

CPSAN14 SEISMIC SURVEY
2014 MOOMBA NORTH MICRO SEISMIC

PPL 7 & 8

SOUTH AUSTRALIA

ACQUISITION REPORT

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Santos Ltd.
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1 INTRODUCTION

1.1 GENERAL

In January and February 2014, Santos Ltd. carried out approximately 28.71 linear kilometres of 2D micro seismic imaging in South Australia's Petroleum Production Licence (PPL) 7 & 8.

The survey was wholly located on the Gidgealpa pastoral lease and was known as the CPSAN14 Moomba North Micro Seismic Survey.

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

Activity	Contractor
Line Preparation	Terrex Contracting Pty. Ltd.
Surveying	RPS Pty. Ltd.
Seismic Recording	Terrex Seismic Pty. Ltd.

Processing of the seismic data was carried out by MicroSeismic Inc (MSI) in their centre in Houston, and will be the subject of a separate report.

This report describes the data acquisition of CPSAN14 Moomba North Micro Seismic Survey, located approximately 6 kilometres northeast of the Moomba Gas Facility, in the South Australian Cooper Basin.

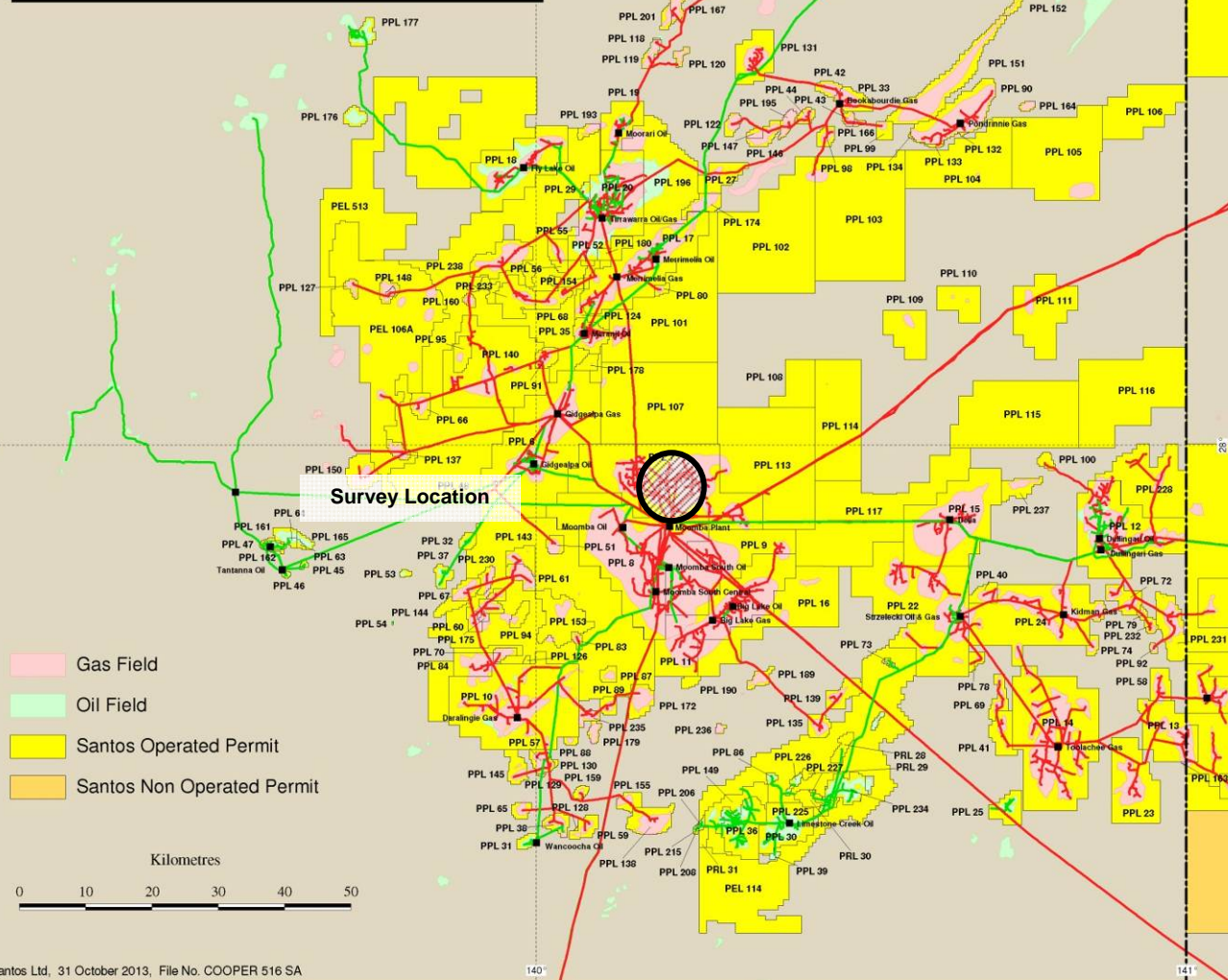
1.2 TIMETABLE OF MAIN EVENTS

Date	Activity
26/11/2013	Notice of Entry sent to Gidgealpa, Native Title claimants and other stakeholders.
29/11/2013	Notice of Intention sent to DMITRE.
9/12/2013	Updated Notice of Intention sent to DMITRE
11/01/2014	Line preparation commenced.
11/01/2014	Survey pegging commenced.
13/01/2014	Survey pegging completed.
14/01/2014	Line preparation completed.
22/01/2014	Spread layout commenced.
24/01/2014	Spread layout completed.
5/02/2014	Recording commenced. (First Frac)
16/02/2014	Recording completed.
23/02/2014	Spread pickup commenced
25/02/2014	Spread pickup completed.
25/02/2014	Line Restoration commenced.
26/02/2014	Line Restoration completed.

South Australia Cooper/Eromanga Basin

Santos

PPL 6-20, 22-25, 27, 29-33, 35-40, 51-61, 63-70, 72-75, 79-81, 83, 84, 86-92, 94, 95, 98-111, 113-117, 119, 120, 124, 126-130, 132-135, 137-140, 142-146, 148-151, 153-155, 158-166, 172, 174-180, 182-190, 193, 195, 196, 228, 230-238	Santos Ltd *	40.70%
	Dellin Petroleum Pty Ltd	20.21%
	Origin Energy Resources Limited	13.10%
	Vanguard Pty Ltd	8.51%
	Santos (NANM) Company Pty Ltd	4.75%
	Bridge Oil Development Pty Ltd	4.20%
	Alliance Petroleum Australia Pty Ltd	3.97%
	Raven Oil Pty Ltd	2.10%
	West Oil Pty Ltd	1.97%
	Santos Petroleum Pty Ltd	0.40%
Expiry Dates:		
PPL 6-20, 22-25, 27, 29-33, 35-40	Life of field	
PPL 41	# 31/12/2011	
PPL 42-48	Life of field	
PPL 51	# 31/12/2011	
PPL 52-54	Life of field	
PPL 55	# 31/12/2011	
PPL 56	31/12/2013	
PPL 57-59	Life of field	
PPL 60	25/06/2014	
PPL 61	# 17/10/2011	
PPL 63, 64	# 23/05/2012	
PPL 65	# 17/07/2012	
PPL 66	# 24/11/2012	
PPL 67	# 17/07/2012	
PPL 68-69	# 31/12/2011	
PPL 70	25/06/2014	
PPL 72	31/12/2013	
PPL 73, 74	31/12/2015	
PPL 75	26/10/2016	
PPL 78-80	31/12/2016	
PPL 81	31/10/2017	
PPL 83	31/12/2016	
PPL 84	06/06/2018	
PPL 85-92	31/12/2017	
PPL 94	08/01/2019	
PPL 95	21/05/2019	
PPL 98-100	31/12/2017	
PPL 101-111, 113-117	02/11/2018	
PPL 119, 120	31/12/2017	
PPL 124	31/12/2018	
PPL 126-128	21/07/2020	
PPL 129, 130	20/04/2020	
PPL 132-135	31/12/2019	
PPL 137	25/05/2020	
PPL 138	10/08/2020	
PPL 139, 140, 143	31/12/2019	
PPL 144, 145	10/08/2020	
PPL 146	31/12/2019	
PPL 148	10/08/2020	
PPL 149	31/12/2019	
PPL 150	10/08/2020	
PPL 151, 153, 154	31/12/2019	
PPL 155	10/08/2020	
PPL 159, 160	22/07/2020	
PPL 161, 162	08/08/2020	
PPL 163, 164	31/12/2019	
PPL 165	26/08/2020	
PPL 166	31/12/2019	
PPL 172, 174, 180, 189-190, 193, 195, 196, 228, 230-238	Life of field	
PPL 26, 76, 77, 116, 121-123, 125, 131, 136, 147, 152, 156, 158, 167, 169, 171, 184, 201, 229	Vanguard P.L.	43.750%
	Santos Ltd *	25.600%
	Dellin Petroleum P.L.	17.140%
	Origin Energy Res Ltd	10.540%
	Santos (NANM) Company P.L.	2.970%
Expiry Dates:		
PPL 26	Life of field	
PPL 76, 77	26/10/2016	
PPL 116, 121	26/05/2019	
PPL 122, 123	23/09/2019	
PPL 125	11/02/2020	
PPL 136	20/04/2020	
PPL 147, 156	10/08/2020	
PPL 152	31/12/2019	
PPL 158	08/08/2020	
PPL 167	02/09/2020	
PPL 182, 187, 194, 201, 229	Life of field	
PPL 206, 208, 215	Santos Ltd *	65.00%
	Stuart Petroleum Ltd	35.00%
Expiry Dates:		
PPL 206, 208, 215	Life of field	
PEL 100	Stuart Petroleum P.L.	50.000%
	Santos Ltd *	28.835%
	Cooper Energy Ltd	19.165%
	Victoria Oil Expl (1977) P.L.	5.000%
Expiry Date:		
PEL 100	# 06/03/2016	
PEL 106A	Santos Ltd *	60.00%
	Drillsearch G.L.B. P.L.	40.00%
Expiry Date:		
PEL 106A	# 08/10/2014	
PEL 114	Santos Ltd *	100.00%
Expiry Dates:		
PEL 114	21/07/2014	
PPL 225, 226, 227	Life of field	
PPL 28	09/09/2017	
PPL 29, 30	10/10/2017	
PPL 31	07/01/2018	
PEL 513	Santos Ltd *	60.00%
	Drillsearch G.L.B. P.L.	40.00%
Expiry Date:		
PEL 513	# 10/10/2017	
@ Subject to approvals # Ratemaking * Operator Blue text Santos Group Interest		
Total Gross Acreage		297.3 km ²
Non-Operated		8.626 km ²



2 SURVEY SCOPE AND OBJECTIVES

This survey comprised surface microseismic monitoring over the Moomba North portion of the Moomba Field, in the SA FFA Cooper Basin JV, to monitor the microseismic events instigated by downhole fracture stimulation operations in the 4 wells of the Moomba North Multi-Well Pad (Moomba 198, 199, 200, 201). Target reservoirs exist in the Toolachee/Daralingie Formation, Epsilon Formation, Patchawarra Formation and Tirrawarra Formation.

OBJECTIVES:

The Moomba North Surface Microseismic Survey will use large surface geophone arrays to monitor the microseismic events instigated by downhole fracture stimulation operations in the 4 wells of the Moomba North multi-well pad.

The objectives are

- to detect and accurately locate microseismic events instigated by frac operations to further our understanding of frac geometry and hence improve completion efficiency through frac model calibration, target selection and frac design
- to confirm that surface microseismic technology can be used as a cost-effective way to monitor microseismic events, particularly in the Patchawarra Formation of the Moomba Field, as an alternative to borehole monitoring, with minimal impact on multi-well pad simultaneous operations (SIMOPS).

SCOPE:

The project scope includes microseismic data acquisition, processing and interpretation to:

- Investigate fracture propagation geometry to improve fracture stimulation design and reservoir completion efficiency
- Integrate with extensive logging, coring, RCA & SCAL to enhance understanding of rock properties especially within the Patchawarra Fm.

The multi-well pad operation provides an opportunity to acquire an extensive microseismic data set, monitoring up to 30 frac stages in 4 wells (av 7 fracs/well). A successful survey will:

- provide an understanding of frac development within the Patchawarra and shallower target formations
- contribute to an optimum field development plan
- support the conversion of contingent resource to reserve bookings.

3 DATA ACQUISITION

3.1 PERMITTING

3.1.1 GENERAL

The programme was located wholly within the boundary of the Gidgealpa 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 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.), before field operations commenced.

3.2 LOGISTICS AND COMMUNICATIONS

Terrex Contracting & RPS mobilised to the prospect arriving on the 4th January 2014. Terrex Contracting established a mobile camp providing messing and accommodation for Terrex personnel. RPS personnel provided their own office and accommodation vans to supplement those provided in the Terrex camp.

Terrex Seismic mobilised to the prospect from Brisbane arriving on the 17th January 2014. They were initially accommodated in Santos Moomba camp however at times personnel were required to move to Innamincka due to the Moomba camp being full from previous bookings. Senior management of Terrex Seismic was located in Perth and Brisbane.

Terrex Seismic supplies and freight was road transported to Moomba by the crew. Any additional supplies were delivered to Moomba and then transported by the Terrex supply truck to the crew.

General rubbish was disposed of in Moomba.

Crew change flights were commercial flights in and out of the Moomba airstrip on an as needs basis.

3.3 SURVEYING

3.3.1 GENERAL

Horizontal and vertical surveying of seismic lines, using Trimble GPS receivers and ancillary equipment, was carried out by RPS Australia East Pty Ltd. A total of two survey personnel were utilised throughout the survey effort. This comprised one senior surveyor and one GPS operator for the duration of the survey.

Surveying commenced on the 11th January, the same day that line preparation commenced.

The senior surveyor had a dual role, being responsible for the overall surveying task and also for coordinating the line preparation effort. Duties included the loading of files into the bulldozers on-board GPS, initiating random field checks and maintaining the survey data base. Initial work included the verification of existing survey control and the establishment of a GPS base station within the 2D grid.

Mapping of petroleum and pastoral infrastructure including pipelines, roads, tracks and fences was an early priority. Another was to install and determine the coordinates of

Environmental Monitor Points (EMP's) selected and photographed by the client representative.

Office duties included the QC of all survey data, the compilation of daily survey and line preparation reports and the preparation of 'as surveyed' maps for the field crews.

The GPS operator was responsible for chaining, pegging and surveying all geophone stations within the tolerances specified by Santos. They were also responsible for effecting survey ties to old survey permanent markers to verify the accuracy of the earlier surveys.

RPS used Trimble R7 GPS and Trimble R7 GNSS receivers and TSC2 / TSC3 survey controllers. These are dual frequency receivers enabling very fast and reliable initialisations. Coupled with Trimble TSC2/3 survey controllers, the system is very efficient and user friendly. Repeater stations were installed when the signal from the base was weak or degraded.

Receiver stations were set-out and surveyed using the 'real time' kinematic (RTK) GPS method. Prior to commencing work the design coordinates of all stations were calculated and loaded into the Trimble TSCe survey controllers used by the GPS operators. Lines were then driven and each station chained and surveyed by reference to its coordinates and pegged within the clients specified cross-line and in-line tolerances. As each station was pegged the X, Y and Z values were computed with reference to the WGS 84 datum and stored in the controller. Geophone stations were pegged at 30m intervals respectively. Numbered wooden pegs and pin flags were used to mark these stations.

Station coordinates were downloaded daily from the TSCe controllers, QC'd in Dynamic Survey Solution's (Trimble owned company) GPSeismic software and transformed from WGS 84 to the Geocentric Datum of Australia (GDA) and the positional data output as MGA coordinates, Zone 54, central meridian 141° 00'E. Ellipsoid heights were converted to the Australian Height Datum (AHD) using the Ausgeoid 98 separation model.

The final survey data was exported directly to mapping software (ArcGIS 10). 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 10 which enabled the crew to visually monitor daily production and produce up to date progress maps, recording access maps and swath maps for the vibrator operators.

'As surveyed' maps were printed for distribution to the vibrator operators and recording line crew. To assist these crews, roads, tracks, infrastructure, hand carry sections, detours, cultural heritage detours and no-go zones were included on the colour coded maps. Final survey data was forwarded to both Terrex Seismic and Santos Limited.

3.3.2 OPERATIONS

Mobilisation to site was completed on the 4th January. Prior to commencing work on the Moomba North MS project, the crew commenced the Roswell MS project. The two projects were very close to each other and operated out of the same camp following on from each other. Inductions for the Moomba North MS survey were completed on the morning of 5th January. The survey was completed utilising 1 dozer and 1 grader. All machines had GPS navigation installed prior to commencing work. Line preparation on the Moomba North MS survey commenced on the morning of 11th January.

Dozing progressed at a good rate with the grader and survey pegging close behind.

There were few hand carry sections during the survey – mainly on sections of pipeline.

One RTK base station was required during the Moomba North Micro seismic survey. It was established at an existing well benchmark at the Moomba #141 well site.

The GPS operators staked out a total of 967 receiver points over 10 receiver lines at a 30m group interval. The total of 29.01 linear km of line was completed in 3 days to give an average productivity rate of 9.67km/day.

The survey crew finished on the 13th January, a day before line grading was completed.

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

3.4 CULTURAL HERITAGE CLEARANCE

The Moomba North Micro Seismic survey was wholly within the Yandruwandha / Yawarrawarrka (YY) native title area.

Santos Limited has a long term agreement with the Native Title claimants where we abide by certain terms and conditions detailed in a jointly agreed Cultural Heritage Management Plan (CHMP). In particular, Santos Limited was to bear the cost of claimant representatives to inspect the proposed survey area in advance of any on ground activities commencing.

The YY provided a clearance team who was assisted by Mike Madey, the Santos Cultural Heritage Supervisor based in Moomba. The clearance was completed on the 10th January.

The clearance identified a number of sites (2) that had exclusion zones placed around them and detours prepared.

Prior to any work line preparation work commencing, a cultural heritage and site induction were conducted by Mike Madey (Santos Cultural Heritage Supervisor).

3.5 LINE PREPARATION

3.5.1 EQUIPMENT

Line preparation was carried out by Terrex Contracting who supplied a total of four (4) personnel throughout the survey effort, including those for crew rotation. Terrex Contracting supplied the following equipment:

- 1 x Komatsu D65EX bulldozers
- 1 x John Deere 772D 6x6 grader
- 2 x 4x4 Toyota support vehicles
- 1 x Prime Mover and Low loader
- 1 x Accommodation Trailer
- 1 x Sleeper / Coldroom Trailer
- 1 x Shower / Laundry Trailer
- 1 x Ablutions Trailer
- 1 x Workshop trailer
- 1 x Water tank truck
- 1 x Fuel Tanker truck
- 1 x Ablutions Trailer
- 2 x Prime Movers

3.5.2 OPERATIONS

The Terrex Contracting operators mobilised into camp on the 4th January 2014. On the 5th January a 'Greenfield' permit was obtained, site inductions completed and the JHA reviewed and signed off by all TC and RPS personnel. Line preparation commenced later that morning.

RPS provided the GPS navigational equipment in the bulldozer and grader. This equipment basically guided the dozer operator along a lines designed course without the need for any material aids. To do this, start and end coordinates of source and receiver lines were loaded into the on-board Garmin 172C GPS receiver. The operator merely called up the lines unique number and a line joining its end points was displayed on a dash mounted navigation screen. Also displayed, were previously recorded cultural heritage sites, cultural heritage exclusions, pipelines and their associated 'No Go' zones, wells and pastoral infrastructure.

During preparation, the machines actual position relative to this line was graphically displayed in real time. Its distance in metres right or left of line was also displayed. The operator was free to weave around rocky terrain, trees, and other substantial vegetation and generally weave to break the line of site. However, operators were specifically requested, where possible, to keep weaving within a ± 10 metre tolerance.

As part of the line preparation, the grader prepared a shallow v shaped trench along the side of the prepared line for the line crew to bury the geophones.

In addition to the micro seismic lines, a number of older vintage seismic lines were re-opened as access between micro seismic line ends. This was only done if no road access was available.

Line preparation progressed at a good rate, the main obstacle being a number of pipeline crossings that had to be detoured.

3.5.3 PRODUCTION

Line preparation (dozing) operations took 2 days to complete at an average of 14.35km per day. All line preparation activities were concluded on the 14th January.

Line Preparation Statistics

Total Kilometres prepared:	28.71
Dozer Hours:	12.25
Grader Hours:	25.25
Production Days:	2
Dozer Km per Hour:	2.34

3.6 RECORDING

3.6.1 RECORDING PARAMETERS

Instrumentation

Instruments	: Sercel 428XL – 24 bit.
No. Channels	: 1420
Tape Format	: SEG-D, 8058 IEEE Demultiplexed, LTO 2 Dual Drive Recorded
Filters	: Hi-cut 200hz. (No Lo Cut)
Sample Rate	: 2 ms
Record Length	: Continuous recording
RTC	: Yes

Receivers

Group Interval	: 30m
Geophones	: Sensor SM24 10 Hz Hi spec super phones.
Spread	: up to 127 ch per receiver line.
No. per string	: 12 phones in line 2.5 m. spacing, centred on station.

Recording parameters are detailed in the Terrex Seismic Operations Report. A copy of this report is attached as Appendix 2.

3.6.2 OPERATIONS

The survey area falls within a dunefield land system. The dune field is characterised by a series of north – south trending, sub-parallel dunes separated by swales that vary from a hundred to several thousand metres in width. Vegetation was mainly Spinifex on dunes with areas of saltbush and native grasses on the flats.

The Moomba North Microseismic was carried out to assist in evaluating the efficiency of hydraulic fracturing operations on the Moomba North multi-well pad, consisting of Wells 198, 199, 200 and 201. These wells were angle-drilled from the same pad and fractured in the Patchawarra formation. Since a number of operations were being carried out concurrently, this was conducted as a SIMOPS operation under the direction of a Site Integration Leader or SIL.

Two Microseismic operations were planned on adjoining sites – the Moomba North site as described and the Roswell site. Since there was a good chance of the frac operations overlapping, the star spreads for both wells were laid out in preparation. As it happened, the Roswell frac took place after the Moomba North frac but since the Roswell spread was laid out and ready, this spread was recorded also.

Lines were laid out in a conventional manner except that the phones were buried in the trenches dug by the grader and cables were connected in the hub of the star spread using cables and repeaters. A geophone was taped to the well head to give perforation breaks and in addition an induction loop was attached to the perforation firing line off the logging truck to give an impulse break on firing.

The SIMOPS field clerk produced a spread sheet each day, logging the frac and perforation times. This of course was only available at the end of the day and presented a problem for the observers in that they had to annotate their logs post-recording, which was time consuming. Often the times given by the field clerk did not correspond to events seen by the observers on the monitors. This was addressed by discussions with the field clerk and Santos perforation engineer and times were then more accurately reported.

The original concept had been to have the recording truck in contact with the frac van by radio. However, the handheld radios used on site were low power and did not have sufficient range to reach the recording truck. To get around this, the mobile radio from the Santos QC truck was modified with the well site frequencies and then set up in the recording truck. This went some way to filling the communications gap. However, it seemed to be the consensus of all drilling personnel that the optimum way to maintain a good information flow between the frac van and the recording truck is to have a seismic person in the frac van relaying information.

For initial layout, a crew of 8 personnel were used. As soon as layout was completed, four of the line crew were sent off site and recording continued with two observers and four line boss/trouble shooters, half on dayshift and half on night shift. The crew turnover was 0600 and 1800 each day.

The recording truck was set up at the Roswell access campsite and linked by transverse lines to both star spreads. The spread held up reasonably well although a good deal of battery changing was required. This was put down to the poor condition of a number of the sealed units. The flooded-cell batteries seemed to hold up better. The observers reported that the battery charging facilities were not optimum and would be improved on future operations.

Acquisition commenced on the Moomba North Micro Seismic survey with the first frac on the 5th February. Operations continued on a 24hr a day basis until the final frac was completed on the 16th February. The recording spread however stayed on the ground for the recording of the Roswell Micro Seismic survey. The Moomba North spread was picked finally up between the 23rd and 25th of February.

Recording services were provided on an hourly basis. The following statistics include the chargeable time related to actual recording operations. Since the recording was on a 24 hours basis and no spread was moved, hour categories are basic.

Recording Project Statistics	
Spread length	28.71km
Profiles recorded	Approx 30,000 files recorded
Work Hrs	403.0
Standby Hrs	40.0
Non-Charge Hrs	22.0

3.6.3 HEALTH & SAFETY

This program was conducted in the months of January and February. Temperatures varied between hot to very hot. Winds were predominantly light with variable direction on most days, but occasional moderate to fresh winds were recorded.

There were no Lost Time Incidents (LTIs) recorded during the survey however there was one MTI for a heat related illness.

All rubbish and waste material, including tyres, scrap metal and batteries, was segregated on site then disposed of at the Moomba waste depot. The disposal of effluent water from the two campsites, kitchens and toilets was managed by Veolia Environmental Services.

Daily Toolbox and weekly Safety meetings were held by all contractors involved with this survey. Minutes of Toolbox and the weekly Safety meetings were forwarded to Santos Limited.

3.7 WEATHERING SURVEY

3.7.1 GENERAL

No weathering survey was acquired.

3.8 ENVIRONMENT

3.8.1 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 “Santos Operations Geophysics SEO Arid Areas July 2012”, and “South Australia Cooper Basin & Arid Regions Environmental Impact Report: Geophysical Operations” Santos Ltd, July 2012.

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 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.

3.8.2 OPERATIONAL OBSERVATIONS

The Moomba North Micro-seismic survey is located in the semi arid region of northeast South Australia, approximately 6km east of the Moomba Gas facility. The area can be accessed via the Moomba-Della road.

The survey area falls within a dunefield land system. The dune field is characterised by a series of north – south trending, sub-parallel dunes separated by swales that vary from a hundred to several thousand metres in width. The dunes range in height from 5m to 15m above the general base level. Inter-dunal swales are generally of a sandy nature however small claypans sometime occupy the lowest points.

Sand dune vegetation is dominated by Canegrass which often form dense colonies on the lower dune slopes and sand terraces but thin towards the dune crests. Sub-ordinate are localised colonies of Spinifex. Whitewood and Marpoo also occur on the lower dune slopes but are very widely scattered and rarely form stands or colonies of any substance.

In the sandy swales Prickly Wattle, Emu Bush and to a lesser extent, Needlewood are the dominate shrubs while Swamp Canegrass, Saltbush are the common shrubs in the clay rich swales that occur at lower elevations. Ruby Saltbush occurs in swales throughout the area but exhibit a preference for a sandy habitat.

Open clay flats supported little vegetation other than Bindii and the occasional stunted saltbush.

The survey falls entirely within the Gidgealpa Pastoral Lease, and as such, is extensively grazed by cattle. The area has also been the subject of previous seismic surveys dating as far back to 1960 which has resulted in the drilling for, the discovery of and the subsequent production of natural gas and oil.

3.8.3 RESTORATION

Following completion of recording activities and recovery of all equipment, restoration activities were undertaken. Two personnel and a grader mobilised back to the survey area on the 24th February. Restoration of the lines was commenced on the 25th February and completed on the 26th February.

Restoration of lines included knocking down windows where required and 2 grader passes along each line to back fill the geophone trench. Where required, road/track verges were also reinstated to discourage third parties from accessing the lines.

APPENDIX 1 – RPS FINAL OPERATIONS REPORT



PROSPECT REPORT
CPSANI4
MOOMBA NORTH MICRO SEISMIC SURVEY
FOR SANTOS LTD
JANUARY 2014

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Appendix A – Survey Network Stations

Appendix B – Well Benchmark Ties

Appendix C – ITRF Control Ties

Appendix D – Control Map

Appendix E – Prospect Map

Appendix F – Environmental Photo Points

Appendix G – CD attached to hardcopy report containing all program maps, reports, spreadsheets and survey data.

I Introduction

RPS was contracted by Santos Ltd to carry out survey operations on the Roswell and Moomba North Micro Seismic surveys operated by Santos Ltd. This report covers the involvement of RPS in the Moomba North Micro Seismic survey. Terrex Seismic (Crew 402) was the seismic acquisition contractor. The prospect was located approximately 6Km north east of Moomba in North East South Australia. A new multi well pad (Moomba #198 - #201) was in the centre of the prospect. The prospect fell in the following petroleum leases: PPLs 7 and 8. The survey was carried out after the completion of the Roswell Micro Seismic survey.

The receiver station interval was 30.0m. There were ten lines located radially around Moomba #200 well. Total length of lines was 28.71Km. Section 1.2 contains line listings.

RPS used two personnel and two vehicles during the survey. The crew consisted of two senior surveyors. The small crew number was due to the small size of the prospect.

Terrex Contracting (TC Crew 1) were contracted to carry out the line preparation. They utilised one bulldozer and one grader. They supplied camp facilities for the survey crew. RPS supplied an office / sleeper (3 beds) caravan. RPS was supplied power, meals and showers by Terrex Contracting. All RPS rooms were designated as single rooms although each had a second bunk installed (used for storage).

The Moomba North Micro Seismic survey prospect fell within the Yandruwandha / Yawarrawarrka (Y/Y) native title claim area. Cultural Heritage clearance was carried out by the YY group assisted by Mike Madey (Santos Cultural Heritage supervisor). They pre-cleared the prospect prior to the crew commencing work. Site locations and directions were passed onto the crew by Mike Madey.

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. All line survey work was carried out using Trimble dual frequency "real time kinematic" (RTK) GPS receivers.

.

1.1 Survey Design

The Moomba North Micro Seismic survey was a radial micro seismic survey to be recorded during the hydraulic fracturing process taking place at Moomba #198 - #201 multi well pad. There was no conventional seismic source (vibrators) used during the survey. The radial survey consisted of 10 lines radiating out from Moomba #200 with each line starting approximately 305m from the well location. The line lengths ranged from 2.76Km to 2.91Km. All lines started at station 1000 at the well end of the line. The station interval was 30m. A prospect map is included in Appendix E.

1.2 Line Lengths

Receiver Lines:

Line	Line Brg	Start	End	Kms
CPSAN14-01	0°	1000	1097	2.91
CPSAN14-02	36°	1000	1096	2.88
CPSAN14-03	72°	1000	1096	2.88
CPSAN14-04	108°	1000	1092	2.76
CPSAN14-05	144°	1000	1096	2.88
CPSAN14-06	180°	1000	1096	2.88
CPSAN14-07	216°	1000	1096	2.88
CPSAN14-08	252°	1000	1096	2.88
CPSAN14-09	288°	1000	1096	2.88
CPSAN14-10	326°	1000	1096	2.88
			Total:	28.71Km

2 Terrain and Logistics

2.1 Terrain and Vegetation

Due to the small area of the prospect there was a little variety in the terrain and vegetation encountered during the Moomba North Micro Seismic survey. The majority of the prospect was flat crabhole floodplain country with a moderate covering of saltbush, small shrubs and grasses. There were areas of dune field terrain in the north east, north and north west. The dune field terrain had occasional whitewood trees, smaller shrubs (e.g. marpoo) and light grasses.



Photo 1: CPSAN14-04 Stn 1022 Looking west (towards well)



Photo 2: CPSAN14-06 Stn 1074 Looking south

2.2 Logistics

RPS commenced mobilisation to the Roswell and Moomba North Micro Seismic surveys on 3rd January 2014 with Eric Amedee and Will MacDonald departing Toowoomba in two Toyota utilities towing the survey office caravan / sleeper and equipment trailer. They spent the first night in Cunnamulla. The next morning they travelled to the Terrex Contracting camp site via Ballera and Innamincka. Upon arrival they set up the caravan and staging area. They also set up the GPS unit in the dozer. Eric Amedee and Rob Pugno completed a JHA for the line preparation and survey that evening. Tony Kenny (Santos Representative) was already on site organising the work permits for the survey.

On the morning of 5th January 2014 Mike Madey (Santos Cultural Heritage Supervisor) conducted a cultural heritage induction for all crew members. This was followed by a site induction conducted by Tony Kenny. Once a Greenfields permit was issued line preparation and survey commenced on the first of the two surveys, the Roswell Micro Seismic Survey, which was completed on the 9th January.

The survey crew then went on standby awaiting Cultural Heritage clearance to be done at Moomba North and for a Greenfields permit to be issued. Cultural Heritage clearance was completed on 10th January and a Greenfields permit was issued for Moomba North on the morning of 11th January.

Dozing and grading were completed on 12th January. The grader then commenced grading a trench for the geophones – this was completed on the morning of 14th January. The line preparation crew additionally prepared approximately 13.6km of access tracks which were made up of joins between the ends of many of the lines and detours around pipelines.

RPS commenced survey commenced line fieldwork on 11th January and completed the survey on 13th January. Will MacDonald completed the vehicular survey field work while Eric Amedee completed the sections of line which required backpacking. Eric Amedee also carried out mapping, scouted lines, took environmental photo points and processed data.

There were no delays due to wet weather during the survey. The only delay was while the crew waited for the Greenfields Permit to be issued by Santos. This period commenced at the end of the Roswell survey on 8th January and finished on the morning of 11th January.

One RTK base station (ROS1) was required during the Moomba North Micro Seismic survey. It was established at the camp location. A repeater was used to extend range and pick up any points missed due to loss of radio link.

At the completion of the survey the crew prepared the camp for demobilisation which commenced on 15th January. The survey office / sleeper caravan was left at Ballera at the cultural heritage yard. Will MacDonald returned to Toowoomba with the trailer. Eric Amedee remained on site (for Santos) until 18th January to assist with the recording crew start up. He then demobilised to Toowoomba.

2.3 Camp Locations

One camp site was used at Moomba North Micro Seismic survey. It was located on the eastern side of the rig road to Roswell #2 well site, approximately 2.7Km south of the Moomba-Della Road. It was reasonably central to both Roswell and Moomba North surveys. There was good access to all parts of the prospect from this location and good radio and telephone reception. The camp site was chosen and cleared by Santos cultural heritage personnel prior to the arrival of the crew.

Camp water was sourced from Moomba. Kitchen water and sewerage from the toilets were collected by Veolia and disposed of in Moomba. Camp rubbish was taken to Moomba.

The camp location was used as a staging area by the Terrex recording crew.

Site	Easting	Northing	Description
Camp 1	431730	6889250	Located on east side of Roswell access road.



Photo 3: Example of geophone trench on CPSAN14-02

3 Personnel and Equipment

3.1 Survey Personnel

The RPS crew consisted of two Senior Surveyors. Both were experienced seismic hands. The following is a list of personnel utilized during the survey:

Duties	Name
Senior Surveyor	Eric Amedee
Senior Surveyor	Will MacDonald

3.2 Line Preparation Personnel

The following is a list of personnel utilized by Terrex Contracting Crew 1 during the survey: -

Duties	Name
Camp Manager / Operator	Rob Pugno
Mechanic / Operator	Mike Carter
Cook	Allain Homeshaw
Operator	Jake Cameron

3.3 Survey Equipment

The following survey equipment was used during the Moomba North Micro Seismic Survey:

Line Pointing	1 Toyota Landcruiser utility
	1 Motion table PC / field mapping unit
	1 Garmin GLO Bluetooth GPS receiver
	1 Garmin 172C GPS receiver
	1 Garmin Montana GPS receiver
Survey	1 Toyota Landcruiser utility
	1 Trimble R7 GNSS Base GPS receiver kit
	2 Trimble R7 GNSS GPS receivers
	1 Pacific Crest HPB 450 base modem
	2 Trimble TSC3 survey controllers
	1 Garmin 276C GPS receiver
	1 Dell Precision M6500 notebook computer
	1 GPSeismic Processing software package
	1 ArcGIS 10 software package
	1 Trimble Business Centre network software
	1 Canon iX5000 A3 colour printer
	1 Iridium Satellite telephone
	1 Sleeper / office caravan (3 x single room)
	1 Heavy duty dual axle box trailer

3.4 Line Preparation Equipment

The following line preparation equipment was used by Terrex Contracting Crew 1 during the Moomba North Micro Seismic survey:

Equipment
1 Komatsu D65 dozer
1 John Deere grader
1 Kitchen / diner trailer
1 Accommodation trailer
1 Sleeper (cook) / coldroom trailer
1 Workshop / Stores trailer
1 Shower / laundry / generator trailer
1 trailer with two toilets
1 Utility truck
2 Prime movers
1 Water tank truck
1 Fuel tanker truck
2 Support 4x4 vehicles
1 VSAT Data / telephone system
1 Satellite telephone

4 Surveying Methods

4.1 Survey datums

The survey datum for Moomba North Micro Seismic survey 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 no transformation between GDA 94 and WGS84 was applied. Note that for higher accuracy work a 14 parameter transformation can be 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 v1.06, a free datum transformation programme developed by the NSW Land Information Group.

4.2 Survey Control

The control for the prospect area was established using GPS static techniques. The datum for the survey was benchmark MOO141A located at Moomba #141 well. This point was held fixed for the network adjustment. The control survey was carried out on 5th January 2014. The Map Grid of Australia (MGA94) coordinates and AHD height for MOO141A are as follows:

Station	East	North	Elevation	Remarks
BM MOO141A	427736.309	6894579.396	46.731	Moomba #141

Note that the coordinates listed above are derived from the well sketch for Moomba #196 which has updated coordinates for the BMs at Moomba #141.

A listing of survey network points is included in Appendix A. Well benchmark ties are listed in Appendix B. ITRF (Auspos) ties are listed in Appendix C. A control network map is included in Appendix D.

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 Business Centre software was used to process static baselines and do network adjustments on the survey control network. This verified the integrity of the network. Data recorded at MOO141A benchmark and ROS1 RTK base station were sent to GeoScience Australia's Auspos website for processing as a check on the quality of the Santos control data. The results of the ties are contained in Appendix E.

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 15 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.

RPS used Trimble R7 GPS GNSS receivers and TSC3 survey controllers. These GPS units are dual frequency receivers enabling very fast and reliable initialisations. Coupled with Trimble TSC3 survey controllers, the system is very efficient and user friendly.

4.4 Permanent Markers

For the Moomba North Micro Seismic survey the survey crew did not establish any new permanent markers.

4.5 Data Processing and Quality Control

Real Time Kinematic (RTK) stakeout position data was collected in Trimble TSC3 Survey Controllers in WGS 84 format and downloaded into Trimble's GPSeismic processing 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 GPSQL and the results exported directly to mapping software (ArcGIS 10) 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 10 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

RPS surveyors scouted the prospect to map fences, gates, tracks, pipelines and any other features pertinent to crew operations. Using this information combined with that supplied by Santos it was possible to supply accurate prospect maps to the crew. These maps also included hand carry locations, access tracks and swath numbers. These maps were supplied to the recording crew in pdf format. The recording crew office had an A3 format colour printer.

5 Line Preparation

Terrex Contracting carried out the line preparation on the Moomba North Micro Seismic survey. Terrex Contracting supplied one bulldozer, one grader and camp facilities.

The line preparation equipment and refuelling vehicles had UHF radios installed to enable communications with the dozer pointer and camp. RPS and Terrex Contracting each had a UHF radio set up in their respective offices to enable communications between camp and field vehicles. The dozer pointer had a satellite phone with him to enable communication to camp in an emergency.

All line preparation was carried out under a Greenfields permit issued by the area supervisor at Moomba Central Fields. No excavation permit was required for Moomba North Micro Seismic survey.

The grader had extra work to do grading a 10-15cm deep trench for the line crew to put the geophones into so that they could be buried.

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 receiver mounted in the dozer. The machine operator 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. The pipelines had a 50m exclusion zone displayed on the GPS to ensure the dozers stayed outside this distance from pipelines.

As well the grader had a Garmin GPS unit (276C) installed. This enabled the grader operator to know exactly where they were at all times and ensured they did not encroach on any pipeline or Cultural Heritage site exclusion zones.

5.2 Environmental Monitoring

Ten environmental photo points were recorded on the Moomba North prospect. One photo point was selected for each line. Eric Amedee took all before and after line preparation photographs. The Santos representative (Tony Kenny) took all post recording photos.

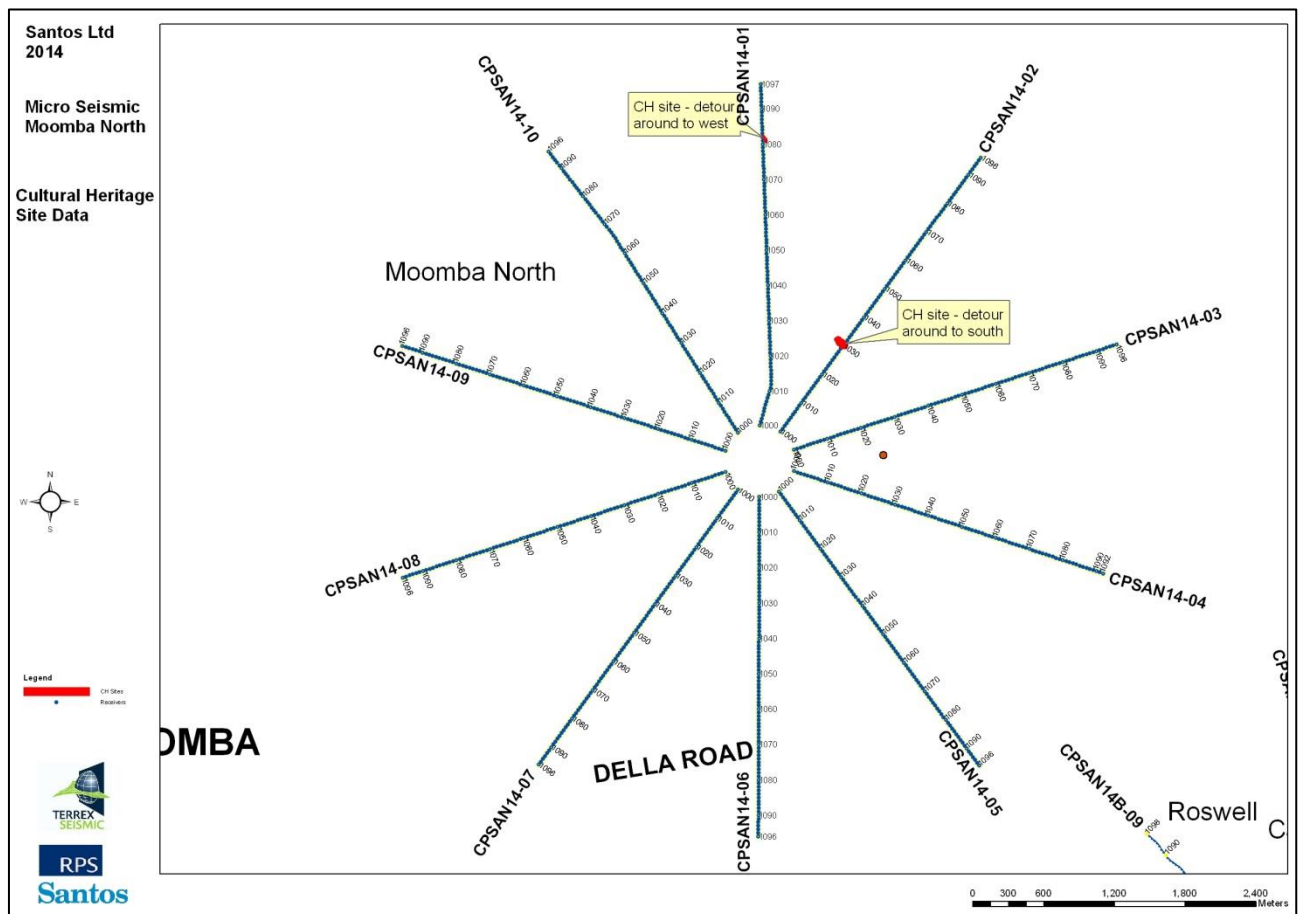
Appendix F contains a map and listing of the photo points.

5.3 Cultural Heritage Clearance

The Moomba North Micro Seismic survey prospect fell in Yandruwandha / Yawarrawarrka (YY) native title area. The area was pre-scouted by a team from the YY group assisted by Mike Madey (Santos Cultural Heritage Supervisor). Upon completion reports were compiled with details of any site areas to be avoided and directions for doing so. This data was imported into the survey GIS and loaded into the line preparation GPS units. The operators were also given detailed maps and information on the sites. The Senior Surveyor checked sites ahead of the dozers to make sure marker pegs were still in place and proposed detours could be followed.

Mike Madey held a Cultural Heritage induction for crew members on 5th January 2014.

The survey and line preparation crews were put on standby while the cultural heritage clearance crew completed the pre-clearance survey and signed off the report. There were only two sites which impacted on the survey – both were detoured and pegged around.



Map 1: Moomba North Micro Seismic survey – Cultural Heritage site data

6 Health, Safety and Environment

All vehicles belonging to RPS were fitted with IVMS, rollover protection, a fire extinguisher, first aid kits and UHF radios. RPS had one Iridium telephone was on site for use if required. There was good mobile phone reception in the prospect due to the proximity to Moomba. The survey office had a UHF radio for intra-field communications. All vehicles and equipment carried a copy of the site emergency response plan detailing emergency contact phone numbers and emergency procedure.

All rubbish generated in the field was returned to camp for proper disposal. Terrex Contracting organised the disposal of all camp rubbish at Moomba. Kitchen waste water and sewerage was collected by Veolia and disposed of in Moomba.

Tony Kenny (Santos Rep) conducted a Santos site induction on 5th January 2014 which was attended by all crew members. 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.

During the survey, the survey crew exercised due care in their operations. Strong emphasis was placed on driving due to the proximity to Moomba and the large amount of third party traffic in the area. RPS and Terrex safety policies were adhered to by all personnel. Daily "toolbox" meetings were held to inform and raise current issues with crew members. The daily toolbox topics were noted in the daily reports. All RPS personnel attended the morning crew toolbox. All RPS personnel attended the weekly TC safety meetings. These were normally held on Sunday mornings.

6.1 HSE Statistics

The following is a summary of HSE statistics for the survey crew.

	January
General	
Breathalyzer (# tested)	14
Toolbox Meeting (# attendees)	14
Vehicle FIT Checks	2
Hazard ID Forms	0
Inspections	
Emergency Drill	0
Fire Ext. & Smoke Alarms	0
First Aid Kit Inspection	0
PPE Inventory	0
Other Inspections	0
OHS Reports	
Incident Reports	0
(LTI) Lost Time Injury	0
(MTI) Medical Treatment Injury	0
(FA) First Aid Injury	0
(NM) Near Miss	0
(HiPo) High Potential Incident	0
JHA	1

7 Summary

Overall the survey and line preparation of the Moomba North Micro Seismic survey Seismic Survey was done in an efficient and environmentally sound manner.

Survey fieldwork took 3 days to complete at an average of 9.57Km / day. Line preparation took 2 days at 14.355Km / day. At the completion of the line grading the grader spent two days grading a trench for the geophones – it was slowed down by overheating problems.

RPS supplied high quality maps to the recording crew detailing hand carry sections, offsets, tracks, detours, pipelines and any other pertinent information.

It is RPS policy to have an experienced dozer pointer on crew to assist with any line preparation problems and to supply mapping information to the seismic crew. All members of the survey crew were experienced seismic hands.

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

Respectfully submitted,



Eric Amedee

Senior Surveyor
RPS

Appendix A

Survey Network Stations

Station	Comment	Easting	Northing	Elev.
MOO141A	BM Moomba #141	427736.309	6894579.396	46.731
MOO162	BM Moomba #162	429955.557	6892296.235	35.573
ROS1	RTK Base Station	431720.485	6889246.965	34.618

Appendix B

Well Benchmark Ties

Station	Site	Survey Easting	Survey Northing	Survey Elev.	BM Easting	BM Northing	BM Elev.	DeltaX	DeltaY	DeltaZ
ROS1BM	BM Roswell #1	433118.208	6887473.465	43.961	433118.178	6887473.589	43.966	0.030	-0.124	-0.005

Appendix C

ITRF Control Ties

Station	Site (JD)	Control Easting	Control Northing	Control Elev.	ITRF/PSM Easting	ITRF/PSM Northing	ITRF/PSM Elev.	DeltaX	DeltaY	DeltaZ
MOO141A	BM Moomba #141 (010)	427736.309	6894579.396	46.731	427736.316	6894579.414	46.725	0.007	0.018	-0.006
ROS1	RTK Base Station (005)	431720.485	6889246.965	34.618	431720.507	6889246.974	34.607	0.022	0.009	-0.011
ROS1	RTK Base Station (012)	431720.485	6889246.965	34.618	431720.506	6889246.975	34.607	0.021	0.010	-0.011



Appendix F – Environmental Photo Points

Santos Ltd
2014

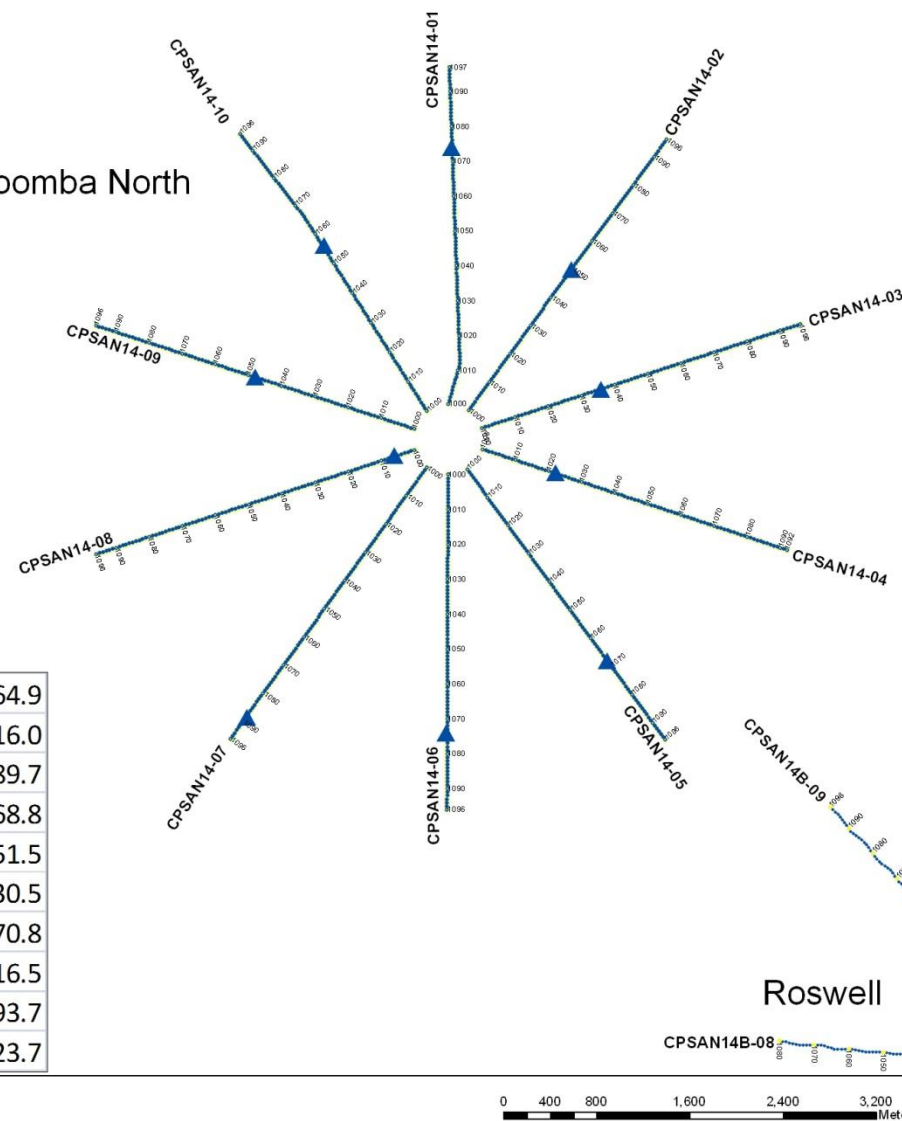
Micro Seismic
Moomba North

Environmental
Photo Points



MN-01-01	1074	427392.6	6895064.9
MN-02-01	1050	428427.2	6894016.0
MN-03-01	1036	428681.1	6892989.7
MN-04-01	1022	428288.1	6892268.8
MN-05-01	1068	428734.6	6890651.5
MN-06-01	1074	427349.4	6890030.5
MN-07-01	1088	425636.9	6890170.8
MN-08-01	1006	426900.9	6892416.5
MN-09-01	1048	425707.1	6893093.7
MN-10-01	1056	426296.0	6894223.7

Moomba North



APPENDIX 2 – TERREX SEISMIC FINAL OPERATIONS REPORT

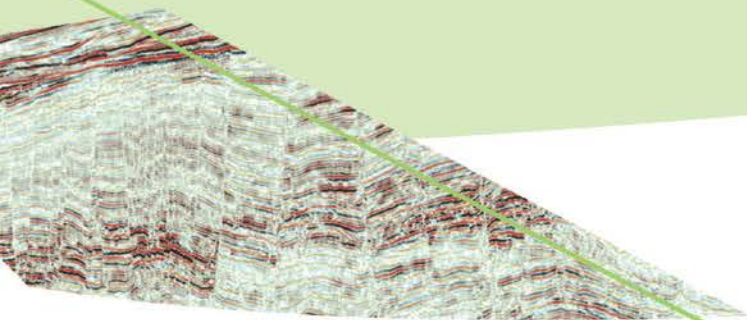
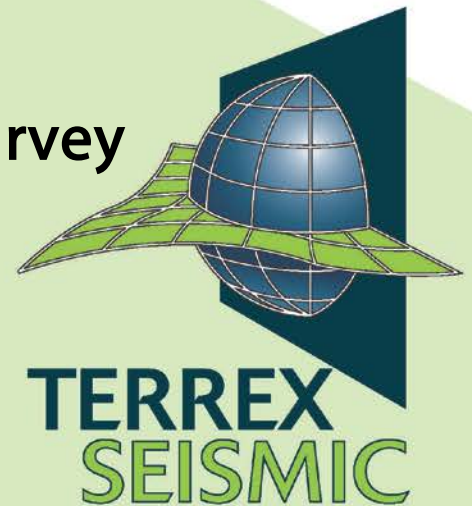
Moomba North Microseismic Survey Field Operations Report

Prepared for Santos Limited

17 January 2014 to 24 February 2014

Job No. A01038

Crew 401



Field Operations Report

For

CPSAN14 Moomba North Microseismic Survey

PPL 7 & 8

Written by

Darren Rea - Crew Manager

Crew 401

This report is confidential and was prepared exclusively for Santos Limited.

Terrex Seismic is certified to OHSAS 18001, ISO 14001 and AS 4801.

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1. INTRODUCTION

Terrex Seismic was contracted by Santos Limited (Santos) to conduct the Moomba North Microseismic Survey. Fracture stimulation on 4 wells M198, M199, M200 & M201 was recorded using a 10 axial line array totalling 28.68 km in length. Acquisition commencing on the 24th January 2013 and was completed on 16th February 2014.

Moomba North Microseismic and Roswell 2 Microseismic were recorded consecutively, however due to the location of the surveys in relation to each other, initial layout and pickup of both surveys were completed together as follows.

Microseismic Survey	Initial Layout Dates	Acquisition Dates	Pickup Dates
Moomba North	17 th -21 st January 2014	24 th January - 16 th February 2014	23 rd -24 th February 2014
Roswell 2	22 nd -24 th January 2014	16 th February – 22 nd February 2014	24 th -25 th February 2014

1.1 Geographic Area

The Moomba North Microseismic Survey was located in South Australia approximately 6 kms north east of the oil and gas installation at Moomba.

Terrain was a combination of sandy flats, clay pans and small sand dunes. This area was covered by salt bush with a high concentration of pipelines, in an east west direction, which crossed line CPSAN14-04, CPSAN14-05, CPSAN14-06 and CPSAN14-07.

The Della Road ran east west through line CPSAN14-05 and CPSAN14-06 on the southern end of the program where culverts were utilised to traverse the cable under the road to avoid any traffic interruptions. This is a main thoroughfare to Santos leases further east and has a high traffic volume. The North Moomba bypass road also ran through the eastern side of the prospect which gave access to wells M196, 197, 198, 199, 200 & 201.

The Moomba North lease is situated on Gidgealpa pastoral lease and is highly stocked due to the abundance of salt bush and watering points.

1.2 Health, Security, Safety and Environmental

The Santos Moomba North Microseismic Survey is situated in a remote location within South Australia approximately 6 km to the north east of the Moomba Oil & Gas installation. Whilst the crew was still isolated and classified as a remote crew, no paramedic was required due to being close to medical facilities in Innamincka and Moomba.

During acquisition there was no LTIs recorded, and only one MTI case that occurred on the 20th January 2014 relating to heat stress which is detailed in Report #000562 in Appendix E- HSE End of Contract Report where a crew member was taken back to camp with a possible case of heat stress.

No cultural heritage, near misses or work days lost were recorded, however 14 hazard identification reports were lodged. A total of 98 hours of training and 74 hours of toolboxes were conducted during the course of the North Moomba Microseismic survey.

As the crew are staying at the Santos Moomba camp, crew personnel fall under the Santos Emergency procedures and drills. Although no ERP drill was completed in the field, desktop emergency scenarios were conducted at toolbox.

Please see Appendix E - HSE End of Contract Report for additional information.

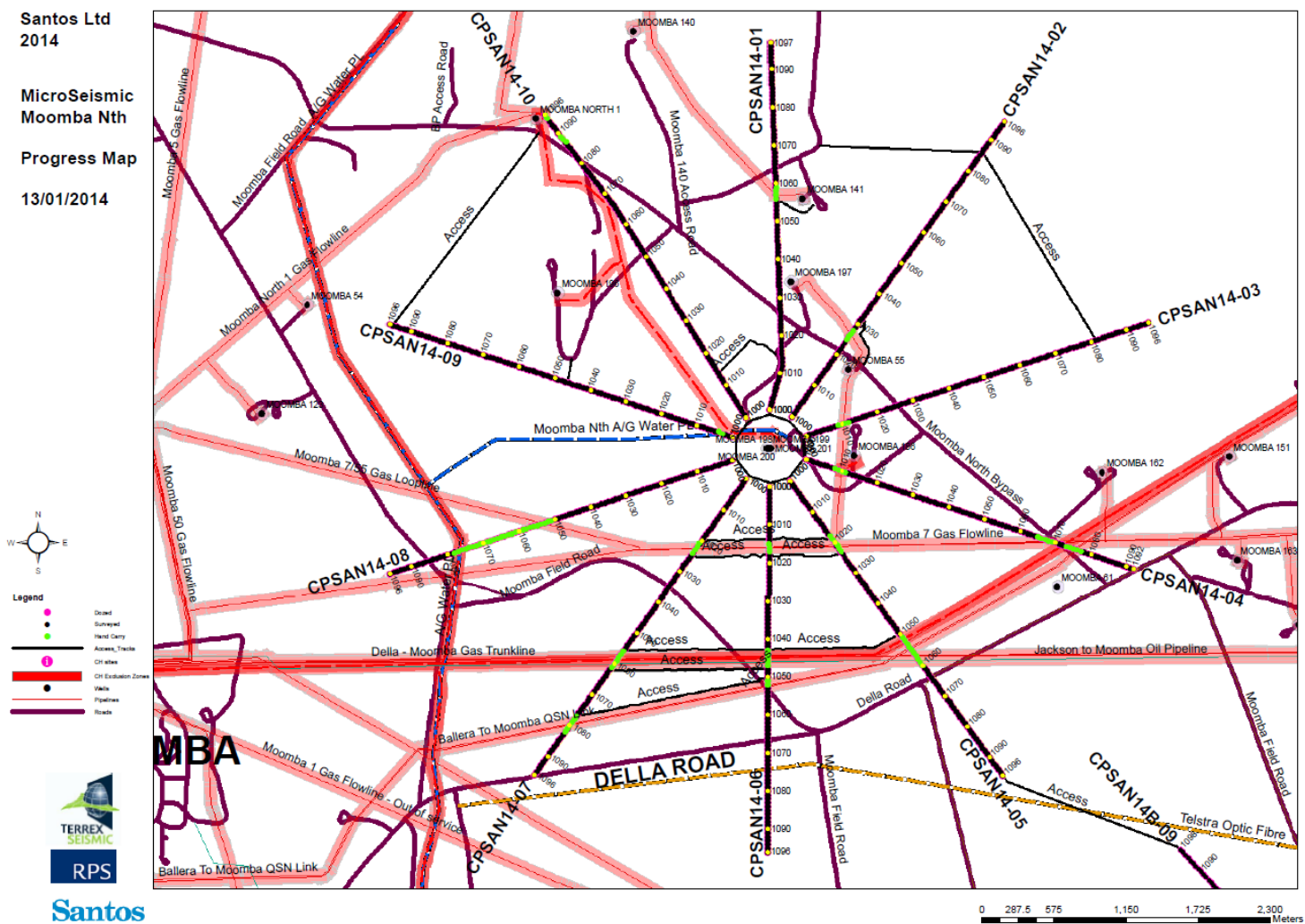


Figure 1 *Moomba North Microseismic Prospect*

1.3 Climatic Conditions

On the 15th February due to wet weather conditions SIL at Moomba North advised that operations would cease until 6.00 am the following day. A further 2.5 hours was lost on the 16th as well as all services were locked in at Moomba until Field Services opened all the roads at 8.30 am.

Average Minimum Temperature:	26.9 degrees
Average Maximum Temperature:	40.3 degrees
Days lost due to weather conditions:	22.50 hours
Rainfall:	7.2 mm

1.4 Logistics

The recording crew started mobilisation from Brisbane on 15th January, 2014 and took a total of 2.3 days to complete with the crew arriving onsite at the lay down area to drop off all spread trucks approximately 8 km east of Moomba on the 17th January, 2014.

Most of the accommodation was in the form of ensuited rooms at the Moomba installation. The layout crew and pickup crew were initially all accommodated and fed at the Moomba installation, but due to ongoing accommodation issues, several crew members were sent to Innamincka during acquisition. All meals and facilities including food, fuel, water and general supplies were supplied by the client. Additional travel time for crew at Innamincka was increased to over an hour compared with the crew at Moomba crew which took 15 minutes to site.

Spotless had full time chefs on crew with spotless camp staff who completed all washing and room maintenance. Meals were excellent and consisted of breakfast, lunch & dinner. Lunch was supplied for the field crew and were supplied at breakfast and taken with the crew to the field.

Fuel and Oil's for the vehicles and recorder was supplied through the Northpoint Toyota workshop, via Santos supplied fuel key. All mechanical work was also completed by Northpoint Toyota.

Any Terrex freight, parts & supplies required were all obtained previously before mobilisation of the crew from Brisbane and taken to the field. Any other supplies required onsite travelled by air or road to Star track site office at Moomba stores. Any further items were obtained from either Northpoint or Moomba stores.

All data was shipped to Santos Limited in Adelaide.

After completion of the project, the crew started on the Roswell 2 Microseismic Survey. After completion of Roswell 2 Microseismic, the crew packed up both Moomba North and Roswell equipment and demobilised to Brisbane.

2. SURVEYING

All surveying works and services were provided by RPS from Brisbane.

RPS were contracted by Santos Limited to perform all survey works and mobilised from Toowoomba on the 03rd January 2014 and arrived at Moomba on Saturday the 04th.

Inductions were completed on the 05th January with control set up on the same day. A total of two survey personnel were onsite for the program.

Survey operations began for both Moomba North and Roswell on the 8th January 2014 and finished on the 13th January 2014. RPS Senior Surveyor onsite was E Amedee. Survey team consisted of 2 x one man teams with two vehicles.

RPS stayed at the Moomba installation for the duration of the project. All water, diesel & supplies were obtained from Northpoint and Moomba stores.

Survey crew demobilised on the 15th January 2014. Eric Amedee remained on site until recording crew arrived.

2.1 Line Pointing/Chaining/Surveying

Survey services were provided by RPS from Brisbane.

Eric Amedee was the senior survey onsite and was there for the entire program. He setup the job and provided and double checked survey control, surveying, final data, maps & line traces for the recording crew. W Macdonald completed all pegging.

During the program there were delays with CH implementing their induction so production could commence. Significant areas of Cultural Heritage were also identified; these were all noted earlier by CH and added the locations to the Terrex Spatial Nav Tablets. These were then also documented and added to the Survey Maps & Line Traces to enable the recording crew to identify these areas easily. There was a total of 28.68 km of line to be surveyed. Several toolbox topics for Survey included hazards such as line crossing points over the Della road, North Moomba bypass road in regards to 3rd party traffic, rehydration and skip gaps for the multiple pipeline infrastructures. These were just some of the main topics discussed each morning at RPS daily toolbox meetings.

RPS Personnel

Crew Member	Position
Eric Amedee	Senior Surveyor
W Macdonald	Surveyor

2.2 Line Clearing

Line clearing services were completed by Terrex Contracting from Brisbane.

All personnel were mobilised from Brisbane via air travel on 2nd January and arrived at Quilpie airport then travelled to TC1 camp located at Eromanga. Collecting their equipment and camp headed for the Roswell camp site arriving on 4th January.

Robert Pugno was the crew manager onsite and was there for the entire program with Jake Cameron onsite as the operator.

During the program there were delays with CH implementing their induction so production could commence. Significant areas of Cultural Heritage were also identified; these were all noted earlier by CH and added the locations to the RPS navigational electronics. There was a total of 28.68 km of line to be cut also trenches were graded in to enable the line crew to bury the geophones as they were deployed. Several toolbox topics for line prep were addressed at the joint Terrex contracting / RPS morning toolbox.

2.3 Production figures

	<i>RPS Survey</i>	<i>Terrex Contracting</i>
Average Kms/day:	8.800	8.3175
Minimum Production:	6.810	11.570
Maximum Production:	9.950	12.990
Average Production:	8.800	8.3175
Lost/Standby Days:	3	3
Total Days Onsite:	6	6
Total Production Kms:	28.68	28.68

3. SERVICES

3.1 Permitting

Permitting services were provided by Santos Limited.

All permitting was completed before the arrival of the Survey and Recording Crews.

3.2 Fencing

No Fencing services were required.

3.3 Traffic Control

No Traffic Control Services were needed. Accesses for cables to cross the Della road were provided by culverts which cables were placed through to enable us to join the remained of the lines.

3.4 Client Representative

The Client Representative for this survey was Tony Kenny from Santos.

He also worked closely with Nik Helme our Instrument Technician onsite during the initial setup stages of the Moomba North Microseismic.

4. RECORDING/PROCESSING

As in most microseismic programs there are less self-initiated events to report about on a daily basis the observer's focus is on recording background noise, logging all events, monitoring spread and liaising with the fracking rig. A great deal of time spent during recording was waiting (Standing by) on the fracking rig to start the fracking stages to log events. Minimal troubleshooting time was spent during the day, mainly changing out batteries and some line equipment like geophones with the occasional cable that went down due to chewage.

The recording was carried out 24 hrs a day once the perforation sequence had commenced (Night time) with the fracture stimulation recorded during daylight hours. There were two full time Observers & two full time Trouble-shooters' onsite at all times. This was to perform Night work recording so that any events either day or night would be recorded.

Production Summary:

15th – 17th January

- Crew mobilise from Brisbane to Innamincka, arrive Innamincka at the Santos Limited camp.

18th – 25th January

- Crew Layout all equipment including the Cross lines (inner hub) to connect all lines together. All Troubleshooting now completed.

25th January

Well # 196 recorded whilst waiting Moomba North cluster to commence production.

- Stage #1 & #2 perforations executed before equipment was in place.
- Stage #3 Perforation, Time: 13:34:26, Depth: 9560'
- Stage #4 not recorded

26th January

- Stage #5 Perforation, Time: 12:03:26, Depth: 8958', Stage #5 Perforation, Time: 12:07:26, Depth: 8958'
- Stage #6 Perforation, Time: 16:40:26, Depth: 8775'

27th January

- Stage #7 Perforation, Time: 10:01:29, Depth: 8261', Stage #8 Perforation, Time: 16:00:57, Depth: 8233'

28th January

Well # 197 recorded whilst waiting Moomba North cluster to commence production.

- Stage #1 & #2 executed before equipment was in place.

29th January

Stage #3 Perforation, Time: 09:19:00, Depth: 8775'

30th January

No Perforation or Fracturing activity at any well site.

31st January

The recording crew is on standby awaiting Halliburton to commence operations.

01st February

- M199 Stage # 1 Perforation, Time: 08:58:00, Depth?’
- M198 Stage # 1 Perforation, Time: 15:28:00, Depth?’

02nd February

The recording crew is on standby awaiting Halliburton to commence operations.

03rd February

The recording crew is on standby awaiting Halliburton to commence operations.

04th February

The recording crew is on standby awaiting Halliburton to commence operations.

05th February

- M200 Stage #1 Fracture, Time: 13:30:00, Depth: 9982-9992’,
- M200 Stage #2 Perforation, Time: 16:55:00, Depth: 9802-9812’

06th February

- M200 Stage #2 Fracture, Time: 08:00, Depth: 9802-9812’, BHP 1100 psi
- M198 Stage #1 Fracture, Time: 11:00, Depth: 10768-10783’, BHP 1400 psi
- M200 Stage #3 Perforation, Time: 11:15, Depth: 9670-9680’, 60 degree phasing, 6 SPF
- M198 Stage #2 Perforation, Time: 16:18, Depth: 10516-10526’, 60 degree phasing, 6 SPF
- M201 Stage #1 Fracture, Time: 16:30, Depth: 10627-10643’, BHP 1200 psi
- M201 Stage #2 Perforation, Time: 20:30, Depth: 10504-10514’, 60 degree phasing, 6 SPF

07th February

- M199 Stage #1 Fracture, Time: 08:30, Depth: 10420-10435’, BHP 7233 psi
- M201 Stage #2 Fracture, Time: 10:37, Depth: 10504-10514’, BHP 8247 psi
- M198 Stage #2 Fracture, Time: 14:04, Depth: 10516-10526’, BHP 8355 psi
- M200 Stage #2 Fracture, Time: 16:58, Depth: 9670-9680’, BHP 7216 psi
- M198 Stage #3 Perforation, Time: 18:15, Depth: 10400-10410’, 60 degree phasing, 6 SPF

08th February

- M201 Stage #3 Perforation, Time: 04:15, Depth: 10416-10426’, 60 degree phasing, 6 SPF
- M198 Stage #3 Fracture, Time: 09:00, Depth: 10400-10410’, BHP 5519 psi
- M201 Stage #3 Fracture, Time: 12:30, Depth: 10416-10426’, BHP 6421 psi
- M200 Stage #4 Perforation, Time: 13:15, Depth: 9368-9378’, 60 degree phasing, 6 SPF
- M200 Stage #4 Fracture, Time: 16:00, Depth: 10241-10251’, BHP 7765 psi
- M201 Stage #4 Perforation, Time: 16:45, Depth: 10241-10251’, 60 degree phasing, 6 SPF
- M198 Stage #3 re-Perforation, Time: 16:57, Depth: 10400-10410’, 60 degree phasing, 6 SPF
- M200 Stage #5 Perforation, Time: 23:00, Depth: 9009-9019’, 60 degree phasing, 6 SPF

09th February

- M201 Stage #4 Fracture, Time: 07:22, Depth: 10241-10251', BHP 7349 psi
- M198 Stage #3 Fracture, Time: 09:56, Depth: 10400-10410', BHP 9549 psi
- M201 Stage #5 Perforation, Time: 10:30, Depth: 10090-10100', 60 degree phasing, 6 SPF
- M198 Stage #4 Perforation, Time: 15:15, Depth: 10191-10201', misfire – no indication of firing
- M200 Stage #5 Fracture, Time: 15:54, Depth: 9009-9019', BHP 7548 psi
- M200 Stage #6 Perforation, Time: 17:30, Depth: 8460-8470', 60 degree phasing, 6 SPF
- M198 Stage #4 Perforation, Time: 23:00, Depth: 10191-10201', misfire – no indication of firing

10th February

- M198 Stage #4 Perforation, Time: 05:55, Depth: 10191-10201', 60 degree phasing, 6 SPF
- M201 Stage #5 Fracture, Time: 08:02, Depth: 10090-10100', BHP 6630 psi
- M201 Stage #6 Perforation, Time: 10:55, Depth: 9927-9937', 60 degree phasing, 6 SPF
- M198 Stage #4 Fracture, Time: 11:00, Depth: 10191-10201', BHP 10000 psi
- M199 Stage #1 re-Perforation, Time: 16:57, Depth: 10425-10435', 60 degree phasing, 6 SPF
- M198 Stage #5 Perforation, Time: 20:30, Depth: 9873-9883', 60 degree phasing, 6 SPF

11th February

- M199 Stage #1 Re-Fracture, Time: 08:02, Depth: 10425-10435', BHP 9522 psi
- M201 Stage #6 Fracture, Time: 11:05, Depth: 9927-9937', BHP 7306 psi
- M199 Stage #2 Perforation, Time: 11:50, Depth: 10310-10320', 60 degree phasing, 6 SPF
- M199 Stage #2 Fracture, Time: 14:15, Depth: 10310-10320', BHP 8321 psi
- M201 Stage #7a Perforation, Time: 17:30, Depth: 9665-9675', 60 degree phasing, 6 SPF
- M199 Stage #5 Perforation, Time: 17:50, Depth: 10130-10140', 60 degree phasing, 6 SPF
- M201 Stage #7b Perforation, Time: 21:45, Depth: 9655-9665', 60 degree phasing, 6 SPF

12th February

- M199 Stage #3 Fracture, Time: 07:18, Depth: 10425-10435', BHP 8251 psi
- M200 Stage #6 Fracture, Time: 09:14, Depth: 8460-8470', BHP 6385 psi
- M198 Stage #5 Fracture, Time: 11:23, Depth: 9873-9883', BHP 7364 psi
- M200 Stage #7 Perforation, Time: 11:55, Depth: 8305-8315', 60 degree phasing, 6 SPF
- M200 Stage #7 Fracture, Time: 13:48, Depth: 8305-8315', BHP 6042 psi
- M199 Stage #4 Perforation, Time: 14:58, Depth: 9824-9834', 60 degree phasing, 6 SPF
- M199 Stage #4 Fracture, Time: 16:10, Depth: 9824-9834', BHP 8970 psi
- M200 Stage #8 Perforation, Time: 16:15, Depth: 8270-8280', 60 degree phasing, 6 SPF
- M199 Stage #5 Perforation, Time: 22:40, Depth: 9804-9814', 60 degree phasing, 6 SPF

13th February

- M201 Stage #7 Fracture, Time: 10:27, Depth: 9655-9675', BHP 6494 psi
- M199 Stage #5 Fracture, Time: 13:28, Depth: 8804-8814', BHP 6073 psi
- M201 Stage #8 Perforation, Time: 13:37, Depth: 8817-8827', 60 degree phasing, 6 SPF
- M200 Stage #8 Fracture, Time: 17:00, Depth: 8817-8827', BHP 5874 psi
- M199 Stage #6 Perforation, Time: 17:39, Depth: 8777-8787', 60 degree phasing, 6 SPF
- M200 Stage #9 Perforation, Time: 20:50, Depth: 8195-8205', 60 degree phasing, 6 SPF

14th February

- M199 Stage #6 Fracture, Time: 07:11, Depth: 8777-8787', BHP 5930 psi
- M201 Stage #8 Fracture, Time: 12:46, Depth: 8820-8827', BHP 6256 psi
- M200 Stage #9 Fracture, Time: 14:25, Depth: 8195-8205', BHP 5686 psi
- M201 Stage #9 Perforation, Time: 18:11, Depth: 8722-8729', 60 degree phasing, 6 SPF
- M199 Stage #7 Perforation, Time: 20:52, Depth: 8679-8689', 60 degree phasing, 6 SPF

15th February

M198 Stage #6 Fracture, Time: 07:30, Depth: 9523-9533', BHP 8249 psi.

Rain commenced falling on the prospect at 8.15 am and the Moomba North program ceased operations at 10.05 am. We were advised by the Moomba North SIL that operations would not commence until 6.00 am the following morning, 16th February – weather permitting.

At 14.31 it was decided that operations would continue (without advising the recording crew). A perforation shot was set off at this time and again at 20.08 – neither shot was recorded.

16th February

Moomba gates were not re opened until 8.30 am – this factor contributed to missing of recording of M198 Stage #7 Fracture which was initiated at 8.17 am.

- M201 Stage #9 Fracture, Time: 10:48, Depth: 8722-8729', BHP 5493 psi
- M198 Stage #8 Perforation, Time: 11:22, Depth: 8696-8706', 60 degree phasing, 6 SPF
- M199 Stage #7 Fracture, Time: 12:48, Depth: 8679-8689', BHP 7385 psi
- M198 Stage #8 Fracture, Time: 15:13, Depth: 8679-8689', BHP 7759 psi

PRODUCTION & RECORDING COMPLETED ON MOOMBA NORTH.

4.1 General Survey Details

Survey:	Moomba North 3D Microseismic survey
Survey Location:	South Australia
Total Kms/Sq Kms:	28.68 linear km
AFE Code:	PPL 7 & 8

4.2 Cable Field Recording

Instruments:	Sercel 428
No. Channels:	967 live traces
Tape Drives:	2 x 2 Tb portable hard drives
Tape Format:	SEGD
Filters:	Hi cut: 200Hz, (0.8 Nyquist – Linear) Low cut: Out
Sample Interval:	2 milliseconds
Record Length:	30 second - continual
RTC:	Yes
Correlation Type:	Raw

Source Specifications

Energy source for this job was Hydraulic Fracturing by Halliburton.

Receivers

Receiver Group Interval:	25 metres
Array:	12 phones over 25 m, centered on station, 2.0833 m spacing
Connection:	Series (6x1)
Receiver Line Interval:	25 Metre
Number of Receiver Lines	10
Number of Receivers per Line	8 x Lines @ 97 trace, 1 x Line @ 98 trace, 1 x Line 93 trace.

4.3 Microseismic Recording

ARRAY OUTLINE

The program was organized in a spoked wheel configuration with the central hub being the well site with the energy source for recording being hydraulic fracturing. 24 hour recording was initiated with Halliburton generally perforating wells of a night time and fracturing through the day. Ten lines protruded outward from the central hub with the traces on each line varying from 93 trace on line 04 to 98 trace on line 01 – the remaining 8 lines had 97 active traces each.

With this being a static configuration there was no movement of spread for the entire job. Trouble shooting for the program was mainly caused by cattle and dingo chewage.

Multiple flow lines and well heads impeded the line crew on initial layout with many hand carry sections being utilized. Traffic, in the main part, was very considerate along the Moomba North bypass with vehicles slowing down to the 40 km range when crossing over the live spread or being in the vicinity of the trouble shooters and the line crew.

With this program being a wheel configuration, and the energy source remaining central there was no usual swath or panel movements.

Two extra channels were deployed on the well site. One for ascertaining the time break and source initiation from the wire line truck and the second connected to the well head.

4.4 Crew Performance

The performance of the crew was very good, considering that ¾ of the crew had never been involved in this type of operation before. The unit itself was formed with personnel from four different crews and bonded together quickly to make a very cohesive unit with co-operation through the hand carry sections, especially, contributing with the equipment being deployed correctly and efficiently in good time.

Retrieval of equipment was disrupted slightly due to half the crew being accommodated in the township of Innamincka as there was not enough accommodation to house the entire crew at Moomba.

4.5 Processing Tapes

A Tapes

sent via Startrack Express to:

SANTOS LIMITED
c/ Toll Priority
Basement 191 Pulteney St.
Adelaide 5000
Ph: 08 8116 7833
ATTN: Nick Papanicolaou

B Tapes

sent via Startrack Express to:

SANTOS LIMITED
c/ Toll Priority
Basement 191 Pulteney St.
Adelaide 5000
Ph: 08 8116 7833
ATTN: Nick Papanicolaou

5. QUALITY CONTROL

5.1 Observer Comments

- This is a Microseismic job not same as conventional seismic so data is quite different. Frac events are very evident but perforation shots are hard to spot unless watching the screen when they happen. Event logs were received from the SIMOPS office but were not always accurate as the information provided did not always line up with actual production events.
- Being a Microseismic operation with 24 hour recording only rain can stop the recording. Wind was lighter at night time but increased during daylight hours which were evident during noise strips.
- Spread was stable for the most part, geophones buried
- There were a couple of days when transmission errors where a problem due to heat and static from high winds.
- Source was Perforation shots and Hydraulic fracturing which was provided by a third party being Halliburton
- No experimentals done for start-up, system was tested before recording started.
- No critical events or changes or restrictions during survey

Conclusion/Recommendations

A better setup for charging batteries to protect chargers from the heat and dust. The event logs supplied could have a bit more accurate making some perforation shots difficult to find.

5.2 Summary and Discussions

In general the program went quite well. There were communication issues with the well site which we endeavoured to rectify with the installation of a Santos field radio in the recorder – This radio was supplied by Tony Kenny. With the new radio we were still lacking a communication line as the hand held radios that Halliburton were utilising were underpowered to reach the recorder.

A discussion between the client representative, Observer and crew manager it was decided that if a Microseismic representative was not available to relay information from the well site that a Terrex Representative be on site to relay using 25 watt VHF radios which would cure the communication issue.

Each day at 6.00 a.m and 5.30 p.m a Terrex representative, either CM or Line boss, would make contact with the SIMOPS on site to ascertain their production schedule for the day and following night – their schedule varied from day to day which was caused by equipment breakdowns and well malfunctions.

Appendix A Cable Field Equipment Specifications

Recording Equipment

Data Acquisition System:	SERCEL 428 - 24 Bit 3D Seismic
Similarity System:	Pelton VIBRPO Real Time
Computing:	Sun Blade Computer with 3 x 19inch Flat Screens
Plotter:	Veritas V12 Plotter, UPS, LIM, APM
Tape Drives:	2 x LTO High Density
Comms:	1 x 10 metre 6 DB Boost High Gain Antenna

Line Equipment

Seismic Cables:	287 (4 FDU's per cable) 967 live (1200 available) channels
Takeouts:	55m separation between takeouts
LAUL Units:	30
LAUX Units:	26
Transverse Cables:	33
Batteries:	56
Battery Chargers:	4 Sercel
Geophones:	Sensor SM24 10Hz geophones or equivalent
Geophone Strings:	2400 (6 ph/group)
Geophone Tester:	1 x Sensor SMT200
Vehicle Radios:	10 VHF

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

Appendix B Vehicle Equipment Listing

No.	Vehicle	Used for	Registration Number
Light Vehicles			
1	Toyota Ute	TC Jugs / geophones	017 RNR
2	Toyota Ute	Trouble Shooter	024 RNR
3	Toyota Wagon Grey	PC	706 ROH
4		Cable / trouble Shooter	740 RCZ
5	Toyota Ute	Cable	764 KZP
6	Toyota Ute	Cable	766 KZP
7	Toyota Ute	CM / TS	949 RUD
8	Toyota Ute	Cable	981 SAH
9	Toyota Ute	Jugs / geophones	982 SAH
10	Nissan Ute JP's Ute	Refuelling Recorder	XMJ 224
Heavy Vehicles			
1	Kenworth prime mover A Frame.	Carrying Spread & towing trailer	KW 9897
2	Hino rigid tray truck	Spread	1CIR 888
3	Isuzu Curtain side rigid tray	Spread	772 RNW
4	Isuzu Curtain side rigid tray	Spread	212 RTJ
5	Isuzu Pan of sorts	Recorder	1 BSB 131
Vans Trailers etc			
1	Trailer	Spread - Towed by KW 9897	1TNY 915

Appendix C Tape Listings

TAPE TRANSMITTAL

TO: SANTOS LIMITED
c/ Toll Priority
Basement 191 Pulteney St.
Adelaide 5000
Ph: 08 8116 7833

Page 1

ATTN: ATTN: Nick Papanicolaou

Moomba North & Roswell 2 3D Microseismic 2014							
Tape #	Wells	First FFID	Last FFID	First VP	Last VP	Date Recorded	Comments
1A	M196, M197, M198, M199, M200, M201 & Roswell 2	1	51518			25/01/2014 - 22/01/2014	Completed See Obs logs

Sent by:Darren Rea.....Date:.....24th February 2014.....

Received by: Date:

Appendix D HSE Policy & OH&S Standards



Health Safety Environment and Quality Policy

Terrex is a Seismic Acquisition and Surveying Contractor providing services to the Oil, Gas, Mineral and Infrastructure Industries.

Our vision is to be one of the world's most operationally efficient, technologically advanced, innovative and safest onshore Seismic Acquisition and Survey service providers.

Our aim is to provide a healthy and safe workplace while minimising the environmental impacts of our activities and satisfying our customers' expectations.

We at Terrex are committed to:

- Providing a healthy and safe workplace for our employees, contractors and the general public.
- Conducting all operations in such a manner as to minimise their impact on the environment.
- Promoting the protection of all Natural and Cultural environments that can be affected by our activities.
- Respecting all forms of indigenous and non-indigenous heritage and maintaining cultural heritage values.
- Seeking to continuously improve in the efficient use of natural resources and energy through recycling and waste management.
- Regularly review and improve our process to minimise health and safety hazards, negative significant impacts to the environment and prevent pollution.
- Establishing measurable objectives and targets for improving our safety and environmental performance.
- Working with our customers, suppliers and employees to seek continual improvement of our activities.
- Complying with legislation and industry codes of practice wherever we conduct business.

To ensure this commitment we have implemented an Integrated Management System, which meets the requirements of:

- AS/NZS 4801 Occupational Health and Safety Management Systems
- OHSAS 18001 Occupational Health and Safety Management System
- AS/NZS ISO 14001 Environmental Management Systems.
- AS/NZS ISO 9001 Quality Systems

This policy is basic to all Terrex operations and adherence is the prime responsibility of management, every employee and all contractors / sub contractors.



Joe Dwyer
Chief Executive Officer

Dated: 18th March 2013



Drug and Alcohol Policy

Terrex is committed to:

- Ensuring the Safety and Health of its employees and its subcontractors is maintained;
- Maintaining a SAFE and Healthy workforce and workplace through a proactive approach.

Scope

This policy outlines the responsibilities and applies to all employees of TERREX and all of its subcontractors.

All personnel are considered "on the job" whenever he/she is on:

- Any Company or client property, including parking areas; or
- Company time even if off Company premises – including paid lunch, rest periods, and periods of being on call.

Responsibilities

- Terrex is responsible for maintaining a Drug-Free Workplace and Workforce.
- As a Duty of Care to all employees and contractors, the company will initiate:
 - Random;
 - Upon suspicion;
 - With cause; and
 - Post-accident / incident Drug and Alcohol Testing.

It is expected all employees and contractors will co-operate with the nominated Company Representative in this matter.

- The Company prohibits the use, unauthorized possession, manufacture, distribution or sale of illegal drugs, illegal inhalants, drug paraphernalia or controlled substances (i.e. all chemical substances or drugs listed in any controlled substances act or regulation applicable under any federal and /or state local laws) by any employee or contractor while on duty, while on Company premises or work sites or conducting Company business, or while operating or occupying any Company vehicle/equipment at any time.
- It is the responsibility of an individual to disclose to the nominated company representative any use of prescription drugs and over-the-counter drugs or designer / "look alike" drugs, prior to entering the work place. As the use of prescription drugs and/or over-the-counter drugs may also affect an employee's job performance and seriously impair his/her ability to work safely and effectively. Misusing prescribed or over-the-counter medication on company property or company assignment is strictly prohibited. Designer or "look alike" drugs are prohibited on all Terrex work sites. Non-disclosure will be treated as a breach of this Policy.
- Subject to Client approval and compliance with the Company's Drug and Alcohol and Fitness for Work Policies, outside of working hours Terrex permits the consumption of mid-strength and light beer only within Terrex camps.
- It is the responsibility of all employees and contractors to have a 0% blood alcohol reading before commencing and during work hours.
- Pertaining to employees and contractors in rehabilitation or self-rehabilitation, confidentiality of personal information will be maintained, although personal information will be released by the Medical Services on a need-to-know basis or as required by law.
- All personnel working on Company premises or performing Company work must have read this Policy and will be asked to cooperate with the administration of this Policy. A breach of this policy and the associated procedure may result in disciplinary action.



Joe Dwyer

Chief Executive Officer

Dated: 13th May 2013



Fitness for Work Policy

Terrex is committed to providing a safe, healthy and productive workplace for all its employees. The company recognises that alcohol, drugs, substance abuse, or fatigue will impair employees' ability to perform their jobs properly and that any of these factors will have adverse effects on the safety, efficiency, and productivity.

Scope

This policy outlines the responsibilities and applies to all employees of TERREX.

All personnel are considered "on the job" whenever on:

- Any Company or client property, including parking areas; or
- Company time even if off Company premises including paid lunch, rest periods, and periods of being on call.

Policy

- The company prohibits the misuse of legitimate drugs, or the use, possession, distribution or sale of illicit or non-prescribed controlled drugs, or other substances, on company business or premises.
- Any employee who takes prescription medication should check with their doctor to establish if the use of the medication will impair their work performance, or pose a safety risk to the worker or any other person in the workplace. If so, the worker should seek advice in writing from their doctor and provide a copy of this letter to their manager.
- In-line with community attitudes, legislation and legal liability, smoking shall only be permitted in designated smoking areas.
- The company recognises alcohol, drug or substance dependency as a treatable condition. Employees who suspect they have a dependency problem are encouraged to seek professional advice and to follow appropriate treatment promptly before it results in work performance problems.
- Employees working outdoors are required to undergo periodical medical examinations at the company's expense.
- Drug and Alcohol testing will be conducted by the company on a daily / random or for-case basis.
- All employees are required to comply with the requirements of the company's Workplace Rehabilitation program and actively support employees who are participating in rehabilitation.
- All employees are required to comply with this Fitness for Work Policy and the relevant company procedures that support this policy that are listed below. Failure to meet the requirement of this policy and its associated procedures will result in disciplinary action, up to, and including, dismissal.
 - TS-PRO-18 Workplace Rehabilitation
 - TS-PRO-19 Drug and Alcohol
 - TS-PRO-20 Code of Conduct
 - TS-PRO-22 Journey Management
 - TS-SOP-GEN009 Fatigue Management



Joe Dwyer

Chief Executive Officer

Dated: 14th December 2012

Appendix E HSE End of Contract Report



CPSAN14 - Moomba North Micro Seismic Survey

Project Dates 15/01/2014 - 24/02/2014

HSE End of Contract

Client: Santos
Location: South Australia – Cooper Basin – Moomba.
Permit: PPL 7 & 8
Project No: A01038

Crew 401

Operations Manager – Richard Barnes

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1 Summary

15/01/2014	Pre mobilisation meeting conducted by Terry Ernst, Fill in operations manager. Refer to Minutes & Meetings. Mobilisation – Day 1 – Brisbane to Charleville; Qld.
16/01/2014	Mobilisation – Day 2 – Charleville to Innamincka, SA.
17/01/2014	Mobilisation – Day 3 – Innamincka to Moomba; SA. Induction - Cultural Heritage Induction, conducted by Tim Collins, Santos. Induction - Project Induction, Conducted by Eric Amedee, RPS at request of Santos. Greenfields Permit & JHA included in Project induction.
18/01/2014	Greenfields Permit JHA reviewed at toolbox meeting. Moomba Communications advised of presence & area of operation. Road signs placed on Moomba North road. Vehicle taken to Northpoint for A/C service.
19/01/2014	Safety Sunday Meeting – Topic – TS-PRO-31 Vehicle Driving Standard Procedure. Refer Safety Sun Minutes. HSE Observation – Camp move / Mobilisation
20/01/2014	Incident – Heat Stress – Refer to Incident report. Crew returned to camp early due to hot weather.
21/01/2014	Toolbox discussion re: Incident. Refer to toolbox minutes 21040121. N. Helme & G. Oswell endeavoured to liaise with “SIMS” at Moomba North micro sites – to no avail SIMS not on site. Crew returned to camp at 3:30pm due to hot weather.
21/01/2014	Completed laying out on Moomba North Micro. Meeting – Department Heads meeting.
26/01/2014	De-mobilisation from Roswell of 7 line crew. (2 wagons & 1 spread truck returning to Bne.) Client Rep - Tony Kenny, Field Tech - Nik Helme, Trouble Shooter - Anthony Claridge, HSE – Geoff Oswell accommodated at Innamincka.
26/01/2014	Survey now reverts to Moomba North. Commence recording of fracking on Well 196.
30/01/2014	Vehicle swap – Bob Nicholson arrives @ Innamincka to swap vehicles. Refer to Load chart.
31/01/2014	HSE observation – Fixing cable in a road mat across a road.
01-05/02/2014	Crew basically on standby as awaiting recording of Moomba North. Crew manager meets with SIL each morning to discuss proposed program. Crew on standby, Observer & 2 Trouble Shooters prepare for night shift. Inspection, formal inspection of staging area.
03/02/2014	Safety Alert - Santos High Potential Incident Safety Bulletin - Truck Rollover received. Discussed with crew.

06/02/2014	JSA – JSA for night operations received. Reviewed with Trouble Shooter & Crew manager. Night JSA folders prepared.
07/02/2014	Santos Operations Geophysics Key Hazard Awareness Discussion - Driving & Heat Stress Heat Stress Video received. Both documents & video presented to crew. Toolbox & JSA meeting at Recorder - Working at Night Operations.
08/02/2014	HSE Observation – Working at Night. JSA – Working at Night revised. Discussed with night crew. Cultural Heritage Induction – Advised Santos CH of additional crew & arranged for CH induction 09/02/14
09/02/2014	Project Induction – Daniel Richardson inducted by G. Oswell. Cultural Heritage – Daniel Richardson inducted by Micheal, Santos Cultural Heritage. SIMOPS on line induction - completed by Daniel Richardson.
11/02/2014	Accommodation – Innamincka personnel now accommodated at Moomba. Land transportation risk decreased. Vehicles – 740 RCZ obtained from Crew 406. To be used as a back-up night trouble shooter vehicle as equipped with lights for night work.
12/02/2014	HSE Observation – Jump starting a vehicle.
13/02/2014	Rain – Discussed action plan with SIL should heavy rains occur.
14/02/2014	Inspection, formal, of staging area.
15/02/2014	Rain – Main gate closed late afternoon. Observer advised of situation.
16/02/2014	Rain - Main gate closed at 0600hrs. Opened later for light vehicles. Moomba North perforations & fracturing completed. Halliburton commence removing equipment from pad.
22-24/02/14	Crew completed all pick up equipment off the ground and loaded spread trucks.

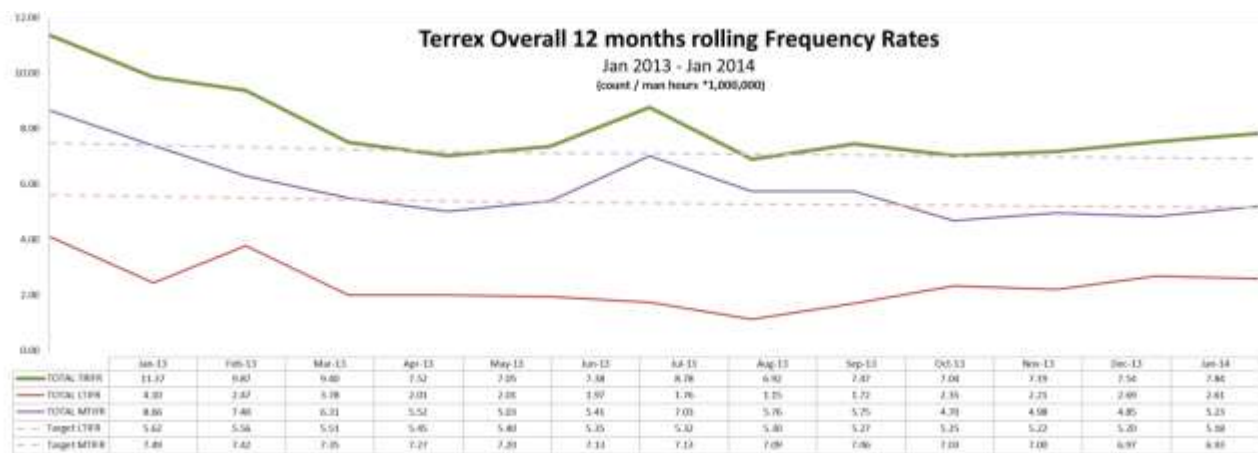
2 Statistical Summary

Table 1 Contract Statistics – Monthly Breakdown

<div> <div>Crew 401</div> <div>Monthly Safety Stats</div> <div>  </div> </div>			
	Jan	Feb	YTD
Terrex Seismic Man-hours	2244.00	1512.00	3756.00
Sub-Contractor Man-hours	312.00	60.00	372.00
Fatalities	0	0	0.00
LTI's	0	0	0.00
MTI's	1	0	1.00
Days since last MTI/LTI	11	40	51.00
Serious Potential Incidents (SPI)	0	0	0.00
First Aid Incidents	0	0	0.00
Environmental Incidents Land Spills (<5 litres)	0	0	0.00
Cultural Heritage Incidents	0	0	0.00
Incident / Accident Reports	1	0	1.00
Near Miss Reports	0	0	0.00
Work Days Lost	0	0	0.00
Hazard Identification Reports	4	10	14.00
Training Hours	49.20	49.00	98.20
Tool Box / Safety Meeting Man-hours	49.80	24.00	73.80
Audits / Inspections	46	65	111.00
Drills	0	0	0.00
			4128.00
TOTAL TRIFR	391.2	242.2	175.4
TOTAL LTIFR	0.0	0.0	0.0
TOTAL MTIFR	391.2	242.2	175.4
Hazard Identification Report	1564.9	3391.5	4210.5

Lead Indicators	Jan	Feb	YTD
Hazard Identification Reports Received	5	10	15.00
Hazard Reports Closed - No. Closed out in ATR	5	10	15.00
Audits/Site Inspections inc HSE obs/inc.	5	2	7.00
Equipment Inspections	41	63	104.00
Training & Induction Hours	49	49	98.00
Tool Box / Safety Meeting Man-hours	50	24	74.00
Tool Box Meetings Conducted	13	16	29.00
HSE Meeting Conducted	1	0	1.00
Risk Assessments Conducted	0	0	0.00
JSA's &/or PTW Conducted	7	1	8.00
SOP's Reviewed	1	44	45.00
IVMS Kms Driven	9,376	8,622	17998.00
IVMS Breaches	11	7	18.00
Drills	0	0	0.00
BAC Conducted	165	80	245.00
BAC Passed	165	80	245.00
Drug Test Conducted	0	0	0.00
Drug Test Passed	0	0	0.00
New Hires Commenced this week	0	0	0.00
Employees terminated /left this week	0	0	0.00

Table 2 Overall Terrex Safety Performance vs Terrex Targets



2.1 Key Performance Indicators

Key Performance Indicator	Measure	Achieved (yes/no)	Performance Score
All personnel to complete Santos Level 1, 2 & Heat Stress Inductions as well as Santos Approved 4WD training	100% Compliance	YES	100%
Land Transportation Incidents per month	<2	YES	100%
Emergency Drills Conducted per project (specifically fire or medical)	1+	NO	
ATR/Hazard Reports Closed out within 90 days	90%	YES	100%
IVMS Exceptions per project	<10	NO	
Documented Crew Manager Inspections per month	4	No	2 Received 50%
Documented Department Head Inspections per month (Line Boss, Mechanic, Cable Repair)	Each department head once per month	No	
Site Audit of Subcontractor Activity	Each contractor 3 monthly	No	Not on site at same time as Contractors.
Consistency in Hazard Reporting volume & Quality throughout all departments based the ratio of number of people in each department	At least 1 per person per month (all departments)	YES	100% 14 for project.

Risk Management Report																									
Company Name		Temo																							
Created on		May 18, 2016																							
From		Jan 6, 2016																							
To		Jan 23, 2016																							
Distance Unit		Km																							
Speed Unit		km/h																							
		Possible Target																							
		over Exceeding T5 K				No Seaworth				Harsh Braking				Device was unplugged				Open Circuit on Antenna				Short Circuit on Antenna			
Item	Group	Total Distance	Duration	Count	Duration	Count	Duration	Count	Duration	Count	Duration	Count	Duration	Count	Duration	Count	Duration	Count							
242954(4) Landcruiser Ute (4x4)	Car 401	210.51	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
242954(4) Landcruiser Trailbike	Car 401	340.01	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
248196(4)	Car 401	80.87	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
248196(4) Toyota 78 Series	Car 401	215.714	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
247410(4) Toyota Landcruiser Vagon	Car 401	170.504	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
242494(4)	Car 401	2956.04	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Landcruiser Vagon G83 - CM	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0	0:00:00	0							
246642(4) Toyota 78 Series	Car 401	0.00																							

Risk Management Report															
Company Name		Telenor													
Created on		May 14, 2014													
From		Jan 28, 2014													
To		Jan 31, 2014													
Distance Unit		km													
Speed Unit		km/h													
Item	Device	Total Distance	Area Exceeding 115 Km		No Searchback		Hatch Draking		Device was unplugged		Open Circuit on Antenna		Short Circuit on Antenna		
			Derivation	Coast	Derivation	Coast	Derivation	Coast	Derivation	Coast	Derivation	Coast	Derivation	Coast	
04707961 Landrover 4x4 (Jaguar)	Crane 40t	183.05	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
01305042 Landrover 4x4 (Jaguar)	Crane 40t	189.32	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
04939032	Crane 40t	24.44	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
01260634 Landrover 4x4 GML - CM	Crane 40t	12.32	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
01815441 Toyota 73 Series	Crane 40t	87.52	0.0000	0	0.0000	0	0.0000	0	0.0000	1	0.0000	0	0.0000	0	
04714031 Toyota Landrover Vagon	Crane 40t	8714.76	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
02449940	Crane 40t	768.23	0.0000	0	0.0000	2	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
02044230 Nissan Patrol	Crane 40t	0.00	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
01446220 Toyota 73 Series	Crane 40t	0.00	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
01446220 Toyota 73 Series	Crane 40t	0.00	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
01562503 Toyota 73 Series	Crane 40t	0.00	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
01622544 Toyota 73 Series	Crane 40t	0.00	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	
		2383.20	0.0000	0.00	0.00	0.00	2.00	0.000000	1.00	0.0000	1.00	0.0000	0.00	0.0000	0.00
							None								

[illegible]

4 Risk Assessments

Refer: **Site Specific Risk Register**



Santos Moomba
North Risk Register C

5 Emergency Response Procedures

5.1 Drills

As the crew are staying at the Santos Moomba camp, crew personnel fall under the Santos Emergency procedures & Drills.

Although no actual ERP drill was completed in the field, desktop emergency scenarios were conducted at toolbox. Refer Toolbox minutes.

Moomba North - Toolbox meeting 20140120 - Heat Stress – Action to take if someone is feeling the effects of heat stress.

Emergency Response Evaluation



Emergency
Response Evaluation.

6 Meetings

6.1 Induction



Santos Moomba
Project Induction.PDF

6.2 Daily Toolbox



Toolbox Mtg
20140115.pdf



Toolbox Mtg
20140116.pdf



Toolbox Mtg
20140117.pdf



Toolbox Mtg
20140118.pdf



Toolbox Mtg
20140120.pdf



Toolbox Mtg
20140121.pdf



Toolbox Mtg
20140126.pdf



Toolbox Mtg
20140201.pdf



Toolbox Mtg
20140202.pdf



Toolbox Mtg
20140203.pdf



Toolbox Mtg
20140204.pdf



Toolbox Mtg
20140205.pdf



Toolbox Mtg
20140206.pdf



Toolbox Mtg
20140207 JSA Mtg..pdf



Toolbox Mtg
20140207.pdf



Toolbox Mtg 201402
08-16.pdf

6.3 Weekly Meeting – Safety Sunday



Safety Sunday Mtg
20140119.pdf

6.4 Operations Meeting/Heads of Department Meetings



HOD_Mtg
-20140130.pdf

7 Audits and Inspections

7.1 External Audit

Nil completed

7.2 Inspections



01-401-Jan
2014-01-19 Observat



01-401-Jan-2014-01
-31 Observation.pdf



2014-02-08 HSE
Observation 1.pdf



2014-02-14 HSE
Observation.pdf



01-401
Jan-2014-01-20 Obs



01-401-Jan-2014-01
-28 Obs CM.pdf

8 Training

Training Summary

	<i>Personnel Participating</i>	<i>Training Time (Hrs)</i>	<i>Total Time (Hrs)</i>
<i>Terrex Corporate Inductions:</i>			
<i>Terrex Site Inductions:</i>	19	1.00	19.00
<i>Project Cultural Heritage Ind.</i>	19	1.00	19.00
<i>JSA</i>	5	0.5	2.50
<i>SIMOPS</i>	16	0.5	8.00
<i>SOP Revisions:</i>	45	1.00	45.00
<i>Safety Sunday:</i>	14	18/60	4.20
<i>Crew Competency:</i>	1	0.5	0.5
Total Training Hours:			98.2hrs

9 Events Reporting

9.1 Incident Reporting



Incident 000562
Heat Stress

9.2 Environmental



Environment
Staging.pdf

9.3 Hazard Reporting

HIR cards submitted over the project

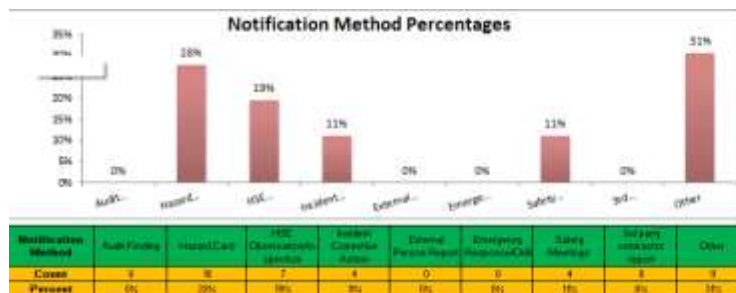
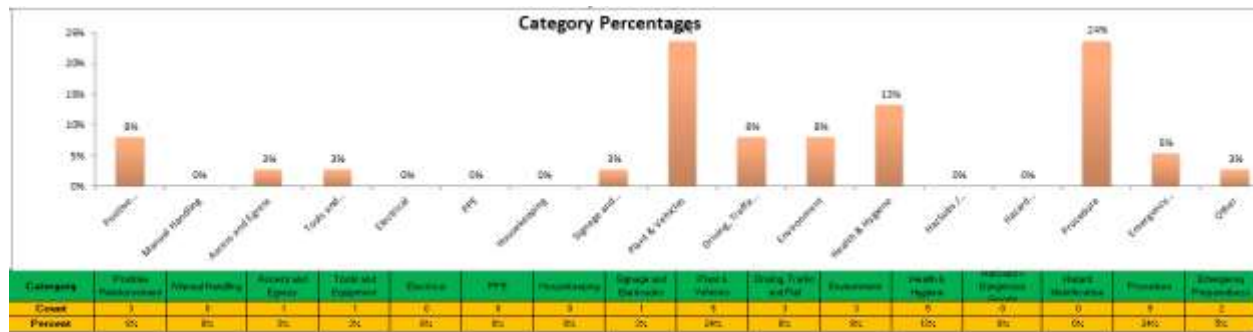
	Total
HIR Cards	14
% Closed	100%



Crew: Action / Hazard Tracking Register																
ATR No.	Project Number	Date of Report	Initiators Name	Haz ID / Obs / Insp	Category	Report Content - Incident / Accident / Hazard / Near Miss	Rating	Action Plan / Comment	Responsible Party	Target Date	Close-out Date	Status	Notes	Days to Close Against Target	Days to Close	
1	AO1038	17/01/2014	D.Rea	HSE Observation/Inspection	Procedure	Vehicles not fitted with dune pole.	Moderate	Stop enroute to Moomba & fit	CM	17/01/2014	17/01/2014	Closed	Vehicles stopped allow ed convey to catch up in dusty conditions & fit dune poles	0	0	
2	AO1038	17/01/2014	Eric Amedee	Safety Meetings	Procedure	Project requirement	Moderate	Conduct Project Induction	Client Rep	17/01/2014	17/01/2014	Closed	Cultural Heritage induction conducted by Tom Collins santos & Project Induction conducted by Eric Amedee RPS	0	0	
3	AO1038	17/01/2014	Eric Amedee	Safety Meetings	Procedure	Site requirement	Moderate	Review JSA & add section to include Seismic operation	HSE	18/01/2014	18/01/2014	Closed	Reviewed, presented to crew at toolbox meeting to review & discuss.	0	1	
4	AO1038	17/01/2014	Geoff Oswell	Other	Procedure	HSE files not set up	Minor	Establish HSE Files	HSE	21/01/2014	22/01/2014	Closed	Established HSE files for project.	1	5	
5	AO1038	18/01/2014	D.Rea	HSE Observation/Inspection	Tools and Equipment	A/C unit not working correctly	Moderate	Take to Northpoint Moomba to have fixed	CM	18/01/2014	18/01/2014	Closed	Vehicles taken to northpoint, A/C serviced& vehicle returned to field 19/01/14	0	0	
6	AO1038	18/01/2014	Toolbox	Other	Health & Hygiene	Laundry procedure not known.	Minor	Peter O'Donnel to ask Spotless. Geoff O also to investigate.	Observer & HSE	19/01/2014	19/01/2014	Closed	Answers provided at toolbox mtg. Spotless will do 2 @ week but may take up to 48hrs. Geoff advised as to whereabouts of machines & as insufficient machines offered to do crew washing.	0	1	
7	AO1038	18/01/2014	R. Vernon	Hazard Card	Environment	Uneven ground on line	Minor	Raise at Toolbox	HSE	19/01/2014	19/01/2014	Closed	Addressed at toolbox mtg.	0	1	
8	AO1038	19/01/2014	D.Rea	Other	Driving, Traffic and Rail	Fuel dongle not activated. Vehicles need to be fuelled.	Moderate	CM to obtain dongle from Toll & vehicles to be taken to Northpoint to be refuelled	CM	20/01/2014	19/01/2014	Closed	Vehicles taken to Northpoint immediately after toolbox & refuelled.	-1	0	
9	AO1038	19/01/2014	Geoff Oswell	HSE Observation/Inspection	Access and Egress	No hand rail on Recorder steps	Minor	Discuss with Nik Helme to ascertain where rails are.	HSE	20/01/2014	11/02/2014	Closed	Nik advised that rail must have been left in Bne after refit of recorder. Nik arranged for Smithy / Nick to have a look for rail. Rail found & sent out with 406. Rail fitted	21	22	
10	AO1038	19/01/2014	Geoff Oswell	Hazard Card	Driving, Traffic and Rail	Traffic not slowing when passing parked Terrex vehicle by side of road with beacon & hazard lights on.	Minor	Address at Toolbox meeting.	HSE	20/01/2014	20/01/2014	Closed	Addressed at toolbox mtg. Always assume vehicle will not slow down. Work to field side of vehicle.	0	1	
11	AO1038	19/01/2014	Geoff Oswell	Hazard Card	Environment	Observation of terrain where working	Minor	Address at Toolbox meeting.	HSE	20/01/2014	20/01/2014	Closed	Addressed at Toolbox mtg.	0	1	
12	AO 1038	19/01/2014	Laura Post	Hazard Card	Health & Hygiene	Hot days Temp over 40 degrees C	Major	Address at Toolbox meeting. Take regular breaks & only do what your body or fitness level allows.	HSE	20/01/2014	20/01/2014	Closed	Address at Toolbox mtg.	0	1	
13	AO1038	21/01/2014	D.Rea	HSE Observation/Inspection	Plant & Vehicles	One headlight out	Minor	Buy bulb at Northpoint. Crew advised type required.	CM	22/01/2014	22/01/2014	Closed	Saga - did not know what bulb. Advised - bought one - wrong base. Bought correct one & Wooley / Geoff fitted.	0	1	
14	AO1038	20/01/2014	D.Rea	Incident Corrective Action	Health & Hygiene	1X line crew coming down with heat stress.	Moderate	Knock crew off early.	CM	20/01/2014	20/01/2014	Closed	Crew ceased work at 1600hrs & returned to Moomba accomm.	0	0	
15	AO1038	20/01/2014	Incident	Incident Corrective Action	Health & Hygiene	1X line crew coming down with heat stress.	Moderate	Discuss incident & heat stress at toolbox	CM / HSE	21/01/2014	21/01/2014	Closed	IP explained heat stress case. HSE lead discussion re: heat stress raising points advised by the RFDS Refer Toolbox minutes 20140121	0	1	
16	AO1038	21/01/2014	Incident	Incident Corrective Action	Health & Hygiene	1X line crew coming down with heat stress.	Moderate	Crew to be knocked off early while present hot weather continues. CM to advise Line Boss to use discretion and knock crew off at around 1600 hrs in hot weather as experiencing.	CM	21/01/2014	21/01/2014	Closed	20/01/14 - discussion with Line boss as to best way to reduce work hrs. @ hr break in middle of day or knock off early. Recommend to mtg to knock off early. Heat still around 40degrees at 1800 hrs. Line Boss advised to use discretion & knock off crew as conditions dictate. 22/01/14 Majority of Crew knocked off at 1600hrs.	0	0	
17	AO1038	22/01/2014	D.Rea	Other	Signage and Barricades	Men symbolic signs (3) to be placed on Moomba by pass rd. Road to Moomba North 1.	Minor	Laura & Brenton to put signs out. Geoff to be spotter.	Geoff Oswell	22/01/2014	22/01/2014	Closed	Men symbolic & cables across rd. signs put out. 1 either end & 1 in middle.	0	0	
18	AO1038	22/01/2014	D.Rea	Other	Driving, Traffic and Rail	Crew advised that a vehicle required fuel	Minor	All vehicles to fuel up at Northpoint.	Geoff Oswell	22/01/2014	22/01/2014	Closed	Vehicles refuelled. Pump cut out at almost \$1000. Had to restart operation.	0	0	
19	AO1038	22/01/2014	D.Rea	Other	Procedure	Joel Carry to site.	Moderate	Call CH to advise of employee arrival. Geoff to provide project induction.	Geoff Oswell	24/01/2014	24/01/2014	Closed	22/01 Phoned CH Ballera Cody. Advised Tim Collins at Moomba. Called CH office - left message. 22/01 Took Joel through induction handout & placed Eric Amedee's project file on a stick for Joel. Joel opened & read files. CH induction by T. Collins 24/01	0	2	
20	AO1038	22/01/2014	D.Rea	Other	Plant & Vehicles	Vehicle A/C fixed by Northpoint. Vehicle to be taken out to staging	Insignificant	Take vehicle out	Line Boss	22/01/2014	22/01/2014	Closed	Vehicle taken to staging.	0	0	
21	AO 1038	27/01/2014	G. Oswell	Hazard Card	Plant & Vehicles	No RHS Drivers mirror - bolt missing	Minor	Get bolt & reattach	HSE	27/01/2014	27/01/2014	Closed	Obtained bolt from North Point. Not correct length but packed out until correct bolt can be obtained.	0	0	
22	A01038	27/01/2014	G. Oswell	Hazard Card	Plant & Vehicles	Wiper blades perished	Minor	Replace wiper blades	CM / HSE	4/02/2014	1/02/2014	Closed	Requested 402 bring a pair over; otherwise try to get from North Point Vehicle taken back to Bne. 01/02/14 Emailed Nick, 1/C Mecho that blades need changing.	-3	4	
23	AO1038	30/01/2014	Wooley	Hazard Card	Procedure	Nil facilities induction at Moomba	Minor	Refer HIR card to Andrew White as all accommodation elsewhere has a booklet in room detailing facilities & layout	HSE	5/02/2014	4/02/2014	Closed	04/02/14 Spoke to Spotless person who was amending the Evacuation Notices in the main recreation / dining area.	-1	4	
24	AO1038	30/01/2014	Wooley	Hazard Card	Environment	Nature of terrain - crab holes, rabbit holes & uneven terrain	Minor	Raise at toolbox & add to re-induction sheet.	HSE	4/02/2014	4/02/2014	Closed	No formal toolbox sessions held due to basically being on standby. Have discussed hazard cards with present	0	4	
25	AO1038	30/01/2014	Wooley	Hazard Card	Positive Reinforcement	Hot days - hydrate	Moderate	Pending hot weather - remind all to Hydrate	HSE	3/02/2014	4/02/2014	Closed	No formal toolbox sessions held due to basically being on standby. Have discussed hazard cards with present crew personnel while at the Recorder.	1	4	
26	AO1038	30/01/2014	Wooley	Hazard Card	Positive Reinforcement	Driving in dust & on coming traffic dusting other traffic out	Moderate	Raise at toolbox as reminder. Dust from vehicles can blind other vehicle for 2-3 seconds.	HSE	3/02/2014	3/02/2014	Closed	No formal toolbox sessions held due to basically being on standby. Have discussed hazard cards with present crew personnel while at the Recorder.	0	3	
27	AO038	31/01/2014	B.Ingram Email	Safety Meetings	Procedure	Email from B.Ingram re introduction of Fitness to work sign sheet.	Minor	Discussed initial draft with crew personnel. 01/02 discussed introduction with CM. Discuss with Crew. Print form & leave at Recorder.	HSE	3/02/2014	3/02/2014	Closed	Discussed with crew - advised Bne of comments. Form printed for 03/02; however, a standby day. Actioned 04/02/14	0	3	
28	AO1038	1/02/2014	Line Crew	Other	Plant & Vehicles	A/C unit not working correctly	Major	Book in for service at North Point & have service	CM	3/02/2014	9/02/2014	Closed	Darren saw North Point personnel & booked in 1 vehicle previously & advised that there were 2 to follow. North Point advised could service another one. Darren took vehicle to North Point.	6	8	
29	AO 1038	2/02/2014	P.O'Donnell	Safety Meetings	Other	Commencement of night shift - ? Meals	Minor	Ask Moomba staff of meal arrangements for night shift workers	HSE / CM	3/02/2014	3/02/2014	Closed	HSE ascertained that there is no dinner at 0600hrs when knock off of a morning only the usual breakfast. Dinner for night shift is available from 1700hrs before start work. Night shift to place order for night meal pack for meals through night.	0	1	
30	AO1038	2/02/2014	G. Oswell	HSE Observation/Inspection	Plant & Vehicles	Faulty fuel gauge V's report that person filled vehicle.	Moderate	Ash / Wooley to fill both fuel tanks & report.	Line Boss	3/02/2014	3/02/2014	Closed	Wooley filled the vehicle. HSE checked to see gauges registering full.	0	1	



31	AO1038	2/02/2014	P.O'Donnell	HSE Observation/Inspection	Plant & Vehicles	State of fuel for Recorder generator	Minor	Get fuel	CM	3/02/2014	4/02/2014	Closed	Fuel obtained - witnessed filling of Recorder tank 05/02. Operations Mgr. sending out a Nissan Ute which has a dedicated refuelling tank /	1	2
32	AO1038	6/02/2014	T. Ernst	Other	Procedure	JSA Night Operations JSA Received	Minor	Make JSA night ops folders & take to Recorder.	HSE	6/02/2014	6/02/2014	Closed	Made folders & took to Recorder.	0	0
33	AO1038	6/02/2014	T. Ernst	Other	Procedure	JSA Night Operations JSA Received	Minor	To have mtg with all, especially night ops personnel to review JSA & sign off on JSA.	CM/ HSE	7/02/2014	7/02/2014	Closed	Reviewed with Night T/S & CM. Held Meeting with observer & 2 night trouble shooters - refer toolbox minutes 20140208	0	1
34	AO1038	7/02/2014	T. Ernst	Incident Corrective Action	Positive Reinforcement	Santos Key Hazard Awareness & heat video Melting Man.	Minor	Discuss with crew	CM/ HSE	9/02/2014	21/02/2014	Closed	Have discussed with most of the crew. Put video clip on stick & left in Recorder. Included in Re-induction - waiting for return of line crew	12	14
35	AO1038	8/02/2014	G. Oswell	Hazard Card	Plant & Vehicles	Swatting files while driving	Minor	Discuss with crew as not good practice as must keep eyes on road.	HSE	10/02/2014	16/02/2014	Closed	Have discussed with some crew.	6	8
36	AO1038	8/02/2014	Wooley	Audit Finding	Plant & Vehicles	Vehicle LHS spot light not working correctly.	Minor	Remove bulb & examin.	HSE	9/02/2014	9/02/2014	Closed	Removed bulb - found to be a 24V bulb. Purchased new bulb & fitted.	0	1
37	AO1038	8/02/2014	P. O'Donnell	Hazard Card	Procedure	Attendance at SIMOPS Mtg	Minor	Refer matter of meeting to Operations Mgr.	HSE	10/02/2014	11/02/2014	Closed	SIMOPS assistant advised not necessary to attend. Advised that Line Boss to be advised of any flaring, venting or no go areas each day when presents for daily info.	1	3
38	AO1038	8/02/2014	G. Oswell	Other	Procedure	Arrival of Daniel Richardson to site	Moderate	Conduct Project Induction & CH induction & Santos SIMOPS on line induction	HSE	9/02/2014	9/02/2014	Closed	Inductions conducted & SIMOPS on line induction completed. Also obtained Santos ID card.	0	1
39	AO1038	10/02/2014	Wooley	Hazard Card	Access and Egress	Access track for lines 5, 6 & 7 - bad bumps if travelling too fast - very hard to see.	Minor	Flagged off area to make people aware of bumps.	Wooley	11/02/2014	10/02/2014	Closed	Went overboard & flagged off well in advance of bump & prior to bump.	-1	0
40	AO1038	11/02/2014	D.Rea	Other	Plant & Vehicles	Remove Cable cage from 740RCZ	Minor	Remove cage & set up vehicle for night trouble shooting	CM & Trouble Shooter	12/02/2014	12/02/2014	Closed	Removed cage.	0	1
41	AO1038	12/02/2014	Ash Windsor	Other	Housekeeping	Rooms not being serviced	Minor	Ask Supervisor as to procedure	HSE	13/02/2014	12/02/2014	Closed	Asked Supervisor. Advised room serviced on arrival & weekly thereafter. Left note in Recorder for crew. Possibly have to take lack of servicing back to Supervisor.	-1	0
42	AO1038	12/02/2014	Wooley	Hazard Card	Plant & Vehicles	Interior light staying on impairing vision at night. 017 RNR	Minor	Immediate disconnect light. Long term write on vehicle check sheet.	Wooley	12/02/2014	12/02/2014	Closed	disconnected & reported on vehicle check sheet. Parts in glove box.	0	0
43	AO1038	12/02/2014	Wooley	Hazard Card	Environment	Tree roots sticking out of the ground as a result of line preparation.	Minor	Dig out & Remove roots - No feasible & not permitted under Environmental plan. Advise all of hazard.	HSE	14/02/2014	14/02/2014	Closed	HSE has informal meeting with day crew at about 0900hrs & night shift at 1710hrs. Advised of HIR card.	0	2
44	AO1038	2/02/2014	G. Oswell	HSE Observation/Inspection	Plant & Vehicles	Faulty fuel gauge V's report that person filled vehicle.	Moderate	Ash / Wooley to fill both fuel tanks & report.	Line Boss	3/02/2014	3/02/2014	Closed	Wooley filled the vehicle. HSE checked to see gauges registering full.	0	1
45	AO1038	2/02/2014	P.O'Donnell	HSE Observation/Inspection	Plant & Vehicles	State of fuel for Recorder generator	Minor	Get fuel	CM	3/02/2014	4/02/2014	Closed	Fuel obtained - witnessed filling of Recorder tank 05/02. Operations Mgr. sending out a Nissan Ute which has a dedicated refuelling tank / system that will be used to refuel Recorder.	1	2
46	AO1038	6/02/2014	T. Ernst	Other	Procedure	JSA Night Operations JSA Received	Minor	Make JSA night ops folders & take to Recorder.	HSE	6/02/2014	6/02/2014	Closed	Made folders & took to Recorder.	0	0
47	AO1038	6/02/2014	T. Ernst	Other	Procedure	JSA Night Operations JSA Received	Minor	To have mtg with all, especially night ops personnel to review JSA & sign off on JSA.	CM/ HSE	7/02/2014	7/02/2014	Closed	Reviewed with Night T/S & CM. Held Meeting with observer & 2 night trouble shooters - refer toolbox minutes 20140208	0	1
48	AO1038	7/02/2014	T. Ernst	Incident Corrective Action	Positive Reinforcement	Santos Key Hazard Awareness & heat video Melting Man.	Minor	Discuss with crew	CM/ HSE	9/02/2014	21/02/2014	Closed	Have discussed with most of the crew. Put video clip on stick & left in Recorder. Included in Re-induction - waiting for return of line crew Some had already seen Melting man.	12	14
49	AO1038	8/02/2014	G. Oswell	Hazard Card	Plant & Vehicles	Swatting files while driving	Minor	Discuss with crew as not good practice as must keep eyes on road.	HSE	10/02/2014	16/02/2014	Closed	Have discussed with some crew.	6	8
50	AO1038	8/02/2014	Wooley	Audit Finding	Plant & Vehicles	Vehicle LHS spot light not working correctly.	Minor	Remove bulb & examin.	HSE	9/02/2014	9/02/2014	Closed	Removed bulb - found to be a 24V bulb. Purchased new bulb & fitted.	0	1
51	AO1038	8/02/2014	P. O'Donnell	Hazard Card	Procedure	Attendance at SIMOPS Mtg	Minor	Refer matter of meeting to Operations Mgr.	HSE	10/02/2014	11/02/2014	Closed	SIMOPS assistant advised not necessary to attend. Advised that Line Boss to be advised of any flaring, venting or no go areas each day when presents for daily info.	1	3
52	AO1038	8/02/2014	G. Oswell	Other	Procedure	Arrival of Daniel Richardson to site	Moderate	Conduct Project Induction & CH induction & Santos SIMOPS on line induction	HSE	9/02/2014	9/02/2014	Closed	Inductions conducted & SIMOPS on line induction completed. Also obtained Santos ID card.	0	1
53	AO1038	10/02/2014	Wooley	Hazard Card	Access and Egress	Access track for lines 5, 6 & 7 - bad bumps if travelling too fast - very hard to see.	Minor	Flagged off area to make people aware of bumps.	Wooley	11/02/2014	10/02/2014	Closed	Went overboard & flagged off well in advance of bump & prior to bump.	-1	0
54	AO1038	11/02/2014	D.Rea	Other	Plant & Vehicles	Remove Cable cage from 740RCZ	Minor	Remove cage & set up vehicle for night trouble shooting	CM & Trouble Shooter	12/02/2014	12/02/2014	Closed	Removed cage.	0	1
55	AO1038	12/02/2014	Ash Windsor	Other	Housekeeping	Rooms not being serviced	Minor	Ask Supervisor as to procedure	HSE	13/02/2014	12/02/2014	Closed	Asked Supervisor. Advised room serviced on arrival & weekly thereafter. Left note in Recorder for crew. Possibly have to take lack of servicing back to Supervisor.	-1	0
56	AO1038	12/02/2014	Wooley	Hazard Card	Plant & Vehicles	Interior light staying on impairing vision at night. 017 RNR	Minor	Immediate disconnect light. Long term write on vehicle check sheet.	Wooley	12/02/2014	12/02/2014	Closed	disconnected & reported on vehicle check sheet. Parts in glove box.	0	0
57	AO1038	12/02/2014	Wooley	Hazard Card	Environment	Tree roots sticking out of the ground as a result of line preparation.	Minor	Dig out & Remove roots - No feasible & not permitted under Environmental plan. Advise all of hazard.	HSE	14/02/2014	14/02/2014	Closed	HSE has informal meeting with day crew at about 0900hrs & night shift at 1710hrs. Advised of HIR card.	0	2
58	AO1038	12/02/2014	Darren Rea	Other	Tools and Equipment	No jumper leads to start vehicle	Minor	Buy a set from North Point	Darre Rea	13/02/2014	13/02/2014	Closed	Purchased & in vehicle at yard.	0	1
59	AO1038	14/02/2014	G. Oswell	HSE Observation/Inspection	Tools and Equipment	Tarp over battery charges being wind blown & requiring attention.	Minor	Advised Line Boss who, with other Trouble Shooter, was going to try to set up in a better manner.	Line Boss	15/02/2014	17/02/2014	Closed	Endeavoured to set up in a better manner but asked HSE to bring out spare tarp at the Moomba yard. Spare tarp taken to staging. Additional ropes set up both under & above original tarp. Sides re-attached. Holding for now.	2	3



10 Health Performance

10.1 Alcohol Testing

BAC Test Conducted Over the Project

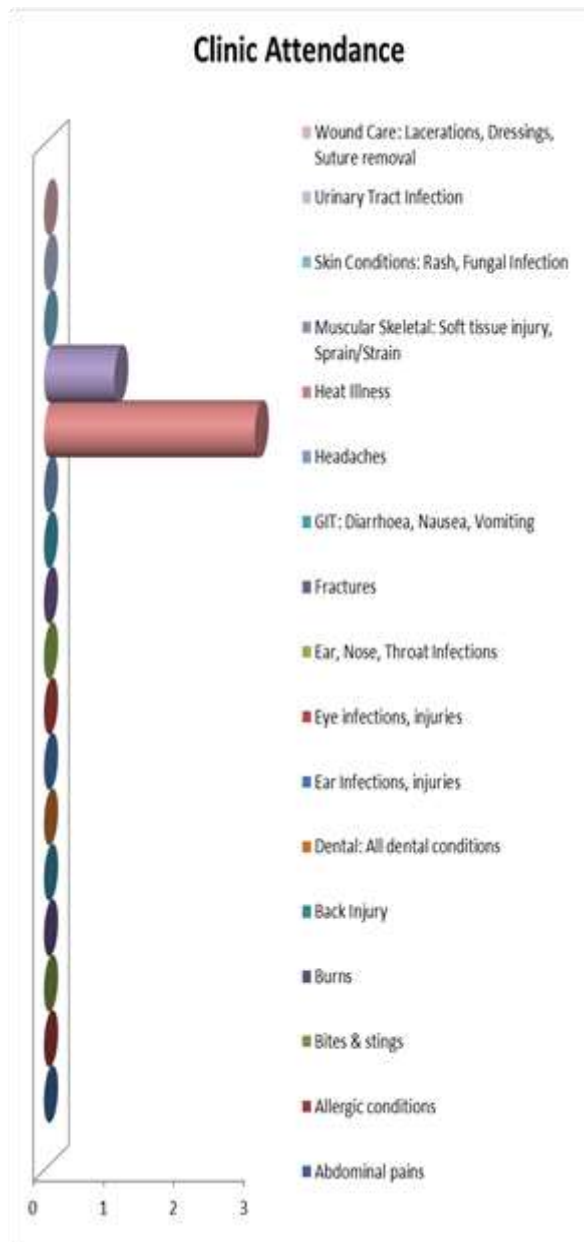
	Jan 2014	Feb 2014	Total
No. Tested	165	80	245
% Passed	100%	100%	100%

10.2 Drug Testing

Preliminary Drug Tests over the project

	Jan 2014	Feb 2014	Total
No. Tested	0	0	0
% Passed			

10.3 Illnesses



Appendix F Personnel Crew List and Numbers

CREW LIST

Admin Staff	
Crew Manager	Darren Rea
HSE Advisor	Geoffrey Oswell
Technical	
Observer	Peter O'Donnell
Observer	Joel Carrey
Senior Line	
Line Boss	Ashley Windsor
Troubleshooter	
Troubleshooter	Matthew Woolley
Troubleshooter	Anthony Claridge
Troubleshooter	Daniel Richardson
Line Crew	
Line Crew	Luke Anderson
Line Crew	Brenton Bishop
Line Crew	Jaron Cathie
Line Crew	Laura Post
Line Crew	Justin Selter
Line Crew	Ty Turner-Bryan
Line Crew	Martin Vale
Line Crew	Robert Vernon

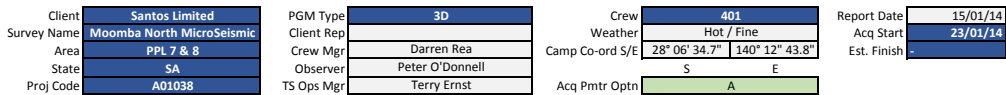
CREW NUMBERS

POSITION	NUMBERS
Crew Manager	1
HSE Advisor	1
Observer	2
Line Boss	1
Trouble Shooter	3
Line Crew	8

Appendix G Recording Statistics

		WORKING RATE							STANDBY			NO CHARGE / OTHER		
Acq Pmtr Optn	Date	Initial Layout/ Pickup	Recording	Line Move	Weather	Other	WR Total	Cumulative WR Total	Other	ST Total	Cumulative ST Total	Mobilisation	NCO Total	Cumulative NCO Total
A	15/01/2014											10.00	10.00	10.00
A	16/01/2014											10.00	10.00	20.00
A	17/01/2014	8.30					8.30	8.30				2.00	2.00	22.00
A	18/01/2014	11.50					11.50	19.80						22.00
A	19/01/2014	11.50					11.50	31.30						22.00
A	20/01/2014	10.10					10.10	41.40						22.00
A	21/01/2014	10.10					10.10	51.50						22.00
A	24/01/2014							51.50						22.00
A	25/01/2014		11.50				11.50	63.00						22.00
A	26/01/2014		11.50				11.50	74.50						22.00
A	27/01/2014		11.50				11.50	86.00						22.00
A	28/01/2014		8.50	3.00			11.50	97.50						22.00
A	29/01/2014		11.50				11.50	109.00						22.00
A	30/01/2014		6.00			5.50	11.50	120.50						22.00
A	31/01/2014							120.50	10.00	10.00	10.00			22.00
A	1/02/2014		11.50				11.50	132.00						22.00
A	2/02/2014							132.00	10.00	10.00	20.00			22.00
A	3/02/2014							132.00	10.00	10.00	30.00			22.00
A	4/02/2014							132.00	10.00	10.00	40.00			22.00
A	5/02/2014		11.50				11.50	143.50						22.00
A	6/02/2014		14.50				14.50	158.00						22.00
A	7/02/2014		24.00				24.00	182.00						22.00
A	8/02/2014		24.00				24.00	206.00						22.00
A	9/02/2014		24.00				24.00	230.00						22.00
A	10/02/2014		24.00				24.00	254.00						22.00
A	11/02/2014		24.00				24.00	278.00						22.00
A	12/02/2014		24.00				24.00	302.00						22.00
A	13/02/2014		24.00				24.00	326.00						22.00
A	14/02/2014		24.00				24.00	350.00						22.00
A	15/02/2014		4.00		20.00		24.00	374.00						22.00
A	16/02/2014		12.50		2.50		15.00	389.00						22.00
A	22/02/2014							389.00						22.00
A	23/02/2014	12.00					12.00	401.00						22.00
A	24/02/2014	2.00					2.00	403.00						22.00
Grand Total		65.50	306.50	3.00	22.50	5.50	403.00	5788.30	40.00	40.00	710.00	22.00	22.00	734.00

Appendix H Survey Daily Reports

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<u>3. HOURS</u>	Hourly Rate	T-Key / L-Sum	Working Rate	Standby	Stand Down	No Chg / Other	Total	Comments
Mobilisation						10.00	10.00	
Demobe/Remobe								
Camp Setup/Packup								
Inductions								
Toolbox								
Safety Meeting								
Travel								
Recorder Setup								
Initial Layout/Pick up								
Experimental								
H/Wires, SIMS, Sweep Tests								
QC Spread								
QC / Testing								
Recording								
Troubleshooting								
Recorder Moveup								
Spread Chewage								
Spread Damage Other								
Detours								
Waiting On Spread								
Line Move								
Prospect Move								
Camp Move								
Traverse Move								
Swath Move								
Vibe Travel								
Weather								
Recorder Down								
Vibes Down								
Human Error								
Washdown								
Other								
TOTAL	-	-	-	-	-	10.00	10.00	
CUM TOTAL	0.00	0.00	0.00	0.00	0.00	10.00	10.00	

*Crew mobilized from Brisbane at @ 6.30 am and arrived in Charleville at @ 7.00 pm
*Major road works encountered between Brisbane to Toowoomba and Roma to Charleville which lengthened travel by @ 1 hour.

*Field technician Nik Helme accompanying crew to site.



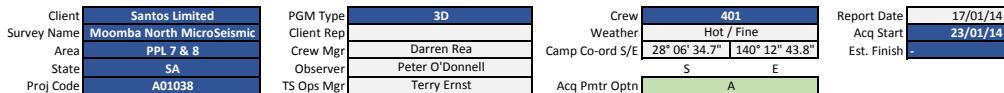
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TEMP: 26.7* - 42.7*

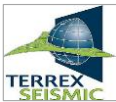


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Mobilisation						2.00	2.00	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up			8.30				8.30	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording							-	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	8.30	-	-	2.00	10.30	
CUM TOTAL	0.00	0.00	8.30	0.00	0.00	22.00	30.30	

<p>*Toolbox at 6.00 am - Topics discussed: 3rd party traffic with emphasis on road trains and a warning about travelling through dust. *Depart Innamincka at 6.30 am. *Met Eric Amedee at the equipment staging area at @ 8.30 am at parked up the heavy vehicles. *Santos inductions at midday. *Crew out to survey and begin loading trucks and deploying equipment.</p> <p>*4 heavy vehicle drivers returned to Innamincka in the afternoon to overnight and travel back to Brisbane. *Field technician Nik Helme on site.</p> <p>TEMP: 25.5* - 43.2*</p>



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 17/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	14.0			14.0			
	10.0			10.0			
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	20
	250
	20

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

Client Representative:

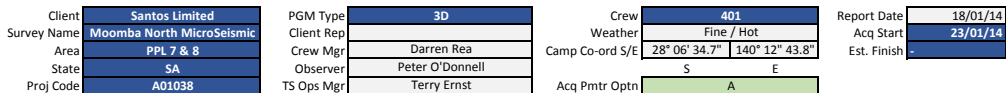
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10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

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Line Layout	Layout Station # From	Layout Station # To	Layout Total
CPSAN14-01	1000	1097	98
CPSAN14-02	1000	1096	97
Total Stations Laid Out			195

Line Pickup	Pickup Station # From	Pickup Station # To	Pickup Total
Total Stations Picked Up			0

Mobilisation							-	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox								
Safety Meeting								
Travel								
Recorder Setup								
Initial Layout/Pick up			11.50				11.50	
Experimental								
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing								
Recording								
Troubleshooting								
Recorder Moveup								
Spread Chewage								
Spread Damage Other								
Detours								
Waiting On Spread								
Line Move								
Prospect Move								
Camp Move								
Traverse Move							-	
Swath Move								
Vibe Travel							-	
Weather								
Recorder Down								
Vibes Down								
Human Error								
Washdown							-	
Other								
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	19.80	0.00	0.00	22.00	41.80	

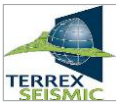
*Toolbox 6.00 am, Topics discussed: Constant 3rd party traffic around the area of operations - utes and road trains. Temperature range expected for the days ahead 40 deg +, Hydrate & keep a close eye on your work colleagues - any sign of aggravation or deterioration put them in an airconditioned vehicle and hydrate.

*Positioning of equipment and the basic layout of the lines.

*Discussion of the benefits of running the line cables and transverse through available culverts avoiding the need to lay over the Della road.

*Field technician Nik Helme on site.

TEMP: 36.9* - 43.5*



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Fine / Hot
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 18/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	14.0			14.0			
	10.0			10.0			9 staying on crew + field Tech's vehicle.
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	20
	250
	20

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

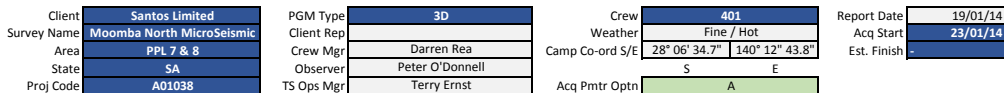
Client Representative: 0

Signature

10. ADVANCE PARTY LEAD

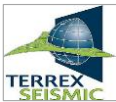
Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox								
Safety Meeting								
Travel								
Recorder Setup								
Initial Layout/Pick up			11.50				11.50	
Experimental								
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing								
Recording								
Troubleshooting								
Recorder Moveup								
Spread Chewage								
Spread Damage Other								
Detours								
Waiting On Spread								
Line Move								
Prospect Move								
Camp Move								
Traverse Move							-	
Swath Move								
Vibe Travel							-	
Weather								
Recorder Down								
Vibes Down								
Human Error								
Washdown							-	
Other								
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	31.30	0.00	0.00	22.00	53.30	

Page 9 of 68



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Fine / Hot
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 19/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	14.0			14.0			
	10.0			10.0			
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	20
	250
	20

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

Client Representative:

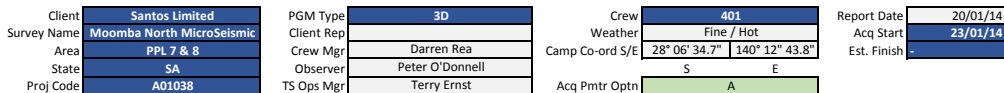
0

Signature

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

[illegible]

Line Layout	Layout Station # From	Layout Station # To	Layout Total
CPSAN14-06	1000	1096	97
CPSAN14-07	1000	1096	97
CPSAN14-08	1000	1040	41
Total Stations Laid Out			235

Line Pickup	Pickup Station # From	Pickup Station # To	Pickup Total
Total Stations Picked Up			0

Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up			10.10				10.10	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording							-	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	10.10	-	-	-	10.10	
CUM TOTAL	0.00	0.00	41.40	0.00	0.00	22.00	63.40	

*Toolbox 6:00 am: Topics discussed - Food and water intake to be maintained throughout the day to keep hydrated. Assist each other as much as possible.
Third party traffic increasing on the Moomba North bypass - be aware when entering the traffic flow and keep a check on complacency.

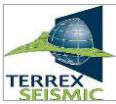
*Crew battling with the heat and digging in the geophones.

*Crew member Anthony Claridge taken back to camp with possible case of heat stress. HSE and CM assessed the situation and with one of the symptoms being back (kidney) pains he was taken to the RFDs clinic for immediate assessment of his condition.

Anthony was rehydrated at the clinic, by means of IV fluid and released from the clinic. He will go back tomorrow morning for a check-up.

*Field technician Nik Helme on site.

TEMP: 28.7* - 43.0*



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Fine / Hot
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 20/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
		14.0		14.0			
		10.0		10.0			
		5.0		5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	20
	250
	20

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

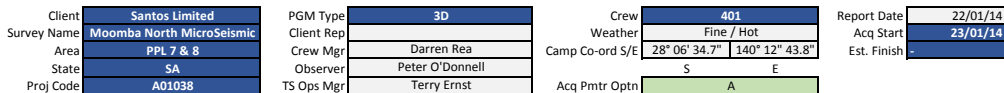
Client Representative: 0

Signature

10. ADVANCE PARTY LEAD

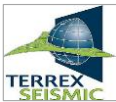
Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up			10.10				10.10	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording							-	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	10.10	-	-	-	10.10	
CUM TOTAL	0.00	0.00	51.50	0.00	0.00	22.00	73.50	

<p>* Toolbox 6.00 am: Topics discussed - Food and water intake to be maintained throughout the day to keep hydrated. Assist each other as much as possible.</p> <p>Third party traffic increasing on the Moomba North bypass - be aware when entering the traffic flow and keep a check on complacency.</p> <p>*Anthony Claridge given a clearance at 7.00 am from the RFDS to return to full duties.</p> <p>*Deployment of equipment completed on all 10 lines on Moomba north project.</p> <p>*Met with Mark Morrow from field services to discuss our equipment deployment plans in relation to roads and infrastructure.</p> <p>*All Moomba north road crossings ready to be joined tomorrow to complete full spread.</p> <p>*</p> <p>*Field technician Nik Helme on site.</p> <p>TEMP: 27.3* - 41.4*</p>



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Fine / Hot
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 22/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	14.0			14.0			
	10.0			10.0			
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

Client Representative:

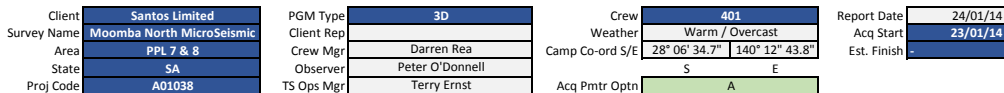
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Signature

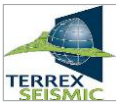
10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording							-	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	-	-	-	-	-	
CUM TOTAL	0.00	0.00	51.50	0.00	0.00	22.00	73.50	



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Warm / Overcast
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 24/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	15.0			15.0			
	10.0			10.0			
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

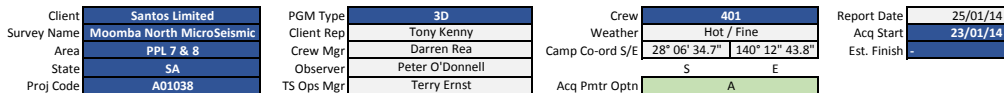
Client Representative: 0

Signature

10. ADVANCE PARTY LEAD

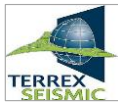
Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			11.50				11.50	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	63.00	0.00	0.00	22.00	85.00	

<p>*Observers and trouble shooters arrive on site at 6.00 am to ensure all equipment was operational for the scheduled continuation of the fracturing of well 196 at 7.00 am.</p> <p>*Line crew drive the lines and re bury geophones effected by extremely high winds the previous night.</p> <p>*Clean vehicles and park in the Terrex yard Moomba.</p> <p>*Tony Kenny arrived on site</p> <p>*Field technician Nik Helme on site.</p> <p>TEMP: 22.5° - 36.0°</p>



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 25/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	15.0			15.0			
	10.0			10.0			
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

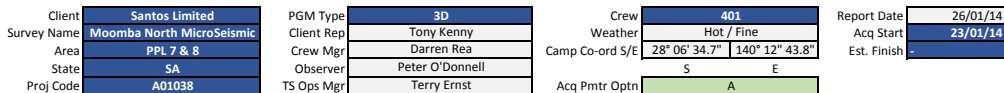
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

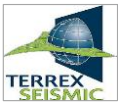
Client Representative: Tony Kenny

Signature

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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			11.50				11.50	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	74.50	0.00	0.00	22.00	96.50	

<p>*Observers and trouble shooters arrive on site at 6.00 am to ensure all equipment was operational for the scheduled continuation of the fracturing of well 196 at 7.00 am.</p> <p>*Day shift staff: Field Tech - Nik Helme, Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor & Matthew Woolley.</p> <p>*Temperature starting to heat up again - remainder of the crew reminded the importance of continual water intake and proper PPE.</p> <p>*7 layout crew depart Innamincka at 6 am heading back to Brisbane - overnighiting in Charleville.</p> <p>*Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.</p>
<p>*Field technician Nik Helme on site.</p>
<p>TEMP: 22.9* - 38.6*</p>



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 26/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			Layout crew back to Brisbane
	8.0			8.0			
	4.0			4.0			Curtain side truck back to Brisbane

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

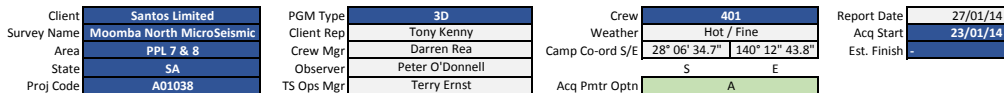
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

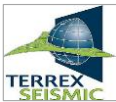
Client Representative: Tony Kenny

Signature

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Mobilisation							-	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			11.50				11.50	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	86.00	0.00	0.00	22.00	108.00	

<p>*Observers and trouble shooters arrive on site at 6.00 am to ensure all equipment was operational for the scheduled continuation of the fracturing of well 196 at 7.00 am.</p> <p>*Day shift staff: Field Tech - Nik Helme, Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor & Matthew Woolley.</p> <p>*Accommodation changes constant for all personnel in Moomba</p> <p>*Inbound layout crew travelled from Charleville to Toowoomba and overnighted at Charlton.</p> <p>*Geoff Osswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.</p> <p>*Field technician Nik Helme on site.</p> <p>TEMP: 25.3* - 40.7*</p>
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Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 27/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	4.0			4.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

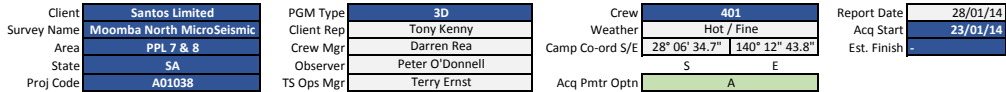
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

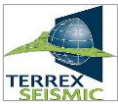
Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			8.50				8.50	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move			3.00				3.00	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	97.50	0.00	0.00	22.00	119.50	

<p>* Observers and trouble shooters arrive on site at 6.00 am to ensure all equipment was operational for the scheduled continuation of the fracturing of well 196 at 7.00 am.</p> <p>* Day shift staff: Field Tech - Nik Helme, Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor & Matthew Woolley.</p> <p>* Halliburton crew completed stage 8 frac on well 196 and moved equipment to well 197.</p> <p>* Terrex staff collected equipment from well 196 and re deployed to well 197.</p> <p>* Inbound layout crew travelled from Toowoomba back to Terrex Brisbane office.</p> <p>* Crew reminded of the importance of constant hydration to combat heat stress - temperature still rising.</p> <p>* Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.</p> <p>* Field technician Nik Helme on site.</p> <p>TEMP: 26.4* - 41.3*</p>



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 28/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

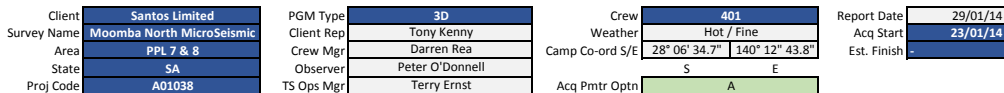
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

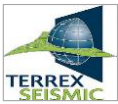
Client Representative: Tony Kenny

Signature

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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			11.50				11.50	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	109.00	0.00	0.00	22.00	131.00	

Page 25 of 68



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 29/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

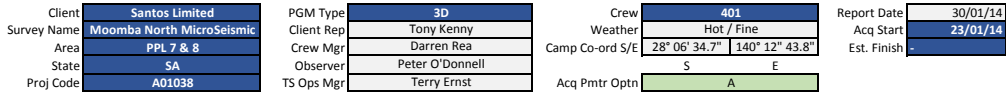
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

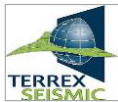
Client Representative: Tony Kenny

Signature

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Mobilisation							-
Demobe/Remobe							-
Camp Setup/Packup							-
Inductions							-
Toolbox							-
Safety Meeting							-
Travel							-
Recorder Setup							-
Initial Layout/Pick up							-
Experimental							-
H/Wires, SIMS, Sweep Tests							-
QC Spread							-
QC / Testing							-
Recording			6.00				6.00
Troubleshooting							-
Recorder Moveup							-
Spread Chewage							-
Spread Damage Other							-
Detours							-
Waiting On Spread							-
Line Move							-
Prospect Move							-
Camp Move							-
Traverse Move							-
Swath Move							-
Vibe Travel							-
Weather							-
Recorder Down							-
Vibes Down							-
Human Error							-
Washdown							-
Other			5.50				5.50
TOTAL	-	-	11.50	-	-	-	11.50
CUM TOTAL	0.00	0.00	120.50	0.00	0.00	22.00	142.50

<p>*Observers and trouble shooters arrive on site at 6.00 am to ensure all equipment was operational for the scheduled continuation of the fracturing of well 196 at 7.00 am.</p> <p>*Day shift staff: Field Tech - Nik Helme, Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor & Matthew Woolley.</p> <p>*Recording completed on 197 at midday.</p> <p>*Toyota landcruiser 766-KPZ put into Northpoint Moomba to air conditioner repaired.</p> <p>*Still no extra accommodation available in Moomba.</p> <p>*Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.</p> <p>*Field technician Nik Helme on site.</p> <p>TEMP: 24.5° - 41.4°</p>
--



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 30/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

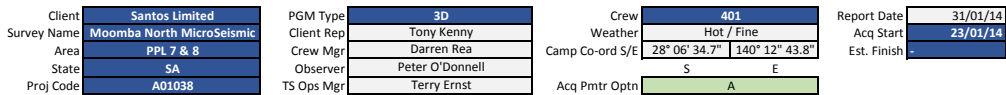
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

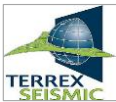
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Mobilisation							-
Demobe/Remobe							-
Camp Setup/Packup							-
Inductions							-
Toolbox							-
Safety Meeting							-
Travel							-
Recorder Setup							-
Initial Layout/Pick up							-
Experimental							-
H/Wires, SIMS, Sweep Tests							-
QC Spread							-
QC / Testing							-
Recording							-
Troubleshooting							-
Recorder Moveup							-
Spread Chewage							-
Spread Damage Other							-
Detours							-
Waiting On Spread							-
Line Move							-
Prospect Move							-
Camp Move							-
Traverse Move							-
Swath Move							-
Vibe Travel							-
Weather							-
Recorder Down							-
Vibes Down							-
Human Error							-
Washdown							-
Other				10.00			10.00
TOTAL	-	-	-	10.00	-	-	10.00
CUM TOTAL	0.00	0.00	120.50	10.00	0.00	22.00	152.50

*Perforation shot at Moomba North postponed until tomorrow - crew on standby
 *Everyone reminded to continue food and water intake throughout the day to keep hydrated
 *Observers commence retrieval of data to be sent to Michael Giles.

*Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.
 *Field technician Nik Helme on site

TEMP: 21.8* - 40.9*



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 31/01/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

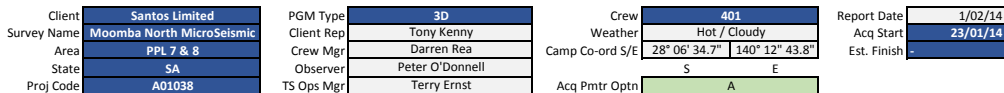
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

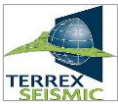
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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			11.50				11.50	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	132.00	10.00	0.00	22.00	164.00	

*Observers and trouble shooters arrive on site at 6.00 am to ensure all equipment was operational for the scheduled commencement of Mooma North Perfection.
 *Day shift staff: Field Tech - Nik Helme, Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor & Matthew Woolley.
 *First shot taken at 9.00 am - second shot recorded at 3.30 pm.

*Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.
 *Field technician Nik Helme on site.

TEMP: 25.5° - 39.4°



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Cloudy
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 1/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

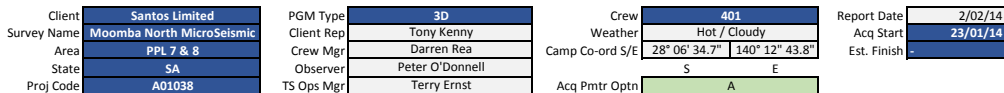
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

Client Representative: Tony Kenny

Signature

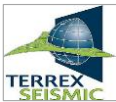
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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording							-	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other				10.00			10.00	
TOTAL	-	-	-	10.00	-	-	10.00	
CUM TOTAL	0.00	0.00	132.00	20.00	0.00	22.00	174.00	

*Crew on standby
*Observers to the recorder to complete gathering data to be sent to Santos Adelaide.
*Trouble shooters change out batteries to be re-charged

*Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.
*Field technician Nik Helme on site.

TEMP: 27.1* - 38.8*



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Cloudy
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 2/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

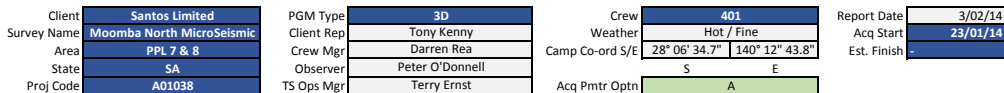
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

[illegible]

Line Layout	Layout Station # From	Layout Station # To	Layout Total
Total Stations Laid Out			0

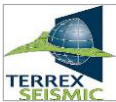
Line Pickup	Pickup Station # From	Pickup Station # To	Pickup Total
Total Stations Picked Up			0

Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording							-	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other				10.00			10.00	
TOTAL	-	-	-	10.00	-	-	10.00	
CUM TOTAL	0.00	0.00	132.00	30.00	0.00	22.00	184.00	

*CREW ON STANDBY

*Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.
*Field technician Nik Helme on site.

TEMP: 27.3* - 39.1*



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 3/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

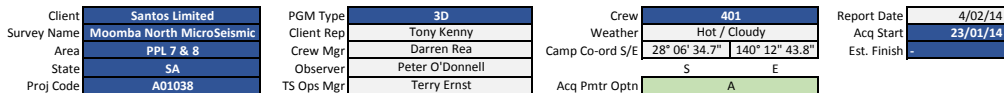
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

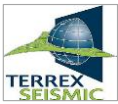
Client Representative: Tony Kenny

Signature

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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording							-	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other				10.00			10.00	
TOTAL	-	-	-	10.00	-	-	10.00	
CUM TOTAL	0.00	0.00	132.00	40.00	0.00	22.00	194.00	

<p>*CREW ON STANDBY</p> <p>*Observers activated both North Moomba - Roswell spread & trouble shot.</p> <p>*Trouble shooters rotated line batteries through the charging station.</p> <p>*Observers changed oil in the recorders generator.</p> <p>*BAD EQUIPMENT: 1 x transverse cable - chewed by animals.</p> <p>*Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.</p> <p>*Field technician Nik Helme on site.</p> <p>TEMP: 26.1* - 42.1*</p>



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Cloudy
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 4/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

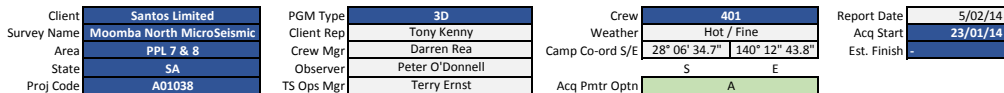
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

Client Representative: Tony Kenny

Signature

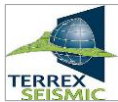
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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			11.50				11.50	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	11.50	-	-	-	11.50	
CUM TOTAL	0.00	0.00	143.50	40.00	0.00	22.00	205.50	

*Observers and trouble shooters arrive on site at 6.00 am to ensure all equipment was operational for the scheduled continuation of Mooma North Activity.
 *Day shift staff: Field Tech - Nik Helme, Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor & Matthew Woolley.
 *Stage #1 frac @ 1.30 pm, Stage #2 perf @ 4.55 pm.

*BAD EQUIPMENT: 1 x line cable, 1 x hanger of geophones.
 *Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.
 *Field technician Nik Helme on site.

TEMP: 29.2° - 41.2°



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 5/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

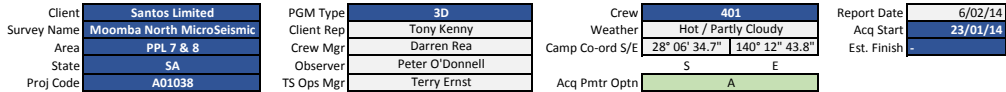
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

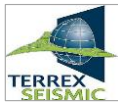


Line	File From	File To	Stn From	Stn To	Swath #	Stn's	Skips	VPs	Charge VPs	L/km	SqKM
Daily Total							-	-	-	-	-
					Cumulative PGM Total			-	-	-	-
					Remaining			-	-	-	28.680
					% Completed			0.0%	0.0%	0.0%	0.0%
					Average Daily Production			-	-	-	-

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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			14.50				14.50	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	14.50	-	-	-	14.50	
CUM TOTAL	0.00	0.00	158.00	40.00	0.00	22.00	220.00	

*Observers and trouble shooters arrive on site at 6.00 am to ensure all equipment was operational for the scheduled continuation of Moomba North Activity.
 *Day shift staff: Field Tech - Nik Helme, Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor & Matthew Woolley.
 *Stage #2 Frac - well M200 @ 8.00 am, Stage #3 Perf - well M200 @ 11.15 am
 *Stage #1 Frac - well M198 @ 11.00 am, Stage #2 Perf - well M198 @ 16.18 pm.
 *Stage #1 Frac - well M201 @ 16.30 pm, Stage #2 Perf - well M201 @ 20.30 pm.
 *BAD EQUIPMENT:
 *Geoff Oswell, Nik Helme, Tony Kenny & Anthony Claridge still accommodated in Innamincka due to no rooms available in Moomba.
 *Field technician Nik Helme on site.
 TEMP: 28.2* - 39.5*



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Partly Cloudy
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 6/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

7. ADDITIONAL CHARGE ITEMS

Item
Crew manager
Line crew
HSE
Channels
Landcruiser
AHV IV
Hemi 60
Hemi 50
Hemi 44
Envirovibe
Accommodation
Other crew
Other vehicle

Units

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

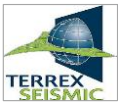
Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

Client Representative: Tony Kenny

Signature



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 7/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

Terrex Crew Manager: Darren Rea

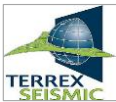
Signature

Client Representative: Tony Kenny

Signature



Recorded for 24hrs, 1 x Day charge as per contract.



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 8/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

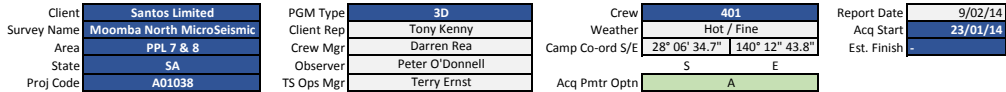
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

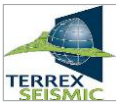
Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			24.00				24.00	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	24.00	-	-	-	24.00	
CUM TOTAL	0.00	0.00	230.00	40.00	0.00	22.00	292.00	

<p>*Observers and trouble shooters shift change at 6.00 am.</p> <p>*Day shift staff: Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor, Daniel Richardson</p> <p>*Night shift: Observer Joel Carry, Trouble shooters - Matthew Woolley, Anthony Claridge.</p>	
<p>*M198 @ 9.56 Stage #3 Frac 10400 - 10410, M198 @ 15.15 Stage #4 Perf (misfire), M198 @ 23.00 Stage #4 Perf 10191 - 10201 ft (misfire)</p> <p>*M200 @ 15.54, Stage #5 Frac 9009 - 9019 ft, M200 @ 17.30 Stage #6 Perf 8460 - 8470 ft.</p> <p>*M201 @ 7.22 Stage #4 Frac 10241 - 10251 ft, M201 @ 10.30 Stage #5 Perf 10090 - 10100 ft.</p>	
TEMP: 34.7* - 41.7*	Recorded for 24hrs, 1 x Day charge as per contract.



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 9/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	7.0			7.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

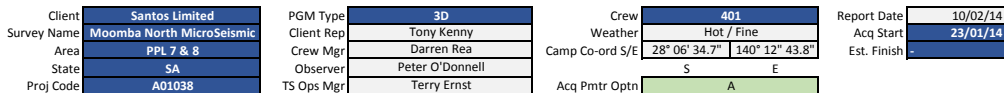
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

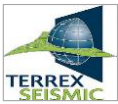
Client Representative: Tony Kenny

Signature

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Mobilisation							-	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox								
Safety Meeting							-	
Travel								
Recorder Setup								
Initial Layout/Pick up								
Experimental								
H/Wires, SIMS, Sweep Tests							-	
QC Spread								
QC / Testing								
Recording			24.00				24.00	
Troubleshooting								
Recorder Moveup								
Spread Chewage								
Spread Damage Other								
Detours							-	
Waiting On Spread								
Line Move								
Prospect Move								
Camp Move								
Traverse Move							-	
Swath Move								
Vibe Travel							-	
Weather								
Recorder Down								
Vibes Down								
Human Error								
Washdown							-	
Other								
TOTAL	-	-	24.00	-	-	-	24.00	
CUM TOTAL	0.00	0.00	254.00	40.00	0.00	22.00	316.00	

*Observers and trouble shooters shift change at 6.00 am
*Day shift staff: Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor, Daniel Richardson
*Night shift: Observer Joel Carry, Trouble shooters - Matthew Woolley, Anthony Claridge.
*Crew reminded of the importance of water and PPE to combat the effects of heat
*Windy days causing dust to obscure vision whilst driving - caution to be used.
*M198 @ 5.55 Stage #4 Perf 10191 - 10201, M198 @ 11.00 Stage #4 Frac 10191 - 10201, M198 @ 20.30 Stage #5 Frac 9873 - 9883 ft.
*M199 @ 11.20, Stage #1 Re Perf 10425 - 10435 ft.
*M201 @ 8.02 Stage #5 Frac 10090 - 10100 ft, M201 @ 10.55 Stage #6 Perf 9927 - 9937 ft.
TEMP: 29.8° - 42.4°
Recorded for 24hrs, 1 x Day charge as per contract.



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 10/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

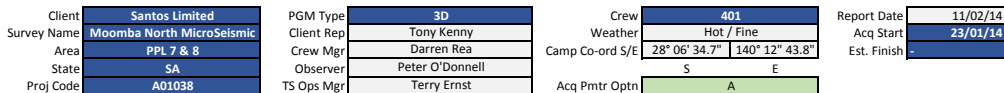
KM	Approx Days

Terrex Crew Manager: Darren Rea

Signature

Client Representative: Tony Kenny

Signature

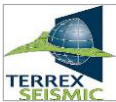
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Mobilisation							-	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox								
Safety Meeting							-	
Travel								
Recorder Setup								
Initial Layout/Pick up								
Experimental								
H/Wires, SIMS, Sweep Tests							-	
QC Spread								
QC / Testing								
Recording			24.00				24.00	
Troubleshooting								
Recorder Moveup								
Spread Chewage								
Spread Damage Other								
Detours								
Waiting On Spread							-	
Line Move								
Prospect Move								
Camp Move								
Traverse Move							-	
Swath Move								
Vibe Travel							-	
Weather								
Recorder Down								
Vibes Down								
Human Error								
Washdown							-	
Other								
TOTAL	-	-	24.00	-	-	-	24.00	
CUM TOTAL	0.00	0.00	278.00	40.00	0.00	22.00	340.00	

*Observers and trouble shooters shift change at 6.00 am
 *Day shift staff: Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor, Daniel Richardson
 *Night shift: Observer Joel Carry, Trouble shooters - Matthew Woolley, Anthony Claridge.

*M199 @ 7.51, Stage #1 Re Frac 10425 - 10435 ft, M199 @ 11.50 Stage #2 Perf 10310 - 10320 ft, M199 @ 14.15, Stage #2 Frac 10310 - 10320 ft, M199 @ 17.50 Stage #3 Perf 10130 - 10140 ft
 *M201 @ 11.05 Stage #6 Frac 9927 - 9937 ft, M201 @ 17.30 Stage #7a Perf 9665 - 9675 ft, M201 @ 21.45 Stage #7b Perf 9655 - 9665 ft

TEMP: 29.8° - 42.4° Recorded for 24hrs, 1 x Day charge as per contract.



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 11/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
				0.0			
				0.0			
				0.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

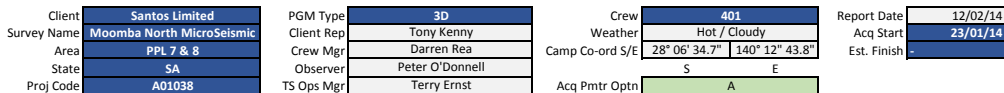
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

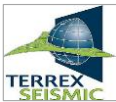
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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			24.00				24.00	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	24.00	-	-	-	24.00	
CUM TOTAL	0.00	0.00	302.00	40.00	0.00	22.00	364.00	

*Observers and trouble shooters shift change at 6.00 am
 *Day shift staff: Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor, Daniel Richardson
 *Night shift: Observer Joel Carry, Trouble shooters - Matthew Woolley, Anthony Claridge.
 *Crew reminded of the importance of water and PPE to combat the effects of heat stress.

*M198 @ 11.23 Stage #5 Frac 9873 - 9883 ft.
 *M199 @ 9.18 Stage #3 Re Perf 10425 - 10435 ft, M199 @ 14.58 Stage #4 Perf 9824 - 9834 ft, M199 @ 16.10 Stage #4 Frac 9824 - 9834 ft, M199 @ 22.40 Stage #5 Perf 8804 - 8814 ft
 *M200 @ 9.14 Stage #6 Frac 8460 - 8470 ft, M200 @ 11.55 Stage #7 Perf 8305 - 8315 ft, M200 @ 13.49 Stage #6 Frac 8460 - 8470 ft, M200 @ 16.15 Stage #8 Perf 8270 - 8280 ft

TEMP: 35.1* - 42.8* Recorded for 24hrs, 1 x Day charge as per contract.



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Cloudy
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 12/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

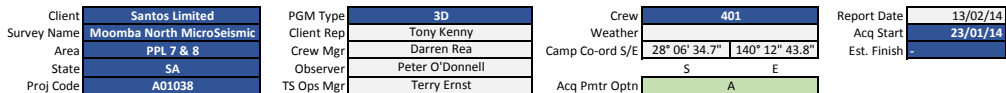
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

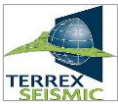
Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox								
Safety Meeting							-	
Travel								
Recorder Setup								
Initial Layout/Pick up								
Experimental								
H/Wires, SIMS, Sweep Tests							-	
QC Spread								
QC / Testing								
Recording			24.00				24.00	
Troubleshooting								
Recorder Moveup								
Spread Chewage								
Spread Damage Other								
Detours								
Waiting On Spread							-	
Line Move								
Prospect Move								
Camp Move								
Traverse Move							-	
Swath Move								
Vibe Travel							-	
Weather								
Recorder Down								
Vibes Down								
Human Error								
Washdown							-	
Other								
TOTAL	-	-	24.00	-	-	-	24.00	
CUM TOTAL	0.00	0.00	326.00	40.00	0.00	22.00	388.00	

<p>*Observers and trouble shooters shift change at 6.00 am</p> <p>*Day shift staff: Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor, Daniel Richardson</p> <p>*Night shift: Observer Joel Carry, Trouble shooters - Matthew Woolley, Anthony Claridge.</p> <p>*Roswell site having issues with coil tubing.</p> <p>*Moomba North:</p> <p>*M199 @ 12.00 Stage #5 Frac 8804 - 8814 ft, M199 @ 17.39 Stage #6 Perf 8777 - 8787 ft.</p> <p>*M200 @ 17.00 Stage #8 Frac 8817 - 8827 ft, M200 @ 20.50 Stage #9 Perf 8195 - 8205 ft.</p> <p>*M201 @ 10.27 Stage #7 Frac 9665 - 9675 ft, M201 @ 13.37 Stage #8 Perf 8817 - 8827 ft.</p> <p>TEMP: 29.8* - 42.4*</p> <p>Recorded for 24hrs, 1 x Day charge as per contract.</p>



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 13/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

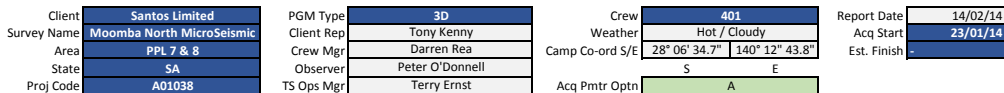
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

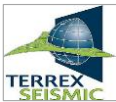
Lead
Survey
LC

KM	Approx Days

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Mobilisation							-	
Demobe/Remobe								
Camp Setup/Packup								
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			24.00				24.00	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	24.00	-	-	-	24.00	
CUM TOTAL	0.00	0.00	350.00	40.00	0.00	22.00	412.00	

Page 57 of 68



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Cloudy
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 14/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

7. ADDITIONAL CHARGE ITEMS

Item
Crew manager
Line crew
HSE
Channels
Landcruiser
AHV IV
Hemi 60
Hemi 50
Hemi 44
Envirovibe
Accommodation
Other crew
Other vehicle

Units

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

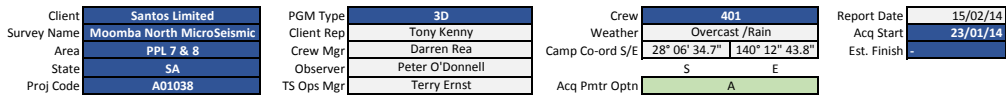
Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

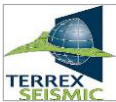
Client Representative: Tony Kenny

Signature

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Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up							-	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording			4.00				4.00	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather			20.00				20.00	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	24.00	-	-	-	24.00	
CUM TOTAL	0.00	0.00	374.00	40.00	0.00	22.00	436.00	

*Observers and trouble shooters shift change at 6.00 am
*Day shift staff: Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor, Daniel Richardson
*Night shift on standby due to wet conditions.
 *M198 @ 7.30 Stage #6 Frac 9523 - 9533 ft.
 *At 10.05 the recorder was advised by the SIL at the Moomba North operation that production would cease until 6 am the following day.
*At 14.31 & 20.08 the Moomba North operation proceeded with two perf shots which were not recorded.
TEMP: 25.8* - 35.4*
Recorded for 24hrs, 1 x Day charge as per contract.



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Overcast /Rain
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 15/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

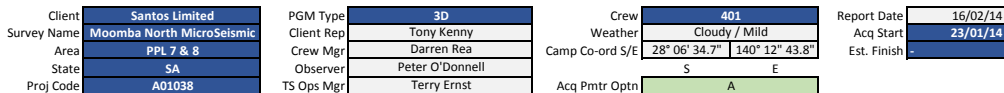
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

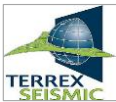
Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-
Demobe/Remobe							-
Camp Setup/Packup							-
Inductions							-
Toolbox							-
Safety Meeting							-
Travel							-
Recorder Setup							-
Initial Layout/Pick up							-
Experimental							-
H/Wires, SIMS, Sweep Tests							-
QC Spread							-
QC / Testing							-
Recording			12.50				12.50
Troubleshooting							-
Recorder Moveup							-
Spread Chewage							-
Spread Damage Other							-
Detours							-
Waiting On Spread							-
Line Move							-
Prospect Move							-
Camp Move							-
Traverse Move							-
Swath Move							-
Vibe Travel							-
Weather			2.50				2.50
Recorder Down							-
Vibes Down							-
Human Error							-
Washdown							-
Other							-
TOTAL	-	-	15.00	-	-	-	15.00
CUM TOTAL	0.00	0.00	389.00	40.00	0.00	22.00	451.00

*MOOMBA GATES CLOSED UNTIL 8.30 AM - 7.2MM OVERNIGHT RAIN.	
*Day shift staff: Observer - Peter O'Donnell, Trouble shooters - Ashlee Windsor, Daniel Richardson	
*Night shift: Observer Joel Carry, Trouble shooters - Matthew Woolley, Anthony Claridge.	
*Last production shot on Moomba North was Shot at 15.13 - Recording completed at 20.30.	
*M198 @ 8.17 Stage #7 Frac 8783 - 8793 ft, M198 @ 11.22 Stage #8 Perf 8696 - 8706 ft, M198 @ 15.13 Stage #8 Frac 8696 - 8706 ft.	
*M199 @ 12.38 Stage #7 Frac 8679 - 8689 ft.	
*M201 @ 10.48 Stage #9 Frac 8722 - 8729 ft.	PRODUCTION ON MOOMBA NORTH COMPLETE.
TEMP: 21.1* - 29.2* Rain: 7.2 mm	Recorded for 24hrs, 1 x Day charge as per contract.



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Cloudy / Mild
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 16/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	8.0			8.0			
	8.0			8.0			
	3.0			3.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

Terrex Crew Manager: Darren Rea

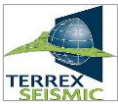
Signature

Client Representative: Tony Kenny

Signature



*4 line crew + CM accommodated in Innamincka due to room shortage at Moomba
*Line crew commence picking up Moomba North spread.
*Geophones picked up from line #1 > #6. Cables picked up from line #1 > #4.
*Everyone reminded to monitor their work partners condition in relation to the effects of heat stress.



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep Tony Kenny
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Fine / Warm
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 22/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	12.0			12.0			
	8.0			8.0			
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

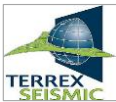
Client Representative: Tony Kenny

Signature

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Fine / Warm
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 23/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	12.0			12.0			
	8.0			8.0			
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
LAUL
LAUX
2 Link Cable
4 Link Cable
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Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
	967
	967
	30
	26
	287
	15
	33
	56

7. ADDITIONAL CHARGE ITEMS

Item	Units
Crew manager	
Line crew	
HSE	
Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

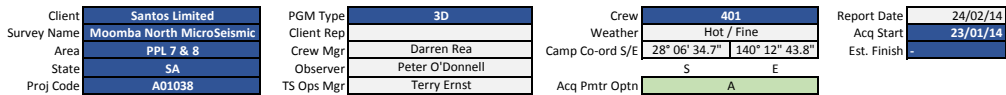
Client Representative: 0

Signature

10. ADVANCE PARTY LEAD

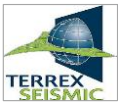
Lead
Survey
LC

KM	Approx Days

[illegible][illegible]

Mobilisation							-	
Demobe/Remobe							-	
Camp Setup/Packup							-	
Inductions							-	
Toolbox							-	
Safety Meeting							-	
Travel							-	
Recorder Setup							-	
Initial Layout/Pick up			2.00				2.00	
Experimental							-	
H/Wires, SIMS, Sweep Tests							-	
QC Spread							-	
QC / Testing							-	
Recording							-	
Troubleshooting							-	
Recorder Moveup							-	
Spread Chewage							-	
Spread Damage Other							-	
Detours							-	
Waiting On Spread							-	
Line Move							-	
Prospect Move							-	
Camp Move							-	
Traverse Move							-	
Swath Move							-	
Vibe Travel							-	
Weather							-	
Recorder Down							-	
Vibes Down							-	
Human Error							-	
Washdown							-	
Other							-	
TOTAL	-	-	2.00	-	-	-	2.00	
CUM TOTAL	0.00	0.00	403.00	40.00	0.00	22.00	465.00	

TEMP: 19.6* - 38.0* Rain: 0.0 mm



Client Santos Limited
Survey Name Moomba North MicroSeismic
Area PPL 7 & 8
State SA
Proj Code A01038

PGM Type 3D
Client Rep
Crew Mgr Darren Rea
Observer Peter O'Donnell
TS Ops Mgr Terry Ernst

Crew 401
Weather Hot / Fine
Camp Co-ord S/E 28° 06' 34.7" 140° 12' 43.8"
S E
Acq Pmtr Optn A

Report Date 24/02/14
Acq Start 23/01/14
Est. Finish

5. PEOPLE & VEHICLES

Headcount
Light Vehicles
Heavy Vehicles

Client	Terrex Crew	Other	Visitors	Total On Crew	In	Out	Comments
	12.0			12.0			
	8.0			8.0			
	5.0			5.0			

6. GROUND EQUIPMENT

Item
Channels
Active Channels
Geophones 6 String
Geophones 12 String
Geophones Nodes
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LAUX
2 Link Cable
4 Link Cable
Laser Links
Repeaters
Transverse
Batteries
Acquisition System
Vibe Elect

On Crew	In Use
1,200	967
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Item	Units
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Channels	
Landcruiser	
AHV IV	
Hemi 60	
Hemi 50	
Hemi 44	
Envirovibe	
Accommodation	
Other crew	
Other vehicle	

8. VIBE DOWNTIME

Vibrator Rego	Issue	Hours

9. ACQ SYSTEM DOWNTIME

Name	Issue	Hours
Pelton		
VE 464		
Sercel 428		
Z Nodal		
Others		
Others		

Terrex Crew Manager: Darren Rea

Signature

Client Representative: 0

Signature

10. ADVANCE PARTY LEAD

Lead
Survey
LC

KM	Approx Days

PERTH HEAD OFFICE

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PO Box 1975
West Perth WA 6872

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www.terrexseismic.com



Health & Safety
OHSAS 18001

SAI GLOBAL



Environment
ISO 14001

SAI GLOBAL



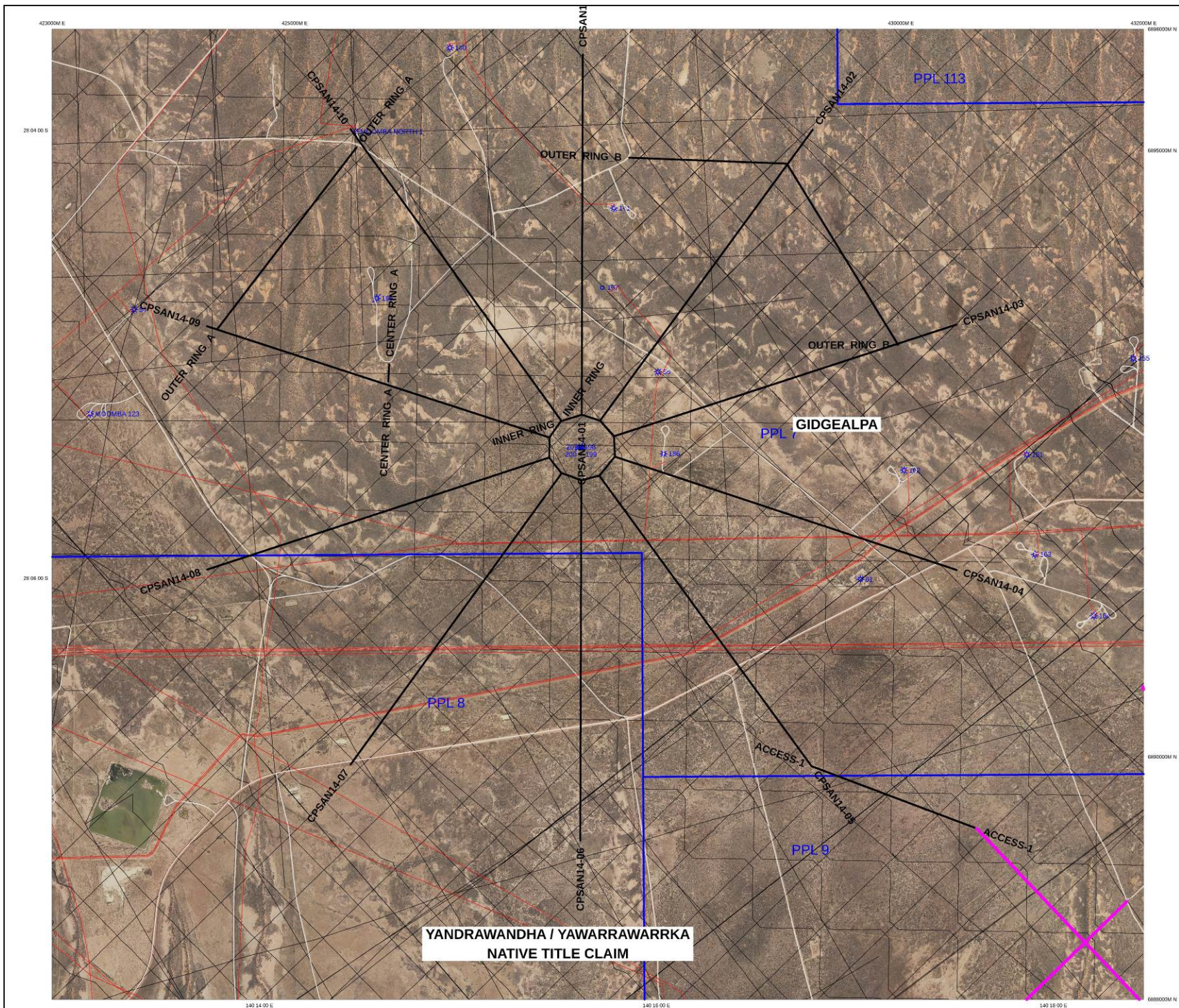
Health & Safety
AS 4801



SAI GLOBAL

Terrex Seismic and Terrex Spatial are certified
to OHSAS 18001, ISO 14001 and AS 4801.

APPENDIX 3 - MAPS





2013 MOOMBA NORTH MICRO-SEISMIC

DATE: 10/07/2013	SHEET: 1 OF 10	WELL:
DRAWN BY: [Name]	CHKD BY: [Name]	APPV: [Name]
SANTOS GAS (AUSTRALIA) PTY LTD		