CPSN08C SEISMIC SURVEY

2008 CHARO 3D

PPL 177, PEL 111

SOUTH AUSTRALIA

ACQUISITION REPORT

Compiled by: A. White
Santos Ltd.
Sept 2008

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1 INTRODUCTION

1.1 GENERAL

In the year 2008 Santos Ltd., as operator of Petroleum Production Licence (PPL) 177 and on behalf of Victoria Oil Exploration (PEL 111) under a data sharing agreement carried out approximately 46 square kilometres of 3D seismic imaging in the Charo area as the CPSN08C Charo 3D Seismic Survey.

The following table details the companies involved in the acquisition of the survey.

Activity	Contractor
Line Preparation	Terrex Contracting Pty. Ltd
Surveying	Conics Positioning Pty Ltd
Shot Hole Drilling	Exploration Field Services
Preloading and Shooting	Sequel Drill and Blast Pty Ltd
Seismic Recording	Terrex Seismic (Crew 402)

Santos Ltd contracted Tony Kenny and John Allen to supervise field operations. Sections below, describing field operations, are largely drawn from their observations.

Processing of the seismic data was carried out by WesternGeco in their centre in Adelaide, and will be the subject of a separate report.

This report describes the data acquisition of CPSN08C Charo 3D Seismic Survey, located approximately 85km north north west of the Santos Moomba facility.

1.2 TIMETABLE OF MAIN EVENTS

Date	**Activity**
29/02/2008	Notice of Intention sent to PIRSA.
03/03/2008	Notice of Entry sent to landholders (Clifton Hills).
18/06/2008	Notification of survey and request for clearance sent to the Dieri Native Title Claimants.
14/07/2008	Land Access and Data Sharing Agreement signed
19/07/2008	Line preparation & surveying commenced.
28/07/2008	Line preparation completed.
30/07/2008	Surveying completed.
04/08/2008	Recording commenced.
11/08/2008	Recording completed.

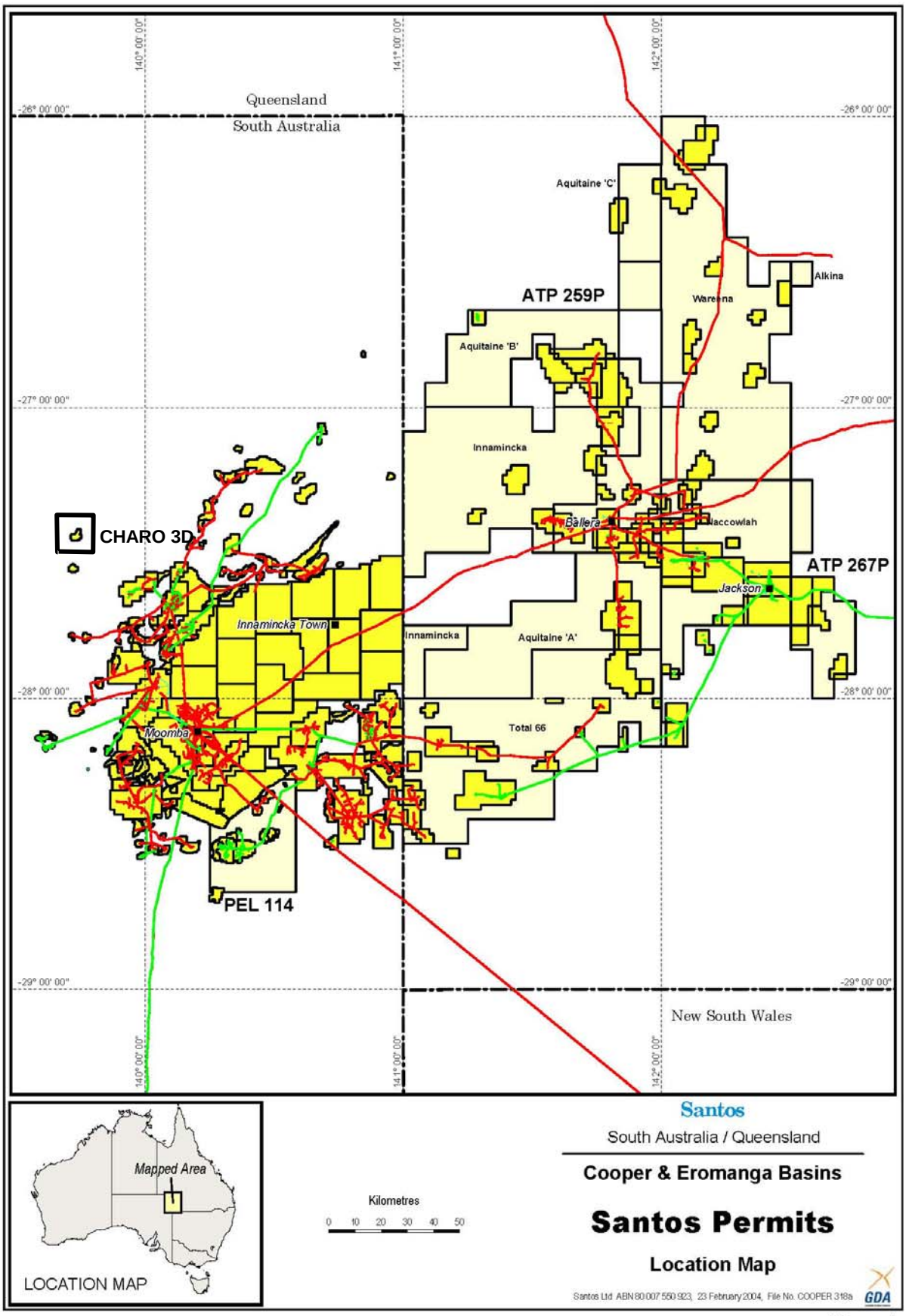
Queensland
South Australia
New South Wales
Aquitaine 'C'
ATP 259P
Aquitaine 'B'
Innamincka
Alkina
Ballera
Naccowlah
ATP 267P
Jackson
CHARO 3D
Innamincka Town
Innamincka
Aquitaine 'A'
Total 66
Moomba
PEL 114
Mapped Area
LOCATION MAP
Kilometres
0 10 20 30 40 50
Santos
South Australia / Queensland
Cooper & Eromanga Basins
Santos Permits
Location Map
Santos Ltd ABN 80 007 550 923, 23 February 2004, File No. COOPER 318a
GDA

Figure 1

2 SURVEY SCOPE AND OBJECTIVES

This survey was designed to provide high quality 3D seismic data over the Charo field, allowing improved certainty of structure and possible Jurassic stratigraphy. The data will facilitate further appraisal and development drilling over the structures and near field opportunities.

Receiver Lines	Start Stn	End Stn	Length
CPSN08C-R1000	5048	5215	5.880
CPSN08C-R1008	5048	5215	5.880
CPSN08C-R1016	5048	5215	5.880
CPSN08C-R1024	5048	5215	5.880
CPSN08C-R1032	5048	5215	5.880
CPSN08C-R1040	5048	5215	5.880
CPSN08C-R1048	5032	5215	6.440
CPSN08C-R1056	5032	5215	6.440
CPSN08C-R1064	5016	5215	7.000
CPSN08C-R1072	5000	5215	7.560
CPSN08C-R1080	5000	5215	7.560
CPSN08C-R1088	5000	5215	7.560
CPSN08C-R1096	5000	5215	7.560
CPSN08C-R1104	5000	5215	7.560
CPSN08C-R1112	5000	5215	7.560
CPSN08C-R1120	5000	5215	7.560
CPSN08C-R1128	5000	5215	7.560
CPSN08C-R1136	5000	5215	7.560
CPSN08C-R1144	5000	5215	7.560
CPSN08C-R1152	5000	5215	7.560
CPSN08C-R1160	5000	5207	7.280
CPSN08C-R1168	5000	5207	7.280
CPSN08C-R1176	5000	5207	7.280
CPSN08C-R1184	5000	5191	6.720
CPSN08C-R1192	5000	5191	6.720
		Total	**173.600**

Source Lines	Start Stn	End Stn	Length
CPSN08C-S5000	1072	1191	4.200
CPSN08C-S5008	1072	1191	4.200
CPSN08C-S5016	1064	1191	4.480
CPSN08C-S5024	1064	1191	4.480
CPSN08C-S5032	1048	1191	5.040
CPSN08C-S5040	1048	1191	5.040
CPSN08C-S5048	1000	1191	6.720
CPSN08C-S5056	1000	1191	6.720
CPSN08C-S5064	1000	1191	6.720
CPSN08C-S5072	1000	1191	6.720
CPSN08C-S5080	1000	1191	6.720
CPSN08C-S5088	1000	1191	6.720
CPSN08C-S5096	1000	1191	6.720
CPSN08C-S5104	1000	1191	6.720
CPSN08C-S5112	1000	1191	6.720
CPSN08C-S5120	1000	1191	6.720
CPSN08C-S5128	1000	1191	6.720
CPSN08C-S5136	1000	1191	6.720
CPSN08C-S5144	1000	1191	6.720
CPSN08C-S5152	1000	1191	6.720
CPSN08C-S5160	1000	1191	6.720
CPSN08C-S5168	1000	1191	6.720
CPSN08C-S5176	1000	1191	6.720
CPSN08C-S5184	1000	1191	6.720
CPSN08C-S5192	1000	1191	6.720
CPSN08C-S5200	1000	1175	6.160
CPSN08C-S5208	1000	1175	6.160
CPSN08C-S5216	1000	1151	5.320
		Total	**172.760**

3 DATA ACQUISITION

3.1 PERMITTING

3.1.1 GENERAL

The programme was located within the boundary of Clifton Hills (Kanowona) pastoral lease. The manager of the pastoral lease was initially advised of forthcoming seismic operations by letter, with attached maps etc. Contact was then made with the manager of the pastoral lease by the Santos Representative to discuss and obtain approval for various aspects of operations, including timeframe, procedures, fences, gates, roads, camp site, water supply, etc, was made before field operations commenced.

3.2 LOGISTICS AND COMMUNICATIONS

The prime contractor, Terrex Seismic, provided a self-contained, air-conditioned, mobile camp, as listed in Appendix 2, to house the field management, recording and maintenance personnel. Line-preparation and Surveying provided their own camp facilities. Senior management of Terrex Seismic was located in Perth.

All food and freight was road transported to the crew by Neil Mansell's Transport from Adelaide.

Fuel for all vehicles was supplied by IOR Petroleum in Eromanga and delivered to site.

Most other equipment and personnel logistics were supported from Terrex Seismic' Perth office.

3.3 SURVEYING

Horizontal and vertical surveying of seismic lines, using Trimble GPS receivers and ancillary equipment, was carried out by Conics Positioning Pty Ltd (formerly Pioneer Surveys No.2)

Operations, personnel and equipment are fully detailed in their "Conics, Prospect Report, CPSN08C Seismic Survey", which is appended hereto (Appendix 1).

3.4 CULTURAL HERITAGE CLEARANCE

The Charo 3D project falls within an area claimed for native title by the Dieri people. Following formal notifications, six (6) representatives of the native title claimants performed a work area clearance of the survey area assisted by archaeologists Jan Scott, Michael Maeorg & Craig Gilbert (who were contracted via Adelaide University) and Bill Hedditch as overall clearance coordinator. This work area clearance was conducted and completed prior to any field activities by Santos.

There were numerous cultural heritage sites identified during the course of this work and detours were identified by the clearance party and provided to Santos. Cultural heritage clearance techniques and details of the detours are the subject of a separate report prepared by representatives of the Dieri people. A copy of this report was also provided to Santos.

3.5 LINE PREPARATION

3.5.1 EQUIPMENT

Line preparation was carried out by Terrex Contracting who supplied a total of thirteen personnel. Personnel work on a 6 week on and 2 week off roster. Terrex contracting supplied the following equipment:

3 x	Komatsu D65EX bulldozers
1 x	Caterpillar 12G grader
1 x	John Deere 6 x 6 grader
3 x	Kenworth prime movers
2 x	Toyota 4x4 utilities
1 x	Nissan 4x4 station wagon
1 x	Isuzu 4x4 supply/crane truck
1 x	Ford L9000 Water Truck with 15,500 litre tank
1 x	Elross 8.1m Kitchen trailer
1 x	Elross 8.1m Diner trailer
2 x	Elross 4 room / 8 man Accommodation trailers
1 x	Office / Sleeper / Laundry trailer
1 x	Shower / Laundry trailer
1 x	Workshop/spare parts trailer
1 x	240v generators – 120kva
1 x	30,000 litre Fuel trailer
2 x	Low loaders
2 x	Trailer mounted chemical toilets

3.5.2 OPERATIONS

Camp and equipment arrived at the Charo campsite on the 14th, 15th and 16th of July. The start up inductions were held on the evening of the 17th and then the crew were forced to stand by waiting on approval of Excavation Permit. Operations finally commenced on the 19th July.

Three bulldozers and two graders were used to prepare all source and receiver lines. Conics Positioning installed Garmin 172C GPS receivers and radio modem antenna equipment on the bulldozers. A separate UHF radio for contact between machines, surveyors and camp had been previously been installed.

Prior to commencing work, start and end coordinates of source and receiver lines are loaded into the dozers GPS receiver. Its current position relative to the straight line joining the end points is graphically displayed on the Garmin 172C on-board navigation screen and its distance in metres right or left of the line is also displayed. The operator is required to keep the machine within the client specified line tolerance of ±7m unless detours are necessary to avoid heritage sites or other natural or man made obstructions such as trees, wellheads, pipelines, evaporation ponds, fences etc.

Most lines on the relatively open interdunal plains required little preparation. Invariably these were walked by the bulldozers with the blade used only to remove hummocks, smooth any washouts and push dead or fallen timber off the lines. Source and receiver lines were weaved extensively and no trees were removed unless absolutely necessary. Doglegs were placed in lines where they crossed roads in the area. Cultural heritage site detours were pegged by the Archaeologist and Clearance team.

Sand dunes ranged in height up to 10 metres however the majority were less than this and did not require a great deal of dozing effort. A few dunes in the west were quite steep on the western flanks. There were no fence lines or station tracks in the area.

3.5.3 PRODUCTION

A total of 312.87 km of source and receiver lines – excluding the 33.5 km on the salt lakes - were prepared in 274.0 charge hours at an average rate of 11.14 km/hour. Bulldozer standby time on this project amounted to 35.25 hours.

Line Preparation Statistics:

Total Kilometres:	346.36
Dozer Hours:	274.00
Grader Hours:	195.50
Dozer Days:	28.25
Km per Charge Hour:	1.14
Km per Work Day:	31.9
Km per Dozer Day:	11.5

3.6 SHOT HOLE OPERATIONS

There were two salt lakes on the prospect, a small one the southern boundary and a larger one just east of centre and it was decided to shoot these with dynamite to avoid large gaps in coverage.

The companies subcontracted to assist were Exploration Field Services (EFS) of Peterborough, Victoria, for drilling & recording logistical support, and Sequel Drill and Blast of Brisbane, who provided a licensed magazine truck and two licensed operators for preloading and shooting services.

3.6.1 EQUIPMENT

EFS supplied 2 custom-made auger units which fitted on rented Takegeuchi skid-steer loaders (bobcats). The bobcats were fitted by EFS with track extensions which considerably increased the flotation of the units and allowed them to advance further into the soft lake surfaces. In addition, 2 rented track tippers, one large, one small, were supplied.

Sequel Drill and Blast provided a mobile magazine which was basically a set of day boxes mounted on a Nissan Pathfinder. This was legal provided the truck was in sight of the preloaders during the day and was guarded at night while in the camp.

The pattern chosen was 3 holes x 2m spacing x 3m deep and each loaded with a 400 gram booster.

3.6.2 PERSONNEL

EFS supplied 2 drillers to operate the rented Takegeuchi skid-steer loaders. Sequel Drill and Blast provided one preloader per rig totalling two persons in the field. Two additional personnel were supplied by Terrex Seismic as required.

3.6.3 OPERATIONS

The lakes were quite wet in some sections. In general, the white sections with dry surface salt were traversable; while brown areas indicated that salt was liquid and the surface wet and soft.

To traverse the very wet sections, the drill and preloading personnel used plywood planks to form a stable base. Because of the physical effort involved in manhandling the planks from front to back, only one rig would operate when this technique was required. There were up to 6 men involved in the plank work, namely 2 drillers, 2 preloaders and two additional assistants supplied by the Terrex recording crew.

The 2 rented track tippers were very slow and were not used a great deal, being mainly kept in reserve to transport plywood planks out to the bobcats when they encountered wet areas.

Drilling operations started on July 28th. One rig was sent to the small western lake and the second to the large lake. The western lake proved too wet to pass over with planks and a number of SPs were offset to the maximum 140m. The drilling was completed on August 12. The rigs averaged 14.2 metres per hour.

There was one preloader per rig and charges were prepared and loaded with a 3 metre loading pole as drilling progressed. The preloaders kept busy since all holes had to be tamped to surface and, because of the wet conditions, this was often slow. The track tippers proved too slow to support the preloaders and so explosives were carried on boxes on the rigs.

After completion of preloading, one preloader returned to Brisbane with the explosives truck and the other remained to do the shooting. This was done on foot since the track tippers were too slow to assist and consequently proceeded at a relatively slow rate. Fortunately, the layout was such that the observer was able to switch back and forth between vibrators and dynamite, so while the shooter was on traverse, he was able to continue shooting with vibrators.

There were no misfires and only one blowout. However, after a day or so, many of the holes collapsed due to subsidence.

Drilling Statistics

Total Holes:		655
Total Shotpoints:		219
Rig Days:		10
Holes per Rig day		65
SPs per Rig day	22	
Rig Hours:		138.00
Metres Drilled		1965
Metres per Hour:		14.2

3.7 RECORDING

3.6.1 EQUIPMENT

Terrex Seismic supplied and operated a complete seismic data acquisition system, including, as required.

Recording Equipment

- 1 x Sercel 428A, 24 bit telemetry recording system and 2000 channel acquisition and processing module
- 1 x Sun Microsystems Sun Blade 2500 server
- 1 x Dell Optiplex GX620 processor with Windows XP 32 operating system
- 2 x NAS 320Gb hard drives plus 2 spares
- 1 x ULTRIUM dual LT02 tape drive
- 1 x Pelton VibPro encode sweep generator.
- 4 x Pelton VibPro VCE's
- 1 x Pelton VIBSIG real time QC system
- 4 x Wall mounted, flat LCD colour display screens
- 1 x Veritas iSys V12 thermal plotter
- 1 x Optus mobilsat phone
- 2 x Motorola 50W VHF radios
- 1 x Uniden 25W UHF radio
- 1 x Codan HF radio

2417 x strings Sensor SM4, 10Hz geophones, 12/string
605 x cables with 4 combined takeout/A-D converters per cable
Sufficient power units and batteries to match cable numbers

Automotive Equipment

1 x Isuzu 4x4 airconditioned recording truck
4 xI/O AHV-IV articulated, hydrostatic 60,000lb vibrators with VHF radios.
1 x Paystar 6 x6 vibrator service truck
1 x Toyota 4x4 Landcruiser wagon – vib scout
1 x Toyota 4x4 utility – line boss
2 x Toyota 4x4 utilities – troubleshooters
4 x Toyota 4x4 utilities – cable trucks
2 x Toyota 4x4 utilities – geophone trucks
4 x Toyota 4x4 Landcruiser wagons – line crew
1 x Toyota 4x4 utility – depegger
1 x Spread trailer (moved by Terrex Contracting prime mover)
1 x Kenworth prime mover
1 x Paystar 6x6 spread truck
2 x Hino 4x4 spread trucks

A complete list of automotive equipment is included in Terrex Seismic Operations Report for "Santos Ltd– 2008 Charo 3D Seismic Survey, Operations Report". A copy of this report is attached as Appendix 2.

3.7.2 RECORDING PARAMETERS

Recording parameters are detailed in the Terrex Seismic Operations Report for "Santos Ltd– 2008 Charo 3D Seismic Survey, Operations Report". A copy of this report is attached as Appendix 2.

3.7.3 OPERATIONS

The recording crew mobilised from a separate contract for Beach Petroleum on August 2nd. Recording commenced on August 4th after layout on the previous day.

Recording was generally straightforward. There was some time lost for dingo chews, although less than expected since dingos were around camp, often seen in the field and were relatively tame. A total of 3.5 hours was lost on the 11th for a HDD interface problem with the Vib control computer.

Data quality was good throughout the survey. Production rates were satisfactory and there were no skips. Overall, there was minimal line noise for most of the survey however there was some wind noise on occasion and also some noise from Charo 2 when the Operator misunderstood communications and left the well running. However, the line rolled off this well after a few hours.

The grid comprised of 25 parallel receiver lines oriented N/S and spaced 280m apart. Lines were numbered in increments of 8 starting with the westernmost most line numbered R1000 and the easternmost, R1304.

Geophone stations were spaced at 35m intervals. At each station, 12 Sensor SM4 geophones were arrayed parallel to the receiver line and spaced 2.92m apart, centred on the station. When fully rolled on, data was recorded by a patch of 1120 geophones on ten lines, each with 112 live stations.

There were 28 parallel source lines, arranged perpendicular to the receiver lines and numbered in increments of 8 starting with the northernmost line numbered S5000 and the southernmost S5216.

VPs were spaced at 35m intervals. There were relatively few offsets, being required only for the Charo 2 and 3 infrastructures, including the interwell pipeline.

This survey was recorded as a single panel.

The vibrator array and the number of sweeps executed at each EP were 2 x 4 secs at 5-90 Hz a. Three Input/Output AHV-IV vibrators were arrayed in line with a pad-pad spacing of 12.5m. Where a linear array was not possible because of obstructions such as fences and pipelines, they were grouped side by side on the peg. If space was insufficient to fit 3 vibs, two were used with 4 sweeps.

After completion of preloading, one preloader remained on site to do the shooting. This was done on foot and consequently proceeded at a relatively slow rate. Fortunately, the layout was such that the observer was able to switch back and forth between vibroseis and dynamite sources, so while the shooter was on traverse, he was able to continue shooting with vibrators.

A total of 4936 EPs were recorded with four skips, all for inaccessible dunes. Of these EPs, 4719 were VPs and 217 were salt lake SPs.

Data shipments were sent weekly via courier service from Moomba. Each shipment consisted of 'A' tapes and supporting data on CD. The 'B' tapes were sent when confirmation was received that A tapes had been successfully read. There was only 1 tape used during the survey

3.8 WEATHERING SURVEY

3.8.1 GENERAL

Due to the existing uphole coverage, no weathering survey was required.

3.9 ENVIRONMENT

3.9.1 GENERAL

As operator, Santos Ltd has, for a number of years, been committed to planning and conducting seismic operations in such a way that environmental disturbance is avoided or minimised, and affected areas can rehabilitate naturally in a reasonable time frame. These objectives have most recently been set out and discussed in the publications "Statement of Environmental Objectives: Geophysical Operations" Santos Ltd, June 2006, and "Environmental Impact Report : Geophysical Operations" Santos Ltd, June 2006.

The commitment has normally included the distribution of copies of the above to all contractors' personnel, and continual pressure by Santos Ltd field representatives on these personnel to conform to the principles and requirements of these documents.

Compliance with the Aboriginal Heritage Act has also been stressed and, during the year, the strategy to ensure meticulous adherence to standard Santos procedures relating to Cultural Heritage Management and Environmental Sensitivity was reinforced by special training of key personnel, and daily meetings to re-iterate key issues and procedures.

3.9.2 OPERATIONAL OBSERVATIONS

The weather was mostly sunny and mild with cold nights. Some days had mild wind, mostly from the south east but occasionally from the west.

Terrain in the general survey area was principally low to medium buff sand dunes, generally around 15-20m. There were some relatively high dunes in the west and northwest. Many dunes had a steep eastern side and some were mobile. The swales were variable, some sandy with saltbush and canegrass and some grassed plain with large marpoo. There were no drainages, although the northwest arm of Cooper Creek was not far to the west. Claypans were infrequent. The most important features were two salt lakes, one small round lake in the south west and a larger lake in the east. As well, the survey encroached on the southern third of Lake Mackinlay, a large dry lake with a soft powdery surface.

Vegetation consisted principally of grasses and small shrubs in the swales and small eucalypts on the dune fringes. Some of the dunes were vegetated with shrubs. The principal plant types were Marpoo, Gidgee and some Silver Cassia and Needlewood. The principal dune trees were Whitewood while scattered gidgee and mulga were found in the interdunal plains. Herbage consisted of sandhill canegrass and mulga grass. Most of the groundsel from the previous rains had died off. The salt lakes were ringed by samphire, with some ruby saltbush farther out on the salt lake fringes. Care was taken to avoid disturbing the samphire as it is very slow to regenerate.

All rubbish and waste material, including tyres and batteries, was segregated on site then disposed of at the Moomba waste depot. Grey water was drained away from the camp and discharged into a graded drain. The camp site was left in a neat and tidy condition on departure.

Environmental Audits of 4 kilometre sections of 4 lines were performed and submitted in a separate report. While there were no serious environmental problems noted on the land work, shothole subsidence was prevalent on the salt lake work and resulted in GAS-2 ratings. Apart from that, the discipline around the salt lakes was good and the only deviations from the three-point turn and stay on line rules seems to have been made by the clearance crews prior to survey activities commencing.

3.9.3 RESTORATION

There is no restoration planned of the salt lake surfaces despite the previously mentioned subsidence and vehicle bogging. Unfortunately, due to the nature of the surface, any attempted restoration work would result in greater visual impact than currently exists. The salt lake surfaces will regenerate naturally when the next rains occur.

Only minimal restoration was required and primarily limited to the campsites and road verges. Restoration activities have been delayed until October / November 2008 due to availability of the required earthmoving equipment.

APPENDIX 1 – CONICS POSITIONING FINAL OPERATIONS REPORT

PROSPECT REPORT

CPSN08C SEISMIC SURVEY

SANTOS: PPL 177

CHARO 3D

FOR

SANTOS LTD

July 2008

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CPSN08C-R1000 - 1192
CPSN08C-S5000 - 5216

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TABLE OF CONTENTS

1.0 INTRODUCTION

Conics Positioning was contracted by Terrex Seismic to carry out survey operations on the Charo 3D operated by Santos Ltd. This report covers the involvement of Conics Positioning in the seismic survey. The survey was located around the Charo oil Field approximately 46 km north-west of Tirrawarra satellite in North East South Australia. The terrain was predominantly small to medium sand dunes lightly vegetated with small trees, shrubs and grasses and lightly vegetated flats. The prospect area also contained two small salt lakes and one dry lake. The survey took place in July 2008. The weather was fine and cool.

The receiver station interval was 35.0m. The source station interval was 35.0m. Receiver and source lines were spaced 280m apart. Total length of lines was 346.36 km. Section 1.2 contains line listings.

Terex Contracting were contracted to carry out the line preparation. Cultural Heritage pre-clearance was carried out by the Dieri group. Site locations with 50m warning circles were loaded onto each Dozer's GPS unit so they could be avoided.

All line preparation and survey work was accomplished using Trimble and Garmin GPS (Global Positioning System) equipment. Much of the mapping information was compiled using Garmin handheld GPS units.

1.1 SURVEY DESIGN

Charo 3D was an orthogonal grid. Receiver lines ran north to south and source lines ran west to east. The following table contains design information:

Parameter	Receiver	Source
Group interval	35m	NA
VP interval	NA	35m
Station increment	1	1
Line spacing	280	280
Intersection offset	17.5m	17.5m
Line bearing (grid)	180°	90°
Offset increment	35m	35m
Inline tolerance	2m	5m
Crossline tolerance	7m	7m
Start line	1000	5000
End line	1192	5216
Min station	5000	1000
Max station	5215	1191

Receiver Origin	Easting	Northing
1000 5000	371400.00	6968232.50

1.2 LINES

Receiver Lines:

Line	Start	End	Kms
CPSN08C-R1000	5048	5215	5.880
CPSN08C-R1008	5048	5215	5.880
CPSN08C-R1016	5048	5215	5.880
CPSN08C-R1024	5048	5215	5.880
CPSN08C-R1032	5048	5215	5.880
CPSN08C-R1040	5048	5215	5.880
CPSN08C-R1048	5032	5215	6.440
CPSN08C-R1056	5032	5215	6.440
CPSN08C-R1064	5016	5215	7.000
CPSN08C-R1072	5000	5215	7.560
CPSN08C-R1080	5000	5215	7.560
CPSN08C-R1088	5000	5215	7.560
CPSN08C-R1096	5000	5215	7.560
CPSN08C-R1104	5000	5215	7.560
CPSN08C-R1112	5000	5215	7.560
CPSN08C-R1120	5000	5215	7.560
CPSN08C-R1128	5000	5215	7.560
CPSN08C-R1136	5000	5215	7.560
CPSN08C-R1144	5000	5215	7.560
CPSN08C-R1152	5000	5215	7.560
CPSN08C-R1160	5000	5207	7.280
CPSN08C-R1168	5000	5207	7.280
CPSN08C-R1176	5000	5207	7.280
CPSN08C-R1184	5000	5191	6.720
CPSN08C-R1192	5000	5191	6.720
		Total:	**173.60**

Note line lengths include additional 0.5 station at each end.

Source Lines:

Line	Start	End	Kms
CPSN08C-S5000	1072	1191	4.200
CPSN08C-S5008	1072	1191	4.200
CPSN08C-S5016	1064	1191	4.480
CPSN08C-S5024	1064	1191	4.480
CPSN08C-S5032	1048	1191	5.040
CPSN08C-S5040	1048	1191	5.040
CPSN08C-S5048	1000	1191	6.720
CPSN08C-S5056	1000	1191	6.720
CPSN08C-S5064	1000	1191	6.720
CPSN08C-S5072	1000	1191	6.720
CPSN08C-S5080	1000	1191	6.720
CPSN08C-S5088	1000	1191	6.720
CPSN08C-S5096	1000	1191	6.720
CPSN08C-S5104	1000	1191	6.720
CPSN08C-S5112	1000	1191	6.720
CPSN08C-S5120	1000	1191	6.720
CPSN08C-S5128	1000	1191	6.720
CPSN08C-S5136	1000	1191	6.720
CPSN08C-S5144	1000	1191	6.720
CPSN08C-S5152	1000	1191	6.720
CPSN08C-S5160	1000	1191	6.720
CPSN08C-S5168	1000	1191	6.720
CPSN08C-S5176	1000	1191	6.720
CPSN08C-S5184	1000	1191	6.720
CPSN08C-S5192	1000	1191	6.720
CPSN08C-S5200	1000	1175	6.160
CPSN08C-S5208	1000	1175	6.160
CPSN08C-S5216	1000	1151	5.320
		Total:	**172.76**

Note line lengths include additional 0.5 station at each end.

2.0 TERRAIN AND LOGISTICS

2.1 TERRAIN

The terrain at Charo 3D prospect consisted of small to medium sized sand dunes that ran in a north-north-westerly direction. Some of the dunes were quite steep with blowy slipfaces. Between the dunes were flat corridors, some of which were reasonably large. The dunes were lightly vegetated with small trees, shrubs and grasses, while the corridors were lightly vegetated. There were also three lakes on the prospect. Two of these were salt lakes and the other a dry lake with a soft powdery surface. Samphire shrubs grew around the edges of the lakes and these areas were not cleared for environmental reasons. The survey crew backpacked the sections of line which fell on the salt lakes. Source points on these were to be drilled using track mounted bobcats and hand augers where necessary.

2.2 LOGISTICS

Terex Contracting established a camp approximately 42 km north west of Tirrawarra satellite on the south side of the access road to Charo oil field. This location was central to the Charo and Callabonna 3D prospects. The camp site was cleared for use by the Cultural Heritage clearance team. The site itself was sandy and reasonably flat. The coordinates for the site are listed below in section 2.2.1.

Conics Positioning mobilised three Toyota Landcruiser utilities (including two new vehicles) and an office caravan from Tieri in Central Queensland on 15th July 2008. The survey crew stayed overnight at Cunnamulla and arrived at Tirrawarra Satellite on 16th July. On 17th July the survey crew travelled to Innamincka to collect a sleeper caravan and trailer. They then travelled back via Tirrawarra and arrived at the Terrex Contracting camp site at approximately 1:30pm. A cultural heritage induction was held by Tom Hedditch on the evening of 17th July.

Conics Positioning set up GSP units on three dozers on 17th and 18th July. Conics Positioning established control and set up a RTK base station on the morning of 18th July and survey fieldwork started on the 19th July. Survey fieldwork was completed on the 28th July. Line preparation commenced on 19th July and was completed on 28th July 2008. The line preparation crew was on standby on 18th July awaiting an excavation permit from Santos.

Only one RTK base station (CHARO1) was required during the Charo 3D survey. It was located on top of a sand dune on the east side of the road to Charo field. It was positioned by GPS static methods. A permanent marker was placed at the site. This base station was also used for Callabonna 3D.

2.2.1 Camp Locations

Site	Easting	Northing	Description
Camp 1	376460	6959175	Approx. 42km north west of Tirrawarra satellite on the south side of the access road to Charo oil field.

3.0 PERSONNEL AND EQUIPMENT

3.1 SURVEY PERSONNEL

The Conics Positioning crew consisted of three people, made up of one senior surveyor and two GPS operators. The following is a list of personnel utilized during the survey:

Duties	Name
Senior Surveyor	Eric Amedee
GPS Operator	John Gerrie
GPS Operator	Bart Kargol

3.2 LINE PREPARATION PERSONNEL

The following is a list of personnel utilized by Terex Contracting during the survey: -

Name	Duties
Camp Boss	Matt Gower
Mechanic / Camp Boss	Peter Dehaas
Mechanic	Ken Matthews
Mechanic	Bryce Gaffin
Mechanic's assistant	Gene Hicks
Cook	Jim Hawthorn
Operator	Eric Ree
Operator	Cliff Jurd
Operator	John Talbot
Operator	Robert Pugno
Operator	Barry Marini
Operator	Rob Warner
Operator	Nick Smith

3.3 SURVEY EQUIPMENT

The following survey equipment was used during the Charo 3D Survey:

Line Pointing	1 Toyota Landcruiser wagon
	3 Garmin 172C GPS receivers
	6 Garmin Data Cards
	3 PacCrest PDL GPS rover radio modems
	1 Garmin 276C GPS receiver
	1 Garmin 3006C GPS receiver
	1 UHF radio
Survey	3 Toyota Landcruiser utes
	1 Trimble R7 Base GPS receiver
	3 Trimble R7 GPS receivers
	1 PacCrest PDL GPS 35W base radio modem
	1 PacCrest PDL GPS 35W repeater radio modem
	3 PacCrest PDL GPS rover radio modems
	4 UHF radios
	1 UHF handheld radios
	1 Toshiba Satellite computer
	1 GPSeismic Processing software package
	1 ArcGIS 9 software package
	1 Canon i9950 A3 colour printer
	1 Lexmark X215 laser printer/copier/fax/scanner
	1 Globalstar Satellite phones
	1 Survey Office caravan
	1 IVMS Download Computer
	1 Six man accommodation caravan
	1 Dual axle box trailer
	1 Air compressor
	Survey consumables

3.4 LINE PREPARATION EQUIPMENT

The following line preparation equipment was used by Terrex Contracting during the Charo 3D survey:

Equipment
3 Komatsu D65 dozers
1 Caterpillar 12G grader
1 John Deere Grader (6x6)
1 Kitchen caravan (Elross)
1 Diner caravan (Elross)
2 Accommodation caravans (Elross)
1 Workshop / generator trailer
1 Office / sleeper trailer
1 Shower / laundry trailer
3 Prime movers
2 Floats
1 Camp generator
1 6x4 Water truck
1 Water bladder
1 Fuel tanker
1 4x4 light truck
1 4x4 supply / crane truck
3 Support 4x4 vehicles
1 VSAT Data / telephone system
1 Satellite telephone (kitchen)

4.0 SURVEYING METHODS

4.1 SURVEY DATUMS

The survey datum for Charo 3D was the Geocentric Datum of Australia 1994 (GDA94). GPS field survey data was collected using the World Geodetic System 1984 (WGS84) datum. It was then downloaded into GPSeismic software for conversion to Australian datums. WGS84 coordinates were converted to the GDA94 and output in Map Grid of Australia (MGA) Zone 54 coordinates. Ellipsoidal heights were converted to the Australian Height Datum (AHD) using the AusGeoid98 geoid separation model.

The following parameters define the World Geodetic System 1984 datum: -

Datum	World Geodetic System 1984
Spheroid	WGS84
Semi-Major Axis	6 378 137.0
Inverse Flattening	298.257
Unit of Measure	International Metres

The following parameters define the Geocentric Datum of Australia 1994: -

Datum	Geocentric Datum of Australia 1994
Spheroid	Geodetic Reference System 1980
Semi-Major Axis	6 378 137.0
Inverse Flattening	298.257222101
Unit of Measure	International Metres

For the purposes of seismic line placement, GDA94 is identical as WGS84, so no transformations were applied.

The following parameters define the Map Grid of Australian Zone 54: -

Projection :	Universal Transverse Mercator
Latitude of origin :	0°
Central Meridian (CM) :	141° E
Scale Factor at CM :	0.9996
False Easting :	500 000
False Northing :	10 000 000
Unit of Measure :	International Metres

A national distortion grid (National84.gsb) was used to convert benchmark data between AGD66/84 and GDA94 coordinates. The software used to do this was Datumtran v1.05, a datum transformation programme developed by the NSW Department of Lands.

4.2 SURVEY CONTROL

The control for the prospect area was established using GPS static techniques. The datum for the survey was from BM CHR2, a station on the Charo #2 well control survey.

The Map Grid of Australia (MGA94) coordinates and AHD height for the BM is as follows:

BM	Description	Easting	Northing	Elev.
CHR2	Charo control survey	377523.275	6960015.148	25.962

A listing of ties to other well benchmarks and old Permanent Markers is included in Appendix B.

4.3 SURVEY METHODS

Survey control was established using the GPS static method. The static method used for control work involves the setting up of a GPS receiver to log data on a known point. A roving GPS receiver then logs data on unknown points for periods of 20 minutes and upwards, depending on the length of the baseline and number of satellites in view at the time. This enabled the change in geometry of the satellite positions to be measured and recorded. After post processing the data to obtain accurate baseline information a position can be determined for the unknown point.

Trimble Geomatics Office software was used to run a network adjustment on the survey control network. This verified the integrity of the network.

Line surveying was carried out using the **'real time' kinematic (RTK)** method. This method also consists of base and rover segments. A GPS receiver is set up on a point of known location. This point has usually been established using the static method mentioned above. Through a 35 watt UHF radio modem the base GPS receiver broadcasts the base position and GPS data measured at the base directly to a radio and modem connected to a roving GPS receiver enabling the rover to initialise (resolve satellite cycle ambiguities). Once initialised the roving receiver can calculate its own position to within a few centimetres.

Conics Positioning used the latest Trimble R7 GPS receivers. These units are dual frequency receivers enabling very fast and reliable initialisations. Coupled with Trimble TSCe and TSC2 survey controllers the system is very efficient and user friendly.

4.4 PERMANENT MARKERS

For the Charo 3D the survey crew established an RTK base station (CHARO1) on top of a sand dune approximately 400m east of the rig road to Charo oil field. An aluminium tag, with the description and comments stamped on it, was attached to the permanent marker. Three Environmental Monitoring Points were placed and surveyed during the survey as well. Appendix A contains a list of Permanent Markers.

4.5 DATA PROCESSING AND QUALITY CONTROL

Real Time Kinematic (RTK) stakeout position data was collected in Trimble TSCe and TSC2 Survey Controllers in WGS 84 format and downloaded into Dynamic Survey Solution's (USA) GPSeismic software. Datum transformations and geoid separations were then applied to the data. Several QC checks were done and the data was then loaded into a database where further checking was done. The QC checks included the following:

- Base coordinates and elevation were checked on download against the control data.
- Antenna heights were checked.
- Cross line and inline offsets from design were checked for any anomalies.
- GPS quality checks - DOPs, Horizontal precision, Vertical precision, Number of satellites and RMS.
- Initialization checks.
- Checkshot comparisons
- Old Permanent Marker comparisons
- Missing station checks.

Once checking was complete data could then be queried using SQL and the results exported directly to mapping software (ArcGIS 9) or to reports. The mapping software allowed for quick visual checking of point locations. Points in suspect locations (e.g. too close to pipeline) could be flagged for checking. Line preparation and survey database information was also automatically mapped in ArcGIS 9 which enabled the crew to visually monitor production each day and produce up to date progress maps, recording access maps and swath maps for the vibrators.

On completion the data was converted to a format suitable for Santos Ltd.

4.6 MAPPING

Conics Positioning surveyors scouted the prospect to map fences, gates, tracks, pipelines and any other features pertinent to crew operations. Cultural Heritage information was supplied by Santos. Using this information combined with that supplied by Santos it was possible to supply accurate prospect maps to the crew.

5.0 LINE PREPARATION

Terrex Contracting carried out the line preparation on the Charo 3D. Terrex Contracting supplied four bulldozers, two graders and camp facilities. Showers and meals were provided by Terrex Contracting.

The line preparation equipment and refuelling vehicles had UHF radios installed to enable communications with the dozer pointer and camp. Conics Positioning had a UHF radio set up in the office to enable communications between camp and field vehicles. The dozer pointer or survey had a satellite phone with them to enable communication to camp or in emergencies.

A Greenfield permit was issued by the Tirrawarra Field Production Superintendent. One of the Greenfield permit requirements was that there would be no excavation within 50m of any infrastructure. Exclusion zones were loaded into the dozer GPS units to ensure dozers stayed outside this zone.

The survey ran smoothly with no delays due to weather. Dozer 5 had some electrical problems towards the end of the survey. The other two dozers had no problems.

The north-south orientation of the receiver lines meant some lines required side cuts or ran along tops of dunes. Due to the generally small nature of the dunes this was not a major issue.

5.1 LINE PREPARATION NAVIGATION

Co-ordinates for the start and end of lines for receiver and source lines were loaded into Garmin 172C GPS receivers mounted in the dozers. The machine operators then used the navigation screens to guide them along the lines. Any cultural heritage sites, pipelines, fences, gates, etc. were also loaded into these units to act as visual aids for the operators.

Exclusion zones for pipelines, wells and cultural heritage features were also loaded into the dozer GPS units to warn the operators of their proximity.

The Differential GPS (DGPS) method was used to supply satellite correction data to the operators' GPS units. A base GPS receiver was set up on a point with known coordinates (usually the same base as survey) and using radio/modem units the base GPS receiver broadcast pseudorange (uncorrected distance to each satellite) corrections to the GPS receivers mounted on the dozers. This enabled the dozing receivers to generate positions to sub-metre accuracy.

5.2 ENVIRONMENTAL MONITORING POINTS

There were three environmental monitoring points (EMP) placed on the Charo 3D prospect. They were located close to the edges of the two salt lakes and the dry lake. Conics Positioning placed the markers and took the before and after line preparation photographs. These points are listed in both Appendices A and B.

6.0 HEALTH, SAFETY AND ENVIRONMENT

All vehicles belonging to Conics Positioning were fitted with rollover protection, a fire extinguisher, first aid kits and UHF radios. A VSAT telephone was located in the office. As well Conics Positioning had a Globalstar satellite telephones on crew. The phone was located in the senior surveyor's vehicle; thus communications could be maintained at all times. The survey office had a UHF radio with a high gain antenna for communications with line preparation and survey field crews.

All rubbish generated in the field was returned to camp for proper disposal. Terrex Contracting organised the disposal of all camp rubbish.

Line preparation was carried out in a manner which adhered to Santos' environmental guidelines. Minimal blade work was done and lines were weaved to reduce the visual impact of the survey.

Conics Positioning conducted daily breath analysis testing of all employees to ensure employees were not under the influence of alcohol. This was done using a Lion Alcolmeter 500.

Conics Positioning vehicles were fitted with SecuraTrak vehicle monitoring systems (IVMS). A downloading computer was set up in the survey office. There were ongoing problems getting the vehicle units to download via the RF unit.

During the survey, the survey crew exercised due care in their operations and as a result there were no lost time incidents. Conics Positioning and Terrex safety policies were adhered to by all personnel. Daily toolbox meetings were held to inform and raise current issues with crew members. Toolbox minutes were documented and passed onto Terrex at the end of each week. The daily topics were added to the daily reports. An evening TC toolbox meeting was held for all personnel in camp. Conics Positioning and TC held weekly safety meetings. These were normally held on Sunday nights before the barbecue.

7.0 SUMMARY

Overall the survey and line preparation of the Charo 3D Seismic Survey was done in an efficient and environmentally sound manner. Extra care was taken around the salt lake areas to minimise environmental impact.

Survey and line preparation fieldwork took 10 days to complete at an average of 34.64 km / day. Line preparation fieldwork took 10 days to complete at an average of 31.29 km / day. There were 33.5km of line not prepared on the lake areas.

Conics Positioning supplied high quality maps to the recording crew detailing hand carry sections, cultural heritage sites, offsets, fences, gates, tracks, detours, pipelines and any other pertinent information.

It is Conics Positioning policy to have a dozer pointer on crew to assist with any line preparation problems and to supply mapping information to the seismic crew.

Conics Positioning has at all times endeavoured to carry out its duties in a professional and efficient manner.

Respectfully submitted,

Eric Amedee

Senior Surveyor
Conics Positioning

APPENDIX A

PERMANENT MARKER LISTING

Stn	Description	Easting	Northing	Elev.
CHARO1	RTK Base Station	375447.45	6961057.25	47.82
EMP1	INT R1064/S5080	373639.91	6965447.34	20.09
EMP2	INT R1136/S5112	376159.21	6964331.55	20.28
EMP3	INT R1032/S5192	372517.90	6961529.55	21.23

APPENDIX B

ENVIRONMENTAL MONITORING POINTS LISTING

Stn	Description	Easting	Northing	Elev.
EMP1	INT R1064/S5080	373639.91	6965447.34	20.09
EMP2	INT R1136/S5112	376159.21	6964331.55	20.28
EMP3	INT R1032/S5192	372517.90	6961529.55	21.23

APPENDIX C

BENCHMARK AND OLD PERMANENT MARKER TIES

Station	Line/Well	Surveyed Easting	Surveyed Northing	Surveyed Elev.	Supplied Easting	Supplied Northing	Supplied Elev.	DeltaX	DeltaY	DeltaZ
PM200	82-LMP	372433.18	6963482.86	37.97	372433.78	6963486.46	38.89	-0.61	-3.60	-0.92
PM358	84-CAW	377129.62	6964843.75	32.95	377127.75	6964847.53	33.94	1.87	-3.78	-0.99
PM422	84-SQD	373066.95	6965360.39	21.02	373062.74	6965361.52	22.00	4.21	-1.13	-0.98
PM440	84-SQT	377719.70	6964086.29	36.93	377715.78	6964088.49	37.88	3.92	-2.21	-0.95
PM284	84-TRW	372198.16	6963788.40	32.25	372193.20	6963789.53	32.56	4.96	-1.13	-0.31
PM440	84-TRW	376724.16	6967463.51	39.33	376720.42	6967465.46	39.57	3.74	-1.95	-0.24
PM280	84-TRX	373154.57	6962584.75	34.33	373153.76	6962588.51	34.17	0.81	-3.76	0.16
PM402	84-TRX	376687.88	6965466.99	24.38	376684.77	6965469.52	24.40	3.11	-2.53	-0.02
PM384	84-TRX	376166.01	6965041.42	21.08	376163.71	6965044.49	20.95	2.30	-3.07	0.13
PM379	84-TRY	376808.69	6963634.58	25.94	376806.75	6963637.46	25.90	1.94	-2.88	0.04
PM406	84-TRY	377592.02	6964271.88	38.80	377589.77	6964274.48	38.86	2.25	-2.60	-0.06
PM662	85-YTH	371433.51	6966539.05	22.43	371432.73	6966542.49	23.37	0.78	-3.44	-0.94
PM652	89-CAT	377877.46	6967479.64	23.68	377876.79	6967483.54	24.90	0.67	-3.90	-1.22
PM518	89-CAT	373965.10	6964315.90	31.90	373963.77	6964319.47	32.82	1.33	-3.57	-0.92
PM281	90-CKB	371806.56	6962581.38	32.96	371805.74	6962584.48	33.82	0.82	-3.10	-0.86
PM275	90-CKC	371508.68	6961221.99	25.58	371508.22	6961226.45	26.60	0.46	-4.46	-1.02
PM315	91-DFZ	371397.96	6962223.80	41.02	371396.74	6962226.54	41.87	1.22	-2.74	-0.85
PM359	91-DFZ	372462.68	6960966.42	21.05	372460.72	6960970.48	21.86	1.96	-4.07	-0.81
PM294	95-FYM	373816.47	6963131.10	29.77	373817.71	6963131.48	29.87	-1.24	-0.38	-0.10
PM334	95-FYM	374772.21	6961974.30	36.14	374773.75	6961974.50	36.26	-1.54	-0.21	-0.12
PM231	96-HJR	372462.68	6960966.42	21.05	372462.73	6960966.51	21.04	-0.06	-0.10	0.01
PM240	97-HPS	377719.70	6964086.29	36.93	377720.35	6964086.21	36.80	-0.66	0.08	0.13
PM200	98-HPT	378103.42	6966868.27	24.37	378103.97	6966868.24	24.32	-0.55	0.03	0.05

Station	Line/Well	Surveyed Easting	Surveyed Northing	Surveyed Elev.	Supplied Easting	Supplied Northing	Supplied Elev.	DeltaX	DeltaY	DeltaZ
BM CHR4	CHARO #1	374582.68	6963555.36	23.82	374582.68	6963555.35	23.79	0.01	0.01	0.04
BM CHR3A	CHARO #3	373696.86	6963952.97	30.09	373696.89	6963952.97	30.01	-0.02	0.01	0.08
BM CHR2	CHARO CONTROL	377523.29	6960015.17	25.99	377523.28	6960015.15	25.96	0.02	0.02	0.03

APPENDIX 2 – TERREX SEISMIC FINAL OPERATIONS REPORT

CPSN08C
CHARO 3D
SEISMIC SURVEY

PPL 177 (SANTOS)
PEL 111 (VICTORIA PETROLEUM)

OPERATIONS REPORT

AUGUST 2008

BY

SHANE GOOSSENS

OF

CREW # 402

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

TABLE OF CONTENTS

1. INTRODUCTION

Terrex Seismic was contracted by Santos Ltd to conduct the Charo 3D Seismic Survey. Recording commenced on the 4th August 2008 and was completed on the 12th August 2008.

1.1 GEOGRAPHICAL AREA

The Charo 3D grid is located approx 45km NW of Tirrawarra Satellite, which itself is approx 70km west of Moomba. The surrounding area consisted mainly of rolling sand hills and open flat clay pan country, with 2 salt lakes, one small one located in the south-eastern corner of the program and a large one located near the middle of the program. The Charo field was also located in the centre of the grid.

Line crew laying spread across salt lake

1.2 WEATHER

The weather was typical winter weather for the area, fine & cool for the entire job, with quite a few windy days.

1.3 LOGISTICS

All equipment and camp mobilised from the previous survey on the 2nd of August. The move took the full day, with some setting up required the following day. Following camp setup was a quick site induction conducted by the Client Rep (Tony Kenny) with spread layout commencing shortly thereafter. Spread layout continued the next day, with recording starting later the following day on the 4th of August.

Access to all the lines was via the main existing roads that ran through the middle of the prospect to the Charo oil wells.

The accommodation facilities were in the form of mobile vans that were provided by Terrex Seismic and were capable of sleeping up to 56 people.

All meals were provided by the mobile kitchen and diner which was staffed by two full time cooks and one kitchen hand.

All supplies and freight were transported via road out of Adelaide and delivered to camp by Mansell's Transport.

Fuel for all vehicles was supplied by I.O.R. Petroleum of Eromanga and was delivered to site. All other logistics were supported out of Terrex Seismic Perth Office.

Spread layout during initial start up

2. SURVEY

2.1 RANGING / CHAINING / SURVEYING

Line chaining and survey for the entire program were completed by Conics Positioning personnel from Brisbane.

2.2 LINE CLEARING

All line clearing was performed by Terrex Contracting.

2.3 PERMITTING

Permitting was carried out by the client with Tony Kenny acting as the client representative for the contract's entirety.

Loading spread on to cable truck

3. RECORDING/PROCESSING

3.1 GENERAL SURVEY DETAILS

Survey: CPSN08C –Charo 3D

Project Code: 5307013

Surface area: 46.4912 sq km
Receiver Lines: 25 lines, 280m interval, 173.60 km
Source Lines: 28 lines, 280 m interval, 172.76 km (all orthogonal)

Source Recorded into patch of **10 receiver lines each of 112 channels**
Source between channels 56 and 57

3.2 RECORDING PARAMETERS

(Non salt Lake areas inc Lake McKinlay)

Instrumentation

Instruments	:	Sercel 428XL – 24 bit.
No. Channels	:	1120 (10 lines of 112)
Tape Format	:	SEGD, 8058 IEEE Demultiplexed, LTO 2 Quad. Recorded (LTO 2 & HD)
Filters	:	Hi-cut 200hz. No Lo Cut available
Sample Rate	:	2 ms
Correlated Record Length	:	4 seconds
RTC	:	Yes
Correlation Type	:	Zero Phase, After Sum
Stack	:	Diversity Stack

Source

Vibrators	:	3 AVH-IV 62,000 lb peak force on 4X4 articulated buggies (1 group)
Electronics	:	Pelton VibPro VCE in vibrators, ESG in recorder.
Sweep Frequency	:	5-90 Hz
Sweep Length	:	4 seconds (plus 4s listen)
Sweep Function	:	Linear Upsweep
No. Sweeps	:	2 standing
VP Interval	:	35m. orthogonal
Vibrator Array	:	3 in line, 12.5 m. pad to pad standing. No move-up.
End Tapers (Cosine)	:	0.2s
Phase Locking Type	:	Ground Force using M51 HP accelerometers.
Amplitude Control	:	Peak to Peak
Sweep amplitude taper	:	100% (none)
Drive level	:	Maximum varied by amplitude control function

Receivers

Group Interval	:	35m
Geophones	:	Sensor SM4 10 Hz Hi spec super phones.
Spread	:	Split, source between channel 56 and 57
No. per string	:	12 phones in line 2.92 m. spacing, centred on station.
Far Trace	:	2234m (diagonal) nominal **but longer offset trials may be requested.**

RECORDING PARAMETERS (Cont.)

(Salt Lakes only)

Instrumentation

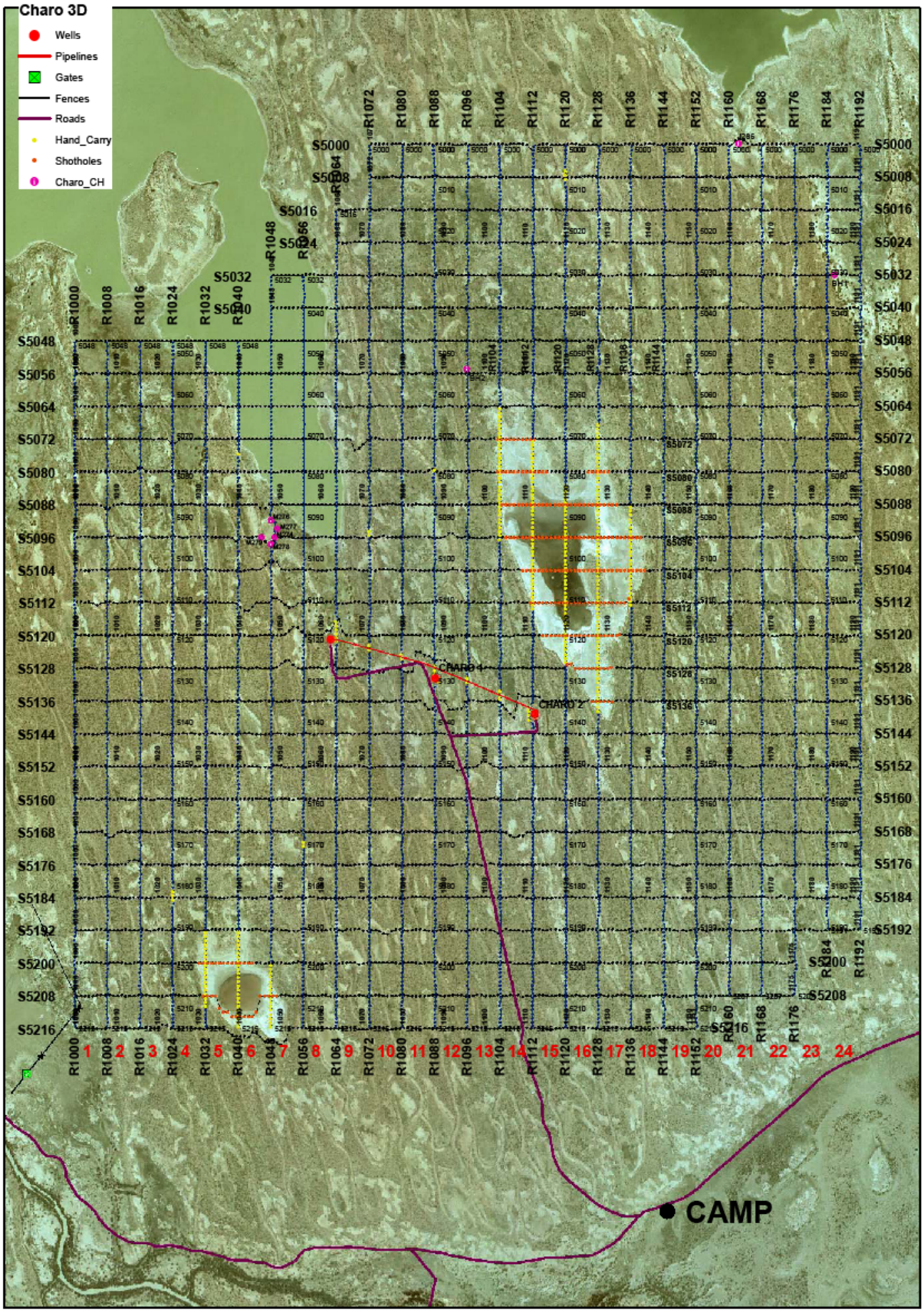
Instruments	:	Sercel 428XL – 24 bit.
No. Channels	:	1120 (10 lines of 112)
Tape Format	:	SEGD, 8058 IEEE Demultiplexed, LTO 2Quad. Recorded (LTO 2 & HD)
Filters	:	Hi-cut 200hz. No Lo Cut available
Sample Rate	:	2 ms
Record Length	:	4 seconds
Source	:	Dynamite 1200gm per SP
Shot Array	:	3 holes 2m apart each drilled to 3m depth and each hole loaded with 400gm. Boosters. Array centred on SP. If unable to get bobcats to SP on soft ground then power auger 3 holes 2m apart to 2m.depth and loads each with 300gm charge
SP Interval	:	35m. orthogonal

Receivers

Group Interval	:	35m
Geophones	:	Sensor SM4 10 Hz Hi spec super phones.
Spread	:	Split, source between channel 56 and 57
No. per string	:	12 phones in line 2.92 m. spacing, centred on station.
Far Trace	:	2234m (diagonal) nominal **but longer offset trials may be requested.**

Modified Bobcats were used to transport spread and also load shot points through all salt lake areas

3.3 CHARO 3D GRID



3.4 RECORDING

The Charo 3D was located in the Cooper Basin, approx 45km NW of Tirrawarra Satellite near Walkers Crossing. The 46.42 sq km grid was small enough to be recorded as a single panel. Recording commenced on the 4th of August with the final VP being recorded on the 12th of August, at an average production rate of 5.46 km per day.

The Charo 3D was recorded using both vibrators & explosives as an energy source, with both salt lakes requiring explosives due to the load limits imposed. Small bobcat mounted drill rigs were used to drill all shot points with explosives being loaded by Sequel Drill and Blast personnel from Brisbane.

3.5 PROCESSING

All final data shipments (A & B Tapes) were sent to:

Nick Papanicolaou
Geophysical Assistant
Santos Ltd - Operations Geophysics
60 Flinders Street,
Adelaide S.A. 5000

Example of line where both vibrators & explosives were required

APPENDIX A

EQUIPMENT SPECIFICATIONS

RECORDING EQUIPMENT (3D Surveys)

SERCEL 428 Seismic Data Acquisition System

- Three (3) 19inch Flat Screens with Sun Blade Computer
- Veritas V12 Plotter, UPS, LIM, APM
- Two (2) LTO High Density Tape Drives
- One Hundred and Fifty (550) Seismic Cables with 4 x FDUs per cable separated by 55 metres between takeouts (2200 Ch)
- Fifty (50) Power Harness Leads
- Ninety-Seven (97) Line Batteries
- Fifty-Four (54) Transverse Cable
- Twenty-Seven (27) Repeaters
- Fourteen (14) LAUX's
- Forty-Nine (49) LAUL's
- Ten (10) Telwin (Nevaboost 140) 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 Superphones**
- Four Thousand Six Hundred (4600) Geophone strings with 6 ph/group (Equivalent of 2300 Channels of 12 phones/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) Input-Output AVH IV 4x4 Buggy Vibrators:**
  Peak force is 62000lbs per Vibe and Hold-Down weight is 62400lbs per Vibe
- **Four (4) Pelton VibPro Vibrator Control Electronics**
- One (1) Pelton VibPro 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
100 Series Landcruiser Wagon	1CCX-396
100 Series Landcruiser Wagon	366 KKZ
100 Series Landcruiser Wagon	094 IIU
100 Series Landcruiser Wagon	096 IIU
100 Series Landcruiser Wagon	1BYK- 183
100 Series Landcruiser Wagon	772 KCU
100 Series Landcruiser Wagon	WZI 799
Troop Carrier Ambo	1CGX-030
Landcruiser Tray back	344IJX
Landcruiser Trayback	799-JMJ
Landcruiser Trayback	1BRD 044
Landcruiser Trayback	308-IJX
Landcruiser Trayback	367-KKZ
Landcruiser Trayback	798-JMJ
Landcruiser Trayback	311-IJX
Landcruiser Trayback	1BSR 496
Landcruiser Trayback	800-JMJ
Landcruiser Trayback	235-GVQ
Landcruiser Trayback	801-JMJ
Landcruiser Trayback	1CUE-670
LIGHT VEHICLE LIST	
I/O AHV-IV Vibrator	C 32657
I/O AHV-IV Vibrator	C 32658
I/O AHV-IV Vibrator	C 32659
I/O AHV-IV Vibrator	C 32660
Hino Recorder	1 CDW 327
Paystar Water Truck	627-JAH
Kenworth Cab/o	1AGB 177
Paystar Vibe ServiceTruck	875 HJU
Kenworth Spread Truck	874 HJU
Hino Spread Truck	7DT 982
Paystar Workshop	371 JCN
Freightliner Water	448 KMT
Kenworth Generators	WNK750
Paystar Spread	626 JAH
Hino Crane Truck	1 CMW 981
HEAVY VEHICLE LIST	

VEHICLE	REGISTRATION
6 x 4 Toilet Trailer (Ladies Single)	1TBF 454
8 x 5 Tandem Box Trailer (Wash Down)	1TBU 582
Dolly	509-QJG
Dry Stores/Coolroom on Trailer	508 QJG
Elross 1 Room (4 man) sleeper	1TER 545
Elross 1 Room (4 man) sleeper	1TER 546
Elross HSE Office	1TFB 626
Homemade Pig Trailer Laundry	496 QJG
Homemade Pig Trailer Showers	504 QJG
Mechanic's Workshop (C'made)	1TAR 750
Modern Caravan (Battery Hen)	6WC 169
Rio Tinto 3 Room Sleeper	506 QJG
Spread Trailer	507-QJG
Tri-axle trailer (Generators)	126-QMP
Tandem-axle trailer (Spread)	092-QIR
Tamworth Cable Repair	N 69423
Tandem 3 Toilet Trailer	0TDJ 497
Elross New Office/ 2 Man sleeper	1 TGL 813
Elross Diner	1 TGZ 789
Elross Kitchen	1TGZ 790
Elross 3 Rooms (6 man) sleeper	1TGL 663
Elross 3 Rooms (6 man) sleeper	1TGL 664
Elross 3 Rooms (6 man) sleeper	1TGL 666
Elross 3 Rooms (6 man) sleeper	1TGL 815
Elross 3 Rooms (6 man) sleeper	1TGL 812
Elross 3 Rooms (6 man) sleeper	1TGL 811
TRAILER LIST	

APPENDIX C

TAPE LISTING

Santos Caroowinnie 3D							
Tape #	Swath	First FFID	Last FFID	First VP	Last VP	Date Recorded	Comments
8004A		1	4829	5216/1000	5192/1191	4/08/2008 - 12/08/08	Charo 3D

APPENDIX D

HSE POLICY and
OCCUPATIONAL HEALTH & 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

Charo Well, centrally located in the prospect

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 SUMMARY

Health Safety & Environment

End of Contract Report Santos_Charo 3D

2nd August - 12th August 2008

Client	**Santos**	**HSE Advisor**	Joanne Wulff / Shirley Bobrowski
Location	103k North West of Moomba	**Combined Personnel**	46
Camp Site	57 person Accomodation	**BAC Tests Conducted**	0
Camp Location	**45km North West of Tirrawarra** **27° 29' 10"** **139° 44' 56"** **E 376 481** **N 6 959 191**	**Preliminary Drug Tests**	0
Sub-Contractors	Terrex Contracting Conics Positioning Surveys	**Standard Operating Procedure Revisions**	0

Summary

02-August-2008	Camp moved from Padollus 2D to Charo 3D
03-August-2008	Crew had an induction to the Charo 3D
	Cultural Heritage induction was held by Tony Kenny
	Commenced Laying Spread
05-August-2008	Commenced Shooting
10-August-2008	Safety meeting - Driving in the feild and IVMS
12-August-2008	Completed Shooting
13-August-2008	Picked up the last of the spread.

Safety Statistics	
Terrex Seismic Man-hours	5940.00
Sub-Contractor Man-hours	2376.00
Fatalities	0
LTI's	0
MTI's	0
Days since last MTI/LTI	16
First Aid Incidents	1
Incident / Accident Reports	1
Work Days Lost	0
Hazard Identification Reports	2
Training Hours	120.90
Tool Box / Safety Meeting Man-hours	134.30
Audits / Inspections	128
Drills	0
Land Spills (< 5 litres)	0

Medical Statistics

Clinic Attendance	
Colds/Flu/Sore throat	10
Non Specific	2
Ear / Nose / Throat	1
Allergies	0
Muscular / Skeletal / Soft Tissue	4
Eye Irritation	0
Headaches	2
Gynaecological	0
Wound / Laceration / Dressing	0
Skin / Rash / Fungal	1
Dental	2
Burn	0
Heat Illness	0
Bites / Stings	0
Upset Stomach	1
TOTAL	**23**

Report compiled by: Joanne Wulff

APPENDIX F

PERSONNEL – CREW LIST

POSITION	NAMES
Crew Manager	Goossens Shane
HSE Trainee	Wulff Joanne
HSE Trainee	Bobrowski Shirley
Admin Staff	
Mechanic	Goossens Julien
Mechanic	Paul Marco
Campy	Halpin Julian
Campy	Harris Sarah
Campy	Powell Lorraine
Cook	Cook Alan
Cook	Smith Geoff
Cook	Togo Beau
Kitchen Hand	Iwaski Masako
Supply Driver	Laycock Timothy
Supply Driver	Kelly Shane
Camp Staff	
Observer	Carry Joel
Cable Repair	Humphries Ben
Cable Repair (Trainee)	Richardson Brad
Technical	
Vib Op/Scout	Lynch David
Vib Op	Davidson Anthony
Vib Op	James Dave
Vib Op	Little Greg
Vib Op	Kelly Shane
Vibrator Crew	
Vib Tech	Manning Edward
Vib Tech	Jourdrey Donald (Steve)
Vib Tech Trainee	Cabot Allen
Vib Tech	
Line Boss	Byrne Gareth
Snr Line	

POSITION	NAMES
T/Shooter	Byrne Nathan
T/Shooter	Capper Alyx
T/Shooter	Miles Keeley
Trouble Shooters	
Line Crew	Ablitt Gregory
Line Crew	Ambachtsheer Nola
Line Crew	Bourke Kristy
Line Crew	Brandley Jessica
Line Crew	Capper Alyx
Line Crew	Dittmer Karl
Line Crew	Durance Dale
Line Crew	Kelly Shane
Line Crew	McConville Christina
Line Crew	McInroy Ryan
Line Crew	Miles Keeley
Line Crew	Newbould Ryan
Line Crew	Novley Darryl
Line Crew	Paul Carlo
Line Crew	Phillips Chris
Line Crew	Powell Lorraine
Line Crew	Post James
Line Crew	Reynolds Johnathan
Line Crew	Rogers Luke
Line Crew	Sampson Brooke
Line Crew	Smith Christine
Line Crew	Smith William
Line Crew	Taylor Aaron
Line Crew	Tonkin Anthony
Line Crew	Wilson Dave
Line Crew	Wyllie Edward
Line Crew	

PERSONNEL – CREW NUMBERS

POSITION	NUMBERS
Crew Manager	1
HSE Trainee	1
HSE Trainee	1
Mechanic	2
Campy	2
Cook	2
Kitchen Hand	1
Supply Driver	1
Observer	1
Cable Repair	1
Vib Op/Scout	1
Vib Op	3
Vib Tech	1
Vib Tech Trainee	1
Line Boss	1
T/Shooter	2
Line Crew	21

APPENDIX G

DAILY REPORTS

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Saturday, 2 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
			0		

Daily Totals

VP's:	0
Skips:	0
Lin.Kms:	0.0000
Day.Sq.Klms:	0.0000

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	0
Cum.Lin.Kms:	0
Cum.Sq.Klm:	0
Lin.Kms.Remaining:	172.7600
Sq.Kms.Remaining:	46.4912
% Completed:	0
Average Daily Production Sq. Kms:	0
Average Daily Production Line Kms:	0
Estimated Finish Date:	#DIV/0!

HOURS

Working Time -	Down Time -	Standby Time -		Daily Totals	
Recording:	Human Error:	Toolbox/Safety Meeting:		Working Time:	0.0
Requested Experimental:	Troubleshooting:	Induction:		Standby Time:	0.0
Recorder Moveup:	Recorder:	Weather:		Down Time:	0.0
Vibrator Moveup:	Vibes:	Other:		Non-Charge Time:	0.0
Detour:	WOS:			Other:	11.5
Traverse Move:	Other:	**Other -**		Total Day Hrs:	11.5
Swath Move:	**Non-Charge Time -**			**Cumulative Totals**	
Spread Damage:	Travel Time:	Spread Layout/Pickup:		Working Time(Job):	0.0
Interprospect Move:	Instrument Tests\Morning QC:	Crew Demobe/Remobe:		Standby Time(Job):	0.0
	Panel Move:	Camp Move:	11.5	Down Time(Job):	0.0
	Other:			Non-Charge Time(Job):	11.5
				Total Hrs (Job):	11.5

COMMENTS:

*6:30am - 8:30am packup camp ready for move
*8:30am - 3:00pm move from Padollus 2D to Charo 3D
*3:00pm - 6:00pm setup camp

Total Crew #'s:44 **Line Crew #'s:25** **Vehicle #'s:18**

Spread Movement

Client: Charo 3D **Date:** Saturday, 2 August 2008

Layout Line	Layout Station #		Layout Tot	Pickup Line	Pickup Station #		Pickup Tot
		Total Stations :	0			**Total Stations:**	0

Equipment Report **Bad Phones:** 0 **Bad Cable:** 0

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client.....	SANTOS	Party Manager:	Shane Goossens
Survey Name.	Charo 3D	Client Rep:	Tony Kenny
Area.....	PPL 177(Santos), PEL 111(Victoria Petroleum)	Weather:	Fine / Cool
State.....	SA	DATE:	Sunday, 3 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
			0		

Daily Totals

VP's:	0
Skips:	0
Lin.Kms:	0.0000
Day.Sq.Klms:	0.0000

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	0
Cum.Lin.Kms:	0
Cum.Sq.Klm:	0
Lin.Kms.Remaining:	172.7600
Sq.Kms.Remaining:	46.4912
% Completed:	0
Average Daily Production Sq. Kms:	0
Average Daily Production Line Kms:	0
Estimated Finish Date:	#DIV/0!

HOURS

Working Time -		Down Time -		Standby Time -		Daily Totals	
Recording:		Human Error:		Toolbox/Safety Meeting:	0.3	Working Time:	0.0
Requested Experimental:		Troubleshooting:		Induction:	1.0	Standby Time:	1.3
Recorder Moveup:		Recorder:		Weather:		Down Time:	0.0
Vibrator Moveup:		Vibes:		Other:		Non-Charge Time:	0.0
Detour:		WOS:				Other:	10.2
Traverse Move:		Other:		**Other -**		Total Day Hrs:	11.5
Swath Move:		**Non-Charge Time -**				**Cumulative Totals**	
Spread Damage:		Travel Time:		Spread Layout/Pickup:	8.0	Working Time(Job):	0.0
Interprospect Move:		Instrument Tests\Morning QC:		Crew Demobe/Remobe:		Standby Time(Job):	1.3
		Panel Move:		Camp Move:	2.2	Down Time(Job):	0.0
		Other:				Non-Charge Time(Job):	21.7
						Total Hrs (Job):	23.0

COMMENTS:

*6:30am - 9:00am finish setting up camp
*9:00am - 10:00am site induction & cultural heritage induction
*10:00am - 6:00pm initial spread layout

Total Crew #'s:44 **Line Crew #'s:25** **Vehicle #'s:18**

Spread Movement

Client: Charo 3D **Date:** Sunday, 3 August 2008

Layout Line	Station #		Tot	Pickup Line	Station #		Tot
1000	5048	5215	168				
1008	5048	5215	168				
1016	5048	5215	168				
1024	5048	5215	168				
1032	5168	5215	48				
		Total Stations :	720			**Total Stations:**	0

Equipment Report **Bad Phones:** 0 **Bad Cable:** 3

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Monday, 4 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
1	5216-5136	1000-1040	3.08	0	88
2	5216-5136	1000-1048	3.08	0	88

Daily Totals

VP's:	176
Skips:	0
Lin.Kms:	6.1600
Day.Sq.Klms:	1.6577

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	176
Cum.Lin.Kms:	6.1600
Cum.Sq.Klm:	1.6577
Lin.Kms.Remaining:	166.6000
Sq.Kms.Remaining:	44.8335
% Completed:	3.57%
Average Daily Production Sq. Kms:	1.6577
Average Daily Production Line Kms:	6.1600
Estimated Finish Date:	Sunday, 31 August 2008

HOURS

Working Time -		Down Time -		Standby Time -		Daily Totals	
Recording:	2.0	Human Error:		Toolbox/Safety Meeting:	0.3	Working Time:	3.1
Requested Experimental:		Troubleshooting:		Induction:		Standby Time:	0.3
Recorder Moveup:		Recorder:		Weather:		Down Time:	0.0
Vibrator Moveup:		Vibes:		Other:		Non-Charge Time:	1.1
Detour:	0.7	WOS:				Other:	7.3
Traverse Move:	0.4	Other:		**Other -**		Total Day Hrs:	11.8
Swath Move:		**Non-Charge Time -**				Total Day Charge Hours:	3.4
Spread Damage:		Travel Time:	0.4	Spread Layout/Pickup:	7.3	**Cumulative Totals**	
Interprospect Move:		Instrument Tests\Morning QC:	0.5	Crew Demobe/Remobe:		Working Time(Job):	0.0
		Panel Move:		Camp Move:		Standby Time(Job):	1.3
		Other:	0.2			Down Time(Job):	0.0
						Non-Charge Time(Job):	21.7
						Total Hrs (Job):	23.0

COMMENTS:

*Production started on 3D
*Spread layout continues while in production

Spread Movement

Client: Charo 3D — **Date:** Monday, 4 August 2008

Layout Line	Station #		Tot	Pickup Line	Station #		Tot
1032	5048	5167	120				
1040	5048	5215	168				
1048	5032	5215	184				
1056	5032	5215	184				
1064	5016	5215	200				
1072	5000	5215	216				
1080	5000	5215	216				
1088	5000	5017	18				
		Total Stations :	1306			Total Stations:	0

Total Crew #'s:44 **Line Crew #'s:25** **Vehicle #'s:18**

Equipment Report **Bad Phones: 3** **Bad Cable: 0**

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Tuesday, 5 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
1	5128-5048	1000-1040	3.08	0	88
2	5128-5048	1000-1048	3.08	0	88
3	5048-5216	1000-1056	6.16	0	176
4	5048-5216	1000-1064	6.055	0	173
5	5048-5216	1000-1072	5.6	0	160
6	5216	1008-1080	0.28	0	8
7	5216	1016-1088	0.28	0	8

EXPLOSIVES

Swath	Source	Receiver	Kms.	Skips	Sp's
4	5200-5208	1000-1064	0.105	0	3
5	5200-5208	1000-1072	0.56	0	16
6	5200-5208	1008-1080	0.42	0	12
7	5208	1016-1088	0.07	0	2

Daily Totals

VP's:	734
Skips:	0
Lin.Kms:	25.6900
Day.Sq.Klms:	6.9134

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	910
Cum.Lin.Kms:	31.8500
Cum.Sq.Klm:	8.5711
Lin.Kms.Remaining:	140.9100
Sq.Kms.Remaining:	37.9201
% Completed:	18.44%
Average Daily Production Sq. Kms:	5.7141
Average Daily Production Line Kms:	21.2333
Estimated Finish Date:	Monday, 11 August 2008

HOURS

Working Time -		Down Time -		Standby Time -	
Recording:	9.3	Human Error:		Toolbox/Safety Meeting:	0.3
Requested Experimental:		Troubleshooting:	0.1	Induction:	
Recorder Moveup:		Recorder:	0.2	Weather:	
Vibrator Moveup:		Vibes:		Other:	
Detour:		WOS:			
Traverse Move:	1.3	Other:		**Other -**	
Swath Move:	0.1	**Non-Charge Time -**			
Spread Damage:		Travel Time:	0.3	Spread Layout/Pickup:	
Interprospect Move:		Instrument Tests\Morning QC:	0.3	Crew Demobe/Remobe:	
		Panel Move:		Camp Move:	
		Other:	0.2		

Daily Totals

Working Time:	10.7
Standby Time:	0.3
Down Time:	0.3
Non-Charge Time:	0.8
Other:	0.0
Total Day Hrs:	12.1
Total Day Charge Hours:	11.0

Cumulative Totals

Working Time(Job):	13.8
Standby Time(Job):	1.9
Down Time(Job):	0.3
Non-Charge Time(Job):	30.9
Total Hrs (Job):	46.9

COMMENTS:

*Good production while rolling in to spread
*First salt lake recorded
*Recorder down time due to wrong spread geometry
*Trouble shooting time due to bad LUAL

Spread Movement

Client: Charo 3D — **Date:** Tuesday, 5 August 2008

Layout Line	Station #		Tot	Pickup Line	Station #		Tot
1088	5018	5215	198	1000	5048	5143	96
1096	5000	5215	216				
1104	5000	5031	32				
		Total Stations :	446			**Total Stations:**	96

Total Crew #'s:44 **Line Crew #'s:25** **Vehicle #'s:18**

Equipment Report **Bad Phones:** 2 **Bad Cable:** 0

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Wednesday, 6 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
6	5208-5048	1008-1080	5.46	0	156
7	5032-5208	1016-1088	6.37	0	182
8	5216-5032	1024-1096	6.72	0	192
9	5016-5104	1032-1104	3.36	0	96

Daily Totals

VP's:	626
Skips:	0
Lin.Kms:	21.9100
Day.Sq.Klms:	5.8962

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	1536
Cum.Lin.Kms:	53.7600
Cum.Sq.Klm:	14.4673
Lin.Kms.Remaining:	119.0000
Sq.Kms.Remaining:	32.0239
% Completed:	31.12%
Average Daily Production Sq. Kms:	5.7869
Average Daily Production Line Kms:	21.5040
Estimated Finish Date:	Monday, 11 August 2008

HOURS

Working Time -		**Down Time -**		**Standby Time -**		**Daily Totals**	
Recording:	6.7	Human Error:		Toolbox/Safety Meeting:	0.3	**Working Time:**	**10.4**
Requested Experimental:		Troubleshooting:	0.4	Induction:		**Standby Time:**	**0.3**
Recorder Moveup:		Recorder:		Weather:		**Down Time:**	**0.6**
Vibrator Moveup:		Vibes:	0.2	Other:		**Non-Charge Time:**	**0.7**
Detour:		WOS:				**Other:**	**0.0**
Traverse Move:	3.4	Other:		**Other -**		**Total Day Hrs:**	**12.0**
Swath Move:	0.3	**Non-Charge Time -**				**Total Day Charge Hours:**	**10.7**
Spread Damage:		Travel Time:	0.4	Spread Layout/Pickup:		**Cumulative Totals**	
Interprospect Move:		Instrument Tests\Morning QC:	0.1	Crew Demobe/Remobe:		**Working Time(Job):**	**24.2**
		Panel Move:		Camp Move:		**Standby Time(Job):**	**2.2**
		Other:	0.2			**Down Time(Job):**	**0.9**
						Non-Charge Time(Job):	**31.6**
						Total Hrs (Job):	**58.9**

COMMENTS:

*Good production
*Trouble shooting time due to LUAL & transverse problems
*Vibe down time due to radio problems

Spread Movement

Client: Charo 3D

Date: Wednesday, 6 August 2008

Layout Line	Station #		Tot
1104	5032	5215	184
1112	5000	5215	216
1120	5000	5070	71
Total Stations :		471	

Pickup Line	Station #		Tot
1000	5144	5215	72
1008	5048	5215	168
1016	5048	5215	168
1024	5048	5215	168
Total Stations:		576	

Total Crew #'s:44 **Line Crew #'s:25** **Vehicle #'s:18**

Equipment Report **Bad Phones:** 2 **Bad Cable:** 1

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Thursday, 7 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
9	5112-5216	1032-1104	3.92	0	112
10	5216-5000	1040-1112	7.84	0	224
11	5000-5216	1048-1120	7.84	0	224
12	5216-5160	1056-1128	2.24	0	64

Daily Totals

VP's:	624
Skips:	0
Lin.Kms:	21.8400
Day.Sq.Klms:	5.8773

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	2160
Cum.Lin.Kms:	75.6000
Cum.Sq.Klm:	20.3446
Lin.Kms.Remaining:	97.1600
Sq.Kms.Remaining:	26.1466
% Completed:	43.76%
Average Daily Production Sq. Kms:	5.8127
Average Daily Production Line Kms:	21.6000
Estimated Finish Date:	Monday, 11 August 2008

HOURS

Working Time -		**Down Time -**		**Standby Time -**		**Daily Totals**	
Recording:	6.6	Human Error:		Toolbox/Safety Meeting:	0.3	**Working Time:**	**10.7**
Requested Experimental:		Troubleshooting:	0.3	Induction:		**Standby Time:**	**0.3**
Recorder Moveup:	0.5	Recorder:		Weather:		**Down Time:**	**0.4**
Vibrator Moveup:		Vibes:	0.1	Other:		**Non-Charge Time:**	**0.6**
Detour:	0.2	WOS:				**Other:**	**0.0**
Traverse Move:	3.2	Other:		**Other -**		**Total Day Hrs:**	**12.0**
Swath Move:	0.2	**Non-Charge Time -**				**Total Day Charge Hours:**	**11.0**
Spread Damage:		Travel Time:	0.4	Spread Layout/Pickup:		**Cumulative Totals**	
Interprospect Move:		Instrument Tests\Morning QC:	0.1	Crew Demobe/Remobe:		**Working Time(Job):**	**34.9**
		Panel Move:		Camp Move:		**Standby Time(Job):**	**2.5**
		Other:	0.1			**Down Time(Job):**	**1.3**
						Non-Charge Time(Job):	**32.2**
						Total Hrs (Job):	**70.9**

COMMENTS:

*Good production
*Trouble shooting time due to cable problems
*Vibe time due to vibes out of position, missing pegs

Spread Movement

Client: Charo 3D — **Date:** Thursday, 7 August 2008

Layout Line	Station #		Tot	Pickup Line	Station #		Tot
1120	5071	5215	145	1032	5048	5215	168
1128	5000	5215	216	1040	5048	5215	168
1136	5000	5143	144	1048	5032	5208	177
		Total Stations :	505			**Total Stations:**	513

Total Crew #'s:44 **Line Crew #'s:25** **Vehicle #'s:18**

Equipment Report **Bad Phones:** 4 **Bad Cable:** 1

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client.....	SANTOS	Party Manager:	Shane Goossens
Survey Name.	Charo 3D	Client Rep:	Tony Kenny
Area.....	PPL 177(Santos), PEL 111(Victoria Petroleum)	Weather:	Fine / Cool
State.....	SA	DATE:	Friday, 8 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
12	5152-5000	1056-1128	5.6	0	160
13	5000-5216	1064-1136	7.77	0	222
14	5216-5000	1072-1144	6.615	0	189
15	5000-5040	1080-1152	1.68	0	48

EXPLOSIVES

Swath	Source	Receiver	Kms.	Skips	Sp's
13	5080-5088	1064-1136	0.07	0	2
14	5104-5072	1072-1144	1.225	0	35
15	5072-5088	1080-1152	0.455	0	13

Daily Totals

VP's:	669
Skips:	0
Lin.Kms:	23.4150
Day.Sq.Klms:	6.3012

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	2829
Cum.Lin.Kms:	99.0150
Cum.Sq.Klm:	26.6458
Lin.Kms.Remaining:	73.7450
Sq.Kms.Remaining:	19.8454
% Completed:	57.31%
Average Daily Production Sq. Kms:	5.9213
Average Daily Production Line Kms:	22.0033
Estimated Finish Date:	Monday, 11 August 2008

HOURS

Working Time -		**Down Time -**		**Standby Time -**		**Daily Totals**	
Recording:	8.1	Human Error:		Toolbox/Safety Meeting:	0.3	**Working Time:**	**11.1**
Requested Experimental:		Troubleshooting:		Induction:		**Standby Time:**	**0.3**
Recorder Moveup:		Recorder:		Weather:		**Down Time:**	**0.0**
Vibrator Moveup:		Vibes:		Other:		**Non-Charge Time:**	**0.7**
Detour:	0.3	WOS:				**Other:**	**0.0**
Traverse Move:	2.6	Other:		**Other -**		**Total Day Hrs:**	**12.1**
Swath Move:	0.1	**Non-Charge Time -**				**Total Day Charge Hours:**	**11.4**
Spread Damage:		Travel Time:	0.4	Spread Layout/Pickup:		**Cumulative Totals**	
Interprospect Move:		Instrument Tests\Morning QC:	0.2	Crew Demobe/Remobe:		**Working Time(Job):**	**46.0**
		Panel Move:		Camp Move:		**Standby Time(Job):**	**2.8**
		Other:	0.1			**Down Time(Job):**	**1.3**
						Non-Charge Time(Job):	**32.9**
						Total Hrs (Job):	**83.0**

COMMENTS:

*Good production
*Explosive work started on second salt lake

Spread Movement

Client: Charo 3D — **Date:** Friday, 8 August 2008

Layout Line	Station #		Tot	Pickup Line	Station #		Tot
1136	5144	5215	72	1048	5209	5215	7
1144	5000	5215	216	1056	5032	5215	184
1152	5000	5215	216	1064	5016	5215	200
1160	5160	5215	56	1072	5000	5215	216
	Total Stations :		560		**Total Stations:**		607

Total Crew #'s:44 **Line Crew #'s:24** **Vehicle #'s:18**

Equipment Report **Bad Phones:** 3 **Bad Cable:** 0

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Saturday, 9 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's	Total
15	5048-5216	1080-1152	4.62	0	132	
16	5216-5000	1088-1160	5.985	0	171	
17	5000-5120	1096-1168	3.185	2	89	**394**

EXPLOSIVES

Swath	Source	Receiver	Kms.	Skips	Sp's	Total
15	5096-5120	1080-1152	1.05	0	30	
16	5136-5088	1088-1160	1.855	0	53	
17	5088-5136	1096-1168	1.54	2	42	**127**

Daily Totals

VP's:	517
Skips:	4
Lin.Kms:	18.2350
Day.Sq.Klms:	4.9072

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	3346
Cum.Lin.Kms:	117.2500
Cum.Sq.Klm:	31.5530
Lin.Kms.Remaining:	55.5100
Sq.Kms.Remaining:	14.9382
% Completed:	67.87%
Average Daily Production Sq. Kms:	5.7369
Average Daily Production Line Kms:	21.3182
Estimated Finish Date:	Monday, 11 August 2008

HOURS

Working Time -		**Down Time -**		**Standby Time -**		**Daily Totals**	
Recording:	6.5	Human Error:		Toolbox/Safety Meeting:	0.3	**Working Time:**	**10.9**
Requested Experimental:		Troubleshooting:	0.2	Induction:		**Standby Time:**	**0.3**
Recorder Moveup:	0.5	Recorder:		Weather:		**Down Time:**	**0.2**
Vibrator Moveup:		Vibes:		Other:		**Non-Charge Time:**	**0.6**
Detour:	0.4	WOS:				**Other:**	**0.0**
Traverse Move:	3.4	Other:		**Other -**		**Total Day Hrs:**	**12.0**
Swath Move:	0.1	**Non-Charge Time -**				**Total Day Charge Hours:**	**11.2**
Spread Damage:		Travel Time:	0.4	Spread Layout/Pickup:		**Cumulative Totals**	
Interprospect Move:		Instrument Tests\Morning QC:	0.1	Crew Demobe/Remobe:		**Working Time(Job):**	**56.9**
		Panel Move:		Camp Move:		**Standby Time(Job):**	**3.1**
		Other:	0.1			**Down Time(Job):**	**1.5**
						Non-Charge Time(Job):	**33.4**
						Total Hrs (Job):	**95.0**

COMMENTS:

*Good production
*Explosive work nearly completed
*2 skip VP's due to salt lake soft edges
*2 lost SP's due to system crash

Spread Movement

Client: Charo 3D — **Date:** Saturday, 9 August 2008

Layout Line	Station #		Tot	Pickup Line	Station #		Tot
1160	5000	5159	160	1080	5000	5215	216
1168	5000	5207	208	1088	5000	5215	216
1176	5000	5207	208	1096	5000	5063	64
		Total Stations :	576			**Total Stations:**	496

Total Crew #'s:44 **Line Crew #'s:24** **Vehicle #'s:18**

Equipment Report **Bad Phones:** 2 **Bad Cable:** 1

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Sunday, 10 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
17	5144-5216	1096-1168	3.08	0	88
18	5216-5000	1104-1176	7.595	0	217
19	5000-5216	1112-1184	7.84	0	224
20	5208-5104	1120-1192	3.92	0	112

EXPLOSIVES

Swath	Source	Receiver	Kms.	Skips	Sp's
17	5136	1096-1168	0.07	0	2
18	5104-5096	1104-1176	0.245	0	7

Daily Totals

VP's:	650
Skips:	0
Lin.Kms:	22.7500
Day.Sq.Klms:	6.1222

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	3996
Cum.Lin.Kms:	140.0000
Cum.Sq.Klm:	37.6752
Lin.Kms.Remaining:	32.7600
Sq.Kms.Remaining:	8.8160
% Completed:	81.04%
Average Daily Production Sq. Kms:	5.7962
Average Daily Production Line Kms:	21.5385
Estimated Finish Date:	Tuesday, 12 August 2008

HOURS

Working Time -		**Down Time -**		**Standby Time -**		**Daily Totals**	
Recording:	7.1	Human Error:		Toolbox/Safety Meeting:	0.3	**Working Time:**	**10.6**
Requested Experimental:		Troubleshooting:		Induction:		**Standby Time:**	**0.3**
Recorder Moveup:		Recorder:		Weather:		**Down Time:**	**0.0**
Vibrator Moveup:		Vibes:		Other:		**Non-Charge Time:**	**1.1**
Detour:		WOS:				**Other:**	**0.0**
Traverse Move:	3.4	Other:		**Other -**		**Total Day Hrs:**	**12.0**
Swath Move:	0.1	**Non-Charge Time -**				**Total Day Charge Hours:**	**10.9**
Spread Damage:		Travel Time:	0.7	Spread Layout/Pickup:		**Cumulative Totals**	
Interprospect Move:		Instrument Tests\Morning QC:	0.2	Crew Demobe/Remobe:		**Working Time(Job):**	**67.5**
		Panel Move:		Camp Move:		**Standby Time(Job):**	**3.4**
		Other:	0.2			**Down Time(Job):**	**1.5**
						Non-Charge Time(Job):	**34.3**
						Total Hrs (Job):	**107.0**

COMMENTS:

*Good production
*All salt lake explosive shots completed
*Spread layout completed
*Spread layout started on Callabonna 3D

Spread Movement

Client: Charo 3D — **Date:** Sunday, 10 August 2008

Layout Line	Station #		Tot	Pickup Line	Station #		Tot
1184	5000	5191	192	1096	5064	5215	152
1192	5000	5191	192	1104	5000	5215	216
				1112	5000	5215	216
	Callabonna 3D						
1000	5024	5156	133				
	Total Stations :	517			**Total Stations:**	584	

Total Crew #'s:44 **Line Crew #'s:24** **Vehicle #'s:18**

Equipment Report **Bad Phones:** 0 **Bad Cable:** 0

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Monday, 11 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
20	5096-5000	1120-1192	3.64	0	104
21	5000-5208	1128-1192	7.56	0	216
22	5208-5056	1136-1192	5.6	0	160

Daily Totals

VP's:	480
Skips:	0
Lin.Kms:	16.8000
Day.Sq.Klms:	4.5210

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	4476
Cum.Lin.Kms:	156.8000
Cum.Sq.Klm:	42.1962
Lin.Kms.Remaining:	15.9600
Sq.Kms.Remaining:	4.2950
% Completed:	90.76%
Average Daily Production Sq. Kms:	5.6262
Average Daily Production Line Kms:	20.9067
Estimated Finish Date:	Tuesday, 12 August 2008

HOURS

Working Time -		**Down Time -**		**Standby Time -**		**Daily Totals**	
Recording:	5.2	Human Error:		Toolbox/Safety Meeting:	0.3	**Working Time:**	**7.6**
Requested Experimental:		Troubleshooting:		Induction:		**Standby Time:**	**0.3**
Recorder Moveup:		Recorder:	3.5	Weather:		**Down Time:**	**3.6**
Vibrator Moveup:		Vibes:	0.1	Other:		**Non-Charge Time:**	**0.5**
Detour:		WOS:				**Other:**	**0.0**
Traverse Move:	2.2	Other:		**Other -**		**Total Day Hrs:**	**12.0**
Swath Move:	0.1	**Non-Charge Time -**				**Total Day Charge Hours:**	**7.9**
Spread Damage:	0.1	Travel Time:	0.4	Spread Layout/Pickup:		**Cumulative Totals**	
Interprospect Move:		Instrument Tests\Morning QC:	0.1	Crew Demobe/Remobe:		**Working Time(Job):**	**75.1**
		Panel Move:		Camp Move:		**Standby Time(Job):**	**3.7**
		Other:				**Down Time(Job):**	**5.1**
						Non-Charge Time(Job):	**34.8**
						Total Hrs (Job):	**119.0**

COMMENTS:

*Recorder down time due to problems with Vibe QC computer
*Vibe down time due to collapsed axle bearing
*Spread layout continued on Callabonna 3D

Total Crew #'s:44 **Line Crew #'s:24** **Vehicle #'s:18**

Spread Movement

Client: Charo 3D **Date:** Monday, 11 August 2008

Layout Line	Station #		Tot	Pickup Line	Station #		Tot
				1120	5000	5215	216
				1128	5000	5215	216
				1136	5120	5215	96
	Callabonna 3D						
1000	5157	5175	19				
1008	5024	5175	152				
1016	5016	5175	160				
1024	5008	5183	176				
1032	5008	5016	9				
	Total Stations :	516			**Total Stations:**	528	

Equipment Report **Bad Phones:** 2 **Bad Cable:** 1

Crew Manager .....

Client Rep .....

Terrex Seismic
Daily Report

CREW 402

Client..... SANTOS
Survey Name. Charo 3D
Area..... PPL 177(Santos), PEL 111(Victoria Petroleum)
State..... SA

Party Manager: Shane Goossens
Client Rep: Tony Kenny
Weather: Fine / Cool
DATE: Tuesday, 12 August 2008

PRODUCTION

Swath	Source	Receiver	Kms.	Skips	Vp's
22	5048-5000	1136-1192	1.96	0	56
23	5000-5192	1144-1192	7	0	200
24	5000-5192	1152-1192	7	0	200

Daily Totals

VP's:	456
Skips:	0
Lin.Kms:	15.9600
Day.Sq.Klms:	4.2950

Cumulative Totals

Cum. Skip Vp's:	4
Cum. VP's:	4932
Cum.Lin.Kms:	172.7600
Cum.Sq.Klm:	46.4912
Lin.Kms.Remaining:	0.0000
Sq.Kms.Remaining:	0.0000
% Completed:	100.00%
Average Daily Production Sq. Kms:	5.4696
Average Daily Production Line Kms:	20.3247
Estimated Finish Date:	Tuesday, 12 August 2008

HOURS

Working Time -		Down Time -		Standby Time -	
Recording:	5.4	Human Error:		Toolbox/Safety Meeting:	0.3
Requested Experimental:		Troubleshooting:		Induction:	
Recorder Moveup:	0.3	Recorder:		Weather:	
Vibrator Moveup:		Vibes:		Other:	
Detour:	0.2	WOS:			
Traverse Move:	1.2	Other:		**Other -**	
Swath Move:		**Non-Charge Time -**			
Spread Damage:		Travel Time:	0.4	Spread Layout/Pickup:	4.1
Interprospect Move:		Instrument Tests\Morning QC:	0.1	Crew Demobe/Remobe:	
		Panel Move:		Camp Move:	
		Other:			

Daily Totals

Working Time:	7.1
Standby Time:	0.3
Down Time:	0.0
Non-Charge Time:	0.5
Other:	4.1
Total Day Hrs:	12.0
Total Day Charge Hours:	7.4

Cumulative Totals

Working Time(Job):	82.2
Standby Time(Job):	4.0
Down Time(Job):	5.1
Non-Charge Time(Job):	35.3
Total Hrs (Job):	131.0

COMMENTS:

*Production on Charo 3D completed
*Recorder and vibrators moved to Callabonna 3D
*Spread layout continued on Callabonna 3D

Spread Movement

Client: Charo 3D

Date: Tuesday, 12 August 2008

Layout Line	Station #		Tot
	Callabonna 3D		
1032	5016	5183	168
1040	5000	5183	184
1048	5000	5183	184
1056	5104	5183	80
	Total Stations :	616	

Pickup Line	Station #		Tot
1136	5000	5119	120
1144	5000	5215	216
1152	5000	5215	216
1160	5000	5207	208
1168	5000	5207	208
1176	5000	5103	104
1184	5000	5047	48
1192	5000	5128	129
	Total Stations:	1249	

Total Crew #'s:44 **Line Crew #'s:24** **Vehicle #'s:18**

Equipment Report **Bad Phones: 2** **Bad Cable: 1**

Crew Manager .....

Client Rep .....

APPENDIX H

RECORDING STATISTICS

SANTOS CHARO 3D

RECORDING STATISTICS

Date	Travel Time	Layout/Pickup Spread	Other	Recording Time	Recorder Move	Detours & Terrain	Trouble-shooting	Testing	Traverse Move	Spread Damage	Downtime	Swath Move	Safety Meetings	Total Stand-by	Total Hours	Total Kms	Total Sq Km's	Crew Numbers	Channel Numbers
	Non-Chargeable	Non-Chargeable	Non-Chargeable	Chargeable	Chargeable	Chargeable	Non Chargeable	Non Chargeable	Chargeable	Chargeable	Non Chargeable	Chargeable	Stand-by	Chargeable	Chargeable			Above 42	Above 2200
4 August 2008	**0.40**	**7.30**	**0.20**	**2.00**		**0.70**		**0.50**	**0.40**				**0.30**	**0.30**	3.10	**6.1600**	**1.6577**	2	200
5 August 2008	**0.30**		**0.20**	**9.30**			**0.10**	**0.30**	**1.30**		**0.20**	**0.10**	**0.30**	**0.30**	10.70	**25.6900**	**6.9134**	2	200
6 August 2008	**0.40**		**0.20**	**6.70**			**0.40**	**0.10**	**3.40**		**0.20**	**0.30**	**0.30**	**0.30**	10.40	**21.9100**	**5.8962**	2	200
7 August 2008	**0.40**		**0.10**	**6.60**	**0.50**	**0.20**	**0.30**	**0.10**	**3.20**		**0.10**	**0.20**	**0.30**	**0.30**	10.70	**21.8400**	**5.8773**	2	200
8 August 2008	**0.40**		**0.10**	**8.10**		**0.30**		**0.20**	**2.60**			**0.10**	**0.30**	**0.30**	11.10	**23.4150**	**6.3012**	2	200
9 August 2008	**0.40**		**0.10**	**6.50**	**0.50**	**0.40**	**0.20**	**0.10**	**3.40**			**0.10**	**0.30**	**0.30**	10.90	**18.2350**	**4.9072**	2	200
10 August 2008	**0.70**		**0.20**	**7.10**				**0.20**	**3.40**			**0.10**	**0.30**	**0.30**	10.60	**22.7500**	**6.1222**	2	200
11 August 2008	**0.40**			**5.20**				**0.10**	**2.20**	**0.10**	**3.60**	**0.10**	**0.30**	**0.30**	7.60	**16.8000**	**4.5210**	2	200
Total	**3.4000**	**7.3000**	**1.1000**	**51.5000**	**1.0000**	**1.6000**	**1.0000**	**1.6000**	**19.9000**	**0.1000**	**4.1000**	**1.0000**	**2.4000**	**2.4000**	**75.1000**	**156.8000**	**42.1962**	**16.0000**	**1,600.0000**

APPENDIX 3 - RECORDING PRODUCTION STATISTICS

SANTOS CHARO 3D

RECORDING STATISTICS

Date	Travel Time	Layout/Pickup Spread	Other	Recording Time	Recorder Move	Detours & Terrain	Trouble-shooting	Testing	Traverse Move	Spread Damage	Downtime	Swath Move	Safety Meetings	Total Stand-by	Total Hours	Total Kms	Total Sq Km's	Crew Numbers	Channel Numbers
	Non-Chargeable	Non-Chargeable	Non-Chargeable	Chargeable	Chargeable	Chargeable	Non Chargeable	Non Chargeable	Chargeable	Chargeable	Non Chargeable	Chargeable	Stand-by	Chargeable	Chargeable			Above 42	Above 2200
4 August 2008	**0.40**	**7.30**	**0.20**	**2.00**		**0.70**		**0.50**	**0.40**				**0.30**	**0.30**	3.10	**6.1600**	**1.6577**	2	200
5 August 2008	**0.30**		**0.20**	**9.30**			**0.10**	**0.30**	**1.30**		**0.20**	**0.10**	**0.30**	**0.30**	10.70	**25.6900**	**6.9134**	2	200
6 August 2008	**0.40**		**0.20**	**6.70**			**0.40**	**0.10**	**3.40**		**0.20**	**0.30**	**0.30**	**0.30**	10.40	**21.9100**	**5.8962**	2	200
7 August 2008	**0.40**		**0.10**	**6.60**	**0.50**	**0.20**	**0.30**	**0.10**	**3.20**		**0.10**	**0.20**	**0.30**	**0.30**	10.70	**21.8400**	**5.8773**	2	200
8 August 2008	**0.40**		**0.10**	**8.10**		**0.30**		**0.20**	**2.60**			**0.10**	**0.30**	**0.30**	11.10	**23.4150**	**6.3012**	2	200
9 August 2008	**0.40**		**0.10**	**6.50**	**0.50**	**0.40**	**0.20**	**0.10**	**3.40**			**0.10**	**0.30**	**0.30**	10.90	**18.2350**	**4.9072**	2	200
10 August 2008	**0.70**		**0.20**	**7.10**				**0.20**	**3.40**			**0.10**	**0.30**	**0.30**	10.60	**22.7500**	**6.1222**	2	200
11 August 2008	**0.40**			**5.20**				**0.10**	**2.20**	**0.10**	**3.60**	**0.10**	**0.30**	**0.30**	7.60	**16.8000**	**4.5210**	2	200
Total	**3.4000**	**7.3000**	**1.1000**	**51.5000**	**1.0000**	**1.6000**	**1.0000**	**1.6000**	**19.9000**	**0.1000**	**4.1000**	**1.0000**	**2.4000**	**2.4000**	**75.1000**	**156.8000**	**42.1962**	**16.0000**	**1,600.0000**

APPENDIX 4 - PERSONNEL LIST

APPENDIX 4
PERSONNEL LIST

(Total Crew involved in project)

Terrex Seismic

Crew Manager (1)

QHSE Officer (2)
Cook (3)
Cook's Assistant (1)
Camp Attendants (2)
Mechanics (3)
Supply Drivers (2)
Observers (2)
Cable Repair Technicians (2)
Vibrator Operators (3)
Vibrator Scouts (1)
Vibrator Technician (2)
Line Boss (1)
Trouble Shooter (2)
Line Crew (min 22)

Conics Positioning

Senior Surveyor / Line Pointer (1)
GPS Operators (3)

Terrex Contracting

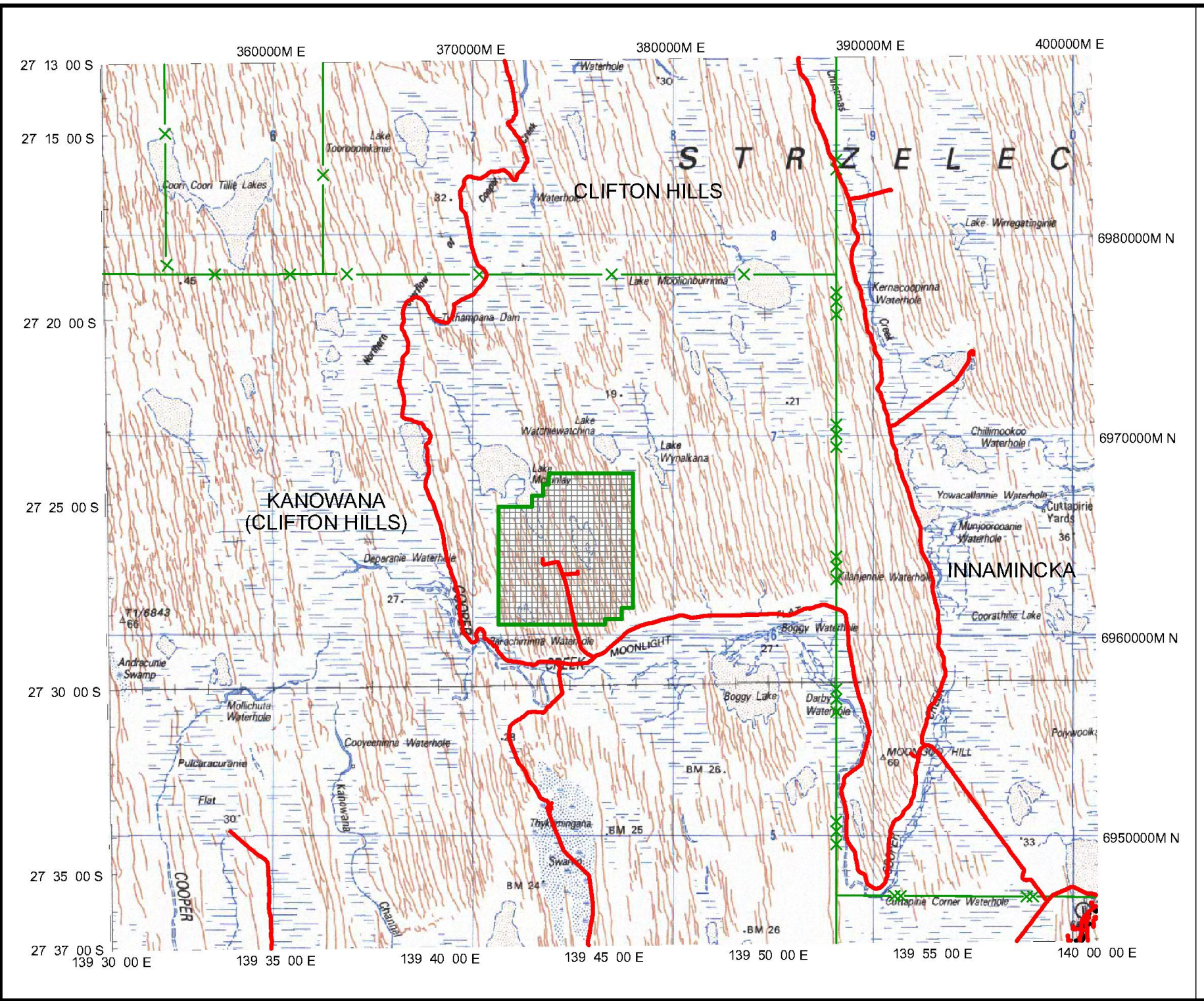
Crew Supervisor (1)
Mechanics (2)
Cooks (1)
Bulldozer Operators (4)
Grader Operators (2)

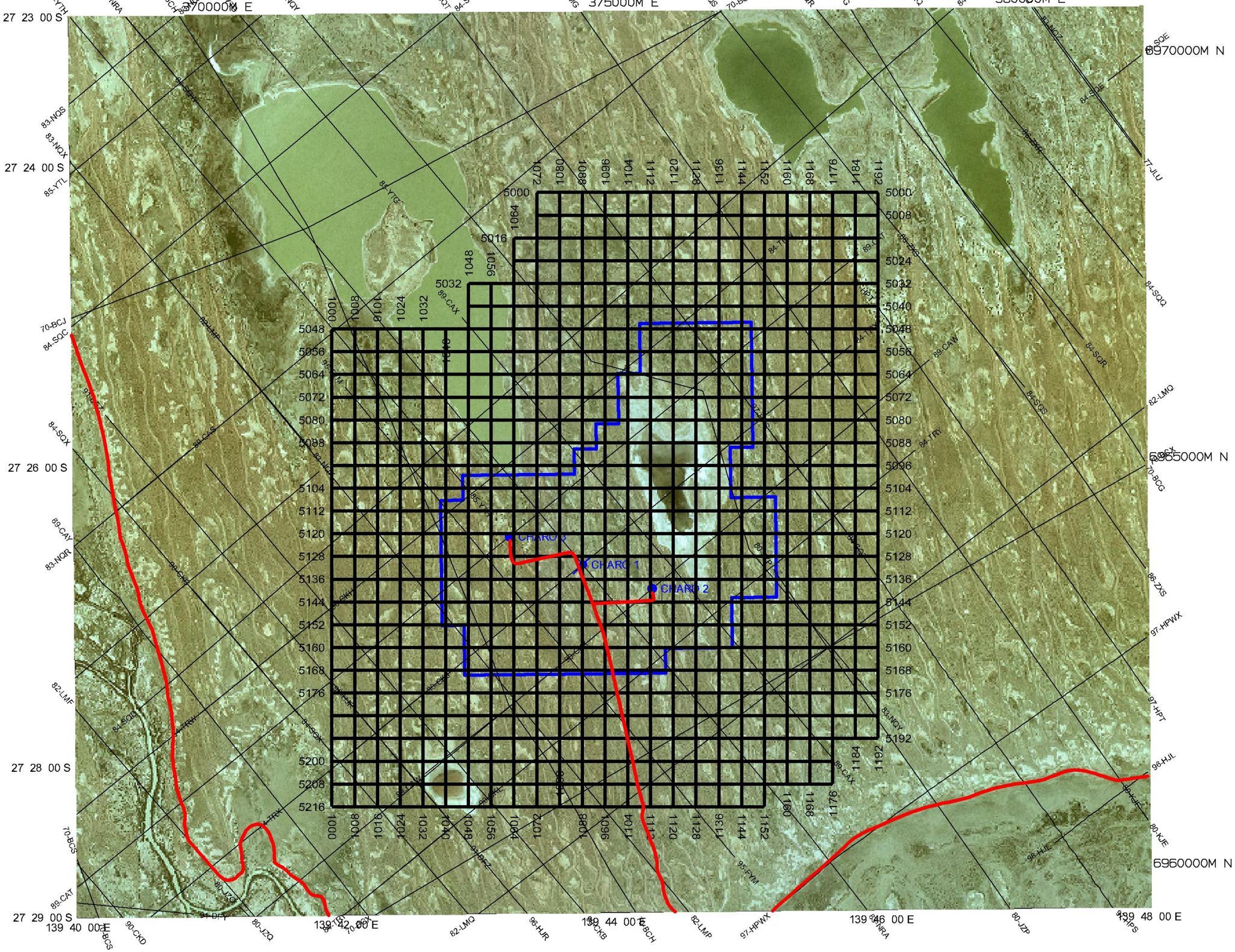
APPENDIX 5 - TAPE LIST

Tape listing for 2008 Charo 3D Seismic Survey

Field Tapes
1 x LTO-2 (8004A) + CD containing SPS and Observers Logs
1 x LTO-2 (8004B) + CD containing SPS and Observers Logs

APPENDIX 6 - MAPS


360000M E
370000M E
380000M E
390000M E
400000M E
27 13 00 S
27 15 00 S
27 20 00 S
27 25 00 S
27 30 00 S
27 35 00 S
27 37 00 S
6980000M N
6970000M N
6960000M N
6950000M N
139 30 00 E
139 35 00 E
139 40 00 E
139 45 00 E
139 50 00 E
139 55 00 E
140 00 00 E
S T R Z E L E C
CLIFTON HILLS
KANOWANA
(CLIFTON HILLS)
INNAMINCKA
Waterhole
Lake Tooroopinkanie
Coori Coori Tillie Lakes
Lake Moolionburrinna
Tirkampana Dam
Lake Watchiewatchina
Lake Wynalkana
Lake Murray
Kernacoopinna Waterhole
Lake Wirregatinginie
Chillimookoo Waterhole
Yowacallannie Waterhole
Cuttapirie Yards
Munjoorooanie Waterhole
Kilanjennie Waterhole
Coorathilie Lake
Deparanie Waterhole
Parachirrinna Waterhole
MOONLIGHT CREEK
Boggy Waterhole
Boggy Lake
Darby Waterhole
MOONLIGHT HILL
Andracunie Swamp
Mollichuta Waterhole
Cooyeenirrina Waterhole
Pulcaracuranie Flat
Kanowana
Thykarringana Swamp
Cuttapirie Corner Waterhole
COOPER
Christmas Creek
Northern Flow
BM 26
BM 25
BM 24
T1/6843
0 1 2 3 4 5
KILOMETRES
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
G.R.S. 1980 SPHEROID
CENTRAL MERIDIAN 141 00 00 E
Mapsheet datum: 'GDA94'
Santos
South Australia Business Unit
PROPOSED
CHARO 3D



0 1 2

KILOMETRES

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
G.R.S. 1980 SPHEROID
CENTRAL MERIDIAN 141 00 00 E
Mapsheet datum: "GDA94"

Santos
South Australia Business Unit

CHARO 3D

Data Processing Report

For

SANTOS LTD

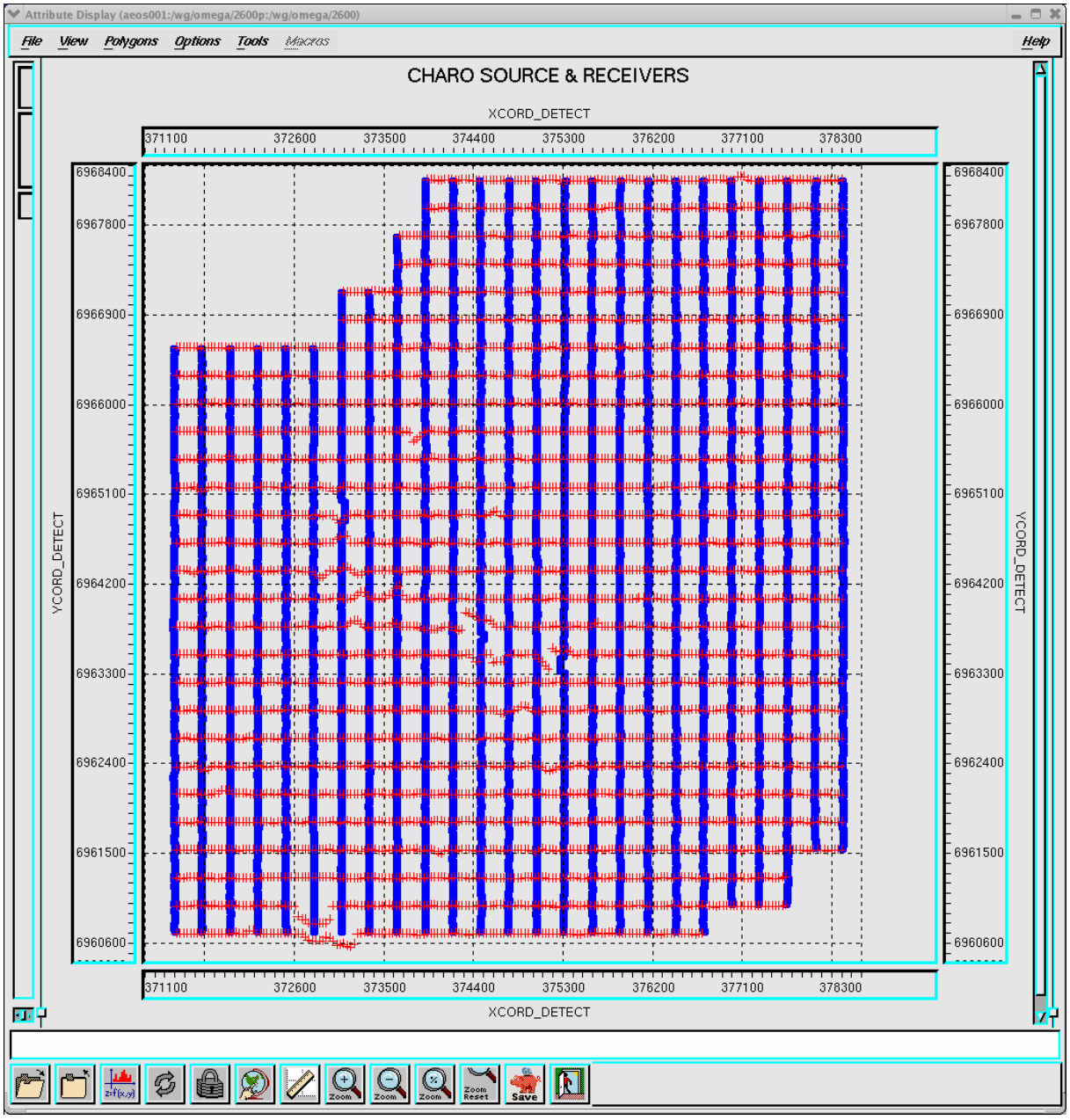
CHARO 3D

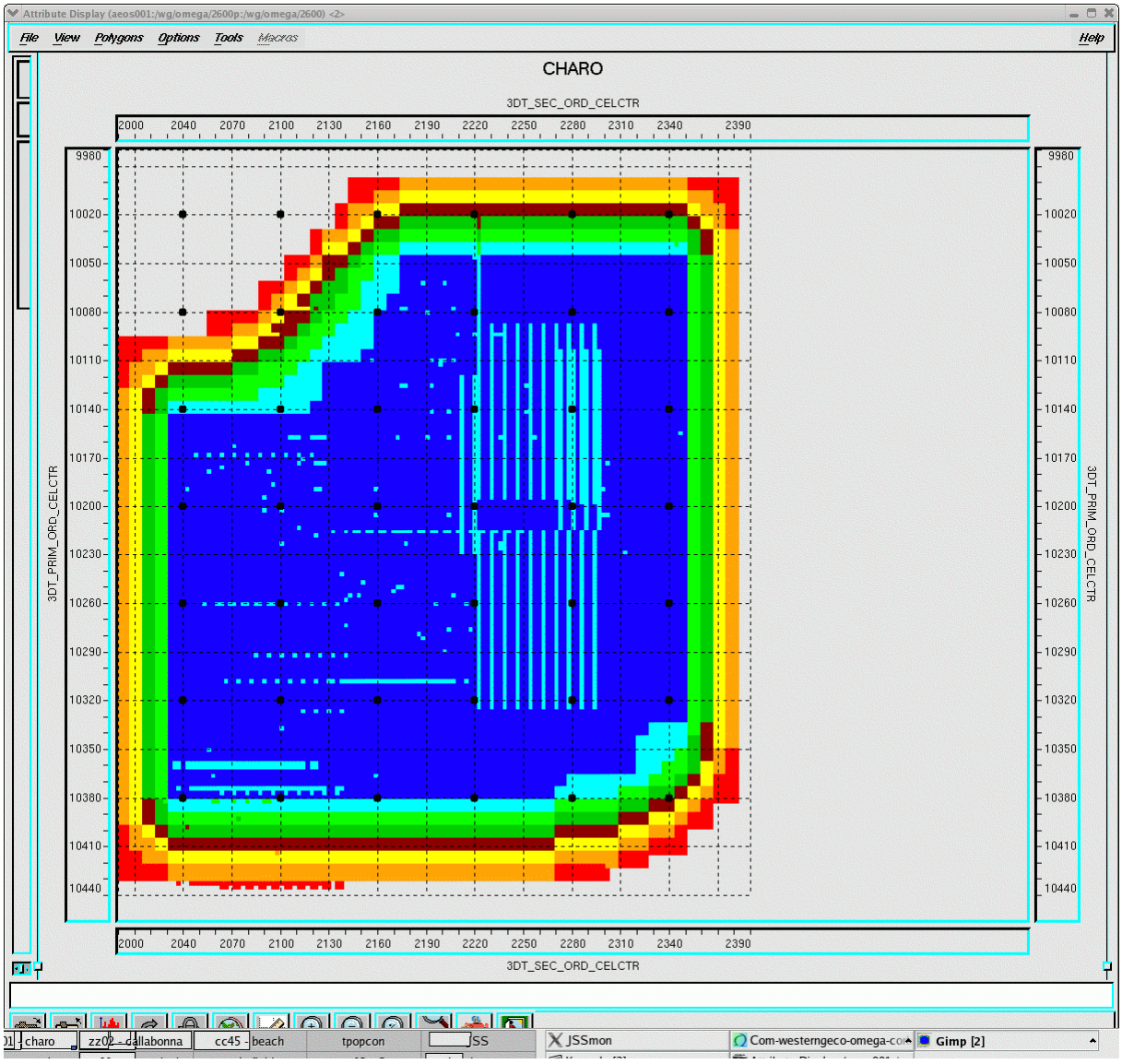
WesternGeco (Australia) Pty Ltd

INTRODUCTION

This report details the processing of the Charo 3D seismic survey recorded from 4th August – 12th August, 2008.

Charo consisted of 25 receiver lines, 1000-1192 incrementing by 8. The lines were 280m apart. There were 28 source lines, 5000-5216 also incrementing by 8 and 280m apart.


Attribute Display (aeos001:/wg/omega/2600p:/wg/omega/2600)
File
View
Polygons
Options
Tools
Macros
Help
CHARO SOURCE & RECEIVERS
XCORD_DETECT
371100
372600
373500
374400
375300
376200
377100
378300
YCORD_DETECT
6968400
6967800
6966900
6966000
6965100
6964200
6963300
6962400
6961500
6960600
Zoom
Zoom
Zoom
Zoom Reset
Save


Attribute Display (aeos001:/wg/omega/2600p:/wg/omega/2600) <2>
File View Polygons Options Tools Macros Help
CHARO
3DT_SEC_ORD_CELCTR
2000 2040 2070 2100 2130 2160 2190 2220 2250 2280 2310 2340 2390
3DT_PRIM_ORD_CELCTR
9980 10020 10050 10080 10110 10140 10170 10200 10230 10260 10290 10320 10350 10380 10410 10440
charo
cc45
beach
tpopcon
JSSmon
Gimp [2]

PROCESSING PARAMETERS

FORMAT CONVERSION

Field data for Charo was recorded in SEGD format onto one LTO2 tapes

GEOMETRY UPDATE

Geometry information was applied to the data.

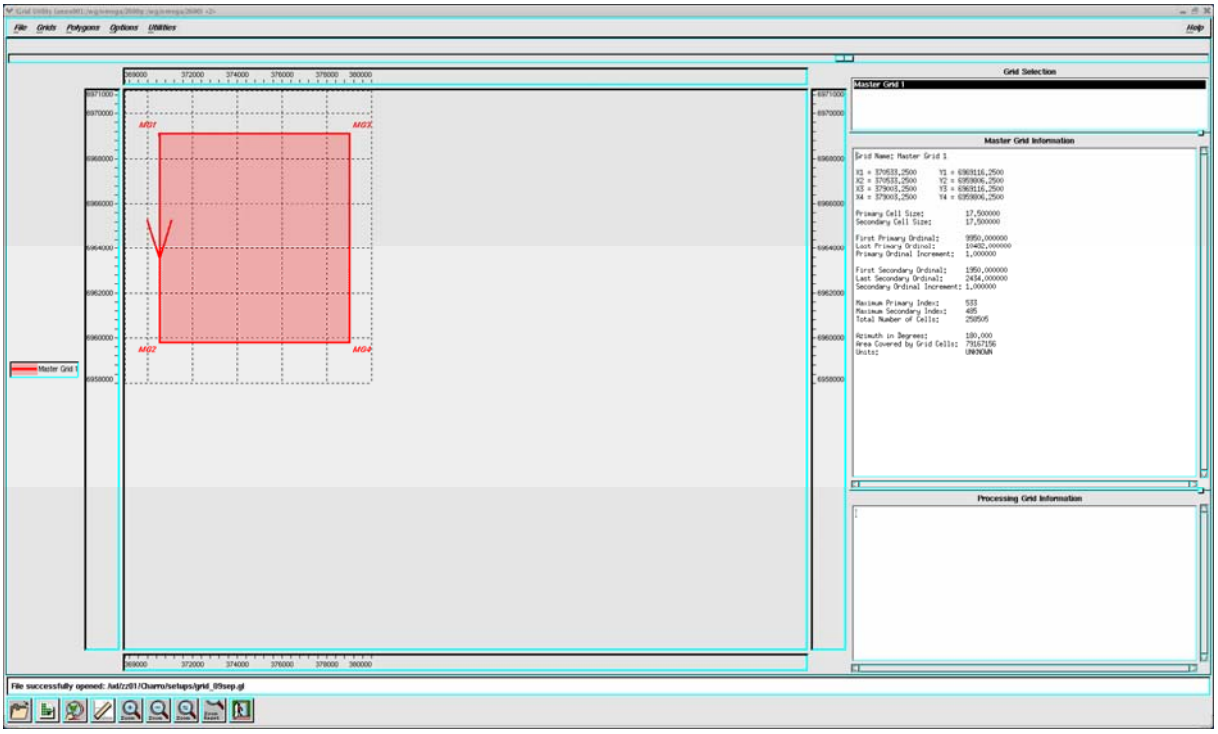
GRID DEFINE

A processing grid was defined to allow sorting to the CMP domain.
The primary ordinal number was defined to be two times the source line number and the secondary ordinal number was defined to be two times the detector line number.

X COORD	Y COORD	PRIMARY ORDINAL	SECONDARY ORDINAL
370533.25	6969116.75	9950	1950
370553.25	6959806.75	10482	1950
379003.25	6969116.75	9950	2434
379003.25	6959806.75	10482	2434

The cell size for this grid is 17.5 m x 17.5 m.

A display of the processing grid is shown below.

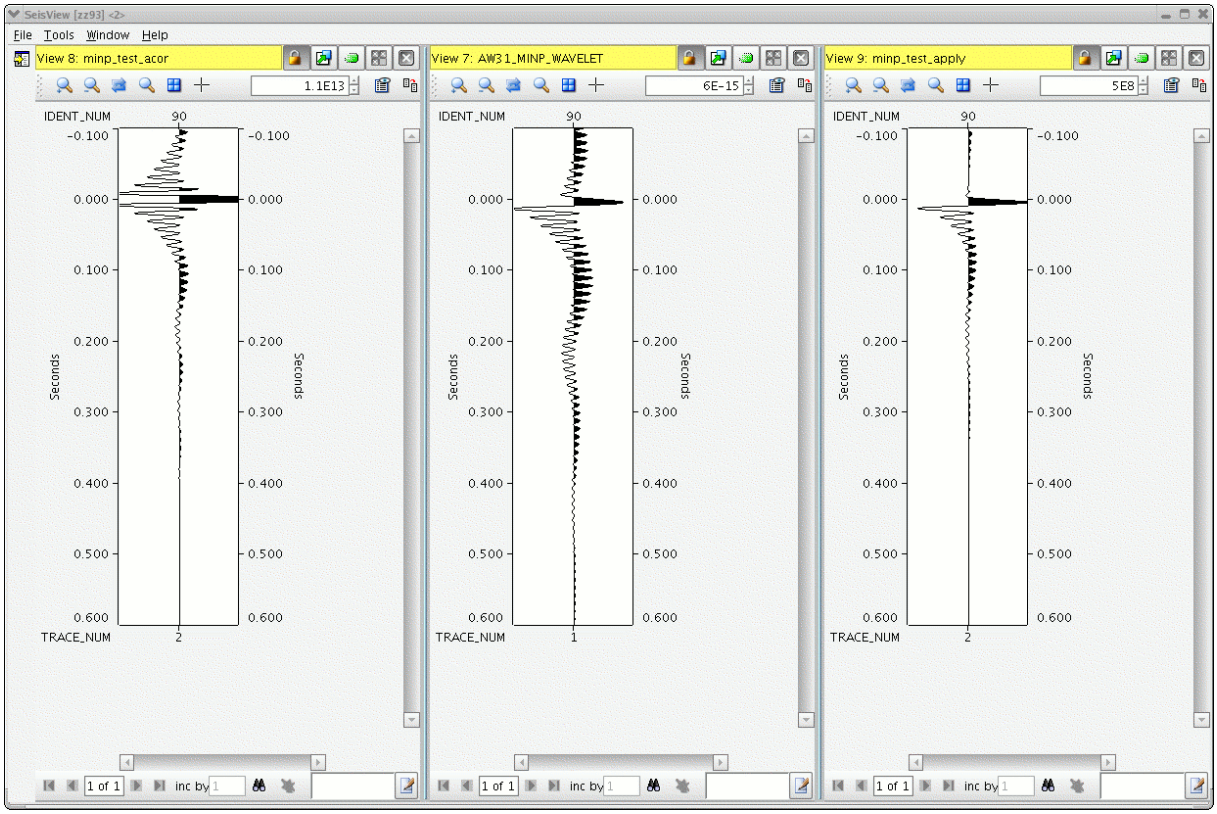


AMPLITUDE RECOVERY

Spherical Divergence Compensation & Exponential Gain 4 dB/sec was applied.

MINIMUM PHASE CONVERSION

An operator was derived from the filtered sweep trace (aux channel 2) and used to convert that data from zero to minimum phase. The autocorrelated sweep before and after the application of the operator is displayed below.



Sweep before and after minimum phase operator.

NOISE ATTENUATION

The data was sorted into the cross spread gather domain - that is a gather with a common detector line and common source line.

A very mild AAA (anomalous amplitude attenuation) was used, initially, to remove spikes or excessive noise from any traces.

3D-RNA (FX deconvolution) was then applied to reduce the random noise.

This allowed the **3D-FK** to work more effectively.

Dips of 10, 12, 15 and 20 ms/tr were evaluated. Test displays were produced on gathers and on stacked data. The test line was inline 2224.

The noise reduction increased with decreasing applied dip.

The dip selected was 10.0 ms/tr

DECONVOLUTION

Deconvolution tests were performed on the same inline as the noise attenuation tests. All tests were run using surface consistent deconvolution with a design window at the near trace of 1100 – 2600 ms. Stacks panels were produced with

1) No deconvolution
2) 80 ms spike
3) 120 ms spike
4) 160 ms spike
5) 200 ms spike

The 160 test was repeated using WesternGeco's new surface consistent deconvolution.

It was decided to use the new version surface consistent **160 ms Spiking Deconvolution.**

PRE STACK GAIN

For the residual & trim static computation processing, 500ms gates with 10% overlap were applied.

COMMON MIDPOINT SORT

The data was sorted to common midpoint order.

VELOCITY ANALYSIS

Velocities were run at 1 km intervals.
Velocity interpretation was done using WesternGeco's InVA software

MUTE

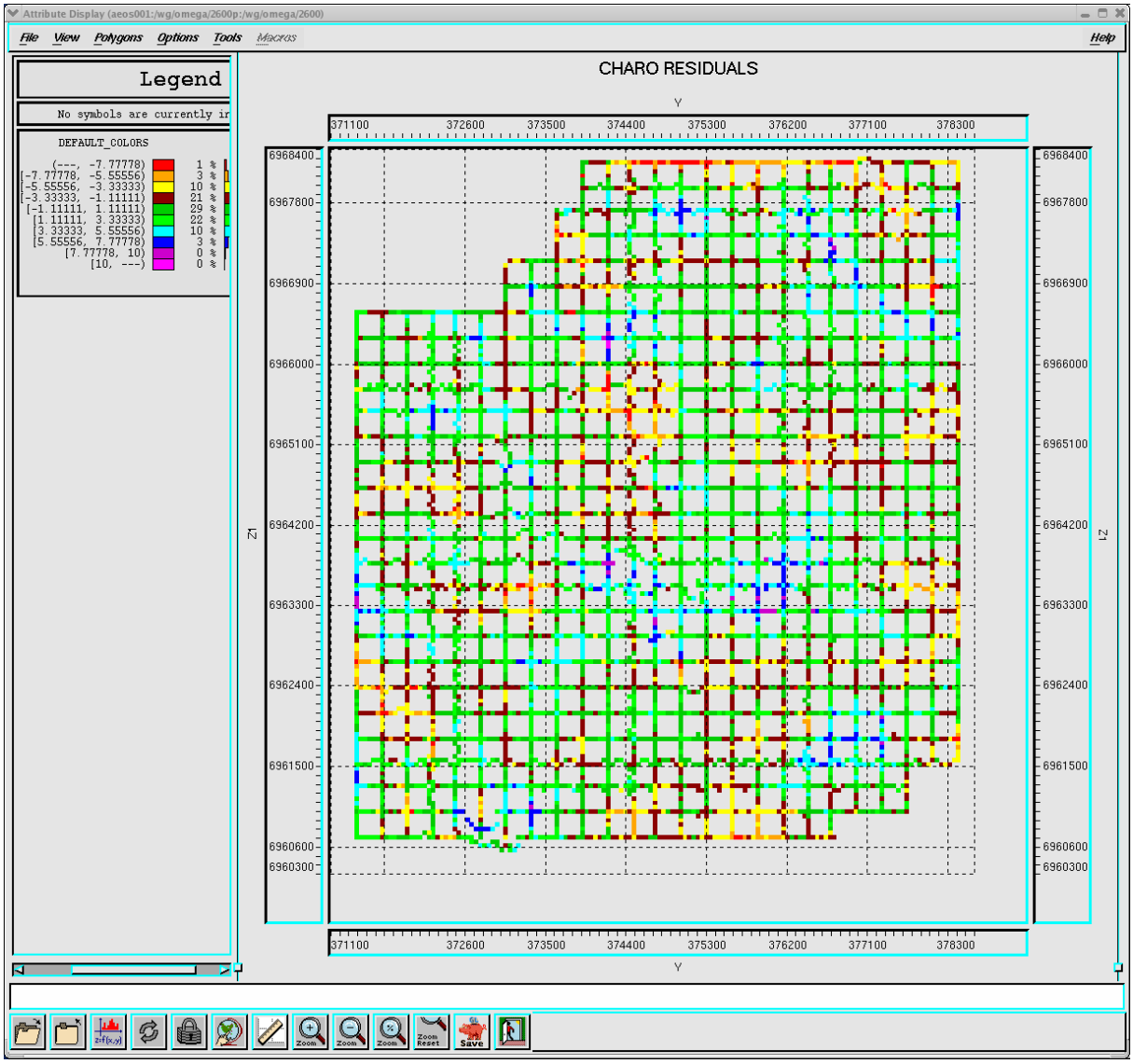
Pre Stack Mute applied

Offset (m)	Time (ms)
350	0
450	500
650	700
1450	1100
1900	1550

A brute stack was produced at this stage.

RESIDUAL STATICS

The determination of residual statics consists of two parts, the statics deviation picker and the statics computation. The picker derives reflection times and quality factors. The statics are obtained by decomposing the reflection pick times into surface consistent source and receiver statics using the Gauss-Seidel iterative algorithm. The window used for Residual Statics Analysis was, 800 – 2400 ms.



Residual statics.

VELOCITY ANALYSIS

Velocities were run at 500 m intervals.
Velocity interpretation was done using WesternGeco's InVA software

TRIM STATICS ANALYSIS

Trim Statics analysis were run over a 500 – 2400 ms window with a maximum shift of 24 ms allowed.
The trim statics were applied and the volume was stacked and a post stack migration was produced.

COMMON OFFSET GATHER

Surface consistent deconvolved data with the noise reduction was sorted into common offset gathers using a statistical equal trace distribution method.
Residual statics and the trim statics were applied.

AMPLITUDE RECOVERY

The Spherical Divergence Compensation & Exponential Gain were removed prior to the PreStack Time Migration

TIME MIGRATED VELOCITY ANALYSIS

A targeted velocity line migration was run to output fully migrated gathers along selected velocity lines. Velocities were run at 500 m intervals on these pre stack time migrated gathers. Velocity interpretation was done using WesternGeco's InVA software. The velocity field was smoothed for use in the full Kirchhoff migration.

DMO

Pre-stack Kirchhoff time migration was to be performed to fully image the dataset. However, forward and reverse DMO was applied to the offset volumes prior to migration in order to regularise the fold and place each trace at its bin-centre position i.e. all output traces at single inline aperture. It was hoped that additional potential benefits of DMO, e.g. attenuation of residual dipping noise might also occur.
Dip Moveout (DMO) is a process that attempts to take traces recorded at a non-zero offset and make them appear as if they had been recorded with zero offset. It can therefore be thought of as a prestack partial migration. After DMO has been applied several goals are achieved:
DMO was applied using the Kirchhoff integral method in the X-T domain. This method works by spreading energy from one trace to its neighbours along the DMO ellipse (the input having had NMO applied). The shape of the ellipse was computed

from a constant-velocity algorithm; truncating and tapering the ellipse produced the DMO operator that was applied along the shot-receiver azimuth.
The limbs of the DMO operator have progressively steeper dips, which results in spatial aliasing occurring at progressively lower frequencies, as one moves out along the operator. To reduce the impact of aliasing the limbs of the operator were time and space variantly high-cut filtered to remove aliased energy from the operator.
At near offsets the DMO operator can quickly reach the stage where its width is comparable to or smaller than the mid-point spacing. Where this occurs accurate amplitude treatment of the data is compromised if the spatial sampling of the operator remains at or greater than the mid-point spacing. To correct for this the operator was super-sampled (spatially) at near offsets. This option, referred to as Hi-Fi DMO, ensures accurate treatment of amplitudes even at very short offsets.

DMO relies on constructive and destructive interference of the various operators in order to formulate the output image and can be heavily influenced by the acquisition geometry of the input data. Any deficiencies in this geometry can result in:
Poor reflection amplitude and phase reconstruction.
Noise (residual energy) from irregularly sampled DMO operators within a gather.

A combination of Equalisation DMO (EQ DMO) and Spatially Unaliased DMO (FAT DMO) were used to mitigate these effects.

EQ DMO works by analysing the geometry of every trace to determine the DMO contribution being made to each and every output location, and calculating the appropriate normalisation factor. The DMO contributions can be loosely segregated into different offset ranges, dip ranges and azimuth ranges in order to fine-tune this equalisation.

In FAT DMO two sets (inline and crossline) of a 2-D modified sinc function are used to interpolate DMO contributions to cell centre. In this way, the initial DMO correction, which was along the source-receiver trajectory, is now spread to cells surrounding the trajectory. This ensures that the requirement for effective implementation of DMO - that the operator is regularly sampled at all times in all cells - is better achieved.

HOLEFILL

Each offset plane had missing traces interpolated using a post stack 2D trace interpolator in both the inline and crossline directions.

KXKY FILTER

A post stack KXKY filter was applied to each offset plane to reduce the acquisition footprint.

INVERSE DMO

The bin-centred regularised data underwent inverse DMO along the inline azimuth.

PRE STACK TIME MIGRATION

The Kirchhoff Time Migration Seismic Function Module (SFM) performs seismic time migration using the Kirchhoff summation method. The migrated image is constructed by summing weighted amplitudes along diffraction curves or curved surfaces for the 3D case. These diffraction curves are determined by two-way travel times from the surface to subsurface scatterers that are computed from the user-supplied velocity field. In prestack mode, migration is performed on common offset volumes for 3D data.
Prestack migration is achieved by migrating the sorted common-offset panels into individual zero-offset panels. During migration the traces are effectively NMO-corrected; however, inverse NMO using the migration velocity is typically applied prior to output of the data. This allows a final velocity analyses and moveout to be performed on the data prior to stacking it.

The data was moved back to the smoothed surface from the mean sea level datum

PRE STACK TIME MIGRATED VELOCITY ANALYSIS

The migrated output data was sorted to cmp order and the smoothed migration velocity field was removed. Post migration velocities were run at 500 m intervals. Velocity interpretation was done using WesternGeco's InVA software

NMO

The velocity functions were applied to the data

PRE STACK GAIN

A prestack gain was applied to the data of 500ms gates with 10% overlap.

TRIM STATICS ANALYSIS

Trim Statics analysis were run over a 500 – 2400 ms window.
The trim statics were applied and a trim stack was produced at this stage.

RADON DEMULTIPLE

A radon demultiple using a 96 pct velocity mute was tested and applied to the data.

PRE STACK TIME MIGRATED STACK
The data was stacked and subsequently shifted from the smoothed surface to the mean sea level datum.

WHITENING
A range of spectral whitening options were tested. Frequency ranges of 10-65, 10-70, 10-75 and 10-80 Hz were tested. Monk whitening was also tested. As a result of these tests it was decided to apply both a 10-75 Hz spectral whitening and monk whitening to produce two versions of the final stack.

FILTER
An 8-75 Hz post stack filter was applied.

GAIN
A post stack trace balance was applied.

ANGLE STACKS
Angle stacks were produced for approximate 0-20 degree and 20-40 degree angle ranges using the mute functions listed below.

Far angle 20-40 degree

40 degree		20 degree	
ms	m	ms	m
4	350	300	105
250	385	600	385
750	1015	1100	665
875	1155	1450	945
1400	1785	1600	1085
1525	1925	1740	1225
1700	2135	2075	1715
		2500	2065

Near angle	Full angle
0-20 degree	0-35degree+

ms	m	ms	m
0	105	0	350
300	385	500	450
1100	665	700	650
1450	945	1300	1450
1600	1085	1500	1900
1740	1225		
2075	1715		
2500	2065		

The angle stacks were also produced with monk whitening applied.

DELIVERABLES

Intermediate stacks were output in SEGY format on DVD.

Decon gathers were output in Segy format to LTO tape.

Final PSTM gathers both with and without radon were output in SEGY format to LTO tapes.

The final stack archives were produced in SEGY on DVD.

Raw final PSTM – 4 copies
Final PSTM (sw) – 4 copies
Final PSTM (monk) – 4 copies
Near angle stack – 4 copies
Far angle stack – 4 copies
Near angle stack (monk) – 4 copies
Far angle stack (monk) – 4 copies

The final velocities in text format and residual statics in text format were ftp'd.

SEGY HEADER

The following is an example of the segy ebcdic header showing the byte locations of stored trace header information.

```
*** SEGY EBCDIC HEADER ***

C01 CLIENT     : SANTOS
C02 AREA        : CHARO
C03 INLINE       : 2000-2383
C04 XLINE        : 10000-10435
C05 FINAL  STACK
C 6 SAMPLE INTERVAL  4.00   SAMPLES/TRACE  1001 BITS/IN      BYTES/SAMPLE
4
C 7 RECORDING FORMAT        FORMAT THIS REEL SEG-Y  MEASUREMENT SYSTEM
METERS
C08 SEGY BYTE LOCATIONS
C09 XCORD CELL CENTER  (I4)  81-84     YCORD CELL CENTER (I4)  85-89
C10 SOURCE STATIC  (I2)         99-100   DETECT STATIC  (I2)       101-102
C11 SOURCE RESID    (R4)        185-188 DETECT RESID  (R4)         189-192
C12 INLINE ORDINAL   (I4)       197-200 XLINE ORDINAL  (I4)       201-204
C13 SWEEP  START     HZ  END     HZ  LENGTH      MS  CHANNEL NO     TYPE
C14
C15 GRID          X                          Y         PRIM ORD     SEC ORD
C16       370533.25         6969116.25        9950           1950
C17       370533.25         6959806.25        10482          1950
C18       379003.25         6969116.25        9950           2434
C19       379003.25         6959806.25        10482          2434
C20
C21 PROCESSING PARAMETERS
C22 CONVERT FROM SEGD TO OMEGA FORMAT
C23 APPLICATION OF GEOMETRY AND GRID
C24 CONVERT TO MINIMUM PHASE  RESAMPLE TO 4MS
C25 GRIDDED UH STATICS  GAIN APPLICATION AND DESPIKE(AAA)
C26 SORT TO XSPREAD GATHERS  3D RNA
C27 3DFK - CUTS +/- 10MS PER TRACE 1750M/SEC
C28 SORT TO CMP
C29 SURFACE CONSISTENT DECON 160MS SPIKE WIN 1100-2200 NEAR TR
C30 SURFACE CONSISTENT AMP COMPENSATION  VELOCITIES 1KM SPACING
C31 RESIDUAL STATICS 1000-1900 MS WINDOW
C32 PRELIM STACK  VELOCITIES 1KM SPACING
C33 TRIM STATICS 500-2400MS WINDOW
C34 SORT TO COMMON OFFSET  TARGETED PSTM ON VELOCITY LINES
C35 MIGRATION VELOCITIES 500M SPACING  INVERSE GAIN
C36 DMO KXKY INVERSE DMO  PSTM  POST MIGRATION VELS 500M SPACING
C37 TRIM STATICS 500-2400MS WINDOW
C38 RADON 96 PCT VELOCITY MUTE
C39 SPECWHIT 10-75HZ  TRACE BALANCE
C40 END EBCDIC
```