasmania. As interpreted the Bark Sub-basin covers an area of approximately 700 km^2 and includes three unique structural features; the Batman, Strathroy and Ross Blocks.

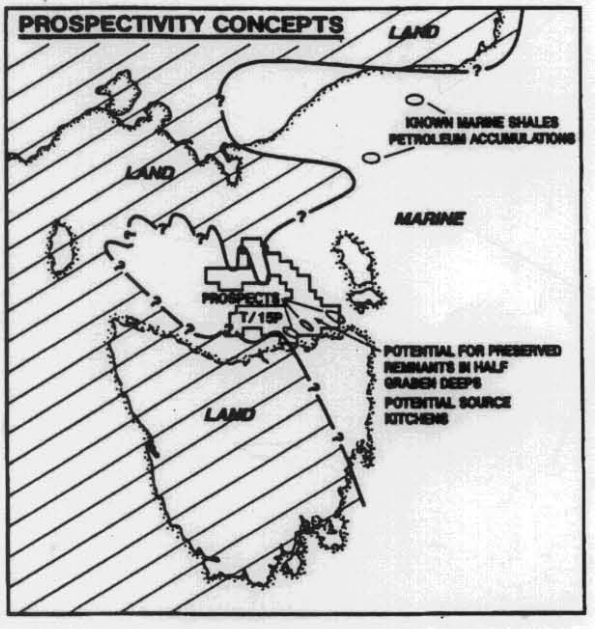
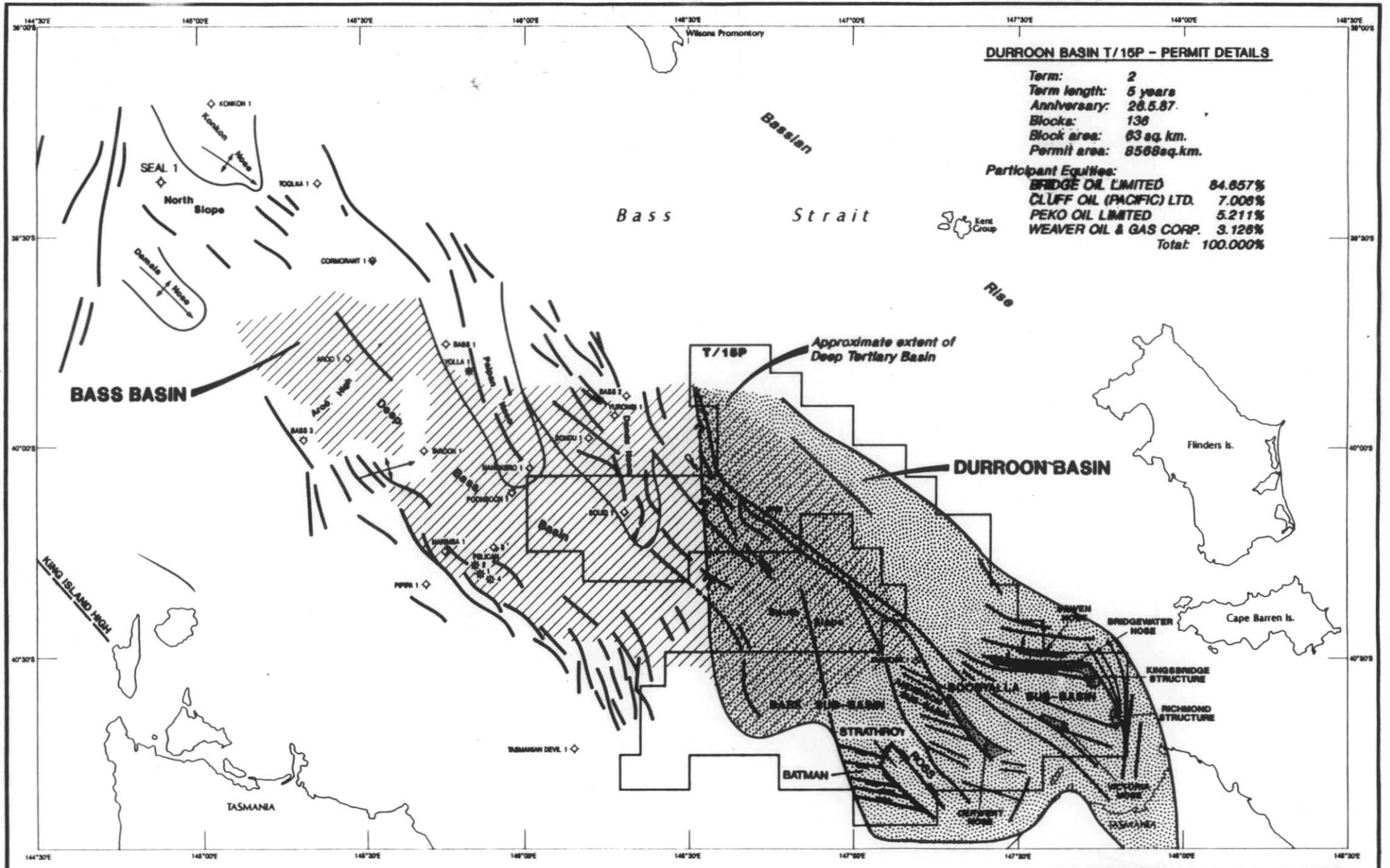


Fig 3. Distribution of the Otway Group

III GEOLOGICAL SETTING:

Williamson *et al* (1987) provides a comprehensive geological description of the Bass Basin. It is felt that further discussion of the subject is unnecessary considering the requirements of this report. Baillie and Pickering (1991) complements Williamson *et al* (1987) by providing a description of the Durroon Basin. The scope of this report does not include a detailed geological description but rather more direct comments regarding the geo-tectonic history of the sequences that relate directly to the stated targets of the Bridge Bass 1990 Seismic Survey.

257288

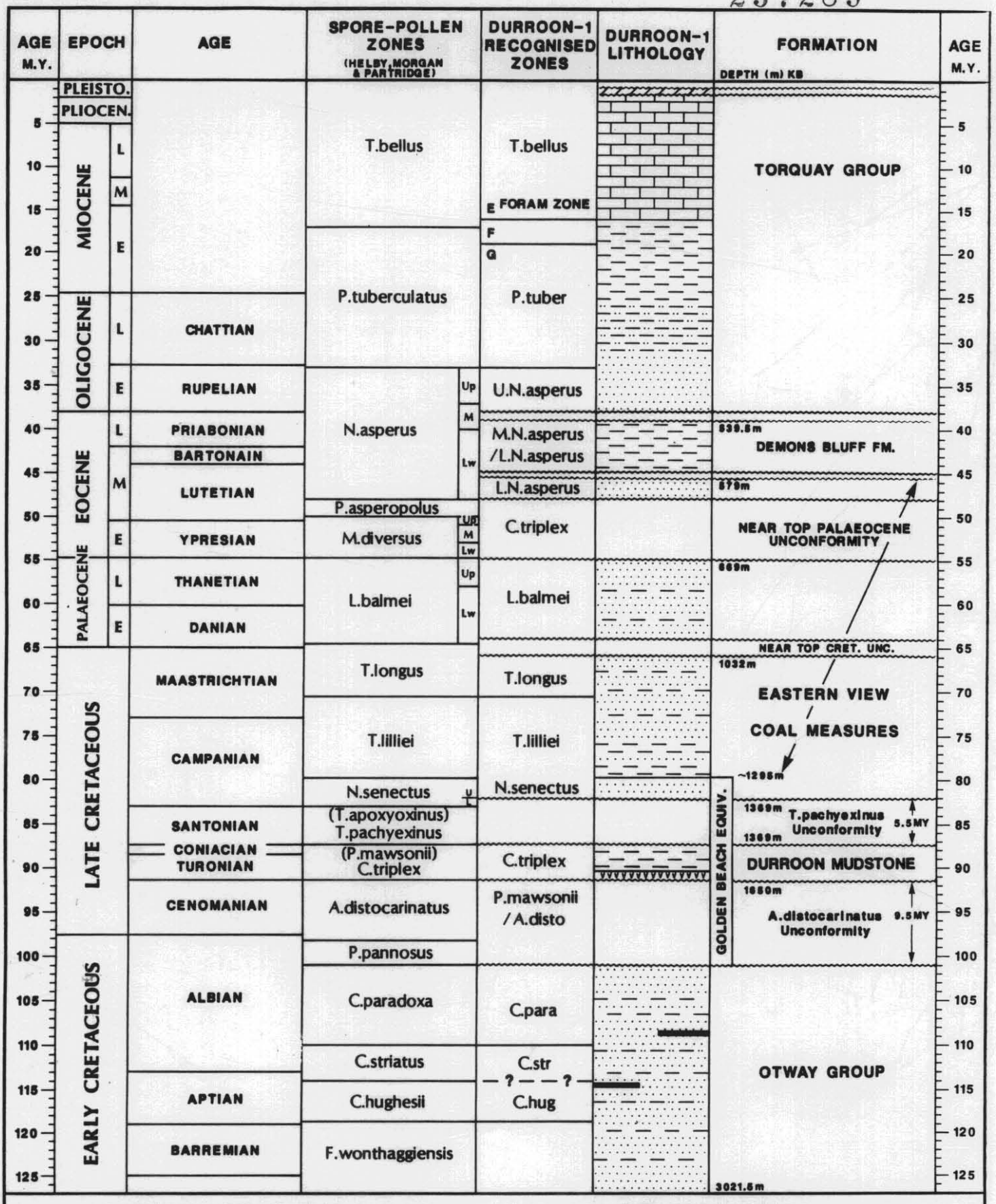


LOCATION MAP OF T/15P

5 cm

FIGURE 1

257289



NOTE : PARTRIDGE (1973) RECOGNISED N.senectus ABOVE THE MID-UPPER CRETACEOUS UNCONFORMITY AT 1341.1m (SWC) AND UNDIFFERENTIATED C.triplex/A.distocarinatus BELOW AT 1374.7-1533.2m

MORGAN (1985) RECOGNISED T.lilliei ABOVE AT 1319m, AND TENTATIVELY L.lilliei BELOW IN A SPARSE ASSEMBLAGE AT 1374m, BUT DID NOT RECOGNISE EITHER N.senectus OR T.pachyexinus IN THE CUTTINGS SAMPLES.

THE WORK OF MORGAN (1991) IS MANIFESTED IN THIS CHART AND THEREFORE SUPERCEDES PREVIOUS INTERPRETATIONS.

5 cm

REFERENCES : HARLAND W.B. et al, 1982, A GEOLOGIC TIME SCALE, CAMBRIDGE UNIVERSITY PRESS.

JELL P.A. 1987, STUDIES IN AUSTRALIAN MESOZOIC PALYNOLOGY, ASSOC. OF AUSTRALIAN PALAEONTOLOGISTS.

Bridge Oil Limited

DURROON-1 STRATIGRAPHIC CHART

AUTHOR : D.C.C.	DATE : AUG'88	REVISED :
DRAFTED BY : G.F.	FILING CODE :	FIGURE No. : 2

Lowry (1987) suggested the existence of a Durroon Basin (nee Bass Basin) correlate for the Golden Beach Formation. Recent work by Morgan (1991) substantiates Lowry's work by drawing clear comparisons between the Durroon Mudstone of Durroon-1 in the Durroon Basin and the Golden Beach Formation of the Kipper Gas Field in the Gippsland Basin.

The results of drilling Cretaceous targets in the Gippsland Basin by a Petrofina lead consortium (Duff *et al*, 1991) substantiates the possibility of commercial quantities of hydrocarbons in rocks of Cretaceous age (in particular the Golden Beach Megasequence) within the basins of the Bass Strait.

The incorporation of the 1988 BMR seismic survey by Edgerley and Taylor (1990) into the data base of T/15P has since lead to the development of a new geo-tectonic model of the Durroon Basin. This report tends to support that model.

As a result of its proximity to the Otway and Tasman rift areas the Bark Sub-basin is geometrically dissimilar to the Anderson and Boobyalla Sub-basins. The Boobyalla and the Bark Sub-basins appear to be rejuvenated half-grabens while the Anderson Sub-basin is a simple rotated half-graben.

The Bark Sub-basin contains three structural entities that result from the phases of tectonism that Edgerley describes in Appendix V of this report.

This interpretation concludes that the synthetic fault systems of the Batman Block were initially created during the Australia-Antarctica rift period at approximately 100 Ma. The collapsed anticline appearance of the Batman block is interpreted to be the result of Otway Rift period synthetic fault systems over printed by antithetic faults that were created during the Tasman Rift period. The sub-basin, being in extension, acquired the rotated half-graben geometry. In particular; the Ross Block was a narrow half-graben through the Otway Rift period into the time of the opening of the Tasman Sea at 80 Ma. Its western bounding fault is the eastern side of the Strathroy Block, its eastern hinge is the western bounding fault of the Anderson Sub-basin. The western side the Strathroy Block forms the eastern boundary of the Batman Block.

The Strathroy Block is a northwesterly dipping uplifted basement horst bounded on the west, north and east by antithetic faults that are the interpreted result of the early stages of the Tasman Rift period. The Durroon Megasequence of the Bark Sub-basin is interpreted to terminate on the northward dipping Otway Group by onlap.

IV GEOPHYSICAL INTERPRETATIONS:

The data set encompassed by this report includes 300 km of new seismic data recorded by the Halliburton Geophysical Services seismic vessel M/V Magnificent Creek in November, 1990 and the existing data set. The interpretation done in conjunction with the work reported by Edgerley in Appendix V of this report.

Enclosures 2 and 3 are Two Way Time Structure Contour Maps of the Eocene Demon's Bluff Formation and the Paleocene. The maps clearly suggest that these horizons, in this area, are shallow, featureless, gently dipping planes and as such are of limited exploration interest.

IVA THE OTWAY FORMATION:

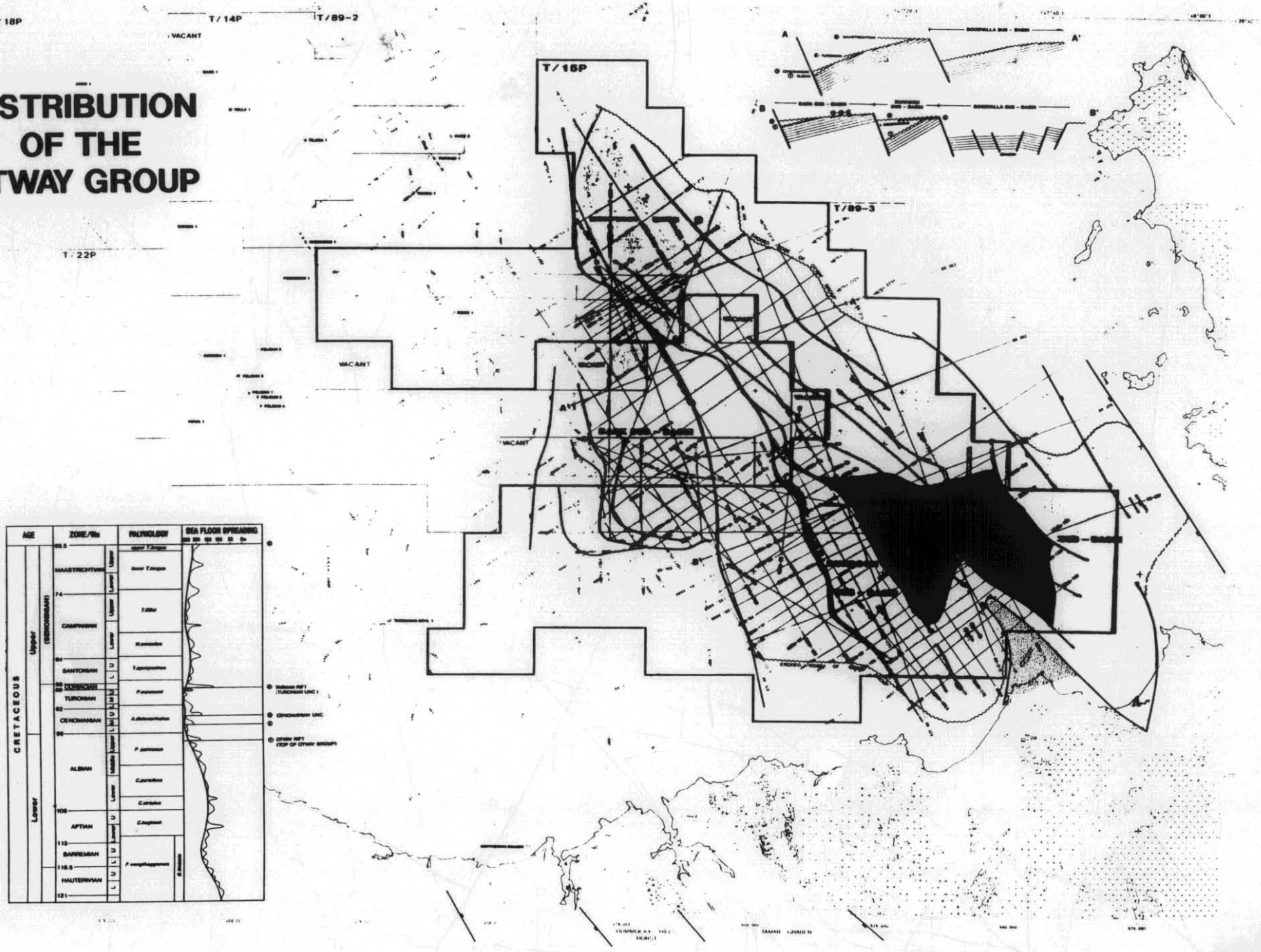
The Otway Formation of the Durroon Basin was deposited in a linear depression that thickens from the central area of T/15P (Fig 4) toward the south (Edgerley and Taylor, 1990). As this formation has not been fully penetrated in any of the Bass Strait basins its seismic thickness is indeterminate. On seismic data the Otway Formation is interpreted to consist of a relatively thick series of parallel to sub-parallel seismic events that provide an unconformity or depositional surface. Volcanic rocks were encountered at the base of the Durroon Mudstone/top Otway Formation at Durroon-1 (Fig 5). The seismic signature of these rocks appear as laterally discontinuous high amplitude events. Thus the seismic interpretation criteria for the top Otway Formation has been taken as follows:

- depositional surface (ie onlap/offlap of seismic events).
- relatively thick series of parallel to sub-parallel moderate amplitude events.
- laterally discontinuous high amplitude events located immediately above a relatively thick series of parallel to sub-parallel moderate amplitude events.
- where the volcanics signature is absent the top of the Otway Formation is assumed to be the first onlap event.

The Strezelecki Formation (age equivalent to the Durroon Basin Otway Formation) has proven to be hydrocarbon bearing in the Otway Basin and is thus considered to be a viable reservoir target in the Durroon Basin. The Two Way Time Structure Contour Map of the Otway Formation (Encl 4) indicates a regional northwesterly dip. This map also shows the fault systems that created the three structural blocks of this sub-basin.

A portion of the Strathroy Block has been mapped in detail (ie 10 ms contour interval). These contours are included in the map of Enclosure 4. The detailed mapping was done to identify a drillable prospect on the Strathroy Block. It is noticeable that, for the most part, the contour trends of the detailed portion honour the trends of the more coarsely mapped areas.

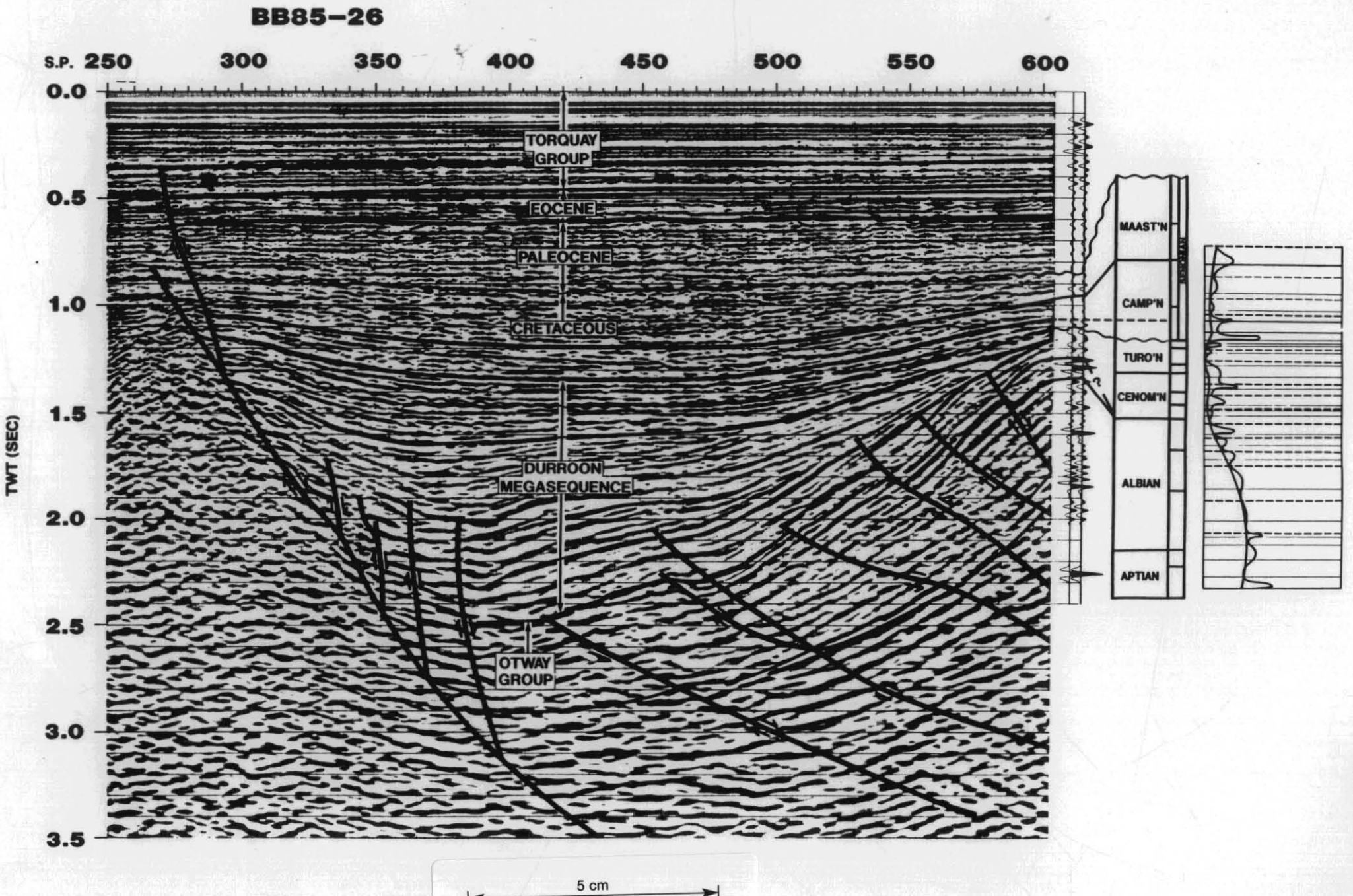
DISTRIBUTION OF THE OTWAY GROUP



2557692

figure 4

SEISMIC TIE AT DURROON-1



257293

FIGURE 5

IVB THE DURROON MEGASEQUENCE

The Durroon Megasequence has been thus named as a result of the work of Morgan (1991), on side wall cores and well cuttings from Durroon-1, where the Durroon Mudstone is positively identified as being age equivalent to the Golden Beach Megasequence of Lowry (1987).

The unconformity at 1286 m in Durroon-1 marks the first occurrence of the micro fossil N.senectus at 1311 m (Morgan, 1991). Morgan suggests that this unconformity represents a 5 million year hiatus in the rock record which occurred coincidental with the opening of the Tasman Sea. Morgan also suggests that the unconformity at the base of this sequence (1414 m) represents a 9.5 million year gap in the rock record which occurred coincidental with the Otway Rift phase that saw Australia split from the Antarctic.

Figure 5 very clearly shows a dramatic increase in thickness in this sequence down structure from the well. It is also obvious that the unconformity at the base of this sequence shrouds the existence of several unconformities that are clearly visible on seismic data down structure from the well.

The map shown in Enclosure 5 clearly shows the fault grain related to the opening of the Tasman Sea. Notable is the obliquity of the fault grain on this map in comparison to the map on the Otway Formation (Encl 4).

The shapes of the three blocks were only slightly altered during the latter stages of the Tasman Rift phase. The only evidence of the antithetic faults on the Strathroy Block is a slight southerly dip that is revealed only by decreased contour spacing. This would clearly indicate that the closure mapped at the Otway Formation pre-dated the faults that transect it and that the faulting pre-dated the deposition of the sediments that are expected to form the sealing rocks for Otway Formation reservoirs in this area.

The western bounding fault of the Bark Sub-basin shows the presence of en echelon moderate dip normal faulting; again due to the stress applied by the opening of the Tasman Sea.

The only available evidence of possible marine incursions in the Durroon Basin lies in the indentification of 'spiny acritarchs' from 1500 m at Durroon-1 (Morgan, 1991). The interpretation of Durroon-1 cuttings and side wall cores show slightly saline conditions across several zones that *'may represent eustatic rise with saline influence at the base (kipperi zone) passing to maximum lake development still with saline influence (eversa acme zone) succeeded by shallowing (eversa partial range zone). The associated logs suggest an upward coarsening sequence stratigraphic unit over this interval (1540 m - 1457 m'.*

V CONCLUSIONS

a GENERAL CONCLUSIONS

The incorporation and interpretation of 300 km of recent seismic data into the data base pertinent to the Bark Sub-basin has resulted in the detailing of a drillable prospect on the Strathroy Block. For the sake of completeness it may be desirable to further record two additional lines of data such that they pass over the mapped culminations of the prospect and parallel to the long axis of the Strathroy horst block.

It can thus be concluded that the Bridge Bass 1990 Seismic Survey has met its objectives in this area of the Durroon Basin in T/15P.

b CONCLUSIONS REGARDING MAP RELIABILITY

There are several conditions that control the reliability of contour maps created from two-way time seismic data; some of these are:

- the number of wells available to which seismic data can be correlated.
- the reliability of correlations to the available wells.
- the location of the well(s) relative to the area being mapped.

The maps relating to this interpretation have been tied to Durroon-1 which is the only well available in the area. This wel,l being located in the Anderson Sub-basin, which necessitates the use of 'look-a-like' correlations when relating data in the Bark Sub-basin to it. Therefore; the most reliable correlations are those that are closest to the well. As the interpretation proceeds southward in the Bark Sub-basin map reliability will be reduced.

The above conclusions apply in the Boobyalla Sub-basin as Edgerley points out in Appendix VI. It becomes imperative that stratigraphic information in the southern extremities of the Bark and Boobyalla Sub-basins be obtained as soon as it is economically feasible.

VI RECOMMENDATIONS

The results of this survey suggest the following recommendations regarding future seismic data recording in the area:

- stratigraphic information is required to improve or substantiate seismic correlations in areas where drilling might be conducted.

- two lines of data are required over the Strathroy feature in order to remove uncertainties regarding the viability of this prospect.

- the comparison of the two data processing streams (see main report text) suggests that the subsurface redundancy may be reduced which would ultimately be reflected in lower acquisition data processing costs.

- interpretation of data in the tectonically complex Strathroy and Batman Blocks would be greatly enhanced by a 3D survey over specific areas of the blocks.

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Dumitru T.A, Hill K.C., Coyle D.A., Duddy I.R., Foster D.A, Gleadow A.J.W., Green P.F., Kohn B.P., Laslett G.M., O'Sullivan A.J. 'Fission track Thermochronology: Application to continental rifting of South-eastern Australia'. APEA (1991) **31**, 131-142.

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257297

BRIDGE OIL LIMITED

SEISMIC STRATIGRAPHIC ANALYSIS OF T/15P

by
D W Edgerley

Petroconsultants Australasia Pty Ltd
May 1991

257298

TABLE OF CONTENTS

1.0 INTRODUCTION

2.0 DEPOSITIONAL SEQUENCE ANALYSIS

3.0 THE EVOLUTION OF THE BASS BASIN

4.0 PRE-RIFT BASIN
- 4.1 The Otway Megasequence
- 4.2 The Otway Megasequence Boundary

5.0 SYN-RIFT BASIN
- 5.1 The Durroon Megasequence
- 5.2 Structural Style
- 5.3 Component Sequences
- 5.4 The Tasman Pull-Apart
- 5.5 The Durroon Megasequence Boundary

6.0 POST-RIFT BASIN
- 6.1 Structural Style

7.0 SOURCE

8.0 TRAPS
- 8.1 The Lachlan Structure
- 8.2 The Bridgewater Nose
- 8.3 The Derwent Nose
- 8.4 The Victoria Nose
- 8.5 The Bowen Nose
- 8.6 The Kingsbridge and Richmond Structures
- 8.7 Subunconformity Truncation Traps
- 8.8 Traps on the Downthrown Side of Listric Faults
- 8.9 Trapdoor Structures

9.0 CONCLUSIONS

10.0 RECOMMENDATIONS

BIBLIOGRAPHY

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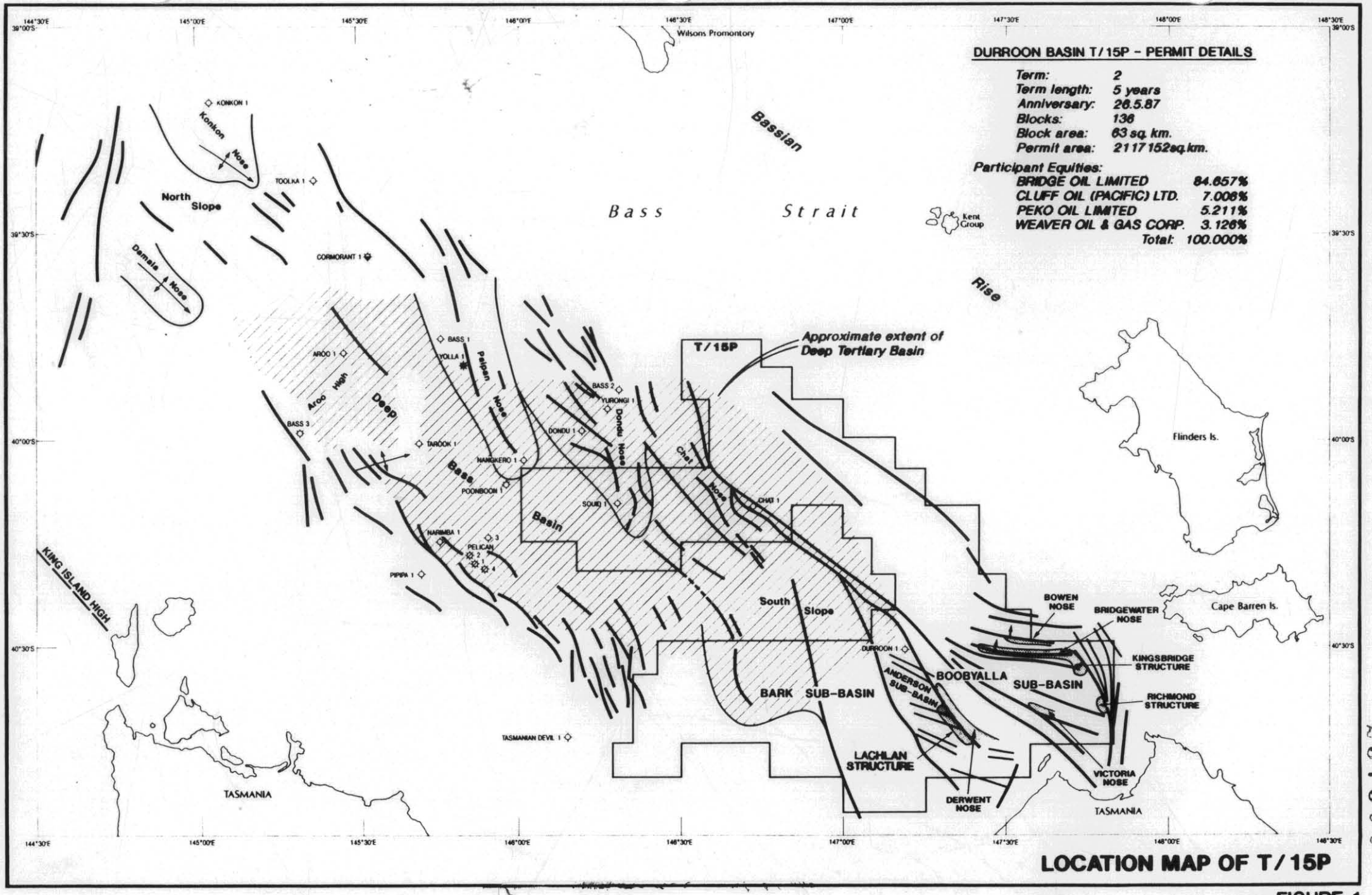
LIST OF FIGURES

Fig 1	Location Map of T/15P
Fig 2	Depositional Limits of Strzelecki and Otway Megasequences
Fig 3	Depositional Limits of Durroon, Golden Beach and Sherbrooke Megasequences
Fig 4	Depositional Limits of Upper Cretaceous
Fig 5	Deposition in Palaeocene
Fig 6	Deposition in Early Miocene
Fig 7	Generalised cross-sections of Durroon Basin and Boobyalla Sub-Basin

LIST OF ENCLOSURES

Encl 1	Seismic Stratigraphic Correlations from Eyre to Gippsland Basins
Encl 2	Six 1:50,000 Two Way Time Structure Maps on Top of Otway Megasequence (6 Sheets)
Encl 3	Six 1:50,000 Two Way Time Structure Maps on Top of Durroon Megasequence (6 Sheets)
Encl 4	Four 1:50,000 Two Way Time Structure Maps on Event Within the Durroon Megasequence (Sheets 2, 3, 5, 6)
Encl 5	Six 1:50,000 Simplified Time Interval Maps Between Top of Durroon Megasequence and Top of Otway Megasequence (6 Sheets)



LOCATION MAP OF T/15P

FIGURE 1

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1.0 INTRODUCTION

Approximately 1,100 km of seismic data were recorded within T/15P in 1990. These data extended the seismic coverage over areas that had not previously been mapped and infilled the existing grid in areas of potential interest.

Regional seismic boundaries were mapped and the component sequences within them identified. The group of related sequences, the megasequences, that represent the major phases of deposition, are recognised as the sedimentary response to major plate reorganisations in the area.

Two seismic megasequence boundaries are mapped. These are:

(1) The Otway Megasequence Boundary
(2) The Durroon Megasequence Boundary

In addition to these an "Event Within the Durroon Megasequence" is mapped.

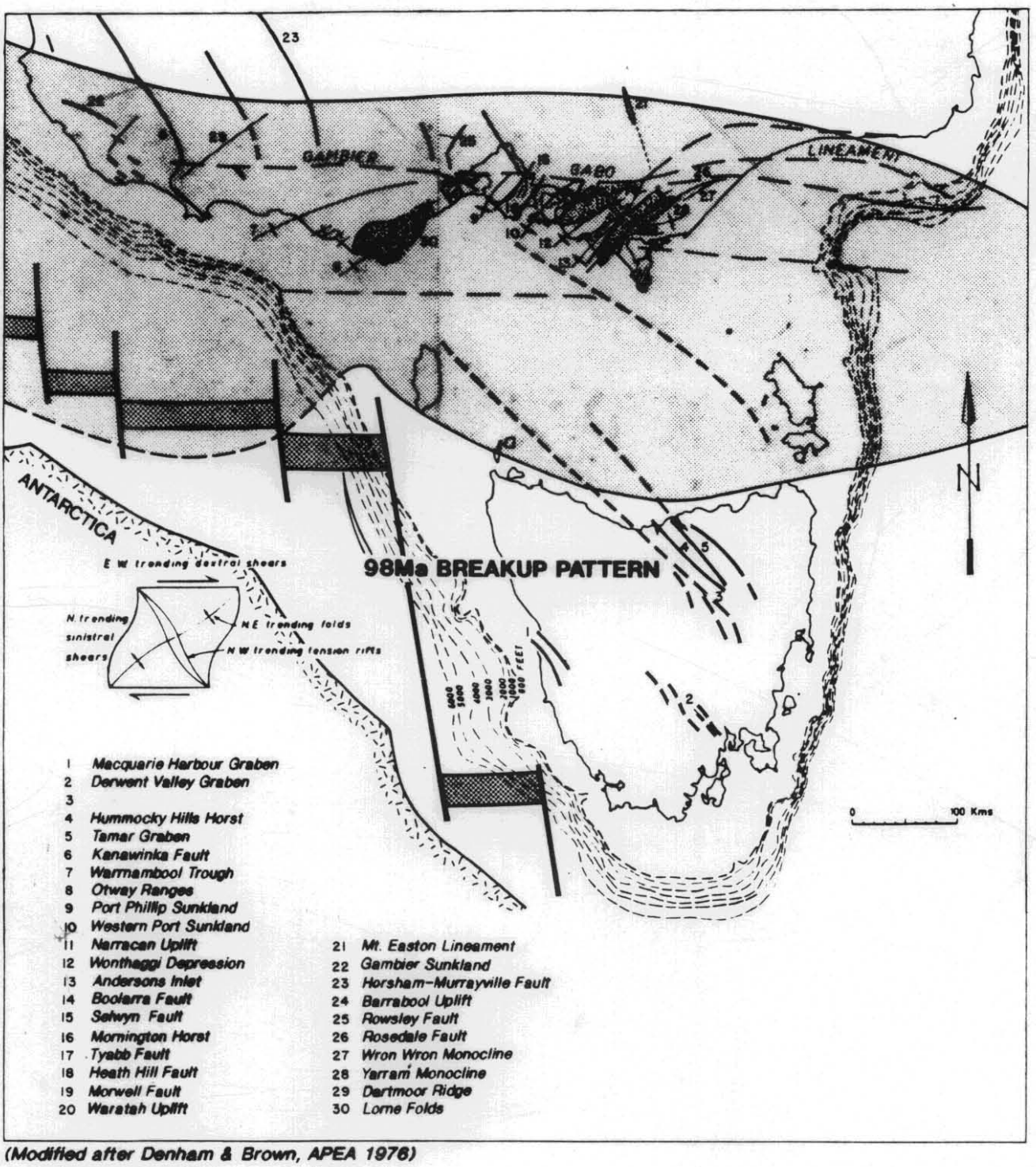
The quality of seismic data is variable. Data within the Anderson and Bark Sub-Basins are superior to those within the Boobyalla, the result, partly, of severe faulting within the latter. An implicit error is present in all seismic correlations of mapped horizons in the Boobyalla Sub-Basin. This is particularly true of the map made from "Event Within The Durroon Megasequence", where correlations from one fault block to another are always in doubt. The seismic maps in the Boobyalla Sub-Basin should be regarded, therefore, as the best fit that has been made between doubtful and unreliable reflections.

2.0 DEPOSITIONAL SEQUENCE ANALYSIS

Duff et al (1991), following Lowry (1987), recognised four megasequences in the Gippsland Basin. The Strzelecki Megasequence was terminated by the breakup of Australia and Antarctica (98Ma); the Golden Beach Megasequence was closed by the rupture of Lord Howe Rise from eastern Australia (80 Ma); the Latrobe Megasequence ended with the marine incursion that deposited the Gunnard Formation (50 Ma); the Seaspray Megasequence was correlated with the transition from a basement-coupled deformational style to one where folds formed independently of basement structures (Encl 1).

Four megasequences are noted within T/15P, at the southern margins of the Bass Basin (Fig 1). The Otway Megasequence Boundary is dated at Durroon-1 at 98 Ma; the Durroon Megasequence Boundary is dated at 80 Ma; the Eastern View Megasequence Boundary is dated at 37 Ma; the Torquay Megasequence follows (Encl 1). The Otway and Durroon Megasequence Boundaries are owing to the same regional plate adjustments that caused the Strzelecki and Golden Beach Megasequence Boundaries. The Latrobe Megasequence Boundary correlates to a second order Eocene sequence boundary in the Bass Basin. The Eastern View Megasequence Boundary appears to have no correlative counterpart within the Gippsland Basin.

There are second order sequence boundaries common to both basins within the 98 Ma to 80 Ma depositional period. Depositional sequence analyses may prove similar correlative sequence boundaries are common in younger beds. Both basins are of the same age and respond to similar regional adjustments of underlying plates. However, the Gippsland Basin appears to have more localised sequence boundaries and later underwent a prolonged period of compression which had no folded counterparts within the Bass Basin.



(Modified after Denham & Brown, APEA 1976)

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DEPOSITIONAL LIMITS OF STRZELECKI AND OTWAY MEGASEQUENCES

FIGURE 2

3.0 THE EVOLUTION OF THE BASS BASIN

The Otway basin is generally regarded as an intracratonic trough that extended across a wide area of the present southern margins of Australia (Fig 2). Wilcox et al (1990) suggested that the concept of a linear rift-valley is incorrect and that oblique extensional grabens may have formed in en echelon patterns along the incipient continental margins. There is subsurface and seismic evidence of an early Jurassic to Neocomanian half-graben extensional phase (Bein & Taylor, 1981; Kopsen & Scholefield, 1990). By Albo-Aptian times, however, this topography was obscured and deposition continued in a slowly subsiding trough (Encl 1).

Rupture of Australia from Antarctica at 98Ma initiated spreading. The Bass and Gippsland Basins were isolated from the zone of rupture by the Tasman Fracture Zone, which formed contemporaneously with the spreading centres. Otway and Strzelecki Group sediments were faulted, rotated, and eroded, with varying degrees of severity within these two basins.

A northwest to southeast fault pattern was now imposed on sediments of the Otway Group in the Bass Basin. Carey (1985) cited evidence of transcurrent faults, northeast-trending compressional synclines and anticlines, northwest-trending extensional structures, and continued seismicity and vulcanism along the southern margins of Australia, as evidence of dextral shear along the Gambier-Gabo lineament. This explanation could as well apply to the origin of the northwest to southeast fault pattern.

Sedimentation now proceeded during regional dextral movements. Smith (1985) pointed out that a further extensional force now operated on the Bass and Gippsland Basins: that associated with the incipient Tasman rift zone. Three asymmetric rotated blocks, those of the Boobyalla, Anderson, and Bark, now formed. The largest, the Boobyalla Sub-Basin, formed adjacent to the Tasman rift zone. The sub-basins decreased in amplitude in proportion to their distance from the rift.

The sub-basins received large volumes of sediments. Sedimentation began with very high burial rates which decreased with time (Smith 1985). The Tasman Rift Phase of burial (98-80 Ma) was in excess of 300m/Ma, being greatest in the Boobyalla Sub-Basin, where depositional isopachs exceeded 5,000 m in the depocentres adjacent to listric bounding faults. The provenance of the sediments in the sub-basins of T/15P, was Tasmania (Fig 3).

The initiation of spreading in the Tasman Sea (80 Ma) caused major upheavals within the Bass-Gippsland region. The Bassian Rise, King Island High, Tasmania, and the Northern Platform of the Gippsland Basin were uplifted. Huge volumes of sediments were stripped from these areas and redeposited. The regime of faults created by the onset of spreading in the Tasman Sea was orientated in a WNW-ESE direction. These faults were overprinted on the earlier grain.

Sediments within the sub-basins of T/15P were faulted and rotated along listric faults. Synthetic and antithetic directions of dipping blocks are mapped within the Boobyalla Sub-Basin, with antithetically dipping blocks being confined to the northeastern margins of the sub-basin. Rollover structures developed along the structural margins of the Boobyalla Sub-Basin.

The Tasman Sea breakup unconformity, identified as the Golden Beach and Durroon Megasequence Boundary in the Gippsland and Bass Basins respectively, was formed at this time. Subsidence within the Gippsland now coincided with

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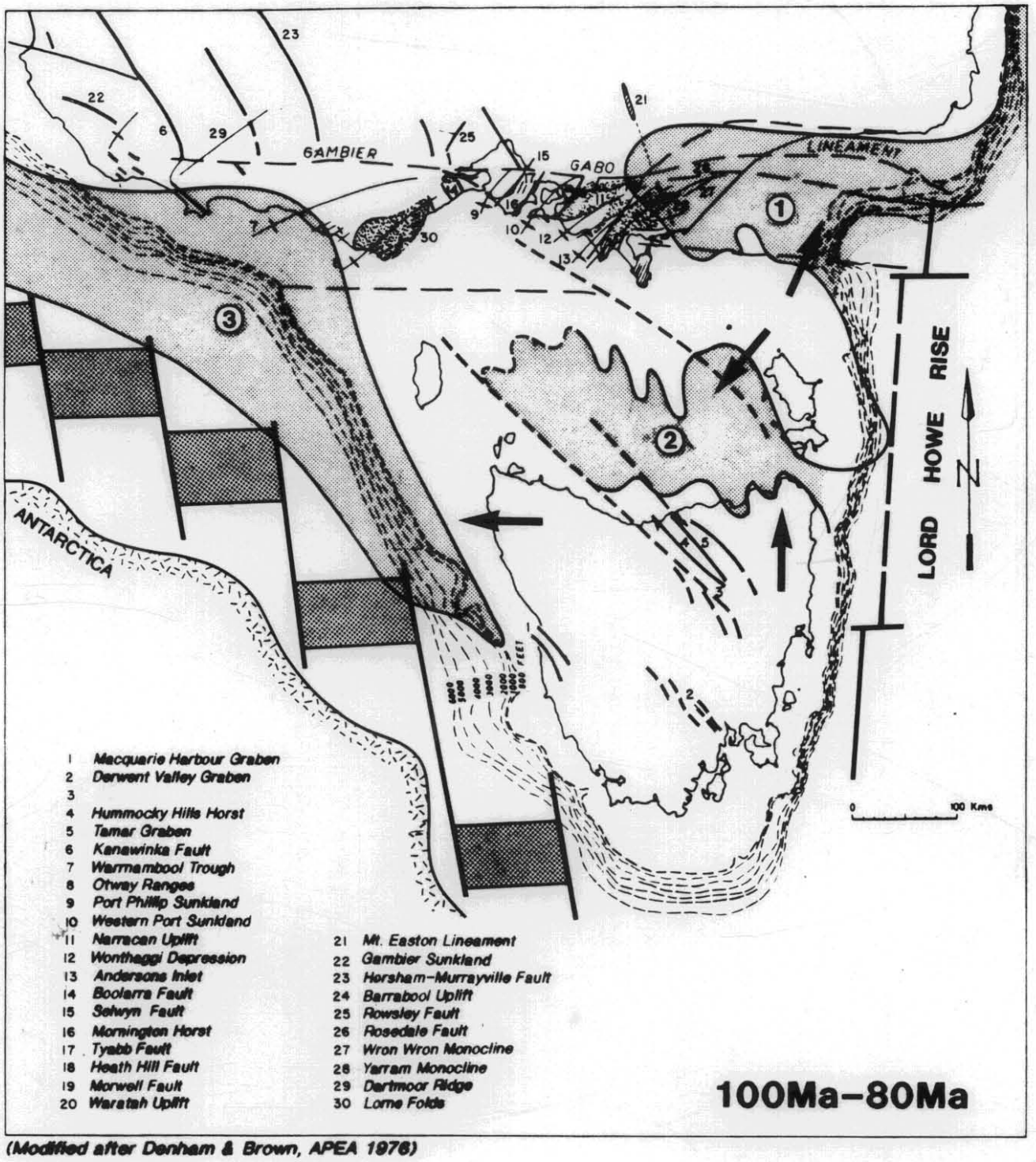

(Modified after Denham & Brown, APEA 1976)

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DEPOSITIONAL LIMITS OF GOLDEN BEACH ①, DURROON ② AND PART OF SHERBROOK ③ MEGASEQUENCES

FIGURE 3

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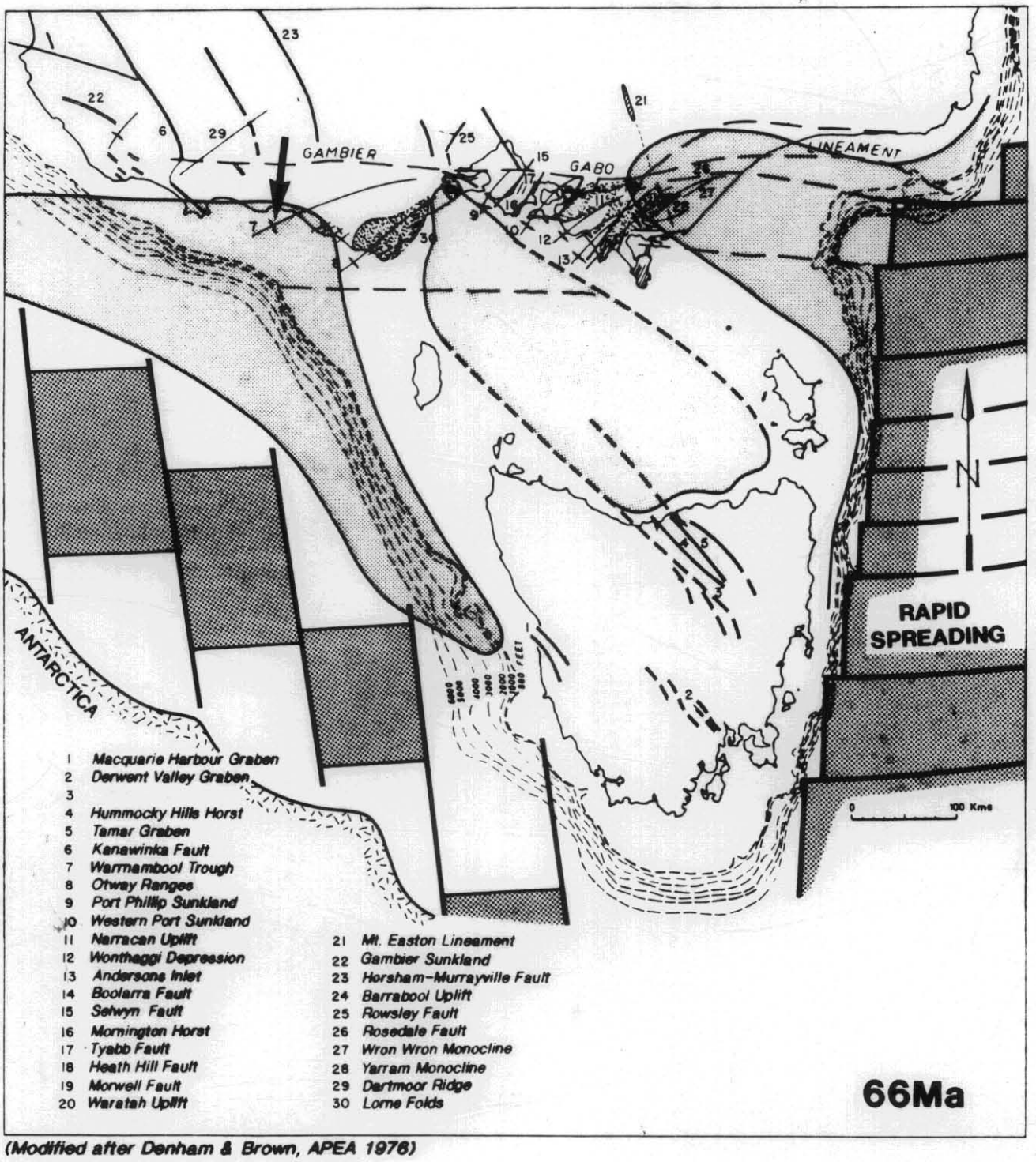

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DEPOSITIONAL LIMITS IN UPPER CRETACEOUS

FIGURE 4

the underlying Lower and Upper Cretaceous basins. In the Bass, sedimentation shifted to the west. The post-rift beds overlying the sub-basins within T/15P thicken from a feather-edge along the margin of the basin, to 1400 m at Durroon-1, to 3,300 m at Poonboon-1 (Fig 1).

The tectono-sedimentary phase of sedimentation associated with Drift lasted from 80 Ma to the present. There are several periods of subsidence and depositional breaks. Among the most important are those at the end of the Cretaceous (66 Ma; Fig 4). Lower Eocene (50 Ma), and Upper Eocene (37 Ma). Depositional limits in Palaeocene and Early Miocene times are shown in Figs 5 and 6.

4.0 PRE-RIFT BASIN

4.1 The Otway Megasequence (112-98 Ma)

The Otway Megasequence is characterised by a suite of nonmarine sands, shales, siltstones, coals, and volcanics. The megasequence had a duration of 14 Ma. The 1,500 m of sediments drilled at Durroon-1 indicate three minor depositional interruptions, which cannot be recognised on seismic data. Smith (1985) warned that the Durroon sample may not be representative owing to its proximity to Tasmania.

Seismic and field evidence suggest that the basin had gently sloping sides. Subsidence was rapid at first, slowing at the end of Albian times. Douglas (1976) thought the beds were largely deposited on extensive flood plains, with braided streams making a significant contribution.

4.2 The Otway Megasequence Boundary (98 Ma)

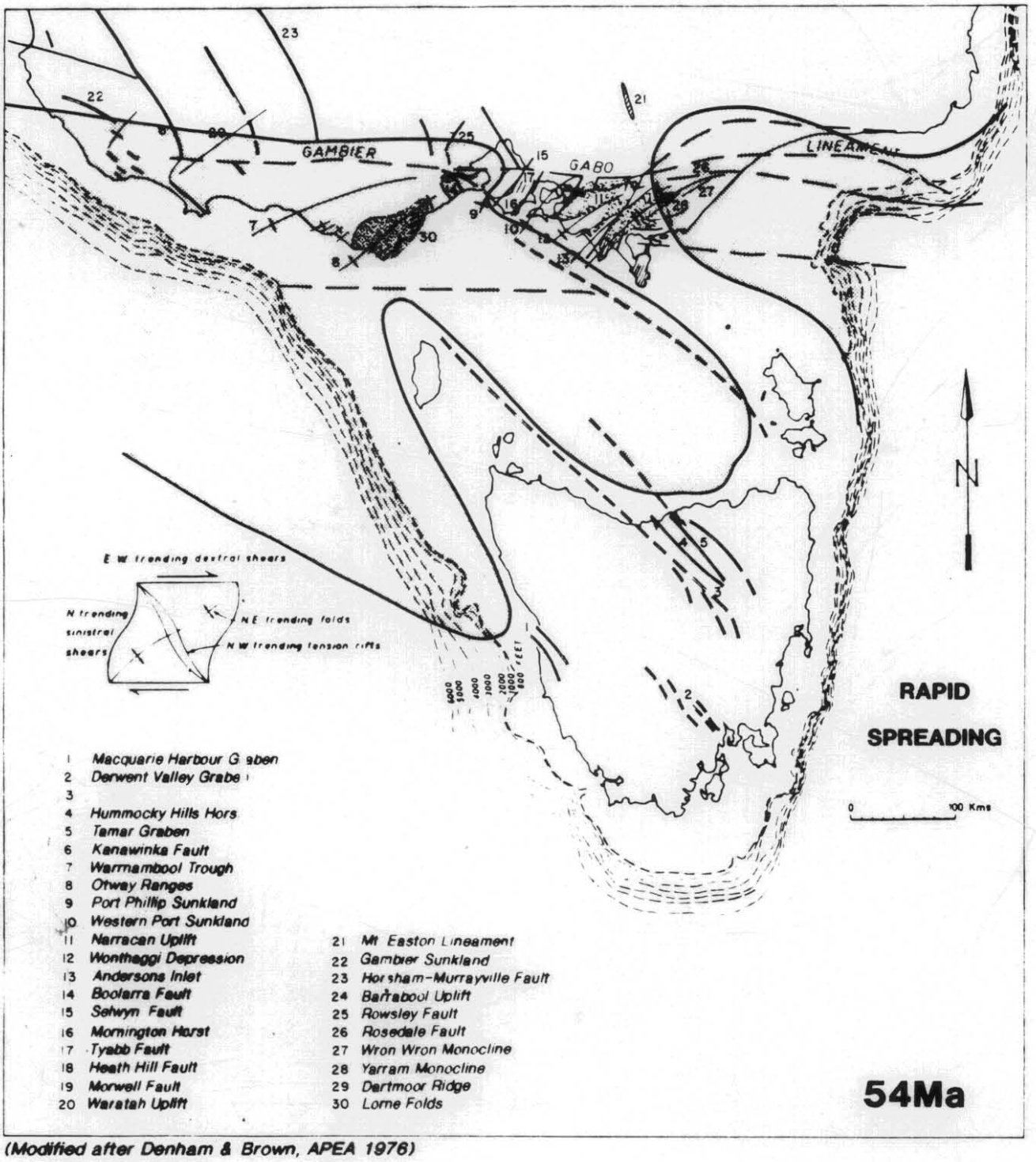
The Bass and Gippsland depositional troughs were not sundered by the onset of drifting along the southern margins of Australia. The Tasman Fracture Zone effectively sealed these basins from the drift that occurred to the west. However, these sediments were affected by the uplift and faulting that accompanied this rupture, and faulting and tilting of Otway sediments occurred within the Bass Basin. The ensuing period of subaerial erosion created a depositional sequence boundary that can be recognised around the margins and over uplifted blocks within the Bass Basin.

This Otway Megasequence Boundary can be recognised on seismic lines within the Anderson and Bark Sub-Basins. Its presence within the Boobyalla is inferred from regional correlations but cannot be substantiated by the presence of a regional angular unconformity or disconformity. This is a problem of the recording of these data since the thicknesses encountered at the Durroon well cannot be identified on seismic data on the downthrown side of the fault block, and partly a problem caused by the severe faulting that later occurred within the Boobyalla Sub-Basin.

5.0 SYN-RIFT BASIN

5.1 The Durroon Megasequence (98-80 Ma)

Smith (1985) drew attention to the fact that this syn-rift megasequence represented both the phase of rifting in the Tasman Sea and the drifting of Australia from Antarctica. The period of Tasman rifting may have been more important. The decreasing size of the sub-basins that were formed at this time in proportion to their distance from the Tasman rift zone follows Cochran's (1983) suggestion that heat flow from the rift system into the adjoining flanks increased syn-rift subsidence.



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DEPOSITION IN PALAEOCENE **FIGURE 5**

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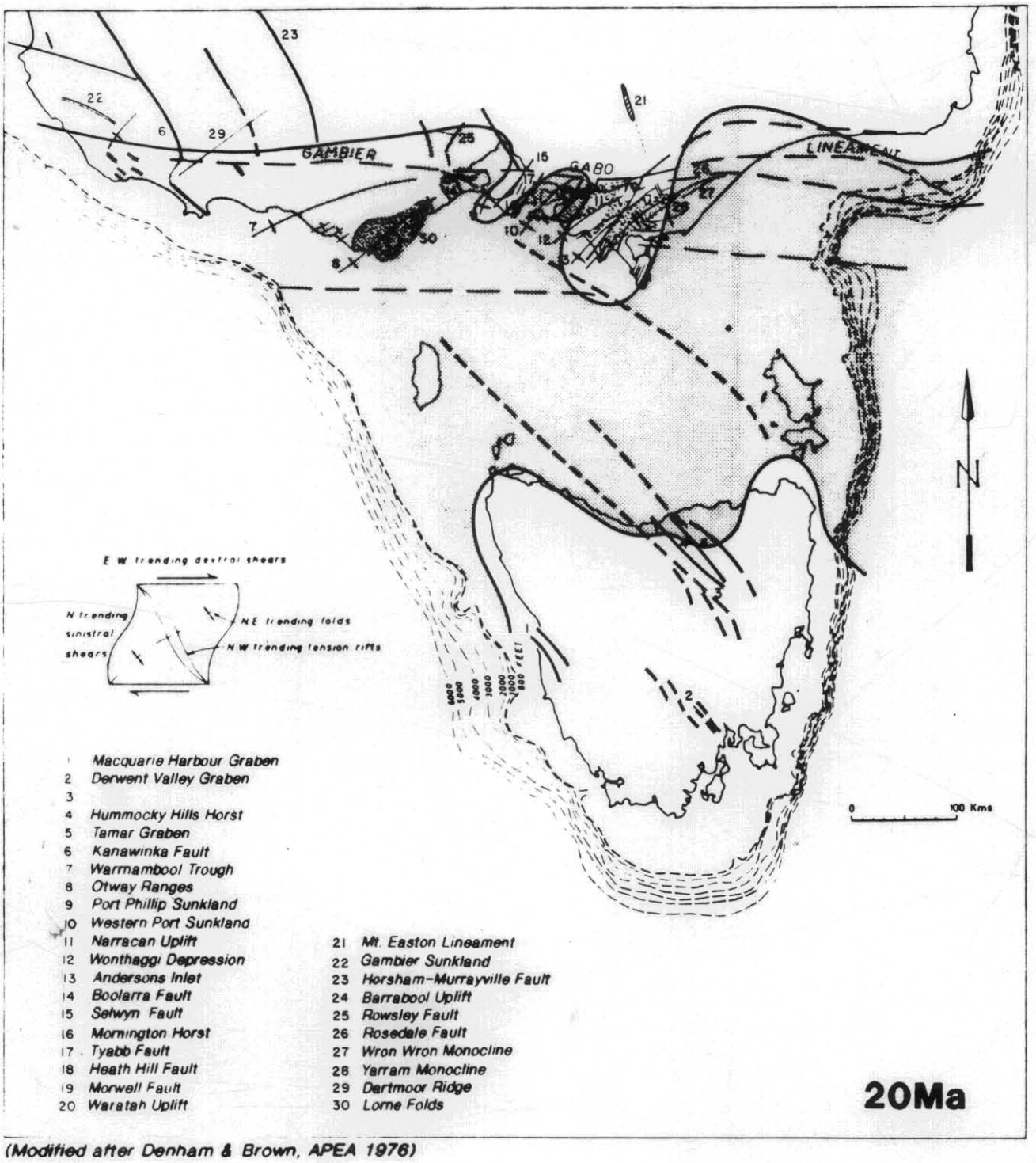

1 Macquarie Harbour Graben
2 Derwent Valley Graben
3
4 Hummocky Hills Horst
5 Tamar Graben
6 Kanawinka Fault
7 Warrnambool Trough
8 Otway Ranges
9 Port Phillip Sunkland
10 Western Port Sunkland
11 Narracan Uplift
12 Wonthaggi Depression
13 Andersons Inlet
14 Boolarra Fault
15 Selwyn Fault
16 Mornington Horst
17 Tyabb Fault
18 Heath Hill Fault
19 Morwell Fault
20 Waratah Uplift
21 Mt. Easton Lineament
22 Gambier Sunkland
23 Horsham-Murrayville Fault
24 Barrabool Uplift
25 Rowsley Fault
26 Rosedale Fault
27 Wron Wron Monocline
28 Yarram Monocline
29 Dartmoor Ridge
30 Lorne Folds

(Modified after Denham & Brown, APEA 1976)

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DEPOSITION IN EARLY MIOCENE **FIGURE 6**

Sedimentation began within T/15P with the rotation of three asymmetric blocks along northwest to southeast-orientated listric faults. These formed the sub-basins of Boobyalla, Anderson, and Bark (Fig 1). The Boobyalla, nearest the incipient Tasman spreading centre, is the largest, measuring 170 km x 30 km. The Anderson, wedged between the Boobyalla and Bark Sub-Basins, is approximately 60 km x 10 km. The Bark Sub-Basin measures 100 km x 37 km.

The isopachs of the Durroon Megasequence are thickest within the Boobyalla Sub-Basin, where in excess of 5,000 m of sediments were deposited adjacent to its bounding listric fault. Isopachs greater than 3,000 m are measured within the Anderson Sub-Basin, though subsequent erosion has likely reduced the original depositional isopach. Those within the Bark Sub-Basin are similarly reduced by erosion and measure in excess of 2,500 m.

5.2 Structural Style

Listric normal faults constitute the predominant structural features of these sub-basins. Individual blocks are internally complex. Second-order faults within the Boobyalla Sub-Basin, for example, have created smaller sub-basins within the larger half-graben, while the bounding faults of the Bark Sub-Basin display a pronounced dogleg pattern.

The segments of the half-grabens have a consistent southwest dip slope within T/15P. These may affect another direction elsewhere in the Bass Basin, though seismic evidence for this appears to depend on the correct identification of the Otway Megasequence Boundary. The dip of the sub-basins along strike appears, within T/15P, to be to the southeast.

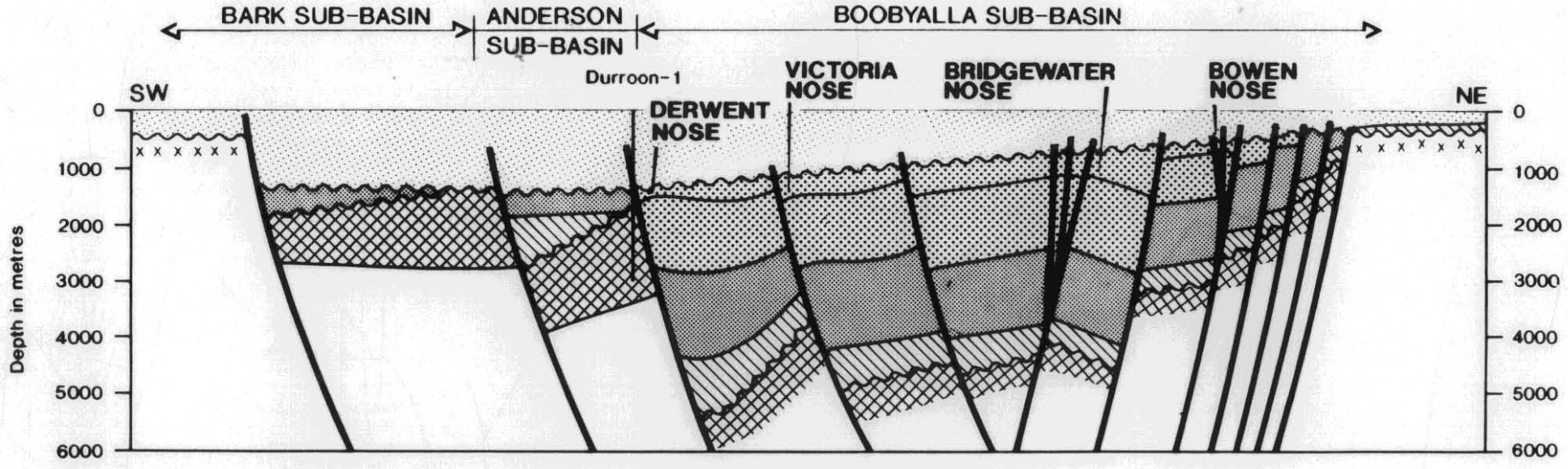
5.3 Component Sequences

Three component sequences are recognised within the Durroon Megasequence in the Anderson Sub-Basin. These are of Cenomanian and Turonian age. At least one younger sequence is mapped within the northern part of the Bark Sub-Basin. Sequence boundaries may be present within the Boobyalla Sub-Basin, though rapid burial and subsequent faulting of the sediments make these impossible to map.

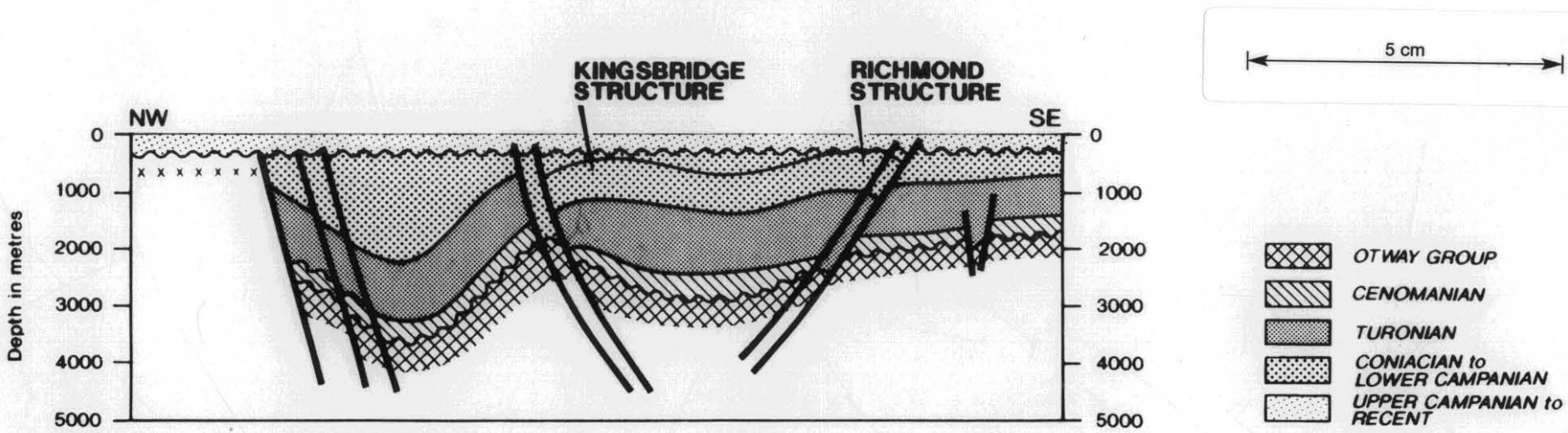
A widespread volcanic terrain developed at the beginning of the rotation of the blocks within T/15P. Seismic evidence of volcanic mounds, intrusions, and lava flows, is seen within the Anderson and Bark Sub-Basins. These episodes of vulcanism were separated by erosion and deposition of clastics derived from the uplifting Otway blocks and the surrounding Palaeozoic and Pre-Cambrain rocks of Tasmania. There is seismic evidence of a similar depositional history within the Boobyalla Sub-Basin. The synchronous subsidence of blocks along listric faults caused reverse drag to develop along the fault faces of some blocks.

Two seismic sequences are recognised within this depositional interval within the Anderson Sub-Basin. These are succeeded by the Durroon Mudstones encountered at Durroon-1. This nonmarine mudstone, a lacustrine deposit of Turonian age, was laid down during an eustatic high stand and may be present over large areas of all three sub-basins. Its depositional thickness is unknown. It is likely that fluvial and deltaic conditions prevailed along the slopes of each sub-basin.

Duff et al (1991) recognised a marine incursion within the uppermost part of UK1 and an extensive incursion within UK2, of the Golden Beach Megasequence of the Gippsland Basin. The uppermost UK1 is dated as Coniacian; that of UK2,



GENERALISED SW-NE CROSS-SECTION OF DURROON BASIN



GENERALISED NW-SE CROSS-SECTION OF BOOBYALLA SUB-BASIN

FIGURE 7

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as Santonian-Lower Campanian. A marine incursion into the Gippsland Basin most likely occurred from the south (Veevers, 1984). This incursion must pass along the Tasman rift zone, past the gap between Tasmania and Cape Barren Island. Seismic evidence from Line 90-205, recorded in this gap, establishes that the Durroon Megasequence was deposited in this area. It is possible that Durroon sequences of Coniacian to Campanian age were laid down under marine influences, at least within the Boobyalla Sub-Basin (Fig 3).

Summarising, little is known, and still less can be extrapolated, about the gross seismic stratigraphy of the Durroon Megasequence.

5.4 The Tasman Pull-Apart

The rupture of Lord Howe Rise from eastern Australia (80 Ma) caused extensive deformation within the Gippsland and Bass Basins. It also was responsible for the uplift of the Northern Platform of the Gippsland Basin, the Bassian Rise, Tasmania, and the King Island High.

The extensional forces at this time imposed a new WNW-ESE pattern of faults on the sub-basins. These were overprinted on the earlier NW-SE pattern of faults. Extensive structuring occurred within the Boobyalla; less, within the Anderson and Bark. Block faulting along WNW-ESE listric faults are mapped with synthetic and antithetic directions of rotation. The sedimentary cover is draped over these block edges, and faulted. At the zones where adjacent blocks show dips in synthetic and antithetic directions, the sedimentary cover is draped into anticlines, sometimes faulted into complex patterns (the Bridgewater Nose; Fig 1; Encl 4).

Rollover anticlines are formed at the faulted margins of the sub-basins. The most prominent are formed within the Boobyalla Sub-Basin. These are post-depositional structures, formed by slumping of sediments onto the surface of glide plane of the fault. Among the most prominent in the Boobyalla Sub-Basin are: the Derwent Nose, the Victoria Nose, the Bowen Nose, the Richmond Structure, and the Kingsbridge Structure (Fig 1 & Fig 7).

5.5 The Durroon Megasequence Boundary (80 Ma)

The regional unconformity, created at the period of uplift and deformation caused by the onset of spreading in the Tasman Sea, marked the end of the deposition cycle of the syn-rift Durroon Megasequence. Erosion stripped the megasequence from the Bassian Rise, Tasmania, and the King Island High. Erosion also removed quantities of sediments from the Boobyalla, Anderson and Bark Sub-Basins.

This megasequence boundary is the exact equivalent of the Golden Beach Megasequence Boundary in the Gippsland Basin.

6.0 POST-RIFT BASIN

Steady collapse characterised this Drift Phase of the evolution of the Bass Basin. The stripping of large amounts of sediments of the Durroon Megasequence and their redeposition in a depocentre west of T/15P, led to a relatively thin post-rift cover of these sediments being present within this permit. The isopachs vary from the basin margin feather edge, to 1370 m at Durroon-1, to in excess of 3,300 m at Poonboon-1 (Fig 1).

There are several component sequences within the two megasequence between 80 Ma to Recent: the Eastern View and Torquay Megasequences, respectively (Encl 1). A Late Cretaceous (66 Ma), Top of Palaeocene (55 Ma), Base of Demons Bluff (39 Ma) and Top of Demons Bluff (38 Ma) sequence boundary is mapped.

All these sequence boundaries converge on, and merge with, the Durroon Megasequence Boundary at the margins of the basin. The last, the Demons Bluff sequence, also demarcated the transition of non-marine to marine deposition within the basin.

6.1 Structural Style

The extensional regime at the end of the Durroon Megasequence continued to act upon the basin. The rollover structures along the southern bounding listric fault to the Boobyalla Sub-Basin were accentuated by continued differential movements along the fault; uplift of the Anderson and Bark Sub-Basins, the Bassian Rise, Tasmania, and King Island High, was continuous; major faults were active throughout the Cretaceous and early Tertiary.

7.0 SOURCE

Morgan (Bridge Oil report, 1991) reported that algal cysts within the Durroon Mudstone contain excellent oil source material, if present in sufficient quantity. They occur in two intervals that might indicate times of maximum algal productivity in large lakes during sea level highstands.

Smith (1985) concluded that the geothermal gradient in the Bass Basin ranged from 40°C/Km on the southwest and northeastern margins of the Bass Basin, to 30°C/Km along the NW-SE basin axis. Goldstein (Bridge Oil, 1991) measured a geothermal gradient of between 29°C/Km to 31°C/Km at Durroon-1, and suggested that the Durroon Mudstones would become mature at a depth of burial of approximately 3,000 m. Mature Durroon Mudstones underlies a large part of the Boobyalla Sub-Basin. Since the cover of post-rift sediments increases to the west, the depth of burial of the Durroon Mudstones also increases in the direction. Mature rocks would exist in both the Anderson and Bark Sub-Basins.

8.0 TRAPS

8.1 The Lachlan Structure

Petroleum accumulations are most frequently found on the upthrown side of extensional blocks. Most production has been found in the highest parts of tilted blocks.

The highest closure mapped along the updip culmination of the Otway Megasequence of the Anderson tilted block is the Lachlan Structure (Fig 1; Encl 4). The structure formed at the onset of spreading in the Tasman Sea (80 Ma). A cover of Cenomanian and Turonian sediments is in trap position, juxtaposed against downfaulted sediments of the Durroon Megasequence of the Boobyalla Sub-Basin. The Turonian mudstones would provide a seal to underlying clastic sediments of Cenomanian age.

This structure measures 14 km x 1.5km. It could be sourced from deeply buried Turonian mudstones on the downthrown side of the fault, or from Turonian mudstones within the Anderson depocentre.

8.2 The Bridgewater Nose

This anticline in beds of the Durroon Megasequence was formed by drape over abutting synthetically and antithetically dipping blocks. The anticline plunges basinwards to the west. It measures 20 km x 5 km (Encl 4).

The crest of the structure is highly faulted, and may represent downfaulted keystone segments. Correlations within the crestal area are often difficult, though Line 90-190 indicates that segments of the structure may show simple anticlinal attitudes.

The western end of the plunging anticline may, in fact, dip in the opposite direction: that is, to the east. The problem arises from the difficulty of making the same correlations across the crest of the structure on "Event Within Durroon Megasequence" on adjacent dip lines. A seismic line down the plunge of the structure, with parallel lines on the flanks, may resolve the nature of this complex anticline.

Traps would, of necessity, be structural-stratigraphic. The nonmarine part of the Durroon Megasequence may be in a fluvial-estuarine depositional environment in these areas and sands may show a limited lateral distribution.

8.3 The Derwent Nose

Rollover structures are formed during the momentary interval when the hanging wall of a fault separates from the footwall, thereby inducing the overlying beds to collapse under gravity onto the fault face.

The Derwent Nose is a post-depositional rollover structure that developed along a series of en echelon faults caused by the onset of spreading in the Tasman Sea. These faults are overprinted on the major NW-SE normal listric fault that demarcated the southern margin of the Boobyalla Sub-Basin.

These extensional faults caused slivers of the updip tilted margin of the Anderson block to subside into the Boobyalla Sub-Basin. The subsiding slivers get larger towards the southeast, finally taking 3 km of the culmination of the Anderson tilted block into the deeper Boobyalla Sub-Basin (Encl 4). When small slivers subsided, the overlying beds collapsed onto the fault face, causing rollover. Where substantial portions of the Anderson block slipped into the Boobyalla Sub-Basin, the increased width of overlying sediments collapsed into more complex and highly faulted structures.

The Derwent Nose changes from a simple rollover, therefore, to a complex zone of faulted blocks, in a southeast direction. It is curvilinear in plan; parallels at least three en echelon faults, causing the crest of the structure to shift abruptly between faults; and plunges to the northwest. The structure always forms on the downside of the faults, and downside beds dip into the fault face.

The structure is 15 km long and 1 km wide. Since only the youngest beds of the Durroon Megasequence are rolled-over, the facies of these sediments cannot be extrapolated from Durroon-1, where only Turonian and Cenomanian(?) sediments were encountered. The presence of reservoir beds within the rollover must be inferred. Mature Durroon Mudstones within the Boobyalla Sub-Basin would act as source rocks.

8.4 The Victoria Nose

The Victoria rollover structure developed on the downside of the normal listric fault that intersected the older NW-SE bounding fault of the southeastern corner of the Boobyalla Sub-Basin (Fig 1; Encl 4).

The structure plunges to the northwest and rapidly loses closure.

8.5 The Bowen Nose

This rollover structure is formed on the downside of the listric fault that rotated the most northerly of the antithetically dipping blocks (Fig 1; Encl 4).

The block plunges to the west from the upfaulted structural platform that marks the southern margins of the Bassian Rise. The rollover structure is most marked where the throw of the fault is greatest; least, where the fault displacement is minimal. There is a complex set of faults associated with the crest of the rollover. There is a possibility that more than a single plunging rollover structure is present within the structural nose.

More seismic data are required to resolve this complicated structure.

8.6 The Kingsbridge and Richmond Structures

Rollover into a listric normal fault is common. Rollover into intersecting listric normal faults is not. Each of these structures demonstrates rollover into listric faults on two sides. The Kingsbridge structure shows downside dip into faults on its west and north; the Richmond structure shows downside dip into faults that bound its east and north (Encl 4).

There are differences between the structures. The Richmond Structure is formed at the depositional hinge line of the Booyalla Sub-Basin. Time intervals thin from basinal positions onto an extensive platform, at the locus of the rollover structure. The Kingsbridge Structure formed at the intersection of the southern structural margin of the Bassian Rise and the fault behind which the first antithetically rotated block is mapped. Both structures are the result of extension and uplift at the time of the onset of Tasman spreading.

Mature source rocks probably do not underlie either structure and migration of hydrocarbons from the deeper parts of the Boobyalla Sub-Basin is required to charge reservoirs within these structures.

Additional seismic data must be acquired to map these anticlinal trends.

8.7 Subunconformity Truncation Traps

The Durroon Megasequence Boundary is an angular unconformity across the Boobyalla Sub-Basin. Severe truncation of the depositional isopach is measured, so that older beds subcrop to the northeast. Fault isolated compartments of these truncated beds show occasional closure against the updip bounding faults, suggesting the possibility of subunconformity traps.

The lack of well control makes it impossible to risk the individual structures, since nothing is known of the lithostratigraphy of the underlying and overlying beds. However, the traps will be of interest if the sub-basin becomes prospective.

8.8 Traps on the Downthrown Side of Listric Faults

Accumulations of oil on the downthrown side of extensional faults are less common. Traps may exist within the areas where reverse drag formed as the downside block rotated along a normal listric fault.

Reverse drag is mapped along the bounding fault to the Boobyalla Sub-Basin.

8.9 Trapdoor Structures

Extensional block trapdoors are mapped along the structural margins of the sub-basins. The basin margins have a continuous history of uplift, and so, of extension. The structures are unlikely to be productive.

9.0 CONCLUSIONS

(1) Post-depositional rollover structures are the most common trap mapped within T/15P. There is the possibility of mapping more rollover structures on the downside of listric faults that define the structural margins in other parts of the Boobyalla Sub-Basin.

Erosion of the Durroon Megasequence in the direction of the Bassian Rise suggests that rollover structures within which an attenuated isopach will be met, may be stripped of significant reservoirs. A drilling location should test both the validity of the trap and as much of the depositional megasequence as possible.

Rollover structures on the Bassian Rise side of the Boobyalla Sub-Basin may be more attractive prospects than those against the southwest bounding faults. Here, fluvial and deltaic facies may develop along the depositional hinge lines and dipping flanks of the half-graben during nonmarine periods of deposition. Conglomerates, coarse sandstones, and lacustrine facies may predominate adjacent to the southwest bounding faults of the Boobyalla half-graben.

The rollover structures that overlie mature source are preferred to those that are at a distance from these rocks.

(2) The Bridgewater Nose is the largest structure within the Boobyalla Sub-Basin. The structure plunges basinwards, though the exact relationship between the structural drape at its western end and the rest of the structure has to be resolved. The problem arises from the difficulty of correlating the "Event With Durroon Megasequence" from one fault compartment to the next. Correlations along the strike of the structure are in doubt, and there is a possibility that the plunge of the structure may reverse at its western extremity.

Structural-stratigraphic traps in nonmarine beds offer the best opportunity for hydrocarbon accumulations.

(3) The bulk of petroleum in extensional basins has been found on the upthrown side of tilted blocks. Durroon-1 was supposed to test the potential of the cover of sediments on top of the tilted Otway Megasequence within the Anderson Sub-Basin. The well was drilled out of closure.

A closed area along the updip culmination of the same block has now been mapped (Lachlan Structure; Encl 2). Durroon Mudstones overly Cenomanian sandstones and lavas on top of the Otway Megasequence, juxtaposed against the downfaulted younger sediments of the Durroon Megasequence of the Boobyalla Sub-Basin.

(4) Subunconformity truncation traps may exist below the Durroon Megasequence Boundary. There are numerous examples within the Boobyalla Sub-Basin of these.

(5) Lesser amounts of petroleum have been discovered on the downthrown side of normal faults. The zones of reverse drag may form traps against the fault face.

(6) Trap door structures are mapped at the margins of the basin. They are not regarded as potential traps. The margins have a long history of continued uplift and erosion and there is considerable opportunity for hydrocarbons to escape.

(7) The Boobyalla Sub-Basin is a frontier basin, without well control to assess any of the geological parameters that help to evaluate these areas. The presence of so many structures common to producing extensional basins of the world must recommend it as an exploration area.

10.0 RECOMMENDATIONS

More seismic data across the rollover structures adjacent to the Bassian Rise is vital. The best of these - Kingsbridge, perhaps - offers a sufficient thickness of Durroon Megasequence (2250 m) for reservoirs of both nonmarine and marine rocks to be present. This structure, together with Richmond, is unlikely to overlie mature source rocks and will depend on migration of hydrocarbons from the source areas to charge the reservoirs.

257317

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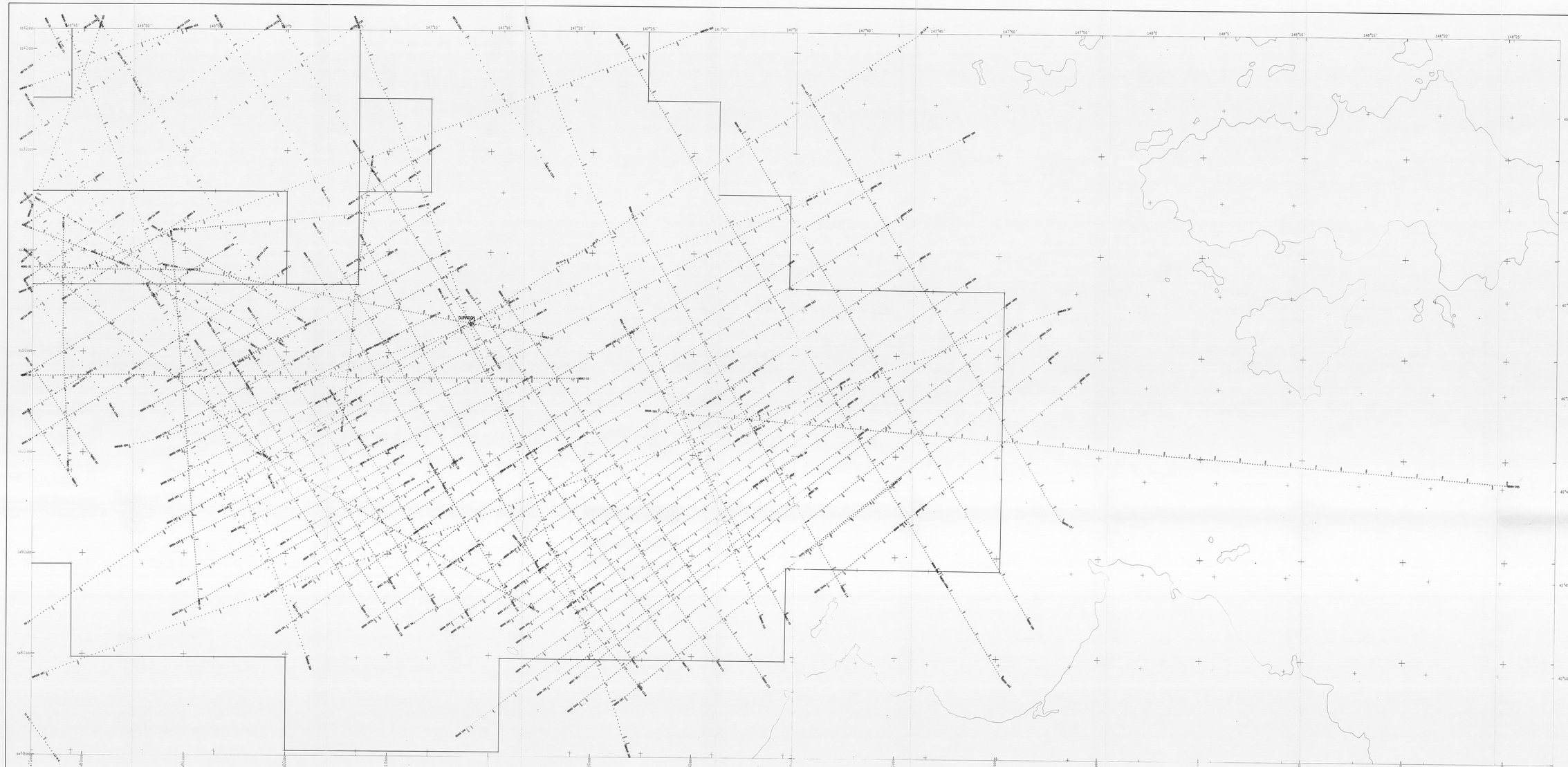

Bridge Oil Limited

BASS BASIN
TASMANIA

T/15P
BRIDGE BASS 1990
SEISMIC SURVEY
SOUTHERN AREA

Author : JNP	Date: 8-Jan-91
Drafted by: GB	Revised:
File No: 8920	Encl No.: 1

OR V 3

OR-0261



5 cm

N

SCALE

1: 250000

0 2 4 6 8 10

KM KM

Australian National Spheroid
U.T.M. Projection
Zone 55 C.M. 147 deg
Equatorial Origin 10,000,000 meters
Central Meridian Origin 500,000 meters
Central Meridian Scale Factor .9996

Location Map



257319

Bridge Oil Limited

BASS BASIN
TASMANIA

T/15P

BRIDGE BASS 1990
SEISMIC SURVEY

Author : RP	Date: 10-Sep-90
Drafted by: cjj	Revised:
File No.: 8680	Encl No.: 2

DR V 3

OR-0261

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ENCLOSURE 3

ADJACENT TRACE SUMMATION

BRIDGE OIL LTD

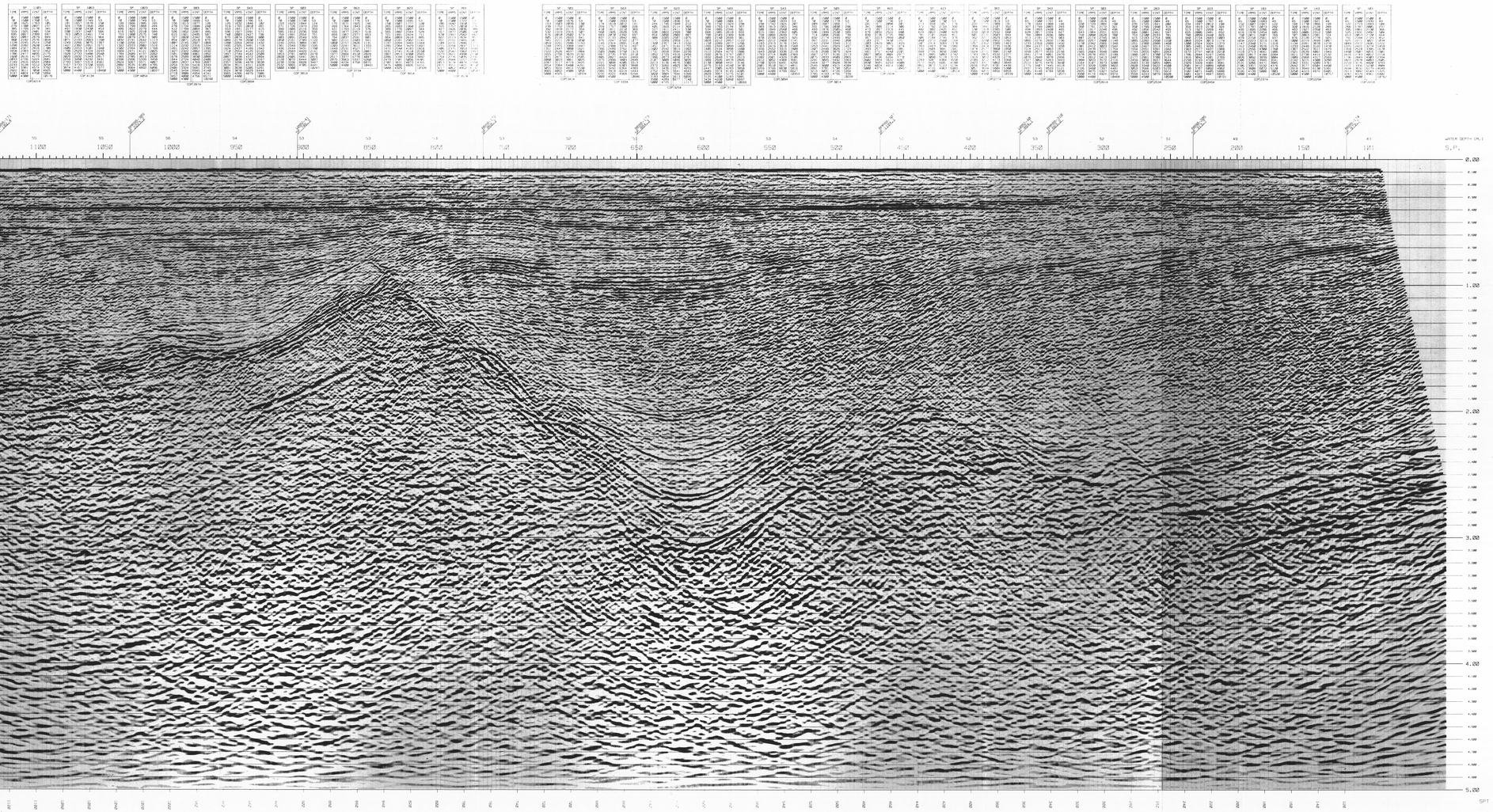
LINE : BB90-194
S.P : 101-1176
AREA : SE BASS BASIN
PERMIT : T/15P

MIGRATED STACK

SOUTH-WEST
BB90-194

BB90-194

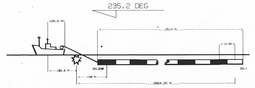
NORTH-EAST
BB90-194



RECORDING PARAMETERS

VESSEL	: HALLIBURTON GEOPHYSICAL SERVICES INC.	ENERGY SOURCE	: GSI 3130 HI TORQUIN AIRGUN
PARTY NO.	: 1	SOURCE DEPTH	: 3 M.B.M.L.
DATES	: NOV/DEC 1990	SOURCE PRESSURE	: 2000 PSI
DEPTH RECORDED	: NOVEMBER 1990	HYDRAULIC PRESSURE	: 1500 PSI
		SOURCE SEPARATION	: 50 M. (AVG.)
RECORDING INSTRUMENTS		SLIP INTERVAL	: 6.0 SEC.
		SHOOTPOINT INTERVAL	: 25M.
INSTRUMENTS	: GSI	NO. OF CHANNELS	: 120
FIELD FILTER	: 5 HZ - 188 HZ 18 DB/OCT 8.0 HZ - 16 DB/OCT	STREAMER	: GSI 6KL (AVERAGE)
SAMPLE RATE	: 2 MSEC	STREAMER TYPE	: MULTIFLEX 17(AVG. SKIN)
RECORD LENGTH	: 6.0 SEC	NO. OF GROUPS	: 240 CHANNEL
TAPE FORMAT	: SEG D 6250BPI	GROUP INTERVAL	: 12.5M.
		NEAR OFFSET	: 338 M. (AVERAGE)
NAVIGATION		FAR OFFSET	: 3000 M. (AVERAGE)
		NO. OF STREAMER DEPTH	: VARIOUS (6 - 9 M.)
PRIMARY	: SYLEDIS	GROUP INTERVALS	: 6.25 M. 3 TRACES (.150)
SECONDARY	: SATTORARI		6.25 M. 1 TRACES (150-2640)

235.2 DEG



PROCESSING SEQUENCE

(1) TRANSCRIPTION
SEGD FIELD TAPES TO DIGICON INTERNAL FORMAT
SAMPLE RATE:.....2 MSEC
SAMPLES/TRACE:.....3 MSEC

(2) RESAMPLE
FILTER TO 0.8 MS MINIMUM PHASE ANTI-ALIAS FILTER
OUTPUT RATE 4 MSEC

(3) STATIC CORRECTIONS
SOURCE STATIC:..... -51.0 MSEC
SOURCE CORRECTION:..... +1.4 MSEC
RECEIVER CORRECTION:..... +0.0 MSEC
TOTAL STATIC:..... -49.6 MSEC

(4) EDIT

(5) 2+1 ADJACENT TRACE SUM
SUM ADJACENT TRACES IN DIRECTION, NAS
SINGLE FOLD FOR 1.0 SEC AT WATER BOTTOM
TAPER 1.0 SEC

(6) SPHERICAL DIVERGENCE CORRECTION
VELOCITY (V) = TIME (T) REPRESENTATION OF VELOCITY FUNCTION

(7) GAIN CORRECTION
EXPONENTIAL +12 DB OVER 0.4 - 4.4 SEC.

(8) VELOCITY FILTER - (F-I-L-T-A-P)
(SEC. SWEEP) WITH RECOVERABLE REJ. (WARPSEC. GATE)
PASS RANGE 7 - 14 DB KM/SEC - 45 DB KM/SEC

(9) 2+1 ADJACENT TRACE SUM
SUM ADJACENT TRACES IN DIRECTION, NAS

(10) PRE-STACK TRACE EQUALIZATION
GATE TIME (MSEC.) 1000 - 4488 MSEC.
MAX. OFFSET 3000 - 5600 MSEC.

(11) WAVELET DECONVOLUTION
SURFACE CONSISTENT DECON
SPIKING, PREDICTIVE DECON
DETERMINISTIC COMPENSATION FOR INSTRUMENT RESPONSE
PRE-SOURCE SIGNATURE DECON
DESIGN GATE TIME (MSEC.) 1200 - 4488 MSEC.
PRE. OFFSET 3000 - 5600 MSEC.
APPLICATION GATE TIME (MSEC.) 1000 - 4488 MSEC.
DESIRED OUTPUT ZERO PHASE WAVELET 5-50 HZ.

(12) C.D.P. GATHER
MINIMUM FOLD = 51

(13) VELOCITY ANALYSIS (-V-) - FIRST PASS
SUB-SEA REFERENCE (SSR) SECTIONS, INTERACTIVE ROUTINE
SUB-SEA ALTERNATE (SSA) SECTIONS, INTERACTIVE ROUTINE
SUPERVISOR EDITS RMS VELOCITY FUNCTIONS

(14) MULTIPLE SUPPRESSION (-S-P-S-L-)
SURFACE CONSISTENT SPIKING DECON FIELD
SUPERVISOR EDITS PREDICTION LAG

(15) DIP MOVEOUT COMPENSATION (-D-M-O-) F-K METHOD

(16) VELOCITY ANALYSIS (-V-) - 2ND PASS
SUB-SEA REFERENCE (SSR) SECTIONS, INTERACTIVE ROUTINE
SUB-SEA ALTERNATE (SSA) SECTIONS, INTERACTIVE ROUTINE
SUPERVISOR EDITS RMS VELOCITY FUNCTIONS

(17) N.M.O. CORRECTION
USING 2ND PASS VELOCITY FIELD
VELOCITIES RE-TRANSITIONED ABOVE SECTION

(18) PRE-STACK TRACE MUTES
SCALING PRIOR TO MUTE START (MSEC.) 3000 4488 2000
SCALING POST MUTE TIME (MSEC.) 0 5600 2000

(19) COMMON DEPTH POINT STACK
MINIMUM FOLD = 51

(20) DECONVOLUTION
TYPE PREDICTIVE GAP = 36 MSEC.
OPERATOR LENGTH 480 MSEC.
WHITE NOISE ADDED 1 %
DECONVOLUTION GATES 1 3000-3500 MSEC. & 5000-5200 MSEC.
2 4000-4200 MSEC. & 5000-5200 MSEC.

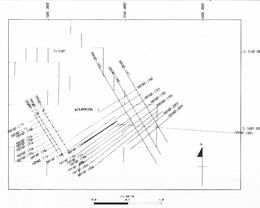
(21) TIME VARIANT BANDPASS FILTER
TIME (MSEC.) FREQUENCY/SLOPE (DB/OCT)
0.0 - 1.0 8/18 - 50/36
1.0 - 4.0 8/18 - 50/36
4.0 - 6.0 8/18 - 50/36

(22) TRACE EQUALIZATION
GATE TIME (MSEC.) GATE TIME END (MSEC.)
1000 4488
1200 4488
1400 4488
1600 4488
1800 4488
2000 4488
2200 4488
2400 4488
2600 4488
2800 4488
3000 4488

(23) MIGRATION
KIRCHHOFF ALGORITHM
SUB-SEA REFERENCE (SSR) VELOCITIES USED
SUB-SEA ALTERNATE (SSA) VELOCITIES USED
FILE - 4 MSEC. - 1 MSEC. INTERPOLATED

DISPLAY PARAMETERS

HORIZONTAL SCALE : 1:6.25 (1" = 26.4 S.P.'s, 1:12,500)
VERTICAL SCALE : 4 INCHES = 1 SEC. (1:5,000 TIME-SEC.)
DISPLAY GAIN : AS RECORDED
RECORDING : TRANSMISSION RECORDED AS NEGATIVE NUMBER
DISPLAYED : ON TAPE
: TAPE POLARITY NORMAL, ON DISPLAY WITH 0° PHASE SHIFT, PEAKS PLOTTED BY WHITE TROUGH.
DATUM : MEAN SEA LEVEL
S.P. TRANSITION : SHOTPOINTS TRANSITIONED TO ANTENNA POSITION.



PROCESSED BY : DIGITAL EXPLORATION LTD.
DIGICON. BRISBANE

PROCESSOR : S.J. JESTICO
DATE : S.V. KHAN
DATE : JANUARY 1991

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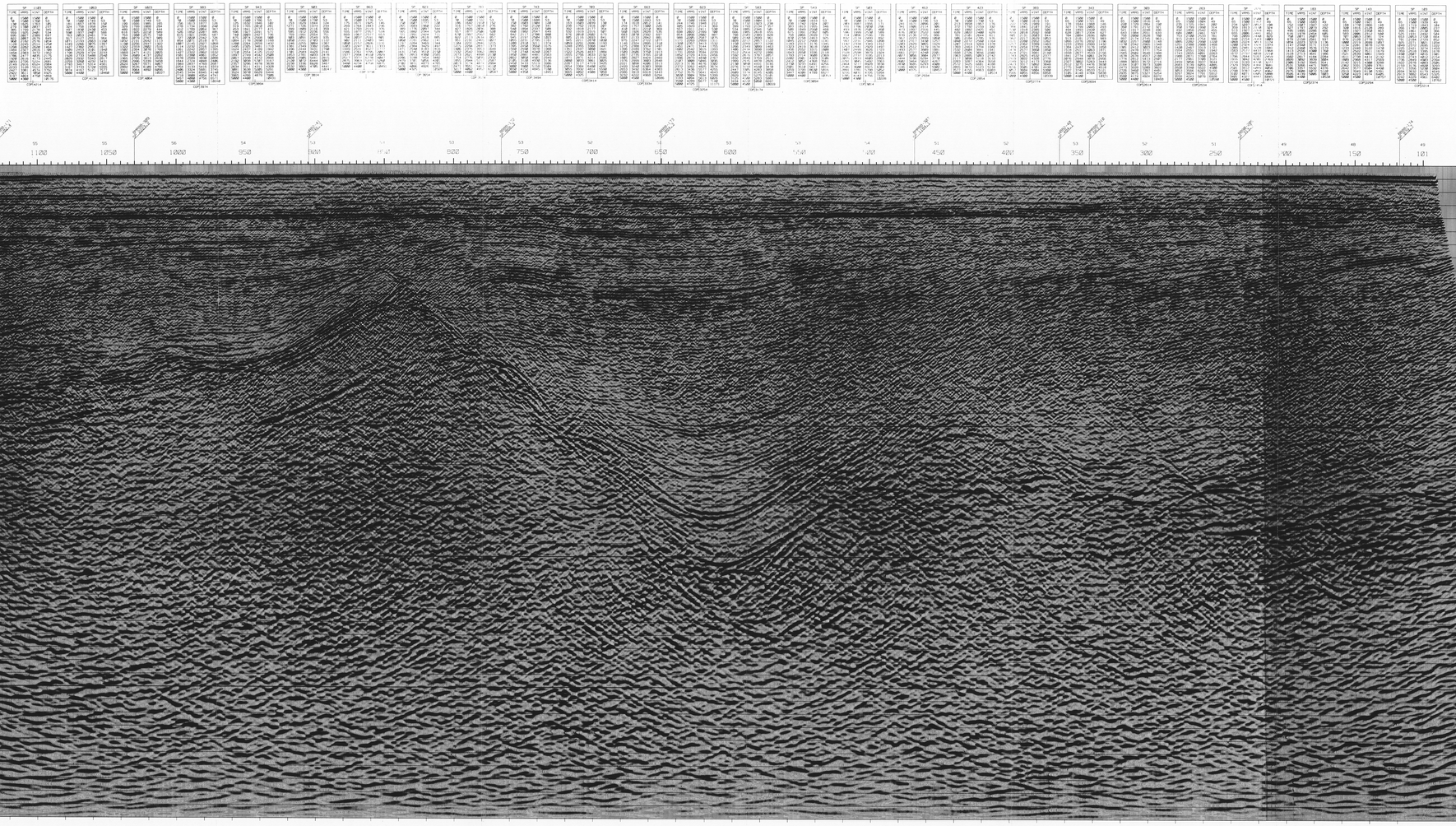
ENCLOSURE 4

SOUTH-WEST
BB90-194

BB90-194

NORTH-EAST
BB90-194



6.25m TRACE INTERPOLATION

BRIDGE OIL LTD

LINE : BB90-194
S.P : 101-1176
AREA : SE BASS BASIN
PERMIT : T/15P

MIGRATED STACK

RECORDING PARAMETERS

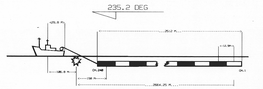
RECORDED BY : WELLSBRITISH DIVISION
PARTY NO. : 2090
LOCALITY : BASS STRAIT/PORT CREEK
DATE RECORDED : NOV/DEC 1989

RECORDING INSTRUMENTS
INSTRUMENTS : TYPE : DFS IV
FIELD FILTER : HI : 128 HZ 72 DB/OCT
LO : 8 HZ 18 DB/OCT
SAMPLE RATE : 2 MSEC
RECORD LENGTH : 6 SEC
TAPE FORMAT : SEGD

NAVIGATION
PRIMARY : SYLEDIS
SECONDARY : SATT/OMNI

SOURCE
ENERGY SOURCE : VSY 36 SLEEVE AIRGUN ARRAY
SOURCE DEPTH : 6 METRES
AIRGUN VOLUME : 2150 CU.IN.
AIRGUN PRESSURE : 1900 PSI.
SHOT INTERVAL : 50 METRES
GUN DEPTH : 6 M.
SHOTPOINT INTERVAL : 25 M.
SHOTPOINT INTERVAL : 50M.M.
STREAMER

STREAMER TYPE : MULTIFLEX (PLUS/C SKIN)
NUMBER OF CHANNELS : 240 (STAR)
STREAMER LENGTH : 2400 M
NEAR OFFSET : 200 M. (OVERRANGE)
FAR OFFSET : 2590 M. (OVERRANGE)
FAR CHANNEL DEPTH : 6M.
GROUP INTERVALS : 12.5 M. (TRACES 1-192)
12.5 M. (TRACES 193-240)



PROCESSING SEQUENCE

[1] TRANSCRIPTION
DEMULTIPLEX TAPES TO DIGICON INTERNAL FORMAT
RECORD LENGTH ..... 6 SEC.
SAMPLE RATE ..... 2 MSEC.

[2] RESAMPLE
RESAMPLE TO 4 MS MINIMUM PHASE ANTI-ALIAS FILTER
BUTTERWORTH @ 128 HZ.

[3] STATIC CORRECTIONS
GUN DELAY ..... -10.0 MSEC.
SOURCE CORRECTION ..... +5.8 MSEC.
DATUM CORRECTION ..... +0.0 MSEC.
TOTAL STATIC ..... -4.2 MSEC.

[4] EDIT

[5] TRACE INTERPOLATION
INTERPOLATE TRACES 1-192 TO GIVE A UNIFORM GROUP
INTERVAL OF 6.25M.

[6] SPHERICAL DIVERGENCE CORRECTION
SCALAR V.T.F. USING NORESPONSIVE VELOCITY FUNCTION

[7] GAIN CORRECTION
EXPONENTIAL T**2 OR OVER 2.4 = 4.4 SEC.

[8] VELOCITY FILTER- (FISTAF)
REJECT VELOCITIES : 1500 M/SEC REJ. (SURFACE- GATE)
PASS RANGE : +4.88 M/SEC. - +5.48 M/SEC.

[9] PRE-STACK TRACE EQUALIZATION
GATES : 1 : NEAR OFFSET 1200-4488 MSEC.
FAR OFFSET 2000- 5888 MSEC.

[10] WAVELET DECONVOLUTION
TYPE : SPIKE/PREDICTIVE DESIGN
OPERATOR : SPIKE/PREDICTIVE DESIGN
OPERATOR LENGTH : 160 MSEC.
OPERATOR GATES : 1 : NEAR OFFSET 1200-4488 MSEC.
2 : FAR OFFSET 2000- 5888 MSEC.
PREWHITENING : 1 PERCENT
DESIGN GATE : 1 : NEAR OFFSET 1200-4488 MSEC.
2 : FAR OFFSET 2000- 5888 MSEC.
OUTPUT OPERATOR : 1 ZERO PHASE WAVELET 5-30 HZ.

[11] C.D.P. GATHER
FOLD : 1 TO 1
CDP INTERVAL : 12.5M.M

[12] VELOCITY ANALYSIS I - 1ST PASS
SUB-OPTIMUM STACKING VELOCITIES FROM ROUTINE
SUPERGATHER SCANNING (SEE VELOCITY FUNCTION).

[13] MULTIPLE SUPPRESSION (ZPULS)
TYPE : PREDICTIVE DECONVOLUTION
OPERATOR LENGTH : 1000 MSEC.
OPERATOR PASS : 1 : 1000 MSEC. TO END OF FIELD

[14] DIP MOVEOUT COMPENSATION I- F-K METHOD

[15] VELOCITY ANALYSIS II - 2ND PASS
OPTIMUM STACKING VELOCITIES FROM ROUTINE
SUPERGATHER SCANNING (SEE VELOCITY FUNCTION).

[16] N.M.O. CORRECTION
STACKING VELOCITY FIELD
DERIVED FROM ANALYSIS II ABOVE

[17] PRE-STACK TRACE MUTES
OUTER TRACE MUTE : TIME (MSEC.) : 500 448 2000
0 500 2000

[18] COMMON DEPTH POINT STACK
FOLD : MINIMUM FOLD = 50

[19] DECONVOLUTION
TYPE : PREDICTIVE
OPERATOR LENGTH : 160 MSEC. GAP = 36 MSEC.
WHITE NOISE (%) : 1.0
OPERATOR GATES : 1 : 500 2000 MSEC. & 4000 5388 MSEC.
APPLICATION GATES : 1 : 500 2000 MSEC. & 4000 5388 MSEC.

[20] MIGRATION
TYPE : FINITE DIFFERENCE ALGORITHM
PERCENTAGE OF SMOOTHED RMS VELOCITIES USED
@ 0 = 50 PERCENT @ 2000 = 50 PERCENT

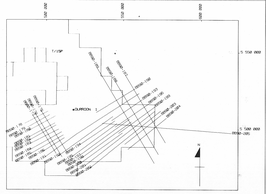
[21] TIME VARIANT BANDPASS FILTER
(SEE VELOCITY FUNCTION)
(TAPERING SLOPES OMITTED)
0.0 0.0 10/18 90/98
1.0 1.0 10/18 90/98
4.0 4.0 7/10 50/70

[22] TRACE EQUALIZATION
TAPER TIME (MSEC.) GATE (TIME (MSEC.)
500 1500
1000 1500
1500 1500
2000 1500
2500 1500
3000 1500
3500 1500
4000 1500

[23] 4:1 DECIMATION

DISPLAY PARAMETERS

HORIZONTAL SCALE : SCALE 1:25,000 OR 1:50,000 (1:25,000)
VERTICAL SCALE : 6 CM. INCHES = 5 SEC. (TWO WAY)
DISPLAY GAIN : 0.250
RECORDED : 1 DEFLECTION RECORDED AS NEGATIVE NUMBER
: 1 TRACE/CM
DISPLAYED : TAPE POLARITY NORMAL ON DISPLAY WITH SEA-BED REFLECTION REPRESENTED BY A WHITE TROUGH.
GROUP : 1 DEFLECTION PER TRACE
SHOTPOINT ANNOTATION : SHOTPOINTS ANNOTATED TO ANTENNA POSITION.



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DIGICON, BRISBANE

PROCESSOR : T.C.GOH
DATE : MAY 1991

30353

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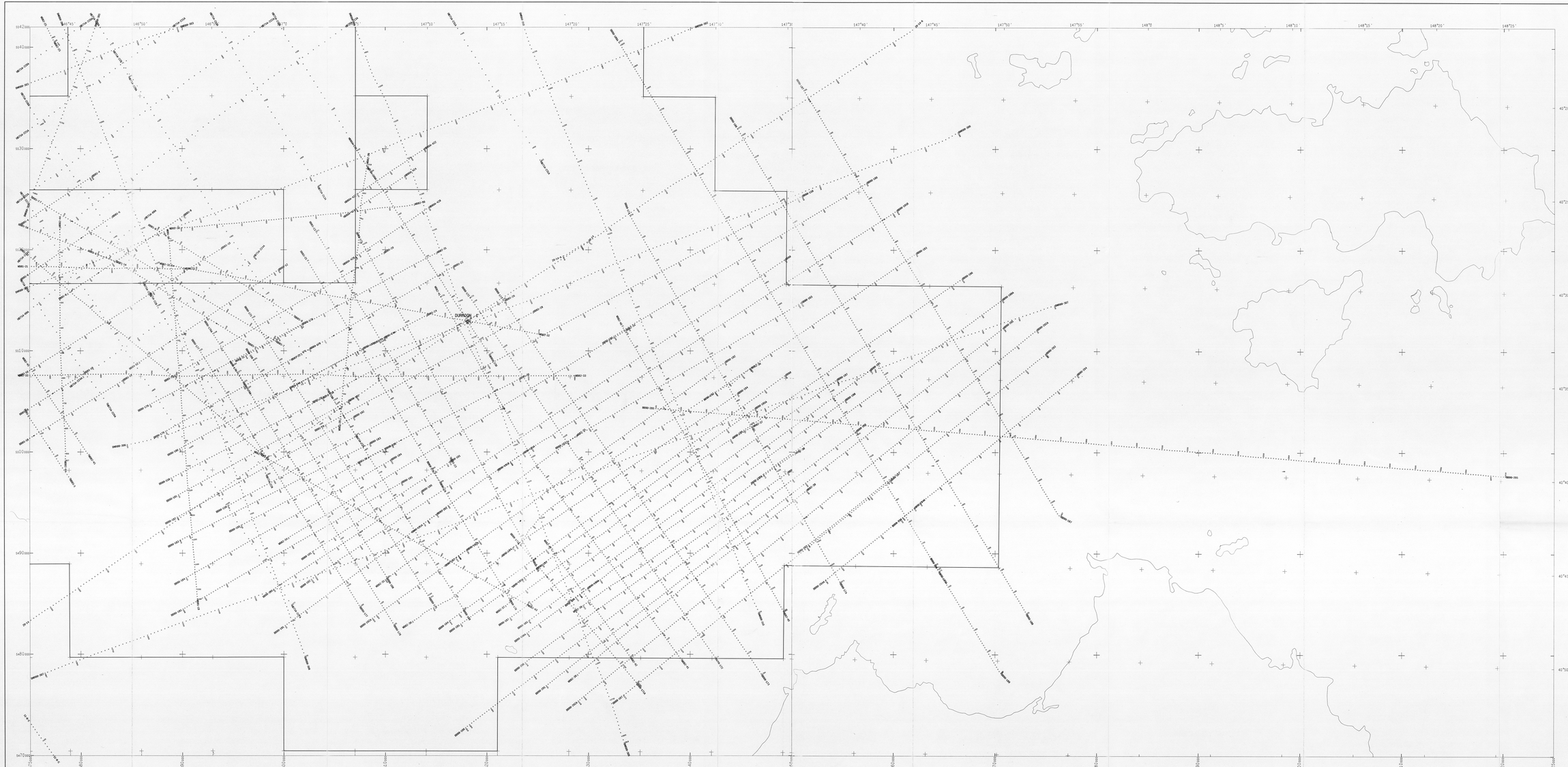


Bridge Oil Limited

BASS BASIN
TASMANIA

T/15P
BRIDGE BASS 1990
SEISMIC SURVEY
SOUTHERN AREA

Author : BP	Date: 8-Jan-91
Drafted by: clj	Revised:
File No.: 8920	Encl No.: 1

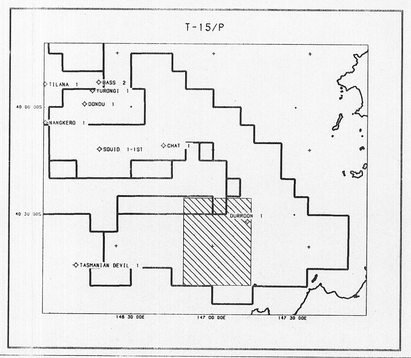
DR V 3

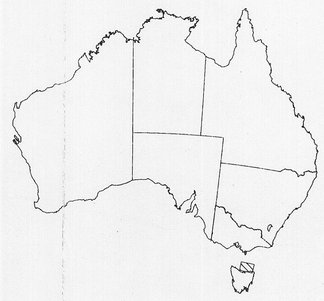
OR-0261

485000M E
490000M E
500000M E
510000M E
520000M E
5525000M N
5520000M N
5510000M N
5500000M N
5490000M N
5480000M N
40 30 00S
40 35 00S
40 40 00S
40 45 00S
146 55 00E
147 00 00E
147 05 00E
147 10 00E
DURROON 1

257323

T-15/P





5 cm

1:50000
KILOMETRES
MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 147 00 00E

Bridge Oil Limited

DURROON BASIN – TASMANIA
T/15P
BARK SUB – BASIN

DEMON'S BLUFF FORMATION TWT STRUCTURE CONTOURS

CI : 50ms OR-0261

Author: RP	Date: July 8, 1991
Drafted by: cjj	Revised:
File No:	Encl No: **2**

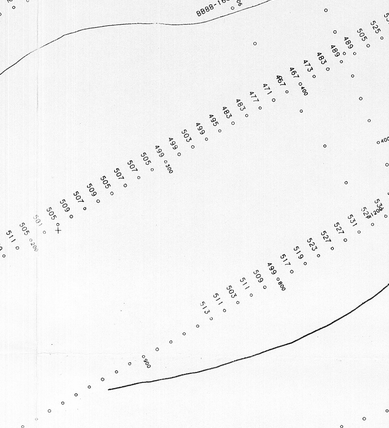
Standard VRF/VCGL (Serveware)

485000M E
490000M E
500000M E
510000M E
520000M E
5525000M N
5520000M N
5510000M N
5500000M N
5490000M N
5480000M N
40 30 00S
40 35 00S
40 40 00S
40 45 00S
146 55 00E
147 00 00E
147 05 00E
147 10 00E

DURROON 1

257324

T-15/P





5 cm

1:50000
0 1 2 3 4 5
KILOMETRES
0 1 2
MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 147 00 00E

Bridge Oil Limited

DURROON BASIN – TASMANIA
T/15P
BARK SUB – BASIN

PALEOCENE TWT STRUCTURE CONTOURS

CI : 50ms OR-0261

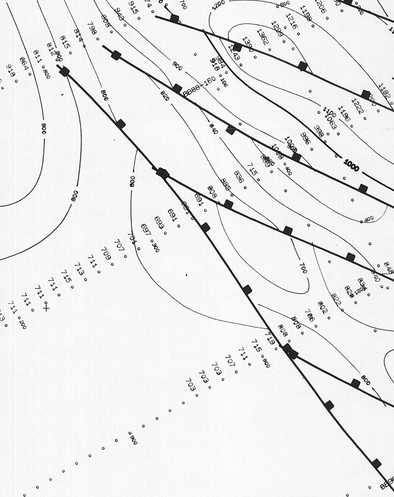
Author: RP	Date: July 8, 1991
Drafted by: cjj	Revised:
File No:	Encl No: 3

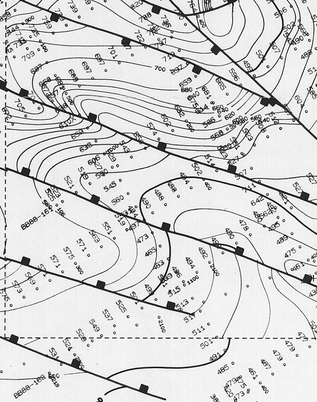
Standard VRF/VCGL (Serveware)

485000M E
490000M E
500000M E
510000M E
520000M E
5525000M N
5520000M N
5510000M N
5500000M N
5490000M N
5480000M N
40 30 00S
40 35 00S
40 40 00S
40 45 00S
146 55 00E
147 00 00E
147 05 00E
147 10 00E

257325

DETAILED STRATHROY PROSPECT
CI : 20ms





5 cm

1: 50000
KILOMETRES
MILES
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 147 00 00E

Bridge Oil Limited

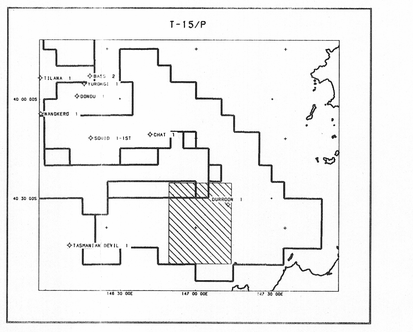
DURROON BASIN – TASMANIA
T/15P
BARK SUB – BASIN

OTWAY GROUP TWT STRUCTURE CONTOURS

CI : 100ms OR-0261

Author: RP	Date: July 10, 1991
Drafted by: cjj	Revised:
File No:	Encl No: **4**

485000M E
490000M E
500000M E
510000M E
520000M E
5525000M N
5520000M N
5510000M N
5500000M N
5490000M N
5480000M N
40 30 00S
40 35 00S
40 40 00S
40 45 00S
146 55 00E
147 00 00E
147 05 00E
147 10 00E
Durroon 1
257326
5 cm





1:50000
0 1 2 3 4 5
KILOMETRES
0 1 2
MILES
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 147 00 00E

Bridge Oil Limited

DURROON BASIN – TASMANIA
T/15P
BARK SUB – BASIN

DURROON MEGA–SEQUENCE TWT STRUCTURE CONTOURS

CI : 50ms OR-0261

Author: RP	Date: July 8, 1991
Drafted by: cjj	Revised:
File No:	Encl No: 5

Standard VRF/YCGL (Serveware)

T/15P



5 cm

1:250000

0 5 10 15 20 25
KILOMETRES

0 2 4 6 8 10
MILES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN 147 00 00E

257327

BASS BASIN
TASMANIA
T/15P
STRUCTURAL FRAMEWORK

OR-0261

ENCLOSURE 6

Standard VAP/VGSL (Serveware)

SEISMIC STRATIGRAPHIC CORRELATION FROM THE EYRE TO GIPPSLAND BASINS

ENCLOSURE 1

Petroconsultants

5 cm

OR-0261

257228

EYRE SUB-BASIN

STRATIGRAPHY

WILSON BLUFF LIMESTONE

HAMPTON SANDSTONE

UNITS JA – JC

UNIT JD

UNIT JE

UNIT JF

UNIT JG

UNIT JH

UNIT JI

UNIT JJ

MADURA FORMATION EQUIVALENT

INTERBEDDED UNNAMED FORMATION

From Benn & Taylor, APEA 1981

TECTONIC EVENTS: POSTRIFT; SYNRIFT

OTWAY BASIN

STRATIGRAPHY

LANDWARD — SEAWARD

MOORABOOL VIADUCT FM.

WHALERS BLUFF FM.

PORT CAMPBELL L.ST.

TORQUAY GROUP

GELLIBRAND MARL

CLIFTON FM.

SEQUENCE BOUNDARY

DEMONS BLUFF FM.

MEPUNGA FM.

NARRAWATURK MARL

TRANSGRESSION

SEQUENCE BOUNDARY

REGRESSION

DARTMOOR SAND

EASTERN VIEW FM.

DILWYN FM.

PEMBER MUDSTONE

MUSSEL FM.

TRANSGRESSION

MEGASEQUENCE BOUNDARY

PEBBLE POINT FM.

REGRESSION

TIMBOON SAND

PAARATTE FM.

BELFAST MUDSTONE

NULLAWARRE GREENSAND

FLAXMAN FM.

WAARRE SANDSTONE

From Thompson (in Press).

TRANSGRESSION

UPPER EUMERALLA FM.

MIDDLE EUMERALLA FM.

HEATHFIELD MBR.

LOWER EUMERALLA FM.

WINDERMERE MBR.

CRAYFISH GROUP

CASTERTON GROUP

From Kopsen & Scholefield, APEA 1990

HEYTESBURY GROUP

NIRRANANDA GROUP

WANGERRIP GROUP

SHERBROOK GROUP

OTWAY MEGASEQUENCE

SCHEMATIC DIAGRAM PRESENT DAY

DURING ?END CRAYFISH 'C' TIME

1. Uplift, erosional and possible fandelta deposition with lacustrine environments

CLOSE OF CRAYFISH 'B' TIME

1. Blanket deposition of sheet sands and shales across basinwide and margin terraces probably in response to a sea level high stand

MID CRAYFISH 'A' TIME

1. Infill deposition of braided stream and alluvial fan sheet sands in basin centre and margins around uplifted basement highs
2. Possible local lacustrine deposition

Sediment transport
Seismic dip terminations
Large scale clinoforms
Parallel seismic bedding
Sand dominated unit
Volcanics
Carbonaceous clastics
Metasedimentary economic basement

E79A-45

E79A-35

E79A-17

WOMBAT

JERBOA

Tp Prograding carbonate
T Tertiary carbonate
P Palaeocene prograding unit
Cn Cenomanian
Alb Alban
Apt Aptian
Nc Neocomian
J Jurassic
PC PreCambrian

TECTONIC EVENTS: POSTRIFT; SYNRIFT

BASS BASIN

STRATIGRAPHY

TORQUAY GROUP

DEMONS BLUFF FM.

SEQUENCE BOUNDARY

MEGASEQUENCE BOUNDARY

SEQUENCE BOUNDARY

SEQUENCE BOUNDARY

SEQUENCE BOUNDARY

SEQUENCE BOUNDARY

SEQUENCE BOUNDARY

EASTERN VIEW COAL MEASURES

SEQUENCE BOUNDARY

SEQUENCE BOUNDARY

SEQUENCE BOUNDARY

SEQUENCE BOUNDARY

OTWAY GROUP

Modified from Bridge Oil Report

TORQUAY MEGASEQUENCE

MEGASEQUENCE BOUNDARY

EO 1

SEQUENCE BOUNDARY

EASTERN VIEW MEGASEQUENCE

PL 2

SEQUENCE BOUNDARY

PL 1

SEQUENCE BOUNDARY

UK 5

SEQUENCE BOUNDARY

UK 4

SEQUENCE BOUNDARY

UK 3

MEGASEQUENCE BOUNDARY (80 Ma)

UK 2

SEQUENCE BOUNDARY

DURROON MEGASEQUENCE

UK 1

MEGASEQUENCE BOUNDARY (98 Ma)

OTWAY MEGASEQUENCE

SCHEMATIC DIAGRAM OF PRESENT-DAY STRUCTURE ON ALBO-APTIAN

BARK SUB-BASIN

DURROON SUB-BASIN

BOOBYALLA SUB-BASIN

SCHEMATIC DIAGRAM OF ALBO-APTIAN AT OTWAY BREAKUP

SCHEMATIC DIAGRAM OF ALBO-APTIAN DEPOSITIONAL BASIN

TECTONIC EVENTS: POSTRIFT; SYNRIFT; PRE RIFT

GIPPSLAND BASIN

STRATIGRAPHY

GIPPSLAND LIMESTONE

LAKES ENTRANCE FM.

GURNARD FM.

TURRUM FM.

GURNARD FM.

MEGASEQUENCE BOUNDARY

FLOUNDER FM.

LATROBE GROUP

GOLDEN BEACH FM.

From Duff et al, APEA 1991, and Featherstone et al, APEA 1991

OTWAY GROUP

SEASPRAY MEGASEQUENCE

LATROBE MEGASEQUENCE

GOLDEN BEACH MEGASEQUENCE

TASMAN BREAK-UP

OTWAY BREAK-UP

STRZELECKI MEGASEQUENCE

SCHEMATIC DIAGRAM OF PRESENT DAY STRUCTURE ON STRZELECKI

HINGE ZONE

HINGE ZONE

PALAEOZOIC

PALAEOZOIC

?

TECTONIC EVENTS: COMPRESSION; POSTRIFT; SYNRIFT; PRE RIFT

TECTONIC HISTORY

OTWAY DRIFTING

TASMAN DRIFTING

TASMAN RIFTING

OTWAY RIFTING

AGE Ma

EUSTATIC CURVES 250 200 150 100 50 0M

SYSTEM / SERIES / STAGE / SPORE-POLLEN ZONES

QUATERNARY

TERTIARY

NEOGENE

PLIOCENE: PIACENZIAN; ZANCLEAN

MIOCENE: MESSINIAN; TORTONIAN; SERRAVALLIAN; LANGHIAN; BURDIGALIAN; AQUITANIAN

PALAEOGENE

OLIGOCENE: CHATTIAN; RUPELIAN

EOCENE: PRIABONIAN; BARTONIAN; LUTETIAN; YPRESIAN

PALAEOCENE: THANETIAN; DANIAN

CRETACEOUS

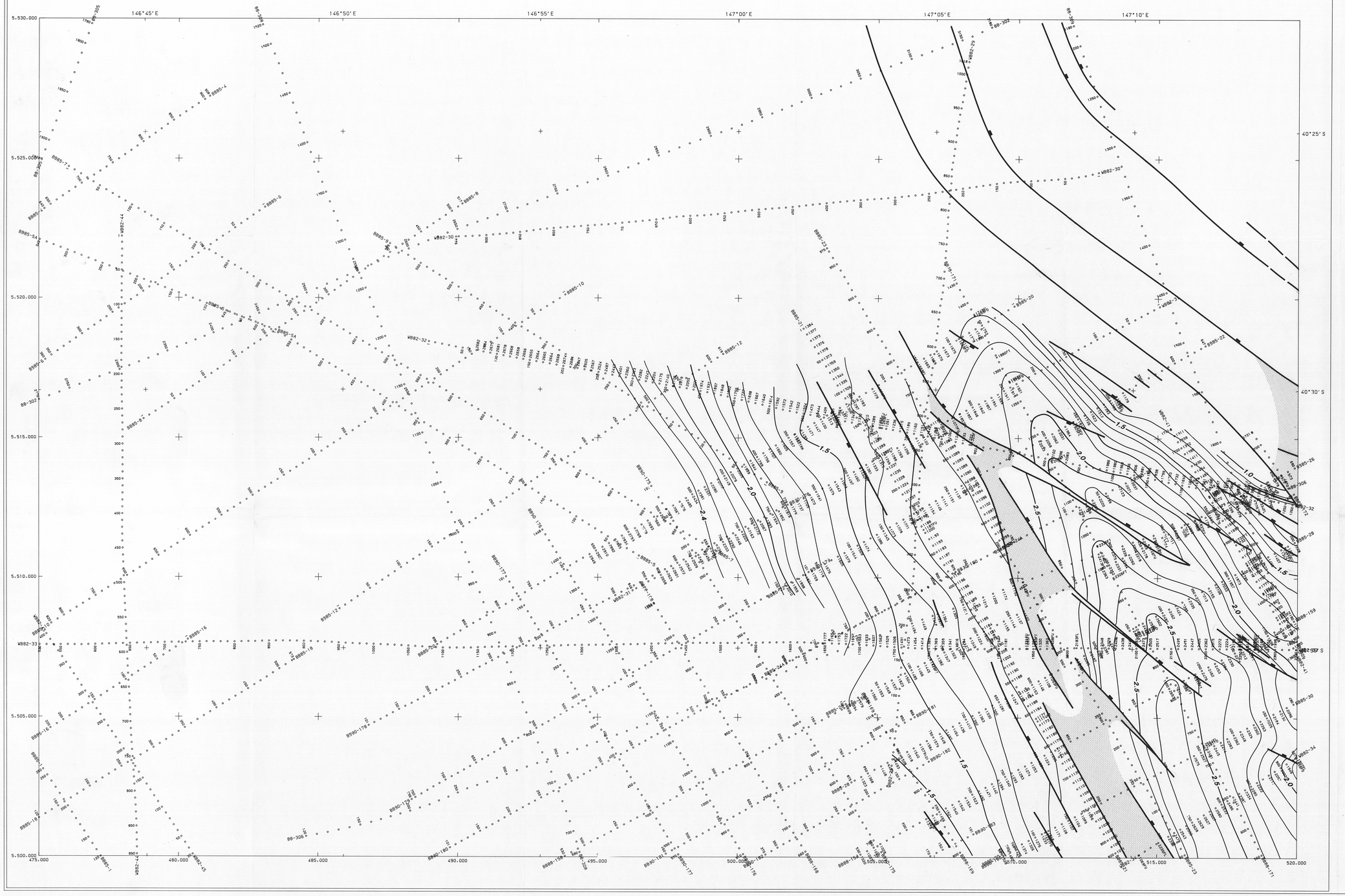
UPPER (Senonian): MAASTRICHTIAN; CAMPANIAN; SANTONIAN; CONIACIAN; TURONIAN; CENOMANIAN

LOWER (Neocomian): ALBIAN; APTIAN; BARREMIAN; HAUTERIVIAN; VALANGINIAN

JURASSIC

UPPER (Malm): TITHONIAN; KIMMERIDGIAN

MIDDLE (Dogger): CALLOVIAN; OXFORDIAN



SHEET INDEX

SHEET 1	SHEET 2	SHEET 3
SHEET 4	SHEET 5	SHEET 6

5 cm

N

SCALE: 1/50,000

1 0 1 2 3 4 5
KILOMETRES

AUSTRALIAN NATIONAL GRID PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN : 147°00'00.000 E
BASE LATITUDE : 000°00'00.000 S
COORDINATE UNITS :METRES

257329

Prepared by
PETROCONSULTANTS AUSTRALASIA PTY. LTD.
for
BRIDGE OIL LIMITED

TWO WAY TIME STRUCTURE
ON
OTWAY MEGASEQUENCE BOUNDARY
SHEET 1

INTERPRETATION BY: D. EDGERLEY	DATE: April 1991
CONTOUR INTERVAL: 0.1 SECOND	DATUM:
MAP NUMBER:	SCALE: 1/50,000

- MAP PRODUCED BY -
PETROCONSULTANTS DIGIMAP
OR-261

ENCLOSURE 2

5 cm

147°15'E 147°20'E 147°25'E 147°30'E 147°35'E

5,530,000 5,525,000 5,520,000 5,515,000 5,510,000 5,505,000 5,500,000

40°25'S 40°30'S 40°35'S

520,000 525,000 530,000 535,000 540,000 545,000 550,000

FAULTED BASIN MARGIN

LACHLAN STRUCTURE

SHEET INDEX

SHEET 1	SHEET 2	SHEET 3
SHEET 4	SHEET 5	SHEET 6

5 cm

N

SCALE: 1/50,000

1 0 1 2 3 4 5
KILOMETRES

AUSTRALIAN NATIONAL GRID PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN : 147°00'00.000 E
BASE LATITUDE : 000°00'00.000 S
COORDINATE UNITS : METRES

257330

Prepared by
PETROCONSULTANTS AUSTRALASIA PTY. LTD.
for
BRIDGE OIL LIMITED

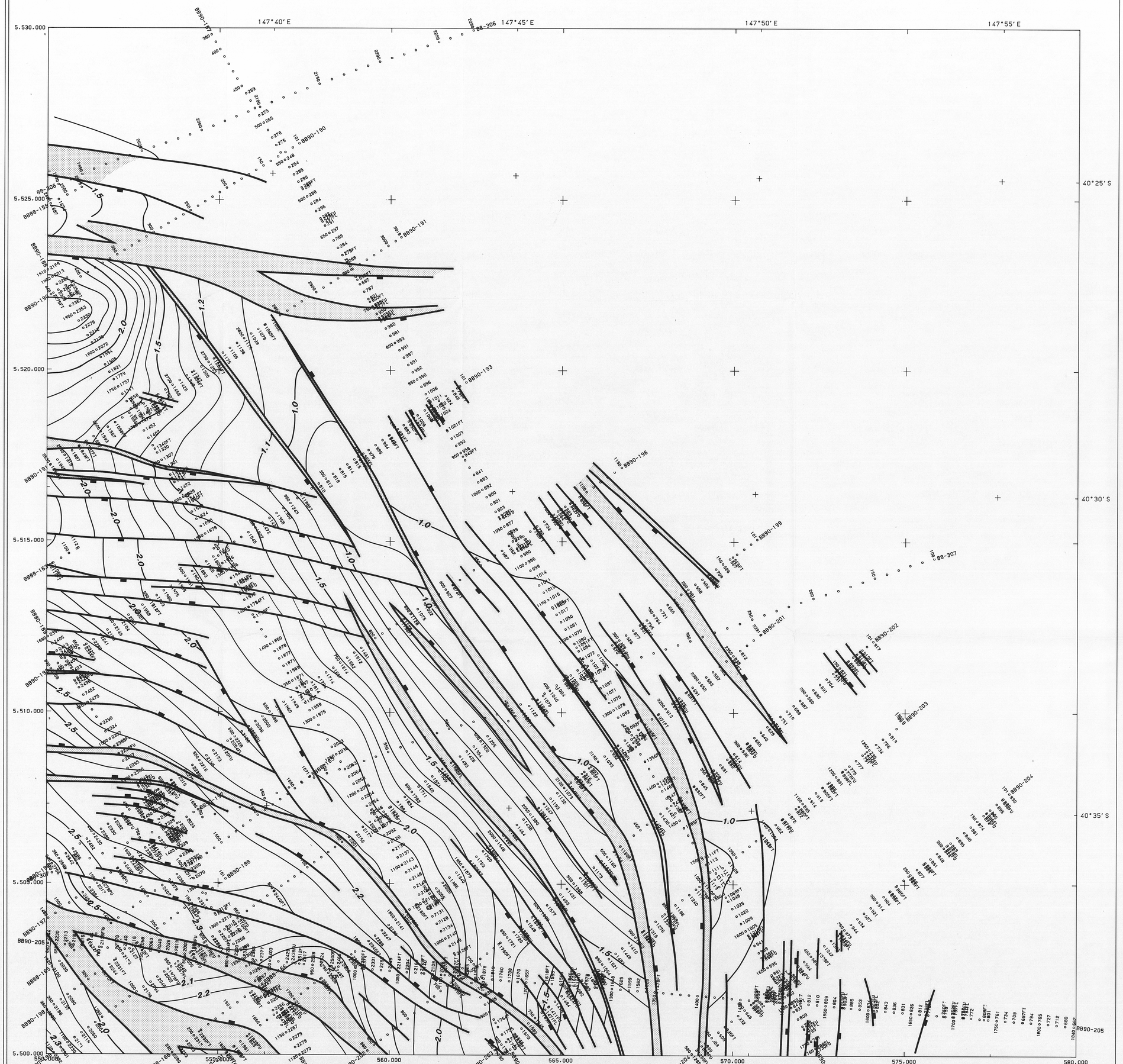
TWO WAY TIME STRUCTURE
ON
OTWAY MEGASEQUENCE BOUNDARY
SHEET 2

INTERPRETATION BY: D. EDGERLEY	DATE: April 1991
CONTOUR INTERVAL: 0.1 SECOND	DATUM:
MAP NUMBER:	SCALE: 1/50,000

- MAP PRODUCED BY -
PETROCONSULTANTS DIGIMAP

ENCLOSURE 2

OR-0261



SHEET INDEX

SHEET 1	SHEET 2	SHEET 3
SHEET 4	SHEET 5	SHEET 6

5 cm

N

SCALE: 1/50,000

1 0 1 2 3 4 5
KILOMETRES

AUSTRALIAN NATIONAL GRID PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN : 147°00:00:000 E
BASE LATITUDE : 000°00:00:000 S
COORDINATE UNITS :METRES

257331

Prepared by
PETROCONSULTANTS AUSTRALASIA PTY. LTD.
for
BRIDGE OIL LIMITED

TWO WAY TIME STRUCTURE
ON
OTWAY MEGASEQUENCE BOUNDARY
SHEET 3

INTERPRETATION BY: D. EDGERLEY	DATE: April 1991
CONTOUR INTERVAL: 0.1 SECOND	DATUM:
MAP NUMBER:	SCALE: 1/50,000

- MAP PRODUCED BY -
PETROCONSULTANTS DIGIMAP
OR-0261

ENCLOSURE 2

146°45'E 146°50'E 146°55'E 147°00'E 147°05'E 147°10'E

40°40'S 40°45'S 40°50'S 40°55'S

5,500,000 5,495,000 5,490,000 5,485,000 5,480,000 5,475,000 5,470,000

475,000 480,000 485,000 490,000 495,000 500,000 505,000 510,000 515,000 520,000

SHEET INDEX

SHEET 1	SHEET 2	SHEET 3
SHEET 4	SHEET 5	SHEET 6

5 cm

N

SCALE: 1/50,000

1 0 1 2 3 4 5
KILOMETRES

AUSTRALIAN NATIONAL GRID PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN = 147°00'00.000 E
BASE LATITUDE = 000°00'00.000 S
COORDINATE UNITS = METRES

257332

Prepared by
PETROCONSULTANTS AUSTRALASIA PTY. LTD.
for
BRIDGE OIL LIMITED

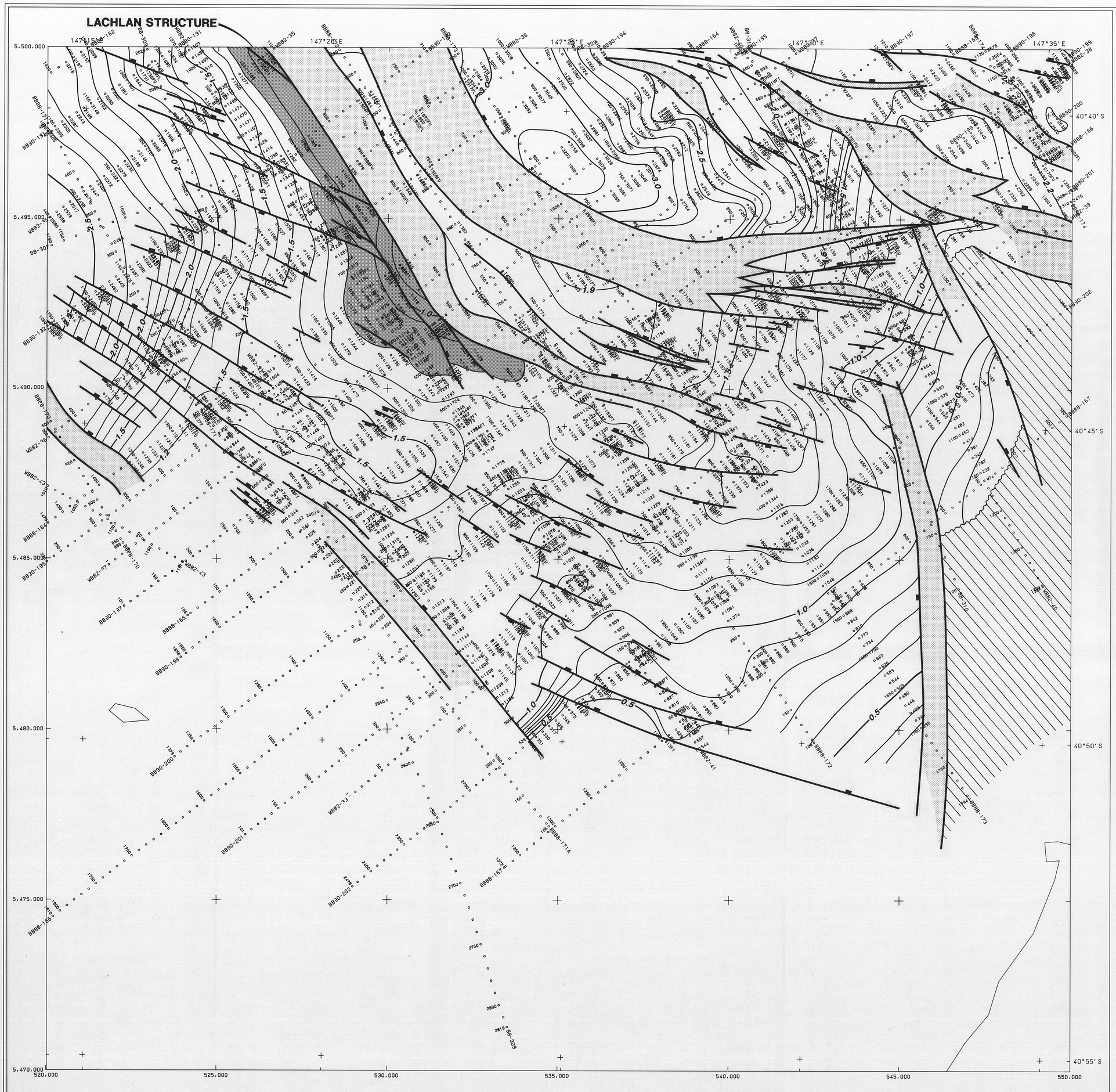
TWO WAY TIME STRUCTURE
ON
OTWAY MEGASEQUENCE BOUNDARY
SHEET 4

INTERPRETATION BY: D. EDGERLEY	DATE: April 1991
CONTOUR INTERVAL: 0.1 SECOND	DATUM:
MAP NUMBER:	SCALE: 1:50,000

- MAP PRODUCED BY -
PETROCONSULTANTS DIGIMAP

ENCLOSURE 2

OR-0261



SHEET INDEX

SHEET 1	SHEET 2	SHEET 3
SHEET 4	SHEET 5	SHEET 6

5 cm

N

SCALE: 1/50,000

1 0 1 2 3 4 5
KILOMETRES

AUSTRALIAN NATIONAL GRID PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN + 147°00'00.000 E
BASE LATITUDE + 000°00'00.000 S
COORDINATE UNITS METRES

257333

Prepared by
PETROCONSULTANTS AUSTRALASIA PTY. LTD.
for
BRIDGE OIL LIMITED

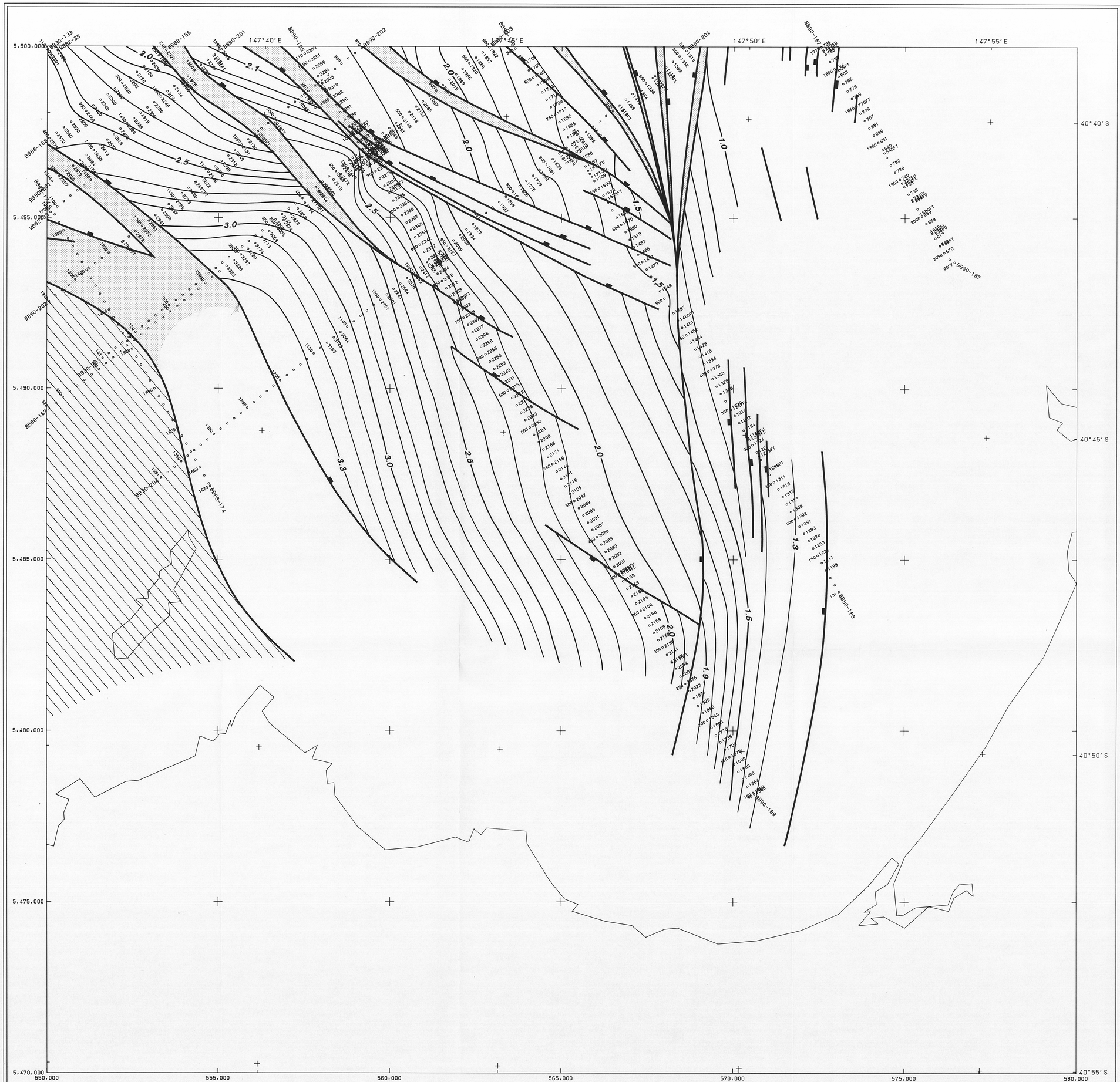
TWO WAY TIME STRUCTURE
ON
OTWAY MEGASEQUENCE BOUNDARY
SHEET 5

INTERPRETATION BY: D. EDGERLEY	DATE: April 1991
CONTOUR INTERVAL: 0.1 SECOND	DATUM:
MAP NUMBER:	SCALE: 1/50,000

- MAP PRODUCED BY -
PETROCONSULTANTS DIGIMAP

ENCLOSURE 2

OR-0261



SHEET INDEX

SHEET 1	SHEET 2	SHEET 3
SHEET 4	SHEET 5	SHEET 6

5 cm

N

SCALE: 1/50,000

1 0 1 2 3 4 5
KILOMETRES

AUSTRALIAN NATIONAL GRID PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN : 147°00'00.000 E
BASE LATITUDE : 000°00'00.000 S
COORDINATE UNITS : METRES

257334

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for
BRIDGE OIL LIMITED

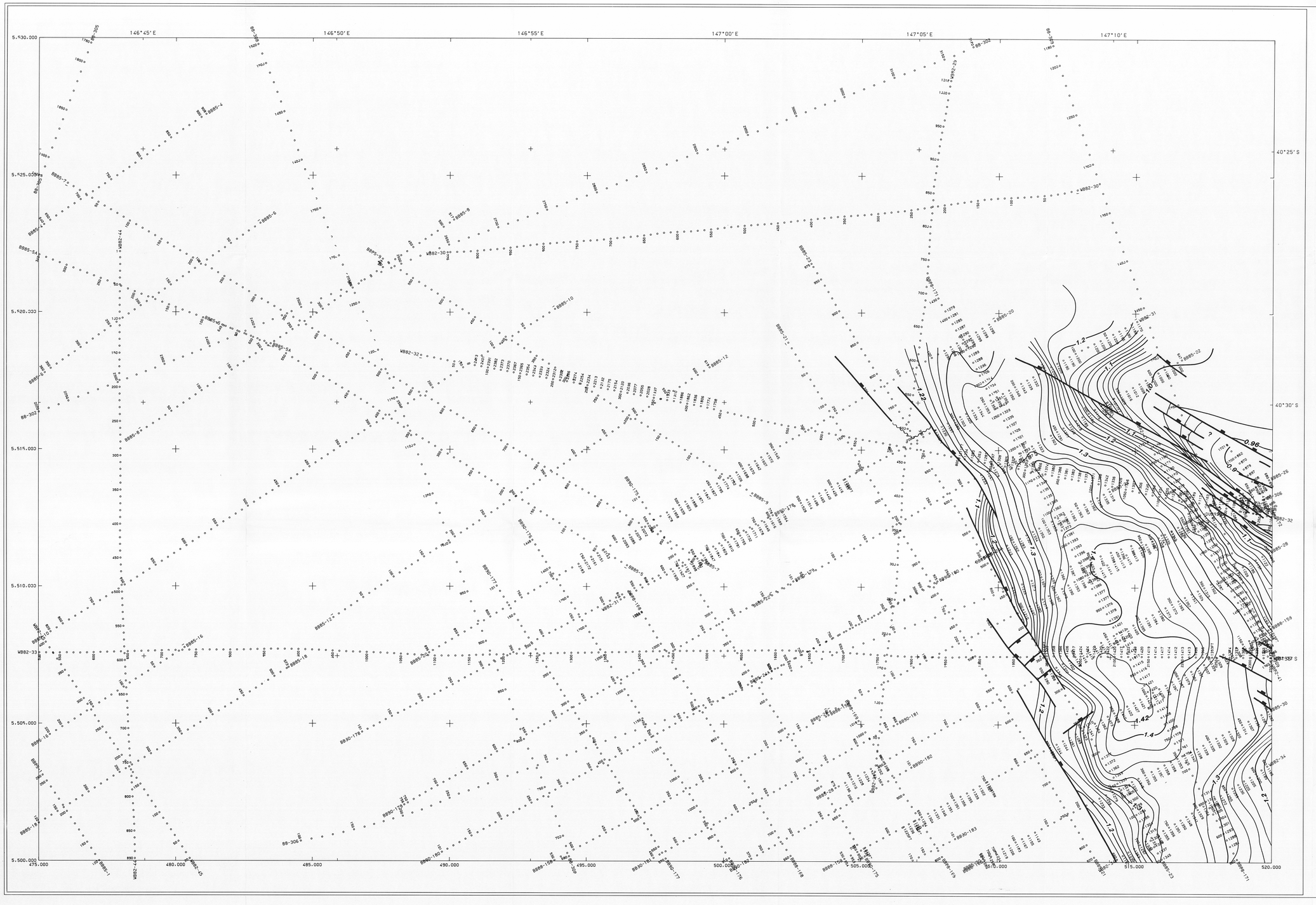
TWO WAY TIME STRUCTURE
ON
OTWAY MEGASEQUENCE BOUNDARY
SHEET 6

INTERPRETATION BY: D. EDGERLEY	DATE: April 1991
CONTOUR INTERVAL: 0.1 SECOND	DATUM:
MAP NUMBER:	SCALE: 1/50,000

- MAP PRODUCED BY -
PETROCONSULTANTS DIGIMAP

ENCLOSURE 2

OR-0261



SHEET INDEX

SHEET 1	SHEET 2	SHEET 3
SHEET 4	SHEET 5	SHEET 6

5 cm

N

SCALE: 1/50,000

1 0 1 2 3 4 5
KILOMETRES

AUSTRALIAN NATIONAL GRID PROJECTION
AUSTRALIAN NATIONAL SPHEROID
CENTRAL MERIDIAN + 147°00'00.000 E
BASE LATITUDE + 000°00'00.000 S
COORDINATE UNITS METRES

257335

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PETROCONSULTANTS AUSTRALASIA PTY. LTD.
for
BRIDGE OIL LIMITED

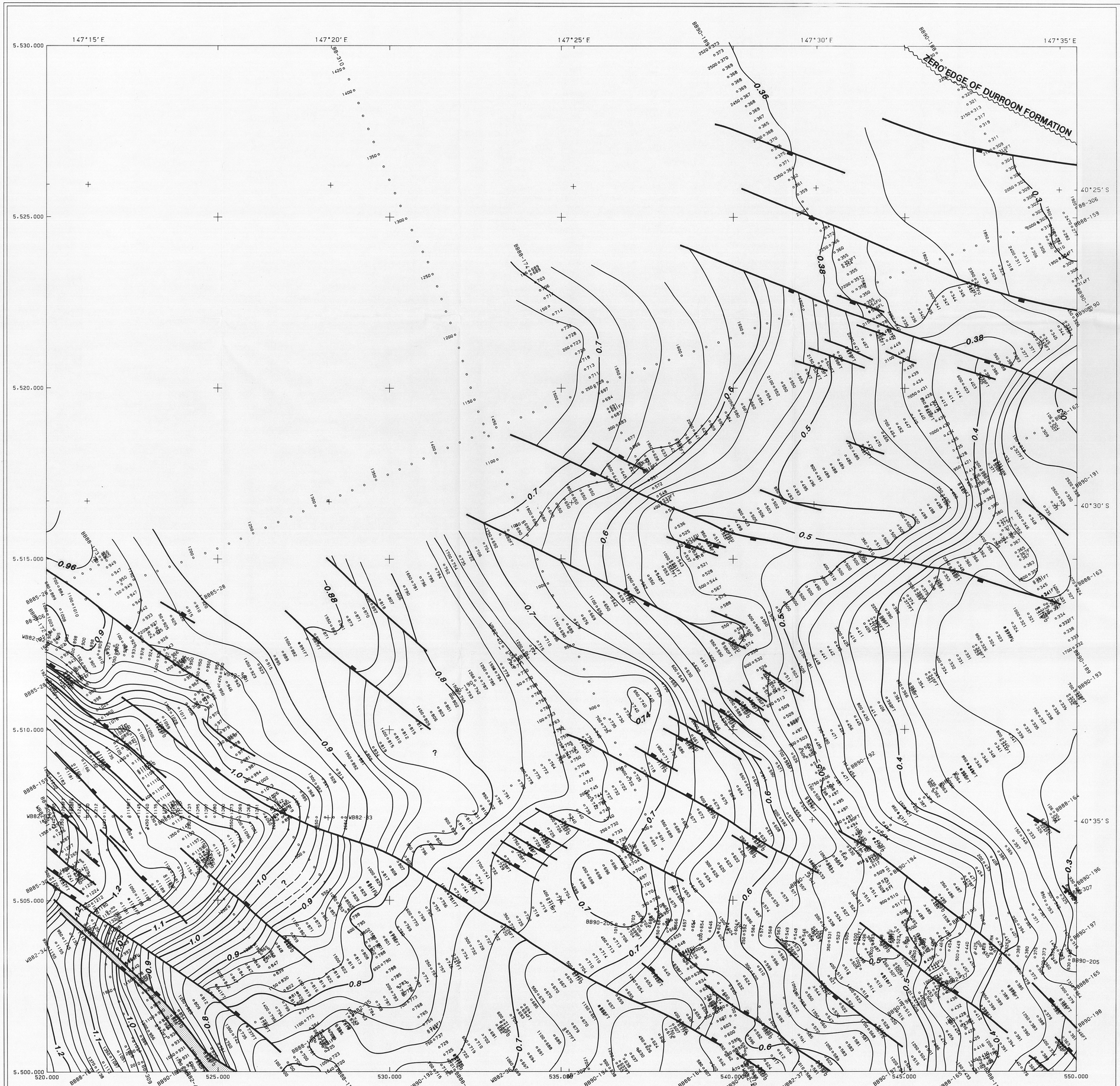
TWO WAY TIME STRUCTURE
ON
DURROON MEGASEQUENCE BOUNDARY
SHEET 1

INTERPRETATION BY: D. EDGERLEY	DATE: April 1991
CONTOUR INTERVAL: 0.02 SECONDS	DATUM:
MAP NUMBER:	SCALE: 1:50,000

- MAP PRODUCED BY -
PETROCONSULTANTS DIGIMAP

ENCLOSURE 3

OR-026/


147°15' E
147°20' E
147°25' E
147°30' E
147°35' E
40°25' S
40°30' S
40°35' S
5.530.000
5.525.000
5.520.000
5.515.000
5.510.000
5.505.000
5.500.000
520.000
525.000
530.000
535.000
540.000
545.000
550.000
ZERO EDGE OF DURROON FORMATION
BB90-189
BB90-188
BB90-191
BB90-192
BB90-193
BB90-194
BB90-196
BB90-197
BB90-198
BB90-199
BB90-205
BB90-90
BB90-92
BB88-159
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