

287001 7/12/92

MTR

POSITIONING REPORT

FOR

BA-FLINDERS 1
Copy 2 of 2 MS.

SAGASCO RESOURCES LIMITED

RIG MOVE OF THE

SEMI - SUBMERSIBLE DRILLING RIG

OCEAN EPOCH

LOCATION : FLINDERS-1
BLOCK : T/25P
DATED : 24th - 29TH NOVEMBER, 1992
REPORT REF : 2010

OR_295

RACAL

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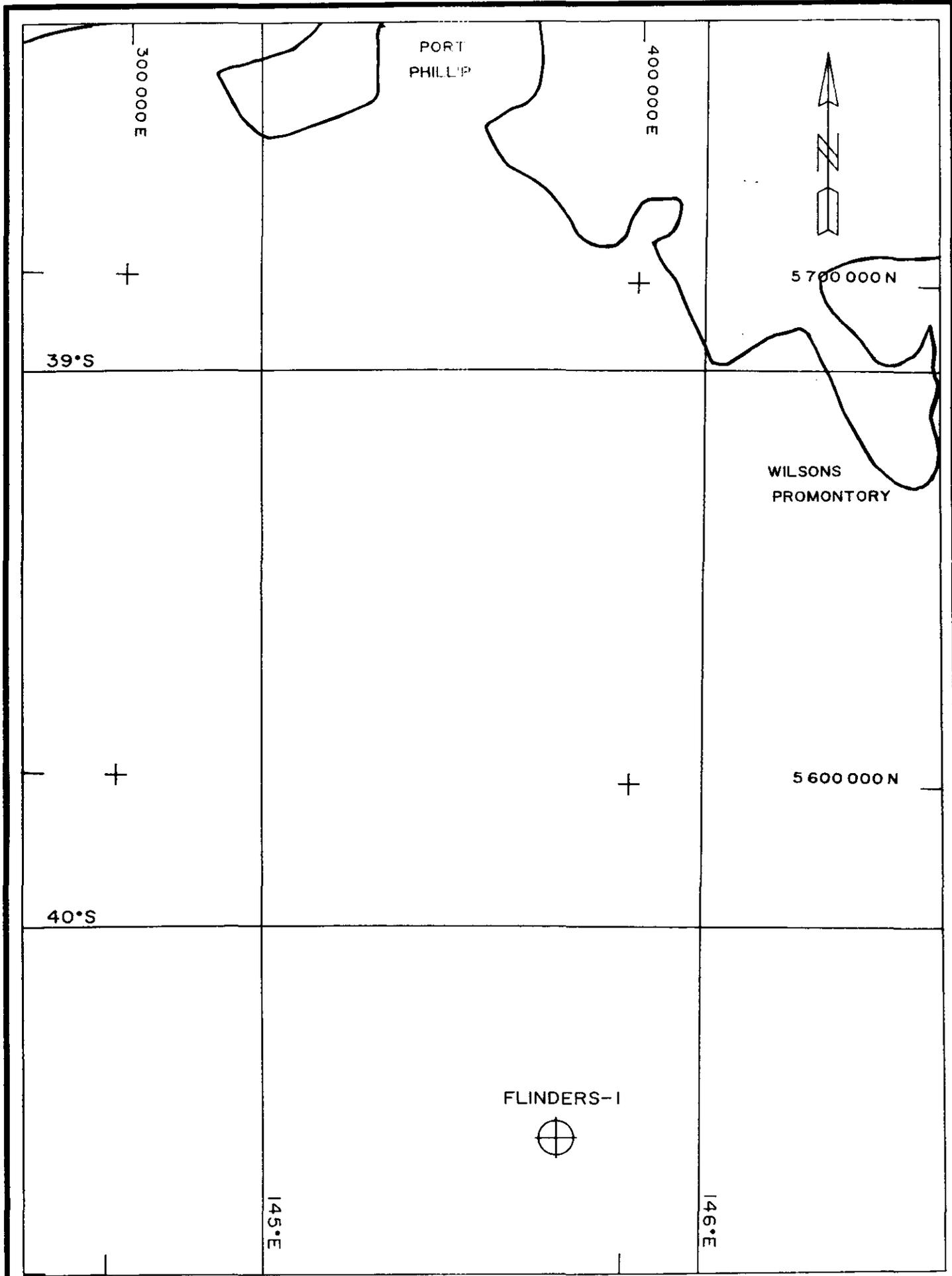
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5 cm

287003



SITE DIAGRAM

1. ABSTRACT

This report details the services provided by RACAL SURVEY AUSTRALIA LIMITED (Racal), prior to and during the positioning of semi-submersible rig OCEAN EPOCH over the FLINDERS-1 location in the Bass Strait, offshore northwest Tasmania for SAGASCO RESOURCES LIMITED (SAGASCO).

Personnel and equipment mobilised to Devonport on the 24th of November, 1992. Positioning equipment was set up on the "Ocean Epoch" on the 24th of November, 1992.

The "Ocean Epoch" was positioned over the Flinders-1 location, on the 28th of November, 1992.

A final Differential GPS fix was obtained, after the "Ocean Epoch" had pretensioned and ballasted down to drilling draught, during the morning of the 29th of November, 1992.

Proposed Location

The co-ordinates of the proposed location, Flinders-1, were provided by SAGASCO as follows:

Datum AGD 84

Latitude : 40° 22' 51.80" South
Longitude : 145° 40' 18.70" East

AMG Zone 55 C.M. 147° E

Easting : 387 261.099m
Northing : 5 529 085.762m

Final Differential GPS Position - Flinders-1

The final DGPS position of the "Ocean Epoch" was derived between 0105 and 0306 hours on the morning of the 29th of November, 1992. The final DGPS position was as follows:

Datum AGD 84

Latitude : 40° 22' 51.810" South
Longitude : 145° 40' 18.687" East

AMG Zone 55 C.M. 147° E

Easting : 387 260.80m
Northing : 5 529 085.46m

The final position is 0.42 metres on a bearing of 225.35° (T) from the intended location.

2. REQUIREMENTS

Racal Survey Australia Limited were contracted by SAGASCO to provide personnel and positioning equipment consisting of a "SkyFix" Differential GPS and Sonardyne acoustic navigation system for the rig move of the "Ocean Epoch" onto the Flinders-1 location. Racal's GNS software was used with the positioning systems to provide online navigation of the rig.

The requirements were as follows:

- a. To provide real-time positioning for the semi-submersible drilling rig "Ocean Epoch" during the tow and onto the Flinders-1 site.
- b. To provide a preliminary position, prior to the tow-master's decision to commence ballasting down to drilling draught.
- c. To provide a final Differential GPS position of the Flinders-1 well.
- d. To provide a final Acoustic position of the Flinders-1 well.

3. SUMMARY OF EVENTS

Racal personnel, Surveyor Mr. J. Austin and Electronics Engineer Mr. C. Hakkennes flew to Devonport airport on Tuesday 24th of November, 1992, arriving at 0930. On arrival, it was confirmed with Lloyd's helicopter personnel that Racal "SkyFix" equipment had already been transported to the "Ocean Epoch".

BHP Surveyor Mr. B. Edmonds arrived at Devonport airport at 1335 on the 24th of November 1992, and at 1425 all personnel departed Devonport airport for "Ocean Epoch", arriving aboard at the King-1 location at 1520. Equipment set-up commenced immediately, and by 2359 was complete, except for measurement of the gyro offset. Approach lines, anchor positions and rig heading were planned in accordance with instructions received during a meeting, at 1915, with Sagasco Company representative Mr. A. Chapman, and Barge Master Mr. D. Phillips.

By 0600 on Wednesday the 25th of November, 1992, anchor handling had commenced and Anchor No. 8 had been recovered, in winds of up to 25 knots and sea state 3. At 0658 Anchor No. 1 was recovered, and at 0718 Anchor No. 4 was also recovered; however at 0755 anchor-handling operations were postponed due to rising wind and seas. Anchor recovery did not recommence until over 48 hours later, after winds, which had risen to 45 knots, abated to 15 knots.

A gyro check was conducted at 2022 on the 25th of November, 1992, by observing the azimuth of the sun at sunset. Heavy cloud interfered with observations, however a preliminary C-O correction was derived and applied to the GNS navigation computer.

Anchor handling recommenced at 1011 on Friday the 27th of November 1992, and Anchor No.5 was recovered at 1100. At 1236, "Terje Viking" secured to the tow bridle and "Ragna Viking" finished with Anchor No.7. "Ragna Viking" recovered Anchor No.3 at 1417, and Anchor No.2 at 1630. "Ocean Epoch" lifted Anchor No.6 at 1713, and at 1740 it was secured and the tow to the Flinders-1 location commenced.

At 0522 on Saturday the 28th of November, 1992, the "Ocean Epoch" was one mile from the Anchor No.6 drop location, and sixty second position fix outputs were commenced. Anchor No.6 was let go at 0554, 29 metres from the intended position. By 0624 "Ocean Epoch" was located over the intended Flinders-1 position, and sixty second fixing was discontinued.

From 0705 to 0920 on the 28th of November, 1992, "Ragna Viking" placed Anchors 2, 7 and 3 on the bottom, generally close to intended locations except for Anchor No.7, which was placed some 12° from its intended bearing. At 1105 "Terje Viking" cast off the towing bridle, and at 1230 she placed Anchor No.8 on the bottom. "Ragna Viking" laid Anchor No.4 at 1339, "Terje Viking" laid Anchor No.1 at 1435, and "Ragna Viking" laid the last anchor, No.5, at 1445. Pretensioning then commenced.

Ocean Epoch completed successful pretensioning at 1848 on the 28th of November, 1992, and commenced ballasting down to drilling draught.

A second gyro check was conducted at 2026 on the 28th of November 1992, in good conditions, and a final gyro correction applied to the navigation software.

"Ocean Epoch" completed ballasting down at 2327 on the 28th of November 1992, and after the winch tensions were checked, observations of final position were commenced.

The final acoustic position was observed from 0015 to 0030 on Sunday the 29th of November, 1992, and then the final differential GPS position was observed from 0105 to 0306 during a period of good GPS coverage.

On completion of successful observations, the Racal navigation equipment was packed, ready for transport. At sunrise, Mr. Hakkennes transferred to the "Ragna Viking" to recover the Sonardyne seabed acoustic transponders, which operation was successfully completed at 0848 on the 29th of November 1992. Mr. Hakkennes transferred back to the rig, then all equipment was prepared for air and sea freighting.

At 1115 on Sunday the 29th of November 1992, all survey personnel and the Racal "SkyFix" equipment were flown to Devonport airport; at 1355 all personnel departed Devonport for Melbourne, thence home or Perth locations.

4. GEODETIC PARAMETERS

All co-ordinates shown in this report, unless stated otherwise, refer to the following:

The location co-ordinates are defined on Australian Geodetic Datum 1984 (AGD 84).

The Global Positioning System (GPS) is referenced to the World Geodetic System 1984 (WGS 84).

4.1 DATUMS

DATUM	:	Australian Geodetic Datum 1984
Spheroid	:	Australian National
Semi-major Axis (a)	:	6 378 160.000m
Semi-minor Axis (b)	:	6 356 774.719m
Eccentricity Squared (e^2)	:	0.006 694 542
Flattening (1/f)	:	298.25

DATUM	:	World Geodetic System 1984
Spheroid	:	WGS 84
Semi-major Axis (a)	:	6 378 137.000m
Semi-minor Axis (b)	:	6 356 752.3142
Eccentricity Squared (e^2)	:	0.006 694 380
Flattening (1/f)	:	298.257 223 563

4.2 PROJECTION : Universal Transverse Mercator

AMG Zone	:	55
Central Meridian (C.M.)	:	147° East
Scale factor on the C.M.	:	0.9996
False Easting	:	500 000m
False Northing	:	10 000 000m
Latitude of Origin	:	0° (Equator)
Unit of Measure	:	International Metre

4.3 DATUM TRANSFORMATION PARAMETERS

The following 7-parameter datum transformation was used to convert WGS 84 co-ordinates to AGD 84 co-ordinates:

Dx	=	+ 116.00m
Dy	=	+ 50.47m
Dz	=	- 141.69m
Rx	=	+ 0.230"
Ry	=	+ 0.390"
Rz	=	+ 0.344"
Scale(k)	=	- 0.0983

4.4 GEOID / SPHEROID SEPARATION

The Geoid/Spheroid separation value (N) at the Flinders-I location is -1.09m.

5. GPS OBSERVATIONS

5.1 PREAMBLE

There are two important types of GPS observations (observables): pseudorange and carrier phase. Carrier phase is sometimes also referred to as carrier beat phase. Pseudorange techniques are generally used for navigation e.g. Deltanav. In high-precision baseline surveying the carrier phase is used. Although the (undifferenced) phase can be used directly, it has become common practice, at least in surveying applications, to process certain linear combinations of the original carrier phase observations (double differences and triple differences).

5.1.1 Pseudoranges

The pseudorange is a measure of the distance between the satellite and the receiver at the epochs of transmission and reception of the signals. The transit time of the signals is measured by comparing (correlating) identical pseudo-random noise (PRN) codes generated by the satellite and by the receiver. A code-tracking loop within the receiver shifts the internal replica of the PRN code in time until maximum correlation occurs. The codes generated at the receiver are derived from the receiver's own clock, and the codes of the satellite transmissions are generated by the satellite system of clocks. It follows that unavoidable timing errors in both the satellite and the receiver clock will cause the measured quantity (pseudorange) to differ from the geometric distance.

In applications offshore where instantaneous positions are required, the pseudorange is the preferred observable. Given the satellite ephemeris (i.e. the position of the satellite at the epoch of transmission), there are seven unknowns: two clock errors, three receiver co-ordinates and the ionospheric and tropospheric delays. The effect of the satellite clock error is negligible for the typical navigation solution, particularly considering that the time errors are indistinguishable from the ionospheric and tropospheric delays. The satellite clocks are constantly monitored and synchronized with GPS time as maintained by the control centre. Actual offsets of the satellite clocks are approximated by polynomials in time and transmitted as part of the navigation message to the user for the correction of the measured pseudoranges. The ionospheric and tropospheric delays can be computed on the basis of ionospheric and tropospheric models, thus there are four unknowns left X, Y, Z and receiver clock error. These can be determined from four pseudoranges measured simultaneously to four GPS satellites.

It must be expected that the navigation accuracy will be degraded to about 100 metres standard deviation (Standard Positioning Service) once the GPS system is fully operational. Selective availability is a program to control the accuracy of pseudorange measurements. Essentially, the user is given a false pseudorange for each satellite so that the resulting measurement is in error by a controlled amount. Differential GPS requires that a receiver be located at a precisely known point from which the pseudorange corrections can be determined and monitored. These pseudorange errors are then communicated by means of a telecommunications link to users (for this project the differential link was SkyFix). Differential GPS improves the navigation solution even when selective availability is not active. In the relative mode most of the important errors, satellite ephemeris errors, and ionospheric and tropospheric delays, cancel.

5.1.2 Carrier Phase

The phase observable is the difference between the phase of the carrier signal of the satellite, measured at the receiver, and the phase of the local oscillator within the receiver at the epoch of measurement. This can be regarded as a biased range measurement of the satellite-receiver distance with the integer number of carrier waves being unknown. The wavelength of the L1 carrier is about 19cm. Because of the fraction of the carrier phase is measured, the term "interferometry" is often used to describe carrier phase techniques.

5.2 SKYFIX DIFFERENTIAL GPS

5.2.1 System Description

The NAVSTAR GPS (Navigational Satellite Timing and Ranging Global Positioning System) is a space based developmental satellite system. It is capable of providing highly accurate three dimensional positioning and can also be used to transfer accurate time to suitably equipped users worldwide. System design consists of three integral parts: the Ground Control Segment, the Space Segment and the User Segment.

When completed, the operational space segment will consist of 21 production satellites and 3 active spares; the term Space Vehicle (SV) is used as a synonym for satellite. The satellites will be in high orbits, at approximately 20,200km, having an orbit period of 12 hours. They will be arranged in 6 orbital planes, inclined at 55 degrees with near circular orbits.

The final configuration will provide complete 4 satellite (3D) coverage worldwide. With the present launch schedule, 24 hour 3 dimensional coverage will not be available until late 1993.

5.2.2 Current Configuration

At present, both Block I (testing) and Block II satellites are in orbit and transmitting healthy data. The Block I's are SV's 3, 11, 12, and 13. The current Block II satellites are SV's 2, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27 and 28. The amount of coverage that the satellite configuration provides, depends upon the geographical position of the user. The present coverage for the project area (assuming 10° elevation mask) is 22 hours of at least 4 Satellite coverage and 2 hours of additional 3 Satellite coverage.

It should be noted that available coverage does not represent actual usable working periods, as the satellites will at times combine to produce poor geometry and therefore poor positioning. This can happen for short periods during the middle of multi-satellite coverage and is a result of the limited satellite constellations presently available. It is essential to ascertain the periods of good coverage prior to commencing any project involving GPS.

Individual satellites can be set 'unhealthy' from time to time whilst they are manoeuvred into new orbital planes or due to other circumstances usually predicted. The status of GPS can be obtained from one of the GPS Bulletin Board Services prior to a project commencing.

See Appendix D for the satellite availability printouts for the survey period.

6. ACOUSTIC POSITIONING SYSTEM

6.1 SYSTEM DESCRIPTION

Sonardyne high precision acoustic technology incorporates COMPATT (Computing and Telemetry Transponder) and PAN (Programmable Acoustic Navigator). The system is available in low, medium and high frequency versions. This allows selection of the optimum frequency band to suit each requirement. Low frequency equipment was used during rig move operations.

The microprocessor-controlled intelligent COMPATT makes direct measurements on the seabed to other Sonardyne transponders, and transmits this baseline data back to a ship or submersible via fast acoustic telemetry in order to calculate the relative position of each transponder.

In its interrogator mode the COMPATT will measure ranges to 8 individual transponders with just one single interrogation. This speeds up 'mobile' COMPATT operations such as ROV tracking and pipelaying.

The reply frequency of the COMPATT is selectable from 15 channels by acoustic command. This feature reduces the need for a large transponder stock and increases immunity to 'rogue' frequencies.

Other commands instruct sensors to measure parameters such as water temperature and pressure, and at the end of the mission another command will effect recovery. An automatic 'self-test' facility can be performed without opening the transponder.

The medium frequency version gives the optimum combination of 3km ranges and 20cm accuracy. This suits most sub-sea engineering operations including rig moves, pipelaying, jacket emplacement and ROV positioning.

6.2 TRANSPONDER DEPLOYMENT AND CALIBRATION - FLINDERS-1 LOCATION

Sonardyne acoustic transponders were deployed and calibrated from the F.T.V. "Bluefin" on the 1st of October, 1992. A full report has previously been supplied - report reference 1974.

The transponders were deployed in a quadrilateral, approximately 500-800 metres from the intended location. Intended drop positions and telemetered depths were used as the basis of subsequent relative and absolute calibrations.

As a check on the relative/absolute calibration of the compatts, a "Box-In" calibration was carried out on all of the compatts.

The F.T.V. "Bluefin" steamed in a clover-leaf configuration throughout the array, logging acoustic ranges to each transponder as well as the surface differential GPS. This recorded data enabled relative (to each other) and absolute (defined in terms of AGD 84) calibrations to be computed.

The "Box-In" calibration (where the co-ordinates of only one Compatt are derived) is carried out by steaming a circle of radius 2.5 times the water depth, in each direction, again recording simultaneous surface and acoustic data.

The results of the Relative calibration were as follows:

Relative Calibration

1st of October 13:06 to 14:31

Transponder	X(m)	Y(m)	Depth(m)	Mean Range Residual(m)	S.D. (m)	
1	201	0.00	0.00	67.40	-0.16	0.52
2	105	1066.49	-0.00	64.50	-0.33	0.54
3	803	463.79	691.02	62.00	-0.18	0.52
4	906	506.80	-818.53	65.80	-0.01	0.54

Total solution standard error: 0.88 metres.

The result of the Absolute calibration were as follows:

Absolute Calibration

Transponder	Easting (m)	Northing (m)	Depth (m)	
1	201	386 814.46	5 528 923.55	67.40
2	105	387 817.82	5 529 285.04	64.50
3	803	387 016.58	5 529 730.87	62.00
4	906	387 568.71	5 528 325.25	65.80

Standard error of dx mean residual = 1.88m
 Standard error of dy mean residual = 1.72m
 Total solution standard error = 2.56m

6.3 "BOX-IN" CALIBRATION

A check on the Absolute calibration was carried out by "Box-In" calibration of all Compatts:

Transponder		Easting (m)	Northing (m)	Depth (m)	RMS(m)
1	201	386 811.89	5 528 925.53	67.40	2.4
2	105	387 815.94	5 529 285.97	64.50	1.9
3	803	387 015.01	5 529 730.11	62.00	1.7
4	906	387 567.81	5 528 324.77	65.80	1.5

The difference between the "Box-In" calibrations and the absolute calibrations were:

Transponder		Easting (m)	Northing (m)
1	201	2.57	1.98
2	105	1.88	0.93
3	803	1.57	0.76
4	906	0.90	0.48

6.4 FINAL TRANSPONDER CO-ORDINATES

The final set of transponder co-ordinates are as follows:

Datum AGD 84

UTM Zone 55 C.M. 147° East

Transponder		Easting (m)	Northing (m)	Depth (m)
1	201	386 814.46	5 528 923.55	67.40
2	105	387 817.82	5 529 285.04	64.50
3	803	387 016.58	5 529 730.87	62.00
4	906	387 568.71	5 528 325.25	65.80

7. FINAL DRILLSTEM POSITION

7.1 FINAL DIFFERENTIAL GPS RIG POSITION

The "Ocean Epoch" was positioned over the Flinders-1 location on the 29th of November, 1992.

A final fix of the "Ocean Epoch" was taken using the "SkyFix" Differential GPS, between 0105 and 0306 on the 29th of November, 1992, 430 fixes were observed from 6 constellations.

CONSTELLATION	SAMPLES	SATELLITES
A	3	25,15,12,11,21,28
B	105	25,21,15,12,11
C	90	28,21,15,12,11
D	27	28,25,21,15,11
E	23	12,25,21,15,11
F	102	21,25,15,14,11

Total number of samples used = 430

The computed Antenna position, with constellations weighted by sample size, was as follows:

Datum WGS 84

Latitude : 40° 22' 46.928" South
 Longitude : 145° 40' 21.878" East

Transforming the above WGS 84 co-ordinates to AGD 84 using the parameters in section 4, gives the following co-ordinates:

Datum AGD 84

Latitude : 40° 22' 52.313" South
 Longitude : 145° 40' 16.969" East

Applying the antenna to datum offsets to the above co-ordinates gives the following drillstem position.

Datum AGD 84

Latitude : 40° 22' 51.810" South
 Longitude : 145° 40' 18.687" East

AMG Zone 52 C.M. 129° East

Easting : 387 260.80m
 Northing : 5 529 085.46m

This position is 0.42 metres on a bearing of 225.35° True from the intended location.

7.2 FINAL ACOUSTIC POSITION

Acoustic observations using the Flinders-1 seabed transponder net commenced at 0015 on the 29th of November, 1992, and were completed at 0030.

The dunking transducer was suspended 10 metres below the sea surface, on a tugger wire rigged 1.5 metres to port of the drillstring, and 1.4 metres forward of the drill string.

Twenty observations were hand recorded, as follows:

Transponder	# 201	# 105	# 803	# 906
	475.8	591.4	690.2	818.8
	476.1	590.9	692.2	816.2
	475.7	590.6	690.3	815.0
	476.1	591.1	691.7	821.9
	476.6	591.1	691.4	820.2
	476.3	591.1	691.4	820.0
	476.1	591.1	690.6	819.4
	476.3	591.1	689.3	819.7
	475.7	591.0	691.0	819.1
	476.2	591.0	690.8	819.2
	475.9	591.1	689.6	819.4
	475.8	590.9	689.8	820.0
	476.0	591.3	691.4	821.2
	476.2	591.5	691.9	820.0
	476.1	591.1	692.1	820.5
	475.9	591.1	691.5	819.4
	476.2	591.0	691.0	820.4
	476.1	591.1	690.9	820.0
	476.2	590.4	690.9	819.2
	476.3	590.8	691.4	820.3
<i>Mean</i>	<i>476.08m</i>	<i>591.04m</i>	<i>690.97m</i>	<i>819.49m</i>

The computed transducer position was as follows:

Datum AGD 84

AMG Zone 55 C.M. 147° East

Easting : 387 261.41m
Northing : 5 529 084.89m

Applying the transducer to datum offsets to the above co-ordinates gave the following drillstem position:

Datum AGD 84

Latitude : 40° 22' 51.768" South
Longitude : 145° 40' 18.746" East

AMG Zone 55 C.M. 147° East

Easting : 387 262.17m
Northing : 5 529 086.77m

This position is 1.47 metres on a bearing of 047°.5 True from the intended location.

8. PERSONNEL AND EQUIPMENT

8.1 PERSONNEL

The following personnel were employed on this project:

For : Racal Survey Australia Limited

J. Austin	-	Surveyor
C. Hakkennes	-	Engineer

For : SAGASCO Resources Limited

B. Edmonds	-	Client Representative (BHP)
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8.2 EQUIPMENT

The following equipment was supplied for use on this project:

2 x Trimble GPS Receivers, Cables and Antennae

2 x "SkyFix" Demodulators

1 x "SkyFix" Rig Portable

2 x Sonardyne Pan Units

1 x LF Pan Spares Kit

1 x SGB 1000 Gyro

1 x SAL-1 Salinometer

1 x Power Conditioner

2 x Sonardyne Dunking Transducers

2 x HP 320 Desktop Computers

2 x HP 9122D Dual Disk Drives

2 x HP 35731B VDU's

2 x Barco Monitors

1 x Quietjet Printers

1 x 2673A Thermal Printer

1 x Interface 80 Units

1 x Toshiba 5200/100 Computer

plus all associated software (GNS Ver R2.06A, DNAV), cables, manuals, etc.

9. DISTRIBUTION

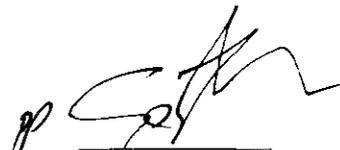
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SAGASCO Resources Limited
Attn: Mr. M. Renison

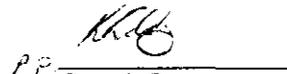
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Racal Survey - Perth

: 1 copy



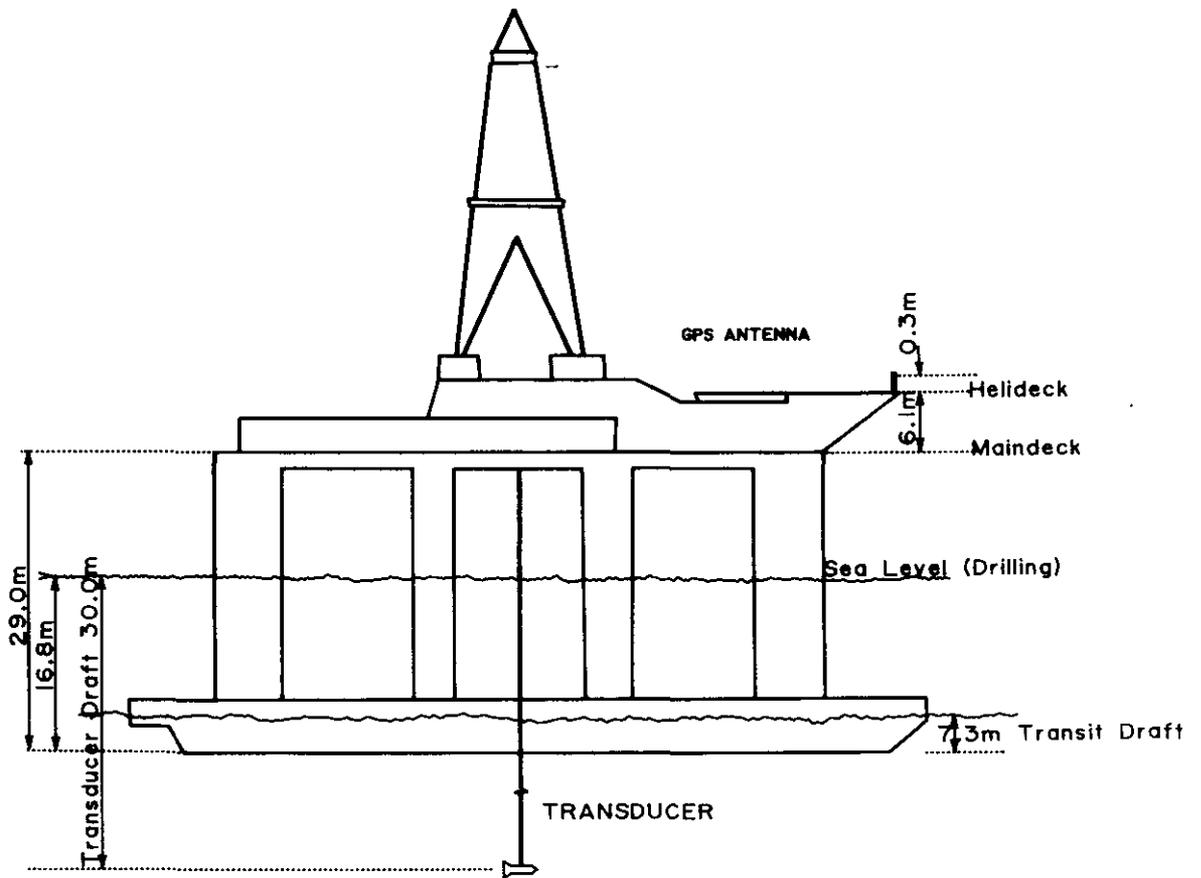
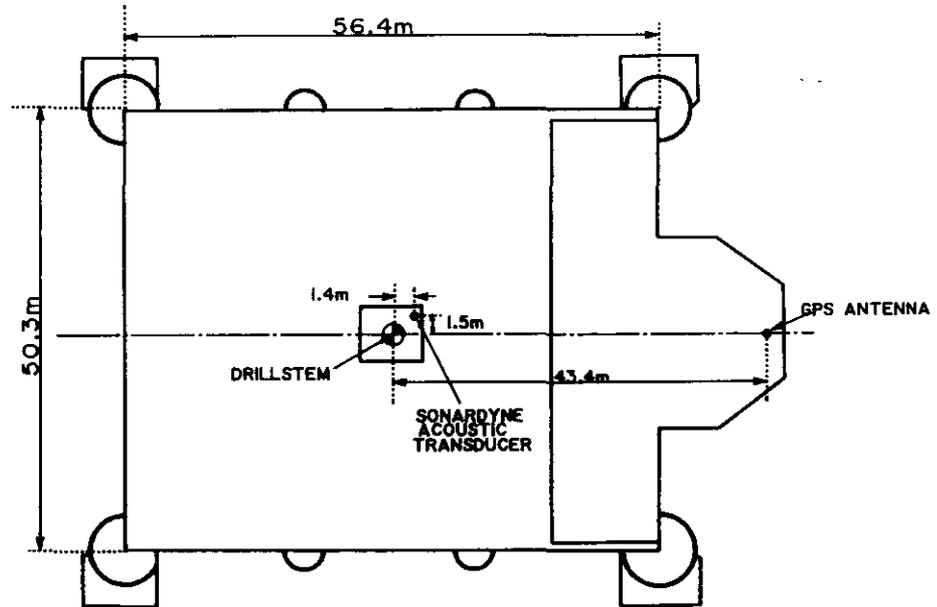
John Austin
Surveyor



Gareth Jones
Area Surveyor

APPENDIX A
OFFSET DIAGRAM - OCEAN EPOCH

APPENDIX A



OCEAN EPOCH

(Not To Scale)

APPENDIX B
SYSTEM DATA PRINTOUT

Ready Use Data (Stored on disc RD2.06) on 29 Nov 1992 at 01:02:04

System Definition

System 1 Sonardyne On/Off Status=OFF
 System 2 Tau On/Off Status=ON
 System 3 Not defined On/Off Status=OFF
 System 4 Not defined On/Off Status=OFF

Station Data :- System 1 Sonardyne FLINDERS-1 Chain

!TPDR 1 ! 201! 386814.46! 5528923.55! 67.40! S ! Y ! 1 ! 2 !
 !TPDR 2 ! 105! 387817.82! 5529285.04! 64.50! S ! Y ! 5 ! 2 !
 !TPDR 3 ! 803! 387016.58! 5529730.87! 62.00! S ! Y ! 3 ! 2 !
 !TPDR 4 ! 906! 387568.71! 5528325.25! 65.80! S ! Y ! 6 ! 2 !

Spheroid Data :- System 2 Tau

Name : WGS 84

Semi Axis : 6378137.00 metres

Eccentr^2 : .00669438

Parameter Shifts :- to AUSTRALIAN NAT 1984 Spheroid

DX : +116.00 in Metres

DY : +50.47 -''-

DZ : -141.69 -''-

Rotation (X) : +.2300 in seconds

(Y) : +.3900 in seconds

(Z) : +.3440 in seconds

Scaling (ppm) : -.0983

Station Data :- System 3 Not defined No Station Data

Station Data :- System 4 Not defined No Station Data

Pattern Corrections and Standard Deviations

System 1 Sonardyne	System 2 Tau	System 3 Not defined
Compatt C-0 St.Dev HRB	C-0 Corrections :-	No Data
0201 +0.00 3.00 Rng	Latit. +0.000 Secs	
0105 +0.00 3.00 Rng	Long. +0.000 Secs	
0803 +0.00 3.00 Rng	Height +0.000 M	
0906 +0.00 3.00 Rng		

Pattern Corrections and Standard Deviations

System 4 Not defined
 No Data

Receiver Interface Addresses

System 1 Sonardyne	System 2 Tau	System 3 Not defined	System 4 Not defined
Receiver 1 702	Receiver 1 70102	Receiver 1	Receiver 1
		Receiver 2	Receiver 2

Peripheral Interface Addresses

GYRO 1 70105
 GYRO 2 Unassigned

INCLINOMETER Unassigned
 TELEMETRY Unassigned
 FIX MODULE Unassigned
 LASER 1 Unassigned
 LASER 2 Unassigned
 GPS Differ. Unassigned
 POSN OUTPUT Unassigned
 C-0 OUTPUT Unassigned
 MOBILES 30 Unassigned

287024

Antennae/Transducer Offsets

System 1 Sonardyne	System 2 Tau	System 3 Not defined	System 4 Not defined
Transducer 1	Receiver 1	Receiver 1	Receiver 1
X Y Depth	X Y Height	X Y Height	X Y Height
-1.50 +1.40 +10.00	+0.00 +43.40 +28.00	+0.00 +0.00 +0.00	+0.00 +0.00 +0.00
Transducer 2	Receiver 2	Receiver 2	Receiver 2
X Y Depth	X Y Height	X Y Height	X Y Height
+0.00 +0.00 +0.00	+0.00 +0.00 +0.00	+0.00 +0.00 +0.00	+0.00 +0.00 +0.00
R.....T	R.....T	R.....T	R.....T
. Heading .	. Heading .	. Heading .	. Heading .
. ^ .	. ^ .	. ^ .	. ^ .
. +Y .	. +Y .	. +Y .	. +Y .
. / .	. / .	. / .	. / .
. -X.....X.....+X .	. -X.....X.....+X .	. -X.....X.....+X .	. -X.....X.....+X .
.
.
. -Y .	. -Y .	. -Y .	. -Y .
F.....G	F.....G	F.....G	F.....G

Datum Point= Receiver 1=/ Receiver 2=X

Receiver Pattern codes

System 1	System 2	System 3	System 4	Receiver1	Receiver1	Receiver1 Re
Sonardyne	Tau	Not defined	Not defined			
ceiver2 Receiver1 Receiver2						
OFF	ON	OFF	OFF	OFF	OFF	
0201 R	Geogs 1					
0105 R						
0803 R						
0906 R						

Computation Pattern Codes

Primary(OFF)	Secondary(ON)[TRACKING]	Tertiary(OFF)	Quaternary(OFF)
LOP Patt Code SRC HRB	LOP Patt Code SRC HRB	No Data	No Data
1 0201 111 R	1 Geogs 211 1		
2 0105 112 R			
3 0803 113 R			
4 0906 114 R			

S=System R=Receiver C=Channel *=Pattern temporarily not used in computation

S=System R=Receiver C=Channel *=Pattern temporarily not used in computation

Spheroidal Data

Spheroid :- AUSTRALIAN NAT 1984
Eccentricity ^2= 0.006694542
Semi-major axis= 6378160.000 Metres

Projection Parameters UTM/TM

Grid scale const = 0.9996000
Unit Conv. Factor = 1.0000000
False Easting = 500000.00 Metres
False Northing = 10000000.00 Metres
Central Meridian =147 DEG 00 MIN 00.000 SEC E
Lat of Origin = 00 DEG 00 MIN 00.000 SEC

Acoustic Parameters

System 1 Sonardyne
Velocity of Propagation = 1494.2 M/Sec
Cable out tow point fish= 0.0 M

Tow Point Offsets

System 1 Sonardyne
K Y Height
+0.00 +0.00 +0.00

R,.....T
. Heading .
. ^ .
. +Y .
. . .
. . .
. -X,.....X,.....+X .
. . .
. . .
. -Y .
F,.....G

Datum Point= Receiver 1=/ Receiver 2=X

Tidal Data

Date	Time	Height
28 Nov 1992	15:04	+2.80
28 Nov 1992	21:45	+1.30
29 Nov 1992	03:58	+2.90
29 Nov 1992	10:15	+1.80
29 Nov 1992	15:52	+2.80

Golf Laser System

Laser 1 : Not Selected Laser 2 : Not Selected

APPENDIX C
DGPS FINAL FIX ANALYSIS AND GRAPHS

FINAL POSITION ANALYSIS: R/M OF OCEAN EPOCH TO FLINDERS-1
 GNS v R2.06 01:05:40 29 Nov 1992 to 03:06:20 29 Nov 1992
 GPS Weighting Option - Constellations weighted by sample size
 Mean Corrected Gyro...249.0 Gyro Correction... -3.5
 Mean Grid Heading.....248.2 Convergence..... +0.860

SECONDARY COMPUTATION - Tau

CONSTELLATIONS USED

Const. #	Samples	S.U.s
A	3	25,28,21,15,12,11
B	105	25,21,15,12,11
C	90	28,21,15,12,11
D	27	28,25,21,15,11
E	23	12,25,21,15,11
F	182	21,25,15,14,11

Total number of samples used = 430

COMPUTED FINAL ANTENNA POSITION

WGS 84 Spheroid

Latitude	40 DEG 22 MIN 46.928 SEC S	(S.D.	1.18 Metres)
Longitude	145 DEG 40 MIN 21.878 SEC E	(S.D.	.78 Metres)
Height	17.31 Metres	(S.D.	3.61 Metres)

AUSTRALIAN NAT 1984 Spheroid

Latitude	40 DEG 22 MIN 52.313 SEC S
Longitude	145 DEG 40 MIN 16.969 SEC E
Height	34.48 Metres

UTM/TM

Eastings	387220.51 Metres
Northings	5529069.34 Metres

COMPUTED FINAL DATUM POSITION

AUSTRALIAN NAT 1984 Spheroid

Latitude	40 DEG 22 MIN 51.810 SEC S
Longitude	145 DEG 40 MIN 18.687 SEC E

UTM/TM

Eastings	387260.80 Metres
Northings	5529085.46 Metres

INTENDED FINAL DATUM LOCATION

AUSTRALIAN NAT 1984 Spheroid

Latitude	40 DEG 22 MIN 51.800 SEC S
Longitude	145 DEG 40 MIN 18.700 SEC E

UTM/TM

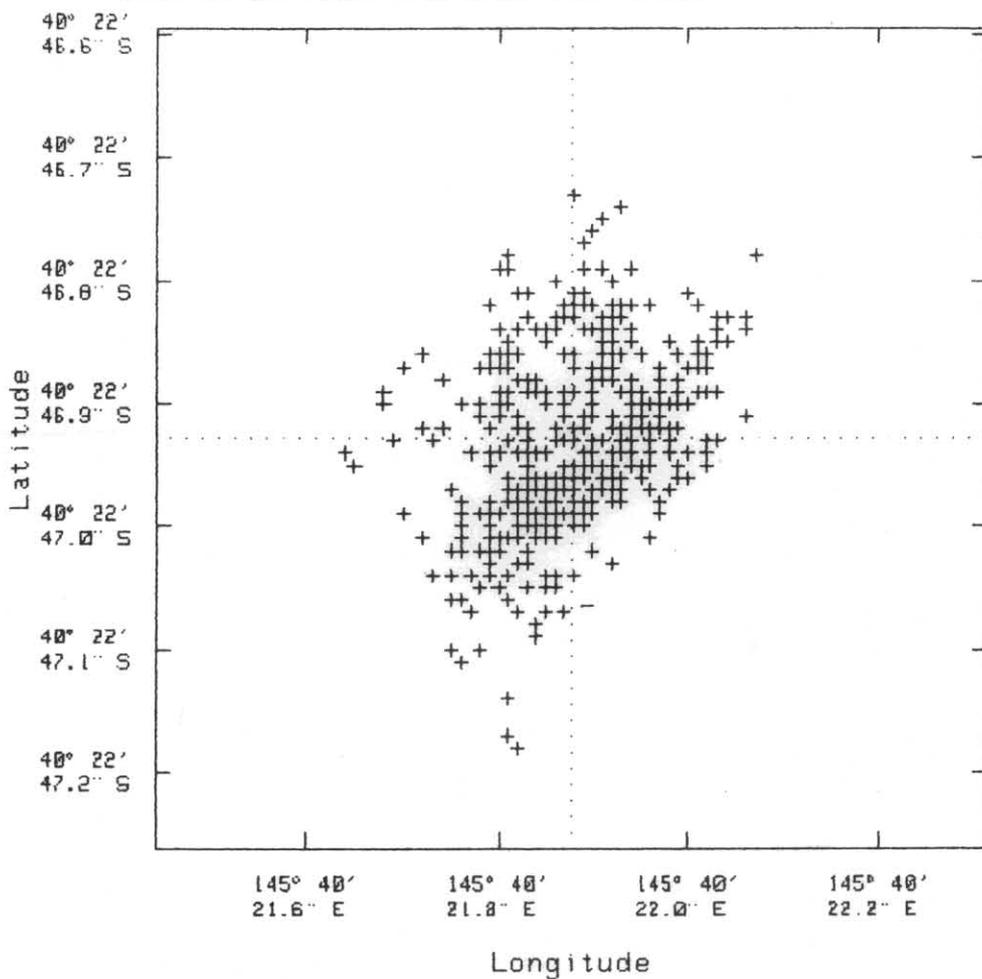
Eastings	387261.10 Metres
Northings	5529085.76 Metres

Final Datum Position is .42 Metres (spheroidal distance) bearing 225.35 I from the Intended Loc.

Final Datum Position is .42 Metres (spheroidal distance) bearing 225.35 T from the Intended Loc.

287028

Secondary Computation GPS Scatter Plot (Tau)

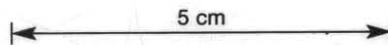


Centred on mean antenna position (passes 1 to 430).

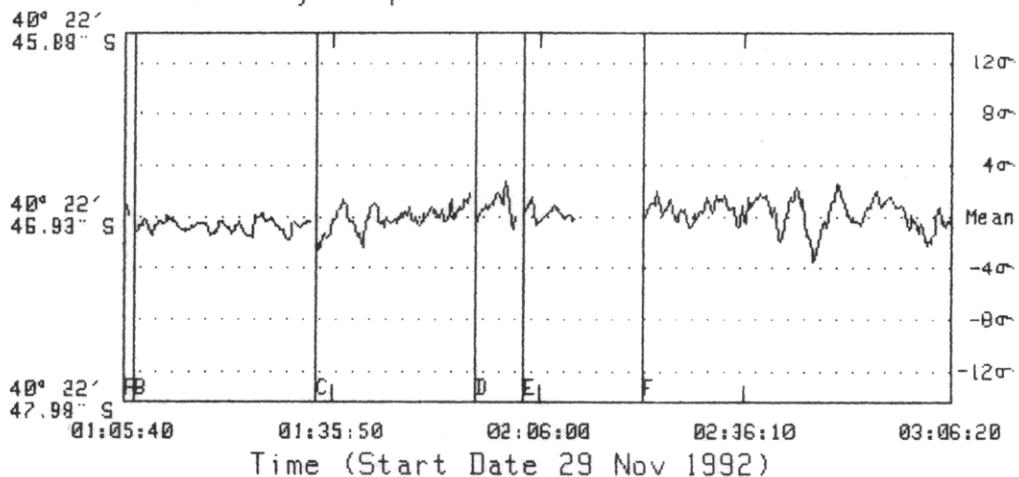
WGS 84 Spheroid

Latitude 40 DEG 22 MIN 46.928 SEC S

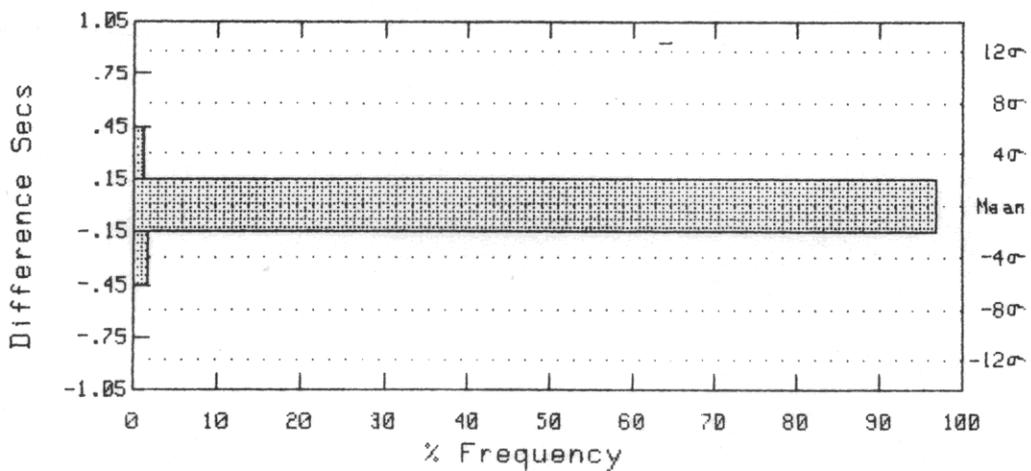
Longitude 145 DEG 40 MIN 21.878 SEC E



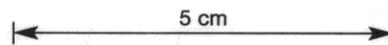
Secondary Computation GPS Latitude (Tau)



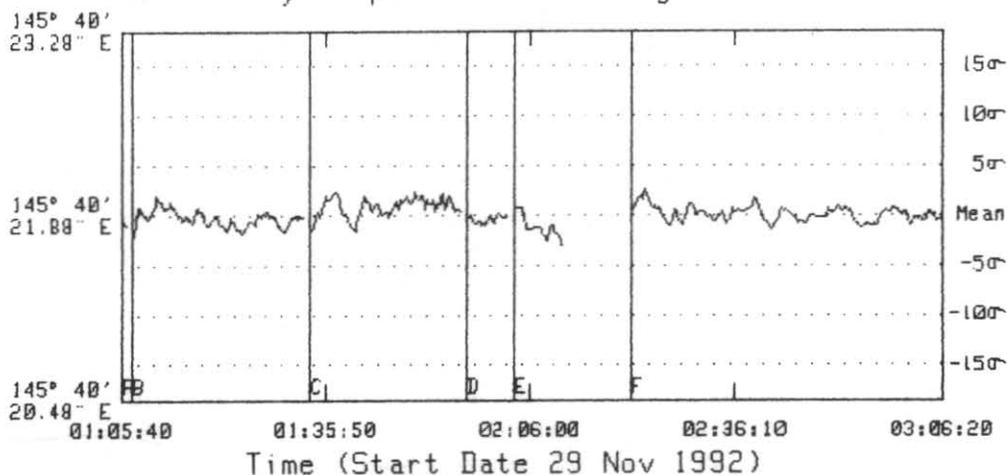
Secondary Computation GPS Latitude (Tau)



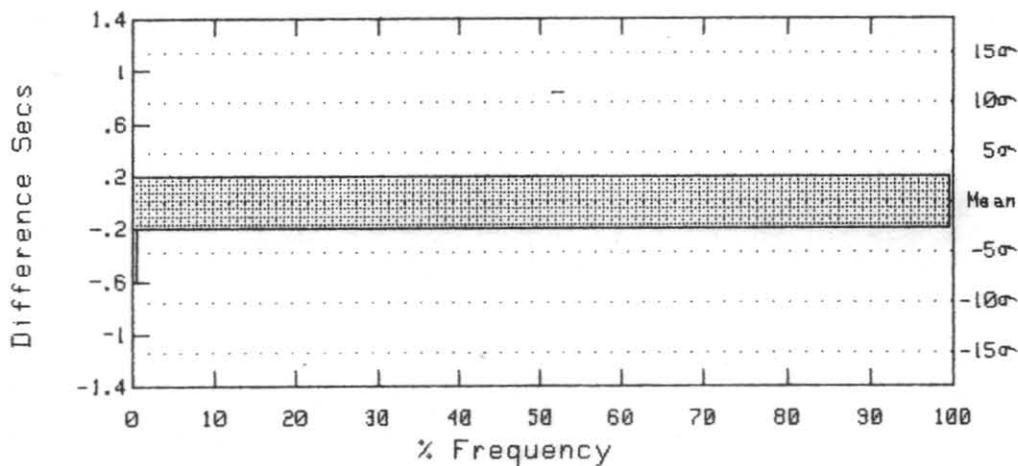
Secondary Computation (WGS 84 - Tau)
Centred on mean of antenna position (passes 1 to 430).
Latitude 40 DEG 22 MIN 46.928 SEC S Sd 2.265 Metres



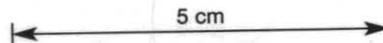
Secondary Computation GPS Longitude (Tau)



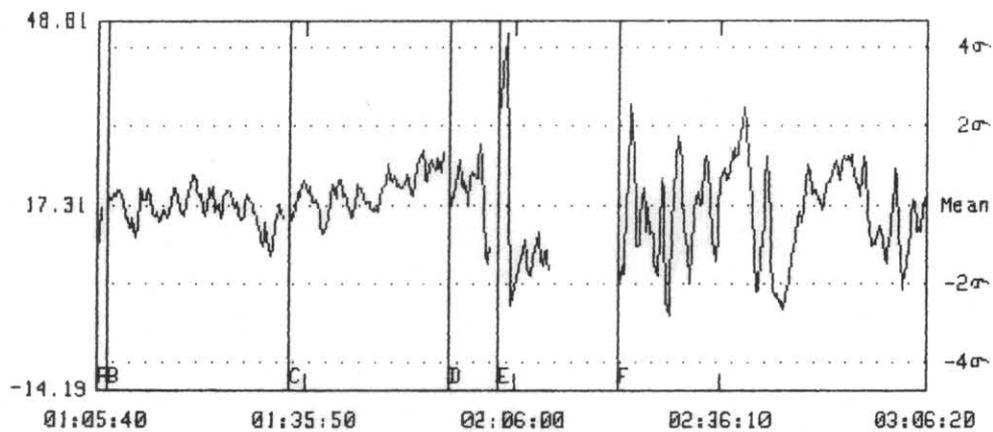
Secondary Computation GPS Longitude (Tau)



Secondary Computation (WGS 84 - Tau)
 Centred on mean of antenna position (passes 1 to 430).
 Longitude 145 DEG 40 MIN 21.878 SEC E Sd 1.785 Metres

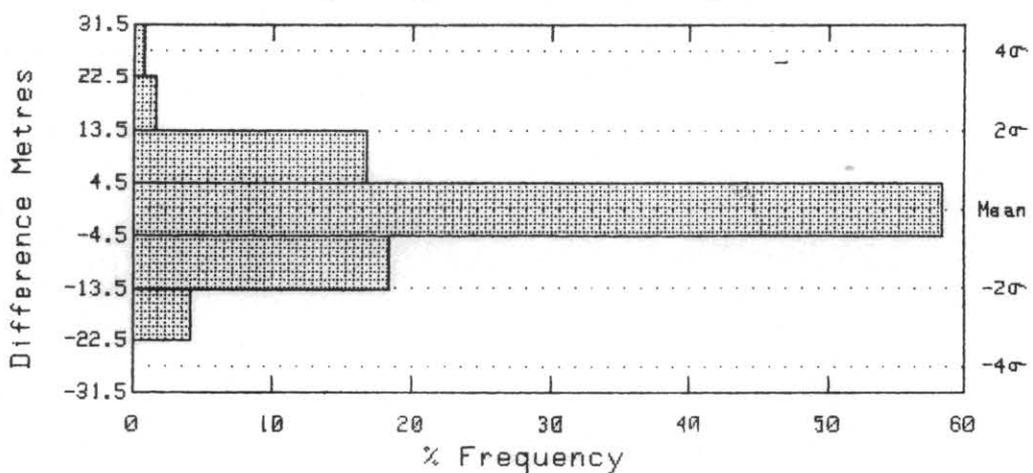


Secondary Computation GPS Height (Tau)

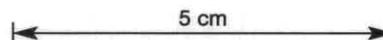


Time (Start Date 29 Nov 1992)

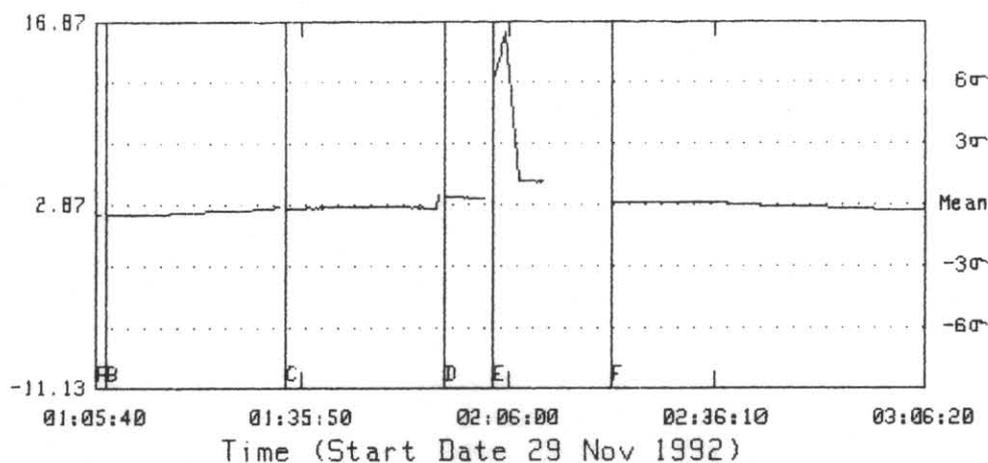
Secondary Computation GPS Height (Tau)



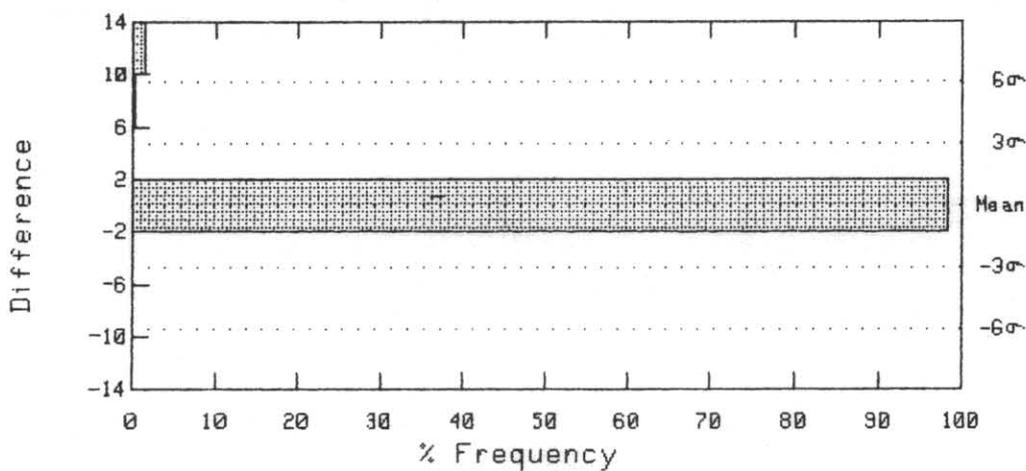
Secondary Computation (WGS 84 - Tau)
 Centred on mean of antenna position (passes 1 to 430).
 Height +17.31 Sd 6.733 Metres



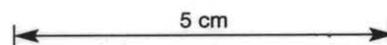
Secondary Computation GPS PDOP (Tau)



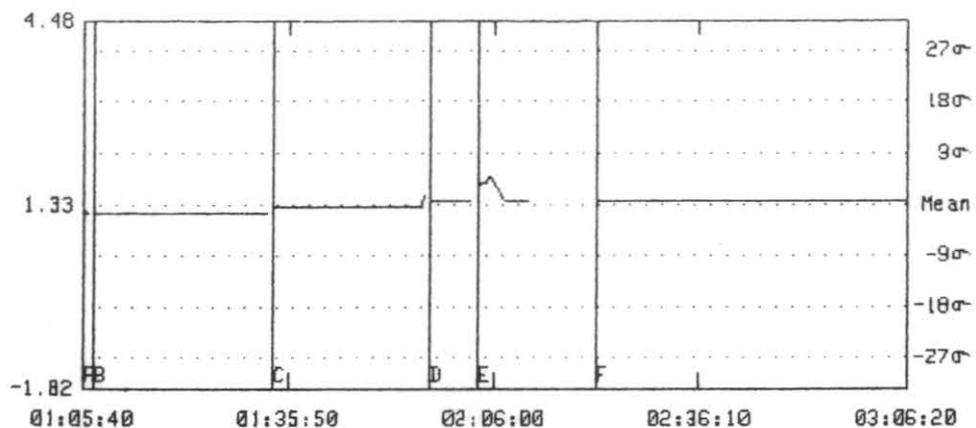
Secondary Computation GPS PDOP (Tau)



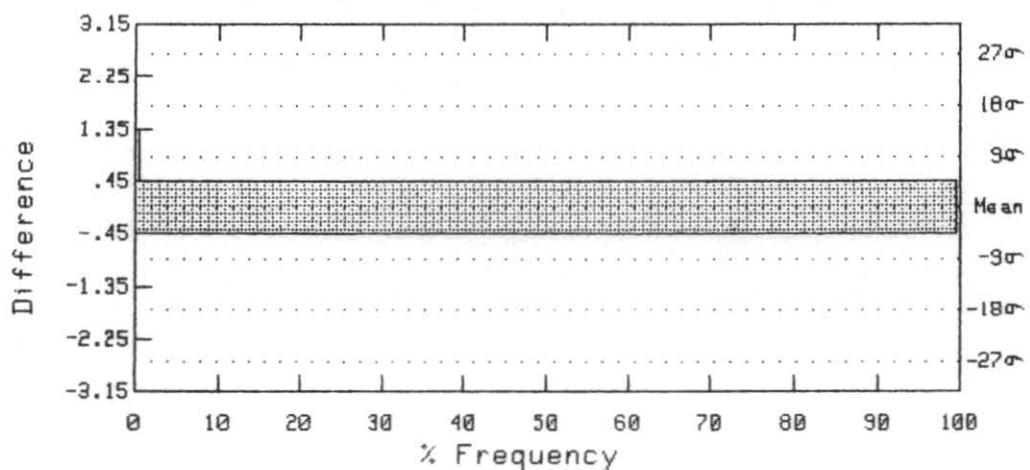
Secondary Computation (WGS 84 - Tau)
 Centred on mean of antenna position (passes 1 to 430).
 PDOP 2.9 Sd 1.569



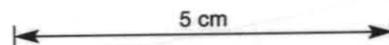
Secondary Computation GPS HDOP (Tau)



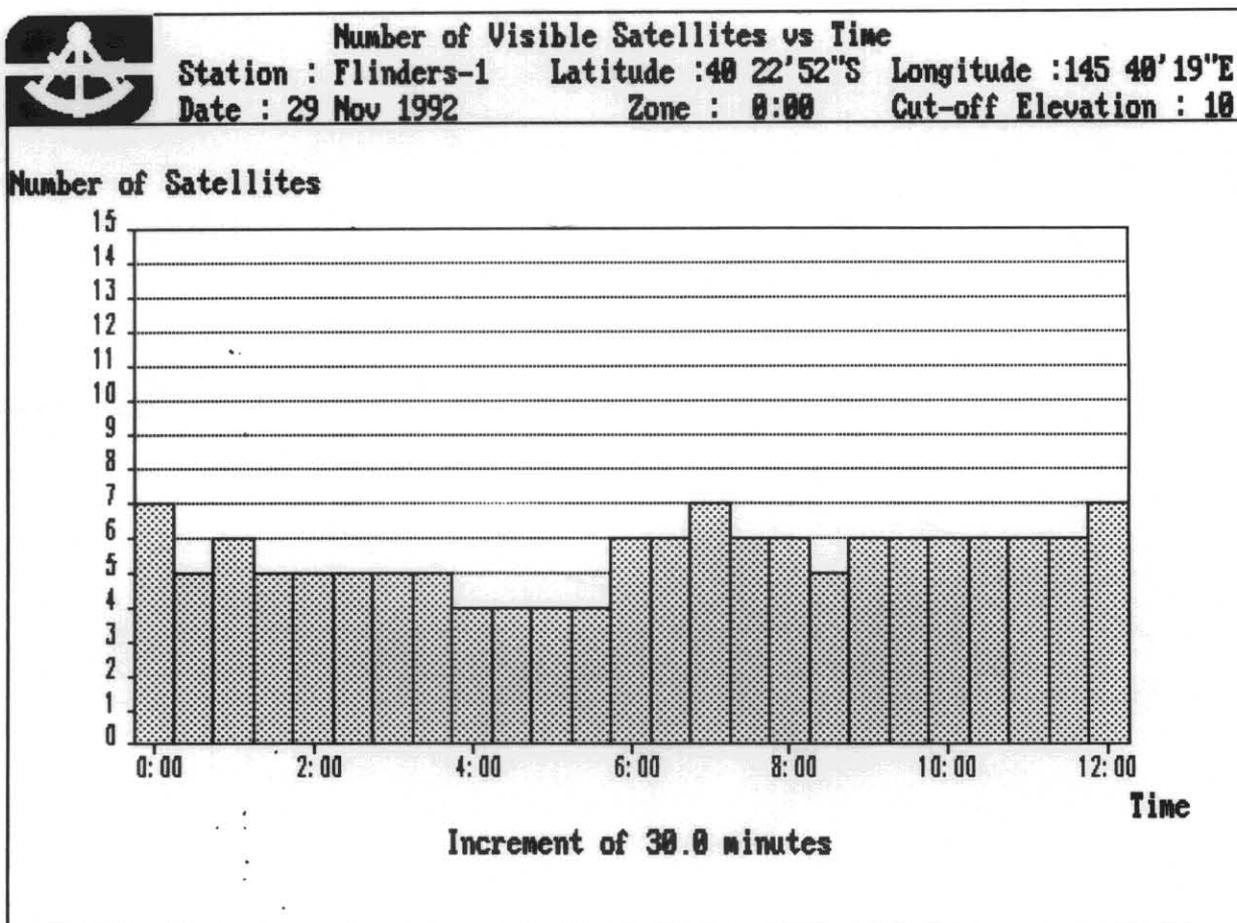
Secondary Computation GPS HDOP (Tau)



Secondary Computation (WGS 84 - Tau)
 Centred on mean of antenna position (passes 1 to 430).
 HDOP 1.3 Sd .097



APPENDIX D
SATELLITE AVAILABILITY PREDICTIONS



5 cm

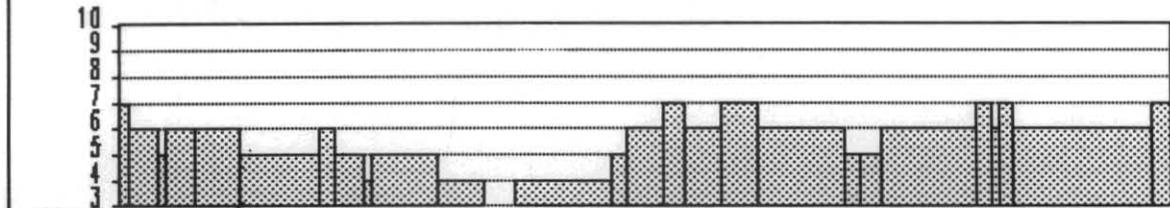


All-In-View PDOP vs Time

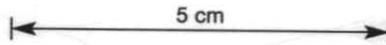
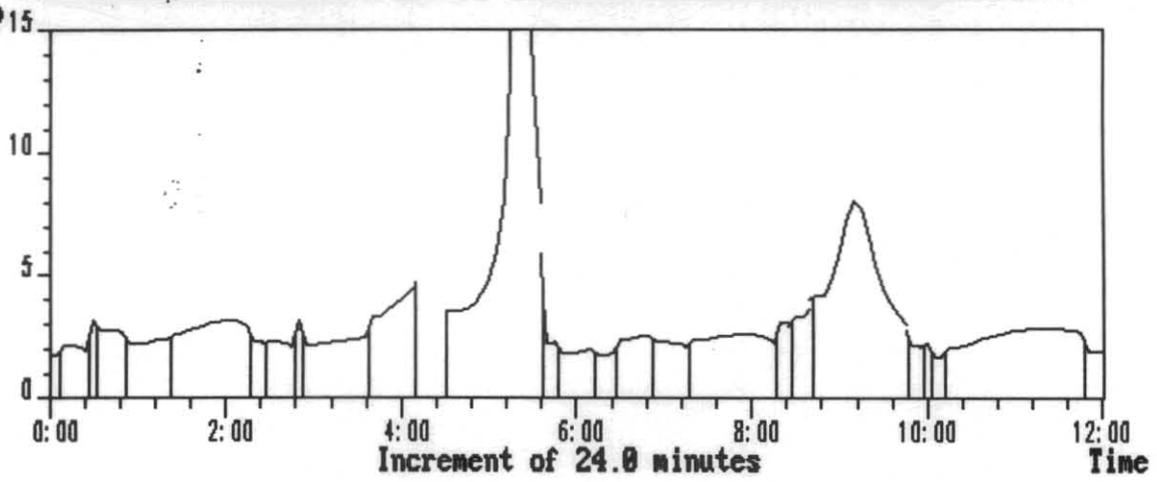
Station : Flinders-1 Latitude : 40 22'52"S Longitude : 145 40'19"E
Date : 29 Nov 1992 Zone : 0:00 Cut-off Elevation : 10

Number of Satellites

8 Channel Receiver



PDOP

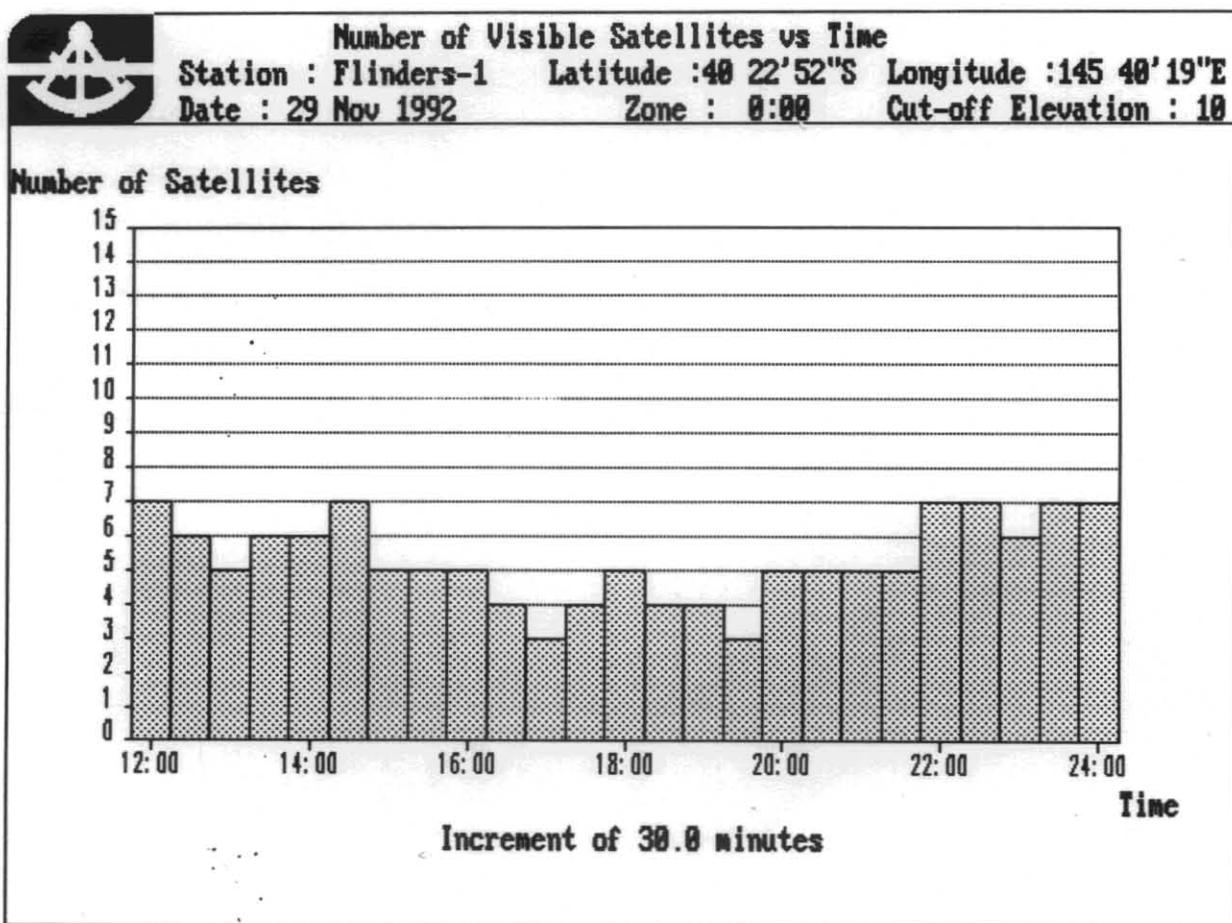


All-In-View PDOP for Flinders-1

Date : 29 Nov 1992
 Time : 0:00 -> 12:00
 Cut-off Elevation : 10°

Latitude : 40° 22' 52" S
 Longitude : 145° 40' 19" E
 Zone : 0:00

Satellite Constellation	Time Rise	Time Set	dT	PDOP Rise	PDOP Set
2 11 16 18 19 26 27	0:00	0:07	0:07	1.8	1.8
2 11 16 19 26 27	0:07	0:27	0:20	2.2	1.9
2 11 19 26 27	0:27	0:32	0:05	3.1	3.1
2 11 15 19 26 27	0:32	0:52	0:20	2.8	2.6
2 13 15 19 26 27	0:52	1:22	0:30	2.2	2.4
2 13 15 26 27	1:22	2:17	0:55	2.7	2.8
2 12 13 15 26 27	2:17	2:27	0:10	2.3	2.3
2 12 13 26 27	2:27	2:47	0:20	2.3	2.1
2 12 13 26	2:47	2:52	0:05	3.1	3.1
2 12 13 24 26	2:52	3:37	0:45	2.2	2.5
2 12 13 24	3:37	4:10	0:33	3.3	4.7
12 13 20 24	4:30	5:37	1:07	3.5	5.9
12 13 16 20 24	5:37	5:47	0:10	2.2	2.3
3 12 13 16 20 24	5:47	6:12	0:25	1.8	2.0
3 12 13 16 20 24 25	6:12	6:27	0:15	1.8	1.8
3 12 16 20 24 25	6:27	6:52	0:25	2.4	2.5
3 12 16 17 20 24 25	6:52	7:17	0:25	2.3	2.0
3 16 17 20 24 25	7:17	8:17	1:00	2.4	2.2
3 16 17 20 25	8:17	8:27	0:10	3.1	3.0
3 16 17 20 23	8:27	8:42	0:15	3.3	4.0
3 16 17 20 23 26	8:42	9:47	1:05	4.2	2.8
3 16 17 20 21 23 26	9:47	9:57	0:10	2.1	2.1
3 16 17 21 23 26	9:57	10:02	0:05	2.2	2.2
3 16 17 21 23 26 28	10:02	10:12	0:10	1.7	1.7
3 17 21 23 26 28	10:12	11:47	1:35	2.1	2.7
3 11 17 21 23 26 28	11:47	12:00	0:13	1.9	1.9



5 cm

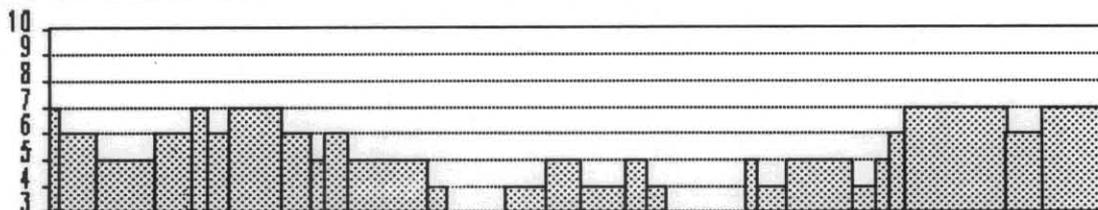


All-In-View PDOP vs Time

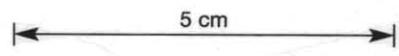
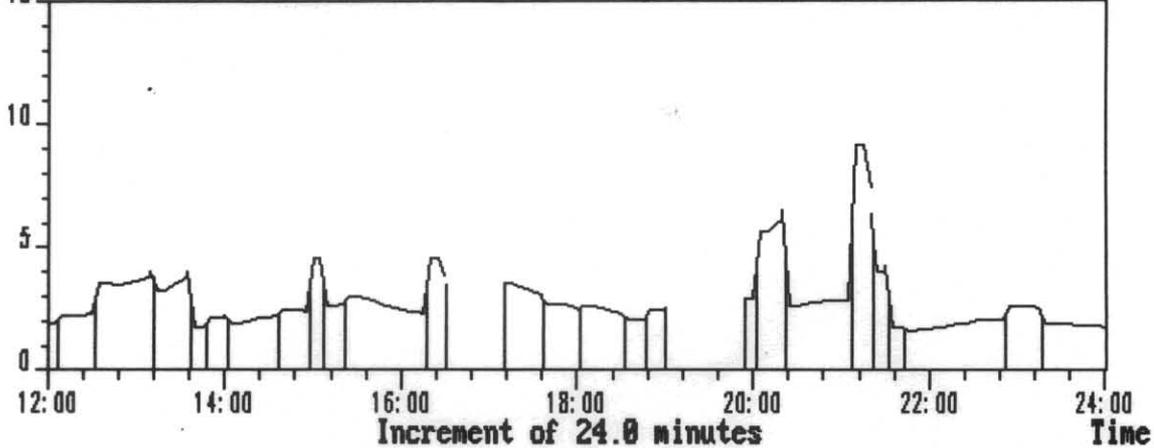
Station : Flinders-1 Latitude : 40 22'52"S Longitude : 145 40'19"E
 Date : 29 Nov 1992 Zone : 0:00 Cut-off Elevation : 10

Number of Satellites

8 Channel Receiver



PDOP



All-In-View PDOP for Flinders-1

Date : 29 Nov 1992
 Time : 12:00 -> 24:00
 Cut-off Elevation : 10°

Latitude : 40° 22' 52" S
 Longitude : 145° 40' 19" E
 Zone : 0:00

Satellite Constellation	Time Rise	Time Set	dT	PDOP Rise	PDOP Set
3 11 17 21 23 26 28	12:00	12:07	0:07	1.9	1.9
3 11 17 21 23 28	12:07	12:32	0:25	2.2	2.3
11 17 21 23 28	12:32	13:12	0:40	3.5	4.0
11 12 17 21 23 28	13:12	13:37	0:25	3.3	4.0
11 12 15 17 21 23 28	13:37	13:47	0:10	1.8	1.8
11 12 15 21 23 28	13:47	14:02	0:15	2.2	2.2
11 12 15 21 23 25 28	14:02	14:37	0:35	1.9	2.2
11 12 15 21 25 28	14:37	14:57	0:20	2.5	2.4
11 12 15 21 25	14:57	15:07	0:10	4.6	4.6
11 12 14 15 21 25	15:07	15:22	0:15	2.6	2.7
11 14 15 21 25	15:22	16:17	0:55	3.0	2.3
14 15 21 25	16:17	16:30	0:13	4.5	3.4
13 14 15 25	17:10	17:37	0:27	3.5	3.0
13 14 15 18 25	17:37	18:02	0:25	2.7	2.4
14 15 18 25	18:02	18:32	0:30	2.6	2.3
14 15 18 19 25	18:32	18:47	0:15	2.1	2.0
14 18 19 25	18:47	19:00	0:13	2.4	2.5
14 18 19 24 27	19:55	20:02	0:07	3.0	2.9
14 18 19 27	20:02	20:22	0:20	5.7	6.5
14 18 19 27 28	20:22	21:07	0:45	2.6	2.8
18 19 27 28	21:07	21:22	0:15	9.2	6.4
16 18 19 27 28	21:22	21:32	0:10	4.0	4.3
2 16 18 19 27 28	21:32	21:42	0:10	1.7	1.8
2 11 16 18 19 27 28	21:42	22:52	1:10	1.6	2.1
2 11 16 18 19 27	22:52	23:17	0:25	2.6	2.5
2 11 16 18 19 26 27	23:17	24:00	0:43	1.9	1.8

APPENDIX E
DAILY LOG SHEETS

RACAL SURVEY AUSTRALIA LIMITED



DAILY RECORD SHEET

WX	SeaState	Swell	WindDir.
0000			
0600			
1200			
1800			

Client : SAGASCO		Job No : 2010		Date : 24 NOV 92		Vessel : OCEAN EPOCH		Anchors / Tpdrs		
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX	2		STD-12 / VELOCITY PROBE	1		J. AUSTIN	ITEM	USED	REMAIN	
SYLEDIS			ECHO SOUNDER (20/25)			C. HAKKENNES	SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS	2		SPARKER (DELPH/EPC)				DISKS		7	
GYRO	1		CORING (GRAVITY/GRAB)				PRINTER CART.	1	1	
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING			B. EDMONDS				
SONARDYNE COMPATTS	4									
SONARDYNE PAN	2									
SONARDYNE (Dunker/Winch/Fish)	2/0/0									

DIARY OF OPERATIONS: **TUESDAY 24 NOVEMBER 1992. TIME ZONE -11.**

0930 RACAL PERSONNEL ARRIVE AT DEVONPORT AIRPORT.

SKYFIX EQPT CONFIRMED AS HAVING BEEN TRANSPORTED TO RIG BY LLOYDS, 23 NOV 92

1335 BHPE SURVEYOR (GC. REP) B. EDMONDS ARRIVES DEVONPORT AIRPORT.

1425 SURVEY PERSONNEL DEPART DEVONPORT FOR RIG BY LLOYDS HELICOPTER.

1520 SURVEY PERSONNEL ABOARD OCEAN EPOCH. EQUIPMENT SET-UP COMMENCED.

1740 DISCUSSION WITH S. IRVINE, COMPANY NIGHT-MAN. RIG HEADING AT FLINDERS-1 TO BE 250°; CHAIN LENGTH 3500'. NOTED AN INTENDED POSITION (Ø 40°22'51"83)-ERROR

1915 PRE-MOVE MEETING WITH A. CHAPMAN, R. WATTS, D. PHILLIPS (COMPANY MAN, TOOLPUSHER, BARGE MASTER.) RIG HEADING TO BE 250°, CHAIN LENGTH 3800', RUN-IN REQUESTED AS 3 MILES. FIRST ANCHOR TO BE NO. 6; - BUT MAY BE NO. 7.

AGREED WITH B. EDMONDS THE Ø ERROR, 0"03, IS INSIGNIFICANT, AND DATUM IS NOT LISTED.

2359 EQUIPMENT SET-UP COMPLETE; GYRO ERROR REMAINS TO BE DETERMINED.

287042

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Transponders to be listed by type and serial numbers. Following codes to be used: L - Laid, R - Recovered, FR - Failed to Reply, FS - Failed to Surface.



DAILY RECORD SHEET

W/A	DEBURR	SWELL	W	DIR.
0000				
0600	3	2m	290/25kt	
1200	6	W/4m	290/35kt	
1800	5	W/4m	280/30kt	

Client : SAGASCO		Job No : 2010		Date : 25 NOV 92		Vessel : OCEAN EPOCH		Anchors / Tpdrs		
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX	2		STB-12 / VELOCITY PROBE	1		J. AUSTIN	ITEM	USED	REMAIN	
SYLEDIS			ECHO SOUNDER (20/25)			C. HAKKENNES	SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS	2		SPARKER (DELPH/EPC)				DISKS		7	
GYRO	1		CORING (GRAVITY/GRAB)				PRINTER CART.	1	1	
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING			B. EDMONDS.				
SONARDYNE COMPATTS	4									
SONARDYNE PAN	2									
SONARDYNE (Dunker/Winch/Fish)	2/0/0									

DIARY OF OPERATIONS: WEDNESDAY 25 NOVEMBER 1992. TIME ZONE -11.

0600 SITREP. RIG AT KING-1, PULLING ANCHORS. ONLY ONE ANCHOR RACKED SINCE MIDNIGHT. - NO. 8.

0658 ANC-1 ON BOLSTER

0718 ANC-4 ON BOLSTER

0755 ANCHOR HANDLING PAUSED, DUE TO WEATHER, AND SEA STATE.

1521 DIFFS NOT AVAILABLE FROM ADELAIDE - SYDNEY AND PERTH DIFFS RECEIVED SATISFACTORILY

1549 DIFFS AGAIN AVAILABLE FROM ADELAIDE.

2022 SUN GYRO CHECK - THROUGH HEAVY CLOUD @ 5 20° 19' 8". AMP. 26.6 ∴ TRUE BNG 243.4
 OCEAN EPOCH GYRO BORE 241° TO THE SUN, ∴ 2 1/2° L.
 OCEAN EPOCH SHIP'S HEAD WAS 259°; ∴ TRUE SHIP'S HEAD WAS 261 1/2.
 RACAL GYRO SHIP'S HEAD BORE 264 1/2; ∴ 3° HIGH. CLAIMED ACCURACY ±5°, DUE TO CLOUD.

Forms are to be completed daily in duplicate on all vessels. Each form should be countersigned by the Clients Representative, the original being retained on board until the next crew change or at the end of job, whichever is the earlier, when they should be returned to the PERTH office.

Transponders to be listed by type and serial numbers. Following codes to be used: L - Laid, R - Recovered, FR - Failed to Reply, FS - Failed to Surface.

Signature

SURVEYOR/ENGINEER

WHITE : Commercial Office
 BLUE : Operations
 YELLOW : Clients Representative

Signature

CLIENTS REPRESENTATIVE

287043

RACAL SURVEY AUSTRALIA LIMITED



DAILY RECORD SHEET

WX	Sea State	Wind	Wind Dir.
0000			
0600	5	3m	260/35
1200	5	3m	260/35
1800	5	3m	270/35

Client : <u>SAGASCO</u>		Job No : <u>2010</u>		Date : <u>26 NOV 92</u>		Vessel : <u>OCEAN EPOCH</u>			Anchors / Tpdrs	
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX	1		STD 12 / VELOCITY PROBE	1		J. AUSTIN	ITEM	USED	REMAIN	
SYLEDIS			ECHO SOUNDER (20/25)			C. HAKKENNES	SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS	2		SPARKER (DELPH/EPC)				DISKS		7	
GYRO	1		CORING (GRAVITY/GRAB)				PRINTER CART.	1	1	
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING			B. EDMONDS				
SONARDYNE COMPATTS	4									
SONARDYNE PAN	2									
SONARDYNE (Dunker/Winch/Fish)	2/0/0									

DIARY OF OPERATIONS: THURSDAY 26 NOVEMBER 1992 TIME ZONE -11.

SITREP - RIG REMAINS SECURED AT KING-1, BY 5 ANCHORS. RECOVERY OF THE REMAINING ANCHORS AWAITS A LESSENING OF THE SEA STATE.

2020 - SUNSET FULLY OBSCURED - NO GYRO CHECK POSSIBLE.

2315 - WIND 40KTS, GUSTING 45 KTS.



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Signature

J. Austin
SURVEYOR/ENGINEER

WHITE : Commercial Office
BLUE : Operations
YELLOW : Clients Representative

Signature

B. Edmonds
CLIENTS REPRESENTATIVE

287044



DAILY RECORD SHEET

0000	5		W	45KTS
0600	4		W	30KTS
1200	3	2m	W	15KTS
1800	3	1.5m	W	10KTS

Client : SAGASCO		Job No : 2010		Date : 27 NOV 92		Vessel : OCEAN EPOCH		Anchors / Tpdrs		
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX	2		SFB-12 VELOCITY PROBE	1		J. AUSTIN	ITEM	USED	REMAIN	
SYLEDIS			ECHO SOUNDER (20/25)			C. HARKENNES	SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS	2		SPARKER (DELPH/EPC)				DISKS		7	
GYRO	1		CORING (GRAVITY/GRAB)				PRINTER CART.	1	1	
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING			B. EDMONDS				
SONARDYNE COMPATTS	4									
SONARDYNE PAN	2									
SONARDYNE(Dunker/Winch/Fish)	2/c/c									

DIARY OF OPERATIONS: FRIDAY 27 NOVEMBER 1992

1011 ANCHOR - HANDLING RECOMMENCED. WIND W, 20KTS

1100 ANCHOR 5 ON BOLSTER. TERJE VIKING PREPARING FOR BRIDLE, RAGNA VIKING PREPARING TO RECOVER ANCHOR-7.

1236 ~~TERJE VIKING~~ RAGNA VIKING FINISHED WITH ANCHOR-7. TERJE VIKING ON TOW BRIDLE.

1417. ANCHORS 2 & 6 STILL OUT; TERJE VIKING ON TOW; RAGNA VIKING RECOVERING ANCHOR-3; RIG 700', 300° FROM KING-1.

1530 SKYFIX 'HUNG-UP'. CAUSE WAS INCORRECT REF POSITION DATA, WITH ADDITIONAL PROBLEM OF ONLY 35V AVAILABLE. REF POSITION ALTERED TO KING-1 LOCATION.

1607. RIG COMMENCED HAULING ON ANCHOR-6. RAGNA VIKING STILL RECOVERING ANCHOR-2, ABOUT 700' AWAY FROM RIG. TERJE VIKING ON BRIDLE.

1630. ANCHOR-2 RECOVERED. RAGNA VIKING RELEASED

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Signature J. Ash
SURVEYOR/ENGINEER

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BLUE : Operations
YELLOW : Clients Representative

Signature W. Edmonds
CLIENTS REPRESENTATIVE

287045

RACAL SURVEY AUSTRALIA LIMITED



DAILY RECORD SHEET

PAGE 2

WX	SeaState	Ill	WindDir.
0000			
0600			
1200			
1800			

Client : SAGASCO		Job No : 2010		Date : 21 NOV 92		Vessel : OCEAN EPOCH		Anchors / Tpdrs		
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX			STD 12 / VELOCITY PROBE				ITEM	USED	REMAIN	
SYLEDIS			ECHO SOUNDER (20/25)				SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS			SPARKER (DELPH/EPC)				DISKS			
GYRO			CORING (GRAVITY/GRAB)				PRINTER CART.			
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING							
SONARDYNE COMPATTS										
SONARDYNE PAN										
SONARDYNE(Dunker/Winch/Fish)										

DIARY OF OPERATIONS :

1713 RIG UNDERWAY - ANC NO. 6 OFF THE BOTTOM.

1740 ⚓ 6 RACKED

TOW TO FLINDERS-1 COMMENCED.

2100 POSITION S 39° 47' 57" E 145° 34' 22" DIST TO GO 32.9 N.M.



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Signature

SURVEYOR/ENGINEER

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Signature

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RACAL SURVEY AUSTRALIA LIMITED



DAILY RECORD SHEET

WX	SeaState	Swell	WindDir.
0000	2	1 1/2	W/10KTS
0600	2	1	W/15KTS
1200	2	1 1/2	W/20KTS
1800			

Client : SAGASCO		Job No : 2010		Date : 28NOV92		Vessel : OCEAN EPOCH		Anchors / Tides		
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX	2		STD 12 / VELOCITY PROBE	1		J. AUSTIN	ITEM	USED	REMAIN	8.
SYLEDIS			ECHO SOUNDER (20/25)			C. HAKKENNES	SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS	2		SPARKER (DELPH/EPC)				DISKS		7	
GYRO	1		CORING (GRAVITY/GRAB)				PRINTER CART.	1	1	
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING			B. EDMONDS				
SONARDYNE COMPATTS	4									
SONARDYNE PAN	2									
SONARDYNE (Dunker/Winch/Fish)	2/0/0									

DIARY OF OPERATIONS: **SATURDAY 28 NOVEMBER 1992**

0001 POSITION S 40° 00' 39" E 145° 39' 22" D.T.G. 19.7 NM
 RIG UNDER TOW TO FLINDERS-1 LOCATION

0300 POSITION S 40° 30' 49" E 145° 43' 54"

0500 1.7 NM TO J6 LOCATION

0522 1.0 NM TO J6 DROP LOCATION. COMMENCED 60s FIXING.

0554 LET GO, J6. 29m FROM INTENDED POSITION

0624 DRILL STRING OVER LOCATION. CABLE NO.6 CEASED PAYOUT. CEASED 60s FIXING.

0705 RAGNA VIKING PLACED NO.2 ON THE BOTTOM.

0816 RAGNA VIKING PLACED NO.7 ON THE BOTTOM; BACKBEARING 110°, NOT 093°.

0920 RAGNA VIKING PLACED NO.3 ON THE BOTTOM.

1105 TERSE CAST OFF TOWING BRIDLE.

1230 TERSE VIKING PLACED NO.8 ON THE BOTTOM.

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Signature

ALL

WHITE Commercial Office

Signature

W Edm L

287047

RACAL SURVEY AUSTRALIA LIMITED



DAILY RECORD SHEET

WX	Sea State	ll	Wind Dir.
0000			
0600			
1200			
1800			

PAGE 2

Client : SAGASCO		Job No : 2010		Date : 28 NOV 92		Vessel : OCEAN EPOCH		Anchors / Tpdrs		
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX			STD 12 / VELOCITY PROBE				ITEM	USED	REMAIN	
SYLEDIS			ECHO SOUNDER (20/25)				SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS			SPARKER (DELPH/EPC)				DISKS			
GYRO			CORING (GRAVITY/GRAB)				PRINTER CART.			
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING							
SONARDYNE COMPATTS										
SONARDYNE PAN										
SONARDYNE (Dunker/Winch/Fish)										

DIARY OF OPERATIONS: SATURDAY 28 NOVEMBER 1992.

1339 RAGNA VIKING PLACED ANC-4 ON THE BOTTOM - ON BEARING; RANGE SHORT?

1435 RERSE VIKING PLACED ANC-1 ON THE BOTTOM.

1445 RAGNA VIKING PLACED ANC-5 ON THE BOTTOM

1546 PRETENSIONING COMPLETE. RIG APPROX 4 FT FROM LOCATION; BALLASTING DOWN COMMENCED.

2026 SUNSET. SUN GYRO CHECK 8 S 20 1/2 AMP 27.6 ∴ TRUE BNG 242 1/2
 OCEAN EPOCH GYRO BORE 241° TO THE SUN, ∴ 1 1/2° h
 OCEAN EPOCH SHIPS HD WAS 248°, ∴ TRUE SHIPS HD WAS 249 1/2
 RACAL GYRO BORE 253° AT SHIPS HEAD, ∴ 3 1/2° HIGH. ENTERED AS C-O.

2327 OCEAN EPOCH AT DRILLING DRAFT - BALLASTING COMPLETE.

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Signature

[Signature]
SURVEYOR/ENGINEER

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 YELLOW : Clients Representative

Signature

[Signature]
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287048

RACAL SURVEY AUSTRALIA LIMITED



DAILY RECORD SHEET

WX	Sea State	l	Wind Dir.
0000	3	15m	W/13kts
0600			
1200			
1800			

Client : SAGASCO		Job No : 2010		Date : 29 NOV 92		Vessel : OCEAN EPOCH			Anchors / Tpdrs			
RACAL Equipment on Board		Op	NonOp	RACAL Equipment on Board		Op	NonOp	RACAL Personnel		Consummables	Laid	Recovered
SKYFIX		2		STD-12 / VELOCITY PROBE	1			J. AUSTIN	ITEM	USED	REMAIN	
SYLEDIS				ECHO SOUNDER (20/25)				C. HAKKENNES	SIDESCAN PAPER			
MICROFIX				SIDESCAN (595/531/PINGER)					E/SOUNDER PAPER			
ARGO				BOOMER (DELPH/EPC)					ELICS PAPER			
GNS		2		SPARKER (DELPH/EPC)					DISKS	1	6	
GYRO		1		CORING (GRAVITY/GRAB)					PRINTER CART.	1	1	
TRIMBLE SST'S				THEODOLITE / EDM				CLIENT Personnel	EPC ROLLS			
TELEMETRY				UNDERWATER TRACKING				B. EDMONDS				
SONARDYNE COMPATTS		4										
SONARDYNE PAN		2										
SONARDYNE (Dunkar/Winch/Fish)		2/0/0										

DIARY OF OPERATIONS: SUNDAY 29 NOVEMBER 1992

0001 SONARDYNE SYSTEM SETUP, TRANSPONDERS ENABLED. ACOUSTIC FINAL FIX COMMENCED; HOWEVER ONLY TWO RANGES OF FOUR AVAILABLE TO GNS COMPUTATION. REVERTED TO HAND-RECORDING OF DATA:

0015 TPDR #201: (475.8, 476.1, 475.7, 476.1, 476.6, 476.3, 476.1, 476.3, 475.7, 476.2

$\bar{x} = 476.08m$ (475.9, 475.8, 476.0, 476.2, 476.1, 475.9, 476.2, 476.1, 476.2, 476.3.

TPDR #105: (591.4, 590.9, 590.6, 591.1, 591.1, 591.1, 591.1, 591.1, 591.0, 591.0,

$\bar{x} = 591.04m$ (591.1, 590.9, 591.3, 591.5, 591.1, 591.1, 591.0, 591.1, 590.4, 590.8

TPDR #803 (690.2, 692.2, 690.3, 691.7, 691.4, 691.4, 690.6, 689.3, 691.0, 690.8,

$\bar{x} = 690.97m$ (689.6, 689.8, 691.4, 691.9, 692.1, 691.5, 691.0, 690.9, 690.9, 691.4.

TPDR #906 (818.8, 816.2, 815.0, 821.9, 820.2, 820.0, 819.4, 819.7, 819.1, 819.2

$\bar{x} = 819.49m$ (819.4, 820.0, 821.2, 820.0, 820.5, 819.4, 820.4, 820.0, 819.2, 820.3.

0030. RANGING COMPLETE. RAW TRANSPONDER POSITION: E 387261.411, N 5529084.891. SD. 4.87m

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Signature

[Signature]
SURVEYOR/ENGINEER

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BLUE : Operations

Signature

[Signature]
CLIENTS REPRESENTATIVE

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RACAL SURVEY AUSTRALIA LIMITED



DAILY RECORD SHEET

WX	Sea State	Wind Dir.
0000		
0600		
1200		
1800		

PAGE 2.

Client : SAGASCO		Job No : 2010		Date : 29 NOV 92		Vessel : OCEAN EPOCH		Anchors / Tpdrs		
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX			STD 12 / VELOCITY PROBE				ITEM	USED	REMAIN	
SYLEDIS			ECHO SOUNDER (20/25)				SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS			SPARKER (DELPH/EPC)				DISKS			
GYRO			CORING (GRAVITY/GRAB)				PRINTER CART.			
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING							
SONARDYNE COMPATTS										
SONARDYNE PAN										
SONARDYNE(Dunker/Winch/Fish)										

DIARY OF OPERATIONS: **SUNDAY 29 NOVEMBER 1992.**

THE TRANSPONDER WAS SUSPENDED 1.4m FWD OF THE DRILL, 1.5m PORT OF \downarrow ; HDG 248°
 ∴ THE DRILL STRING IS E 387 262.169 N 5529 086.769,
 40° 22' 31".768 S, 145° 40' 18".746 E

WHICH IS 1.47m, bearing 046° 44' FROM THE INTENDED LOCATION.

0031 COMMENCED DGPS FIX, SETUP. SET-UP DNAVN.

0105 DGPS DATA COLLECTION COMMENCED

0306 DGPS DATA COLLECTION COMPLETED.

COMPUTED FINAL DATUM POSITION: AGDBA 40° 22' 51".810 S, 145° 40' 18".687 E
 E 387 260.80 N 5529 085.46

WHICH IS 0.42m BEARING 225° 35'(T) FROM THE INTENDED LOCATION.
 AND 1.89m BEARING 226° FROM THE ACOUSTIC FIX POSITION.

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Signature

 SURVEYOR/ENGINEER

WHITE	: Commercial Office
BLUE	: Operations

Signature

 CLIENTS REPRESENTATIVE

287050

RACAL SURVEY AUSTRALIA LIMITED



DAILY RECORD SHEET

PAGE 3.

WX	SeaStat	vell	WindDir.
0000			
0600			
1200			
1800			

Client : SAGASCO		Job No : 2010		Date : 29 NOV 92		Vessel : OCEAN EPOCH		Anchors / Tpdrs		
RACAL Equipment on Board	Op	NonOp	RACAL Equipment on Board	Op	NonOp	RACAL Personnel	Consummables		Laid	Recovered
SKYFIX			STD I2 / VELOCITY PROBE				ITEM	USED	REMAIN	4
SYLEDIS			ECHO SOUNDER (20/25)				SIDESCAN PAPER			
MICROFIX			SIDESCAN (595/531/PINGER)				E/SOUNDER PAPER			
ARGO			BOOMER (DELPH/EPC)				ELICS PAPER			
GNS			SPARKER (DELPH/EPC)				DISKS			
GYRO			CORING (GRAVITY/GRAB)				PRINTER CART.			
TRIMBLE SST'S			THEODOLITE / EDM			CLIENT Personnel	EPC ROLLS			
TELEMETRY			UNDERWATER TRACKING							
SONARDYNE COMPATTS										
SONARDYNE PAN										
SONARDYNE (Dunker/Winch/Fish)										

DIARY OF OPERATIONS :

0630 C. HAKKENNES TRANSFERRED TO RAGNA VIKING TO RECOVER TRANSPONDERS.

0848 TRANSPONDERS RECOVERED; TRANSFERRED TO OCEAN EPOCH.

1030 EQUIPMENT STOWED, OR READY FOR AIRFREIGHT.

1115 PERSONNEL LEFT RIG FOR DEVONPORT AIRPORT WITH LLOYDS HELO

1355 PERSONNEL DEPARTED DEVONPORT AIRPORT FOR MELBOURNE.

7

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Signature

J. [Signature]
SURVEYOR/ENGINEER

WHITE	: Commercial Office
BLUE	: Operations
YELLOW	: Clients Representative

Signature

W. [Signature]
CLIENTS REPRESENTATIVE

287051