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OFFSHORE EUCLA BASIN

GREAT AUSTRALIAN BIGHT 1990 SPECULATIVE MARINE SEISMIC, GRAVITY AND MAGNETIC SURVEY. REPORTS FOR THE PERIOD 19/3/90 TO FEBRUARY 1992

Submitted by

Japan National Oil Corp.
1992

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MARINE GRAVITY AND MAGNETIC DATA ACQUISITION

M/V Pacific Titan
Eucla Basin
Offshore Australia

Japan National Oil Corporation (JNOC)

Halliburton Geophysical Services, Inc. (HGS)

August - October 1990

EDCON, Inc.
171 S. Van Gordon
Denver, Colorado 80228

November, 1990

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INTRODUCTION

A total of 5,547.2 km of gravity and magnetic data were acquired by EDCON, Inc. for Halliburton Geophysical Services Inc. on the M/V Pacific Titan offshore Australia from August 20, 1990 through October 5, 1990. These data were acquired over Eucla Basin for Japan National Oil Corporation.

Blake Stitzer and Cliff Ward of EDCON operated the gravity and magnetic equipment throughout the survey.

INSTRUMENTATION

Shipborne Gravity Meter

LaCoste and Romberg Model S marine gravity meter, serial number S-31, was used to acquire these gravity data. LaCoste and Romberg shipborne gravity meters consist of a highly damped, zero-length spring type gravity sensor mounted on a gyro stabilized platform with associated electronics. Gravity readings are recorded on stripcharts and magnetic tape.

Gravity meter S-31 has a calibration table which is used to convert the gravity values computed by the system in counter units to gravity values in milligals. Calibration information for S-31 is in Appendix A. The gravity meter was operated at sea using three minutes of RC filtering.

Gravity Meter Sensor Location

The gravity meter sensor was located in the U.P.S. room, 2.0 meter starboard of the centerline, 40.6 meters forward of the stern, and 1.2 meters above the nominal waterline of the vessel. The M/V Pacific Titan is 62.5 meters long with a beam of 12.2 meters. A diagram of the ship showing the gravity sensor location is in Appendix B.

Magnetometer

A GeoMetrics Model G801 marine proton magnetometer was used to acquire these magnetic data. The proton free precession magnetometer operates on the principles of nuclear magnetic resonance to produce a measurement of the total magnetic intensity, that is, the scaler magnitude of the ambient field. The magnetometer was operated at a sensitivity of one gamma and a repetition rate of six seconds. The magnetometer sensor was trailed behind the vessel at a towing distance of 210 meters. - Analog magnetic data was recorded on a Hewlett Packard Model 680 single channel chart recorder.

There was no base station magnetometer operated for this survey.

Fathometer

A Simrad EA bathymetry system with an operating range of 0-1700 meter was used to measure and record water depths. Transducer depth of 3.3 meters was corrected to produce a true sea bottom to water surface depth.

Navigation

Offshore Navigation International (ONI) provided navigation for the survey using Spot, a medium frequency (1.72 mhz) radio positioning system. Secondary system and Global Positioning System (GPS). These systems were interfaced to the HGS' onboard navigation equipment which included a Transit Satellite systems. Navigation data were recorded at each shotpoint on the Configurable Marine System (CMS) magnetic tape.

Shotpoint

Shotpoint fixes were marked every 25 meters by the navigation system. At each shotpoint, a closure was transmitted to the gravity system and recorded on digital and analog records.

Time

Navigation and gravity system clocks were synchronized to Coordinated Universal Time via a Magnavox Satellite Navigator. The synchronization between the navigation and gravity clocks was never more than five seconds off throughout the survey. Any time the clocks were out of synchronization, notation was made on the recording information line log, daily operations log and daily sea check log.

Auto Pilot

The ship was equipped with a Resco, Tokyo Keiki auto pilot, coupled to a Sperry Mk227 gyroscope. There were some problems encountered in heavy seas with the gravity data quality that are believed to have been due to excessive "hunting" by the autopilot system.

DATA DESCRIPTION

Gravity and magnetic data were recorded in both digital and analog format.

Digital Record

A Design Enterprises Model DE6200B data logger interfaced to both a Kennedy Model 9800 tape transport was used to record digital gravity and magnetic data. The Design Enterprises logger converts analog signals and shaft encoder values from the gravity meter to digital data which is recorded by the Kennedy tape transport. A Zenith Model 180 PC computer recording on high-density 3.5 inch floppy disks was used as a secondary data logging system.

The digital field tape records consist of 21 seven character data blocks as follows ("b" characters represent blanks):

Data Block	Parameter
1	Manual fixed data (EEELLLLb); seven digits manually entered using thumbwheels. The first three digits (EEE) record the EDCON consecutive line number (incremented once each time the recording sequence is interrupted thus uniquely identifying each survey line segment). The second four digits (LLLL) are the program line number.
2	Julian day (DDDbbbbb)
3	Coordinated Universal Time (HHMMSSb)
4	Analog computed gravity (GGGGGGb)
5	Spring tension (SSSSSSb)

(Hex characters 8A and 8D at this location on the 3.5 inch floppy disk records.)

The next 10 data blocks are the gravity meter analog channel readouts, (NNPMMMMb), where 'NN' is the channel number, 'P' polarity, and 'MMMM' the analog channel data in millivolts.

Data Block	Channel
6	0 - Average Beam position (AVB)
7	1 - Total Cross Coupling (TCC)
8	2 - Total Correction (TC)
9	3 - Inherent Cross Coupling (VCC)
10	4 - Long Imperfection Cross Coupling (AL)
11	5 - Cross Imperfection Cross Coupling (AX)
12	6 - Average square of Vertical Acceleration (VE)

13	7 - Average absolute Cross Acceleration (HX)
14	8 - Average absolute Long Acceleration (HY)
15	9 - Second order Cross Imperfection Cross Coupling (AX2)

(Hex characters 8A and 8D at this loction on the 3.5 inch floppy disk records.)

The next two data blocks are as follows:

Data Block	Channel
16	Shotcount (CCCCCCb)
17	Shotpoint time (exact time the event in channel 16 occurred) (HHMMSSb)

The final four data blocks are extender channels available for recording auxiliary information.

Data Block	Channel
18	Extender channel 1 - Magnetometer value
19	Extender channel 2 - not used
20	Extender channel 3 - not used
21	Extender channel 4 - not used

(Hex characters 8A and 8D at this location on the 3.5 inch floppy disk records.)

The Kennedy tape transport Model 9800 records at 800 BPI in 9-track, ASCII format. Data were recorded at ten second intervals. A read-after-write tape verifier record was made at the start, at thirty minute intervals along, and at the end of each line.

The Zenith 180 PC computer records in ASCII format every 10 seconds, on 3.5 inch high-density disks. Data are recorded on the computer in the same format as on the tape drive, with the addition of a pair of extra characters, Hex 8A and Hex 8D, inserted between blocks 5 and 6, 15 and 16 and at the end of the record. One data file is created for each day. The filename corresponds to the Julian Day (JJJ) and the year (YY). "-1" is appended as a suffix to the filename to indicate the recording serial port. The format of the file name is:

JJJYY-1.SER

ANALOG RECORDS

Gravity

Analog gravity stripcharts include beam and accelerometer records.

The beam stripchart recorder used is a four channel Texas Instruments Servo Ritter II, operated at a chart speed of 1/2 inch per minute. The information provided by each trace is as follows:

Green trace	Analog computed gravity; Time event marks every minute at start and end of line, and every five minutes along each line.
Brown trace	Total correction value; Time event marks every minute at start and end of line, and every five minutes along each line; Shotpoint event marks every shotpoint at start and end of line, and every 10 shotpoints along each line.
Blue trace	Spring tension value; Instantaneous beam position (five minutes each hour) Shotpoint event marks every shotpoint at start and end of line, and every 10 shotpoints along each line.
Red trace	Total cross-coupling value; At the operators discretion this trace was used to monitor average beam velocity one hour out of each day.

The gravity beam stripchart recorder was annotated at the start, at 30 minute intervals along, and at the end of each line with time, gravity, spring tension, and shotpoint values. Any events that might affect gravity data quality, such as changes in boat speed or course were noted on the beam chart.

Accelerometer

The accelerometer stripchart recorder is a two channel Soltec Model S-4202, operated at a chart speed of 1/2 centimeter per minute and a sensitivity of one volt, providing the following information:

Black trace	Filtered or unfiltered cross horizontal acceleration; Time event marks every minute at start and end of line, and every five minutes along each line.

Red trace	Filtered or unfiltered long horizontal acceleration; Shotpoint event marks every shotpoint at start and end of line, and every 10 shotpoints along each line.

Both accelerometer traces normally displayed filtered horizontal accelerations except for five minutes per hour when they were switched to monitor unfiltered horizontal accelerations.

The accelerometer stripchart was annotated at the start, at 30 minute intervals along, and at the end of each line, with time and shotpoint values.

Magnetometer

The magnetometer stripchart recorder is a single channel Hewlett-Packard Model 680, operated at a speed of one inch per minute, and a sensitivity of 100 mV, providing the following information:

Blue trace	100 gamma scale (2 gammas per division)

The magnetometer stripchart was annotated at the start, at 30 minute intervals along, and at the end of each line, with time, gamma value, and shotpoint values. Any events that might affect magnetic data quality, such as anomalies caused by crossing in close proximity to manmade objects were noted on the magnetometer stripchart.

Recording Information Log

EDCON Recording Information Logs contain information about each line segment surveyed.

The header section identifies general line parameters including client, vessel, date, line number, gravity meter serial number, magnetometer model and serial number, distance to sensor, ship's course, first and last shotpoint, and start and end of line times.

The data section is used to record time, shotpoint number, gravity value, magnetic value, water depth, ship's speed in knots, ship's heading, and the total cross coupling value. These values are recorded at the start, at 30 minute intervals along, and at the end of each line.

The remarks portion of the Recording Information Log is used to note any occurrences that might affect data quality.

A representative example of the Recording Information Log is included as Figure 1.

EDCON

Figure 1

JOB NO. 90012

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Of 1

Recording Information Log
Marine Gravity/Magnetic Survey

Client: HGS / JNOC		Prospect: EUCLA BASIN		Date: 10 SEPT. 90	Julian Day: 253
Gravity meter no.: S-31	Meter factor: TABLE	Magnetometer model and serial no.: G801-S S/N 78		Vessel: PACIFIC TITAN	
Tape no.: 09	Recording at sec.: 10	Distance to sensor: 210 M	Mag paper speed: 1 IN/MIN	Observer: STITZER / WARD	
EDCON Consecutive line no.: 17		Program Line no.: JA 90-29		Sea state: 3-4	Course: 179.8°
Start time (first SP): 071434		End Time (last SP): 16:19:18		First sp: 101	Last sp: 3973
Tape recorder on: 070600		Tape recorder off: 16:23:00		Recording mode: G200B	
Avg. selector: 3 MIN		Verifier paper record interval: 1/30 MIN		Fathometer Transducer depth: CORRECTED	
Fathometer type: SIMRAD EA			Navigation type: SPOT/GPS		

REMARKS

*NOTE: IN REMARKS BELOW, SP 640 = 083850; SP 720 = 092310; SP 970 = 091840; SP 980 = 092000; NOTE: NO "JULIAN DAY" ON TAPE OR DISK RECORD 094500: SEAS INCREASING; SHIP PITCHING; SP 1153 095500: MAGNETIC ANOMALY; SP 1220 NO SHOTS SP 1316 - SP 1320 SP 1360: STRONG CROSS CURRENT; STEERING PROBLEMS CONTINUE; 101500 110330: SP 1711 INSTALLING NEW MAGNETOMETER PEN; 120540: SP 1749 NEW PEN IN.

TIME GMT ☑ LOCAL ☐ hr:min:sec	SHOT POINT NUMBER	AUTO READER GRAVITY	MAGNETOMETER sensitivity 1x rep. rate 6 sec	WATER DEPTH ft ☐ m ☐ fath ☑	SHIP SPEED (Kts)	SHIP HEADING	TOTAL CROSS COUPLING	REMARKS
								SOL
								LAT: 32 24 12.66 S.
07:14:34	101	7915.0	59647	46	5.4	189	0.2	LONG: 128 15 50.63 E.
07:30:00	204	7917.0	59297	46	5.5	187	1.9	072900: MAGNETIC ANOMALY; SP 196
08:00:10	412	7922.9	59239	48	5.5	186	0.7	
08:30:00	627	7925.8	59132	49	5.7	188	3.2	* SP 670: SHIP SWINGS 02° OFF COURSE
09:00:00	838	7933.5	59043	49	5.6	189	1.5	CORRECTED AT APPROX. SP 720.
09:30:00	1050	7936.4	59005	49	5.6	188	4.4	SP 970: 2° OFF COURSE, CORRECTED
10:00:00	1257	7944.9	59592	50	5.8	190	4.2	APPROX. SP 980 *
10:30:00	1466	7948.4	59499	51	5.9	192	7.1	SP 1280: SHIP 03° OFF COURSE (133630)
11:00:00	1685	7955.7	59727	57	5.8	190	5.6	101040: SP 1328; ON COURSE
11:30:00	1904	7963.3	59520	56	5.5	188	8.4	
12:00:00	2123	7968.8	59349	57	5.9	188	7.2	
12:30:00	2337	7975.2	59472	67	5.8	188	10.7	
13:00:00	2552	7980.2	59625	71	5.8	188	8.9	
13:30:00	2764	7985.1	59427	80	5.7	190	11.2	SP 2740: 132630) SHIP SWINGS 2°
14:00:00	2980	7989.5	59634	100	5.8	187	10.0	SP 2810. (133630) SHIP ON LINE.
14:30:00	3196	7995.4	59757	101	5.8	186	5.4	SP 2960 (135640) STEERING PROBLEMS
15:00:00	3410	7999.4	59983	120	5.8	189	5.7	CONTINUE.
15:30:00	3624	7996.9	59889	125	5.7	188	5.6	
16:00:00	3837	7993.1	59273	138	5.6	187	8.6	
16:19:18	3973	7983.1	59064	164	5.7	189	8.7	E.O.L.
: :								LAT: 33° 16' 34.94" S
: :								LON: 128° 15' 59.36" E
: :								
: :								COMPLETE

Approximate no. of Recording miles	Gravity	Magnetics	Total
96.83 km	96.83 km	96.83 km	2762.7 km

Daily Marine Operations Report

EDCON Daily Marine Operations Reports contain information on all aspects of the survey operations including start and end of line information, ship's course or speed change information, detailed discussion of system malfunctions, tape and chart change logs, port arrivals and departures, and any other relevant information. A copy of the Daily Marine Operations Reports is in Appendix D.

Daily Sea Checks

LaCoste and Romberg recommended Daily Sea Checks were observed and recorded on a daily basis. The Daily Sea Checks provide valuable diagnostic information about the gravity meter performance. Subtle changes in the values observed in these checks may indicate problems developing with the gravity system and guide the operator to appropriate preventive maintenance.

A representative example of the Daily Sea Checks log is included in Figure 2.

Still Readings and In-Port Checks

Three still readings were conducted for this survey. The first still reading was taken at the port of Portland, Victoria, Australia prior to the start of the survey. The second and third final still readings were performed at Esperance, Western Australia, Australia upon completion of survey. Still readings and recommended LaCoste and Romberg in-port checks are used to evaluate gravity system drift and overall performance.

Gravity meter base constants are calculated for each port reading. The base constant is defined by:

Base Constant = station gravity - calibrated S-meter gravity

Still Reading	Date	Location	Base Constant
1	August 19, 1990	Portland,Australia	971451.5
2	September 18, 1990	Esperance, Australia	971458.7
3	October 05, 1990	Esperance, Australia	971460.8

Copies of the base constant drift curve, the still readings with base constant calculations, in-port checks information and base station gravity descriptions are included in Appendix C.

Figure 2

EDCON Daily Sea Checks Job 90012
Halliburton Geophysical Services
Australia
M/V Pacific Titan

Time/Date: 0500 8 SEPTEMBER 1990 DAY 251
Operator: STITZER/WARD

Spring tension counter synchronization: OK
Gravity counter synchronization: OK

Stripchart calibration
Gravity: OK
Spring Tension: OK

Input voltage: 109 VAC; frequency: 60.6 Hz.; current: 7.5 Amps.

Regulated AC voltage: 110

Power supply voltages
+15 Volt DC: 15.642 VDC ; -15 Volt DC: -15.670 VDC

Optics Lamp Voltage: 4.7 VDC

Gravity meter pressure: 25.45"

400 Hz. Gyro AC power source phase voltages
AB: 25.7; BC: 26.5; AC: 26.0

Thermostating cycles
Gravity meter element: 5 seconds on; 17 seconds off
Cross axis gyroscope: 4 seconds on; 1 seconds off
Long axis gyroscope: 4 seconds on; 1 seconds off

Gyroscope identification
Long axis gyroscope: V-5 ; 0154 Hr.
Cross axis gyroscope: D-5 ; 5360 Hr.
Spare gyroscope: A-20 ; 2886 Hr.

Clock synchronization between the EDCON data system clock and the navigation system clock: OK

Remarks:

SURVEY OPERATIONS

Following is a chronological listing of significant survey events:

August 9	Stitzer and Ward depart Denver, Colorado.
August 11	Stitzer and Ward arrive Portland, Victoria, Australia. Contact HGS representative Mr. B. Tuck.
August 12	Standing by for vessel arrival, expect vessel to arrive 14th.
August 14	Meet Mr. C. King (HGS) Perth, Australia. Vessel M/V Pacific Titan arrives dock side. Board vessel to find gravity element cold. Auxiliary heater failure. A note attached to system indicated torque motors were removed and reinstalled by HGS personnel. Power gravity system up.
August 15	Gravity system powered up, element on heat. Conduct minor maintenance, gyros installed - on heat. Vessel departs to complete unfinished portion of present survey. G-meter delivered and on heat.
August 16	Conduct gravity base station tie between Mt. Gambier, Victoria police station and Portland harbor docks.
August 17	Complete gravity base tie. Standing by for vessel to arrive.
August 19	Vessel arrives dock side. Complete gravity and magnetometer installation. Stitzer and Ward move onboard vessel.
August 20	Conduct Still Reading No. 01.
August 21	Complete Still Reading No. 01. Vessel departs for survey area.
August 25	Begin production - first line of survey.
September 17	Stop production. Heading for Esperance for crew change.
September 18	Arrive Esperance, Western Australia. Conduct Still Reading No. 02.
September 19	Vessel crew change.
September 20	Vessel departs Esperance for survey area.

September 22	Resume survey production.
September 25	Gravity meter failure. Optic chopper motor failure, replace chopper motor, meter operational. No data loss, all gravity data loss was recovered on overlap due to circle for navigation failure.
October 4	Complete production of final survey line.
October 5	Arrive Esperance, Western Australia, Australia. Conduct final Still Reading No. 03. Begin demobilizing gravity and magnetometer equipment.
October 6	Complete demobilizing of all gravity and magnetometer equipment for trucking to Perth, Australia. Begin gravity base station tie between dock and Esperance airport.
October 7	Complete final gravity base station tie to dock. Stitzer and Ward depart for Perth. Arrive Perth, stand by for gravity shipment to arrive.
October 8	Gravity and magnetometer equipment arrive HGS office Perth. Unload truck, magnetometer equipment shipped to the Netherlands, gravity data system and data shipped to Denver, gravity S-meter stored in HGS warehouse in Wangara.
October 9	Ward departs Perth for Denver. Connect S-meter element to auxiliary heater.
October 10	Auxiliary failure, repair auxiliary heater.
October 11	Stitzer departs for Denver, Colorado.

GENERAL OPERATIONS

Marine Gravity

The marine gravity data acquired during this survey are of high quality. The problem encountered was an optic chopper motor failure during line acquisition. At approximately the same time there was a navigation failure causing the line to be terminated and the vessel to circle. All lost gravity data were re-recorded.

Marine Magnetics

The marine magnetometer system worked well for the survey. There was one problem that affected the data set. The magnetometer situation that should be mentioned is that when the ship was on a southern heading the magnetometer data was significantly noisier than on any other heading. This was attributed to a floating tow system with large swells and seas causing increased sensor motion and consequently more noise when travelling into head seas and swells (South) than when travelling with the seas. It is also possible that the prevailing currents may move the magnetometer sensor closer to the seismic streamer on the southern heading and contributed to the increased noise. On a southern heading noise levels would run as much as ±3-5 gamma. On any other heading, the noise was normally ±1 gamma.

Weather

The weather throughout the survey was of marginal to fair sea conditions, along with continuous large swells from the south. Running at Beaufort Force three to nine.

Production

A total of 5,547.2 kilometers of gravity and magnetic data were acquired between August 19 and October 4, 1990. The total seismic data collected during the survey was 5,495.8 km. (These production numbers include all reshoots and overlaps).

EDCON, Inc.

Blake W Stitzer
Senior Marine Party Chief

APPENDIX A

S-31 Meter Calibration Information

LACOSTE and ROMBERG, Inc.
December 1980
Calibration Information for Air-Sea Gravity Meter: S-31

Gravity Meter Calibration Factor: See calibration table

ENCODER READOUTS

Analog Gravity 1 Count = .1 counter unit
Spring Tension 1 Count = .1 counter unit

ANALOG VOLTAGE READOUTS

Abbreviations:
Average Beam (AVB)
Total Cross Coupling (CC)
Total Correction (TC)
Inherent Cross Coupling (VCC)
Long Imperfection Cross Coupling (AL)
Cross Imperfection Cross Coupling (AX)
Vertical Acceleration^2 (VE)
Second Order Imperfection Cross Coupling (AX-2)
Average Cross Acceleration (AVX)
Average Long Acceleration (AVL)
Milligal (mgal) Millivolt (mv)

CHANNEL	READOUT	CALIBRATION			% of CORRECTION USED
0	(AVB)	2mv/min	=	-1 mgal.	
1	(CC)	10 mv	=	+1 mgal.	
2	(TC)	10 mv	=	-1 mgal.	
3	(VCC)	7 mv	=	+1 mgal.	+250%
4	(AL)	55 mv	=	+1 mgal.	+ 30%
5	(AX)	20 mv	=	-1 mgal.	- 80%
6	(VE)	1250 mv	=	$(100k\ mgal)^2$	- 5%
7	(AVX)	10 mv	=	1000 mgal.	
8	(AVL)	10 mv	=	1000 mgal.	
9	(AX-2)	50 mv	=	+1 mgal.	+ 10%

STRIPCHART READOUTS (Beam Chart)

Green Pen - Analog Gravity	1 div.	=	+1 mgal.
Black Pen - Total Correction	1 div.	=	-1 mgal.
Red Pen - Total Cross Coupling or	1 div.	=	+1 mgal.
Average Beam Position	1 div/min.	=	-1 mgal.
Orange Pen - Spring Tension or	1 div.	=	+1 mgal.
Beam Position	80 div.	=	100 E.P.D.

STRIPCHART READOUTS (Accelerometer Chart) (1 Volt Range)

Unfiltered Horizontal Acceleration	1 div.	=	3000 mgal.
Filtered Horizontal Acceleration	1 div.	=	1 bubble div.

December 1980

Calibration Information for Air-Sea Gravity Meter: S-31

	Position of average selector switch 1	2
I. Encoder readouts		
Analog Gravity	2 min	3 min
Spring Tension	0	0
II. Analog Voltage Readouts	1 min	1 min
III. Strip Chart Readouts (Beam Recorder)		
Analog Gravity	2 min	3 min
Total Correction	2 min	3 min
Total Cross Coupling	2 min	3 min
Average Beam Position	2 min	3 min
Spring Tension	0	0
Beam Position	0	0
IV. Strip Chart Readouts (Accelerometer Recorder)		
Unfiltered Horizontal Acceleration	0	0
Long Period Level (Filtered Horizontal Acceleration)	1 min	1 min
V. Digitally Computed Gravity		
Filter Position 1	2 min	
Filter Position 2	5 min	

Calibration Table for Air-Sea Gravity Meter: S-31

Calibration Set: November 3, 1980

0	0	1.01490	4700	4776.68	1.01774	9400	9563.04	1.018
100	101.49	1.01500	4800	4878.45	1.01779	9500	9664.85	1.018
200	202.99	1.01510	4900	4980.23	1.01779	9600	9766.66	1.018
300	304.50	1.01520	5000	5082.01	1.01784	9700	9868.47	1.017
400	406.02	1.01525	5100	5183.79	1.01789	9800	9970.26	1.017
500	507.55	1.01535	5200	5285.58	1.01794	9900	10072.05	1.017
600	609.08	1.01540	5300	5387.38	1.01799	10000	10173.83	1.017
700	710.62	1.01545	5400	5489.18	1.01799	10100	10275.61	1.017
800	812.17	1.01550	5500	5590.98	1.01804	10200	10377.38	1.017
900	913.72	1.01550	5600	5692.78	1.01809	10300	10479.13	1.017
1000	1015.27	1.01555	5700	5794.59	1.01814	10400	10580.88	1.017
1100	1116.83	1.01555	5800	5896.41	1.01814	10500	10682.62	1.017
1200	1218.38	1.01560	5900	5998.22	1.01819	10600	10784.35	1.017
1300	1319.94	1.01560	6000	6100.04	1.01824	10700	10886.07	1.017
1400	1421.50	1.01560	6100	6201.87	1.01824	10800	10987.78	1.016
1500	1523.07	1.01565	6200	6303.69	1.01829	10900	11089.48	1.016
1600	1624.63	1.01570	6300	6405.52	1.01834	11000	11191.16	1.016
1700	1726.20	1.01575	6400	6507.35	1.01834	11100	11292.83	1.016
1800	1827.78	1.01585	6500	6609.19	1.01839	11200	11394.49	1.016
1900	1929.36	1.01600	6600	6711.03	1.01839	11300	11496.14	1.016
2000	2030.96	1.01620	6700	6812.87	1.01844	11400	11597.77	1.016
2100	2132.58	1.01630	6800	6914.71	1.01849	11500	11699.39	1.015
2200	2234.22	1.01636	6900	7016.56	1.01849	11600	11800.99	1.015
2300	2335.85	1.01625	7000	7118.41	1.01854	11700	11902.57	1.015
2400	2437.48	1.01625	7100	7220.27	1.01859	11800	12004.13	1.015
2500	2539.10	1.01635	7200	7322.13	1.01864	11900	12105.68	1.015
2600	2640.74	1.01645	7300	7423.99	1.01869	12000	12207.21	1.0150
2700	2742.38	1.01655	7400	7525.86	1.01869			
2800	2844.04	1.01665	7500	7627.73	1.01874			
2900	2945.71	1.01675	7600	7729.60	1.01874			
3000	3047.38	1.01679	7700	7831.48	1.01879			
3100	3149.06	1.01689	7800	7933.36	1.01879			
3200	3250.75	1.01694	7900	8035.24	1.01879			
3300	3352.45	1.01704	8000	8137.12	1.01879			
3400	3454.15	1.01709	8100	8239.00	1.01874			
3500	3555.86	1.01709	8200	8340.87	1.01874			
3600	3657.57	1.01709	8300	8442.75	1.01869			
3700	3759.28	1.01714	8400	8544.62	1.01864			
3800	3860.99	1.01714	8500	8646.48	1.01859			
3900	3962.71	1.01719	8600	8748.34	1.01854			
4000	4064.43	1.01729	8700	8850.20	1.01849			
4100	4166.16	1.01734	8800	8952.05	1.01844			
4200	4267.89	1.01739	8900	9053.89	1.01839			
4300	4369.63	1.01749	9000	9155.73	1.01834			
4400	4471.38	1.01759	9100	9257.56	1.01829			
4500	4573.14	1.01764	9200	9359.39	1.01824			
4600	4674.91	1.01769	9300	9461.22	1.01819			

APPENDIX B

Vessel Diagram of S-Meter and Magnetometer Location
Personnel Listing

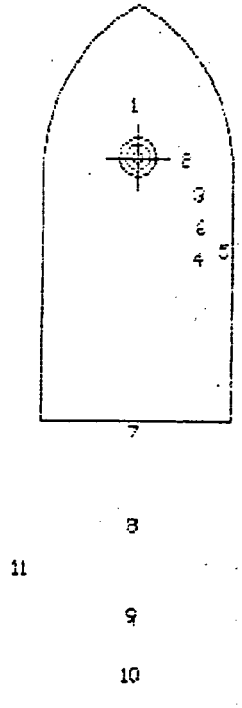
PLATE #4

M/V PACIFIC TITAN

ANTENNAE LOCATION DIAGRAM

CLIENT: JNOC AREA: EUCLA BASIN

DATE: AUG/SEP 1990



KEY

LOCATION	OFFSET FROM CNP	
	Y (+ STB)	X (+ FWD)
1 CNP SPOT PRIMARY ANTENNA	0.0 m	0.0 m
2 TRANSIT SATELLITE ANTENNA	1.0 m	-2.5 m
3 FATHOMETER TRANSDUCER	2.0 m	-4.6 m
4 SONAR TRANSDUCER	2.0 m	-14.0 m
5 SPOT SECONDARY ANTENNA	6.6 m	-10.7 m
6 GRAVITY SENSOR	2.0 m	-5.9 m
7 CENTRE-STERN	0.0 m	-46.5 m
8 CENTRE OF SOURCE	0.0 m	-113.5 m
9 CENTRE OF NEAR GROUP	0.0 m	-313.5 m
10 NEAR COMPASS (BCU)	0.0 m	-369.9 m
11 MAGNETOMETER	-16.1 m	-254.5 m

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

PERSONNEL LISTING

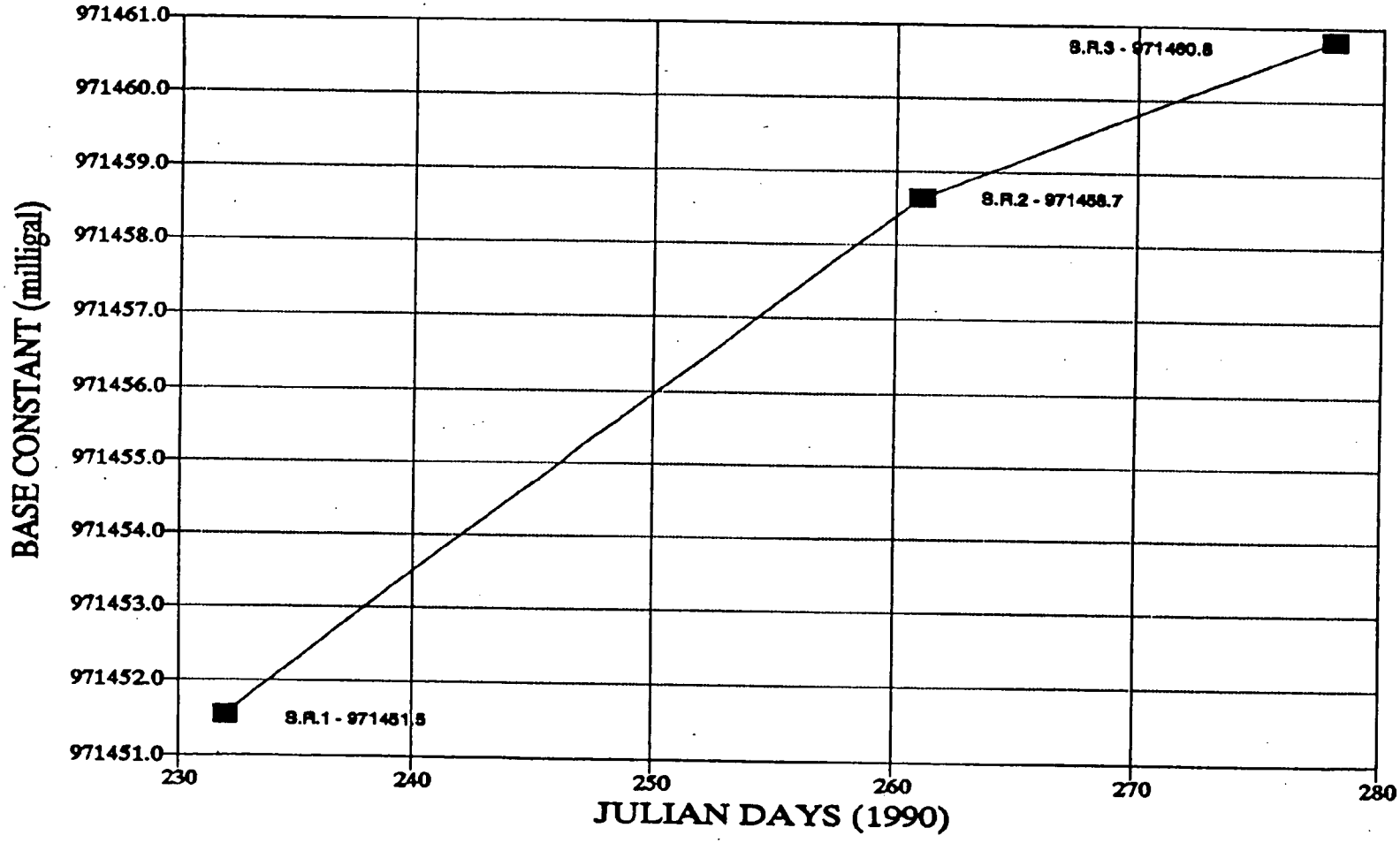
Halliburton Geophysical Services, Inc.
M/V Pacific Titan

Captain	: P. Armstrong
	: B. Spencer
Party Manager	: E. Pickstone
	: K. Webber
Client Representative	: H. Akai (JNOC)
	: H. Akai
	: Y. Nagasaki(JNOC)
	: T. Aeiki
Gravity/Magnetic System Operators	: B. Stitzer (EDCON)
	: C. Ward (EDCON)
Navigation Operators	: B. Viney (ONA)
	: P. Ryane (ONA)
	: M. Mathews (ONA)
	: B. Viney (ONA)
Survey Engineers	: B. Lloyd
	: N. Hoy
	: D. Cambell
	: M. Summers
Systems Operators	: G. Granville
	: G. Whittle
	: R. Hodson
	: T. Waker
	: G. Miller
	: G. Heal
	: J. Holt
Quality Controllers	: A. Hadland
	: P. Blake
	: C. Halvorson
	: R. Luff
Compressor Engineer	: M. Eginton
	: K. Bakewell
Source Mechanics	: B. Lunnie
	: R. Johns
	: J. Vickery
	: L. Whitcombe
	: G. Clark
	: B. Woodcock
	: J. Salter
	: T. Krzyzosiak

APPENDIX C

Base Constant Drift Curve
Base Constant Calculations
Still Readings and In-port Checks
Base Station Gravity Descriptions

LACOSTE AND ROMBERG GRAVITY METER S-31
DRIFT CURVE (ISOGAL 84)



EDCON JOB 90012

BASE CONSTANT CALCULATIONS

Dockside Station Gravity Values

A land gravity base tie was conducted with a gravity land meter (S/N G-586) supplied by Geoterrex on August 16-17, 1990. The station gravity value at the dock location occupied for Still Readings #1 at Portland, Victoria, Australia was measured to be **980031.45 mgal**, Isogal 84 datum.

A land gravity base tie was conducted with gravity land meter (S/N G-617) supplied by Geoterrex on October 06-07, 1990. The station gravity value at the dock location occupied for Still Readings #2 and #3 at Esperance, Western Australia at the completion of survey was measured to be, **979607.41 mgal**, Isogal 84 datum.

Still Reading #1, August 20, 1990, Day 232, EDCON Job 90012

Client: Halliburton Geophysical Services Inc. for Japan National Oil Corporation
Vessel: M/V Pacific Titan
Location: K.S. Anderson Berth, Portland, Victoria, Australia
Latitude: 38° 21'11.7" S; Longitude: 141° 37'07.5" E; Heading: 19.7 NNE
(Latitude and longitude measured off harbor chart)

See accompanying diagram for location sketch.

Readings: Gravity (Auto Reader): 8435.0
Spring Tension: 8435.4
Water depth: Fathometer: 12.4 meters
Measured: 13.0 m. (port side); 11.8 m. (starboard side)

Dock to Water: 2.6 m. above water
Dock to Gravity Meter: 1.2 m. above meter element
Gravity Meter to Water: 1.5 m. above water

Base Constant Calculation:

Dockside station gravity:	980031.5
Free air correction to sensor:	+0.3
Station gravity at sensor:	980031.8
Gravity: 8468.0; Calibrated gravity:	- 8580.3
Base Constant:	**971451.5**

In Port Checks:

1. Gravity element measuring screw counter and Auto Reader Spring Tension counter are synchronized.
2. Gravity counter values equals Spring Tension counter value when Total Correction is switched off.
3. The pens on the beam stripchart recorder accurately indicate the relative values.
4. The five cross coupling channels at zero volts (±1 mV).
5. Gravity element optics lamp voltage is 4.6 VDC.
6. Gravity element pressure is 25.4 inches.
7. The Beam Zero and Gain require no adjustment.
8. K-check required 3/4 counter clockwise turn of the analog K adjustment potentiometer.
9. Auto Reader responds correctly to input.
10. Gravity equals Total Correction added to Spring Tension correctly.
11. Cross channel accelerometer required minor adjustment to level cross channel spirit level. The long channel did not require adjustment.
12. The stable platform torque motor levels felt correctly set with firm resistance to external pressure without vibration.
13. Input voltage: 109 VAC Frequency: 60.6 Hz Current: 4.5 Amps
14. 15 Volt power supply voltages measure: +16.107, -16.114
15. The shock absorber oil levels are ok after refill.

Still Reading #2, September 18, 1990 Day 261 EDCON Job 90012

Client: Halliburton Geophysical Services Inc. for Japan National Oil Corporation
Vessel: M/V Pacific Titan
Location: Esperance Bulk dock, Esperance, Western Australia, Australia
Latitude: 35° 52'15.84" S; Longitude: 121° 53'59.64" E; Heading: 278.4 NNW
(Latitude and longitude measured from SATNAV after 24 hr. period)

See accompanying diagram for location sketch.

Readings: Gravity (Auto Reader): 8011.8
Spring Tension: 8012.2
Water depth: Fathometer: 13.3 meters
Measured: 12.0 m. (port side); 14.6 m. (starboard side)

Dock to Water: 3.1 m. above water
Dock to Gravity Meter: 1.3 m. above meter element
Gravity Meter to Water: 2.0 m. above water

Base Constant Calculation:

Dockside station gravity:	979607.4
Free air correction to sensor:	+0.4
Station gravity at sensor:	979607.8
Gravity: 8011.8; Calibrated gravity:	- 8149.1
Base Constant:	**971458.7**

In Port Checks:

1. Gravity element measuring screw counter and Auto Reader Spring Tension counter are synchronized.
2. Gravity counter values equals Spring Tension counter value when Total Correction is switched off.
3. The pens on the beam stripchart recorder accurately indicate the relative values.
4. The five cross coupling channels at zero volts (+/-1 mV).
5. Gravity element optics lamp voltage is 4.6 VDC with new type optics lamps.
6. The gravity meter pressure was 25.45 inches.
7. The Beam Zero and gain required minor adjustment
8. K-check required no adjustment.
9. Auto Reader responds correctly to input
10. Gravity equals Total Correction added to Spring Tension correctly.
11. Cross channel accelerometer required minor adjustment to level cross channel spirit level. The long channel did not require adjustment.
12. The stable platform torque motor levels felt correctly set with firm resistance to external pressure without vibration.
13. Input voltage: 109 VAC Frequency:61.5 Hz Current: 6.5 Amps
14. 15 Volt power supply voltages measure: +15.662, -15.650
15. The shock absorber oil levels are ok.

Still Reading #3, October 5, 1990 Day 278 EDCON Job 90012

Client: Halliburton Geophysical Services Inc. for Japan National Oil Corporation
Vessel: M/V Pacific Titan
Location: Esperance Dock, Esperance, Western Australia, Australia
Latitude: 33° 52'19.88" S; Longitude: 121° 54' 00.0" E; Heading: 122 SSW
(Latitude and longitude from a SATNAV system)

See accompanying diagram for location sketch.

Readings: Gravity (Auto Reader): 8009.8
Spring Tension: 8010.1
Water depth: Fathometer: 12.8 meters
Measured: 13.8 m. (port side); 11.9 m. (starboard side)

Dock to Water: 3.5 m. above water
Dock to Gravity Meter: 1.5 m. above gravity meter element
Gravity Meter to Water: 2.0 m. above water

Base Constant Calculation:

Dockside station gravity:	979607.4
Free air correction to sensor:	+0.5
Station gravity at sensor:	979607.9
Gravity: 8009.8; Calibrated gravity:	- 8147.1
Base Constant:	**971460.8**

In Port Checks:

1. Gravity element measuring screw counter and Auto Reader Spring Tension counter are synchronized.
2. Gravity counter values equals Spring Tension counter value when Total Correction is switched off.
3. The pens on the beam stripchart recorder accurately indicate the relative values.
4. The five cross coupling channels at zero volts (+/-1 mV).
5. Gravity element optics lamp voltage is 4.6 VDC
6. Gravity meter pressure is 25.35"
7. The Beam Zero and Gain require minor adjustment
8. K-check 1 mgal out - not adjusted
9. Auto Reader responds correctly to input
10. Gravity equals Total Correction added to Spring Tension correctly.
11. Gravity meter levels are ok
12. The stable platform torque motor levels felt correctly set with firm resistance to external pressure without vibration.
13. Input voltage: 091 VAC Frequency:60.6 Hz Current: 5.0 Amps
14. 15 Volt power supply voltages measure: +15.699, -15.733
15. The shock absorber oil levels are ok.
16. Gravity meter thermostating cycles: Element: 6.0 sec on 18.0sec off
    X-Gyro: 4.0 sec on; 2.0sec off
    L-gyro: 4.0 sec on; 2.0 sec off

EDCON

OJECT HGS/JNOC Job# 90012 DATE Aug. 16-17, 1990 SHEET

GRAVITY METER G-586 SCALE FACTOR MAP

ELEVATION FACTOR NORTHING FACTOR OPERATOR

STA. NO.	TIME	METER READING	STATION GRAVITY	ELEVATION METERS	ELEVATION FEET	LAT. BASE NORTHING	NORTHING EASTING	BOUGUER G.	WEATHER & REMARKS
FUEL	08.07	3595.04							RAIN- GUSTY WIND 30-
BULK	08.20	3595.70							
SILO	08.31	3596.65							
MT. GAMBIER POLICE	10.20	3546.45							BASE STATIO
FUEL	11.59	3594.97							
BULK	12.12	3595.65							STILL V. WINDY
SILO	12.22	3596.63							BATTERY CHANG
GAMBIER POLICE	14.38	3546.47							
FUEL	16.19	3594.92							STILL WINDY
BULK	16.31	3595.59							
SILO	16.40	3596.54							
		AUGUST 17, 1990							
GAMBIER POLICE	09.20	3546.42							READING STEADIER
FUEL	10.45	3594.91							WIND: ± 20 KM.
BULK	10.55	3595.59							BATTERY CHAN
SILO	11.02	3596.55							
GAMBIER POLICE	12.50	3546.42							
FUEL	14.27	3594.94							
BULK	14.52	3595.64							
OS	15.00	3596.60							READINGS STE ER THAN YESTER

BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS

CNR CONSTITUTION AVENUE AND ANZAC PARADE, CANBERRA
Postal address: G.P.O. Box 378, Canberra, A.C.T. 2601
Please address all communications to the Director

Telephone: 49 9111
Telegrams: BUROMIN
Telex: 62 109

Department of Resources and Energy

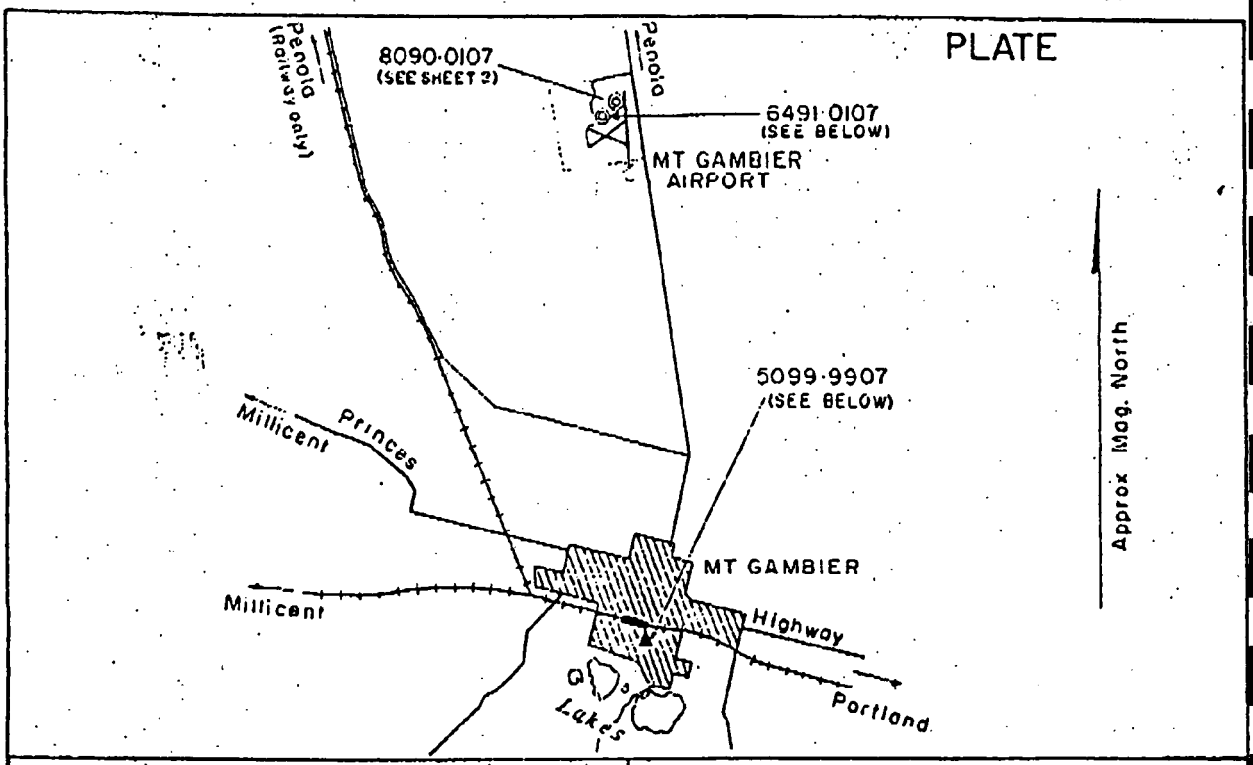
In reply please quote:

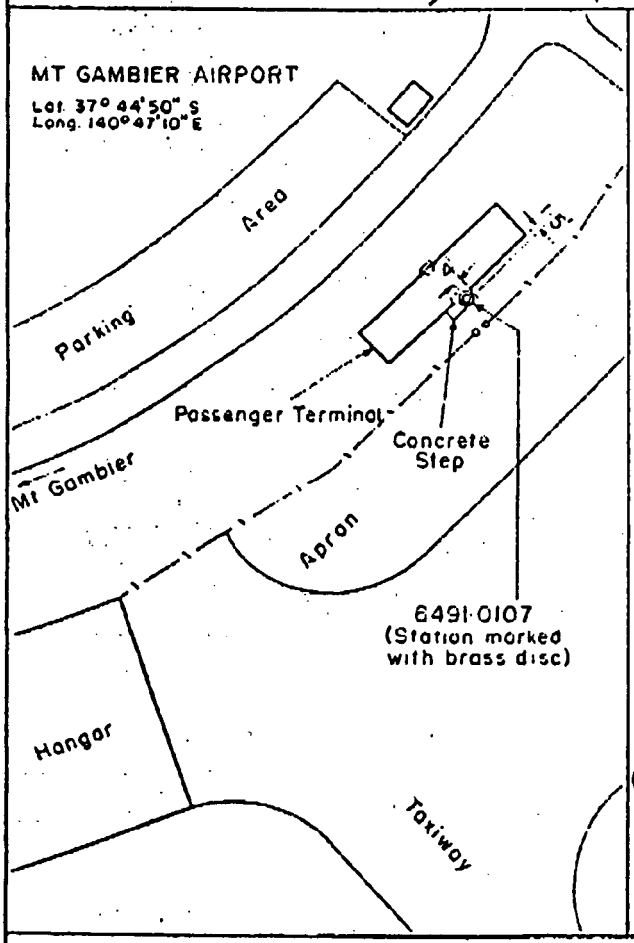
BMR station number	Latitude S (°) (')	Longitude E (°) (')	Altitude (m)	Gravity value Isogal65 (mGal)	Isogal84 ($\mu m\ s^{-2}$)	Location (for abbreviations see end)
HAMILTON 45472						
J 6491.9002	37 39.0	142 3.6	238.76	979938.39	9799246.6	A/S TERMINAL
K 6491.1002	37 44.8	142 1.7	175.44	979967.00	9799532.8	RS
L 6491.2002	37 45.0	142 0.6	******	979965.92	9799521.8	FROME BASE B
MOUNT GAMBIER 45470						
A 5099.9907	37 50.1	140 46.7	43.54	979993.65	9799799.0	POLICE STORE
J 6491.0107	37 44.7	140 47.1	63.29	979977.22	9799634.7	A/S TERMINAL
K 8090.0107	37 44.7	140 47.1	63.	979976.65	9799629.0	A/S HANGAR
COLAC 45483						
J 6491.9001	38 22.1	143 41.1	185.43	979993.43	9799796.4	YEO A/S HANGAR
K 6491.1001	38 20.3	143 35.8	126.28	980000.08	9799862.9	PO
L 6491.2001	38 20.6	143 35.3	133.13	979998.79	9799850.0	RS
M 6491.3001	38 20.6	143 35.3	136.65	979998.06	9799842.7	NR RS FROME K16

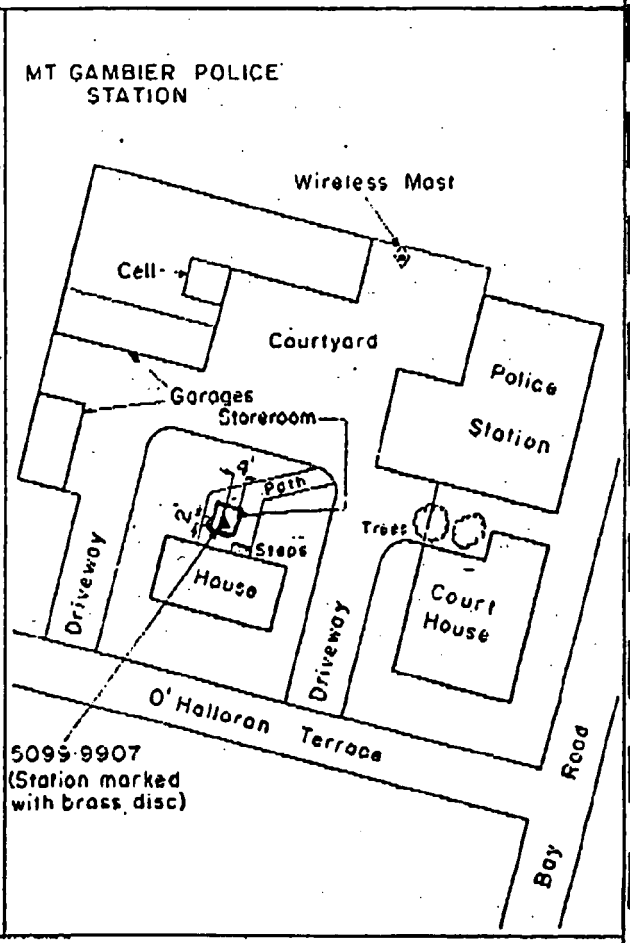
PORTLAND

6996.4035 38° 19.25' 141° 35.72' 34.59m 980014.28 PORTLAND/HEYWOOD/

PLATE







▲ Primary base
△ Secondary base
⊕ Excentre

MOUNT GAMBIER SA

Sheet 1 of 2 J54/B2-23A

GRAVITY STATIONS
AUSTRALIAN NATIONAL GRAVITY NETWORK

In-Port Information Log
Marine Gravity Survey

EDCON

Gravity Meter	Date	Job No.	Still Reading No.
S-31	23, 24 AUG. 90	90012	01

Client	Vessel
HGS / JNOC	M/V PACIFIC TITAN

Observers	Port	Country
STITZER / WARD	PORTLAND, VIC.	AUSTRALIA

Latitude	Longitude	Lat./Lon. Source
38 21.185 S.	141 37.130 E.	SAT-NAV

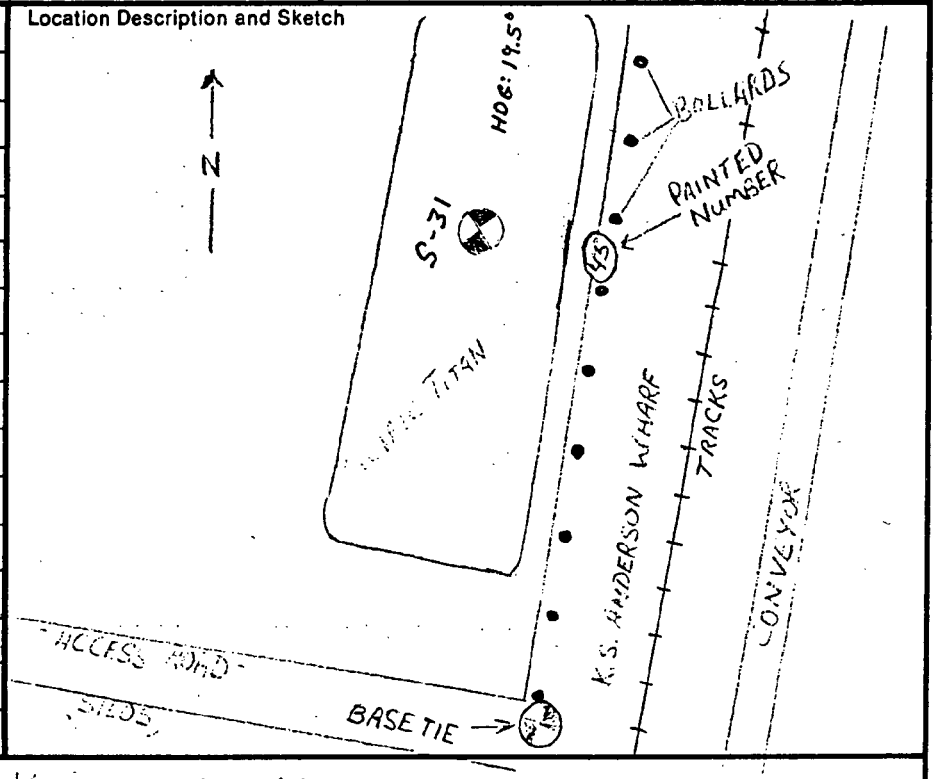
Gravity (Auto Reader)	Spring Tension
8435.0	8435.1

Dock to Water	Water Depth	Meter Pressure	Time (GMT)
2.6 M.	12.35M.	25.40	

In-Port Checks

ST Counter Sync	OK
ST = g w/TC Off	OK
Stripchart Cal.	ADJUST-OK
CC Zeros	SLIGHT ADJ. OK
Lamp Voltage	4.6 V.
Beam Zero & Gain	SLIGHT ADJ. OK
K-Check	3/4 OK
Auto Reader Response	OK
g = ST + TC	OK
Meter Levels	OK
Stable Platform	OK
Thermostating Cycles	X- 3/2 LE 3/2 M 5/20
Input Voltage & Freq.	109VAC 60.5HZ
Power Supply Voltages	112 VAC
Shock Oil Level	OK

Location Description and Sketch



Remarks: WINDY - VESSEL UNSTABLE

S-METER WAS LOCATED BETWEEN SIXTH AND SEVENTH BOLLARDS

Gravity Base Tie	Base Location	Base Gravity Value and Datum
	MT. GAMBIER POLICE STORE	9799999.0 ISCGAL-84

Land Meter Type and Serial No.	Land Meter Calibration Factor	S-Meter Calibration Factor
LCR G-586	1.027	SEE S-31 TABLE.

Station/ Location	Time	Meter Reading	Drift Corr.	Calibrated Gravity

S-Meter Base Constant Calculations

Avg. Calibrated Base Gravity	
Avg. Calibrated Dockside Gravity	
Δ g _____ Dockside Station Gravity	980031.46
Δ Elev. Dock to ~~Water~~ METER	3.77 FT x .09406 mgal/ft = 0.35 mgal
Station Gravity at S-Meter Element	980031.81
Calibrated S-Meter Gravity	8580.27
S-Meter Base Constant	971451.54

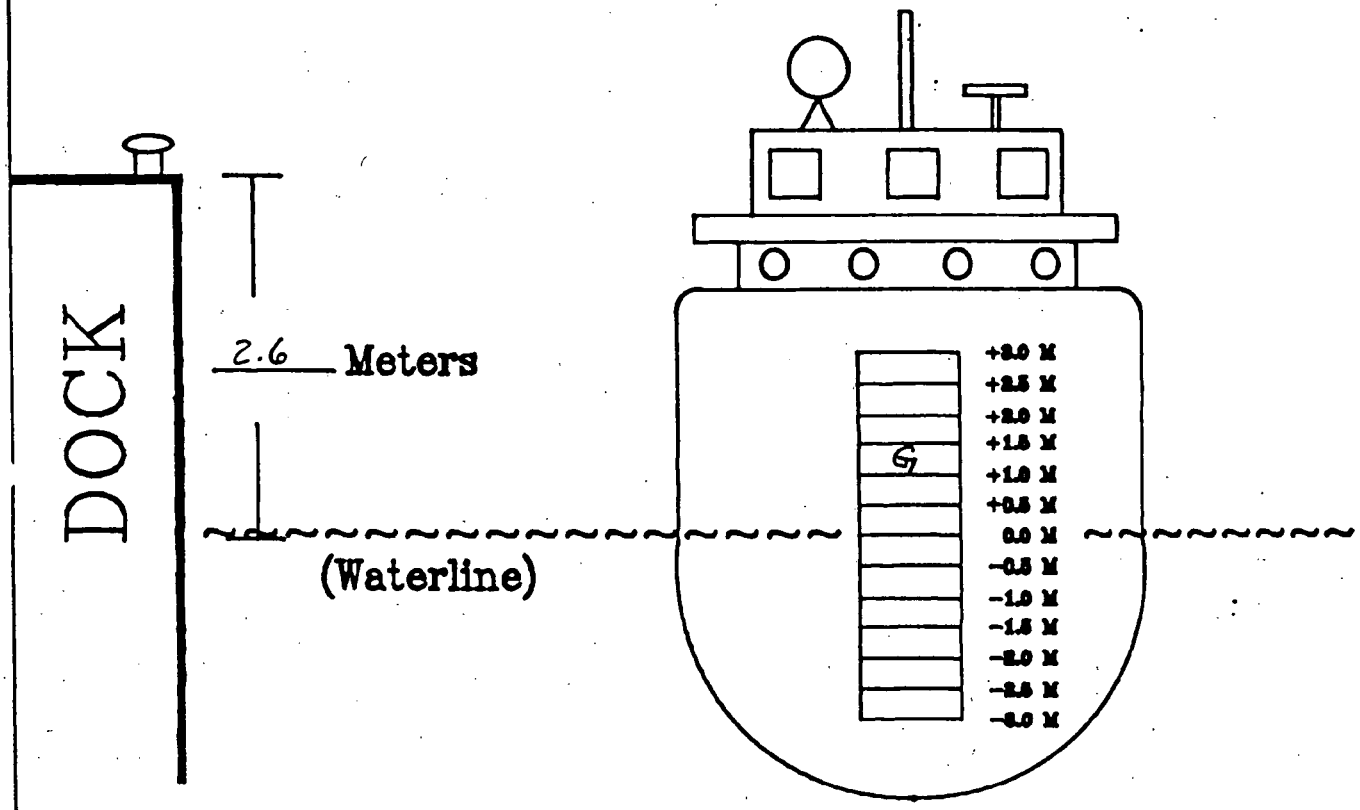
Remarks: TCC : 0 = 0 + .003

FREE AIR CORRECTION MEASUREMENTS

Gravity Meter	Date	Job No.	Still Reading No.
S-31	28 AUG 90	90012	01

Client	Vessel/Ship
HGS / JNOC	M/V PACIFIC TITAN

Observers	Port	Country
STITZER / WARD	PORTLAND, VICT.	AUSTRALIA



Draw a "G" on the above scale to indicate the Gravity sensor position above or below the waterline of the vessel.

Gravimeter to Dock = 1.15 Meters (above / (below))

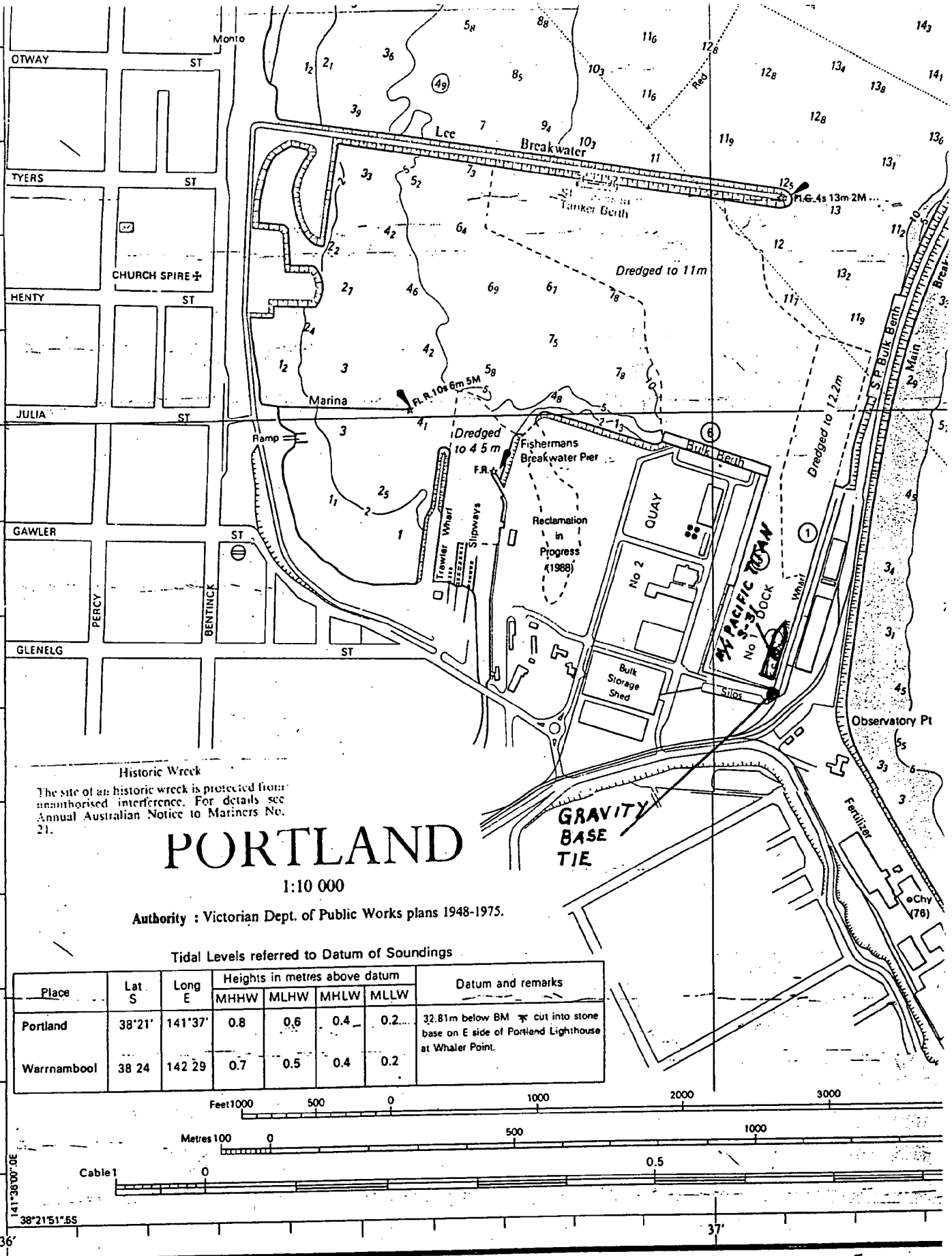
Gravimeter to Water = + 1.45 Meters ((above) / below)

Dock to Water = 2.60 Meters

Water Depth = 12.35 Meters

Are the measurements the same from the beginning to the end of the readings? ((Yes) / No)
If no, indicate the amount of change.

1 Meter = 3.28 Feet



Historic Wreck

The site of an historic wreck is protected from unauthorised interference. For details see Annual Australian Notice to Mariners No. 21.

PORTLAND

1:10 000

Authority : Victorian Dept. of Public Works plans 1948-1975.

Tidal Levels referred to Datum of Soundings

Place	Lat S	Long E	Heights in metres above datum				Datum and remarks
			MHHW	MLHW	MHLW	MLLW	
Portland	38°21'	141°37'	0.8	0.6	0.4	0.2	32.81m below BM ⊼ cut into stone base on E side of Portland Lighthouse at Whaler Point.
Warrnambool	38 24	142 29	0.7	0.5	0.4	0.2	

Feet 1000 500 0 1000 2000 3000

Metres 100 0 500 1000

Cable 1 0 0.5

141°36'00"E

38°21'51"S

GRAVITY BASE TIE

all Corrections 1977-36-64-1980-[14-4]-332-1981-608-1982-48-344-615-1983 [11-2] 1984-585-[2-11] 1986-243-547-1987-132-1988-346-1990-135

TEMP & PRELIMINARY NOTICES

STILL READING #01

20 AUG. 1990

EDCON JOB #90012

Still Reading #1, August 20, 1990, Day 232, EDCON Job 90012

Client: Halliburton Geophysical Services Inc. for Japan National Oil Corporation
Vessel: M/V Pacific Titan
Location: K.S. Anderson Berth, Portland, Victoria, Australia
Latitude: 38° 21'11.7" S; Longitude: 141° 37'07.5" E; Heading: 19.7 NNE
(Latitude and longitude measured off harbor chart)

See accompanying diagram for location sketch.

Readings: Gravity (Auto Reader): 8435.0
Spring Tension: 8435.4
Water depth: Fathometer: 12.4 meters
Measured: 13.0 m. (port side); 11.8 m. (starboard side)

Dock to Water: 2.6 m. above water
Dock to Gravity Meter: 1.2 m. above meter element
Gravity Meter to Water: 1.5 m. above water

Base Constant Calculation:

Dockside station gravity:	980031.5
Free air correction to sensor:	+0.3
Station gravity at sensor:	980031.8
Gravity: 8468.0; Calibrated gravity:	- 8580.3
Base Constant:	**971451.5**

In Port Checks:

1. Gravity element measuring screw counter and Auto Reader Spring Tension counter are synchronized.
2. Gravity counter values equals Spring Tension counter value when Total Correction is switched off.
3. The pens on the beam stripchart recorder accurately indicate the relative values.
4. The five cross coupling channels at zero volts (±1 mV).
5. Gravity element optics lamp voltage is 4.6 VDC.
6. Gravity element pressure is 25.4 inches.
7. The Beam Zero and Gain require no adjustment.
8. K-check required 3/4 counter clockwise turn of the analog K adjustment potentiometer.
9. Auto Reader responds correctly to input.
10. Gravity equals Total Correction added to Spring Tension correctly.
11. Cross channel accelerometer required minor adjustment to level cross channel spirit level. The long channel did not require adjustment.
12. The stable platform torque motor levels felt correctly set with firm resistance to external pressure without vibration.
13. Input voltage: 109 VAC Frequency: 60.6 Hz Current: 4.5 Amps
14. 15 Volt power supply voltages measure: +16.107, -16.114
15. The shock absorber oil levels are ok after refill.

In-Port Information Log
Marine Gravity Survey

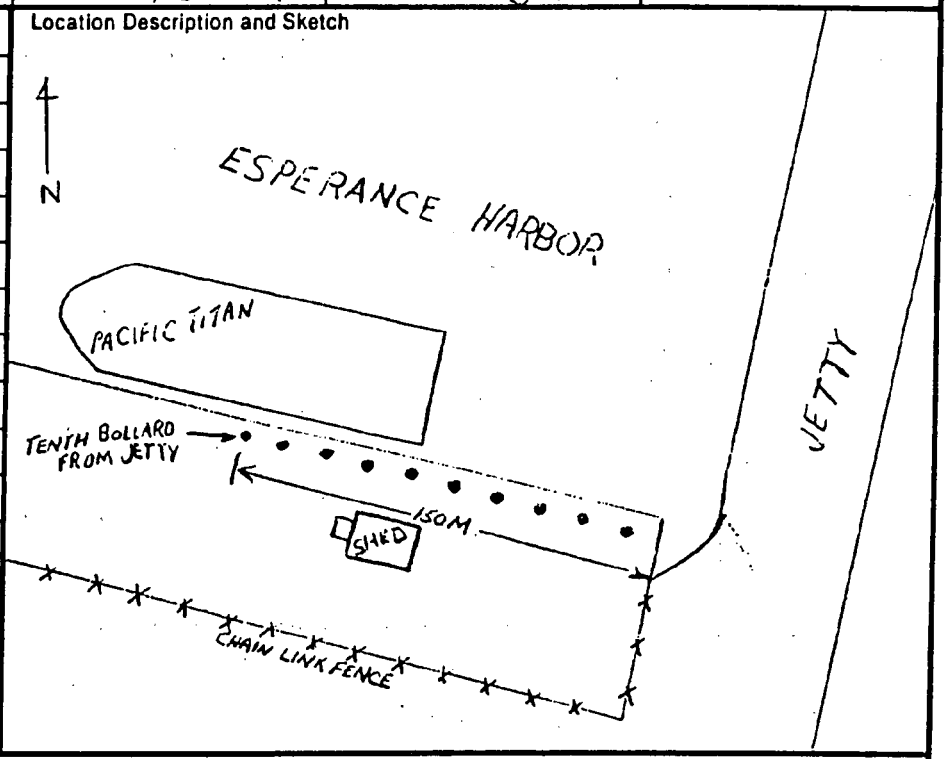
EDCON

DAY: 261

Gravity Meter S-31	Date 18 SEPT. 90	Job No. 90012	Still Reading No. 02
Client HGS / JNOC		Vessel M/V PACIFIC TITAN	
Observers STITZER / WARD		Port ESPERANCE	Country AUSTRALIA
Latitude 33° 52' 15.84" S.	Longitude 121° 53' 59.64" E.		Lat./Lon. Source 24HR. SAT/NAV
Gravity (Auto Reader) 8011.8		Spring Tension 8012.2	
Dock to Water 3.1 M.	Water Depth 13.3 M.	Meter Pressure 25.45	Time (GMT)

In-Port Checks	
ST Counter Sync	OK
ST = g w/TC Off	OK
Stripchart Cal.	OK
CC Zeros	OK
Lamp Voltage	4.6
Beam Zero & Gain	OK
K-Check	OK
Auto Reader Response	OK
g = ST + TC	OK
Meter Levels	OK
Stable Platform	OK
Thermostating Cycles	X: 4/2 L: 4/2 M: 6/18
Input Voltage & Freq.	109 VAC 60 HZ
Power Supply Voltages	+15.662 -15,650; 111 VAC
Shock Oil Level	OK

Location Description and Sketch



Remarks

Gravity Base Tie	Base Location	Base Gravity Value and Datum
Land Meter Type and Serial No.	Land Meter Calibration Factor	S-Meter Calibration Factor

Station/ Location	Time	Meter Reading	Drift Corr.	Calibrated Gravity

S-Meter Base Constant Calculations

Avg. Calibrated Base Gravity _____

Avg. Calibrated Dockside Gravity _____

Δ g _____ Dockside Station Gravity 979607.4

Δ Elev. Dock to ~~Water~~ METER 4.1 x .09406 mgal/ft = 0.4 mgal

Station Gravity at S-Meter Element 979607.8

Calibrated S-Meter Gravity 8149.2

S-Meter Base Constant 971458.7

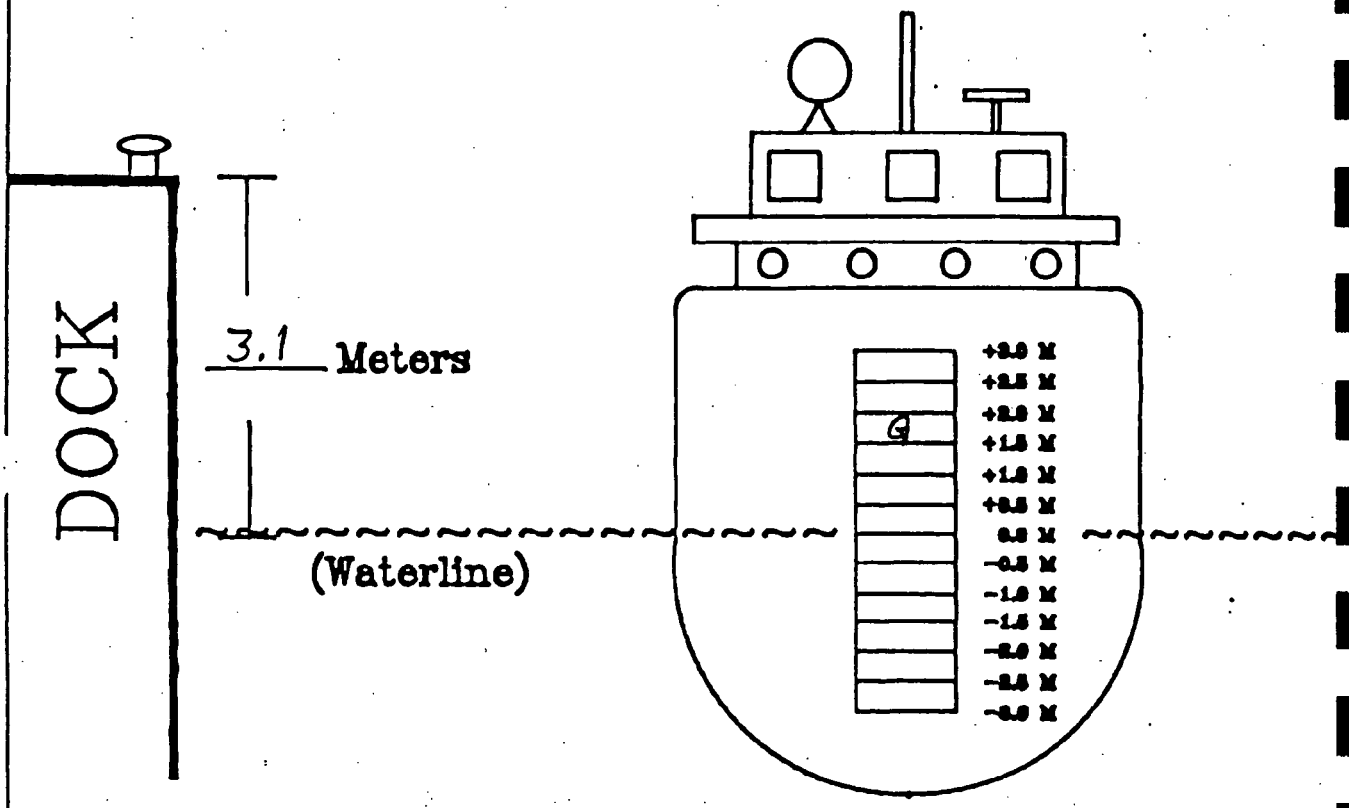
Remarks

FREE AIR CORRECTION MEASUREMENTS

Gravity Meter	Date	Job No.	Still Reading No.
S-31	18 SEPT 90	90012	02

Client	Vessel/Ship
HGS / JNOC	M/V PACIFIC TITAN

Observers	Port	Country
STITZER / WARD	ESPERANCE	AUSTRALIA



Draw a "G" on the above scale to indicate the Gravity sensor position above or below the waterline of the vessel.

Gravimeter to Dock = 1.25 Meters (above / (below))

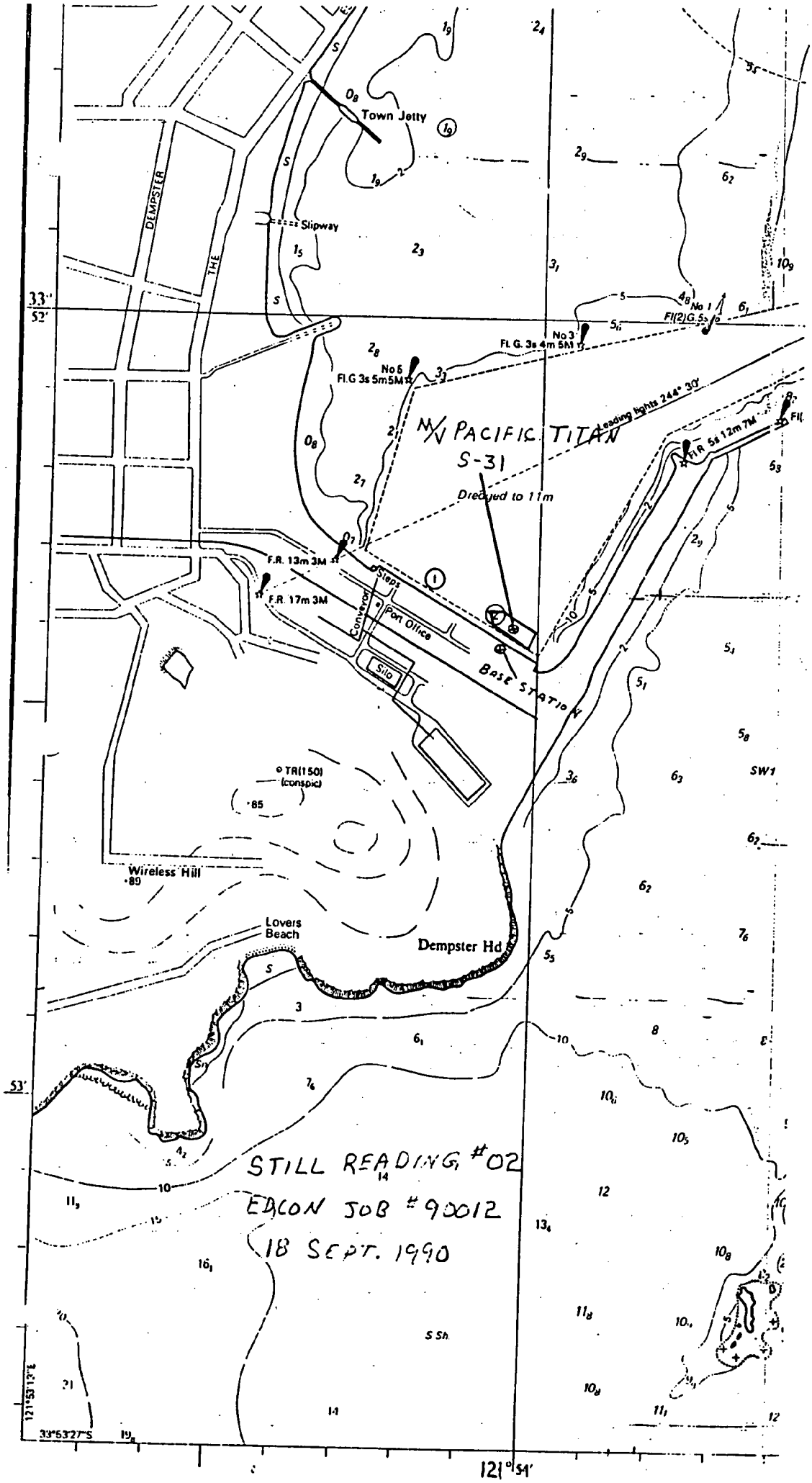
Gravimeter to Water = 1.95 Meters ((above) / below)

Dock to Water = 3.1 Meters

Water Depth = 13.3 Meters

Are the measurements the same from the beginning to the end of the readings? (Yes / (No))
If no, indicate the amount of change.

1 Meter = 3.28 Feet 0.3 M DEEPER AT END OF SR


Town Jetty
Slipway
DEMPSTER
THE
No 1
Fl(2)G.5s
No 3
Fl.G. 3s 4m 5M
No 5
Fl.G 3s 5m5M
Leading lights 244° 30'
M/V PACIFIC TITAN
S-31
Dredged to 11m
Fl.R 5s 12m 7M
F.R. 13m 3M
F.R. 17m 3M
Steps
Conveyor
Port Office
Silo
BASE STATION
TR(150)
(conspic)
Wireless Hill
Lovers
Beach
Dempster Hd
SW1
33°
52'
53'
121°51'
121°53'12"E
33°53'27"S
STILL READING #02
EDCON JOB #90012
18 SEPT. 1990

Still Reading #2, September 18, 1990 Day 261 EDCON Job 90012

Client: Halliburton Geophysical Services Inc. for Japan National Oil Corporation
Vessel: M/V Pacific Titan
Location: Esperance Bulk dock, Esperance, Western Australia, Australia
Latitude: 35° 52'15.84" S; Longitude: 121° 53'59.64" E; Heading: 278.4 NNW
(Latitude and longitude measured from SATNAV after 24 hr. period)

See accompanying diagram for location sketch.

Readings: Gravity (Auto Reader): 8011.8
Spring Tension: 8012.2
Water depth: Fathometer: 13.3 meters
Measured: 12.0 m. (port side); 14.6 m. (starboard side)

Dock to Water: 3.1 m. above water
Dock to Gravity Meter: 1.3 m. above meter element
Gravity Meter to Water: 2.0 m. above water

Base Constant Calculation:

Dockside station gravity:	979607.4
Free air correction to sensor:	+0.4
Station gravity at sensor:	979607.8
Gravity: 8011.8; Calibrated gravity:	- 8149.1
Base Constant:	**971458.7**

In Port Checks:

1. Gravity element measuring screw counter and Auto Reader Spring Tension counter are synchronized.
2. Gravity counter values equals Spring Tension counter value when Total Correction is switched off.
3. The pens on the beam stripchart recorder accurately indicate the relative values.
4. The five cross coupling channels at zero volts (+/-1 mV).
5. Gravity element optics lamp voltage is 4.6 VDC with new type optics lamps.
6. The gravity meter pressure was 25.45 inches.
7. The Beam Zero and gain required minor adjustment
8. K-check required no adjustment.
9. Auto Reader responds correctly to input
10. Gravity equals Total Correction added to Spring Tension correctly.
11. Cross channel accelerometer required minor adjustment to level cross channel spirit level. The long channel did not require adjustment.
12. The stable platform torque motor levels felt correctly set with firm resistance to external pressure without vibration.
13. Input voltage: 109 VAC Frequency:61.5 Hz Current: 6.5 Amps
14. 15 Volt power supply voltages measure: +15.662, -15.650
15. The shock absorber oil levels are ok.

In-Port Information Log
Marine Gravity Survey

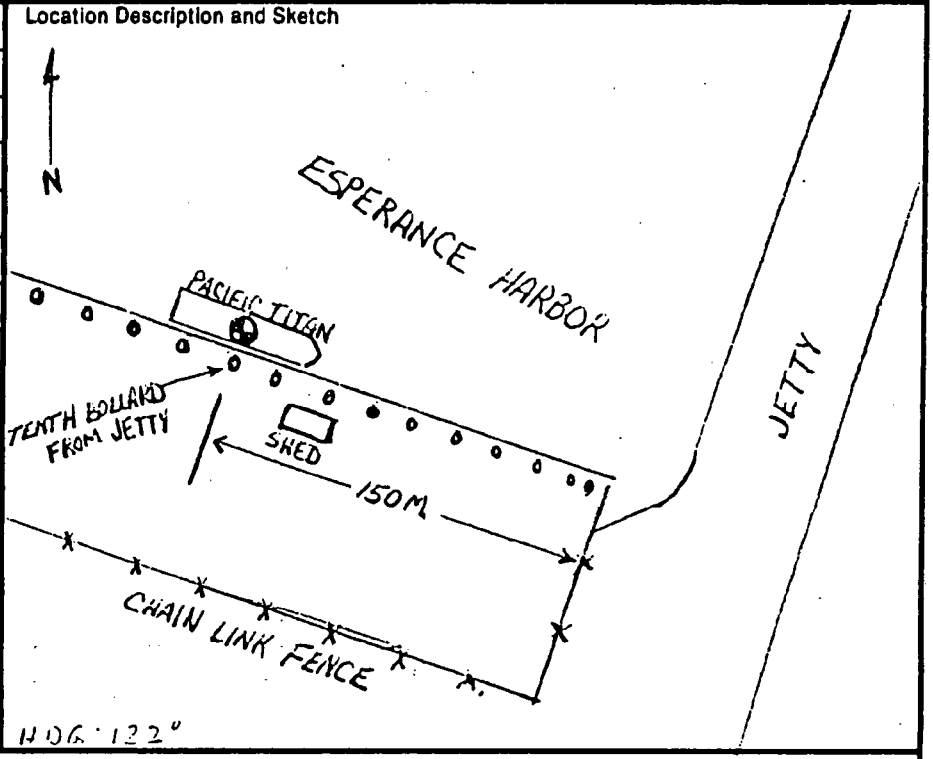
EDCON

DAY-278

Gravity Meter S-31	Date 5 OCT 90	Job No. 90012	Still Reading No. 03
Client HGS / SNOC		Vessel M/V PACIFIC TITAN	
Observers STITZER / WARD		Port ESPERANCE	Country AUSTRALIA
Latitude 33° 52' 19.80" S	Longitude 121° 54' 000" E	Lat./Lon. Source SATNAV	
Gravity (Auto Reader) 8009.8		Spring Tension 8010.1	
Dock to Water 3.5 M	Water Depth 12.8 M	Meter Pressure 25.35	Time (GMT)

In-Port Checks	
ST Counter Sync	OK
ST = g w/TC Off	ok
Stripchart Cal.	OK
CC Zeros	TC -.005
Lamp Voltage	4.6
Beam Zero & Gain	-.005, 9 + 7.600 - 8.100
K-Check	OK
Auto Reader Response	OK
g = ST + TC	OK
Meter Levels	ok
Stable Platform	ok
Thermostating Cycles	X - 4/2, L - 4/2, M - 6/18
Input Voltage & Freq.	109 VAC, 60.6 HZ
Power Supply Voltages	+15.699, - 15.733
Shock Oil Level	OK

Location Description and Sketch



Remarks: WINDY - SHIP MOVING AROUND QUITE A BIT

TCC = 0 = -.003, BOW - MOVE MOST

Gravity Base Tie	Base Location	Base Gravity Value and Datum
Land Meter Type and Serial No.	Land Meter Calibration Factor	S-Meter Calibration Factor

Station/ Location	Time	Meter Reading	Drift Corr.	Calibrated Gravity

S-Meter Base Constant Calculations

Avg. Calibrated Base Gravity _____

Avg. Calibrated Dockside Gravity _____

Δ g _____ Dockside Station Gravity 979607.4

Δ Elev. Dock to ~~Water~~ METER 4.9 × .09406 mgal/ft = +0.5 mgal

Station Gravity at S-Meter Element 979607.9

Calibrated S-Meter Gravity 8147.1

S-Meter Base Constant 971460.8

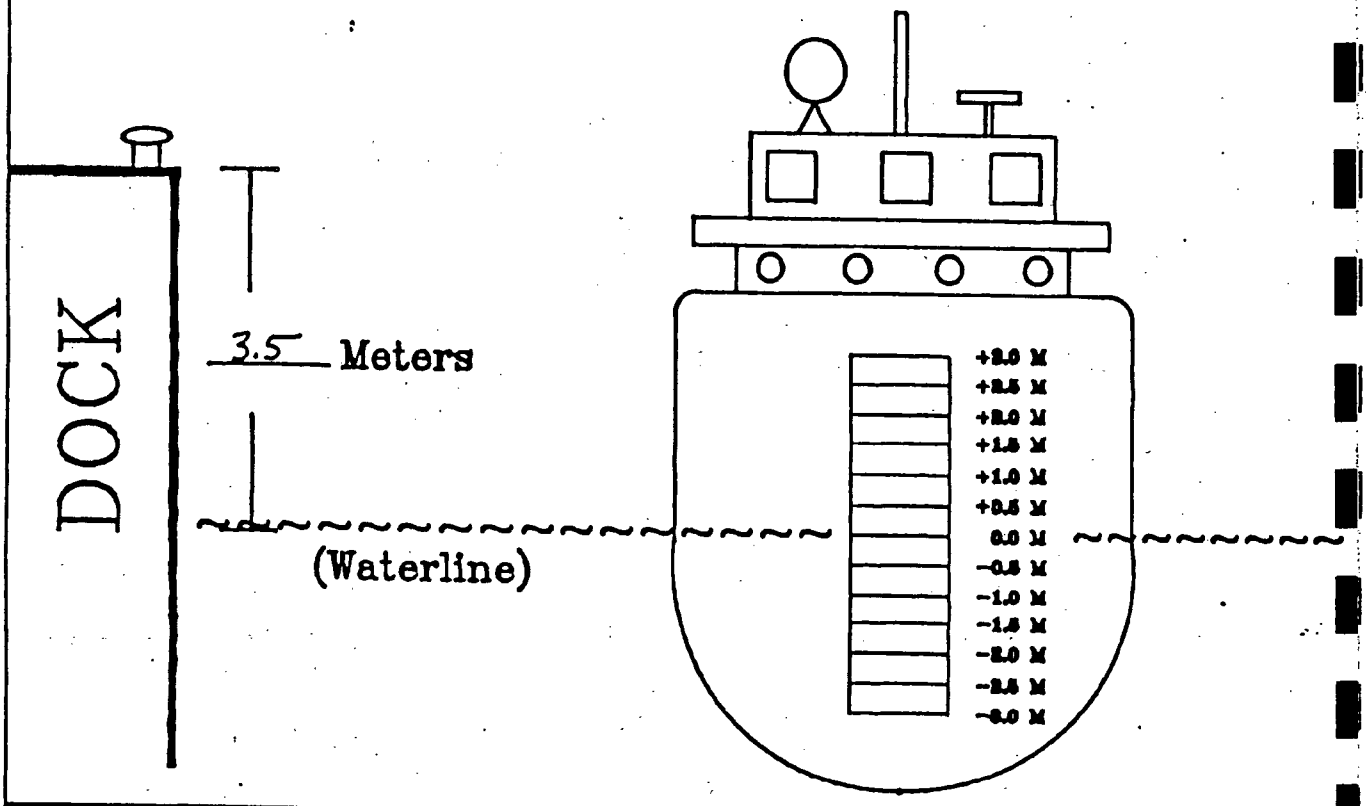
Remarks

FREE AIR CORRECTION MEASUREMENTS

Gravity Meter	Date	Job No.	Still Reading No.
S-31	5 OCT 1990	90012	03

Client	Vessel/Ship
HGS / JNOC	M/V PACIFIC TITAN

Observers	Port	Country
STITZER / WARD	ESPERANCE	AUSTRALIA



Draw a "G" on the above scale to indicate the Gravity sensor position above or below the waterline of the vessel.

Gravimeter to Dock = 1.5 Meters (above / (below))

Gravimeter to Water = 2.0 Meters ((above) / below)

Dock to Water = 3.5 Meters

Water Depth = 12.8 Meters

Are the measurements the same from the beginning to the end of the readings? ((Yes) / No)
If no, indicate the amount of change.

1 Meter = 3.28 Feet

Gravity Base Station Description

EDCON

Station Designation	Job No.	Station No.
ESPERANCE, W.A., AUSTRALIA	90012	

Job. No.	Station No.	Job No.	Station No.	Job No.	Station No.

City	County	State	Country
Esperance		Western Australia	Australia

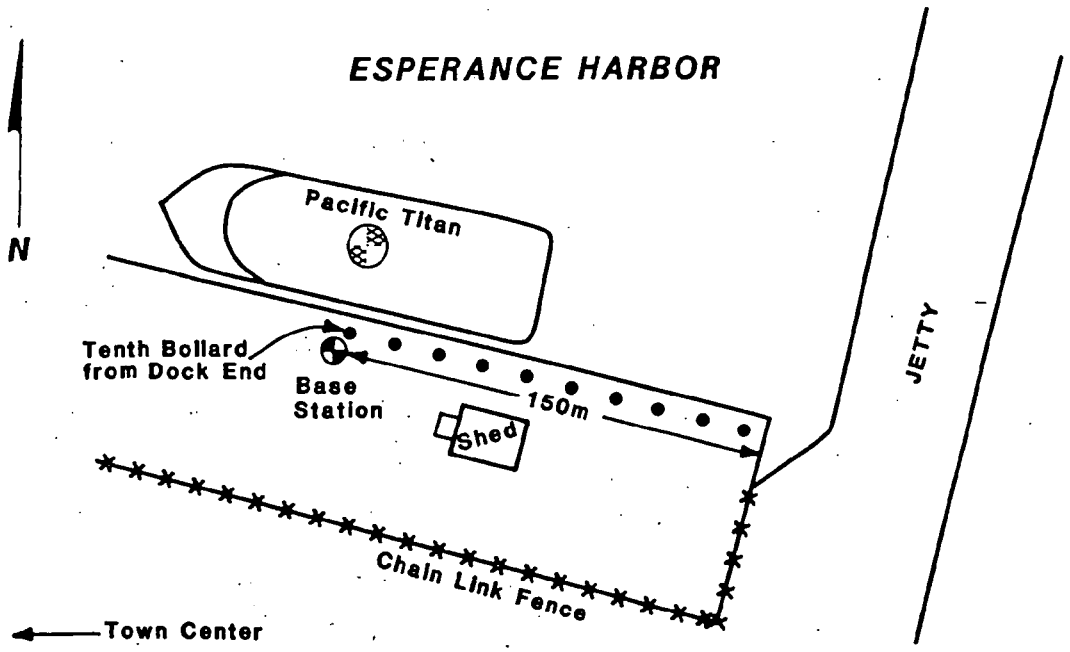
Latitude	Lat./Lon. Source
-33 ° 52 ' 15 •84 "	Nautical chart
Longitude	
121 ° 53 ' 59 •64 "	
Elevation	**Elev. Source**
3.1 m ft.	

Gravity Value (1930 Datum)	Estimated Accuracy
mgal	± mgal
Gravity Value (ISGN 71 Datum)	**Estimated Accuracy**
979 607.41 mgal	± mgal

Type of Mark

Tie to Known Station	Δ g Known–Unknown	Date	Tie to Known Station	Δ g Known–Unknown	Date
A/S Light Base	-40.9	10-07-90			

Description and Sketch
Station Location



Described By	Date	EDCON Reference No.
C.Ward/B.Stitzer	10-07-90	

Gravity Base Station Description

EDCON

Station Designation		Job No.	Station No.
ESPERANCE, W.A., AUSTRALIA		90012	
Job. No. / Station No.	Job No. / Station No.	Job No.	Station No.

City	County	State	Country
Esperance		Western Australia	Australia

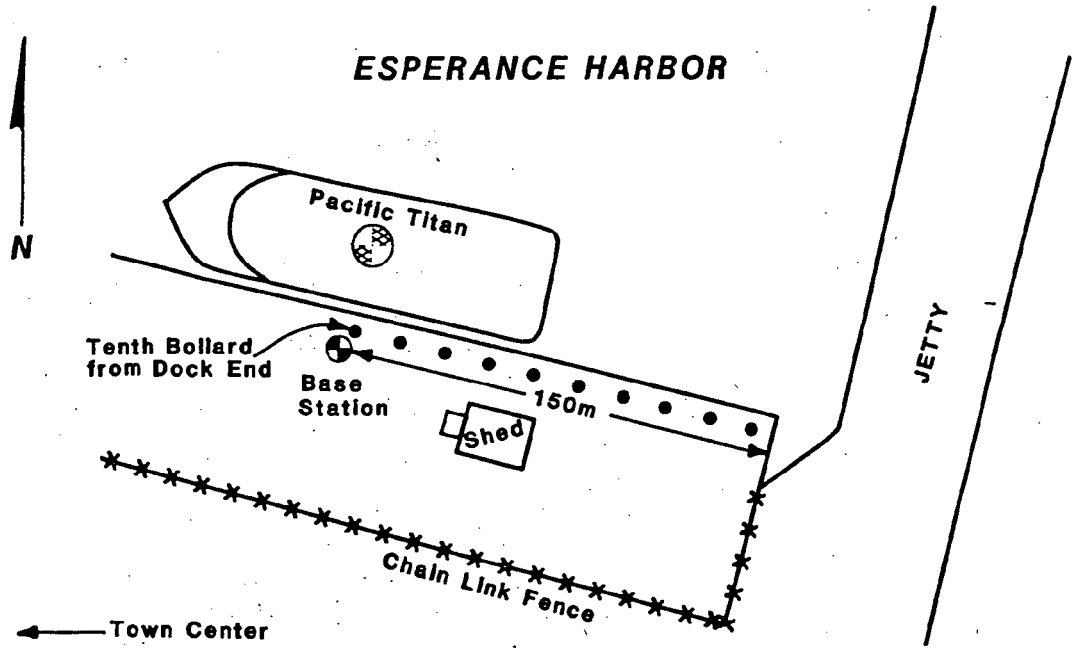
Latitude	Lat./Lon. Source
-33 ° 52 ' 15 • 84 "	Nautical chart
Longitude	
121 ° 53 ' 59 • 64 "	
Elevation	**Elev. Source**
3.1 m / ft.	

Gravity Value (1930 Datum)	Estimated Accuracy
mgal	± mgal
Gravity Value (ISGN 71 Datum)	**Estimated Accuracy**
979 607.41 mgal	± mgal

Type of Mark

Tie to Known Station	Δ g Known–Unknown	Date	Tie to Known Station	Δ g Known–Unknown	Date
A/S Light Base	-40.9	10-07-90			

Description and Sketch
Station Location



Described By	Date	EDCON Reference No.
C.Ward/B.Stitzer	10-07-90	

EDCON

Gravity Base Station Description

Station Designation		Job No.	Station No.
ESPERANCE, W.A., AUSTRALIA			
Job. No. 90012	Station No.	Job No.	Station No.
Job No.	Station No.		

City	County	State	Country
ESPERANCE		WESTERN AUSTRALIA	AUSTRAILA

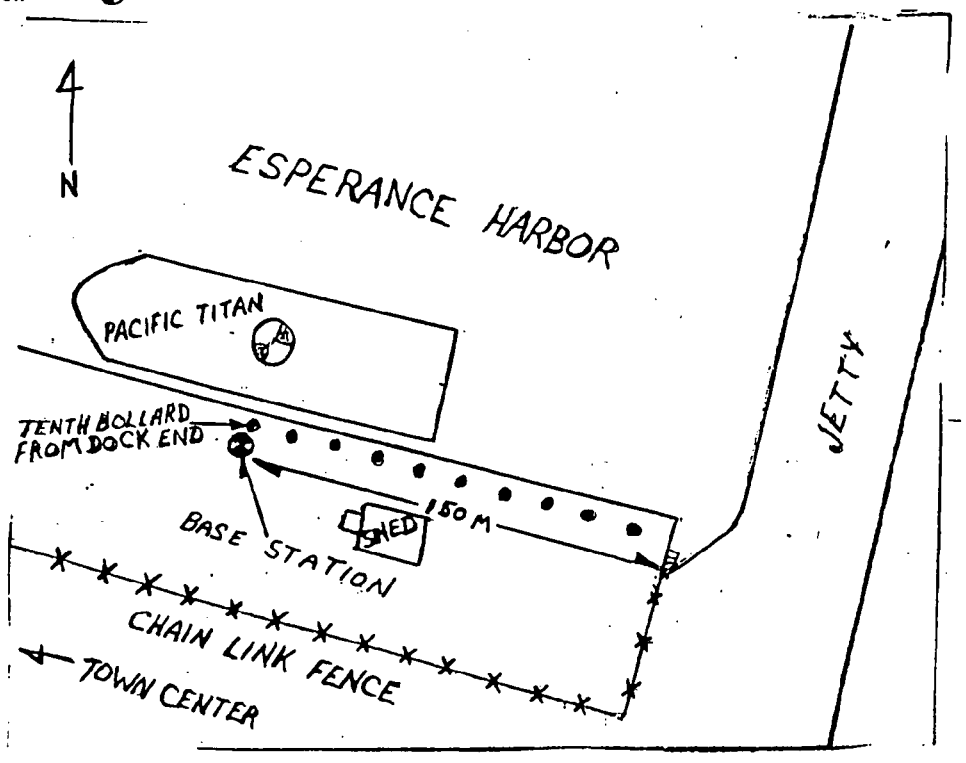
Latitude	Lat./Lon. Source
- 33 ° 52 ' 15.84 "	
Longitude	
121 ° 53 ' 59.64 "	NAUTICAL CHART
Elevation	Elev. Source
3.1 m ft.	

Gravity Value (1930 Datum)	Estimated Accuracy
mgal	± mgal
Gravity Value (ISGN 71 Datum)	Estimated Accuracy
979607.41 mgal	± mgal

Type of Mark

Tie to Known Station	Δ g Known–Unknown	Date	Tie to Known Station	Δ g Known–Unknown	Date
A/S LIGHT BASE	-40.9	7 OCT 90			

Description and Sketch
Station Location



Described By	Date	EDCON Reference No.
WARD/STITZER	7 OCT 90	

Gravity Base Station Description

EDCON

Station Designation	Job No.	Station No.
K.S. ANDERSON WHARF	90012	

Job. No.	Station No.	Job No.	Station No.	Job No.	Station No.

City	County	State	Country
Portland		Victoria	Australia

Latitude	Lat./Lon. Source
S 38 ° 21 ' 17 • 4 "	Harbor chart
Longitude	
E 141 ° 37 ' 05 • 4 "	

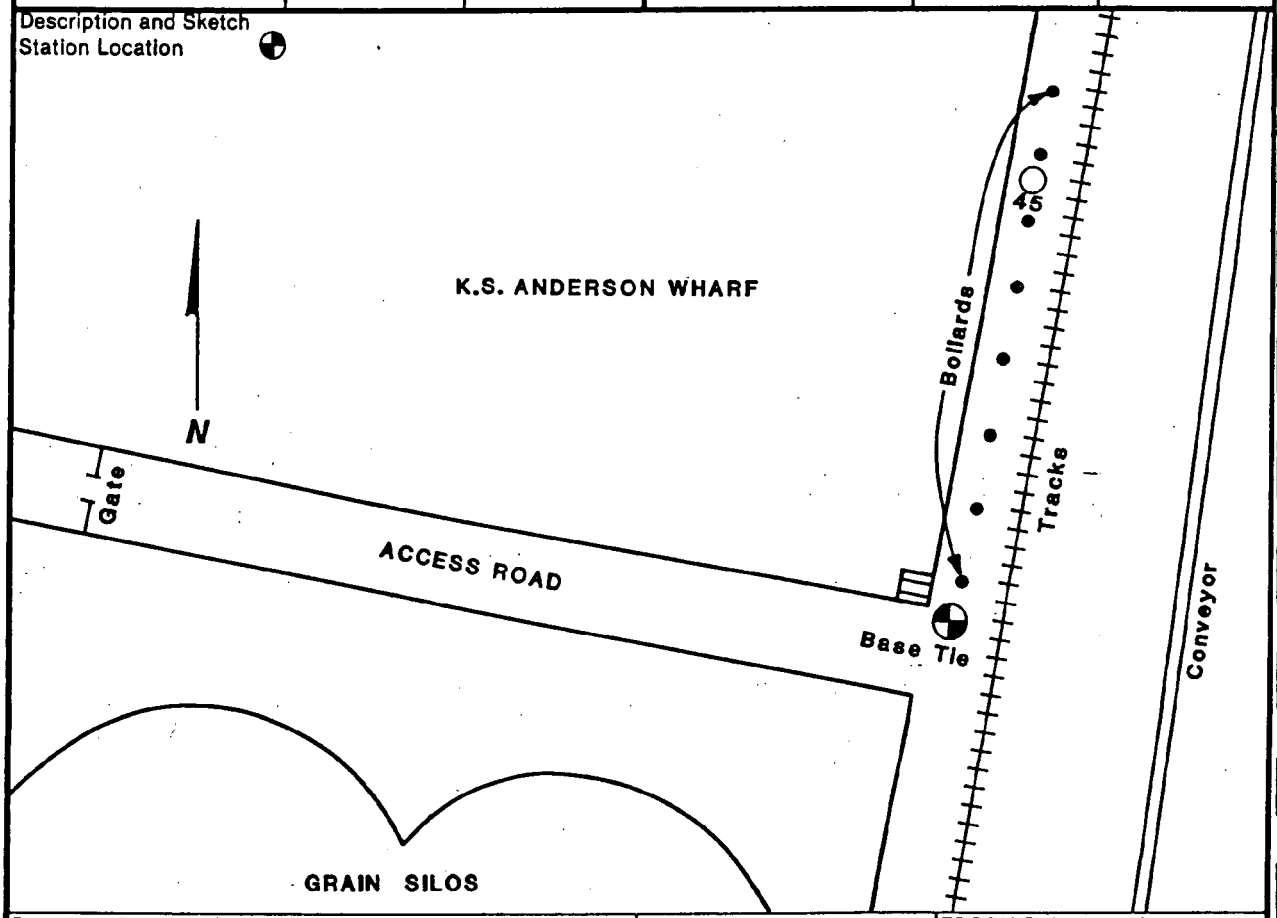
Elevation	Elev. Source
2.6 m ft.	Harbormaster records

Gravity Value (1930 Datum)	Estimated Accuracy
mgal	± mgal
Gravity Value (ISGN 71 Datum)	**Estimated Accuracy**
980 031.45 mgal	±0.05 mgal

Type of Mark
White paint standard mark: "Gravity 8-90"

Tie to Known Station	Δ g Known–Unknown	Date	Tie to Known Station	Δ g Known–Unknown	Date
Mt. Gambier Police Station	-51.55	08-19-90			

Description and Sketch
Station Location



Described By	Date	EDCON Reference No.
B. Stitzer/C. Ward	08-19-90	

Exploration Data Consultants, Inc., Denver, Colorado

EDCON

Gravity Base Station Description

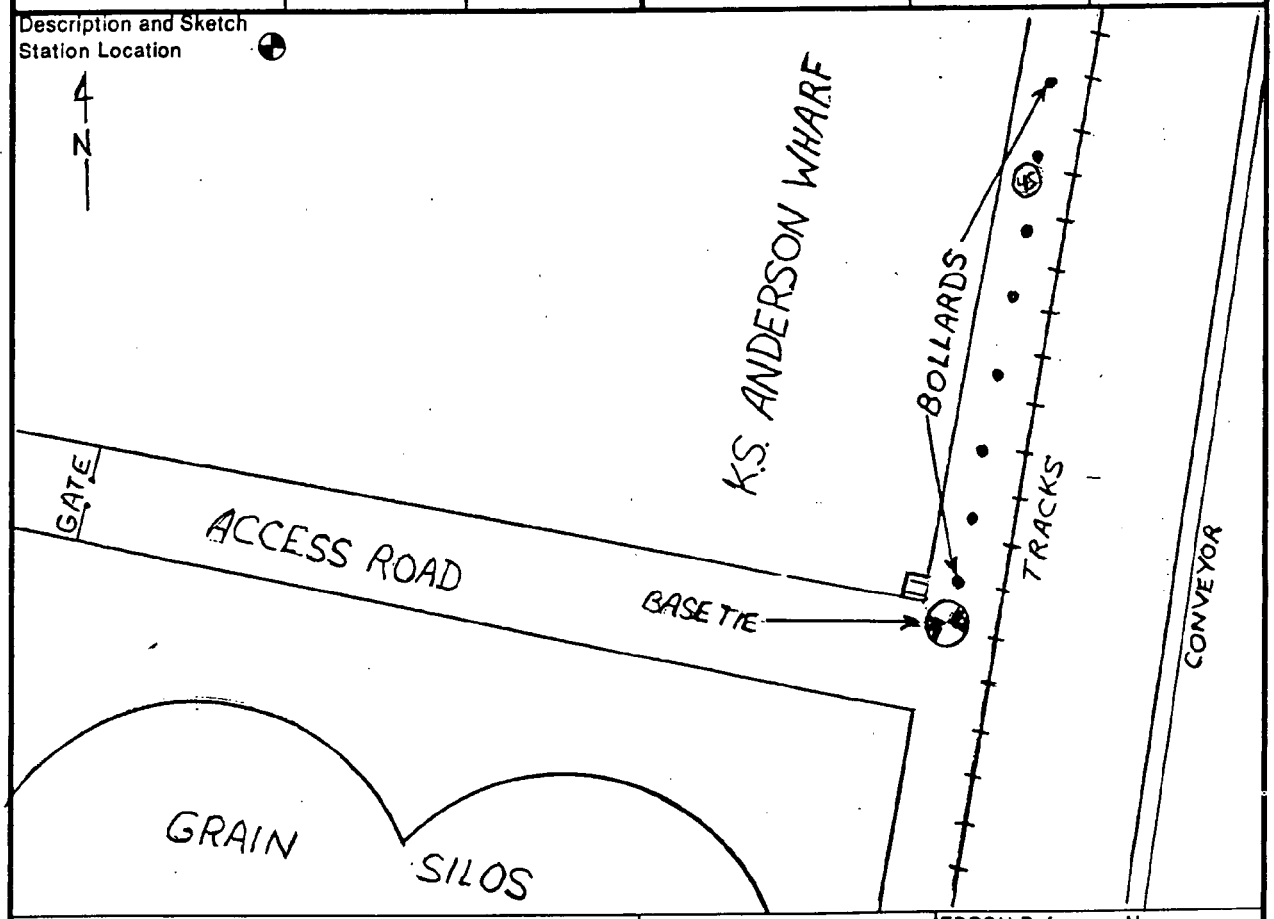
Station Designation K.S. ANDERSON WHARF		Job No.	Station No.
Job. No. 90012	Station No.	Job No.	Station No.
Job No.	Station No.		

City PORTLAND	County	State VICTORIA	Country AUSTRALIA
Latitude S. 38 ° 21 ' 17·4 "		Lat./Lon. Source HARBOR CHART	
Longitude E. 141 ° 37 ' 05·4 "			
Elevation 2.6 (m) ft.		Elev. Source HARBORMASTER RECORDS	
Gravity Value (1930 Datum) mgal		Estimated Accuracy ± mgal	
Gravity Value (ISGN 71 Datum) 980031.45 mgal		Estimated Accuracy ± 0.05 mgal	

Type of Mark: WHITE PAINT STANDARD MARK : "GRAVITY 8-90"

Tie to Known Station	Δ g Known–Unknown	Date	Tie to Known Station	Δ g Known–Unknown	Date
MT. GAMBIER POLICE STATION	-51.55	19 AUG. 90			

Description and Station Location



Described By	Date	EDCON Reference No.
B. STITZER / C. WARD	19 AUG. 90	

Exploration Data Consultants, Inc., Denver, Colorado

EDCON

Gravity Base Station Description

Station Designation	Job No.	Station No.
BULK BERTH	90012	

Job. No.	Station No.	Job No.	Station No.	Job No.	Station No.

City	County	State	Country
Portland		Victoria	Australia

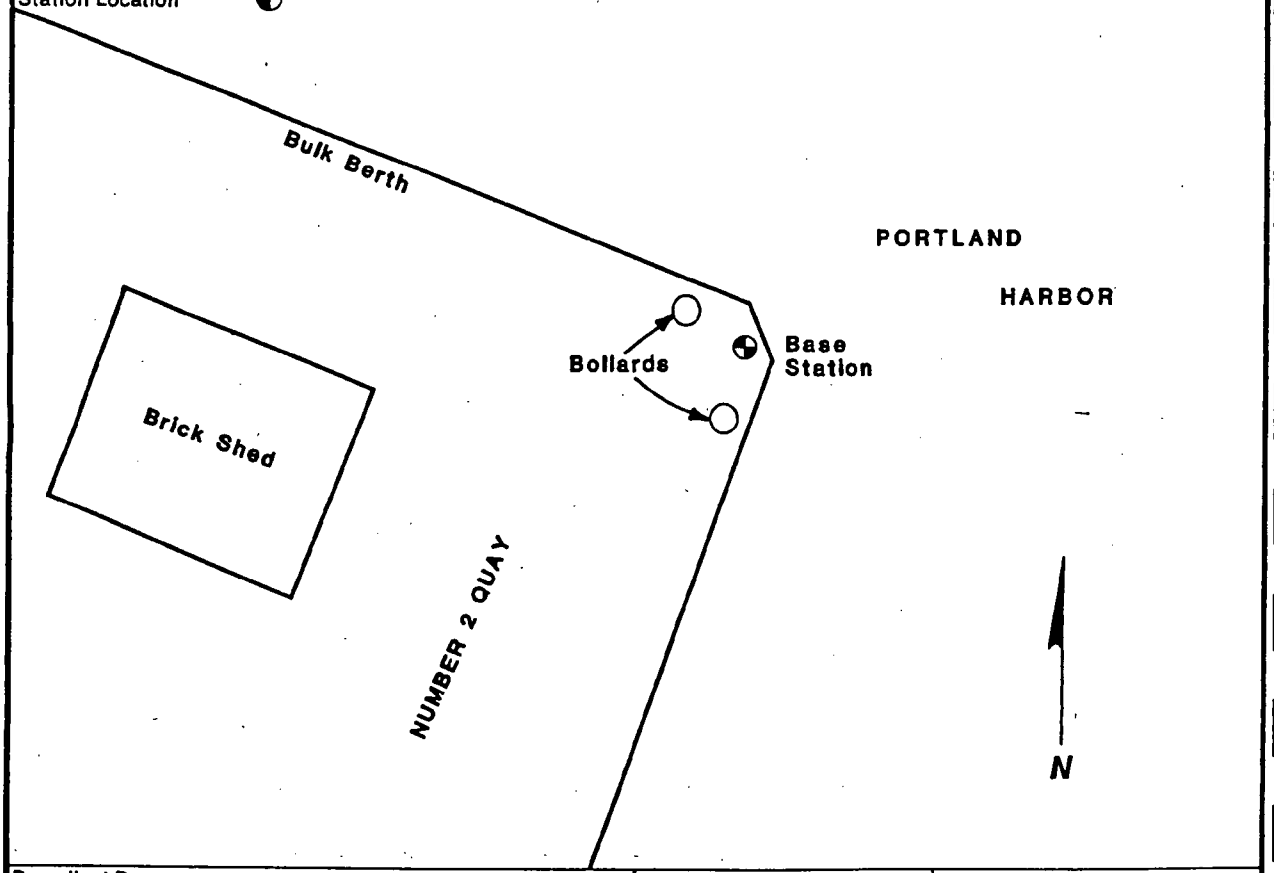
Latitude	Lat./Lon. Source
38 ° 21 ' 04 • 2 " S	Harbor chart
Longitude	
141 ° 37 ' 04 • 8 " E	
Elevation	**Elev. Source**
2.6 m ft.	Harbormaster records

Gravity Value (1930 Datum)	Estimated Accuracy
mgal	± mgal
Gravity Value (ISGN 71 Datum)	**Estimated Accuracy**
980 030.45 mgal	± 0.05 mgal

Type of Mark
Standard painted mark: "Gray 8-90"

Tie to Known Station	Δ g Known–Unknown	Date	Tie to Known Station	Δ g Known–Unknown	Date
Mt. Gambier Police Station	-50.55	08-19-90			

Description and Sketch Station Location



Described By	Date	EDCON Reference No.
C.Ward/B.Stitzer	08-19-90	

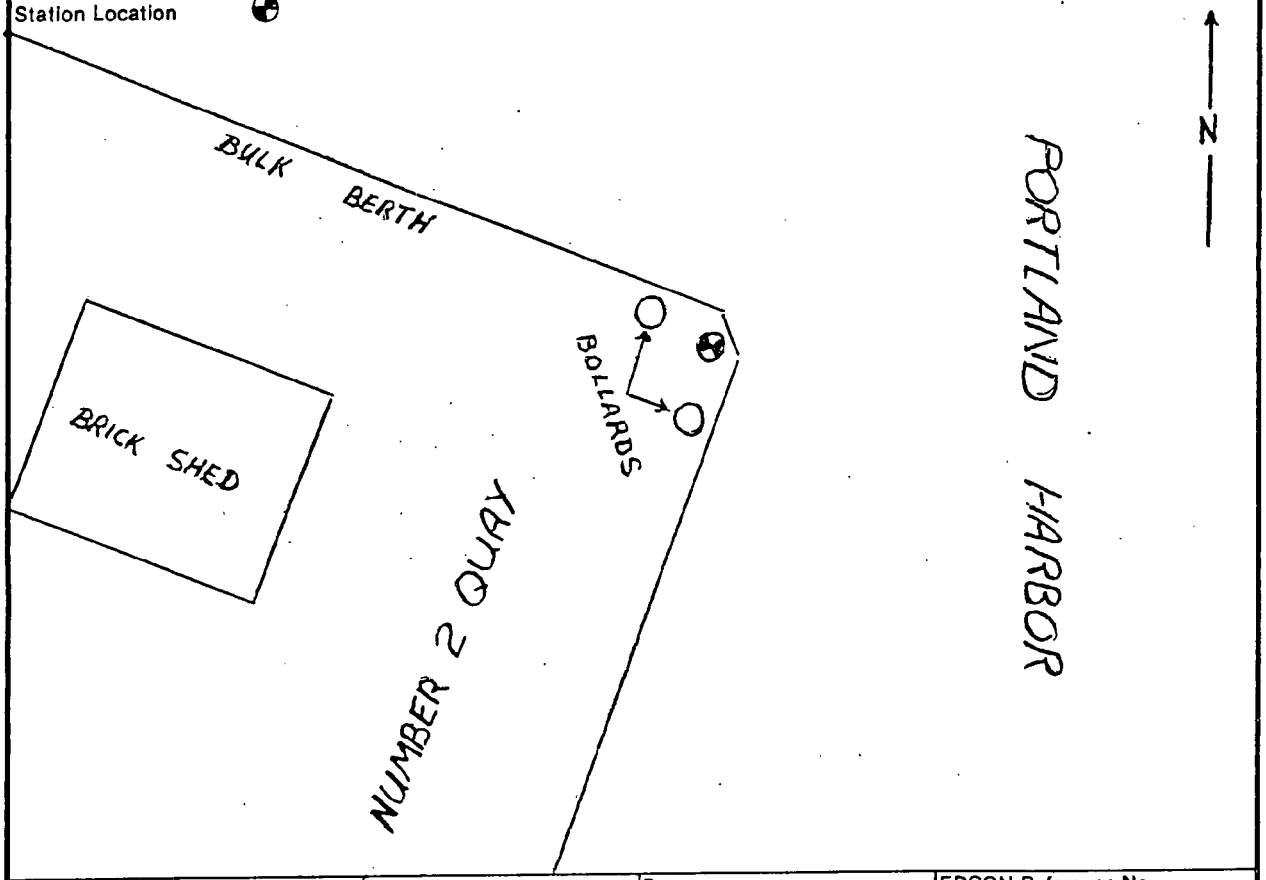
Gravity Base Station Description

EDCON

Station Designation BULK BERTH		Job No.	Station No.
Job. No. 90012	Station No.	Job No.	Station No.
Job No.	Station No.	Job No.	Station No.
City PORTLAND	County	State VICTORIA	Country AUSTRALIA
Latitude 38 ° 21 ' 04·2 " S.		Lat./Lon. Source HARBOR CHART	
Longitude 141 ° 37 ' 04·8 " E.			
Elevation 2.6 (m) ft.		Elev. Source HARBORMASTER RECORDS	
Gravity Value (1930 Datum) mgal		Estimated Accuracy ± mgal	
Gravity Value (ISGN 71 Datum) 980030.45 mgal		Estimated Accuracy ± 0.05 mgal	
Type of Mark STANDARD PAINTED MARK: "GRAV 8-90"			

Tie to Known Station	Δg Known–Unknown	Date	Tie to Known Station	Δg Known–Unknown	Date
MT. GAMBIER POLICE STATION	-50.55	19 AUG. 90			

Description and Sketch Station Location



Described By	Date	EDCON Reference No.
C. WARD / B. STITZER	8-19-90	

Exploration Data Consultants, Inc., Denver, Colorado

EDCON

Gravity Base Station Description

Station Designation		Job No.	Station No.
TANKER BERTH		90012	
Job. No. / Station No.	Job No. / Station No.	Job No.	Station No.

City	County	State	Country
Portland		Victoria	Australia

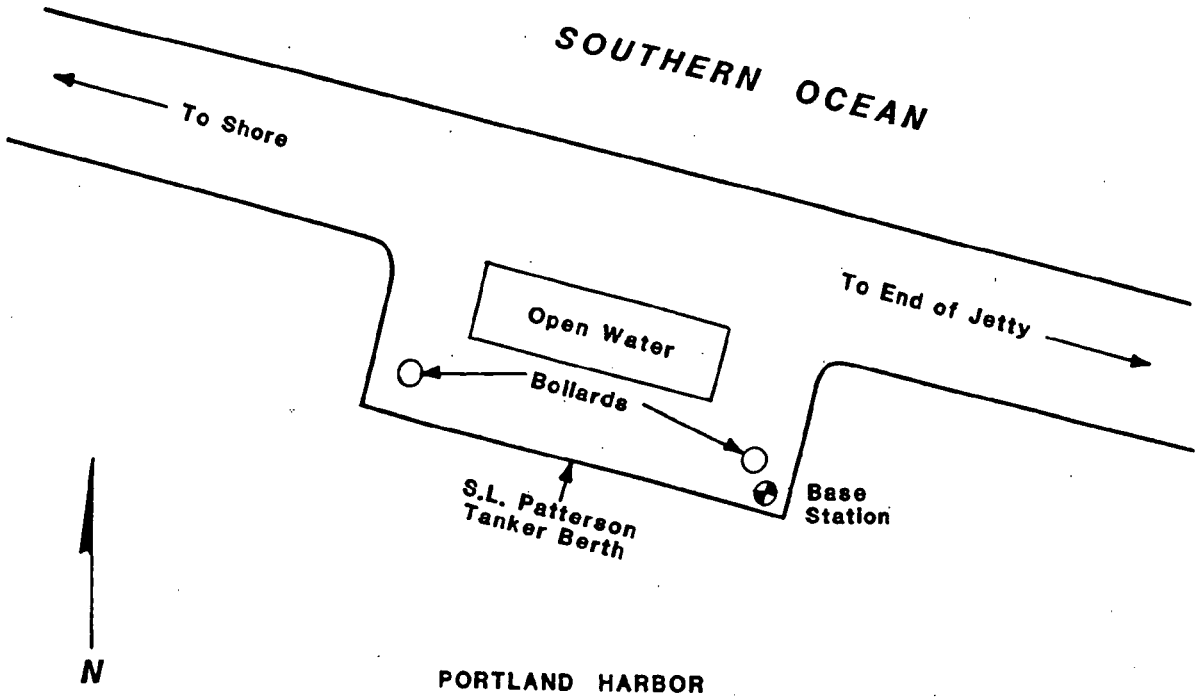
Latitude	Lat./Lon. Source
38 ° 20 ' 45 •6 " S	Harbor chart
Longitude: 141 ° 36 ' 50 •4 " E	
Elevation: 2.6 m / ft.	Elev. Source: Harbormaster records

Gravity Value (1930 Datum)	Estimated Accuracy
mgal	± mgal
Gravity Value (ISGN 71 Datum): 980 029.75 mgal	Estimated Accuracy: ± 0.05 mgal

Type of Mark: Standard painted mark: "Grav 8-90"

Tie to Known Station	Δ g Known–Unknown	Date	Tie to Known Station	Δ g Known–Unknown	Date
Mt. Gambier Police Station	-49.85	08-19-90			

Description and Sketch Station Location



Described By	Date	EDCON Reference No.
C.Ward/B.Stitzer	08-19-90	

EDCON

Gravity Base Station Description

Station Designation		Job No.	Station No.
TANKER BERTH			

Job. No.	Station No.	Job No.	Station No.	Job No.	Station No.
90012					

City	County	State	Country
PORTLAND		VICTORIA	AUSTRALIA

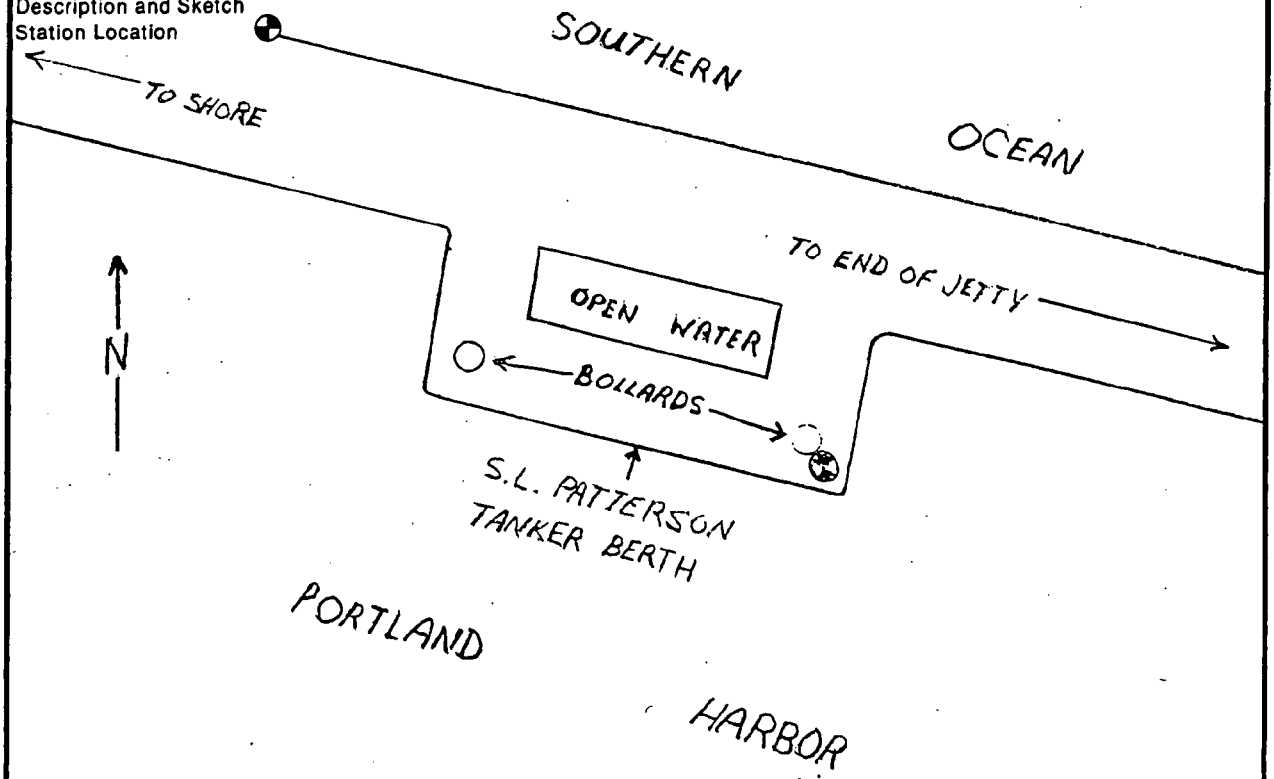
Latitude	Lat./Lon. Source
38 ° 20 ' 45·6 " S	HARBOR CHART
Longitude	
141 ° 36 ' 50·4 " E	
Elevation	**Elev. Source**
2.6 (m) ft.	HARBORMASTER RECORDS

Gravity Value (1930 Datum)	Estimated Accuracy
mgal	± mgal
Gravity Value (ISGN 71 Datum)	**Estimated Accuracy**
980029.75 mgal	± 0.05 mgal

Type of Mark: STANDARD PAINTED MARK: "GRAV. 8·90"

Tie to Known Station	Δ g Known–Unknown	Date	Tie to Known Station	Δ g Known–Unknown	Date
MT. GAMBIER POLICE STATION	-49.85	19 AUG. 90			

Description and Sketch Station Location



Described By	Date	EDCON Reference No.
C. WARD/B. STITZER	8-19-90	

EDCON

PROJECT HGS / JNOC DATE 6-7 OCT 90 SHEET

GRAVITY METER G-617 SCALE FACTOR MAP

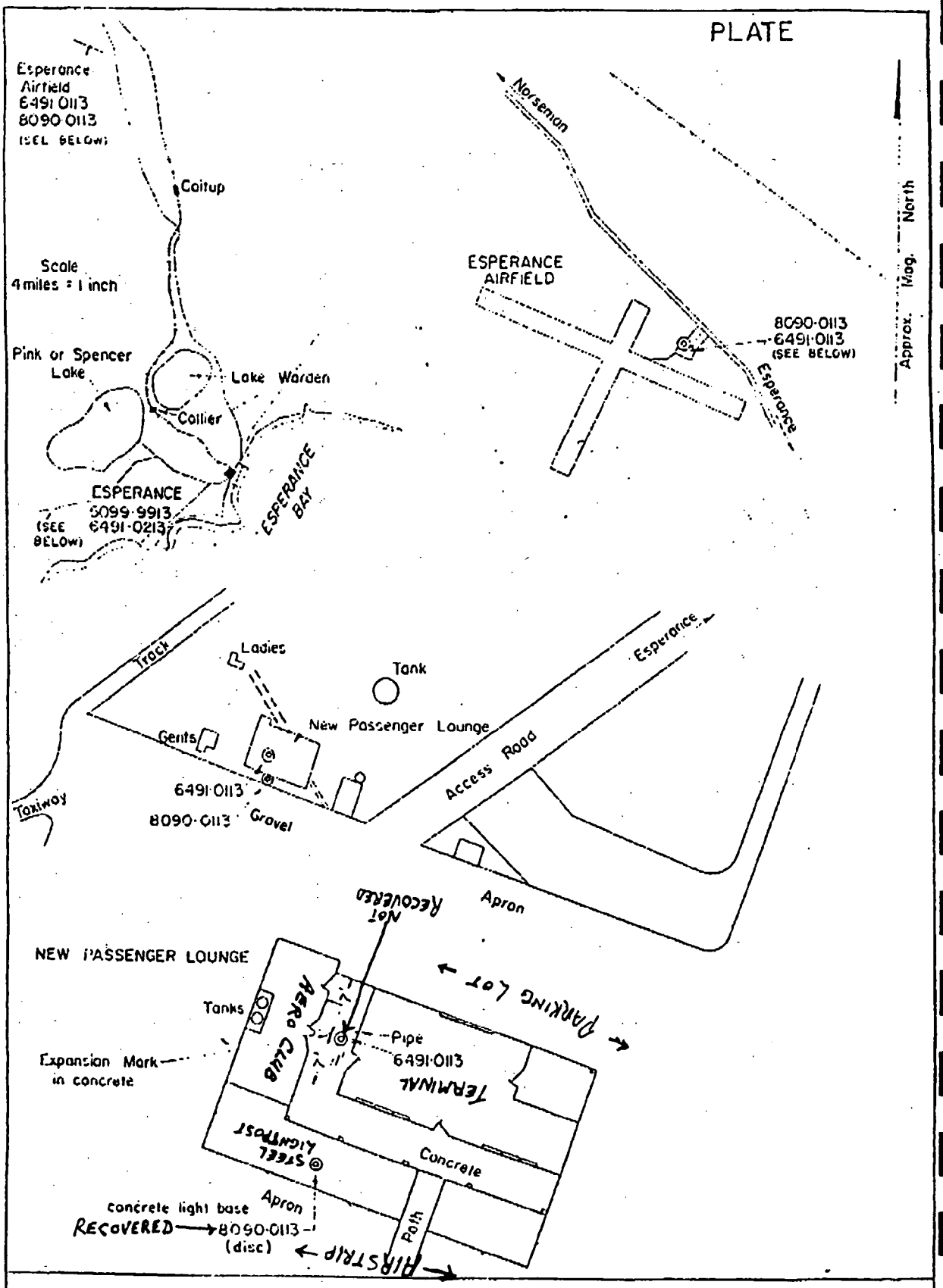
ELEVATION FACTOR NORTHING FACTOR OPERATOR

ESPERANCE, WESTERN AUSTRALIA, AUSTRALIA

6/OCT STA. NO.	LOCAL TIME	METER READING	STATION GRAVITY	ELEVATION METERS	ELEVATION FEET	LAT. BASE NORTHING	NORTHING EASTING	BOUGUER G.	WEATHER & REMARKS
BASE	18:18	3091.47							READING UNSTEADY VERY WINDY
DOCK	19:00	3131.68							
BASE	19:26	3091.48							
7/OCT									
BASE	6:20	3091.79							READING STEADY
DOCK	6:44	3131.96							
BASE	7:07	3091.75							
DOCK	7:33	3131.95							
BASE	8:02	3091.73							

BMR station number	Latitude S (°) (')	Longitude E (°) (')	Altitude (m)	Gravity value Isogal65 (mGal)	Isogal84 ($\mu m\ s^{-2}$)	Location (for abbreviations see end)
EDMUND 42136						
J 6792.9208	23 46.1	116 5.8	336.28	978788.71	9787745.2	A/S WINDSOCK
K 6792.1208	23 46.0	116 5.7	336.28	978788.51	9787743.3	A/S STRIP
L 6792.2208	23 45.7	116 5.9	337.70	978788.38	9787742.0	A/S BM ZN-67
M 5105.3320	23 45.7	116 6.8	335.76	978787.96	9787737.7	GATE
ELCHO ISLAND 38325						
J 6491.9076	12 1.2	135 34.2	29.	978330.48	9783161.1	A/S
EMU 41982						
J 6792.9201	28 37.6	132 12.0	257.29	979167.33	9791533.9	A/S WINDSOCK
K 6792.1201	28 38.2	132 12.2	263.09	979167.91	9791539.7	BM 2980
L 6792.2201	28 38.2	132 11.6	273.67	979164.90	9791509.6	HUT
ESPERANCE 45631						
A 5099.9913	33 51.0	121 54.1	2.83	979621.06	9796071.5	DRY CLEANERS
J 6491.0113	33 41.0	121 50.1	142.84	979580.38	9795665.0	A/S TERMINAL
K 6491.0213	33 51.7	121 53.6	2.75	979621.93	9796080.1	AGRIC. DEPT.
L 8090.0113	33 41.0	121 50.1	143.	979580.37	9795664.9	A/S LIGHT BASE
EUCLA 45618						
A 5099.9911	31 43.1	128 53.5	5.	979439.54	c9794256.0	OLD TELEGRAPH
J 6491.0111	31 42.4	128 53.0	4.03	979439.40	9794254.6	A/S TROUGH
K 6491.0211	31 42.8	128 53.1	3.76	979439.62	9794256.7	ROAD JN Y88A
L 6491.0311	31 42.8	128 53.1	3.76	979439.60	9794256.7	ROAD JN Y88B
M 6491.0411	31 42.8	128 53.1	3.76	979439.60	9794256.7	ROAD JN Y88C
FITZROY CROSSING 38485						
J 6491.9060	18 11.0	125 33.7	115.43	978518.45	9785040.4	A/S TERMINAL
K 5308.9036	18 10.7	125 35.8	109.27	978521.07	9785066.6	BM T-36
FLINDERS ISLAND 49007						
J 6491.1140	40 5.7	148 0.2	30.16	980204.61	9801911.3	DCA GARAGE
K 7390.1140	40 5.6	148 0.4	31.	980204.25	9801907.9	A/S APRON
L 6491.9140	40 5.7	148 0.3	30.92	980204.49	9801910.3	A/S TERMINAL
FORREST 45608						
A 5099.9912	30 50.8	128 6.8	155.80	979306.25	9792922.2	A/S HANGAR
J 6491.0112	30 50.8	128 6.8	155.80	979306.28	9792922.6	A/S
GASCOYNE JUNCTION 42155						
J 6491.9092	25 4.1	115 8.9	139.66	978925.03	9789108.0	A/S WINDSOCK
GEORGETOWN 38283						
J 6491.9049	18 18.1	143 31.8	314.	978493.34	9784789.1	A/S GATE
K 6612.4230	18 17.5	143 32.6	294.04	978494.73	9784803.0	COURT BM EI-57

PLATE



▲ Primary base
△ Secondary base
◎ Excentre

ESPERANCE WA

Sheet 1 of 2

151/82-17-1

GRAVITY STATIONS
AUSTRALIAN NATIONAL GRAVITY NETWORK

NOV 1990

TABLE 1

MILLIGAL VALUES FOR LACOSTE & ROMBERG, INC. MODEL G GRAVITY METER #G- 617

COUNTER READING*	VALUE IN MILLIGALS	FACTOR FOR INTERVAL	COUNTER READING*	VALUE IN MILLIGALS	FACTOR FOR INTERVAL
000	000.00	1.01614			
100	101.61	1.01600	3600	3660.44	1.01864
200	203.21	1.01591	3700	3762.30	1.01875
300	304.81	1.01586	3800	3864.18	1.01886
400	406.39	1.01584	3900	3966.06	1.01896
500	507.98	1.01584	4000	4067.96	1.01906
600	609.56	1.01586	4100	4169.87	1.01911
700	711.14	1.01588	4200	4271.78	1.01921
800	812.73	1.01592	4300	4373.70	1.01928
900	914.32	1.01598	4400	4475.63	1.01936
1000	1015.92	1.01604	4500	4577.56	1.01942
1100	1117.53	1.01610	4600	4679.50	1.01948
1200	1219.14	1.01617	4700	4781.45	1.01953
1300	1320.75	1.01624	4800	4883.41	1.01957
1400	1422.38	1.01632	4900	4985.36	1.01961
1500	1524.01	1.01638	5000	5087.32	1.01961
1600	1625.65	1.01646	5100	5189.28	1.01961
1700	1727.29	1.01654	5200	5291.25	1.01961
1800	1828.95	1.01661	5300	5393.21	1.01960
1900	1930.61	1.01669	5400	5495.17	1.01958
2000	2032.28	1.01678	5500	5597.12	1.01956
2100	2133.95	1.01686	5600	5699.08	1.01953
2200	2235.64	1.01696	5700	5801.03	1.01948
2300	2337.34	1.01706	5800	5902.98	1.01944
2400	2439.04	1.01717	5900	6004.93	1.01938
2500	2540.76	1.01729	6000	6106.86	1.01928
2600	2642.49	1.01740	6100	6208.79	1.01917
2700	2744.23	1.01751	6200	6310.71	1.01902
2800	2845.98	1.01765	6300	6412.61	1.01886
2900	2947.74	1.01775	6400	6514.50	1.01869
3000	3049.52	1.01789	6500	6616.37	1.01849
3100	3151.31	1.01801	6600	6718.21	1.01827
3200	3253.11	1.01814	6700	6820.04	1.01806
3300	3354.92	1.01827	6800	6921.85	1.01784
3400	3456.75	1.01837	6900	7023.63	1.01761
3500	3558.59	1.01852	7000	7125.39	

* Note: Right-hand wheel on counter indicates approximately 0.1 milligal.

8-19-81
RP

TABLE 1

MILLIGAL VALUES FOR LACOSTE & ROMBERG, INC. MODEL G GRAVITY METER #G- 586

COUNTER READING*	VALUE IN MILLIGALS	FACTOR FOR INTERVAL	COUNTER READING*	VALUE IN MILLIGALS	FACTOR FOR INTERVAL
000	000.00	1.02727	3600	3697.90	1.02806
100	102.73	1.02711	3700	3800.70	1.02810
200	205.44	1.02696	3800	3903.51	1.02813
300	308.13	1.02686	3900	4006.32	1.02815
400	410.82	1.02679	4000	4109.14	1.02818
500	513.50	1.02676	4100	4211.96	1.02819
600	616.18	1.02672	4200	4314.78	1.02821
700	718.85	1.02671	4300	4417.60	1.02822
800	821.52	1.02671	4400	4520.42	1.02823
900	924.19	1.02673	4500	4623.24	1.02823
1000	1026.86	1.02675	4600	4726.07	1.02820
1100	1129.54	1.02677	4700	4828.89	1.02817
1200	1232.21	1.02680	4800	4931.70	1.02812
1300	1334.89	1.02682	4900	5034.51	1.02807
1400	1437.58	1.02686	5000	5137.32	1.02802
1500	1540.26	1.02690	5100	5240.12	1.02796
1600	1642.95	1.02694	5200	5342.92	1.02790
1700	1745.65	1.02699	5300	5445.71	1.02783
1800	1848.35	1.02703	5400	5548.49	1.02774
1900	1951.05	1.02708	5500	5651.27	1.02763
2000	2053.76	1.02713	5600	5754.03	1.02751
2100	2156.47	1.02720	5700	5856.78	1.02738
2200	2259.19	1.02724	5800	5959.52	1.02722
2300	2361.91	1.02731	5900	6062.24	1.02704
2400	2464.64	1.02736	6000	6164.94	1.02684
2500	2567.38	1.02741	6100	6267.63	1.02661
2600	2670.12	1.02748	6200	6370.29	1.02637
2700	2772.87	1.02755	6300	6472.93	1.02612
2800	2875.62	1.02763	6400	6575.54	1.02585
2900	2978.39	1.02770	6500	6678.12	1.02557
3000	3081.16	1.02775	6600	6780.68	1.02529
3100	3183.93	1.02781	6700	6883.21	1.02501
3200	3286.71	1.02788	6800	6985.71	1.02471
3300	3389.50	1.02793	6900	7088.18	1.02442
3400	3492.29	1.02798	7000	7190.62	
3500	3595.09	1.02803			

* Note: Right-hand wheel on counter indicates approximately 0.1 milligal.

10-27-80
TN-

APPENDIX D

EDCON Daily Marine Operations Logs

DAILY MARINE OPERATIONS REPORT

EDCON JOB NO. 90012

HALLIBURTON GEOPHYSICAL SERVICE
(HGS)

M/V PACIFIC TITAN

JAPAN NATIONAL OIL CORPORATION
(JNOC)

August 09 - October 10 1990

Thursday 9 August 1990 Day 221

1735 Blake Stitzer and Cliff Ward (EDCON) departs Denver, Colorado for Portland, Australia

Saturday 11 August 1990 Day 223

1200 Stitzer and Ward Arrive Portland, Australia. Met by Mr. Bruce Tuck (HGS), check into Richmond Henty Hotel Motel. Informed that the vessel is expected to arrive in port 14 August, the EDCON spares shipment and (GEOTERREX) G-meter are expected to arrive 13 August.

Sunday 12 August 1990 Day 224

0800 Contact Mr. Tuck to discuss possible gravity base station locations. Standing by for vessel.

Monday 13 August 1990 Day 225

0700 Scout possible gravity base tie locations.

1200 Informed by Mr. Tuck that EDCON spares shipment has arrived and G-meter will arrive 15 August from GEOTERRREX, Sydney.

2000 Meet Mr. Chris King (HGS) from Perth. Informed vessel is expected to arrive late afternoon 14 August. Mr. King delivers gravity base station locations for Portland area. Send FAX to EDCON stating current status.Standing by.

Tuesday 14 August 1990 Day 226

0800 Discuss plans for conducting gravity base tie to Mt. Gambier base station and Portland dock locations.

1800 Vessel M/V Pacific Titan arrives Fuel dock Portland.

1830 Stitzer and Ward arrive onboard vessel. Gravity meter inspected and element was found cold. Auxiliary heater indicator lamp was on but not oscillating, removed top of element and internal parts were cold to the touch. Disconnected auxiliary heater from element.
NOTE: A note attached to system indicated that during standby period the torque motors were removed and reinstalled by HGS personnel. Personnel were asked by EDCON during stand by period to remove gyros for shipment to Denver and mistook torque motors for gyros. HGS (Drew Murray) thinks he had reinstalled motors just as they were removed. We shall see.

2030 EDCON spares shipment arrive at vessel.

2130 Install and connect 100 ft. element, gyros installed.

2215 Gravity system connected to U.P.S. power.

2230 All heaters on.

2300 Power tripped out to system, will leave just the heaters on for the night.

Wednesday 15 August 1990 Day 227

0600 All heaters oscillating.

0630 Four new spare shocks filled with oil and installed.

0700 Power reset to system. All power voltages good, unreg. = 110 VAC, reg. = 113 VAC, freq. = 61.75 HZ, current = 4.5 AMP., beam voltage = 4.6 VDC, Pressure = 27.05, Heaters - X = 5/1, L = 5/1, Meter = 6/15 seconds on/off.

0715 400 HZ on, AB = 25.5 V, BC = 26.5 V, AC = 26.0 V.

0720 Cross torque motor on - OK, Long torque motor on - no good, platform unstable (shimmering), torque motors off.

0725 Long gyro found slightly out of alignment, correct alignment.

0730 Torque motors on, platform leveling.

0830 Platform stable, unclamp beam. Check beam zero - gain, zero = -0.012 mV, gain = + 7.560 mV, - 8.051 mV, no adjustment

0900 Servo's on gravity value stabilizing, using 2 min. filter. Note: frequency drop, freq = 60.7 HZ.

0945 Gravity value slightly unstable, Average beam trace has one milligal oscillation over one minute interval. switching to 3 min. filter, Gravity = 8424.0, Spring tension = 8424.1.

1015 Gravity value stable, G = 8423.8, ST = 8423.7, Water depth = 12.0 m.

1030 Servo's off, beam clamped, torque motors off, 400 HZ off, secure platform, standard L & R power down, cut power to system, leave power to element heater only. Note: unable to complete installation of data recording system and magnetometer console due to seismic equipment in the way and will need to be relocated. The vessel will return to sea for a couple days to complete present prospect before returning to port.

1100 Vessel scheduled to depart port. Stitzer and Ward stay ashore to complete gravity base station tie between Mt. Gambier and Portland harbor while vessel completes present prospect.

1200 Receive G-meter S/N 586 from GEOTERREX, Sydney. Unpack G-meter, check meter, chargers and batteries for damage - none found.

1230 G-meter on heat, batteries on charge.

1500 Complete establishment for location of gravity base ties in Portland harbor.

1800 Check G-meter sensitivity - found to be slightly unstable.

Thursday 16 August 1990 Day 228

0700 Begin gravity base tie between Portland harbor and Mt. Gambier. Gravity base station located at Mt. Gambier police station store house.

0530 Complete two open loops between harbor and base station.

Friday 17 August 1990 Day 229

0700 Begin third loop between Harbor and Mt. Gambier.

1530 Complete final loop for gravity base tie.

Saturday 18 August 1990 Day 230

0800 Reduce base tie data information.

1200 Gravity tie computations for Portland harbor:
Fuel dock (tanker berth):
Lat: 38 DEG 20.76 min S, Lon: 141 DEG 36.84 min W
elevation: 2.6 m
gravity = 980029.77
Bulk berth (6 & 5 corner):
Lat: 38 DEG 21.07 min S, Lon: 141 DEG 37.08 min W
elevation: 2.6 m
gravity = 980030.46
K.S. Anderson (near silos):
Lat: 38 DEG 21.29 min S, Lon: 141 DEG 37.09 min W
elevation: 2.6 m
gravity = 980031.46

Pack G-meter and return to GEOTERREX Sydney via HGS.

1800 Standing by for vessel to return to port

Sunday 19 August 1990 Day 231

0700 Standing by for vessel arrival

1800 Complete new gravity base station location descriptions and mark locations with white paint. Vessel arrives at K.S. Anderson dock. Meter element still on heat and oscillating. Meter = 8/18 seconds on/off.

1900 Gyros connected to heat. All power good, power reset unreg. = 110 VAC, reg. = 113 VAC, 3.5 AMP.

1930 All heaters oscillating. X = 4/2, L = 3/2 seconds on/off.

2000 400 HZ on, torque motors on; platform stabilizing.

2200 Complete installation of marine magnetometer console and digital data recording system. Zenith not excepting characters from 6200B data system, will look into problem later. Complete power up of all systems. Platform level after slight adjustment to long accelerometer. Unclamp beam, servos on gravity value stabilizing. Continue storing spares.

Monday 20 August 1990 Day 232

0600 Power failure, standard L & R power down of system.

0605 Reset power to system. Power good; reason for power failure unknown.

0615 Continue to check out system.

0700 400 HZ on, torque motors on platform stabilizing.

0730 Unclamp beam, servos on; gravity value stabilizing.

0830 Complete adjustment to gain on all TI trace servo motor amps.

0900 Tape transport malfunction, forward tape motion unstable.

0930 Check tape transport power and reseat all PC boards. Tape transport functioning.

0938 Power failure, standard L&R power down of system.

0950 Reset power, all power good. Power failure due to faulty power plug to bay gravity system connection.

0955 400 HZ on, torque motors on platform stabilizing.

1010 Unclamp beam, servos on; gravity stabilizing.

1100 Average beam unstable due to high winds moving vessel about. Switch from 2 minute filter to 3 minute filter.

1200 Average beam more stable in 3 minute filter, bleed element pressure. Pressure before = 27.2, pressure after = 25.4

NOTE: ALL TIME WILL NOW BE RECORDED IN "COORDINATED UNIVERSAL TIME" (CUT or Z)

Tuesday 21 August 1990 Day 233

013000 Check cable continuity, check serial.cfg file Zenith still not accepting characters from 6200B data system.

024500 Begin Still Reading, K-Check and In-port Information Log No. 01.

100000 Complete Still Reading, K-Check and In-port Information Log No. 01. All in-port adjustments, calibrations and measurements complete.
Location: K.S. Anderson Wharf, Portland, Victoria, Australia
Latitude 038 deg. 21.185 min. South
Longitude 141 deg. 37.130 min. East
Gravity (CU) = 8435.0
Spring tension (CU) = 8435.1
Water depth = 12.4 m
WD average between port and starboard
Dock to water = 2.6 m
Gravimeter to dock = 1.2 m below
Gravimeter to water = 1.5 m above
Calibrated S-Meter Base Constant = 971451.54

110000 Fax EDCON, Denver with current vessel and equipment status, and current problem information.

223000 Depart Portland for prospect area.

Wednesday 22 August 1990 Day 234

000000 Receive telex from EDCON regarding Zenith logger problem. Reset baud rate from 6200B, 4800 baud to 9600 baud. Zenith logger program is now operational.

020000 Weather very rough. Clamp beam, servo's off, torque motors off and 400 HZ off. Platform secured.

025000 Power failure, standard L&R power down of system. Power failure due to loose plug connecting power to bay.

030000 Power reset, all power good. Standard L&R power up of system.

050000 Tape transport failure, forward tape motion unstable (jumpy) and involuntary, trouble shooting tape deck. Vessels Marisat out of order.

240000 In-transit to prospect area.

Thursday 23 August 1990 Day 235

000000 Weather conditions rough.

040000 Unable to repair tape transport, replace with spare tape deck. Spare tape deck unable to read load point, manage to make tape deck functional.

070000 Install stabilizer fins to magnetometer sensor.

081200 Power failure to gravity system, standard L&R power down of system. Reset power, all power good, reason for power failure unknown.

093000 Relocate power source for gravity system to adjacent bay (still on UPS power), all power good.

240000 In transit to prospect area.

Friday 24 August 1990 Day 236

000000 Weather conditions much improved.

025500 400 HZ on, torque motors on, platform stabilizing.

033000 Tape transport skew checked for correct alignment with skew tape and controller. No adjustments needed.

043000 Platform unstable, unable to maintain a proper level point. Platform visibly slightly shaking and shimmering.

051500 Check cross and long OP AMPs out signal with oscilloscope, signal shaky. Increase long and cross torque motor gain by 1/2 turn. Signal improved and platform now appears to be maintain a steady level considering large ground swell conditions.

060000 Unclamp beam, servos on gravity value stabilizing.

070000 Magnetometer tow system rigged through blocks onboard and gun array boom, sensor stowed on gun deck.

080000 Magnetometer console checked-out with test oscillator. No adjustment needed.

100000 Gravity value stable. Servos off, beam clamped.

160000 Torque motors off, platform secured. Gyros remain on.

220000 Torque motors on, platform stabilizing.

230000 Platform stable and holding level considering sea conditions and ground swells.

240000 In-transit to prospect area.

Saturday 25 August 1990 Day 237

020000 Arrive prospect area - EUCLA BASIN, Great Australian Bight

060000 Begin to deploy seismic cable. Attach drag shoot to magnetometer sensor.

163000 Unclamp beam, servo's on gravity value stabilizing.

170000 Heading for first prospect line.

184500 Magnetometer deployed 210 m., signal good. Magnetometer data slightly noisy - 3 to 5 gamma due to rough sea conditions.

190000 Malfunction of guide wire for trace pen on magnetometer stripchart recorder HP-680.

190400 Tape, charts and Zenith on-line 01-JA90-10

START: Magnetic Field Tape w/Verifier No. 01
Beam and Accelerometer Chart No. 01
Magnetometer Chart No. 01
Floppy Data Disk No. 01

191329 SOL 01-JA90-10, FSP = 101, CS = 267.9 DEG, SEA - 6
LAT: 33 DEG 18 MIN 20.57 SEC S.
LON: 126 DEG 32 MIN 22.51 SEC E.
No magnetometer chart record, chart out of order, data noisy d/t rough sea conditions,
NOTE: seismic CMS FSP time = 19:13:51, 22 seconds ahead of EDCON time.

220000 Magnetometer stripchart on-line
230000 Weather conditions increasing force 7 - 8

233339 EOL 01-JA90-10, LSP = 1865, incomplete, (44.13 KM)
LAT: 32 DEG 19 MIN 10.07 SEC S.
LON: 126 DEG 03 MIN 58.88 SEC E.
Terminate d/t rough weather conditions, last good seismic shotpoint = 1400.
Seismic CMS LSP time = 23:34:01

233700 Tape, charts and Zenith off-line 01-JA90-10

240000 Standing by for rough weather.

PRODUCTION TODAY = 44.13 KM
PRODUCTION TO DATE = 44.13 KM

Sunday 26 August 1990 Day 238

000000 Standing by for rough weather.

023000 Clamp beam, servo's off. Travelling different course heading looking for best heading for production.

123000 Seas improving slightly.

132500 Unclamp beam, servo's on gravity value stabilizing.

154700 Tape, charts and Zenith on-line 02-JA90-09

155853 SOL 02-JA90-09, FSP = 4201, CS = 179.5 DEG, SEA 5-6,
LAT: 33 DEG 21 MIN 26.83 SEC S.
LON: 126 DEG 01 MIN 13.96 SEC E.
NOTE: Seismic CMS FSP time = 15:59:16
Working sideseas and swells.

230000 Water depths off fathometer scale,taking water depths from seismic camera records.

235650 EOL 02-JA90-09, LSP = 7453, incomplete, (81.33 KM)
LAT: 34 DEG 05 MIN 24.01 SEC S.
LON: 126 DEG 01 MIN 01.20 SEC E.
NOTE: Seismic CMS LSP time = 23:57:13
Vessel making severe rolls during entire line, data - fair

240000 Tape, charts and Zenith off-line 02-JA90-09

PRODUCTION TODAY = 81.33 KM
PRODUCTION TO DATE = 125.46 KM

Monday 27 August 1990 Day 239

001500 Magnetometer sensor retrieved, standing by for seismic cable work.

030500 Magnetometer senor deployed, signal - good

031500 Long torque motor gain increased 1/8 turn, long motor gain is at it's maximum limit. Cross torque motor increased 1/4 turn. Platform leveling improved in rough seas.

0408 Tape, charts and Zenith on-line 03-JA90-11

042009 SOL 03-JA90-11, FSP = 101, CS = 000.1 DEG, SEA = 4-5
LAT: 33 DEG 59 MIN 45.67 SEC S.
LON: 126 DEG 14 MIN 49.99 SEC E.
Seismic CMS FSP time = 04:20:23 Z

042550 Missed SP 140

043810 Updated EDCON SP counter SP 232

065950 Tape and Zenith off-line, no digital data, accidentally turned off tape run.

070030 Tape and Zenith back on-line. lost 40 seconds digital data.

084000 Telex EDCON, weekly production report.

101000 Seas increasing.

101450 Zenith lock-up, no digital data to hard drive.

102300 Reboot lap-top, Zenith back on-line, lost of 7 minute of digital data to desk.

102500 Seas improving.

120400 END: Magnetometer Chart No. 01
Lines: 01-03x, Days: 237-239, Dates: 25-27 August 1990.

121300 START: Magnetometer Chart No. 02

122000 Gravity trace pen on beam chart dragging.

172000 Increase gain to maximum on gravity trace pen servo op amp. Trace recording improved.

200000 Beam chart switch TCC trace to AVB.

210000 Switch avb trace to tcc.

220607 EOL 03-JA90-11, LSP = 7358, COMPLETE, (181.45 KM)
LAT: 32 DEG 21 MIN 37.63 SEC S.
LON: 126 DEG 15 MIN 02.74 SEC E.
NOTE: Seismic CMS LSP time = 22:06:30 Z

220900 Tape, charts and Zenith off-line 03-JA90-11
END: Magnetic Field Tape w/Verifier No. 01
Lines: 01-03, Days: 237-239, Dates: 25-27 August 90
Beam and Accelerometer Chart No. 01
Lines: 01-03, Days: 237-239, Dates: 25-27 August 90

PRODUCTION TODAY = 181.45 KM
PRODUCTION TO DATE = 306.91 KM

Tuesday 28 August 1990 Day 240

000000 START: Magnetic Field Tape w/Verifier No. 02
Beam and Accelerometer Charts No. 02

004400 Tape, charts and Zenith on-line 04-JA90-09 A

005019 SOL 04-JA90-09 A, FSP = 101

002841 EOL 04-JA90-09 A, LSP = 773, (00.0 KM)
"DO NOT PROCESS" D/T LOSS OF NAVIGATION

023200 Tape, charts and Zenith off-line 04-JA90-09 A

044500 Magnetometer sensor retrieved, standing by for seismic cable work.

060000 Seas increasing.

100000 Standing by for rough weather.

120000 Navigation back on-line

144000 Clamp beam, servo's off, standing by for weather.

151400 Unclamp beam, servo's on gravity value stabilizing. Heading for a line.

163000 Clamp beam, servo's off. Still too much sea noise on seismic cable for production, standing by for rough weather.

240000 Standing by rough weather.

PRODUCTION TODAY = 00.0 KM
PRODUCTION TO DATE = 306.91 KM

Wednesday 29 August 1990 Day 241

000000 Standing by for weather.

083000 Weather improving.

093500 Unclamp beam, servo's on. Heading for line.

094500 Magnetometer sensor deployed, signal - good.

113000 Tape, charts and Zenith on-line 05-JA90-08

112359 SOL 05-JA90-08, FSP = 7701, CS = 89.6 DEG, SEA = 5
LAT: 33 DEG 07 MIN 43.24 SEC S.
LON: 126 DEG 38 MIN 04.90 SEC E.
NOTE : Seismic CMS FSP time = 11:24:14 Z

170215 NOTE: SP 10,000; Seismic reset shotpoint number to 0 (zero) due to seismic equipment can only record a four digit number. Subtract 10,000 from EDCON shotpoint to stay in sync with seismic (NAV) shotpoint.

183500 SP 10632, END: Magnetometer Chart No. 02
Lines: 03x-05x, Days: 239-241, Dates: 27-29 August 90

183740 SP 10650, START: Magnetometer Chart No. 03.

184000 Accelerometer chart accidentally turned off.

185600 Accelerometer chart back on-line.

192830 SP 10998, Update EDCON shotpoint counter. Missed SP's 10992, 10993, 10994 and 10995.

240000 Mid-night shotpoint = 12848,
total of line today (128.7 KM)

PRODUCTION TODAY = 128.7 KM
PRODUCTION TO DATE = 435.61 KM

Thursday 30 August 1990 Day 242

000000 Mid-night SP 12848, Line 05-JA90-08 continued.

054310 Missed SP 15225 due to navigation problems;

055320 Updated EDCON shot counter SP 15297 to synchronize with CMS (NAV) counter.

085405 EOL Line 05-JA90-08, LSP 16568,Incomplete,Today (93.0 KM)
Total: (221.7 KM)
Latitude: 33 DEG 05 MIN 33.39 SEC S.
Longitude: 129 DEG 00 MIN 36.79 SEC E.

085730 Tape, charts, and Zenith off-line 05-JA90-08

End: Magnetic Field Tape w/Verifier No. 02
Lines: 04-05 Days: 240-242 Dates: 28-30 Aug. 1990
Beam and Accelerometer Chart No. 2
Lines: 04-04 Days: 240-242 Dates: 28-30 Aug. 1990

START: Magnetic Field Tape w/Verifier No. 03
Beam and Accelerometer Chart No. 03

114928 Tapes, Charts, and Zenith on-line 06-JA90-06

114928 SOL Line 06-JA90-06; FSP = 101; CS = 268.5 Sea: 3-4
Lat: 32 DEG 52 MIN 24.91 SEC S.
Long: 128 DEG 59 MIN 16.52 SEC E.
Note: Seismic CMS FSP Time = 114952

115020 Magnetometer found to be in standby mode; activate.

120500 Slight increase in ship's speed and slight course change are evident on gravity data;

121500 Gravity data stable.

142200 Find that EDCON shot counter is two shotpoints behind seismic counter. Missed shot points due to navigation problems and occurred at: SP 898 (134300 hrs.), and SP 1033 (140200 hrs.).

142310 Update EDCON shotpoint counter by two to SP 1187.

161500 SP 1980, END: Magnetometer Chart No. 03;
Lines: 05x-06x, Days: 241-242, Dates: 29-30 August 1990

161830 SP 2003, START: Magnetometer Chart No. 04

171430 SP 2379, No data recorded on diskette due to archiving data from harddrive to diskette. Harddrive was running

out of memory.

171640 SP 2393, complete archiving - recording data to harddrive.
END: Zenith Diskette No. 01
Lines: 01-05x, Days: 237-241, Dates: 25-29 August 1990

200000 AVB recorded on beam chart.

210000 TCC recorded on beam chart.

211330 Magnetometer chart off line, trace pen guide wire off track.

212230 Repair guide wire magnetometer chart on line.

213210 SP 4115, Zenith malfunctioning, not receiving all the record data characters.

213840 SP 4159, Reboot Zenith logger program, lap-top back on line and recording normal.

240000 Mid-night shotpoint = 5114, today (125.35 KM)

PRODUCTION TODAY = 218.35 KM
PRODUCTION TO DATE = 653.96 KM

Friday 31 August 1990 Day 243

000000 SP 5114, midnight shotpoint line 06-JA90-06 continued.

014000 Archiving from hard drive to data disk, missed data record on disk for shotpoints 5816, 5812 - 014120Z and 5813 - 014130Z. Needed more memory space.

103500 END: Magnetometer Chart No. 04
Line: 06x-06x, Days: 242-243, Dates: 30-31 Aug. 1990

104100 START: Magnetometer Chart No. 05.

130510 Missed Shotpoints 10611, 10612. 10613, 10614, 10615, 10616 and 10617 (130600 hrs.) due to seismic recording system error.

130730 Update EDCON shot counter to SP 10625 to sync with seismic system counter.

182700 Miss shotpoints 12873 and 12874; update EDCON shotpoint counter to SP 12894 to sync with seismic counter.

184540 "LOGGER" program error, periodically missing shotpoints

185110 "LOGGER" program recording correctly, missed 32 shotpoints on disk record, 13025, 13025-13040, 13041, 13047-13057-13062 and 13063

195000 "LOGGER" ERROR, not recording all characters to file. Missed shotpoints to recorded data on disk.

195200 "LOGGER" Program recording data correct.

200000 Beam Chart switch TCC trace to AVB.

201800 END: Magnetic Field Tape w/Verifier No.03 at SP 13670. Lines: 06-06x, Days: 242-243, Dates: 30-31 August 90

202100 START: Magnetic Field Tape w/Verifier No. 04 at SP 13690.

202620 "LOGGER" PROGRAM system error, not recording data in proper sequence from serial port - reason unknown.

203200 Reboot "LOGGER" Program.

203250 "LOGGER" Program data recording correct.

210000 Switch AVB trace to TCC.

211000 END: Beam and Accelerometer Chart No. 03 at SP 13598. Lines: 06-06x, Days: 242-243, Dates: 30-31 August 1990

211400 START: Beam and Accelerometer Chart No. 04 at SP 14053.

223300 Shift change on bridge - poor steering.

232846 EOL 06-JA90-06, LSP 14979, Complete, Today (246.63 km.)
Total: (371.98 km.)
Latitude: 32 DEG 53 MIN 56.71 SEC S.
Longitude: 125 DEG 00 MIN 57.68 SEC E.
CMS FSP time = 232911 Z

233200 Tape, charts, and Zenith off-line 06-JA90-06

240000 MIDNIGHT - line change

PRODUCTION TODAY = 246.63 KM.
PRODUCTION TO DATE = 900.59 KM.

Saturday 1 September 1990 Day 244

061050 Tape, Charts, Zenith on-line 07-JA90-10

062235 SOL 07-JA90-10 A, FSP = 5668, CS = 88.7 SEAS = 3-4
Latitude: 33 DEG 20 MIN 34.26 SEC S.
Longitude: 125 DEG 02 MIN 51.98 SEC E.
Note: Seismic CMS FSP = 062259

06300 Note: Shotpoints are decrementing on Line 07-JA90-10 A; FSP is SP 5668, second SP 5667, and so on.Shotpoint markers on stripchart recorders are recording each tenth shotpoint on the 09 (such as SP 5599, SP 5589, SP 5579)

092450 Seismic miss SP 4405.

092615 Decrease EDCON shotpoint counter by one, to SP 4393 to sync with seismic counter.

092657 Line aborted at SP 4389 due to Seismic instrument failure.

092657 EOL 07-JA90-10 A, LSP = 4389, Incomplete, (32.0 Km.)
Latitude: 33 DEG 20 MIN 09.26 SEC S.
Longitude: 125 DEG 23 MIN 28.886 SEC E.
Note: Seismic CMS LSP = 092721

093850 Tape, charts, Zenith off-line 07-JA90-10 A.

112140 Tape, charts, Zenith on-line 08-JA90-10 B.

113322 SOL 08-JA90-10 B, FSP = 4568, CS = 88.7 deg, SEA = 4
Latitude: 33 DEG 20 MIN 13.18 SEC S.
Longitude: 125 DEG 20 MIN 34.97 SEC E.
Note: Seismic CMS FSP = 113346 Z
Note: decrementing shotpoints.

114500 Magnetometer recording chart sticking. Turn off to perform repairs.

115100 Magnetometer recording chart repaired and running.

131830 END: Magnetometer Chart No.05 at SP 3833.
Lines: 06x-08x, Days: 243-244, Dates: 31 Aug - 1 Sept 90

132620 START: Magnetometer Chart No.06 at SP 3778.

144950 Mistakenly punch reset button on 6200B DATA LOGGER at SP 3187; EDCON reset shotpoint counter to 8007.

145220 Reset EDCON shotpoint counter at SP 3170.

173623 Update EDCON shotpoint counter SP 2003, missed SP 2007.

180000 Recording AVB on beam chart

180200 Receiving system errors on "LOGGER" program, reboot laptop.

180250 "LOGGER" program operating.

190000 Recording TCC on beam chart

192155 EOL 08-JA90-10 B, LSP = 1256, complete, total (82.83 KM)
LAT: 33 DEG 18 MIN 53.32 SEC S
LAT: 126 DEG 13 MIN 56.28 SEC E
NOTE: Seismic CMS LSP time = 192228 Z

192500 Tape, charts and Zenith off-line 08-JA90-10 B.

202500 Servo's off, clamped beam. Torque motors off, 400 HZ off. Preparing for meter maintenance. There appears to be low frequency oscillation in platform acceleration chart records and all traces on beam chart records. Double checking to make sure it is due to sea and swell conditions and not mechanical.

204000 Remove chopper motor: check optic bearings - OK, check chopper motor bearing - OK. Reconnect chopper motor, motor -OK.

205000 Replace cross gyro A-20 (2886 hr) with spare gyro V-5 (0004 hr).

210000 Gyro's on heat

212500 Gyro heaters cycling

213000 400 HZ on, torque motors on platform stabilizing.

215000 Platform stable unclamp beam, servo's on gravity value stabilizing.

211500 NOTE: Seismic reset their CMS system clock to sync. with SATNAV Magnavox UCT. EDCON and CMS NAV clocks are now synchronized.

220000 END: Zenith diskette No. 02
Lines: 05x-06, Days: 242-243, Dates: 30-31 August 1990

240000 MIDNIGHT
PRODUCTION TODAY = 114.83 KM.
PRODUCTION TO DATE = 1015.42 KM.

Sunday 2 September 1990 Day 245

010000 Tape, charts and Zenith on-line 09-JA90-08 A

011211 SOL 09-JA90-08 A, FSP = 7831, CS = 269.6 DEG, SEA 4-5
LAT: 33 DEG 07 MIN 41.18 SEC S
LON: 126 DEG 40 MIN 10.14 SEC E
NOTE: SEISMIC CMS FSP TIME = 011212 Z, EDCON time and NAV time are synchronized.
"HEAVY" side swell action, vessel taking large rolls.

041200 Magnetometer chart turned off to replace trace pen.

041650 Magnetometer chart turned on.

080000 Observe extreme magnetic anomaly - magnetometer recording upward gradients of 6 to 8 gamma at each interval.

083000 Magnetometer reading 60334; reading of 080000 was 59380, a rise of 954 gamma in 30 minutes.

133250 END: Magnetometer Chart No. 06, SP 2580
Lines: 08x-09x, Days: 244-245, Dates: 1-2 Sept., 1990

134200 START: Magnetometer Chart No. 07, SP 2505.

145800 SP 1966: "LOGGER" program system error, not recording data in proper sequence from serial port; reason unknown.

150300 SP 1929: Reboot "LOGGER" program. Data recording correctly.

172940 Update EDCON shotpoint counter SP 896, missed SP 899

190000 Observe extreme magnetic anomaly.

191030 SP 183, NOTE: Magnetic field tape rewound, NO "END OF FILE" record on tape.

END: Magnetic Field Tape w/Verifier No. 04
Lines: 06x-09x, Days: 243-245, Dates: 31 Aug - 2 Sept 90

191400 SP 163, START: Magnetic Field Tape w/Verifier No. 05.

193334 EOL 09-JA90-08 A, LSP = 25, complete, total (195.18 KM)
LAT: 33 DEG 07 MIN 21.33 SEC S
LON: 124 DEG 34 MIN 47.11 SEC E
NOTE: NAV TIME AND EDCON TIME SYNCHRONIZED

193700 Tape, charts and Zenith off-line 09-JA90-08 A

END: Beam and Accelerometer Chart No. 04
Lines: 06x-09, Days: 243-245, Days: 31 Aug - 2 Sept 1990

205500 Servo's off. clamp beam, torque motors off, 400 HZ off

210700 Swap cross gyro V-5 and long gyro D-5. Gyro's on heat. Cross gyro now D-5, long gyro now V-5.

213500 Gyro heaters cycling, 400 HZ on, torque motors on, platform stabilizing.

230000 Platform stable, unclamp beam, servo's on. Gravity value stabilizing.

240000 Weekly production figure for the week from 240000 hrs., Sunday, August 26 (Day 238), through 240000 hrs., Sunday, September 2 (Day 245);
TOTAL: 1085.14 KM.
Remaining line to be shot: 4410.7 Km.

MIDNIGHT - line change

PRODUCTION TODAY = 195.18 KM
PRODUCTION TO DATE = 1210.60 KM

Monday 3 September 1990 Day 246

014200 Tape, charts and Zenith on-line 10-JA90-12

START: Beam and Accelerometer Chart No. 05

014853 SOL 10-JA90-12, FSP = 101, CS = 90.2 DEG, SEA = 3-4
LAT: 33 DEG 32 MIN 15.02 SEC S.
LON: 124 DEG 22 MIN 20.45 SEC E.
CMS NAV in sync with EDCON time, large ground swells causing the vessel to take some pretty good rolls.

015050 SP 114, Update EDCON shotpoint counter, missed SP 110

020628 SP 227, "LOGGER" missed recording three records, sp 224, 225 and 226. Reason unknown.

033000 Observe extreme magnetic anomaly.

040500 Between 040500 and 092000 extreme magnetic gradients are observed; each gradient rose or dropped consistently without any opposite movement. The gradients were at times extreme, as much as 16 gamma per polarizing cycle in a few cases.

105240 SP 3933: "LOGGER" program system error; not recording data in proper sequence from serial port; reason unknown.

105350 SP 3941: Reboot "LOGGER"; recording normally.

141300 END: Magnetometer Chart No. 07 at SP 5362.
Lines: 09x - 10x Days: 245 - 246 Dates: 2-3 Sept. 1990.

141900 START: Magnetometer Chart No. 08 at SP 5406.

143530 Miss SP 5525 and 5526 due to seismic system coordinator failure.

143610 Increase EDCON shotpoint counter by 2, to synchronize with seismic shotpoint counter at SP 5531.

172640 SP 6730, Update EDCON shotpoint counter, missed SP 6632.

210000 Recording AVB on beam chart.

220000 Recording TCC on beam chart.

2358?? "LOGGER ERROR" data to lap-top not recording in proper sequence.

235900 Reboot "LOGGER" program.

235950 SP 9495, "LOGGER" recording correctly.

240000 Midnight shotpoint = 9697, total line today (239.93 KM)

PRODUCTION TODAY = 239.93 KM
PRODUCTION TO DATE = 1450.53 KM

Tuesday 4 September 1990 Day 247

000000 Midnight shotpoint = 9697; Line 10-JA90-12 continued.

060900 SP 12101, "DOG LEG"
LAT: 33 DEG 30 MIN 15.64 SEC S
LON: 127 DEG 36 MIN 01.51 SEC E
Alter Course to 88.4 DEG

060910 Supposedly passing over wellhead "JERBOA 1"; Magnetometer "does not" show any indication of a wellhead.

090320 END: Magnetometer Chart No.08 SP 13345
Line: 10x-10x, Days: 246 - 247, Dates: 3-4 Sept. 1990.

090850 START: Magnetometer Chart No. 09 SP 13384

102??? END: Magnetic Field Tape w/Verifier No. 05;
Lines: 9x-10x Days: 245-247 Dates: 2-4 Sept. 1990
Note: No "E.O.F." record at end of tape as it ran out; also not certain of shotpoint number.

103430 START: Magnetic Field Tape w/Verifier No. 06;
SP 13384.

104640 END: Accelerometer Chart No. 05; SP 14083
Lines: 10-10x; Days: 246-247; Dates: 3-4 Sept. 1990

104840 START: Accelerometer Chart No. 06; SP 14098

110240 END: Beam Chart No. 05; SP 14203
Lines: 10-10x; Days: 246-247; Dates: 3-4 Sept. 1990

111048 START: Beam Chart No. 06; SP 14262

133800 "Logger" error; system not recording to lap-top in proper sequence. Try to correct problem by simply reentering "Logger" program without rebooting lap-top. System shown as operating properly, but alarm continues sounding every record.

134420 Reboot lap-top.

134550 "Logger" reloaded; system operating normally.

145820 Miss Shotpoints 15896 and 15904 due to ship's velocity.

145830 Updated EDCON Shotpoint counter 2 Shotpoints to synchronize with ship's counter at SP 15904.

154120 Miss SP 16207 due to excessive ship's velocity.

154200 Update EDCON Shotpoint counter by one to synchronize with seismic shotpoint counter.

205900 "LOGGER ERROR" program not recording normally.

210000 AVB recorded on beam chart

210500 Re-enter logger program without rebooting lap-top. Viewing "on-screen" data records with C:\> ALT. mode engaged, data looks and records to lap-top - normally. Turn off "on-screen" viewing with ALT. and "LOGGER ERROR" appears with No Data From Serial Port No. 1..., return to "on-screen" viewing data records normal, turn off "on-screen" viewing again no data from serial port.

211200 Reboot lap-top.

211250 SP 18513, Enter "LOGGER" program, recording normal with no problems viewing or not viewing "on-screen" data.

211620 SP 18537, Update EDCON sp counter, missed sp 18523.

220000 TCC recorded on beam chart.

240000 Midnight SP = 19671, total of line today (249.35 KM)

PRODUCTION TODAY = 249.35 KM
PRODUCTION TO DATE = 1699.88 KM

Wednesday 5 September 1990 Day 248

000000 Midnight SP = 19671, line 10-JA90-12 continued.

012200 Missed 8 shotpoints, SP's 20242-20249, on data disk due to Archiving data from harddrive to diskette. Harddrive was running out of memory. Data disk does not have enough memory will have to start two new disks.

012930 Missed 9 shotpoints, SP's 20264-20299, on data disk due to Archiving data from harddrive to data diskette.

021000 Missed 4 shotpoints, SP's 20570-20573, on data disk d/t Archiving data from harddrive to diskette.

040430 END: Magnetometer Chart No. 09; SP 21368.
Line: 10x-10x; Days: 247-248; Dates: 4-5 Sept. 1990

041020 START: Magnetometer Chart No. 10; SP 21410.

044620 SP 21664; "Logger" not recovering data in proper sequence from serial port.

044920 SP 21685; Reboot lap-top.

045030 SP 21693; "Logger" recording correctly.

072040 SP 22762; "Logger" again not recovering data in proper sequence from serial port.

072450 SP 22792; Reboot lap-top.

072540 SP 22798; "Logger" recording correctly.

093220 SP 23702; "Logger" not recovering data in proper sequence from serial port.

093320 SP 23709; Reboot lap-top; "Logger" recording correctly.

094250 SP 23778; "Logger" not recovering data in proper sequence from serial port.

094550 SP 23800; Reboot lap-top; "Logger" recording correctly.

094640 SP 23806; "Logger" not recovering data in proper sequence
from serial port.

094750 SP 23814; Reboot lap-top; "Logger" recording correctly.

095921 Pass wellhead "Potoroo-1"; SP 23898; "DOG LEG" new Course 86.6 DEG.; No evidence of wellhead on magnetometer. Latitude: 33 DEG 23 MIN 13.57 SEC S. Longitude: 130 DEG 46 MIN 06.90 SEC E.

104250 SP 24218; "Logger" not recovering data in proper sequence from serial port.

104330 SP 24223; Reboot lap-top; "Logger" recording correctly.

113458 EOL 10-JA90-12, LSP: 24585, complete, (612.13 Km.)
Lat: 33 DEG 23 MIN 13.57 SEC S.
Long: 130 DEG 46 MIN 06.90 SEC E.
Note: EDCON clock three seconds behind seismic CMS NAV clock at completion of line.
Production of line today (122.85 km)

114310 Tape, charts and Zenith off-line 10-JA90-12

120000 EDCON clock reset to synchronize with seismic CMS navigation clock.

121500 Magnetometer sensor winched in, bringing on all seismic gear for long line change.

132000 All seismic gear onboard.

144500 Servos off; beam clamped. Standing by for long line change.

214000 Unclamp beam, servo's on gravity stabilizing.

240000 Midnight - line change

PRODUCTION TODAY = 122.85 KM
PRODUCTION TO DATE = 1822.73 KM

Thursday 6 September 1990 Day 249

003000 Magnetometer sensor deployed, signal good. Heading for line.

014000 Tape, charts and Zenith on-line 11-JA90-14

014618 SOL 11-JA90-14, FSP = 101, CS = 267.2, SEA = 4-5

020500 EOL 11-JA90-14, TERMINATE, incomplete, (00.0 KM)
"DO NOT PROCESS" D/T seismic equipment failure, circle.
Tape, charts and Zenith off-line 11-JA90-14

042800 Tape, charts and Zenith on-line 12-JA90-14 A

043912 SOL 12-JA90-14 A, FSP = 101, CS = 267.2, SEA = 4-5
Lat: 33 DEG 37 MIN 38.56 SEC S.
Long: 128 DEG 59 MIN 21.82 SEC E.
EDCON time and NAV time in sync.

051250 Miss SP 334 and SP 335 due to ship's velocity; update EDCON shotpoint counter to synchronize at SP 338.

061500 Vessel slows to 4.3 knots to compensate for delayed seismic signals due to extreme depth.

070000 Slowly increasing vessel speed.

081420 END: Magnetic Field Tape w/Verifier No. 06; SP 1423
Lines: 10x-12x Days: 247-249 Dates: 4-6 Sept. 1990
NOTE: NO "END OF FILE" Record on tape at end of data recording.

082110 START: Magnetic Field Tape w/Verifier No. 07;
SP 1462

105200 Miss SP 2412 due to navigation update.

110630 END: Accelerometer Chart No. 06; SP 2509
Lines: 10x-12x; Days: 247-249; Dates: 4-6 Sept. 1990

110940 START: Accelerometer Chart No. 07; SP 2530

111200 END: Beam Chart No. 06; SP 2546
Lines: 10x-12x; Days: 247-249; Dates: 4-6 Sept. 1990

111820 START: Beam Chart No. 07; SP 2587

130600 Increment EDCON shotpoint counter to sync with seismic counter at SP 3314.

140330 END: Magnetometer Chart No. 10; SP 3715
Lines: 10x-12x; Days: 248-249; Dates: 5-6 Sept. 1990

140840 START: Magnetometer Chart No. 11; SP 3750

154230 Missed SP 4391.

154620 Updated EDCON sp counter, SP 4419 in sync.

200000 AVB recorded on beam chart, observe magnetic anomaly.

210000 TCC recorded on beam chart.

2329?? Approx. SP 7880, Magnetic tape transporter failure. Tape was not threaded properly over tension capstan to take-up spool after last tape change. This caused forward tape motion to malfunction (stop) after a period of time. Power off tape drive.

240000 Midnight shotpoint = 7846,
total of line today (193.65 KM)

PRODUCTION TODAY = 193.65 KM
PRODUCTION TO DATE = 2016.38 KM

Friday 7 September 1990 Day 250

000000 Midnight SP 7846, line 12-JA90-14 A continued

000500 SP 7880, Tape transport on-line after proper threading of tape over tension capstan.
NOTE: There will be a blank gap in data recorded on tape between the times of rethreading of tape.

070940 SP 10801: Vessel swings 2 degrees off-line; course corrected at SP 10830.

073750 SP 11100: Vessel again swings 2 degrees off-line; course corrected at SP 11130.

080510 END: Magnetometer Chart No. 11 SP 11202
Lines: 12x-12x; Days: 249-250; Dates: 6-7 Sept. 1990

081830 START: Magnetometer Chart No. 12 SP 11297.

115910 Miss SP 12861 due to seismic system coordinator failure.

115940 Increment EDCON shotpoint counter by one to synchronize with seismic counter at SP 12865.

134220 Beam Chart off to replace ST trace pen.

134620 Beam Chart on and operating normally.

162649 EOL 12-JA90-14 A, LSP = 14799, COMPLETE, TOTAL 367.48 KM
LAT: 33 DEG 43 MIN 23.41 SEC S
LON: 125 DEG 01 MIN 49.65 SEC E
Total of line today (173.83 KM)
NOTE: EDCON time and CMS NAV time in sync.

163000 Tape, charts and Zenith off-line 12-JA90-14 A

170000 Magnetometer sensor retrieved, standing by for seismic cable work and long line change.

END: Magnetic Field Tape w/Verifier No. 07
Lines: 12x-12x, Days: 249-250, Dates: 6-7 Sept. 90

END: Beam and Accelerometer Chart No. 07
Lines: 12x-12x, Days: 249-250, Dates: 6-7 Sept. 90

213000 Deploy magnetometer sensor, signal good. Heading for line.

224100 Tape, charts and Zenith on-line 13-JA90-16

START: Magnetic Field Tape w/Verifier No. 08
Beam and Accelerometer Chart No. 08

224936 SOL 13-JA90-16, FSP = 101, CS = 89.7 DEG, SEA = 4
LAT: 33 DEG 54 MIN 08.38 SEC S.
LON: 124 DEG 34 MIN 27.46 SEC E.
EDCON and CMS NAV time are in sync. Observe extreme magnetic anomaly at SOL.

240000 MIDNIGHT SP = 594, total for line today (12.35 KM)
Continue extreme magnetic anomaly, AVB recorded on beam chart.

PRODUCTION TODAY = 186.18 KM
PRODUCTION TO DATE = 2202.56 KM

Saturday 8 September 1990 Day 251

000000 MIDNIGHT SP = 594, Line 13-JA90-16 continued.

010000 TCC recorded on beam chart. Extreme magnetic anomalies continue.

063730 SP 3410: Ship swings two degrees off course.

064150 SP 3440: Ship's course corrected.

072120 EOL 13-JA90-16, LSP = 3716, Incomplete, today (78.05 KM)
LATITUDE: 33 DEG 53 MIN 38.73 SEC S.
LONGITUDE: 125 DEG 33 MIN 05.58 SEC E.
Note: EDCON and CMS NAV clocks are in sync. Terminate and circle due to seismic equipment failure. total of line = 90.4 km.

072400 Tape, Charts, and Zenith off-line 13-JA90-16

083000 END: Magnetometer Chart No. 12 (change between Lines.)
Lines: 12x-13; Days: 250-251; Dates: 7-8 Sept. 1990

083200 START: Magnetometer Chart No. 13

090240 Tape, Charts, and Zenith on-line 14-JA90-16 A

091351 SOL 14-JA90-16 A, FSP=3631, CS=89.7 DEG, SEA= 3-4
LATITUDE: 33 DEG 53 MIN 39.37 SEC S.
LONGITUDE: 125 DEG 31 MIN 41.80 SEC E.
EDCON and CMS clocks are in sync.

161000 SP 6628,
NOTE: Fixed data program line number accidentally set to No. 160 at SOL.
Change fixed data program line from No. 160 to 16.

170000 Reducing speed from 5.8 to 5.5 knots.

173000 Reducing speed from 5.5 to 5.0 kt.

200000 AVB recorded on beam chart.

210000 TCC recorded on beam chart.

213000 Increasing speed slowly 5.0 to 5.5 kt

240000 MIDNIGHT SP = 9736, total of line today (152.65 KM)

PRODUCTION TODAY = 230.70 KM
PRODUCTION TO DATE = 2433.26 KM

Sunday 9 September 1990 Day 252

000000 MIDNIGHT SP = 9736, line 14-JA90-16 A, continued.

033300 END: Magnetometer Chart No. 13; SP 11150
Lines: 14-14x, Days: 251-252, Dates: 8-9 Sept. 1990

033510 START: Magnetometer Chart No. 14; SP 11165

050607 EOL 14-JA90-16 A, LSP = 11732, Complete, today (49.9 KM) total of line 202.55 Km.
LATITUDE: 33 DEG 50 MIN 53.79 SEC S.
LONGITUDE: 127 DEG 42 MIN 59.31 SEC E.
Note: Seismic CMS and EDCON clocks in sync.

051110 Tape, Charts, and Zenith off-line 14-JA90-16 A

060000 END:Beam and Accelerometer Charts No. 08;
Lines: 13-14, Days: 250-252, Dates: 7-9 Sept. 1990
3.5 inch Data Diskette No. 05
Lines: 10x-13x, Days: 248-250, Dates: 5-7 Sept. 1990
Magnetic Field Tape w/Verifier No. 08;
Lines: 13-14, Days: 250-252, Dates: 7-9 Sept. 1990

081050 Tape, Charts, and Zenith on-line 15-JA90-27
START: Magnetic Field Tape w/Verifier No. 09;
Beam and Accelerometer Charts No. 09

082301 SOL 15-JA90-27, FSP = 101, CS = 00.25 DEG, SEA = 3
LATITUDE: 33 DEG 48 MIN 55.09 SEC S.
LONGITUDE: 128 DEG 02 MIN 53.63 SEC E.

094400 EOL 15-JA90-27, LSP=671, Incomplete, Total (14.28 Km)
LATITUDE: 33 DEG 41 MIN 11.97 SEC S.
LONGITUDE: 128 DEG 02 MIN 56.14 SEC E.
Note: Seismic CMS and EDCON clocks in sync. Line aborted due to Seismic Recording System failure.

095500 Tape, Charts, and Zenith off-line 15-JA90-27

111640 Tape, Charts, and Zenith on-line 16-JA90-27 A

112632 SOL 16-JA90-27 A, FSP = 601, CS = 00.25 DEG, SEA = 3
LATITUDE: 33 DEG 42 MIN 09.17 SEC S.
LONGITUDE: 128 DEG 02 MIN 55.38 SEC E.

180000 Vessel swings 3-4 deg off line, swings back to line, poor steering.

190000 Observe extreme magnetic anomaly.

230000 Continue extreme magnetometer anomalies.

232550 SP 5673, Update EDCON shotpoint counter by 2, missed SP's 5667 and 5669

240000 MIDNIGHT SP 5911, total of line today (132.78 KM)
Weekly production from Sunday 2 Sept. 240000 to Sunday 9 Sept. 240000 = 1419.62 KM.

PRODUCTION TODAY = 196.96 KM
PRODUCTION TO DATE = 2630.22 KM

Monday 10 September 1990 Day 253

000000 MIDNIGHT SP 5911, Line 16-JA90-27 A, continued. Extreme magnetic anomalies continue.

025820 SP 7166, Update EDCON shotpoint counter 3, seismic counter missed SP 7162, 7163 and 7164.

032240 EOL 16-JA90-27 A, LSP = 7337, Complete, TODAY (35.65 KM)
Total OF LINE: 168.43 Km.
LATITUDE: 32 DEG 11 MIN 04.82 SEC S.
LONGITUDE: 128 DEG 03 MIN 24.87 SEC E.

032600 Tape, Charts, Zenith off-line 16-JA90-27 A

040000 END: Magnetometer Chart No. 14;
Lines: 14x-16, Days: 252-253, Dates: 9-10 Sept. 1990

START: Magnetometer Chart No. 15

053000 Send weekly production report telex to EDCON, Denver.

070600 Tape, Charts, Zenith on-line 17-JA90-29

071434 SOL 17-JA90-29; FSP=101; CS=179.8; SEA=3
LATITUDE: 32 DEG 24 MIN 12.66 SEC S.
LONGITUDE: 128 DEG 15 MIN 50.63 SEC E.
NOTE: No Julian Day record on Tape and Disk data.

072900 SP 198; Observe magnetic anomalies.

083850 SP 690; Ship swings two degrees off-course.

084310 SP 720; Ship on-course.

091840 SP 970; Ship swings two degrees off-course.

092000 SP 980; Ship on-course.

092300 Zenith displays "low power" light. D.C. jack and mains connection appear good. Prepare to check D.C. jack with voltmeter for power.

092700 "Low power" light stops displaying before voltage checked. Operations appear normal.

094500 SP 1153; Seas increasing to Beaufort 4-5; ship pitching and rolling.

095500 SP 1220; Magnetic anomaly observed.

100320 SP 1280; Ship swings three degrees off-course.

101040 Ship on-course.

101500 SP 1360; Strong cross-current. Steering problems continue.

110330 SP 1711; Installing new magnetometer pen; magnetometer shut down.

110840 SP 1749; New magnetometer pen installed; magnetometer running normally.

132630 SP 2740; Ship swings two degrees off-course;

133630 SP 2810; Back on-course.

135640 Rising seas and strong cross-currents cause increasing difficulty in maintaining course.

161918 EOL 17-JA90-29, LSP = 3973, COMPLETE, TOTAL (96.83 KM)
LAT: 33 DEG 16 MIN 34.94 SEC S
LON: 128 DEG 15 MIN 59.36 SEC E
NOTE: Julian Day was "NOT" recorded on Tape and Disk data for entire line. Swell and sea conditions = poor, weather increasing.

162300 Tape, Charts and Zenith off-line 17-JA90-29

END:
Magnetic Field Tape w/Verifier No. 09
Lines: 15-17, Days: 252-253, Dates: 9-10 Sept. 90

Beam and Accelerometer Chart No. 09
Lines: 15-17, Days: 252-253, Dates: 9-10 Sept. 90

START:
Magnetic Field Tape w/Verifier No. 10
Beam and Accelerometer Chart No. 10

205500 Tape, charts and Zenith on- line.

210200 Tape, charts and Zenith off-line. Terminate line before FSP D/T sea and swell conditions too rough on this line heading. Will try another line heading.

213000 Servo's off, beam clamped. Stand by for rough weather while heading for another line.

240000 Standing by for line change.

PRODUCTION TODAY = 132.48 KM
PRODUCTION TO DATE = 2762.70 KM

Tuesday 11 September 1990 Day 254

000000 Standing by for travel to another line heading and rough weather.

030000 Unclamp beam, servo's on gravity value stabilizing.

114050 Tape, Charts, Zenith on-line.

114720 Tape, Charts, Zenith off-line. Terminate line before FSP due to rough seas. Steaming to different line heading.

142440 Tape, Charts and Zenith on-line 18-JA90-02

143313 SOL 18-JA90-02, FSP = 4601, CS = 89.1 DEG, SEA = 5-6
LATITUDE: 32 DEG 29 MIN 00.85 SEC S.
LONGITUDE: 127 DEG 22 MIN 12.95 SEC E.

150300 SP 4808; Observe magnetic anomaly.

150320 SP 4810; Ship two degrees off-course.

151040 SP 4860; Ship on-course.

160000 Observe magnetic anomaly.

181300 Slight increase in speed.

200000 AVB recorded on beam chart.

210000 TCC recorded on beam chart.

223500 SP 7967
END: Magnetometer Chart No. 15
Lines: 15-18x, Days: 253-254, Dates: 10-11 Sept. 90

223800 SP 7988
START: Magnetometer Chart No. 16

230000 Observe extreme magnetic anomaly.

240000 MIDNIGHT SP = 8561, total of line today (99.03 KM)

PRODUCTION TODAY = 99.03 KM
PRODUCTION TO DATE = 2861.73 KM

Wednesday 12 September 1990 Day 255

000000 MIDNIGHT SP =8561, line 18-JA90-02, continued.

035500 Observe extreme magnetic anomaly.

052045 EOL 18-JA90-02, LSP = 10778, INCOMPLETE, Today (55.43 KM)
Total of line (154.45 Km.)
LATITUDE: 32 DEG 27 MIN 04.46 SEC S.
LONGITUDE: 129 DEG 00 MIN 44.01 SEC E.
Note: East end of Line 18-JA90-02 is characterized by a number of magnetic anomalies.

052220 Tape, Charts, Zenith off-line 18-JA90-02

091650 Tape, Charts, Zenith on-line 19-JA90-33

092603 SOL 19-JA90-33, FSP = 101, CS = 179.8 DEG, SEA = 5-6
LATITUDE: 32 DEG 23 MIN 41.60 SEC S.
LONGITUDE: 128 DEG 41 MIN 31.42 SEC E.
Note: North end of Line 19-JA90-33 is characterized by a number of magnetic anomalies.
Heading into seas and swells, vessel pitching and rolling (corkscrewing).

130500 SP 1650; Ship swings two degrees off-line.

132350 SP 1780; Ship back on-course.

133000 SP 1823; Notice Gravity trace has not been tracking properly since 131500; ("stuck"). Reset trace; now tracking normally.

143000 SP 2238; Observe sharp magnetic anomaly.

164540 SP 3180, Lap-top "Logger Error", data out of sequence

164720 SP 3191, Reboot Lap-Top

164800 SP 3196, Lap-Top on-line, recording normal.

170000 AVB recorded on beam chart.

171000 Speed and course corrections, poor steering and speed control due to sea and swell conditions.

173000 Extreme poor steering d/t bad navigation signals and rough sea conditions.

180000 TCC recorded on beam chart.

183712 EOL 19-JA90-33, LSP = 3960, COMPLETE, Total (96.5 KM)
LAT: 33 DEG 15 MIN 53.60 SEC S.
LON: 128 DEG 41 MIN 42.46 SEC E.
Poor steering and rough sea conditions along entire line.

184000 Tape, charts and Zenith off-line 19-JA90-33.

240000 MIDNIGHT - Line change

PRODUCTION TODAY = 151.93 KM
PRODUCTION TO DATE = 3013.70 KM

Thursday 13 September 1990 Day 256

000000 Midnight - Line change.

021900 Tape, Charts and Zenith on-line 20-JA90-25

022548 SOL 20-JA90-25, FSP = 101, CS = 00.3 DEG, SEA = 4-5
LAT: 33 DEG 10 MIN 38.75 SEC S
LON: 127 DEG 50 MIN 13.22 SEC E

040540 END: Magnetometer Chart No.16, SP 789
Lines: 18x-20x, Days: 254-256, Dates: 11-13 Sept. 1990

041030 START: Magnetometer Chart No.17, SP 841.

052440 SP 1351: "Logger" not collecting data in proper sequence from serial port.

052730 SP 1371: Reboot Zenith; "Logger" recording correctly.

093620 END: Magnetic Field Tape w/Verifier No.10, SP 3152
Lines: 18-20x, Days: 253-256, Dates: 10-13 Sept. 1990

094312 START: Magnetic Field Tape w/Verifier No. 11, SP 3201

103556 EOL 20-JA90-25, LSP = 3577, COMPLETE, total (86.93 Km)
LATITUDE: 32 DEG 23 MIN 38.06 SEC S.
LONGITUDE: 127 DEG 50 MIN 30.80 SEC E.
NOTE: Several magnetic anomalies were observed near EOL.

104250 Tape, Charts and Zenith off-line 20-JA90-25

110000 END: Beam and Accelerometer Charts No. 10
Lines: 18-20, Days: 253-256, Dates: 10-13 Sept. 1990

START: Beam and Accelerometer Charts No. 11

144050 Tape, Charts, Zenith on-line 21-JA90-02

144812 SOL 21-JA90-02 A, FSP = 4611, CS = 269.1 DEG, SEA = 4
LATITUDE: 32 DEG 29 MIN 00.89 SEC S.
LONGITUDE: 127 DEG 22 MIN 22.57 SEC E.
NOTE: Shotpoints decrementing.

145500 Accelerometer chart off-line d/t paper-jam

145550 SP 4557: "Logger" not collecting data in proper sequence from serial port.

145640 SP 4551: Reboot lap-top; "Logger" recording correctly.

150200 Accelerometer chart repaired, on-line.

165620 SP 3700, Magnetometer chart malfunction, chart not advancing, chart off-line.

200000 AVB recorded on beam chart.

200750 SP 2356, "LOGGER ERROR", Data out of sequence.

200950 SP 2343, Re-boot Zenith lap-top, on-line recording data.

205700 SP 2010, Repair stripped gear in gear drive chain for magnetometer chart recorder. chart on-line.

210000 TCC recorded on beam chart.

240000 MIDNIGHT SP = 719, Total of line today (97.33 KM)

PRODUCTION TODAY = 184.26 KM
PRODUCTION TO DATE = 3197.96 KM

Friday 14 September 1990 Day 257

000000 MIDNIGHT SP = 719, Line 21-JA90-02 A, continued.

013714 EOL 21-JA90-02 A, LSP = 28, COMPLETE, Today (17.28 KM)
LAT: 32 DEG 29 MIN 37.55 SEC S.
LON: 126 DEG 09 MIN 16.43 SEC E.
Total of line (114.6 KM)

014000 Tape, Chart and Zenith off-line 21-JA90-02 A.

052320 Tape, Chart and Zenith on-line 22-JA90-13

053126 SOL 22-JA90-13, FSP = 101, CS = 180.1 DEG, SEA = 3-4
LATITUDE: 32 DEG 22 MIN 59.36 SEC. S.
LONGITUDE: 126 DEG 27 MIN 59.24 SEC. E.

053740 "LOGGER ERROR" PROBLEMS, PLEASE REFER TO "NOTE" AT EOL.

110320 END: Magnetometer Chart No. 17, SP 2431
Lines: 20x-22x, Days: 256-257, Dates: 13-14 Sept. 1990

111200 START: Magnetometer No. 18, SP 2492

121710 SP 2944 and 121730, SP 2946: Miss Shotpoints due to Navigation signal problems.

121930 SP 2962: Increment EDCON shotpoint counter by two to sync with Seismic shotpoint counter.

162940 SP 4731, Update EDCON SP counter, missed SP 4557 - 4558, d/t seismic equipment error.

200000 AVB recorded on beam chart.

210000 TCC recorded on beam chart.

223000 Water depths deeper than fathometer scale can track, taking w.d. from seismic single trace record.

231024 EOL 22-JA90-13, LSP = 7352, COMPLETE, Total (181.3 KM)
LAT: 36 DEG 00 MIN 59.32 SEC S.
LON: 126 DEG 27 MIN 46.54 SEC E.
NOTE: SEVERAL RE-BOOTS OF ZENITH LAP-TOP DURING ENTIRE LINE D/T "LOGGER ERROR". PLEASE REFER TO VERIFIER RECORD FOR ALL RE-BOOT TIMES AND SHOTPOINTS. Trouble shooting "Logger" problem at line change.

231400 Tape, charts and Zenith off-line 22-JA90-13

233000 Magnetometer sensor retrieved, standing by for line change and seismic cable work.

END:
Magnetic Field Tape w/Verifier No. 11
Lines: 20x-22, Days: 256-257, Dates: 13-14 Sept. 1990

Beam and Accelerometer Chart No. 11
Lines: 21-22, Days: 256-257, Dates: 13-14 Sept 1990

240000 MIDNIGHT - Line change

PRODUCTION TODAY = 198.58 KM
PRODUCTION TO DATE = 3396.54 KM

Saturday 15 September 1990 Day 258

000000 MIDNIGHT - Line change

010000 REF: "LOGGER ERROR" failure; Have been advised by EDCON that the baud rate maybe too high for recording. Changed baud rate from 9600 to 4800 in "Logger" program and 6200B serial I/O card.

020000 START:
Magnetic Field Tape w/Verifier No. 12
Beam and Accelerometer Chart No. 12

025500 Deploy Magnetometer sensor, signal good.

032100 Tape, charts and Zenith on-line 23-JA90-15

032947 SOL 23-JA90-15, FSP = 101, CS = 359.8 DEG, SEA = 5
LAT: 34 DEG 00 MIN 25.15 SEC S
LON: 126 DEG 40 MIN 59.58 SEC E
Working sideseas and swells.

034210 Re-boot Zenith lap-top "LOGGER ERROR"

035100 Re-boot Zenith lap-top "LOGGER ERROR"

093730 SP 2619,
END: Magnetometer Chart No. 18
Lines: 22x-23x, Days: 257-258, Dates: 14-15 Sept. 90

094150 SP 2647,
START: Magnetometer Chart No. 19

100000 Wind and seas increasing

110000 Sea state = 6-7, winds - 35 knots

133700 Observe extreme magnetic anomalies, NOTE: Unsteady vessel d/t beam/head seas causing poor steering and extreme vessel rolling and pitching.

161300 Vessel loss of one engine - rapid speed drop off.

161706 EOL 23-JA90-15, LSP = 5426, INCOMPLETE, Total (133.15 KM)
LAT: 32 DEG 48 MIN 27.41 SEC S.
LON: 126 DEG 40 MIN 41.58 SEC E.
Circle d/t loss of one vessel engine, Seismic last good shotpoint = 5401, Note: Zenith lap-top "LOGGER" program worked well this line except for the two re-boots at SOL. Operators stopped using any other wp programs while on line.

162000 Tape, charts and Zenith off-line 23-JA90-15

181000 Tape, charts and Zenith on-line 24-JA90-15 A

182202 SOL 24-JA90-15 A, FSP = 5331, CS = 359.8 DEG, SEA = 6-7
LAT: 32 DEG 49 MIN 44.22 SEC S.
LON: 126 DEG 40 MIN 43.58 SEC E.
Sea and swell conditions on this line heading causing the vessel to make severe rolling and pitching motion. Gravity data quality fair.

231022 EOL 24-JA90-15 A, LSP = 7350, COMPLETE, TOTAL (50.5 KM)
LAT: 32 DEG 22 MIN 26.96 SEC S.
LON: 126 DEG 40 MIN 38.25 SEC E.
NOTE: NO PROBLEMS WITH ZENITH LAPTOP DATA RECORDING THIS LINE.

231700 Tape, Charts and Zenith off-line 24-JA90-15 A.

240000 MIDNIGHT - Line change

PRODUCTION TODAY = 183.65 KM
PRODUCTION TO DATE = 3580.19 KM

Sunday 16 September 1990 Day 259

000000 MIDNIGHT - Line change

RE: "LOGGER" program;

It was found that "6200.cfg" file was corrupt in the c drive root directory. Copied over this file with "6200.cfg" file from the "LOGGER" boot disk. "LOGGER" Program booted up automatically with "autoexec.bat" file. This may have been our problem from the very beginning of prospect.
Changed baud rate in "serial.cgf" file and serial I/O card in 6200B, from 4800 to 9600.

023500 Tape, Charts and Zenith on-line 24-JA90-17

024659 SOL 25-JA90-17, FSP = 101, CS = 180.2 DEG, SEA = 6
LAT: 32 DEG 25 MIN 22.61 SEC S.
LON: 127 DEG 01 MIN 26.83 SEC E.
Vessel pitching and rolling d/t excessive sea and swell conditions, degrading gravity data.

065600 Vessel slews off-line; heavy beam seas.

083600 END: Magnetometer Chart No.19; SP 2580
Lines: 23x-25x, Days: 258-259, Dates: 15-16 Sept. 1990

083910 START: Magnetometer Chart No. 20; SP 2603

084120 SP 2619: Increment EDCON shotpoint counter after being told by seismic crew that SP 2615 had been missed.

084330 SP 2635: Decrease EDCON SPC after visual check showed seismic SPC was one shotpoint behind; subsequently found that missed shotpoint was within the seismic "FCS" link and had no bearing on the shotpoint counter.

105109 EOL 25-JA90-17, LSP = 3545, COMPLETE, Total: (86.13 KM.)
LATITUDE: 33 DEG 11 MIN 55.62 SEC S.
LONGITUDE: 127 DEG 01 MIN 15.73 SEC E.
Note: Degraded gravity quality due to rough seas and poor steering.

105250 Tape, Charts, Zenith off-line 25-JA90-17

150710 Tape, Charts, Zenith on-line 26-JA90-21

151503 SOL 26-JA90-21, FSP = 101, CS = 359.7 DEG, SEA = 6+
LATITUDE: 33 DEG 11 MIN 03.72 SEC S.
LONGITUDE: 127 DEG 24 MIN 30.55 SEC E.
Note: Thirty-five knot head winds and large swells make steering erratic at SOL.

151520 SP 102: Miss shotpoint on digital record due to accidentally hitting tape "autorun" switch, off and on.

161000 Due to rough sea conditions steering is very poor, vessel taking severe rolls.

200000 AVB recorded on beam chart. Continued very poor steering and extreme vessel motion.

203300 SP 2340,
END: Magnetic Field Tape w/Verifier No. 12
Lines: 23-26x, Days: 258-259, Dates: 15-16 Sept 90

203600 SP 2363,
START: Magnetic Field Tape w/Verifier No. 13

210000 TCC recorded on beam chart.

232249 EOL 26-JA90-21, LSP = 3537, COMPLETE, TOTAL (85.93 KM)
LAT: 32 DEG 24 MIN 38.25 SEC S.
LON: 127 DEG 24 MIN 17.26 SEC E.
Degraded gravity data quality due to poor steering, sea and swell conditions.

232600 Tape, charts and Zenith off-line 26-JA90-21

END:
Beam and Accelerometer Chart No. 12
Lines: 23-26, Days: 258-259, Dates: 15-16 Sept. 90
Magnetometer Chart No. 20
Lines: 25x-26, Day: 259, Date: 16 Sept 90
Magnetic Field Tape w/Verifier No. 13
Line: 26x-26, Day: 259, Date: 16 Sept. 90

240000 MIDNIGHT - Retrieving all seismic gear, for crew change.
Weekly production total 9 Sept. 240000 to 16 Sept. 240000 = 1122.03 KM

PRODUCTION TODAY = 172.06 KM
PRODUCTION TO DATE = 3752.25 KM

Monday 17 September 1990 Day 260

010000 Magnetometer sensor retrieved onboard.

013000 Servos off, beam clamped.

021500 All seismic gear onboard, heading for Esperance, Western Australia, Australia, for crew change.

083000 Send telex of weekly production report to EDCON, Denver.
Packing two boxes for data and one box with magnetometer sensor for shipment to EDCON, Denver.

240000 MIDNIGHT - In-transit to Esperance, Australia.

Tuesday 18 September 1990 Day 261

000000 In-transit to Esperance, Australia.

080000 Unclamp beam, servos on.

093000 Arrive Esperance, Australia, Grain Dock.

103000 Start Still Reading, K-Check and In-port Information No. 02

130000 Complete Still Reading, K-Check and In-port No. 02.
Location: Esperance Bulk Berth
LATITUDE: 35 DEG 52 MIN 15.84 SEC S.
LONGITUDE: 121 DEG 53 MIN 59.64 SEC E.
GRAVITY cu = 8011.8
SPRING TENSION cu = 8012.2
WATER DEPTH = 13.3 m
DOCK TO WATER = 3.1 m
METER TO WATER = 2.0 m above
METER TO DOCK = 1.3 m below
METER PRESSURE = 25.4 psi
No major adjustments made.

240000 MIDNIGHT - Standing by for crew change.

Wednesday 19 September 1990 Day 262

080000 Recheck S-Meter calibrations. Locate gravity base station ties for fial port call.

240000 Standing by for crew change and seismic equipment installation.

Thursday 20 September 1990 Day 263

013000 Depart Esperance for survey area.

200000 Replace drag chute for magnetometer, deploy magnetometer sensor and tow cable on block at end of boom for starboard gun array.

203000 Unclamp beam, servos on. Arrive survey area, standing by to deploy seismic gear.

240000 Standing by as seismic crew conducts tests.

Friday 21 September 1990 Day 264

050000 Standing by as seismic crew continues testing.

160000 Standing by for seismic cable work. Wind and rough sea conditions increasing.

200000 Heading for line JA90-23

240000 MIDNIGHT - Heading for line, weather conditions increasing rough.

Saturday 22 September 1990 Day 265

000000 MIDNIGHT - Heading for line.

063300 Tape, charts, Zenith on-line 27-JA90-23

063543 SOL 27-JA90-23, FSP = 101, CS = 180.5 DEG, SEA = 6-7
LATITUDE: 37 DEG 23 MIN 26.47 SEC S.
LONGITUDE: 127 DEG 35 MIN 24.57 SEC E.
START:
Magnetic Field Tape w/Verifier No. 14,
Magnetometer Chart No. 21,
Beam and Accelerometer Chart No. 13

065000 EOL 27-JA90-23, LSP = 180, Incomplete, (0 Km.)
LATITUDE: 37 DEG 22 MIN 22.86 SEC S.
LONGITUDE: 127 DEG 35 MIN 26.83 SEC E.
NOTE: DO NOT PROCESS; Seismic "Dummy" (Practice) Line.

070110 Tape, Charts, Zenith off-line 27-JA90-23
Marginal weather; high winds and seas. Circle to attempt Line 28-JA90-19.

124800 Tape, Charts, Zenith on-line 28-JA90-19

125713 SOL 28-JA90-19, FSP = 101, CS = 00.4 DEG, SEA = 6-7
LATITUDE: 33 DEG 56 MIN 17.60 SEC S.
LONGITUDE: 127 DEG 11 MIN 47.60 SEC E.
NOTE: Forty knot winds and high seas at SOL; steering poor.

125750 Miss shotpoint 105

130050 SP 123: Increment EDCON shotpoint counter to sync with seismic shotpoint counter.

133250 EOL 28-JA90-19, LSP = 326, INCOMPLETE, (0.0 Km.)
LATITUDE: 33 DEG 53 MIN 15.00 SEC S.
LONGITUDE: 127 DEG 11 MIN 51.44 SEC E.
NOTE: "DO NOT PROCESS". Abort line d/t rough sea conditions, too rough for seismic data line will be reshot.

133820 Tape, Charts, Zenith off-line 28-JA90-19.

151410 Tape, Charts, Zenith on-line 29-JA90-19 A.

152325 SOL 29-JA90-19 A, FSP = 1001, CS = 00.4, SEA = 6-7
LATITUDE: 33 DEG 44 MIN 07.46 SEC S.
LONGITUDE: 127 DEG 11 MIN 53.07 SEC E.
NOTE: High winds, heavy seas at SOL degrading gravity data.

152350 SP 1003: Shotpoint missed.

152420 SP 1007: Increment EDCON shotpoint counter to sync with seismic shotpoint counter.

153000 Accelerometer not feeding paper correctly.

153500 Accelerometer working smoothly.

183000 Poor steering d/t rough sea and swell conditions. Vessel has high vibration a) when pounding into the waves b) when sliding down the back side of high seas and swells.

200000 AVB recorded on beam chart.

210000 TCC recorded on beam chart.

240000 MIDNIGHT SP 4363, total of line today (84.08 KM)

PRODUCTION TODAY = 84.08 KM
PRODUCTION TO DATE = 3836.27 KM

Sunday 23 September 1990 Day 266

000000 MIDNIGHT SP 4363, Line 29-JA90-19 A, continued, slightly increase speed 5.4 to 5.9 knots. Weather and sea conditions improving.

003000 Slightly reduce speed 5.9 to 5.4 knots.

061327 EOL 29-JA90-19 A, LSP = 6984, INCOMPLETE, today (65.63 KM)
Total of line = 149.60 Km.
LATITUDE: 32 DEG 23 MIN 35.80 SEC S.
LONGITUDE: 127 DEG 12 MIN 31.22 SEC E.
Magnetometer data 2-4 gamma noise d/t sea conditions.

061730 Tape, Charts, Zenith off-line 29-JA90-19 A

113400 Tape, Charts, Zenith on-line 30-JA90-23 A

114153 SOL 30-JA90-23 A, FSP = 101, CS = 180.5 DEG, SEA = 4-5
LATITUDE: 32 DEG 16 MIN 42.49 SEC S.
LONGITUDE: 127 DEG 36 MIN 45.25 SEC E.

114220 Miss SP's 102 and 103

114240 Increment EDCON shotpoint counter two shotpoints to sync with seismic counter at SP 107.

122500 Observe magnetic anomaly.

134230 END: Magnetometer Chart No. 21, SP 945
Lines: 27-30x, Days: 265-266, Dates: 22-23 Sept. 1990

134500 Observe another magnetic anomaly.

134620 START: Magnetometer Chart No. 22, SP 973

153000 Observe magnetic anomaly.

183000 Extreme magnetic anomalies continue.

192940 SP 3387, Update EDCON SP counter missed SP's 3261 and 3262.

200000 AVB recorded on beam chart.

210000 TCC recorded on beam chart.

220000 Seas and wind increasing.

23500 Decrease speed 5.9 to 5.4 knots

240000 MIDNIGHT SP 5340, total of line today (131.0 KM)
Weekly production 16 Sept. 2400Z to 23 Sept. 2400Z, total for the week - 280.65 KM

PRODUCTION TODAY = 196.63 KM
PRODUCTION TO DATE = 4032.90 KM

Monday 24 September 1990 Day 267

000000 MIDNIGHT SP 5340, Line 30-JA90-23 A, continued.

011350 SP 5843, Update EDCON SP counter, 4 missed SP's 5833,5834,5835 and 5836

024000 SP 6426,
END: Magnetic Field Tape w/Verifier No. 14
Lines: 27-30x, Days: 265-267, Dates: 22-24 Sept 90

024320 START: Magnetic Field Tape w/Verifier No. 15

030500 END: Beam and Accelerometer Chart No. 13
Lines: 27-30x, Days: 265-267, Dates: 22-24 Sept. 90

031000 START: Beam and Accelerometer Chart No. 14

033000 Wind and seas increasing, degrading gravity data.

080320 END: Magnetometer Chart No. 22, SP 8417
Lines: 30x-30x, Days: 266-267, Dates: 23-24 Sept. 1990

080910 START: Magnetometer Chart No. 23, SP 8451

083000 Telex weekly production report to EDCON, Denver.

112412 EOL 30-JA90-23 A, LSP = 9580, COMPLETE, today (106.0 KM)
Total of line - 237.0 Km.
LATITUDE: 34 DEG 24 MIN 23.99 SEC S.
LONGITUDE: 127 DEG 35 MIN 24.16 SEC E.
Gravity degraded d/t rough sea conditions. Magnetometer slightly noisy 3-5 gamma d/t rough sea conditions.

113000 Tape, Charts and Zenith off-line 30-JA90-23 A

123000 Magnetometer sensor retrieved and secured on board for long line change.

124000 Servos off, beam clamped.

203000 Unclamp beam, servos on.

210000 Deploy magnetometer sensor, signal good.

240000 MIDNIGHT - Line change

PRODUCTION TODAY = 106.00 KM
PRODUCTION TO DATE = 4138.90 KM

Tuesday 25 September 1990 Day 268

000000 MIDNIGHT - Line change

002500 Tape, Charts and Zenith on-line 31-JA90-31

003213 SOL 31-JA90-31, FSP = 101, CS = 000 DEG, SEA = 6-7
LAT: 33 DEG 48 MIN 13.99 SEC S.
LON: 128 DEG 28 MIN 57.40 SEC E.
Sea conditions - rough, Water depth off fathometer scale obtain value from seismic camera records. Decreasing speed at SOL 5.5 to 4.5 knots.

023000 Water depth recorded from fathometer.

033000 Increase speed 4.5 to 5.0 knots.

034330 SP 1202: Gravity meter malfunctions; meter down. Continue to record magnetic data. Beam clamped servos off.

034400 Gravity malfunction due to optic chopper motor failure.

035253 EOL 31-JA90-31, LSP = 1261, INCOMPLETE, total (29.03 KM) gravity total = 27.55 KM, magnetometer total = 29.03 Km., a loss of 1.45 Km of gravity data.
LATITUDE: 33 DEG 32 MIN 32.92 SEC S.
LONGITUDE: 128 DEG 28 MIN 54.31 SEC E.
Line aborted due to loss of navigation signals.

NOTE: The seismic overlap, due to circle for navigation, will overlap the portion of the line that has missed gravity data.

040930 Tape, charts, Zenith off-line 31-JA90-31

041000 Torque motors off, 400 HZ off.

Note: Gravity meter optic chopper motor was replaced while circling to resume line.

051000 400 HZ on, Torque motors on, platform stabilizing.

051500 Unclamp beam, servos on

053000 Gravity meter again functioning normally.

054020 Tape, Charts, Zenith on-line 32-JA90-31 A

055500 SOL 32-JA90-31 A, FSP = 1191, CS = 000 DEG, SEA = 6-7
LATITUDE: 33 DEG 33 MIN 29.71 SEC S.
LONGITUDE: 128 DEG 28 MIN 54.45 SEC E.

Note: The first shotpoint on Line 32-JA90-31 A was SP 1191, that means shotpoints 1202 through 1261 from Line 31-JA90-31 was re-shot due seismic overlap. With the gravity meter again operational, gravity data for shotpoints 1202 through 1261 was acquired in the Line overlap, and no gravity data was lost.

060000 Ship course erratic due to large swells and rolling.

143000 Observe extreme magnetic anomaly.

160000 Continue extreme magnetic anomalies.

170329 EOL 32-JA90-31 A, LSP = 5911, INCOMPLETE, circle d/t seismic equipment failure, Total (118.03 Km)
LAT: 32 DEG 29 MIN 38.52 SEC S.
LON: 128 DEG 28 MIN 46.06 SEC E.
Seismic last good shotpoint = 5901

170500 Tape, Charts and Zenith off-line 32-JA90-31 A

END: Magnetometer Chart No. 23
Lines: 30x-32, Days: 267-268, Dates: 24-25 Sept 90

START: Magnetometer Chart No. 24

202300 Tape, Charts and Zenith on-line 33-JA90-31 B

202845 SOL 33-JA90-31 B, FSP = 5841, CS = 000 DEG, SEA = 6
LAT: 32 DEG 30 MIN 35.85 SEC S.
LON: 128 DEG 28 MIN 45.51 SEC E.

210000 AVB recorded on beam chart.

220000 TCC recorded on beam chart. Observe magnetic anomalies.

240000 MIDNIGHT SP 7327, total of line today (37.18 KM).

PRODUCTION TODAY = 184.24 KM
PRODUCTION TO DATE = 4323.14 KM

Wednesday 26 September 1990 Day 269

000000 MIDNIGHT SP 7327, Line 33-JA90-31 B, continued.

010037 EOL 33-JA90-31 B, LSP = 7768, COMPLETE, today (11.03 KM)
Total of line = 48.20 KM.
LAT: 32 DEG 04 MIN 32.38 SEC S.
LON: 128 DEG 28 MIN 42.74 SEC E.

010400 Tape, Charts and Zenith off-line 33-JA90-31 B

END:
Magnetic Field Tape w/Verifier No. 15
Lines: 30x-33, Days: 267-269, Dates: 24-26 Sept 90

Beam and Accelerometer Chart No. 14
Lines: 30x-33, Days: 267-269, Dates: 24-26 Sept 90

START:
Magnetic Field Tape w/Verifier No. 16
Beam and Accelerometer No. 15

061250 Tape, Charts, Zenith on-line 34-JA90-35

061942 SOL 34-JA90-35, FSP = 101, CS = 180 DEG, SEA = 4
LATITUDE: 31 DEG 52 MIN 17.47 SEC S.
LONGITUDE: 128 DEG 54 MIN 26.81 SEC E.
Note: Several magnetic anomalies were observed in the Northern portion of this line.

073000 Speed and steering erratic due to pitching motion of ship.

132202 EOL 34-JA90-35, LSP = 2920, INCOMPLETE, total (70.50 Km.)
LATITUDE: 32 DEG 30 MIN 48.14 SEC S.
LONGITUDE: 128 DEG 54 MIN 22.43 SEC E.
ABORT line due to seismic recording system failure.
Circling to resume line.

133120 Tape, Charts, Zenith off-line 34-JA90-35

150550 Tape, Charts, Zenith on-line 35-JA90-35 A

151323 SOL 35-JA90-35 A, FSP = 2851, CS = 180 DEG, SEA = 5
LATITUDE: 32 DEG 29 MIN 49.40 SEC S.
LONGITUDE: 128 DEG 54 MIN 21.72 SEC E.

154830 EOL 35-JA90-35 A, INCOMPLETE, (0.0 Km.)
ABORT Line due to seismic recording system failure.
NOTE: "DO NOT PROCESS"

155720 Tape, Chart, Zenith off-line 35-JA90-35 A

170000 Retrieve magnetometer cable and sensor, standing by for seismic cable work.

193000 Deploy magnetometer cable and sensor, signal good. Seismic cable work complete; heading for line.

212000 Tape, charts and Zenith on-line 36-JA90-35 B

212428 SOL 36-JA90-35 B, FSP = 2851, CS = 180 DEG, SEA = 4-5
LAT: 32 DEG 29 MIN 49.42 SEC S.
LON: 128 DEG 54 MIN 22.33 SEC E.
Heading into large heavy swells causing extreme pitching of vessel, degrading gravity and magnetometer data. Observe magnetic anomalies.

220000 AVB recorded on beam chart.

230000 TCC recorded on beam chart, continue observation of extreme magnetic anomalies.

240000 MIDNIGHT SP 3915, Observe several magnetic anomalies since SOL. total of line today (26.63 Km)

PRODUCTION TODAY = 108.18 KM
PRODUCTION TO DATE = 4431.32 KM

Thursday 27 September 1990 Day 270

000000 MIDNIGHT SP 3915, Line 36-JA90-35 B, continued.

012100 SP 4489,
NOTE: After reviewing data recorded to laptop it found there was malfunction in recording sequence.

014930 SP 4691,
Data record to laptop recording in proper sequence. Reason for malfunction may have been using too many WP functions while data was recording in back ground.

023700 SP 5021, END: Magnetometer Chart No. 24
Lines: 33-36x, Days: 268-270, Dates: 25-27 Sept. 90

023900 SP 5035, START: Magnetometer Chart No. 25.

040000 Ship speed and course erratic due to very large swells.

043210 SP 5836: Miss shotpoints 5837 through 5843

070350 NOTE: SP 6881, Increment EDCON shotpoint counter "SEVEN" shotpoints to sync with seismic system counter.

093000 Ship slowing for delayed shot relay time due to extreme water depth.

151936 EOL 36-JA90-35 B, LSP = 9953, COMPLETE, today (150.95 Km)
Total of line - 177.58 Km.
LATITUDE: 34 DEG 05 MIN 51.71 SEC S.
LONGITUDE: 128 DEG 54 MIN 14.56 SEC E.

152200 Tape, Charts, Zenith off-line 36-JA90-35 B
Beam clamped, servos off.

160000 Magnetometer sensor retrieved for long line change.

240000 MIDNIGHT - Line change

PRODUCTION TODAY = 150.95 KM
PRODUCTION TO DATE = 4582.27 KM

Friday 28 September 1990 Day 272

000000 MIDNIGHT - Line change

004500 Unclamp beam, servos on

015000 Deploy magnetometer sensor, signal good.

031700 Tape, Charts, and Zenith on-line 37-JA90-19 A

032457 SOL 37-JA90-19 A, FSP = 101, CS = 000 DEG, SEA = 5
LAT: 33 DEG 56 MIN 17.75 SEC S.
LON: 127 DEG 11 MIN 48.68 SEC E.
Large swells coming from the rear causing the vessel to pitch forward.

041500 Increase ship speed 0.5 knot.

053920 Poor steering affecting data.

054500 Again increase ship speed by 0.5 knot.

062321 EOL 37-JA90-19 B, LSP = 1191, COMPLETE, (27.28 Km.)
LATITUDE: 33 DEG 41 MIN 37.76 SEC S.
LONGITUDE: 127 DEG 11 MIN 54.20 SEC E.

062700 Tape, Charts, Zenith off-line 37-JA90-19 A

END:
Magnetic Field Tape w/Verifier No. 16
Lines: 34-37, Days: 269-271, Dates: 26-28 Sept. 1990

Beam and Accelerometer Charts No. 15
Lines: 34-37, Days: 269-271, Dates: 26-28 Sept. 1990

Magnetometer Chart No. 25
Lines: 36x-37, Days: 270-271, Dates: 27-28 Sept 90

START:
Magnetic Field Tape w/Verifier No. 17
Beam and Accelerometer Charts No. 16
Magnetometer Chart No. 26

081000 Beam clamped, servos off for long line change.

143000 Magnetometer retrieved, stand by for seismic cable work.

183000 Complete seismic cable work, unclamp beam, servos on.

190000 Deploy magnetometer sensor, signal good.

202800 Tape, Charts and Zenith on-line 38-JA90-04

203415 SOL 38-JA90-04, FSP = 101, CS = 269.3 DEG, SEA = 5-6

204100 EOL 38-JA90-04, Terminate line d/t seismic cable failure, Tape, Charts and Zenith off-line 38-JA90-04, "DO NOT PROCESS" TOTAL (00.0 KM)

211500 Retrieve magnetometer sensor,

223000 Servos off, clamp beam, Standing by for seismic cable work.

240000 MIDNIGHT - Standing by for seismic cable work.

PRODUCTION TODAY = 27.28 KM
PRODUCTION TO DATE = 4609.55 KM

Saturday 28 September 1990 Day 272

000000 MIDNIGHT - Standing by for seismic cable work.
020000 Unclamp beam,servos on

031500 Deploy magnetometer sensor, signal good. Seismic cable work complete heading for line.

045850 Tape, Charts, Zenith on-line 39-JA90-04 A

050603 SOL 39-JA90-04 A, FSP = 101, CS = 269.3 DEG, SEA = 4
LATITUDE: 32 DEG 41 MIN 45.20 SEC S.
LONGITUDE: 127 DEG 16 MIN 51.96 SEC E.
Note: Several magnetic anomalies were observed near beginning of line.

204613 EOL 39-JA90-04 A, LSP = 6774, COMPLETE, total (166.85 KM)
LAT: 32 DEG 42 MIN 10.10 SEC S
LON: 125 DEG 30 MIN 07.49 SEC E

205000 Tape, Charts, and Zenith off-line 39-JA90-04 A

END: Magnetometer Chart No. 26
lines; 38-39, Days: 271-272, Dates: 28-29 Sept. 90

START: Magnetometer Chart No. 27

240000 MIDNIGHT - Line change

PRODUCTION TODAY = 166.85 KM
PRODUCTION TO DATE = 4776.40 KM

Sunday 30 September 1990 Day 273

001800 Tape, Charts, and Zenith on-line 40-JA90-01

002330 SOL 40-JA90-01, FSP = 101, CS = 180.5 DEG, SEA = 4
LAT: 32 DEG 49 MIN 12.47 SEC S.
LON: 125 DEG 08 MIN 12.66 SEC E.

040000 Wind and seas increasing. Force - 5

121513 EOL 40-JA90-01, LSP = 5101, INCOMPLETE,total (125.03 Km.)
LATITUDE: 33 DEG 56 MIN 51.79 SEC S.
LONGITUDE: 125 DEG 07 MIN 26.92 SEC E.
ABORT line due to seismic recording system failure.
Circling to resume line

122330 Tape, Charts, Zenith off-line 40-JA90-01

140240 Tape, Charts, Zenith on-line 41-JA90-01 A

141044 SOL 41-JA90-01 A, FSP = 5031, CS = 180.5, SEA = 4

141537 EOL 41-JA90-01 A, Terminate line due to seismic recording system failure.
"DO NOT PROCESS" Total(0.0 Km.)
Circling to resume line

142200 Tape, Charts, Zenith off-line 41-JA90-01 A

154950 Tape, Charts and Zenith on-line 42-JA90-01 B

155600 Tape, Charts and Zenith off-line 42-JA90-01 B
Abort line before first shotpoint d/t seismic system failure. Circle to resume line.

END:
Magnetic Field Tape w/Verifier No. 17
Lines: 38-41, Days: 271-273, Dates: 28-30 Sept. 90

Beam and Accelerometer Chart No. 16
Lines: 38-41, Days: 271-273, Dates: 28-30 Sept 90

START:
Magnetic Field Tape w/Verifier No. 18
Beam and Accelerometer Chart No. 17

203410 Tape, Charts and Zenith on-line 42-JA90-01 B

203726 SOL 42-JA90-01 B, FSP = 5031, CS = 180.5, SEA = 5-6
LAT: 33 DEG 55 MIN 54.99 SEC S.
LON: 125 DEG 07 MIN 28.10 SEC E.

203820 Update EDCON SP counter, FSP value set to counter was incorrect at SOL, SP 5036 in sync with seismic SP's.

210000 AVB recorded on beam chart, Seas increasing

220000 TCC recorded on beam chart.

221500 Magnetometer stripchart not advancing properly to EOL.

222222 EOL 42-JA90-01 B, LSP = 5756, COMPLETE, TOTAL (18.15 KM)
LAT: 34 DEG 05 MIN 44.04 SEC S.
LON: 125 DEG 07 MIN 22.36 SEC E.

222500 Tape, Charts and Zenith off-line 42-JA90-01 B

240000 MIDNIGHT - Line change.
Weekly production total - (2400 Z) 23 Sept. to (2400 Z) 30 Sept. = 886.68 Km.

PRODUCTION TODAY = 143.18 KM
PRODUCTION TO DATE = 4919.58 KM

Monday 1 October 1990 Day 274

012020 Tape, Charts and Zenith on-line 43-JA90-03

012616 SOL 43-JA90-03, FSP = 101, CS = 000 DEG, SEA = 5
LAT: 34 DEG 10 MIN 59.84 SEC S
LON: 125 DEG 21 MIN 49.05 SEC E
Gravity and magnetometer data degraded d/t sea and swell conditions. Vessel seems to have a high frequency vibration effecting accelerometers and spring tension signals.

040000 Sea and swell conditions with cross currents continue to affect gravity and magnetometer data.

050250 END: Magnetometer Chart No. 27, SP 1548
Lines: 40-43x, Days: 273-274, Dates: 30 Sept.-1 Oct. 1990

050610 START Magnetometer Chart No. 28 SP 1571

073000 Magnetometer chart malfunction. Chart not advancing properly.

090000 NOTE: Magnetometer chart working, but at a speed of"two"inches per minute, as at this time cannot force it to work at the normal rate of one inch per minute.

100000 Seas settling down; data quality improves.

164405 EOL 43-JA90-03, LSP = 6430, COMPLETE, Total (158.25 KM)
LAT: 32 DEG 44 MIN 02.89 SEC S.
LON: 125 DEG 22 MIN 43.07 SEC E.

164800 Tape, Charts and Zenith off-line 43-JA90-03

END: Magnetometer Chart No. 28
Line: 43x-43, Day: 274, Date: 1 Oct 90

START: Magnetometer Chart No. 29

Unable to repair magnetometer chart recorder during line change, stripped gears in gear chain - no replacements.

193700 Tape, charts and Zenith on-line 44-JA90-05

194533 SOL 44-JA90-05, FSP = 101, CS = 180 DEG, SEA = 4-5
LAT: 32 DEG 38 MIN 54.05 SEC S
LON: 125 DEG 36 MIN 34.15 SEC E
NOTE: No magnetometer stripchart record, chart recorder out-of-order.

220000 AVB record on beam chart.

230000 TCC recorded on beam chart

240000 MIDNIGHT SP 1883, Total of line today (44.58 Km)

PRODUCTION TODAY = 202.83 KM
PRODUCTION TO DATE = 5122.41 KM

Tuesday 2 October 1990 Day 275

000000 MIDNIGHT SP 1883, Line 44-JA90-05, continued.

023000 Fluctuating speed affecting data.

071330 END:
Magnetic Field Tape w/Verifier No.18, SP 4843
Lines: 42-44x, Days: 273-275, Dates: 30 Sept.- 2 Oct.1990

Note: No "End Of File" marks were made at end of tape.

071940 START: Magnetic Field Tape w/Verifier No.19, SP 4884

073000 Rising seas affecting data.

113340 END:
Beam and Accelerometer Chart No. 17, SP 6582
Lines: 42-44x, Days: 273-275, Dates: 30 Sept.- 2 Oct.1990

114120 START: Beam and Accelerometer Chart No. 18, SP 6634

120350 Replace Spring Tension trace pen.

130101 EOL: 44-JA90-05, LSP = 7145, COMPLETE, today (131.55 Km)
Total of line (176.13 Km.)
LATITUDE: 34 DEG 14 MIN 10.60 SEC S.
LONGITUDE: 125 DEG 36 MIN 19.19 SEC E.
NOTE: NO magnetometer stripchart record, chart recorder permanently out-of-order.

132250 Tape, Charts,and Zenith off-line 44-JA90-05

152940 Tape , Charts and Zenith on-line 45-JA90-07

154003 SOL 45-JA90-07, FSP = 101, CS = 000 DEG, SEA = 5-6
LAT: 34 DEG 09 MIN 18.30 SEC S
LON: 125 DEG 49 MIN 07.50 SEC E

173500 Slight speed increase 0.3 kt.

200000 AVB recorded on beam chart.

210000 TCC recorded on beam chart.

240000 MIDNIGHT SP 3335, total of line today (80.88 KM)

PRODUCTION TODAY = 212.43 KM
PRODUCTION TO DATE = 5334.84 KM

Wednesday 3 October 1990 Day 276

000000 MIDNIGHT SP 3335, Line 45-JA90-07, continued.

071500 Ship's speed drops 0.4 knots

092013 EOL 45-JA90-07, LSP = 7344, COMPLETE, today (100.23 Km)
Total of line - 181.10 Km.
LATITUDE: 32 DEG 31 MIN 19.36 SEC S.
LONGITUDE: 125 DEG 49 MIN 17.07 SEC E.

092440 Tape, Charts, Zenith off-line 45-JA90-07

121120 Tape, Charts, Zenith on-line 46-JA90-09 B

121937 SOL 46-JA90-09B, FSP = 101, CS = 180 DEG, SEA = 5

122243 EOL 46-JA90-09 B, Terminate line due to seismic airgun system control fault.
NOTE: "DO NOT PROCESS" Total:(0.0 Km.)

122850 Tape, Charts, Zenith off-line 46-JA90-09 B

151710 Tape, Charts, Zenith on-line 47-JA90-09 C

152456 SOL 47-JA90-09 C, FSP = 101, CS = 180 DEG, SEA = 5
LATITUDE: 32 DEG 24 MIN 38.61 SEC S.
LONGITUDE: 126 DEG 01 MIN 29.49 SEC E.

164500 Decrease speed 5.9 to 5.0 kt.

164600 Increase speed 5.0 to 5.5 kt.

17000 Receive telex from EDCON office confirming all EDCON gravity - magnetometer equipment and supplies (except onboard magnetometer cable) will be demobilized at end of survey.

200000 AVB recorded on beam chart.

210000 TCC recorded on beam chart.

240000 MIDNIGHT SP 3680, total of line today (89.5 Km)

PRODUCTION TODAY = 189.73 KM
PRODUCTION TO DATE = 5524.57 KM

Thursday 4 October 1990 Day 277

000000 MIDNIGHT SP 3680, Line 47-JA90-09 C, continued

000030 SP 3683,
END: Magnetic Field Tape w/Verifier No. 19
Lines: 44x-47x, Days: 275-277, Dates: 2-4 Oct 90
NOTE: NO "END-OF-FILE" RECORD AT END OF TAPE

000400 SP 3708,
START: Magnetic Field Tape w/Verifier No. 20

015633 EOL 47-JA90-09 C, LSP = 4491, COMPLETE, today (20.28 Km)
Total of line - 109.78 Km
LAT: 33 DEG 24 MIN 01.33 SEC S.
LON: 126 DEG 01 MIN 12.88 SEC E.

COMPLETE FINAL SURVEY LINE.

020000 Tape, Charts and Zenith off-line 47-JA90-09 C

END:
Magnetic Field Tape w/Verifier No. 20
Line: 47x-47, Day: 277, Date: 4 Oct 1990

Beam and Accelerometer Chart No. 18
Lines: 44x-47, Days: 275-277, Dates: 2-4 Oct. 90

Final 3.5 in. Diskette No. 13
Lines: 44x-47, Days: 275-277, Dates: 2-4 Oct. 90

024500 Retrieve magnetometer sensor and cable, prepare to demobilize cable from power winch

031000 Servos off, clamp beam. Retrieving all seismic gear.

043000 All seismic gear onboard, heading for Esperance,W.A., Preparing all gravity and magnetometer gear for demobilizing.

240000 Enroute to Esperance, W.A.

PROTUCTION TODAY = 20.28 KM
PRODUCTION TO DATE = 5544.85 KM

END PRODUCTION OF SURVEY

Friday 5 October 1990 Day 278

000000 Enroute to Esperance, Western Australia, continue packing for demobilization.

050000 Unclamp beam, servos on

091500 Arrive Esperance dock side.

094500 Begin final Still Reading, K-Check, and In-Port Information Log No. 03.

120000 Complete final Still Readding No. 03.

130000 Begin complete demobilization of gravity and magnetometer equipment.

190000 Complete packing equipment in shipping boxes. Standing by for crain operator and truck to off load equipment from vessel.

Saturday 6 October 1990 Day 278

010000 Begin off loading equipment from vessel.

030000 Complete off loading gravity and magnetometer equipment. Stitzer and Ward move to hotel in Esperance.

040000 Land gravity meter from GEOTERREX S/N 617 connected to heat in hotel room.

060000 Land meter up to heating temperature, find condinsation in level glass and eletrostatic meter. Remove lid of gravity meter to let meter dry out and clean up moisture.

120000 G-Meter appears to be dry. Attempt first loop of gravity land base station tie to Esperance Airport. Weather poor very windy and rain. Meter unstable due to wind. Will continue loops in the morning when weather is to improve.

210000 Weather much improved. G-Meter stable, continue base tie.

Sunday 7 October 1990 Day 280

010000 End gravity base station tie.

030000 Stitzer and Ward depart Esperance, flight to Perth. Gravity and magnetometer shipment depart by truck for Perth.

063000 Arrive Perth, Stitzer and Ward check into Hotel. Standing by for gravity and magnetometer equipment to arrive HGS office.

Monday 8 October 1990 Day 281

020000 Arrive HGS office Wangara, Australia (Perth).

040000 All equipment unloaded from truck.

080000 Complete separation of gravity and magnetometer shipments. Magnetometer shipped to THE NETHERLANDS, gravity data and data system shipped to Denver. Gravity meter S-31 stored in HGS warehouse.

Tuesday 9 October 1990 Day 282

020000 Ward depart Perth for return to Denver. Stitzer returns to HGS office, clear all documents for gravity and magnetometer shipments.

043000 Remove gravity element from shiping box, connect auxiliary to element.

Wednesday 10 October 1990 Day 283

030000 Return to HGS office to repair malfunctioning auxiliary heater.

053000 Auxiliary heater repaired. Element stored in HGS warehouse and on heat.

Thursday 11 October 1990 Day 284

150000 Stitzer departs Perth, Australia for Denver, Colorado.

END DAILY LOG