TORRENS ENERGY LIMITED

Geophysical Operations and Data Report

09TE-01

Due Date for Submission: 23th January 2010

Submitted by – Bruce Godsmark

Contents

1. Introduction

Torrens Energy is an explorer for geothermal resources and has identified an inferred resource in the area between Lake Torrens and the Flinders Ranges in the vicinity of Parachilna. In order to progress this project and identify a target for deep (> 4km) drilling the Parachilna seismic survey was conducted.

The Parachilna Seismic Survey 09TE-01 was completed over 2 days, on the 22nd and 23rd of January 2009.

2. Objectives of the Activity

The seismic survey was designed as a 40km 2-D seismic survey with a primary aim of determining the depth crystalline basement and a secondary aim of resolving specific sedimentary packages between the surface and the crystalline basement.

3. Geophysical Exploration History

Regional magnetic and gravity surveys are available for the area between Lake Torrens and the Flinders Ranges but no seismic surveys have been completed in the area.

4. Location of Survey

The seismic survey was located in the Northern Flinders Ranges in the vicinity of the "town" of Parachilna. The survey took place on GEL230, GEL278 and AFL 152. The survey extended from Lakes Torrens in the west to the Flinders Ranges range front to the east, figure1and Figure 2.

The survey was conducted on existing station tracks and public roads.

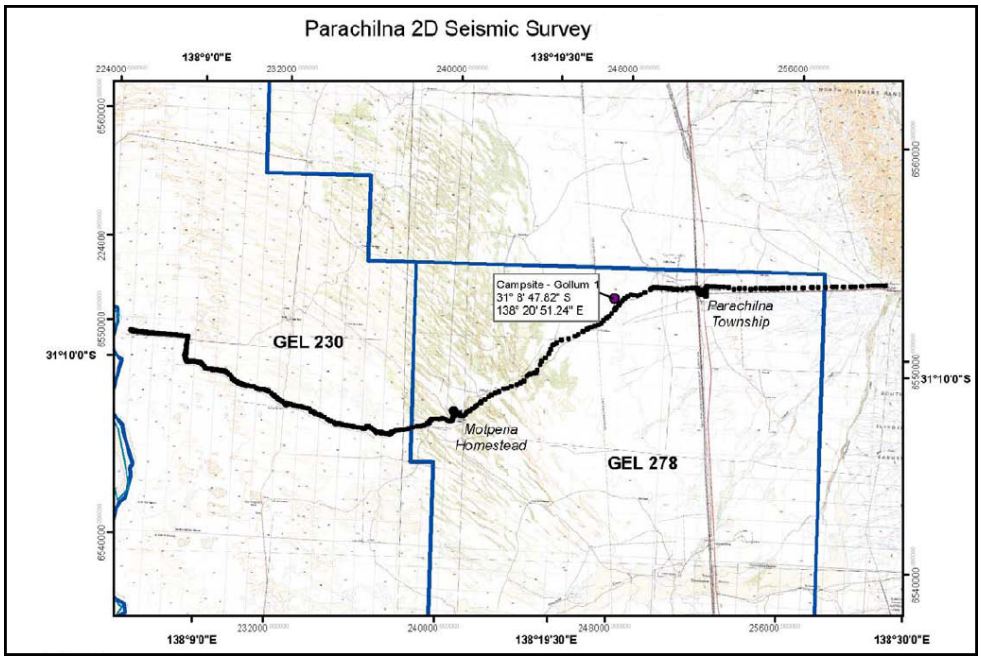

Figure 1: Location map for seismic line 09TE-01

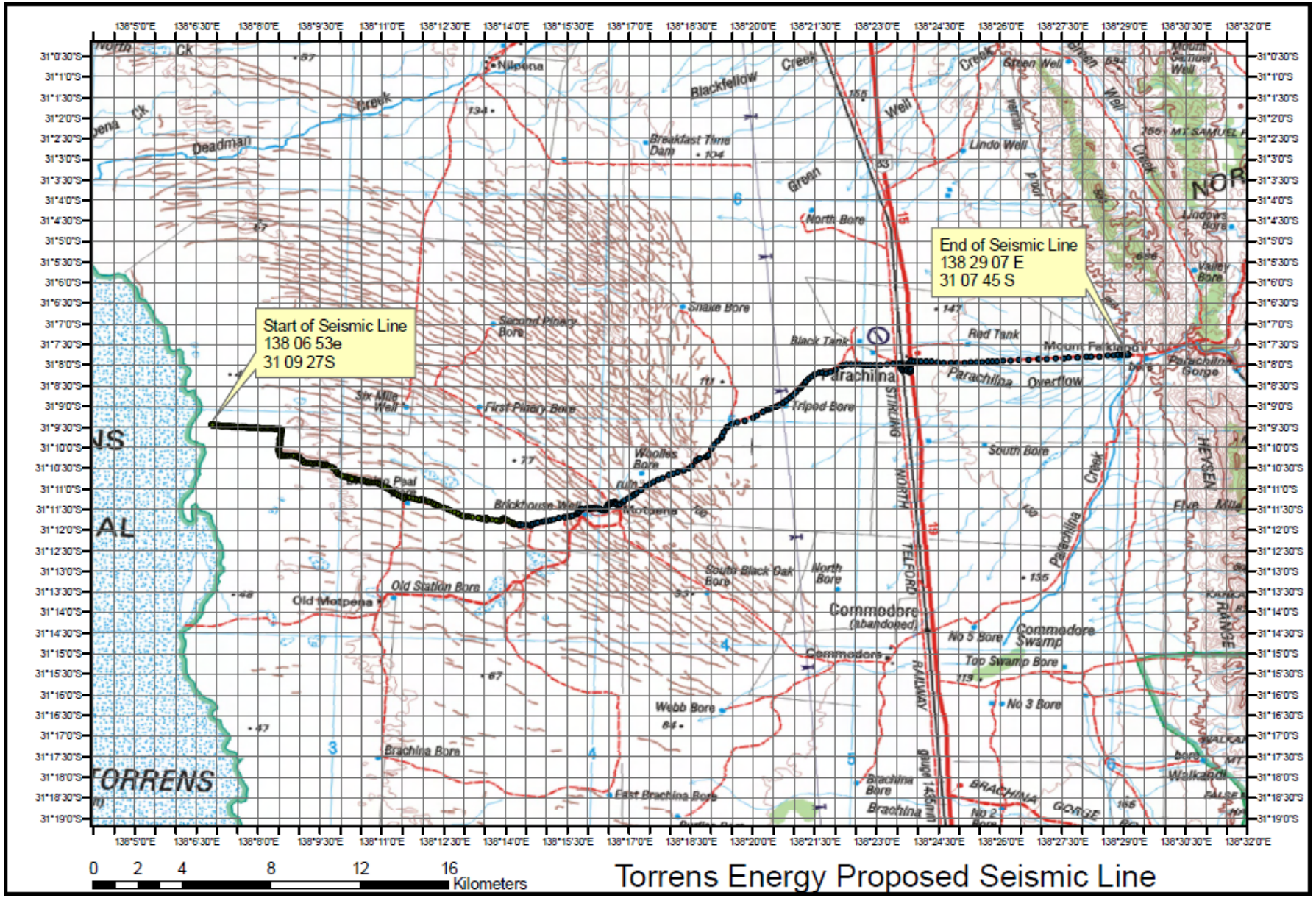

Figure 2: Detailed location map for seismic line 09TE-01

5. Planning Methodology

The location for Parachilna Seismic survey was planned using topographic maps of 1:250,000, 1:100,000 scale and google maps. To allow easy access to the area existing roads were chosen for the proposed seismic survey.

To ensure that there was no detrimental impact to the environment, and to satisfy statutory regulations the seismic survey being reported on was completed under the SEO entitled " Sapex Limited, Arckaringa Basin Geophysical Operations Statement of Environmental Objectives October 2007".

6. Consultation

A number of "land owners" have an interest in the area. These include, pastoral leases, traditional owners and mineral and petroleum exploration companies. Prior to operations commencing all land owners were informally contract and then a "notice of entry" document was served on the land owner at least 21 days prior to the work being undertaken. A list of the contact land owners is shown below.

- Daryl and Barbara Fels, Motpena Statino
- Peter Short, Department of Transportation, Energy & Infrastructure
- Flinders power partners
- Salisbury Exploration
- Andyamathana #1 Native Title Claimants

7. Survey Activities

Line Surveying

Surveying was undertaken by Dynamic Satellite Surveys between the 5th and 7th of January 2009.

A detailed survey operations report describing is attached as appendix 1.

Data acquisition

Acquisition of the 2-D seismic survey data occurred on the 21st and 23rd of January 2009. No up hole surveying was undertaken. A detailed operations report describing the recording parameters, equipment used and daily production reports is attached as appendix 2.

Bill Forster acted as Torrens Energies representative and "bird dog" for the duration of the survey, his report outlining observations, comments and recommendations is included as appendix 3.

Data Processing:

Processing of Seismic line 09TE-01 was undertaken by Mario Vecchi of Velseis Processing Pty Ltd. Processing took place during January and February 2009.

A detailed processing report describing testing, processing and archiving is attached as appendix 4.

8. Digital Data

The tables below shows the location of the digital data provided so as to comply with section 37 of the Petroleum and Geothermal Energy Regulations 2000 and the Guidelines for submission of Geophysical Data.

List of digital data and types

Torrens Energy - Parachilna 2D										
Contractors	**TYPE**	**Tape #**	**#ID**	**Line**	**First FFID**	**Last FFID**	**First VP**	**Last VP**	**Date Recorded**	**Comments**
Terrex Seismic	TAPE	1	1B	09TE-01	1	190	1000.5	1189.5	22-Jan-09	See Observers Logs
Terrex Seismic	TAPE	2	2B	09TE-01	191	360	1193.5	1370.5	22-Jan-09	See Observers Logs
Terrex Seismic	TAPE	3	3B	09TE-01	361	492	1371.5	1510.5	22-Jan-09	See Observers Logs
Terrex Seismic	TAPE	4	4B	09TE-01	493	652	1511.5	1671.5	23-Jan-09	See Observers Logs
Terrex Seismic	TAPE	5	5B	09TE-01	653	812	1672.5	1842.5	23-Jan-09	See Observers Logs
Terrex Seismic	TAPE	6	6B	09TE-01	813	989	1843.5	2019.5	23-Jan-09	See Observers Logs
Velseis	CD	DATA PROCESSING REPORT, TORRENS ENERGY LIMITED, 2009 PARACHILNA 2D, SEISMIC SURVEY								
Dynamic Satelite Surveys	CD	Final Operations Report on the 2009 Parachilna 2D Seismic Survey								

Data Required	Format	Data Due Date	Remarks	Notes regarding compliance and data submitted to meet the regulations and guidelines
FIELD DATA				
Shot point location data Must include final processed coordinate listings including elevation/bathymetry data	UKOOA	Twelve months after completion of the survey	P1/90, SPS or subsequent format with header information of navigation/ shotpoint location data including elevations or bathymetry. Coordinates must be provided for source, receiver (if applicable), and CDP locations. All data must be GDA94 coordinates and full Header Information supplied. Detailed example of data format provided in Appendix 1.	See Appendix 1: Dynamic Satellite surveys Final Operations Report
Seismic field data	SEG Standard	Twelve months after completion of the survey	To be submitted on high density media and accompanied by Observer Logs and other support data. All tapes/cartridges to be clearly labelled.	See Appendix 5: High density media provided in box. Observers Logs: on CD
Seismic support data	Digital	Twelve months after completion of the survey	Including Observer's logs (ASCII or PDF). Permanent marker listings (ASCII or EXCEL) and other information as appropriate.	Observers Logs: See appendix 5: Permanent Markers: See Appendix 1
	Hard Copy	Twelve months after completion of the survey	Data to include Observer logs, Permanent Marker details, Chainage Notes and Intersection Diagrams to be sorted on a Line basis.	
Uphole data (onshore)	ASCII	Twelve months after completion of the survey	Data to include Line Name, shotpoint nos, date, elevation, total drill depth and coordinate details plus time depth pairs for each uphole. See Appendix 6 for details.	Not applicable Not applicable
	Hard Copy	Twelve months after completion of the survey	Require field plots showing trace data and time picks plus lithological logs if available Data to be submitted in conjunction with other support data as listed above.	
Itemised field tape listing	ASCII	Twelve months after completion of the survey	Field data showing tape number, survey name, line number, shotpoint range, data type in ASCII format. Detailed specifications are contained in Appendix 2.	Field Tape Listing: See appendix 2.

PROCESSED DATA				
Raw and final stack data -if generated as part of the processing sequence	SEG-Y	Twelve months after completion of the survey	Includes fully annotated EBCDIC header. See Appendix 3 for detailed specifications	See Appendix 4
Raw and final migrated stack data	SEG-Y	Twelve months after completion of the survey	Includes fully annotated EBCDIC header. See Appendix 3 for detailed specifications	See Appendix 4
Fully annotated image of final processed migrated data	CGM+ or TIFF	Twelve months after completion of the survey	CGM+ file must be created using a time scale at least 5cm/sec. See Appendix 4 for detailed specifications.	See Appendix 4
	Hard Copy	Twelvemonths after completion of the survey	A paper QC plot must accompany the digital data for verification, in not less than 5cm/sec	
Shotpoint to CDP relationship	ASCII	Twelve months after completion of the survey	Sufficient SP/CDP data for workstation interpretation. At least SOL and EOL relationships for each line and a listing of equivalent CDP/SP pairs for each line.	Only one line: see header data of seg files in Appendix 4. CDP/SP RELATIONSHIP:2000/1000 - 4038/2019
Itemised process tape listing	ASCII	Twelve months after completion of the survey	Processed data showing tape number, survey name, line number, shotpoint range, CDP range, data type in ASCII format.	See Appendix 5 for tape, CD and DVD listing.

Dynamic Satellite Surveys PTY LTD

09001

Final Operations Report

on the

2009 Parachilna 2D
2D Seismic Survey

for

Terrex Seismic Pty Ltd

and

Torrens Energy Limited

January 2009

The Director
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Dynamic Satellite Surveys Pty Ltd has a Quality Management System, externally certified to AS/NZS ISO 9001:2000 standards by SAI Global Pty Ltd. (Lic# QEC10046)

This project was undertaken for Terrex Seismic Pty Ltd and Torrens Energy Limited.

The sole purpose of the job was to install and survey 2D Seismic Lines. The use of the data for any other purpose is not authorised.

All data contained in this report and on the attached CD is deemed to be final and overrides any previous data received from DSS, unless otherwise stated.

Table of Contents

1

INTRODUCTION

The following report covers the **2009 Parachilna 2D Seismic Survey**, performed by **Dynamic Satellite Surveys Pty Ltd** (DSS) whilst contracted to **Terrex Seismic Pty Ltd** (Terrex) for **Torrens Energy Limited** (Torrens).

The Parachilna seismic operation consisted of one (1) line 40.76 kilometres in length named 09TE-PC. 09TE-PC began approximately 1 kilometre East of the shore of Lake Torrens and headed in an easterly direction through Motpena Homestead, narrowly avoiding Parachilna, to finish 8.5 kilometres West of Parachilna near Mount Falkland homestead.

The survey operations were completed between the 5th of January and the 8th of January, 2009.

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INSTRUMENTATION AND PERSONNEL

2.1 Personnel and Logistics

DSS personnel involved in the survey were as follows.

Mark Green
- Bachelor of Geomatics
- Senior Surveyor
- 1 year seismic experience

Nick Phelps
- Survey Assistant
- 2 year seismic experience

Personnel and equipment logistics were supported by the DSS Yeppoon office.

2.2 Equipment

Equipment provided by DSS and used on this project.

	Description	Qty
Vehicles	Toyota Utes	2
Communications	Telstra Next G Phones	1
	Iridium Satellite Phone	1
	UHF radios	2
GPS receivers	NovAtel GPS receivers with VHF telemetry	3
Computers	Toshiba T9 4000	1
	Fujitsu XP tablet	1
	HP iPAQs	2
Software	Nav05 field software - DSS	Ver 4.23
	MIB for Windows - DSS	Ver 6.54
	MapInfo Professional	Ver 8.5
	GrafNet	Ver 7.60
Printer	Canon iX4000	1
Miscellaneous	Digital Camera	1
	Field and Office Consumables	

3

SURVEY REFERENCE SYSTEMS

3.1 Geodetic Datum

This project was based on the Geocentric Datum of Australia 1994 (GDA94), which is based on the Geodetic Reference System 1980 (GRS80) model defined by the following parameters:

Datum:	GDA94(Geocentric Datum of Australia 1994)
Spheroid:	GRS80
Reference Frame:	ITRF92 (International Terrestrial Reference Frame)
Semi-Major Axis Length:	6 378 137.0
Inverse Flattening:	298.257222101
The Unit of Measure:	International Metre

3.2 Map Projection

Final rectangular coordinates were based on the Map Grid of Australia 1994 (MGA94). Parameters for this projection are as follows:

Projection:	Universal Transverse Mercator (MGA Zone 53)
Latitude of Origin:	0°
Central Meridian (CM):	135° E
Scale Factor at CM:	0.9996
False Easting:	500 000
False Northing:	10 000 000
The Unit of Measure:	International Metre

3.3 Height Datum

All elevations obtained relative to GDA94 have been reduced to the Australian Height Datum (AHD) using the AUSGeoid98 Geoid - Spheroid separation model to determine the geoid-ellipsoid separation (N) for the particular area.

GPS observations are made on the GDA94 datum. The height associated with this datum is an ellipsoidal height (h). The Australian Height Datum (AHD), the height datum associated with MGA94, is an orthometric height, which is measured as the height above mean sea level, or the geoid (H).

The function that defines the relationship between the ellipsoid and orthometric heights is:

H = h - N

Or

AHD = GDA94 - (Geoid / Ellipsoid Separation)

The value for the geoid/spheroid separation is interpolated from a national model called AUSGeoid98.

AUSGeoid98 is the third in a series of national geoid models produced for Australia by the Australian Surveying and Land Information Group (AUSLIG). The geoid-ellipsoid data is prepared for the Australian region from:

- EGM96 Global Geopotential Model;
- 1996 Australian Gravity DataBase, from the Australian Geological Survey Organisation (AGSO);
- AUSLIG / AGSO GEODATA nine-second digital elevation model;
- Satellite altimeter - derived free air gravity anomalies offshore;
- Theories, techniques and software developed by Associate Professor Will Featherstone, Curtin University of Technology[1].

AUSGeoid98 N values were interpolated using the GrafNet Version 7.60 software, distributed by Waypoint Consulting Inc.

[1] Johnston, G.M., Featherstone, W.E. (1998) AUSGeoid98: A New Gravimetric Model for Australia

4

SURVEY CONTROL

Survey control was established by adopting AUSPOS[2] results, described as:

Line	Station	Easting	Northing	AHD
09TE-PC	PC01	804134.28	6545345.43	54.14

All station information and control checks are listed in **Appendix A - Survey Control.**

[2] AUSPOS is Geoscience Australia's on-line GPS post processing engine

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MONUMENTATION

Line 09TE-PC was pegged at 40-metre intervals, source stations were even-numbered and receiver stations were odd-numbered.

Source stations were marked with a peg numbered either side, whilst a pink pin flag was used to mark odd-numbered stations (which were receiver stations).

Permanent Markers were used for all GPS base stations. These consisted of a star picket with associated tag stating Client, DSS Job Number and the unique Base ID. Another star picket was placed at the base of the larger start picket to mark where the station was surveyed.

6

METHOD OF SURVEY

6.1 Line Preparation

Prior to DSS' arrival, Torrens had established the layout for 09TE-PC. However, some sections around the Motpena Homestead where navigated around with a little variation to the original plan in order to smooth the line as well as maintain safe distances from the homestead. Additionally, around the Parachilna district, the line was altered some what from the original design to accommodate for passage under the railway and highway, as well as smooth the line on to the final easterly road. Sections where line was altered from the original design did not need to be prepared and were suitable for seismic crews to work on.

6.2 GPS Surveying

There are three modes of use in GPS surveying; static, kinematic, and real-time kinematic. On assessment, it was decided a real-time kinematic survey would best enable position and elevation co-ordinates to be acquired in real-time and on the appropriate datum. The survey was completed using DSS' OEMV-3 real-time kinematic (RTK) surveying technique.

NovAtel real-time kinematic methods can achieve accuracies of better than +/-0.05m in position and elevation, depending on base line length. The expected precision for locating pegged positions is better than 0.3 metres and is generally better than 0.2 metres.

Initialisation of the OEMV-3 rover GPS usually takes as little as one minute, although this is greatly dependant on satellite geometry, availability and base line length.

6.3 Processing and Quality Control

All survey data was immediately recorded internally on the Fujitsu XP Tablets and subsequently downloaded to the office computer each evening.

Quality of the satellite data was monitored by careful examination of the various on-screen quality control statistics produced by the Nav05 software. These checks on data integrity are in the form of standard deviation (or sigma) values for Easting, Northing and Height and are generally better than 0.05 metres.

Any recording of positions where the standard deviation values exceeded 0.1 m was highlighted to the surveyor at the time of recording. Following this, it was possible to re-initialise the GPS in order to obtain a more accurate solution. Any recorded position falling outside the required tolerances were flagged for further investigation and re-recording if necessary.

Numerous checks on pre-recorded marks were observed during each days survey in order to confirm the integrity of the GPS base receiver and the placed markers.

Coordinates were also checked in the office by determining point to point direction and distance. Profile plots were examined in detail to identify any height anomalies. Any points showing unusual position or height details were flagged and checked in the field.

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DATA PRESENTATION

All line files were checked and finalised before the survey crew demobilised from the prospect.

All final data was in UTM grid coordinate format on the MGA94 datum on the GRS80 reference spheroid. All elevations were on the Australian Height Datum (AHD71).

Final data produced were:

Photos

*.JPG - project photographs

Survey Data

*.SEG - text files of all line data in SEGP1 format
*.UKA text files of all line data in UKOOA format

Trace Diagrams - PDF files for each line.

All files are backed up on digital disks in the Yeppoon office for future reference.

No hard copy data was provided.

8

SAFETY

DSS personnel are aware of safety conditions concerning all exploration seismic surveys. The DSS **"Quality Policy Statement"** and **"Health, Safety and Environment Policy"** were adhered to at all times.

DSS received copies of the ERP and SSSP for the Parachilna Survey, prior to work commencing.

Each vehicle was fitted with a phone (NextG or Satellite), UHF radio, shovel, first-aid kit, CO_2 and water fire extinguishers, vehicle recovery equipment, rotating beacon and weekly vehicle maintenance check lists.

Caution was taken when surveying on the country roads in the area. Flashing beacons where switched on and communication between surveyor and assistant was made if on-coming traffic was approaching.

A landowner at the Motpena Homestead informed us that we could contract him on UHF CH06 if we came into any trouble whilst on his land, thus a communication was open to another source.

Heat became somewhat of an issue whilst working on the Parachilna job with temperatures rising above 40° Celsius. Survey crew altered between driving and the manual labour of pegging to ensure heat stress would not become and issue. Regular breaks where also taken.

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OPERATIONAL ASPECTS

Mark Green and Nic Phelps mobilised on the 5th of January from Melbourne and Lismore respectively, to arrive in Port Augusta where they picked up two vehicles from the local Toyota dealership (as they had both been serviced over the Christmas break).

The survey crew arrived in Parachilna on the 6th of January and set-up the office prior to heading out to establish two control stations along Line 09TE-PC. Once control had been established, it was then possible for the survey crew to begin pegging. Twelve kilometres were completed that afternoon. The following day saw a steady production and a further twenty kilometres of production was obtained.

On the 8th of January the survey crew finished production and obtained checks to survey marks in the Parachilna area. The report, trace maps, and survey data were finalised. Survey crew then prepared for demobilisation for the following day.

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CONCLUSIONS AND RECOMMENDATIONS

Survey operations on the Parachilna 2D Seismic survey ran efficiently. Most of this can be put down to small travel times to the job as we were able to stay in the township of Parachilna.

One issue that did arise, and would have been handy to know from the start, was that the job straddled two mapping zones (zone 53 and 54). The survey crew originally began surveying in Zone 54 on the first day, however, transferred all data to Zone 53 once requested by the client.

The survey crew where able to obtain a daily average of 13.59 kilometres. However, on two of these days, only half days were used to peg. Thus, a more realistic daily average would be 20.38 kilometres.

The survey was completed accident and incident-free.

Signed,
Dynamic Satellite Surveys Pty Ltd
Mark Green
Senior Surveyor

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APPENDICES

Survey Control

Coordinates are Map Grid of Australia (MGA94) Zone 53
Elevations are AHD71 using AUSGeoid98 N Value Model

Parachilna Control Stations

NAME	EASTING	NORTHING	HEIGHT
PC01	804134.28	6545345.43	54.14

Parachilna Base Station Checks

NAME	EASTING	NORTHING	HEIGHT	COMMENTS
PC02	823547.80	6550768.41	138.73	Survey
	823547.82	6550768.42	138.67	AUSPOS
	0.02	0.01	-0.06	Difference
65355042			141.10	Survey
			140.91	Given
	0.00	0.00	-0.18	Difference

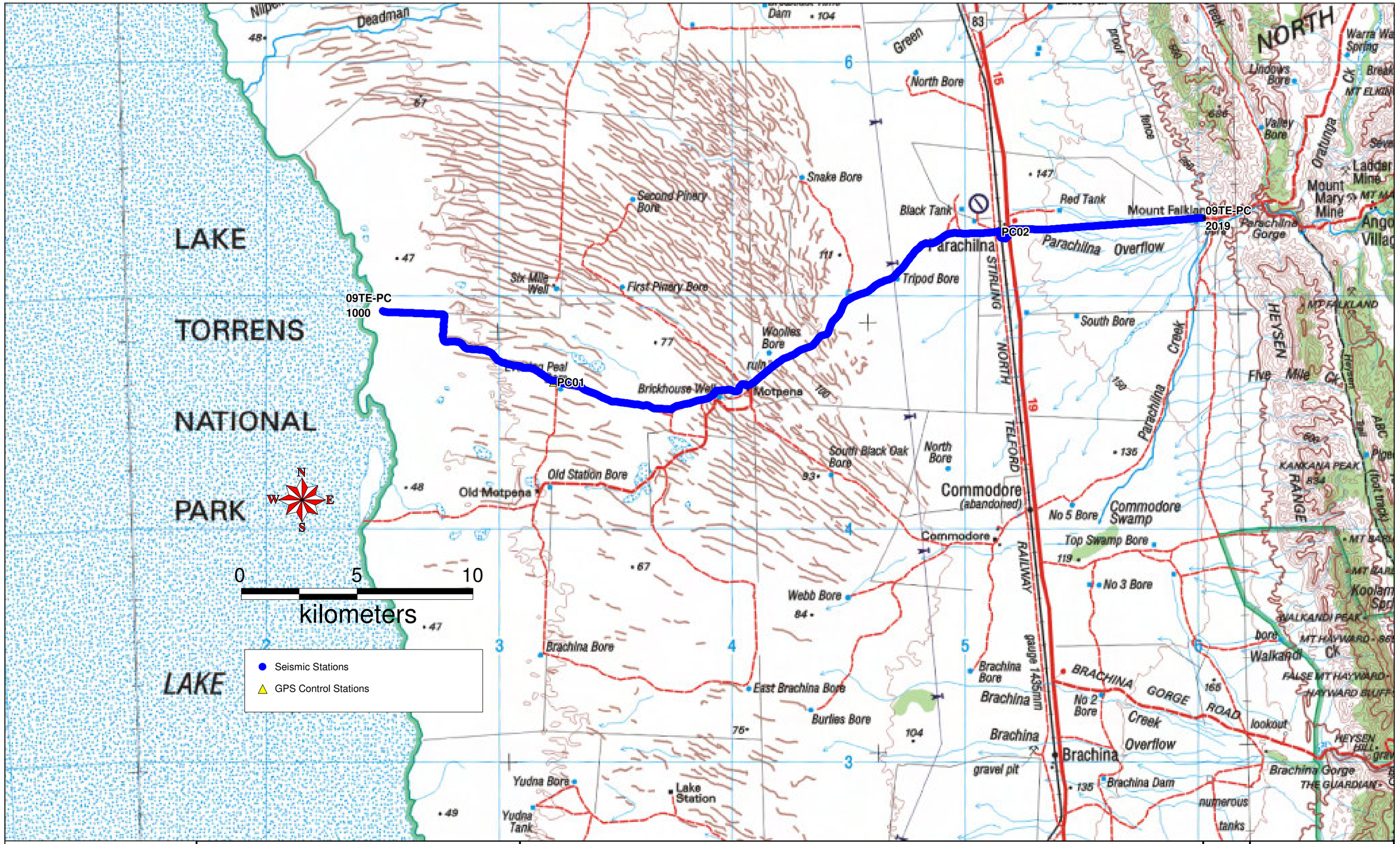
Coordinates are Map Grid of Australia (MGA94) Zone 53

Elevations are AHD71 using AUSGeoid98 N Value Model

New Parachilna Base Stations

NAME	EASTING	NORTHING	HEIGHT
PC01	804134.28	6545345.43	54.14
PC02	823547.80	6550768.41	138.73

Project Map



Dynamic Satellite Surveys PTY LTD

Dynamic Satellite Surveys : Phone 1800 060 407

Terrex / Torrens Energy

Parachilna

Scale	1cm = 1.5km @ A3
Drawn	Mark Green
File	Parachilna Map
Rev:	0.0
Date	08-01-09

Line Lengths Summary

Line Length Summary

Parachilna 2D Seismic Survey

Station Interval = 40m

Line Name	Start	End	Distance (km)
09TE-PC	1000	2019	40.76
		TOTAL	40.76

Trace Diagrams

Dynamic Satellite Surveys

TRACE DIAGRAM

DSS-FF-07
REV 8.0
August 2004

LINE: 09TE-PC

PROJECT/JOB # 09001 CLIENT Terrex/Torrens Energy

PAGE 1 OF 5 AREA: Parachilna STN INTERVAL: 40 m SHOT INTERVAL: 80 m

FROM STN 1000 TO STN 1327 SHOOTING DIRECTION: West to East BEARING: °

1143
Tree·Debris
1142
1125
1097
Track
1096
1075
1067
Veer Right
1066
1030
Rabbit Holes
1029
1023
Dry Creek
1022
Caution Uneven Track
SOL
1000

Track
1327
1326
1300
1275
1250
1231
Vibe Skip
1230
Tank
1230
1226
Veer Left North Of Cattle Yard,
To straighten line and Avoid
Fence Crossings
1225
1192
Vibe Skip
1190-92
Capped Well
1190
1175
1168
Low Tree
1167

Dynamic Satellite Surveys

TRACE DIAGRAM

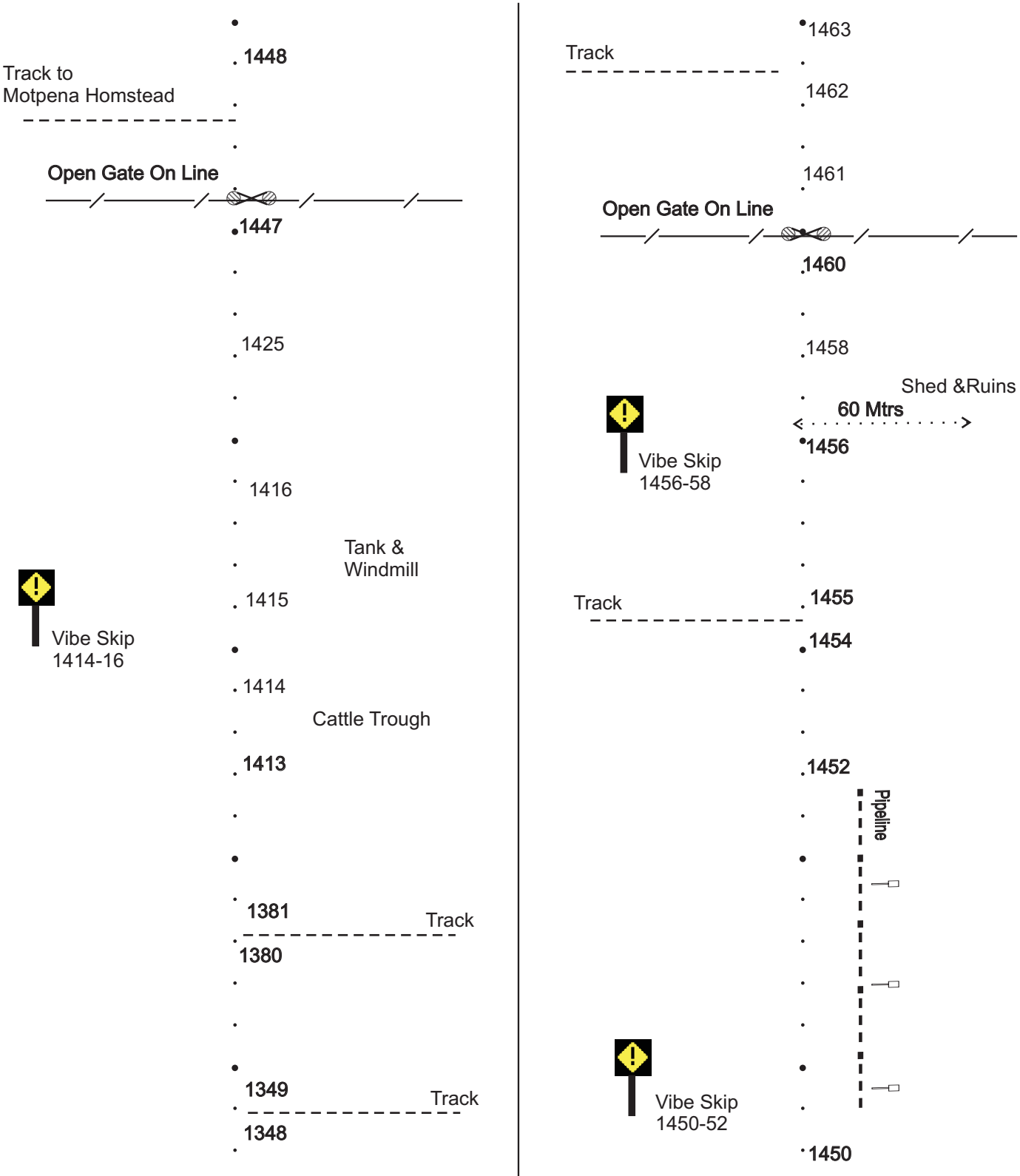
DSS-FF-07
REV 8.0
August 2004

LINE: 09TE-PC

PROJECT/JOB # 09001 CLIENT Terrex/Torrens Energy

PAGE 2 OF 5 AREA: Parachilna STN INTERVAL: 40 m SHOT INTERVAL: 80 m

FROM STN 1327 TO STN 1463 SHOOTING DIRECTION: West to East BEARING: °



Dynamic Satellite Surveys

TRACE DIAGRAM

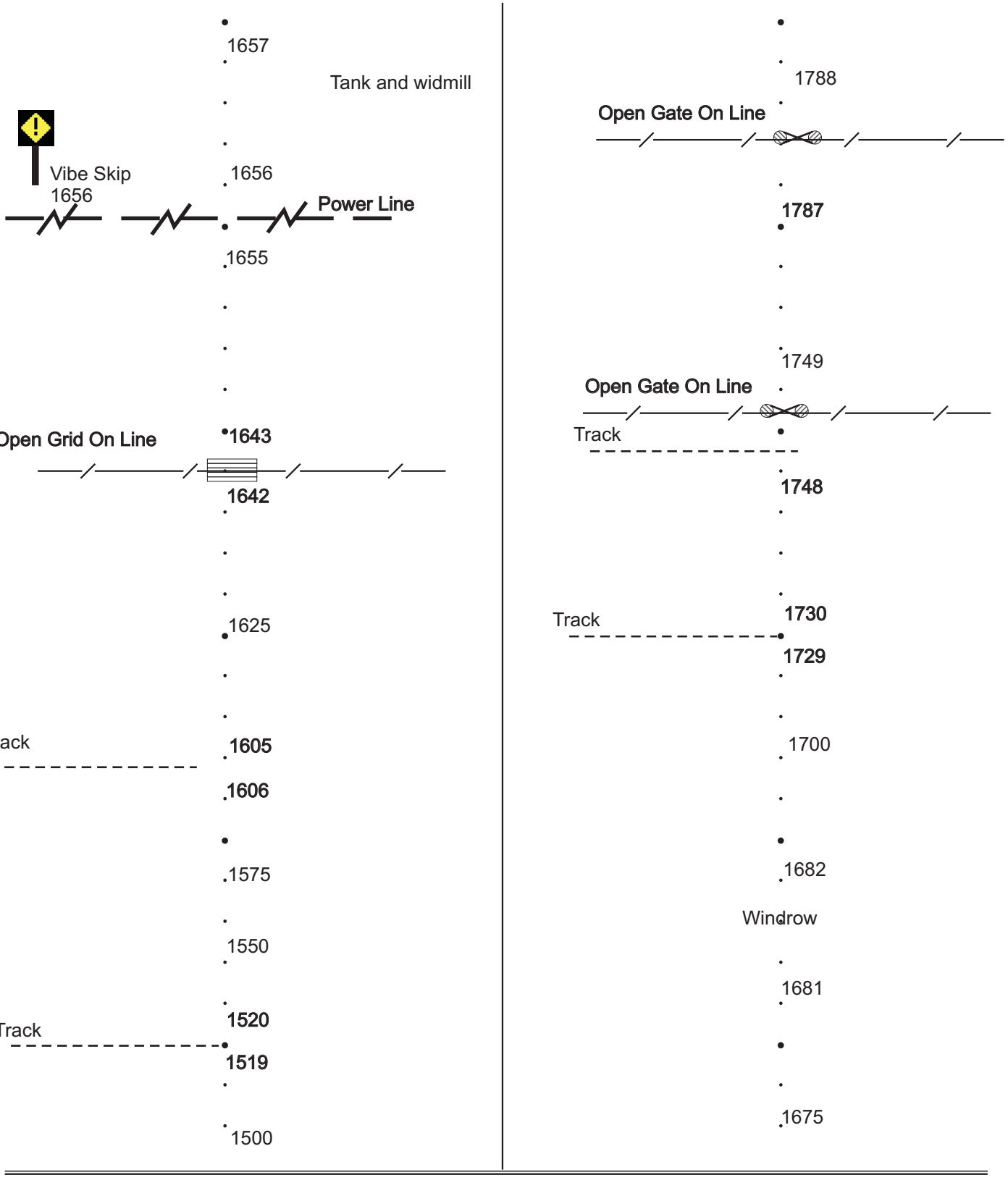
LINE: 09TE-PC

DSS-FF-07
REV 8.0
August 2004

PROJECT/JOB # 09001 CLIENT Terrex/Torrens Energy

PAGE 3 OF 5 AREA: Parachilna STN INTERVAL: 40 m SHOT INTERVAL: 80 m

FROM STN 1463 TO STN 1788 SHOOTING DIRECTION: West to East BEARING: °



Dynamic Satellite Surveys

TRACE DIAGRAM

DSS-FF-07
REV 8.0
August 2004

LINE: 09TE-PC

PROJECT/JOB # 09001 CLIENT Terrex/Torrens Energy

PAGE 4 OF 5 AREA: Parachilna STN INTERVAL: 40 m SHOT INTERVAL: 80 m

FROM STN 1788 TO STN 1809 SHOOTING DIRECTION: West to East BEARING: °

1800

Power Line

Vibe Skip
1800

1799

Track

1798

1798

Send cables under
Rail Road bridge,
Refer to above image

Dry Creek

1796

1809

Pipeline

Vibe Skip
1808

Sewer manhole

1808

Send cables through
culvert, refer to above
image

1807

Highway to

Liegh Creek

Vibe Skip
1806

1806

1802

Vere left off track

1801

Dynamic Satellite Surveys

TRACE DIAGRAM

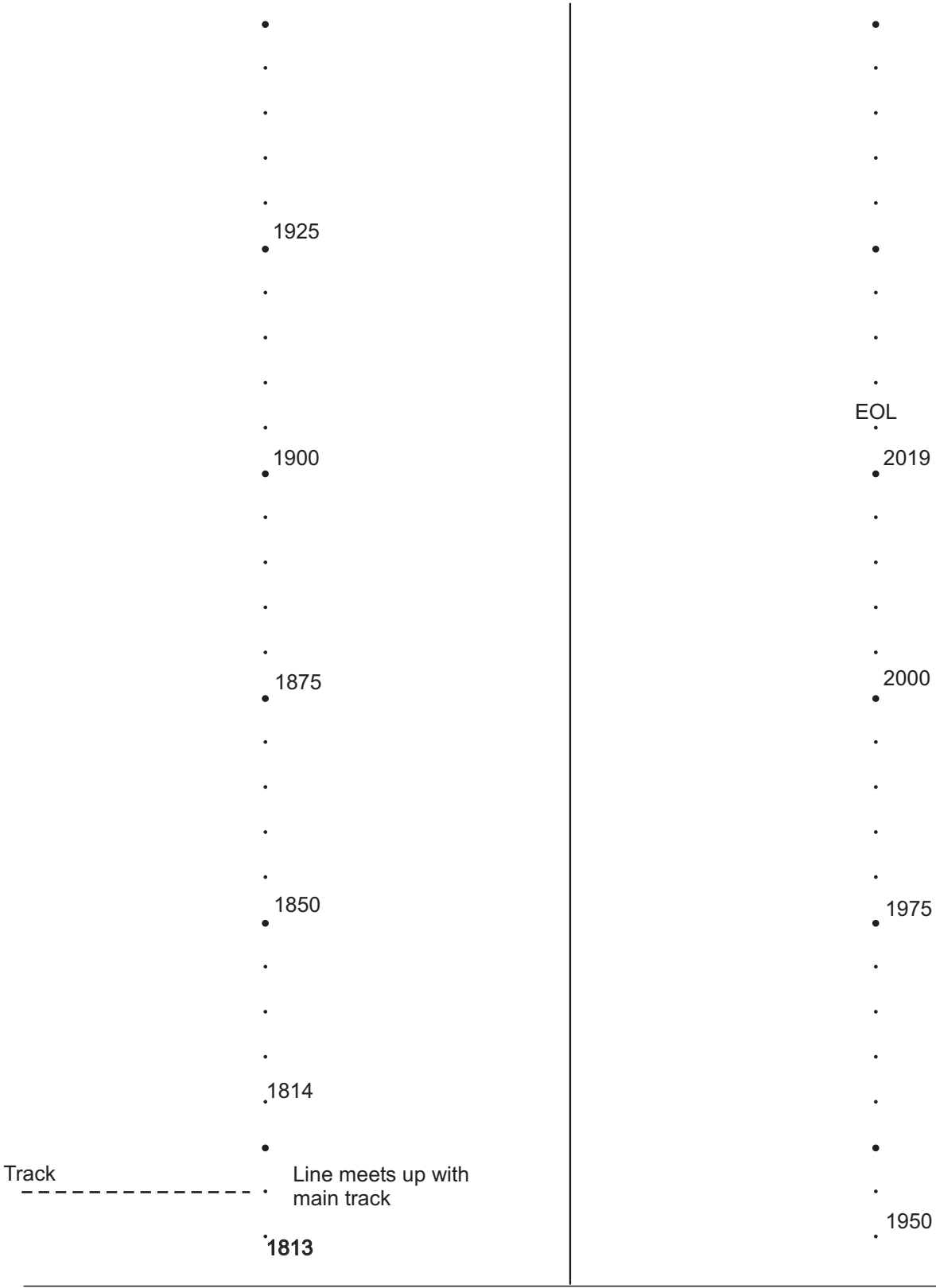
DSS-FF-07
REV 8.0
August 2004

LINE: 09TE-PC

PROJECT/JOB # 09001 CLIENT Terrex/Torrens Energy

PAGE 5 OF 5 AREA: Parachilna STN INTERVAL: 40 m SHOT INTERVAL: 80 m

FROM STN 1809 TO STN 2019 SHOOTING DIRECTION: West to East BEARING: °



Photographs

Tank and windmill adjacent station 1416

Location of pipeline nearby Motpena,
stations 1450-1452

Blow fly infestation, quite an issue
towards the end of the day

TORRENS ENERGY
2009 PARACHILNA
2D SEISMIC SURVEY

OPERATIONS REPORT

JANUARY 2009

BY

Warren Campbell

OF

CREW # 403

TERREX SEISMIC
UNIT # 2 / 37 HOWSON WAY
BIBRA LAKE
WESTERN AUSTRALIA, 6163

TABLE OF CONTENTS

1. INTRODUCTION

Terrex Seismic was contracted by Torrens Energy to conduct the Parachilna 2D Seismic Survey. Acquisition commenced 21st January 2009 and was completed 23rd January 2009, covering 40.76km of recording running from West to East.

1.1 GEOGRAPHICAL AREA

The proposed seismic line runs along a station track, and then it uses gazette public roads through to Parachilna approximately 66 kilometers south of Leigh Creek in South Australia. The seismic line crosses the Sterling North Telford Railway, a culvert 10m to the north was used to pass the recording cable under the rail line.

Back Crew Retrieving Geophones

1.2 WEATHER

Warm weather was encountered throughout the program with no down time recorded due to adverse weather conditions.

1.3 LOGISTICS

All equipment and vehicles were mobilised from the previous prospect by Terrex personnel.

Access to and from seismic line was via main roads and unsealed tracks.

All approved access roads and tracks were indicated on the maps supplied by Dynamic Satellite Survey's personnel from Yepoon, QLD.

Accommodation was provided in the form of a mobile camp provided by Terrex Seismic which housed the entire crew and client representatives.

Meals were also provided by Terrex Seismic from a mobile kitchen and dining van which was staffed by two cooks.

All supplies and freight were transported via AAE, Australia Post, or TNT.

Fuel for all vehicles was supplied by Mogas from Port Augusta.

An induction held by the Client Representative was given to the crew in camp before commencement of the Torrens Energy 2D.

All other logistics were supported out of Terrex Seismic Perth Office.

2. SURVEYING

2.1 RANGING / CHAINING / SURVEYING

Line Chaining, Survey and Maps for the entire program were supplied by Dynamic Satellite Survey's personnel from Yepoon, QLD.

2.2 LINE CLEARING

No line clearing was required for the Parachilna 2D.

2.3 PERMITTING & CLIENT RERESENTATIVE

Permitting and Client Representative Duties on site were carried out by Bill Foster and Bruce Godsmark for Torrens Energy.

Terrex Recorder

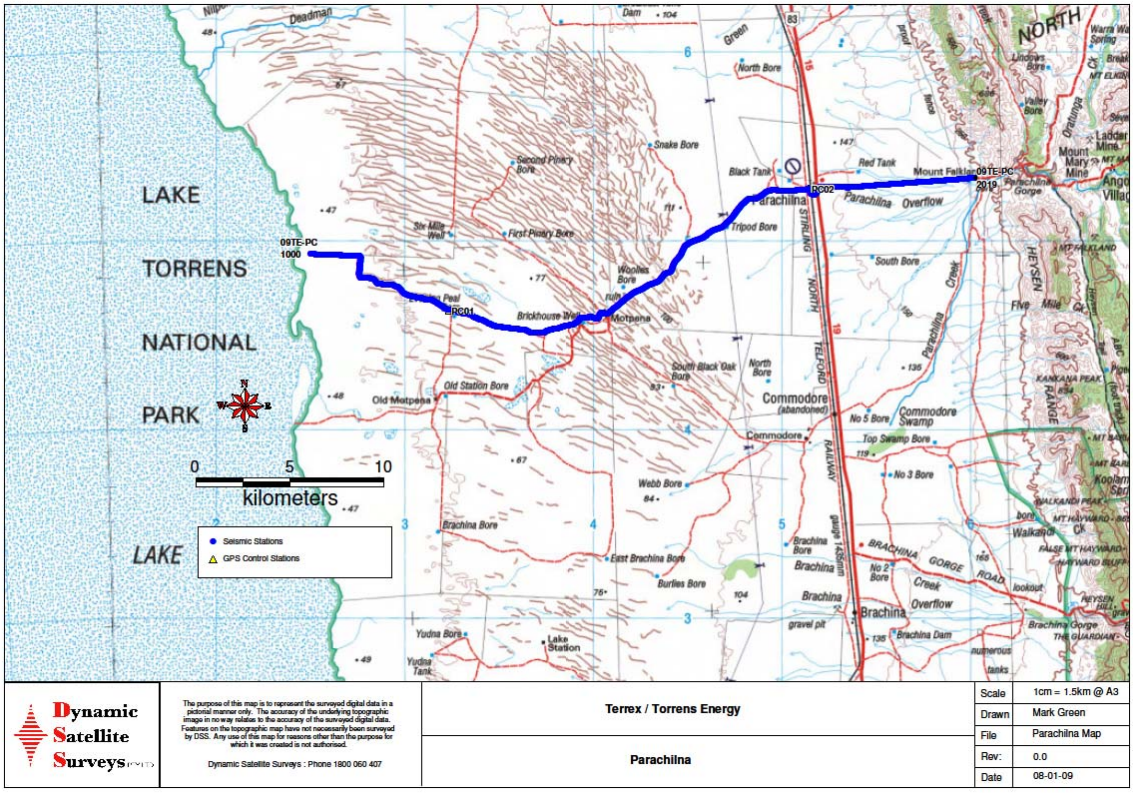
3. RECORDING / PROCESSING

3.1 RECORDING PARAMETERS

Acquisition Type:	Sercel 388 - 24 Bit Telemetry System
Energy Source:	3 x Hemi 60 60,000lb Peak Force
	4x4 Buggy Mounted Vibrators Online
Vibrator Point Interval:	80 metres
Vibrator Array:	15 m Pad-Pad / No Moveups = 24m Array Length
Vibrator Array Location:	Centred midway between Station Pegs
	(Centred at SP 100.5)
Receivers:	12 x 10 Hz SM24 Geophones / Group
Receiver Interval:	40 metres
Receiver Array:	40 metres (12 phones with 3.33m spacing)
Receiver Array Location:	Centred between Station Pegs (Centred at SP100)
Sweep Length:	12.0 sec
Number of Sweeps:	3
Sweep Type:	Liner up-sweep
Sweep Frequencies:	12-96 Hz
Sweep Taper:	200 msec Taper
Sweep Energy per Km:	600 sec/km
Sweep Control:	Pelton VIBPRO
Accelerometers:	Pelton M5 High Performance
Similarity System:	Pelton VIBPRO VIBRA-SIG
Peak Force:	60,000 lbs
Hold Down Weight:	60200 lbs
Vibrator Drive Level:	Force Control On - 70% Peak Force
Phase Lock:	Ground Force Phase Lock
No. of Channels:	300 Channels Live
Maximum Offset:	2990 – 10 - 0 – 10 – 2990 metres
Fold:	75 Fold with 10m CDPs
Anti-Alias Filter:	175 Hz
Record Length:	6.0 seconds

Correlation Sample Rate:	2 milliseconds
Written to Tape S.R.:	2 milliseconds
Output Data Format:	SEG D

3.2 TORRENS ENERGY – PARACHILNA PROSPECT MAP



3.3 RECORDING

Hardwires and Point source testing was completed before any production VPs were taken. Acquisition commenced 22nd of January 2009 and was completed the following day. One line of 40.76 km to be recorded from the west.

09TE-01

Production started 22nd January on VP 1000.5 and was completed 23rd January on VP 2019.5 for a total of 40.76 km. This line was recorded from Low to High station numbers in a West to East direction. Production was completed in two days at an average of 20.38 kms recorded per day. The end of line 01 represented the completion of the Parachilna 2D, the line crew picked up the equipment, packed camp and mobilised to the next prospect the following day, contract completed.

3.4 PROCESSING

All final data shipments were sent to the below locations.

“A” tapes for the G.A 2009 2D were given to Bruce Godsmark Personal on crew.

“B” tapes for the G.A 2009 2D was given to.

Cable Truck at Work

APPENDIX A

EQUIPMENT SPECIFICATIONS

RECORDING EQUIPMENT 2D SEISMIC CREW

SERCEL 388 - 24 Bit 3D Seismic Data Acquisition System

- Sun Monitor and Sun Sparc 5 Computer
- OYO DFM 480 Plotter, UPS, LIM, APM
- Two (2) Fujitsu 3490 Tape Drives
- One Hundred (100) SU6 Telemetry units (800 Ch)
- Two Hundred (200) Seismic Cables (800 Ch)
- Fourteen (14) Sercel PSUs and Two (2) Sercel CSUs
- Four (4) CSU Patch Cables
- Four (4) Battery case power Cords
- Twenty (20) Batteries for SU6 Units
- Four (4) Sercel Battery Chargers
- Pelton Real Time Similarity System
- One (1) 10 metre 6 DB Boost High Gain Antenna on Recording Truck
- Sensor SM4 10Hz High Specification Super phones
- One Thousand (1000) Geophone strings with 6 ph/group

Note: Terrex Seismic warrants that 90% of equipment will be used in field and up to 10% may be undergoing repair and maintenance.

SOURCE EQUIPMENT

- Four (4) Hemi 60 4x4 Buggy mounted Vibrators:
- Peak force is 60000lbs per Vibe and
- Hold-Down weight is 60200lbs per Vibe
- Four (4) Pelton Advance 2 Model 6 Vibrator Control Electronics
- One (1) Pelton Encoder Sweep Generator for Recorder
- Three (3) operating online and One (1) on Standby
- Electronics are capable of Trade Marked **Varisweep.**

APPENDIX B

VEHICLE EQUIPMENT LIST

#	VEHICLE	REGISTRATION
1	2008 V8 Toyota Wagon	847-LIX
2	2008 V8 Toyota Trayback	852-LIX
3	2008 V8 Toyota Trayback	849-LIX
4	2008 V8 Toyota Trayback	851-LIX
5	2008 V8 Toyota Trayback	853-LIX
6	2008 V8 Toyota Trayback	855-LIX
7	2008 V8 Toyota Trayback	176-JNA
8	2008 V8 Toyota Trayback	850-LIX
9	2008 V8 Toyota Trayback	848-LIX
10	2008 V8 Toyota Wagon	845-LIX
11	2008 V8 Toyota Wagon	846-LIX
12	2008 V8 Toyota Wagon	844-LIX
13	2008 V8Toyota Troop carrier	478-LGW
14	Isuzu 4x4 Truck	1BSB - 131
15	Isuzu 4x4 Truck	110 - JQL
16	Isuzu 4x4 Truck	1AOR - 420
17	Isuzu 4x4 Truck	1CIR - 888
18	Isuzu 4x4 Truck	636 - KBK
19	Hino 4x4 Truck	1CJN - 619
20	Paystar 6x6 Truck	628 - JAH
21	Birdwagon	YAJ – 00W
22	Birdwagon	YAJ – 01W
23	Birdwagon	YAJ – 02W
24	Birdwagon	YAJ – 03W
25	Hino 4x4 Truck	1CLE - 851
26	M.A.N 4x4 Truck	1BCY - 868
27	International	204 - KFB
28	Ford Primemover	596 - KBK
29	Elross Van	1THR - 800
30	Elross Van	1THR - 801
31	Elross Van	1THV - 393
32	Elross Van	1THV – 394
33	Elross Van	1THV – 395
34	Elross Van	1THV – 396
35	Elross Van	1THT – 116
36	Elross Van	1THT - 117
37	Van	8UW – 160
38	Van	498 - QJG
39	Van	501 – QJG
40	Van	N60 - 916
41	Trailer	C1 - 1305
42	Trailer	C1 - 1306
43	Trailer	T 5210 B
44	Trailer	T 97 069
45	Trailer	785 – QNM
46	Trailer	784 – QNM
47	Trailer	LG 2356
48	Trailer	870 - QNE

APPENDIX C

TAPE LISTINGS

3 Vibes in line on a move up

Torrens Energy - Parachilna 2D								
Tape #	**#ID**	**Line**	**First FFID**	**Last FFID**	**First VP**	**Last VP**	**Date Recorded**	**Comments**
1	1B	09TE-01	1	190	1000.5	1189.5	22-Jan-09	See Observers Logs
2	2B	09TE-01	191	360	1193.5	1370.5	22-Jan-09	See Observers Logs
3	3B	09TE-01	361	492	1371.5	1510.5	22-Jan-09	See Observers Logs
4	4B	09TE-01	493	652	1511.5	1671.5	23-Jan-09	See Observers Logs
5	5B	09TE-01	653	812	1672.5	1842.5	23-Jan-09	See Observers Logs
6	6B	09TE-01	813	989	1843.5	2019.5	23-Jan-09	See Observers Logs
Torrens Energy 2D Completed								

APPENDIX D

HSE POLICY and OCCUPATIONAL HEALTH and SAFETY STANDARDS

- Site specific inductions / daily toolbox meetings / weekly safety meetings
    - Weekly Section head meetings
        - Personal protective equipment
            - Traffic Management Safety as required
                - VHF / UHF / HF communications
                    - Vehicle emergency equipment
                        - Random drug and alcohol tests

TERREX SEISMIC HEALTH, SAFETY AND ENVIRONMENT POLICY

Terrex Seismic is an Exploration Contractor involved in Seismic Acquisition to the Oil, Gas and Mineral Industries.

Our Commitments

- To provide a safe, healthy and injury free workplace for our employees, contractors and the general public.
- Assisting all of our employees and contractors to meet their HSE obligations.
- Establish and implement an HSE Management System and Operational Plans at all levels of the Company.
- Education and training of all of our Employees in HSE Systems, Procedures, Risk Assessment and Risk Minimization.
- Ongoing evaluation and modification of all of our HSE Management Systems, Procedures and Plans in order to ensure a consistent improvement in the establishment of a safe, healthy and environmentally sound workplace.
- Ensure all of our HSE Systems are in accordance with the relevant legislation and requirements of Clients and Government Bodies.

Our Goal

- To achieve a workplace where the targets of zero injuries, equipment damage and environmental incidents are attained.

Our Systems

- Management shall provide a visible, personal involvement in all aspects of HSE, and through their actions create a culture that facilitates employee HSE involvement. Management shall make available the appropriate resources to carry out all manner of HSE.
- Policies and objectives shall be initiated, defined, communicated and revised at all organizational levels.
- Organizational responsibilities shall be defined and the necessary resources provided to achieve HSE objectives
- Management shall continuously evaluate the HSE risks to the employees, clients and environment. Comprehensive risk assessment provides the necessary information in order to take action to reduce the risk to our operations.
- HSE shall be integrated in the design, development and delivery of all services. This includes planning for existing operations, managing change and developing emergency response measures.

Each employee has a personal responsibility to comply with this policy and contribute towards its implementation. Management holds the responsibility to communicate the requirements of this policy to all our employees, contractors and visitors and to involve them in its implementation.
Breach of this policy will be taken very seriously and may involve disciplinary action.

Stephen P. C. Tobin

APPENDIX E

END OF CONTRACT HSE REPORT

Lake Torrens

Health Safety & Environment
Torrens Energy

End of Contract Report
Parachilna 2D

21th January - 24th January

Client: Torrens Energy

Location Gawler Craton

Camp Site: 38 Bed Accommodation

Camp Location: 5km West of Parachilna

Sub-Contractors: Dynamic Satellite Surveyors

HSE Advisor: **Timothy Hill**

Combined Personnel: **35**

BAC Tests Conducted:

Preliminary Drug Tests Conducted:

Standard Operating Procedure Revisions:

Summary:

21-Jan-09 Mobilize Camp from Hawker to Parachilna
21-Jan-09 Set up camp and commence laying spread.
23-Jan-09 Finished shooting.
24-Jan-09 Finished picking up spread.

Safety Statistics

Terrex Seismic Man-hours	1,620
Sub-Contractor Man-hours	96
Fatalities	0
LTI	0
MTC	0
First Aid / Medical Cases	0
Incident / Accident Reports	0
Hazard Identification Reports	1
Training Hours	35
Tool Box / Safety Meeting Man-hours	40
Audits / Inspections	62
Drills	0
Land Spills (< 5 litres)	0

Medical Statistics

Clinic Attendance	
Skin	0
Colds, Influenza type symptoms	0
Muscular / Skeletal / Soft Tissue	0
Headache	0
Misc	0
TOTAL	**0**

APPENDIX F

PERSONNEL – CREW LIST

POSITION	NAMES
Crew Manager	Campbell Warren
HSE	Hill Tim
Admin Staff	
Mechanic	Lawless Shane
Mechanic	Smith Robert
Cook	Viney Dennis
Cook	Gill Mark
Cook	Philpott Peter
Supply	LittleJohn Jeff
Supply	Brooke-Bailey Oliver
Campy	Mitchell Madeleine
Camp Staff	
Observer	McCann James
Cable Repair	Bailey-Garden Marama
Technical	
Vib Op	Coward Juile
Vib Op	Keat David
Vib Op	Parkyn Clive
Vib Op	Summers David
Vibrator Crew	
Vib Tech	Garden Robert
Vib Tech	Rauckman Stuart
Vib Tech Trainee	Cabot Allen
Vib Tech	
Line Boss	Henry Brenton
Snr Line	
T/Shooter	Bann Megan
Trouble Shooters	
Line Crew	Ball James
Line Crew	Charles Mitchell
Line Crew	Collier Natasha
Line Crew	Hanson Mark
Line Crew	Itzstein Derek
Line Crew	Laxton Mark
Line Crew	Marr Samantha
Line Crew	McFarlane Benjamin
Line Crew	Miller Glen
Line Crew	Ngatai Bryan
Line Crew	Robinson Daniel
Line Crew	Salley Jahvis
Line Crew	Saunder Dave
Line Crew	Stasse Alain
Line Crew	Taimani Tai
Line Crew	Williams Andrew
Line Crew	

PERSONNEL – CREW NUMBERS

POSITION	NUMBERS
Crew Manager	1
HSE	1
Mechanic	2
Cook	3
Supply	2
Campy	1
Observer	1
Cable Repair	1
Vib Op	4
Vib Tech	3
Line Boss	1
T / Shooter	1
Line Crew	16

APPENDIX G

DAILY REPORTS

Terrex Seismic Crew 403 - Torrens Energy Limited

Daily Report

CREW 403

Client.....	Torrens Energy Limited	Party Manager..	Warren Campbell
		Client Rep.....	Bill Foster
Survey Name.....	2009 Torrens Energy - Parachilna 2D. Seismic Survey.	Client Rep.....	Bruce Godsmark
Area.....	Parachilna	Weather.....	Fine /Hot
State.....	S.A	Date.....	Wednesday, 21 January 2009

Line	VP	VP	File	File	Extra's	Omit	KM	VPs	Stns
09TE-01							0.00	0	0

TOTALS	
VPs...	0
Makeup Shots...	0
Lin.km...	0.00
Cum.Lin.km...	0.00
Lin.km.Remaining...	40.00
Cum.Total Vps (Job)...	0
Av.Daily Production Lin.km	0.000
%Completed...	0.00%
Estimated Finish Date:	

Chargeable Production Hours:

Recording.....	
Recorder Move.....	
Line Move.....	
Detours/Terrain.....	
Travel Time.....	1.5
Layout Spread.....	3.7
Pickup Spread.....	
Other.....	

Chargeable (Non-Production) Hours:

Human Error.....	
QC Spread.....	
Recorder.....	
Vibes.....	
WOS.....	
H/Wires + P/Source + Exper.....	0.5
Toolbox/Induction.....	0.8
Weather St/By.....	
Washdown.....	
Camp Move.....	6.2
Other.....	

Total Production hrs (Day)...	5.2
Total Production hrs (Job)...	5.2
Total Non-Production hrs (Day)...	7.5
Total Non-Production hrs (Job)...	7.5
Day Total.....	12.7
Cum.Total Hrs (Job)	12.7
Total Chargeable.....	12.7

Non Chargeable Hours:

Recorder.....	
Vibes.....	

Daily Non Chargeable hrs.....	0.0
Total Non Chargeable hrs.....	0.0

COMMENTS:

* Toolbox and Induction 6.30am-6.45am.
*Induction from 6:45-7:20 from Bruce Godsmark the Torrens Energy client rep.
*Pack up an camp move from 7:20am arrived at new camp set up main camp at 13:30pm line crew mob to the field camp staff continued setting up main camp.
*Toolbox 0.3 Inductions 0.5.
*Part of spread layout time is all so vibes walking to start of line slow going from rough terrain.

* Point source & wirelines test completed.

***Down time :**

2 Client Rep's on site

Total Crew #'s 31 **Line #'s 17** **Vehicle #'s 29**

Spread Movement

Client: Torrens Energy Limited

Layout Line	Layout Station #	Layout Tot	Pickup Line	Pickup Station #	Pickup Tot
09TE-01					
Total Stations:		0	**Total Stations:**		0
Bad Cables		1	Bad Phones		3

Crew Manager _____

Client Rep _____

Terrex Seismic Crew 403 - Torrens Energy Limited

Daily Report

CREW 403

Client.....	Torrens Energy Limited	Party Manager..	Warren Campbell
		Client Rep.....	Bill Foster
Survey Name.....	2009 Torrens Energy - Parachilna 2D. Seismic Survey.	Client Rep.....	Bruce Godsmark
Area.....	Parachilna	Weather.....	Fine /Hot
State.....	S.A	Date.....	Thursday, 22 January 2009

Line	VP	VP	File	File	Skips	Omit	KM	Stns	VPs
09TE-01	1000.5	1510.5	1	492	21	2	20.40	510	490

TOTALS	
VPs...	490
Skips	21
Lin.km...	20.40
Cum.Lin.km...	20.40
Lin.km.Remaining...	20.36
Cum.Total Vps (Job)...	490
Av.Daily Production Lin.km	20.400
%Completed...	51.00%
Estimated Finish Date:	**22 January 2009**

Chargeable Production Hours:		**Chargeable (Non-Production) Hours:**			
Recording.....	9.4	Human Error.....			
Recorder Move.....	1.1	QC Spread.....	0.6	Total Production hrs (Day)...	11.0
Line Move.....		Recorder.....		Total Production hrs (Job)...	16.2
Detours/Terrain.....		Vibes.....			
Travel Time.....	0.5	WOS.....		Total Non-Production hrs (Day)...	0.9
Layout Spread.....		H/Wires + P/Source + Exper.....	0.3	Total Non-Production hrs (Job)...	8.4
Pickup Spread.....		Toolbox/Induction.....			
Other.....		Weather St/By.....		**Day Total.....**	12.5
		Washdown.....		**Cum.Total Hrs (Job)**	25.2
		Camp Move.....		**Total Chargeable.....**	11.9
Non Chargeable Hours:		Other.....			
Recorder.....				Daily Non Chargeable hrs.....	0.6
Vibes.....	0.6			Total Non Chargeable hrs.....	0.6

COMMENTS:

* Toolbox 6.30am-6.45am.
*Client rep to the field.
*HSE to the field.
*Crew manager to cable container .
*Crew are doing a good job.
*Crew change 3out-4in.

***Down time :**

2 Client Rep's on site

Total Crew #'s 33 **Line #'s 17** **Vehicle #'s 29**

Spread Movement

Client: Torrens Energy Limited

Layout				**Pickup**			
Line	Station #		Tot	Line	Station #		Tot
09TE-01	1301	1799	499	09TE-01	1000	1397	398
Total Stations:			499	**Total Stations:**			398
Bad Cables		2		Bad Phones			5

Crew Manager _____

Client Rep _____

Terrex Seismic Crew 403 - Torrens Energy Limited

Daily Report

CREW 403

Client.....	Torrens Energy Limited	Party Manager..	Warren Campbell
		Client Rep.....	Bill Foster
Survey Name.....	2009 Torrens Energy - Parachilna 2D. Seismic Survey.	Client Rep.....	Bruce Godsmark
Area.....	Parachilna	Weather.....	Fine /Hot
State.....	S.A	Date.....	Friday, 23 January 2009

Line	VP	VP	File	File	Skips	Omit KM	Stns	VPs
09TE-01	1511.5	2019.5	493	989	12	20.36	509	497

Torrens Energy LTD 2D completed

TOTALS	
VPs...	497
Skips	12
Lin.km...	20.36
Cum.Lin.km...	40.76
Lin.km.Remaining...	0.00
Cum.Total Vps (Job)...	987
Av.Daily Production Lin.km	20.380
%Completed...	100.00%
Estimated Finish Date:	**23 January 2009**

Chargeable Production Hours:

Recording.....	8.9
Recorder Move.....	
Line Move.....	
Detours/Terrain.....	0.1
Travel Time.....	0.5
Layout Spread.....	
Pickup Spread.....	2.5
Other.....	

Chargeable (Non-Production) Hours:

Human Error.....	
QC Spread.....	0.2
Recorder.....	
Vibes.....	
WOS.....	
H/Wires + P/Source + Exper.....	0.3
Toolbox/Induction.....	
Weather St/By.....	
Washdown.....	
Camp Move.....	
Other.....	

Total Production hrs (Day)...	12.0
Total Production hrs (Job)...	28.2
Total Non-Production hrs (Day)...	0.5
Total Non-Production hrs (Job)...	8.9
Day Total.....	12.5
Cum.Total Hrs (Job)	37.7
Total Chargeable.....	12.5

Non Chargeable Hours:

Recorder.....	
Vibes.....	

Daily Non Chargeable hrs.....	0.0
Total Non Chargeable hrs.....	0.6

COMMENTS:

* Toolbox 6.30am-6.45am.
*Client rep to the field.
*HSE to the field.
*Crew manager to Hawker .
*Crew are doing a good job.
*Recording completed at 16:30pm crew continued to pick up spread .

***Down time :**

2 Client Rep's on site

Total Crew #'s 33 **Line #'s 17** **Vehicle #'s 29**

Spread Movement

Client: Torrens Energy Limited

Layout				Pickup			
Line	Station #		Tot	Line	Station #		Tot
09TE-01	1800	2019	220	09TE-01	1398	2019	622
Total Stations:			220	**Total Stations:**			622
Bad Cables			2	Bad Phones			5

Crew Manager _____

Client Rep _____

APPENDIX H

RECORDING STATISTICS

RECORDING STATISTICS

Date	Travel Time	Downtime	Recording	Layout/Pick-up Spread	Camp Move	H/Wires & P/Source & Exp	Recorder/ Vibrator Move	QC Spread	Detours	Swath Move	QC Spread	WOS	Testing	Other	Weather/Other	Safety Meeting's	Total Stand-by	Total Chargeable Hours	Total Operational Hours	Total Km's
	Chargeable	Non-Chargeable	Chargeable	Chargeable	Chargeable	Chargeable	Chargeable	Chargeable	Chargeable	Chargeable	Chargeable	Chargeable	Chargeable	Non-Chargeable	Stand-by	Stand-by	Chargeable	Chargeable		
21 January 2009	**1.50**			**3.70**	**6.20**	**0.50**										**0.80**	**0.80**	11.90	12.70	
22 January 2009	**0.50**	**0.60**	**9.40**			**0.30**	**1.10**	**0.60**									-	11.90	12.50	**20.4000**
23 January 2009	**0.50**		**8.90**	**2.50**		**0.30**		**0.20**	**0.10**								-	12.50	12.50	**20.3600**
Total	**2.5000**	**0.6000**	**18.3000**	**6.2000**	**6.2000**	**1.1000**	**1.1000**	**0.8000**	**0.1000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.8000**	**0.8000**	**36.3000**	**37.7000**	**40.7600**

Observations, Comments and Recommendations

(Post operations on the 2009 Parachilna 2D Seismic Survey.)

GENERAL

Terrex conducted the Parachilna Seismic Survey efficiently and professionally. They mobilised to site on the morning of January 21, 2009. That afternoon they laid out sufficient spread to allow the start recording and conducted Vibrator Hardwire Similarities and Point Source Tests, ready for production recording the following day.

The crew were generally good at sticking to the 5m cleared work zone, with vehicles carrying out 3 point turns rather than 'U' turns. Unattended vehicles were left immediately adjacent to the track rather than pulling them off into the scrub. There were a couple of infringements of vehicles moving outside the 5m work zone corridor but these were relatively minor events.

A road train had dropped off a trailer of equipment for Terrex at the Parachilna line. This occurred prior to the mobilisation date indicated by the seismic crew. The driver had sought permission from the Station owner for a site to leave it and was directed to an open area near the line. Unfortunately, this was not the designated campsite. Vehicle access to this unit was limited and confined to a path in and out.

Seismic recording was completed on January 23, 2009, with all spread back in camp that day, except for a few cables. Hourly charges to Torrens Energy also ceased on this date.

SURVEY & HERITAGE

Two instances occurred where the DSS surveyors cut off sharp bends in the seismic line during pegging and surveying, whereas Heritage approval had covered only the track access itself and had, technically, not approved these altered zones. As a result, the vibrators were not permitted to travel through these zones and the stations had to be skipped.

Comment & Recommendation:- When the seismic operation is confined to existing tracks and roads then, very often, there is little flexibility in the seismic line location but, wherever possible, very sharp bends and sections of track running at right-angles to the general line direction should be avoided. Although these instances can be handled with crooked line processing, there is, nonetheless, some degradation of data.

Any future surveys should consider alternate pathways to those sections of line with drastic bends prior to the Heritage Survey, with the view to having these options also approved when the Heritage Survey takes place.

Sharp turns and the right-angled section of line immediately west of the railway could have been avoided by taking the line straight on. The seismic cable could still have safely crossed the railway via the existing culvert by the use of extension cables. Vibe skips would have been needed near the rail line and town precinct, (these occurred anyway through non-heritage clearance), but the line would have been considerably straighter and required less processing.

A more extensive seismic survey may take benefit from direct supervision of Surveying operations or even more detailed pre-Survey scouting with greater annotation of trouble spots for the Surveyors guidance.

DATA QUALITY

A high velocity refractor could be seen on the monitor records, circa 0.4 seconds but little evidence of any reflectors, save for a few shallow ones on the early part of the line, could be seen on these monitors. A significant amount of groundroll was evident on the monitors. Data Processing will most likely remove the groundroll without too much trouble but it makes it difficult in the field to tell whether there are any deeper reflectors present or not.

Comment & Recommendation:- If the groundroll proves to be an issue, or if Torrens wants cleaner looking field records, then going to a rolling vibrator array, rather than the static one used on this survey, may help to attenuate some of the unwanted noise. A longer source array with greater pad to pad spacing may also aid in this.

Respectfully submitted,

Bill Foster
Resubi Exploration Services
January 24, 2009.

DATA PROCESSING REPORT

TORRENS ENERGY LIMITED

2009 PARACHILNA 2D SEISMIC SURVEY

Date Processed: *January 2009 – February 2009*
Date Compiled: *13 March 2009*
Report Number: *VP09-391*
Compiled By: *Mario Vecchi*

Velseis Processing Pty Ltd
ABN 30 058 427 204

Integrated Seismic Technologies

Disclaimer

This report has been prepared in good faith and with all due care and diligence. It is based on the seismic and other geophysical data presented and referred to, in combination with the author's experience with the seismic technique, and as tempered by the geological and stratigraphic evidence presented in various forms and through discussions with client representatives.

As such, the report represents a collation of opinions, conclusions and recommendations, the majority of which remain untested at the time of preparation. In the light of these facts it must be clearly understood that Velseis Processing Pty. Ltd., its proprietors and employees cannot take responsibility for any consequences arising from this report.

TABLE OF CONTENTS

INTRODUCTION

Velseis Processing processed line 09ET-01 totalling 40.8km, for Torrens Energy Limited from January 2009 to February 2009. The line was processed using a standard post-stack finite difference time migration processing sequence incorporating refraction statics.

Line Summary

Line	First Receiver	Last Receiver	Group interval(M)	Length(KM)
09ET-01	1000	2020	40	40.8

Acquisition Parameters

Recorded by	Terrex
Instruments	Sercel SN428
Sample Rate	2 ms
Record Length	10000ms
No. of Channels	240
Source Array	Vibroseis – 4-64Hz & 8-72Hz
Offsets	Near Trace – 20m; Far Trace – 4780m
Group Spacing	40m
V.P. Spacing	40m
Coverage	12000%

TESTING

True Amplitude Recovery

Time raised to power correction, spherical divergence and dB/sec corrections were tested. A time-power constant of 1.6 was chosen.

Deconvolution

Operator lengths of 80ms, 120ms and 160ms were tested using spiking deconvolution, of which 160ms was the best. Then a surface consistent spiking deconvolution using the 160ms operator length was tested, however this gave an inferior result than the trace-by-trace deconvolution.

A 2 window trace-by-trace deconvolution was then tested resulting in a good improvement with the deeper data, and because of this it was decided to proceed with the 2 window spiking deconvolution.

PROCESSING PARAMETERS

Reformat

Input is reformatted to ProMAX internal data format.

Trace Edit

Remove bad or noisy traces from shot records interactively.

Geometry

Assign geometry information to trace headers. Information assigned to each trace includes source, receiver and CDP locations along with offsets, elevations, and CDP fold.

Gain

Spherical divergence using a Time-Power value of 1.6 was applied.

Static Computation

Statics calculated with a single layer refraction method. Refraction statics were tied to uphole data where available.

For this refraction method, first breaks were picked on a refractor corresponding to the base of weathering.

Replacement Velocity	Final Datum
2000 m/s	0 m

Deconvolution

Whitening of the spectrum to enhance signal resolution was achieved using a 2 Window Spiking Deconvolution with two 160ms operators which were picked from a shot record.

Velocity Analysis (1st Pass)

Velocities were picked using the ProMAX interactive velocity picking package (IVA). IVA uses velocity spectra, moved out gathers and stacked panels to assist in a careful interpretation of stacking velocities. As the velocity function is altered, revised gathers and stacks are produced until optimised stacking velocities are achieved.

Velocities were picked at locations 600m (80 CDPs) apart. The regional velocity was used as the guide function and 11 velocity panels covering 85% to 115% of the guide velocities for every location. Each panel consisted of 11 trace CDP stacked sections using the 11 differing velocities.

Residual Statics Calculation and Application

Surface consistent residual statics were calculated and applied using Maximum Power Autostatics.

Pilot or reference traces were formed for a 200-800ms time gate following structure by flattening all traces along the autostatics horizon over 7 CDP's.

These traces are summed to form a single pilot trace. Each trace from the active CDP is time shifted relative to the pilot trace and summed with it. The power of the stack is measured for each time shift. This shift-power trace is then summed with other traces having the same shot and receiver in their respective domains.

After the shift spectra has been calculated for the entire line and summed in the Receiver/Shot domains, time shifts are picked at the maximum of the power shift spectra and stored as Static Values.

The pilot stack is updated and the process repeated for a number of iterations.

In this case, calculations were conducted for at least 8 iterations or until the RMS of the change in the computed statics was less than .05.

Velocity Analysis (2nd Pass)

Velocities were picked using the ProMAX interactive velocity picking package (IVA). IVA uses velocity spectra, moved out gathers and stacked panels to assist in a careful interpretation of stacking velocities. As the velocity function is altered, revised gathers and stacks are produced until optimised stacking velocities are achieved.

Velocities were picked at locations 1000m apart. The first pass velocity was used as the guide function and 11 velocity panels covering 90% to 110% of the guide velocities for every location. Each panel consisted of 11 trace CDP stacked sections using the 11 differing velocities.

Residual Statics Calculation and Application

Surface consistent residual statics were calculated and applied using Maximum Power Autostatics.

Pilot or reference traces were formed for a 200-800ms time gate following structure by flattening all traces along the autostatics horizon over 7 CDP's.

These traces are summed to form a single pilot trace. Each trace from the active CDP is time shifted relative to the pilot trace and summed with it. The power of the stack is measured for each time shift. This shift-power trace is then summed with other traces having the same shot and receiver in their respective domains.

After the shift spectra has been calculated for the entire line and summed in the Receiver/Shot domains, time shifts are picked at the maximum of the power shift spectra and stored as Static Values.

The pilot stack is updated and the process repeated for a number of iterations.

In this case, calculations were conducted for at least 8 iterations or until the RMS of the change in the computed statics was less than .05.

CRS

CRS is based on a set of attributes that characterise the shape of pre-stack reflections. In normal move-out processing only a single parameter is used to define this travel-time surface while in two dimensions the CRS travel-time surface uses three parameters. These parameters are the angle of emergence or dip of a zero-offset wavefront, or central ray; the instantaneous radius of the zero-offset wavefront; and the instantaneous radius of curvature of the wavefront in the offset dimension.

Velocity Analysis (3rd Pass)

Velocities were picked using the ProMAX interactive velocity picking package (IVA). IVA uses velocity spectra, moved out gathers and stacked panels to assist in a careful interpretation of stacking velocities. As the velocity function is altered, revised gathers and stacks are produced until optimised stacking velocities are achieved.

Velocities were picked at locations 500m apart. The second pass velocity was used as the guide function and 11 velocity panels covering 90% to 110% of the guide velocities for every location. Each panel consisted of 11 trace CDP stacked sections using the 11 differing velocities.

Trace Amplitude Balance

A 500ms AGC scaling window was applied.

Normal Moveout Correction

An NMO correction was applied to the data using the DMO velocity.
Dynamic corrections are applied to the data using the following formula.

$$TX^2 = T0^2 + X^2/V^2$$

TX = time at offset X
T0 = time at zero offset
X = offset of the trace
V = velocity at time T

Stack

Add traces within a common midpoint gather. The post stack trace was scaled by the square root of the sum of fold for each sample in the trace.

FX Deconvolution

Applied to remove random noise and increase the signal to noise ratio. Applied frequency range is 10-120Hz.

Finite Difference Time Migration

The stacked sections were migrated using 100% of smoothed stacking velocities.

Bandpass Filter

A time-variant bandpass filter was applied to the data.

Scaling

A 500ms AGC was applied to the final data.

ARCHIVING

1. A Compact Disc, CPCD-967 containing raw and filtered final stacks, raw and filtered finite difference and crs migrations in SEGY format. CGM displays of the migrations together with a digital copy of the final report are also included on this CD-rom.

2. Processing report.

APPENDIX

These data were processed by Velseis Processing Pty. Ltd., Brisbane, Australia.

Velseis Processing utilizes ProMAX 3D processing software. This is a totally interactive system allowing the user to view data processing at each stage, producing a final result of the highest quality.

The software executes on a quad processor Sparc 20 Sun workstation and a 145 CPU linux cluster. Data is viewed via X terminals networked to the main system, each terminal has a high definition monitor to enable accurate representation of the digital data in pixel form.

The overall efficiency of the system enabled processing to be completed within the allotted time frame.

Plots were generated via a 300 dpi laser plotter. This was used to generate paper plots for QC purposes as well as the ability to provide final filmed copies.

Velseis Processing is committed to offering a premium product, the software development undertaken by ProMAX resulting in processing algorithms which are state of the art.