DEPARTMENT OF MINES AND ENERGY

GEOLOGICAL SURVEY

SOUTH AUSTRALIA

REPORT BOOK 92/17

SEISMIC INTERPRETATION OF MT HOPELESS LINE 1

by

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CONTENTS

PLATES

		Transparency No
1.	Signing the site clearance agreement with the Aboriginal Heritage Represetatives.	39904
2.	Geoflex cord spool/feed assembly and Dozer mounted ripper tyne.	39905
3.	Bulldozer ploughing in the geoflex detonating cord during experimental work.	39906
4.	Firing off a shot.	39907
5.	'Walking' the dozer, blade off ground, ploughing in geoflex cord with minimal ground disturbance.	39908
6.	View towards Mt Hopeless looking SW along the line which passes to the LHS of Mt Hopeless.	39909

APPENDIX 1 - Site Clearance Agreement

APPENDIX 2 - VELSEIS Operations Report, including Processing Report

APPENDIX 3 - Project personnel and equipment movements

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Thirty three kilometres of high resolution seismic was shot in March 1991 on Moolawatana 1:100 000 map sheet, between Lake Crossing Bore and drill hole 588/6, south east of Mt Hopeless.

The project aimed to ascertain the tectonic character of the Blanche Lineament, determine structure and lithologic continuity of the Eromanga Basin sequence, determine the presence or absence of older basin sequences (Cambrian, Permian), examine basement topography and structure, and, if possible, elucidate any structure within the Tertiary sequence.

Geoflex detonating cord provided the seismic energy source. Seismic data aquisition was carried out by VELSEIS Pty Ltd using a Sercel 338-HR 96 tracer recording system. Six hundred percent CDP coverage was obtained using symmetrical spread receiver geometry.

A high quality seismic section was produced, revealing a probable cause for the Blanche Lineament viz. a SW shallow dipping diachronous thrust fault. In addition, the section revealed abundant listric faulting within the Mesozoic shales, the presence of a thick pre-Mesozoic SW dipping sequence, the presence of probable crystalline basement near and south of Mt Hopeless, and deformed Mesozoic/Tertiary strata east and SE of Mt Hopeless.

There is a discrepancy between the drilled depth to 'basement' lithologies and the interpreted position of the basement reflector at the Mt Hopeless end of the line. Furthermore, the ages and lithologies of pre-Mesozoic rocks have not yet been resolved. Two drill holes located at station points 178 and 1685 would resolve these uncertainties.

INTRODUCTION

The Mount Hopeless Seismic Line (#01) was proposed by Regional Geology Branch with significant input from the Geophysics Group within Oil, Gas and Coal Division, as part of CALLABONNA geological mapping (National Geoscience Mapping Accord) and Eromanga Basin data aquisition.

Mount Hopeless is situated 13 km south of the Strzelecki Track and 22 km north of Mt Babbage in the northern Flinders Ranges (Figs 1, 2). The seismic line is 33 km long and runs from 4 km southwest of Mt Hopeless to 3 km northeast of Lake Crossing Bore and approximately 5 km east of Mt Hopeless Outstation. Access is via the Strzelecki Track, Mt Hopeless to Arkaroola Road and the Moomba-Adelaide gas pipeline road.

Topography in the line vicinity ranges from alluvial plains to rolling downs to low hills and breakaways. At the northern end, salt-bush-covered sand flats and channels associated with the floodway between Lakes Blanche and Callabonna occur. These channels are very close to sea level. Between Lake Crossing Bore (11.3 m AHD) and Mt Hopeless Dam, the line crosses gibber clad gentle northerly sloping ground with little or no vegetation. From the Arkaroola Road intersection (31.3 m AHD) to Mt Hopeless (126.3 m AHD) the ground rises firstly as low rounded knolls then into breakaway country with ridges armoured by silcrete. Southwest of Mt Hopeless the ground slopes gently to the south along a drainage divide between westward and eastward gullies to Mt Hopeless and Yerila

Creeks. Vegetation is limited to small trees and bushes along creek lines within the hilly portion of the line. Beyond the southern end of the line (77 m AHD), occasional silcrete capped mesas rise above the gently rolling terrain, Mt Yerila being the most prominent, towards the Flinders Ranges.

Objectives of the seismic line were to investigate the:

1. Nature of the Blanche Lineament/Fault. This is a major feature trending NW-SE across CALLABONNA passing SW of Lakes Blanche and Callabonna. It forms the hypothetical boundary between the Warburton and Arrowie Basins, and also a major palaeo-faunal boundary. The line was positioned to bisect this feature at ~90°.

2. Basement topography, structure and depth.

3. Presence or absence of Cambrian deposits (Warburton and/or Arrowie Basin limestones and shales).

4. Structure within the Mesozoic sequences (ie faults).

5. Structure within the Tertiary sequence (ie. faulting, drag folding, and any major channelling).

6. Subsurface geology of the basins to the north of the Flinders Ranges basement outcrop, for incorporation into the geological mapping and tectonic interpretation of the CALLABONNA 1:250 000 and Moolawatana 1:100 000 map areas.

PREVIOUS WORK AND REGIONAL GEOLOGY

A table of stratigraphic units recognised in the Frome Embayment and Callabonna Sub-basin (eastern Lake Eyre Basin) is given in Figure 3. Graphic logs to the region's deep stratigraphic wells are set out in Figure 4.

The line was positioned so as to intersect the Landsat surface trace of the Blanche Lineament at approximately 90° and to tie into existing drill holes for stratigraphic control. Two drillholes were chosen for line intersection. These were Lake Crossing Bore and hole 588/6. The latter was drilled for Petromin NL et al (1972) on Special Mining Lease (SML) 588 as part of a broad uranium exploration program (Figs 2,5). Additional stratigraphic information was obtained from Montecollina Bore to the north east, Petermorra Bore to the west, and holes 5 to 10 on SML 588.

Only the uranium exploration holes 588/6 to 588/10 intersected rocks with basement characteristics (ie porphyritic quartz monzonite, micro quartz diorite, amphibolite). These rocks are consistent with those outcropping between Mount Babbage and Prospect Hill 20 km to the south of Mt Hopeless.

Table 1 displays the anticipated stratigraphy for the line, and Figure 5 displays the anticipated line section, based on proximal drilling. Summary logs to the strategic drill holes and control drill holes are provided in Tables 2 to 7. The line was extended 3 km beyond each of the stratigraphic control holes in order to provide adequate seismic data at these control points.

TABLE 1
ANTICIPATED STRATIGRAPHY:
(adapated from existing drilling data)

Age Packet	Depth ranges (South-North)	Lithologies and Unit Names
Quarternary	0 ->24 to 33 m	Silts, clays, sands,gravels
Tertiary	24 to 33 -> 60 to 270 m	Clays, sands, some gravel - Eyre Fm
Mesozoic	60 to 270 -> 270 to ~600 m	Shales - Oodnadatta Fm, Bulldog Shale (Marree Subgroup)
	? -> 510 to 520 m	sands - Coorikiana Sandstone
	~400 -> ~730 m	sandstone with cemented top - Cadna-Owie Fm
Cambrian	Not present -> ?800+ m	Limestones, shales/slates
Precambrian Basement	~450+ -> ?100+ m	qtz porphyry granite, amphibolite

Both Lake Crossing and Montecollina bores were drilled in the late 1890s as government sponsored water supply bores. Neither fully penetrates the basin stratigraphy. Lake Crossing Bore was completed in ?Coorikiana Sandstone and Montecollina Bore was completed in Cadna-Owie Formation (Fig 4). Thirty kilometres to the west of the line is the Santos' Blanchewater Hill CBH #2 stratigraphic hole, which intersected ?Cambrian red-bed mudstone/shale/sandstones at a depth of 602m (Santos, 1981; Preiss and Harris 1982). Skeleton #2, drilled 42 km SSE, intersected granitic basement beneath Mesozoic sediments at a depth of 583.4 m (Callen et al, 1990) (Fig 4). Hole SPH-1 drilled 11 km east of Moolawatana Station Homestead and 15 km west of Skeleton #2, revealed Mesozoic sediments to rest directly on Proterozoic calcsilicate hornfels rocks (BHP Mining, 1983; Tahan and Dunbar, 1983)(Fig 4).

Mount Yerila to the south, exposes Marree Subgroup shales on its lower flanks and ?Coorikiana Sandstone on its northern and eastern mid flanks. The latter unit is unconformably overlain by Tertiary Eyre Fm that has a strongly silcreted upper surface. Mapping around Mt Hopeless has established outcropping Tertiary mudstones, sands and silcretes of the Eyre Fm. Some of these display steeply dipping beds suggesting either localised drag folding or listric block rotation (Sheard and Callen, in prep).

Pre-existing aeromagnetic data maps indicated that the area consisted of 'typical' magnetic basement and that the line would cross a broad magnetic ridge between two highs - to the west and east.

ACCESS ARRANGEMENTS

The line did not intersect any Regional Reserves or National Parks, and the Department of Environment and Planning (DEP) anticipated that there would not be any long term environmental impact provided the following measures were adopted:

- large shrubs and trees were avoided
- lower herbs and forbs were not bladed out
- wind rows and trenches were rehabilitated
- banks of creeks were not graded for access
- access tracks to the seismic line to be controlled to avoid tourist access.

These requirements were in accord with the Dozer Manual of Nicholls (1988) and the Arid Zone Field Environmental Handbook (Mc Laren et al., 1990).

On the recommendation of the Aboriginal Heritage Unit of DEP with respect to the possible traversing of heritage and/or sacred sites by the proposed line, a site inspection was undertaken with the Flinders Ranges Aboriginal Heritage Consultative Committee (FRAHCC) on the 4th and 5th of March 1991. Representatives from the FRAHCC were Mr G Coulthard (Chairman) and Mr B Coulthard (Community member); and from S.A.D.M.E., M Sheard (Regional Geology) and P Dunne (Geophysics). Three significant but small heritage sites were identified and marked both in the field (pegs and flagging) and on area maps - one of which was

given to the FRAHCC representatives. A site clearance agreement was signed by both parties (Plate 1) to allow work to proceed with avoidance of the three sites. A copy of this agreement is provided in Appendix 1.

The Pipelines Authority of South Australia (PASA) was approached for access to drinking and ablutions water from Compressor Station #2 on the Moomba-Adelaide Gas Pipeline.

Access permission for the seismic work by VELSEIS Pty Ltd to the Mt Hopeless Outstation area was obtained by VELSEIS.

LINE OPERATIONS

A full account of all line operations is set out in the VELSEIS Operations Report in Appendix 2.

On-site personnel and equipment movements are set out in Appendix 3.

A brief summary of the procedures is given below.

Surveying

A contract surveyor set out the line using standard chaining techniques, each geophone spread point was marked with a 'pin flag' which had a plastic coloured tag at the top. These flags were placed at stations 12.5 m apart (100/8 m) and were coloured thus: blue = ordinary point, red = start or end of shot point, and yellow = centre point to shot for detonation (Fig 6).

The line avoided the three Aboriginal Heritage sites previously identified and was layed out well in advance of the seismic work. Line deviation was kept within 7° of a straight line where avoiding obstacles, which also included a silcrete capped ridge (near Mt Hopeless).

Follow-up leveling and survey tie-in to existing Department of Lands benchmark and trig points was made at the completion of line layout work.

A detailed plan of the seismic line is provided in Figure 7, while a list of Permanent Markers along the line appears in Table 8.

Shot Emplacement and Experiments

The seismic energy source consisted of a charge of ICI Red Cord detonating cord (PETN charge - 10 gms/metre), 50 m long and ploughed in to a depth of 0.5 m. The cord was capped with a single electrical detonator at the centre of each 50 m shot (Fig 6). Cord was ploughed in using a Liebherr 731 Bulldozer (equivalent to Caterpillar D-6.5). Attached to the ripper tyne was a copper-lined reinforced cord-feed tube. Above this was a twin cord spool holder and feed assembly (Plates 2, 3).

Experimental shots were carried out at the northern end of the line in order to establish shot length, strength and the signal to noise ratio. Previous work by SADME at Bopeechee near Lake Eyre South, over similar but thinner basin stratigraphy, had established an optimum cord length of 32 m (Cockshell, 1988). Anticipating that similar parameters would work at Mt Hopeless, the line was set out with charge shot points on 100m centres.

Three single strands of Red Cord (25 m, 50 m, 75 m) were ploughed in and fired (Plate 4) to determine optimum charge size. The seismic records indicated that 50 m length provided the best signal. A fourth charge of double strand 50 m long was ploughed in and fired but no additional enhancement to the signal was noticed.

The experimental work accomplished a secondary role in providing an opportunity to further develop the ripper-ploughing technique. Furrow infill/smoothing of the shot point furrows was accomplished simultaneously with the ploughing by towing an improvised set of harrows. Ripping worked well in the sandy to clayey soils but some difficulty was experienced near Mt Hopeless with silcrete. The bouldery edge to a silcrete ridge was pre-ripped three times prior to ploughing in of the Red Cord.

Shot emplacement ripping was achieved without prior line clearing and without putting the Dozer blade to the ground, but rather by just 'Walking' the dozer along the line (Plate 5). No herbs, shrubs or trees were removed and all root stock was left in place where flattened by the dozer tracks. No additional access tracks were prepared. Fences were unhitched and layed flat then re-established following ripping. Shot point-ripping was kept at least two to three kilometres ahead of the recording set up on the

first day. Following that the Dozer kept at least 8 km ahead of the recording crew.

Seismic Recording and Firing

Firing and recording proceeded well with good to excellent records. Only one delay misfire in over 300 shots was observed. Shots were skipped at roads, fences, bores and pipeline crossings with only minimal effect on the final stacked records.

Some time was lost due to problems with the electronic firing system. Additional lost time of two days was due to strong winds that produced unacceptable signal to noise ratios. This problem was solved by shooting the last 4.2 km of line at night when conditions were calm.

DATA PROCESSING

Seismic Processing

Processing was done by Velseis Pty Ltd in Brisbane. A relatively standard processing sequence was used. The high quality of the field data assisted processing and negated the need to apply sophisticated signal enhancement packages. A full account is presented in Appendix 2.

As the line aimed for structural reconnaissance, more emphasis was placed on reflector coherency than true amplitude recovery. Even so, the quality of the data did not necessitate the application of coherency filters. Migration of the data was not deemed necessary, after consideration of the relatively low relief of the reflectors.

Final stack section was presented in film form at a horizontal scale of 1:5000 (8 traces/cm) and a resolution of 1000 dots/inch. A reduced scale version was also prepared as a paper print at 1:10000 with a resolution of 400 dots/inch (Fig 8).

Data Quality

The seismic quality of most of the field data was quite high to excellent. Isolated records were noisy due to windy and possibly poor source tamping. Over most of the line this causes only minor deterioration of section quality. However between stations 340 to 410, section quality is poor where severe wind conditions caused poor records.

Over much of the section, seismic events near strong reflectors have been substantially attenuated by the application of strong amplitude equalisation over a 400 millisecond window. This makes interpretation more difficult as bland zones can indicate either thick homogeneous rock or mathematically subdued zones.

SEISMIC INTERPRETATION

Geological Control

Geological identification of the seismic profile is based on six drillholes on or near the line. The sequence intersected comprises Quaternary and Tertiary sediments, thickening northeastward, underlain by a relatively uniform Cretaceous sequence (Marree Subgroup and Cadna-Owie Formation). A porphyritic quartz monzonite was intersected in the southwestern-most two holes (588/7 and 588/6) but this may not be representative of basement for the whole area. Details of boreholes and depth intersections are included in Tables 1 to 7, and Figures 2, 4 and 5.

Accurate conversion of unit depths to time values on the seismic section is hampered by the absence of measured well velocity data from any of the above boreholes. Interpreted two-way travel times (TWT) are set out in Tables 1 to 7. The nearest bore with such data is Skeleton #2 approximately 40 kilometres southeast of the line (Callen, et al, 1990).

Detailed discussion with Velseis Pty Ltd highlighted the following information on the velocity analyses:

1. Original velocity analysis was done on ground level based velocity gathers.

2. Four different sets of statics were applied to the data, with the result of time 0.0 seconds on the section representing 0.0 m MSL.

3. Velocity analyses were corrected for elevation so that 0 time in the tabulated velocity values represents 0.0 seconds on the section and 0.0 m MSL.

Initial conversion of depths to seismic times used the stacking velocities near each borehole location. These values were then compared to the average velocity values from Skeleton 2 well. The two data sets were found to be reasonably consistent indicating that the computed time picks would reasonably represent the intersected units to within 15% of the MSL value.

Section Interpretation

The processed seismic section is presented in Figure 8 (1) to (5).

(a) Cainozoic

The shallowest and most reliably identified seismic horizon interpreted is the Tertiary-Cretaceous boundary. In Lake Crossing Bore the horizon separates a relatively uniform bland seismic zone, typical of the Marree Subgroup, from an overlying sequence of strong basal Tertiary reflectors. A similar situation is seen at the end of the section closest to Montecollina Bore, where the presence of lignite within the Tertiary sequence would strengthen reflectors. The horizon picks at the northeast end of the line (SP 2653) are shallower than the Montecollina Bore picks, due to anticipated section deepening toward the bore. Southwestward, the Tertiary sequence thins, particularly near SP 1900 and SP 500 where significant onlap events are seen.

Southwest of SP 350 the horizon is interpreted to subcrop at datum. However, interpretation of the 0-0.1 second part of the record is subjective due to lack of data, low fold of stacking and/or selection of recording parameters to target deeper levels.

At its deepest point the Quaternary-Tertiary boundary occurs at 0.055 (ie. not resolvable) at Montecollina Bore and was therefore not interpreted.

(b) Cretaceous

In Lake Crossing Bore, a sandy, brackish water zone which occurs at 404 to 439 m below MSL, corresponds to a relatively consistent reflector mappable along the section. It correlates approximately with similar zones in Montecollina and 588/7 bores. It is suggested that this zone represents the Coorikiana Sandstone. The presence of thick, uniform and bland seismic sequences above and below this zone (Oodnadatta Formation and Bulldog Shale respectfully) further supports this.

The Marree Subgroup (Oodnadatta Formation/ Coorikiana Sandstone/Bulldog Shale) is remarkably uniform in character and thickness along the entire section. This unit has substantial internal structuring, mostly normal listric faulting. Such faulting is typical of syndepositional movement in thick shale sequences although many faults appear to continue into the basal Tertiary sequence, indicating later or continuing deformation.

A major low angle reverse fault is seen between SP's 1300 and 1500 deforming the underlying sequences and extending at least to the basal Tertiary sequence. The surface trace of the extrapolated fracture closely corresponds to the 'Blanche Lineament'. There are no other features on the section to provide a geological explanation for this lineament. Further seismic work would be required east and west of this line to define more precisely the geometric attitude and extent of this feature. However, a NE-SW compressional regime appears to have promoted the development of this thrust fault.

The Cadna-Owie Formation was intersected in Montecollina and Petermorra Bores beneath Bulldog Shale. Although neither bore lies on the section, a strong, relatively undeformed reflector near this level was interpreted to represent the top of this sequence. This unit shows substantial, generally continuous reflectors. It also shows common lensing-out of reflectors with upward and downward terminations, indicating substantial facies variation. This is consistent with an expected marginal marine to fluviatile/deltaic environment of deposition. Over much of the section, this interval is approximately 100m thick. However, in the centre of the section it thins rapidly and may even be absent between SP's 1370 and 1480. Onlap of reflectors onto the underlying unconformity in this area indicates that a substantial high existed prior to deposition of the Cadna-Owie Formation in the Early Cretaceous. This is further supported by infilling of erosional and fault related depressions in the underlying surface. The possibility that earlier Mesozoic sediments are preserved in these depressions

cannot be discounted because a thickness of 100 metres for the Cadna-owie Fm alone is considered to be anamalous here.

At the southwest quarter of the section, this interval shows consistent thickness even though it is much shallower, particularly southwest of SP 300. Between SP's 300 and 400 is a major zone uplifted to the southwest by reverse faulting and monoclinal flexure. It is interpreted that stable depositional conditions existed in the Early Cretaceous and that deformation occurred in the Late Cretaceous (at earliest) or, more likely, in the Tertiary associated with the Flinders Ranges uplift.

(c) **Pre-Mesozoic**

The reflector interpreted to represent the base of the Mesozoic section is generally a very strong event, representing a strong unconformity surface. The strength of the event and marked increase in average stacking interval velocities indicates that the underlying rocks are much harder and more indurated than the Mesozoic sequence. This points to rocks of Precambrian to early Palaeozoic age.

The apparent dip of reflectors below this unconformity is 4° to the southwest. This compares to an apparent 3° northeast dip for the regional dip of the overlying Cretaceous sequence.

These reflectors are most observable between SP's 1200 and 2100, down to 1.4 seconds. Below this level they are either absent or are swamped by multiples from the Mesozoic-Cainozoic sequence. Laterally, the occurrence and strength of reflectors diminish quite rapidly probably due to a combination of:

- reduced seismic penetration
- swamping of signal by multiples
- reduced reflectivity caused by facies variations
- major rock-type changes.

The consistency and strength of these reflectors is similar to those from the Cambrian sequences in the Arrowie Basin (to the south) and the Warburton Basin (in the north). However, it is also possible that they represent Adelaidian, Ordovician or even Devonian rocks. Drilling will be required for positive identification.

Southwestward of SP 400 there is a major change of seismic character beneath the unconformity. Here there are no apparent dipping reflectors and very few multiple events. This corresponds to a very high amplitude reflector of the unconformity, indicating the presence of an underlying rock unit with a very high velocity. Although this is not seen in the calculated stacking velocities, velocity analyses in hard rock zones with virtually no reflectors are rarely reliable.

It is therefore postulated that there is a major change of pre-Mesozoic bedrock rock type southwest of SP 400. Such a change may be associated with the zone of reverse faulting and monoclinal flexure between SP 300 and 400.

A major dilema exists regarding identification of bedrock in bores 588/7 and 588/6 (Petromin NL et al, 1972). These 1972 mineral exploration bores were both logged as having intersected porphyritic quartz monzonite at TD. However, transposing of the bore depth data to the seismic section, using existing velocity data, locates these igneous intersections well above the interpreted Cadna-Owie Formation. Even allowing for 15% velocity variation they remain well above this unit.

One possible explanation is that the bores both bottomed in 'lonestones' within the Bulldog Shale. Lonestones, ranging from centimetres to three metres in diameter are common within this unit. They are interpreted as being brought in by ice rafting then dropped into the underlying muds (proto-Bulldog Shale) as isolated erratics (Frakes and Francis, 1988; Sheard, 1990).

Most holes drilled in this mineral exploration series intersected less than 0.5 m of this igneous material at TD. This enhances the possibility that the intersections do not represent pre-Mesozoic bedrock. However, the fact that most holes (8) were logged as intersecting the same material makes the above explanation more difficult. Re-logging of cuttings from the bores will be necessary to verify rock identification.

CONCLUSIONS

The seismic survey has successfully defined the geometry and stratigraphic relationships of the Mesozoic sequences. The configuration of the basal Tertiary sequence has also been stratigraphically defined over much of the line. The base of the Mesozoic section (as interpreted) is clearly shown as a strong unconformity event. A major sequence of pre-Mesozoic rock is observable over much of the section which may be Precambrian to Devonian in age. However, a Cambrian age is thought likely. Crystalline rocks may exist southwest of SP 300.

The survey has been successful in achieving its main aim, identifying the cause of the Blanche Lineament. It has shown the most probable cause of this feature is related to a major low angle reverse fault dipping to the southwest, active in the Tertiary, and possibly more recently.

A seismic unit interpreted to be the main aquifer in the region, the Cadna-Owie Formation, has been delineated. This substantially improves the hydrogeological knowledge of the region.

The postulated occurrence of Precambrian - early Palaeozoic rocks beneath the Mesozoic section may have significance to base metal and hydrocarbon exploration. If the sequence is Cambrian, petroleum prospectivity would be enhanced in terms of generation and reservoir potential. On this particular line, entrapment may be a difficulty, although three mechanisms appear possible:

1. Stratigraphic entrapment within shallow dipping early Palaeozoic reservoirs with a weathered or shaly facies near the unconformity separating the reservoir from the Cadna-Owie Formation aquifer.

2. Entrapment within the same reservoirs, capped by Bulldog Shale - where the Cadna-Owie Formation is absent.

3. Entrapment in domal warps within the Cadna-Owie Formation sealed by the Bulldog Shale. However, water flushing would be a major difficulty in this scenario.

The good definition of structural features on the section provides new information on the tectonic history of the area and will assist in tectonic reconstruction of the region.

RECOMMENDATIONS

To promote additional exploration in this region, further investigations are recommended:

1. Acquisition and interpretation of ground magnetic and gravity data along the line.

2. Application of seismic refraction probing at several sites along the traverse.

3. Undertake drilling at sites A and B along the line:

   Site A

   Drill a stratigraphic well near bores 588/6 to 588/7 (Fig. 9) to identify interpreted basement horizons and tie in with the seismic line. *NB: No cuttings or samples are available in the Glenside Core Library for these holes.*

   A shallow hole drilled south of exploration hole 588/6 at Site A (Fig. 9). A saving of some 65 m^+ in drilling depth may arise if the hole is sited near the seismic line end (ie. SP 75). This results from a topographic advantage and narrower section. Coring only from a depth of 230 m below ground level to basement. Seismic basement interpreted as crystalline rock at a depth of 469 m. Coring to penetrate 5 to 10 m of basement. A seismic velocity well shoot to follow drilling to determine actual seismic unit velocities.

   The retrieved core will assist with an assessment of base metal potential for this area of buried basement.

Anticipated unit intersecton depths for drilling proposal A

Unit	Depth(m):
Marree Subgroup	0 to 359
Cadna-Owie Fm.	359 to 469
Basement	469+

Site B

Identification of the southward dipping interpreted pre-Mesozoic sequence overlying (?) crystalline basement is required. The mid-line dome structure between SP 1350 and 1850 presents the best target area with a cored drill hole optimal at SP 1685 (Fig. 9). At this location advantage is taken of a reasonable twin layer pre-Mesozoic section on a subtle dome structure while avoiding major faults. Organic and inorganic geochemical analyses of retrieved core would assist with an assessment of hydrocarbon and basemetal potential.

It is proposed to drill a stratigraphic well at SP 1685 to a depth of 1200 with selected coring between 450 to 1200 m.

A seismic velocity well shoot at the end of drilling would provide measured unit velocities for the section and further enhance the seismic section data.

Drilling to basement at this location would require a hole at least 1500 m deep.

Anticipated unit intersection depths for Drilling proposal B

Unit	Depth (m):
Quarternary-Tertiary	0 to 214
Marree Subgroup	214 to 634
Cadna-Owie Fm	634 to 654
Basement (top)	654
Z1	654 to ~830
Z2	~830 to ~1120
Z3	>1500

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TABLE 2
SUMMARY LOG AND INTERPRETED SEISMIC TWT TIME MONTECOLLINA BORE

LOCATION: 14.9 km NE of SP2656
ELEVATION: Approx. 8.8 m MSL

DEPTH (m GL)	DEPTH (m MSL)	UNIT	SEISMIC TWT TIME (msec below MSL Datum)
0	9	Quaternary	-14
45	36	Tertiary sands, clays	55
285	276	Cretaceous Marree Subgroup	328
743	734	Cadna-Owie Formation sands shales	801
777	768	TD	814
507	498	?Coorikiana Sst	586
512	503		591

TABLE 3
SUMMARY LOG AND INTERPRETED SEISMIC TWT TIME LAKE CROSSING BORE

LOCATION: SP 2416
ELEVATION: 11 m MSL

DEPTH (m GL)	DEPTH (m MSL)	UNIT	SEISMIC TWT TIME (msec below MSL Datum)
0	-11	Quaternary	-14
32	21	Tertiary sands, lignite	27
256	245	Cretaceous Marree - Subgroup	279
519	508	TD	536
415	404	?Coorikiana Sst	434
450	439		470

TABLE 4
SUMMARY LOG AND INTERPRETED TWT TIME PETERMORRA BORE

LOCATION: 7.8 km NW of SP 437
ELEVATION: 55 m MSL

DEPTH (m GL)	DEPTH (m MSL)	UNIT	SEISMIC TWT TIME (msec below MSL Datum)
0	-55	Quaternary	-67
22	-33	Tertiary	-40
57	2	Cretaceous Marree - subgroup	2
367	312	Cadna-Owie Fm	353
379	324	TD	366

TABLE 5
SUMMARY LOG AND INTERPRETED TWT TIME DRILL HOLE 588/5

LOCATION: 400 m SE of SP 300
ELEVATION: Approx 130 m MSL

DEPTH (m GL)	DEPTH (m MSL)	UNIT	SEISMIC TWT TIME (msec below MSL Datum)
0	-130	Quaternary	-209
23	-107	Tertiary sand, mudstones	-172
34	-94	Cretaceous Marree - subgroup	-151
88	-42	TD	-68

TABLE 6
SUMMARY LOG AND INTERPRETED TWT TIME
DRILL HOLE 588/6

LOCATION: On SP 178
ELEVATION: 90 m MSL

DEPTH (m GL)	DEPTH (m MSL)	UNIT	SEISMIC TWT TIME (msec below MSL Datum)
0	-90	Quaternary Mudstone	-150
11	-79	Tertiary sandstones	-92
21	-69	Cretaceous Marree-subgroup	-81
255	165	Porphyritic Quartz Monzonite	209
255	165	TD	209

TABLE 7
SUMMARY LOG AND INTERPRETED TWT TIME
DRILL HOLE 588/7

LOCATION: 300 m NW of SP 100
ELEVATION: Approx 60 m MSL

DEPTH (m GL)	DEPTH (m MSL)	UNIT	SEISMIC TWT TIME (msec below MSL Datum)
0	-60	Quaternary Mudstone	-100
2	-58	Tertiary sandstones	-97
18	-42	Cretaceous Marree - subgroup	-70
257	197	Porphyritic Quartz Monzonite	-224
257	197	TD	224
44	-16	?Coorikiana Sst	-27
55	-5		-8

TABLE 8
LIST OF PERMANENT MARKERS

LOCATION	EASTING	NORTHING	ELEVATION (AHD)
Northern end of Line *Station No 2656	393 585.10	6733 284.40	6.50 m
Track to Compressor Station No 2. *Station No 2580	-	-	7.7 m
Fence (approx *Station No 2460+)	-	-	10.2 m
Lake Crossing Bore (approx Station No 2416)	391 472.13	6731 155.43	11.35 m
*Station No 1991 (approx 5 km SW of Lake Crossing Bore)	-	-	19.0 m
Track to Mt Hopeless Dam Station No 1591	384.109.03	6723 938.22	24.70 m
Arkaroola Road Station No 1176	380 406.04	6720 305.93	31.32 m
Fence west of Road, Station No. 963	378 409.12	6718 545.89	39.94 m
*Station No 563 (approx 5 km SW of Station No 963)	-	-	70.0 m
*Station No 280 (old track to Mount Hopeless)	-	-	94.5 m
Drill Hole 588/6 Station No 178	371 097.63	6712 016.14	91.40 m
*Southern end of line Station No 16	369 719.80	8710 533.90	77.50 m

** Additional Permanent Markers put in after work completed in order to comply with the marking of seismic lines under the Petroleum Act.*

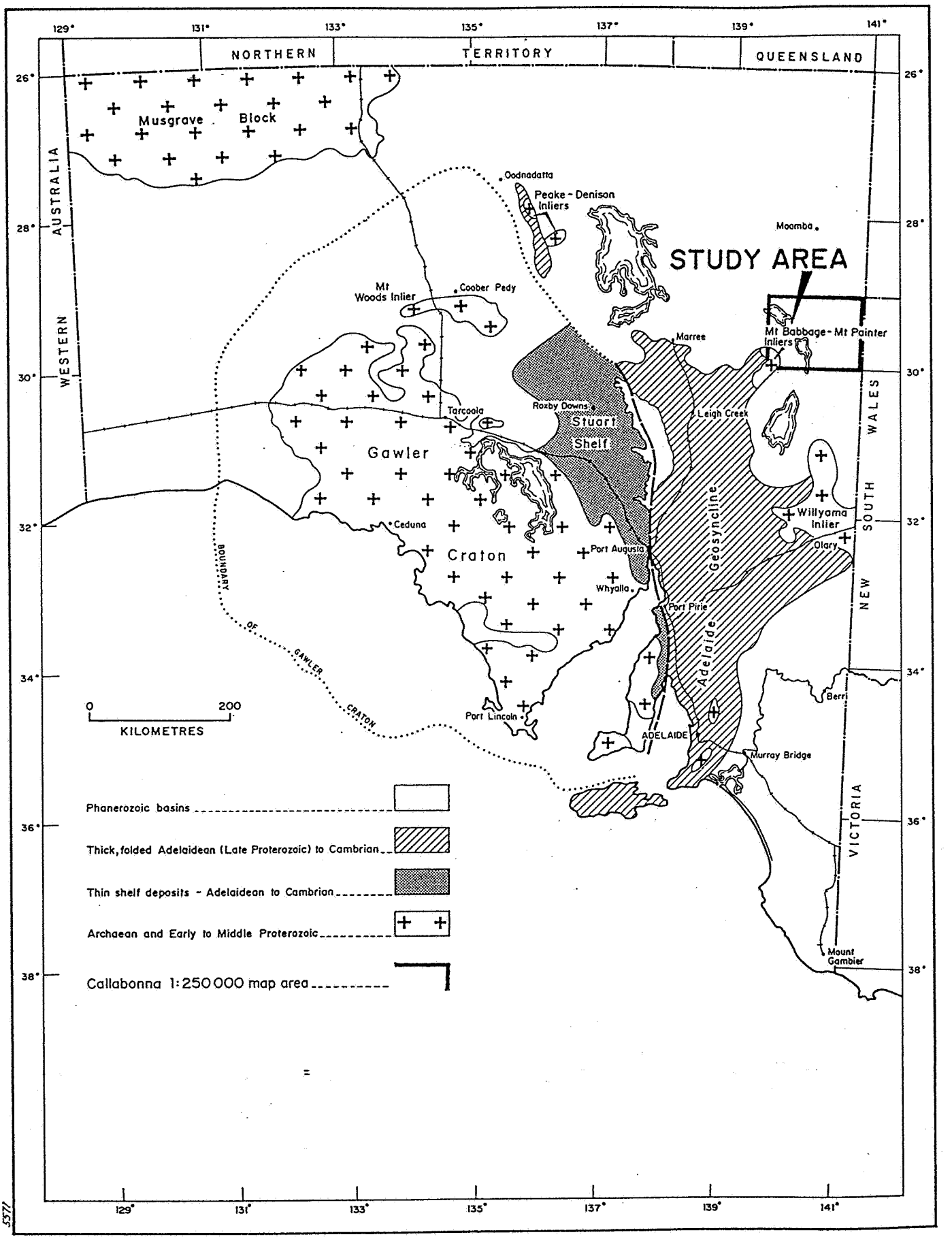


Figure 1. Regional locality plan for Mt Hopeless Line 1 seismic interpretation

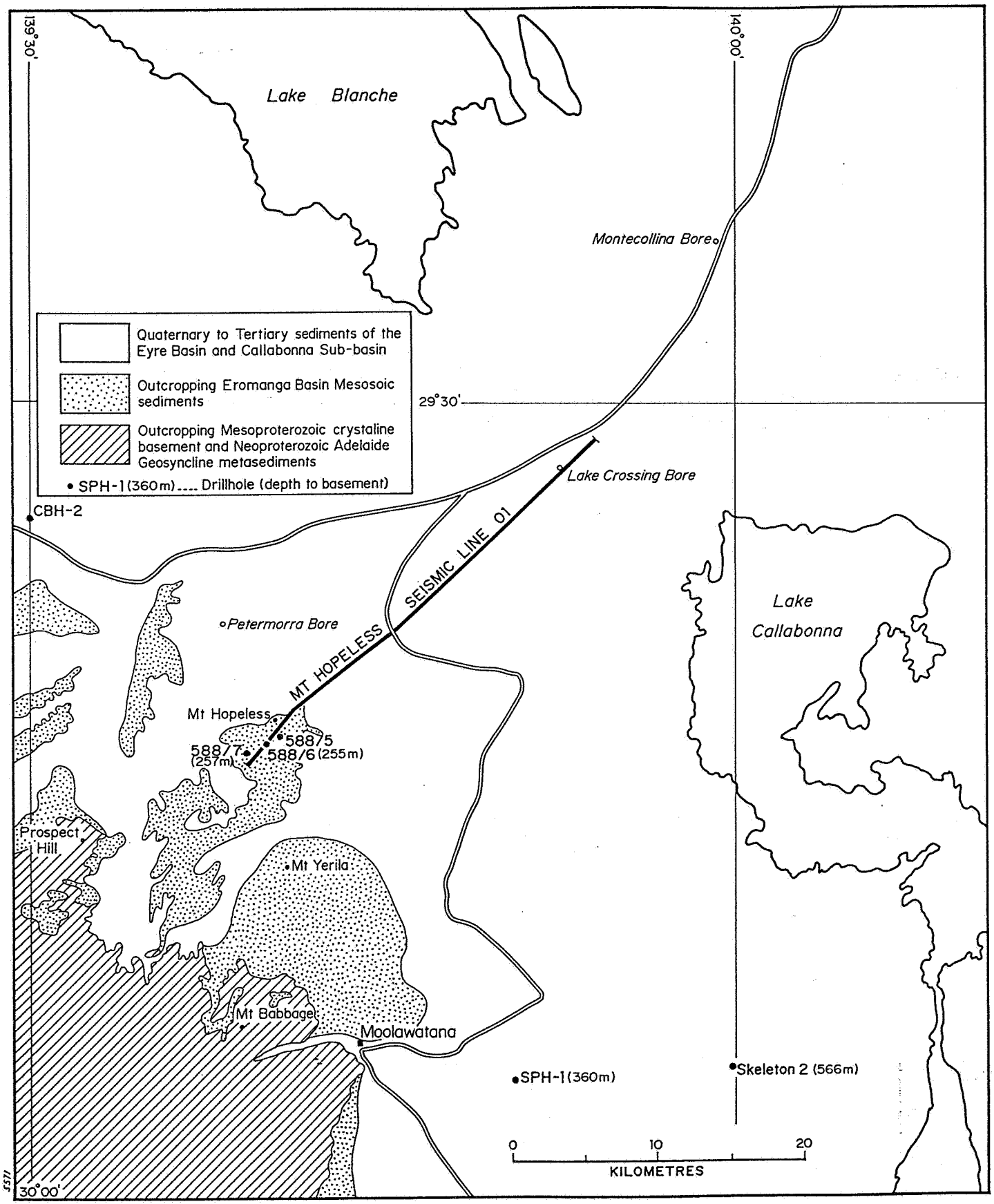
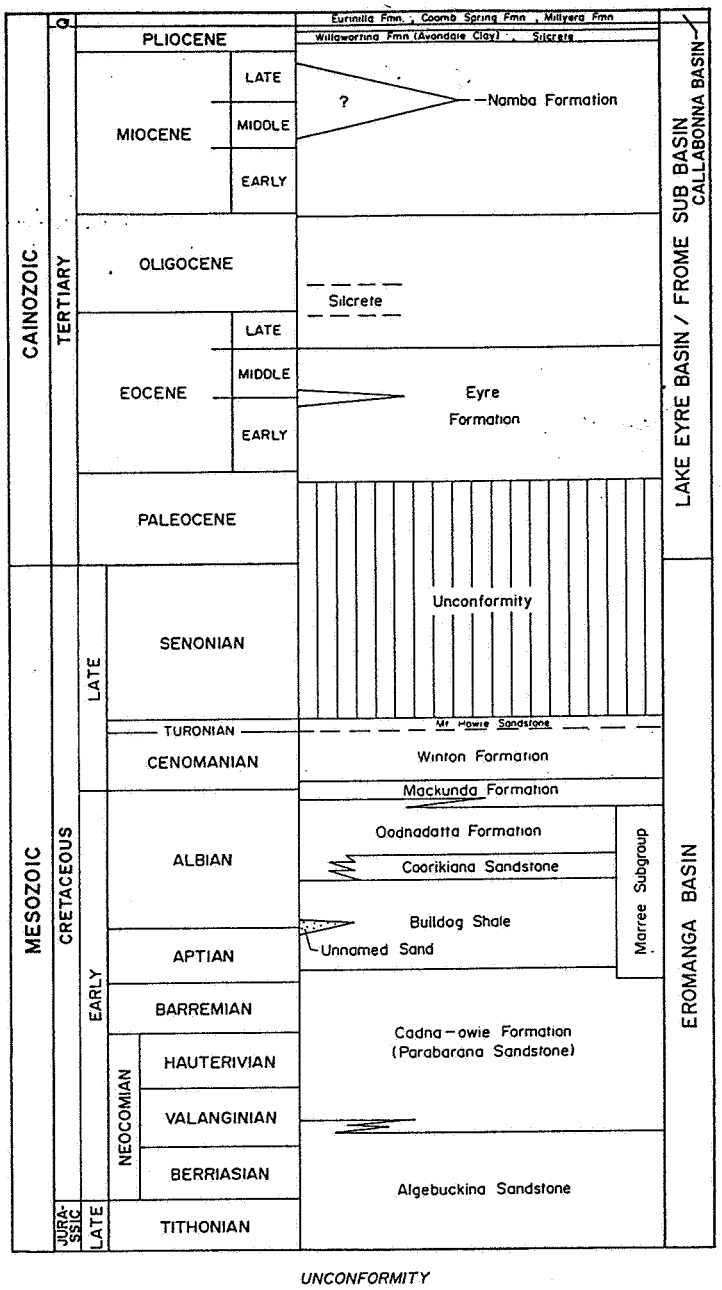


Figure 2. Drillhole and Mt Hopeless Seismic Line 1 locality plan



UNCONFORMITY

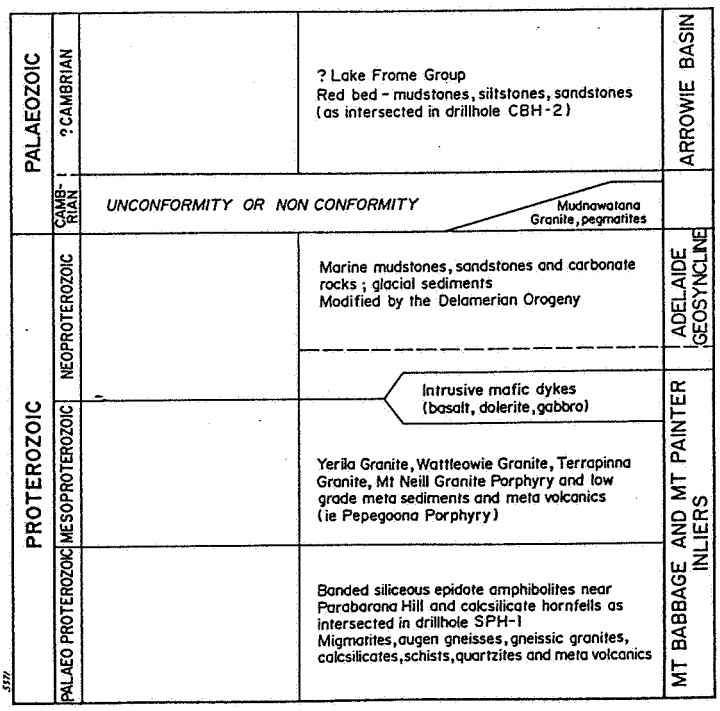


Figure 3. Mt Hopeless seismic line 1, regional stratigraphic units

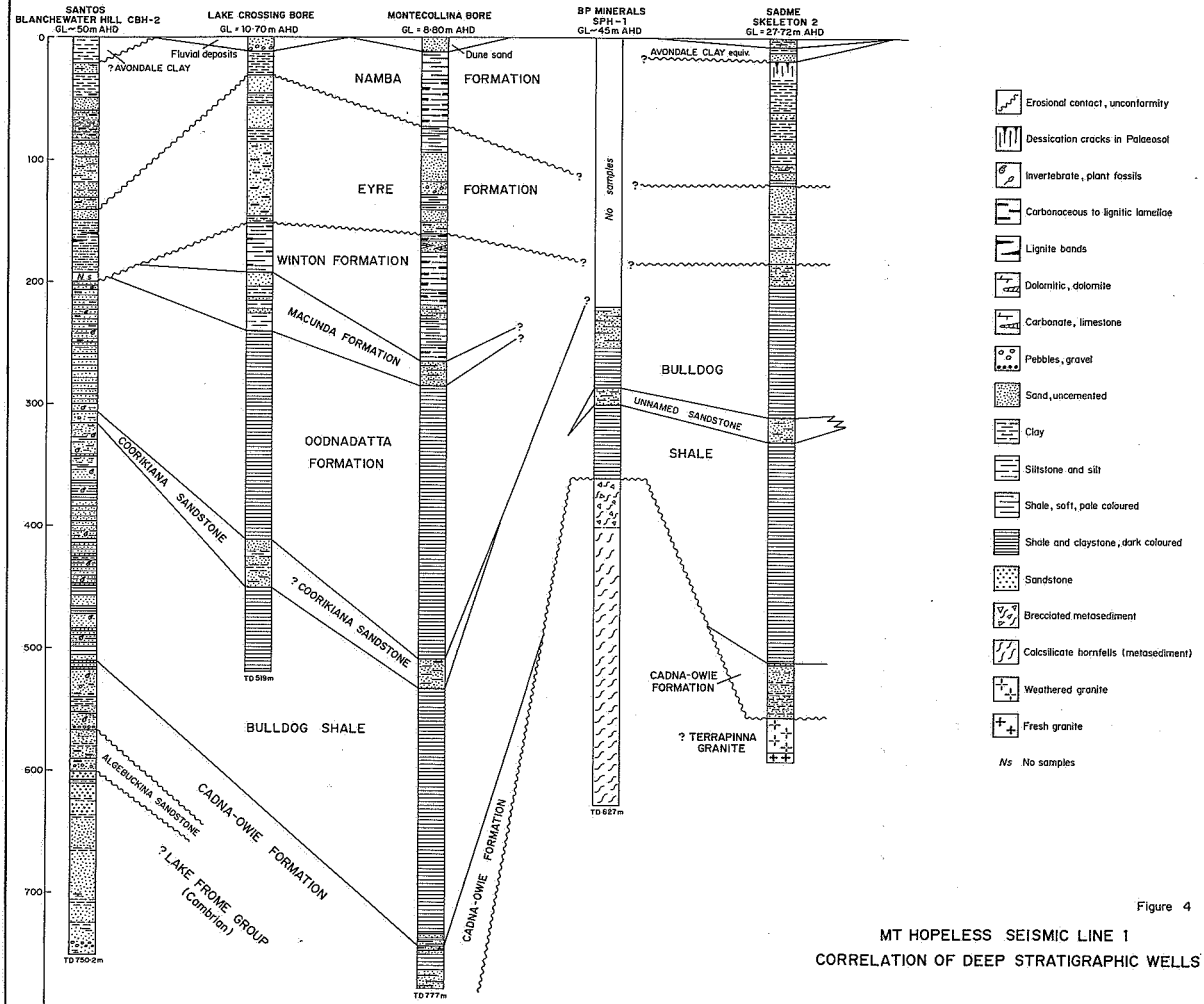


Figure 4

MT HOPELESS SEISMIC LINE 1
CORRELATION OF DEEP STRATIGRAPHIC WELLS

Compiled M.J.S. 2-3-92

SADME 92-456

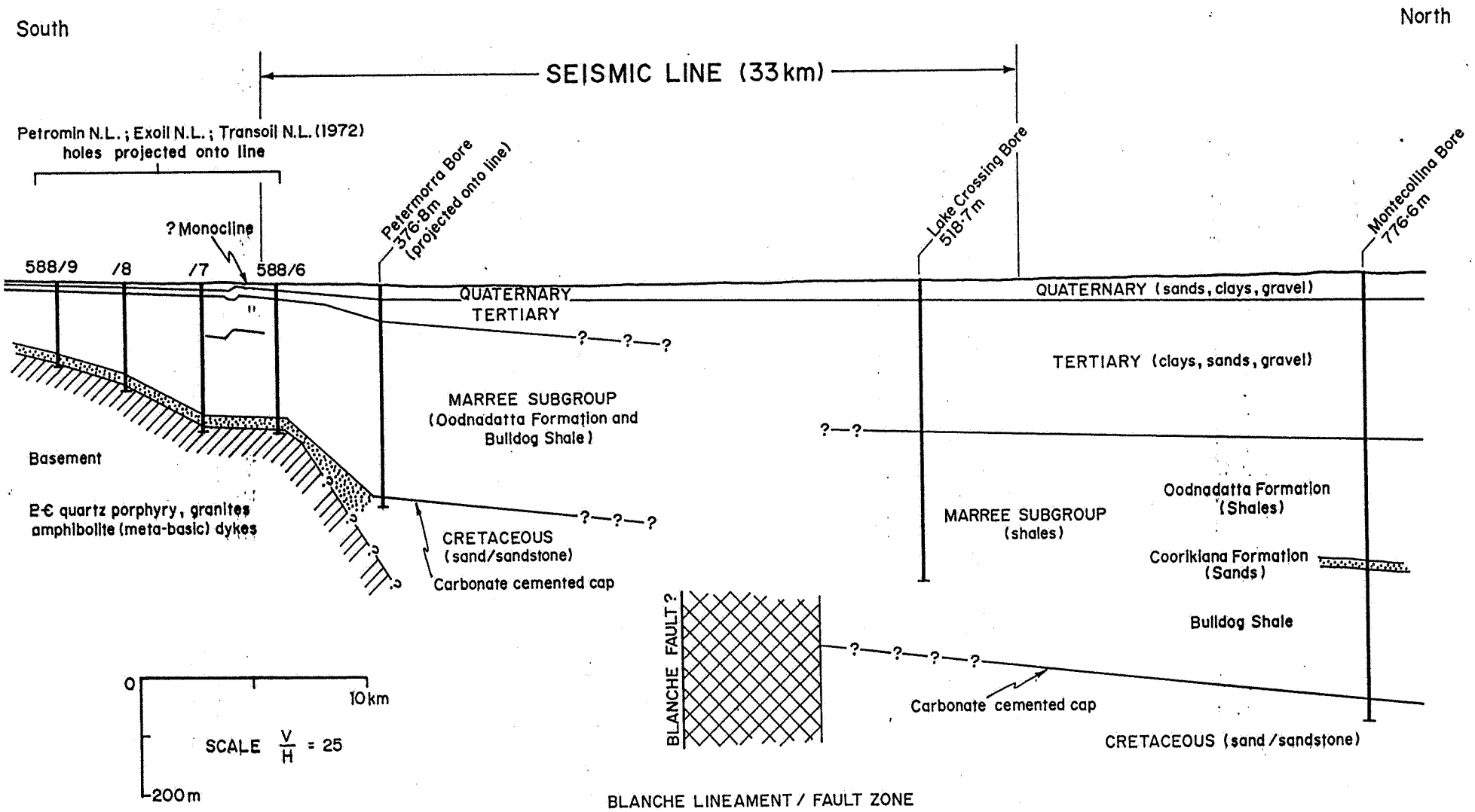
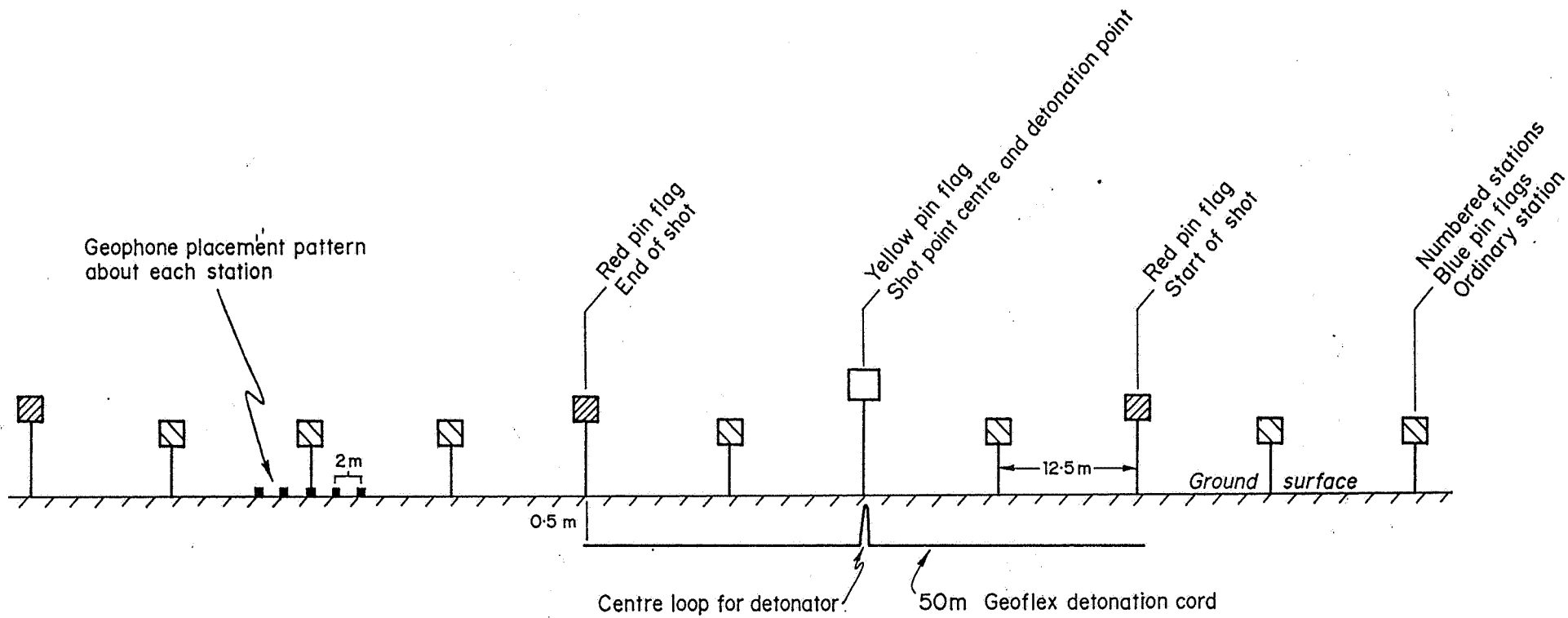
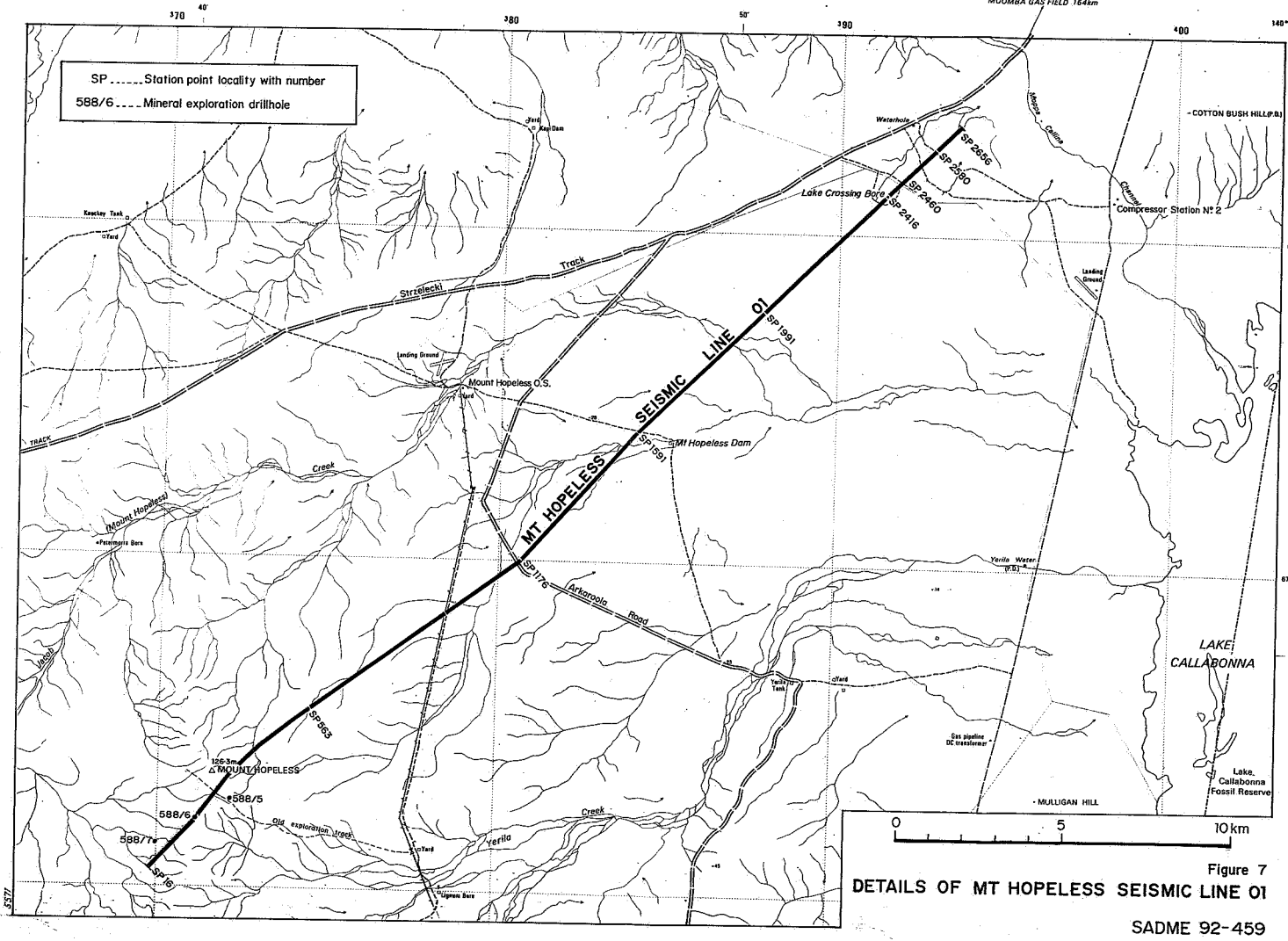


Figure 5. Cross section along Mt Hopeless seismic line, geology adapted from existing drillhole data prior to seismic aquisition



Note : Shot point centres were 100 m apart

Figure 6. Individual shot point layout for seismic interpretation of Mt Hopeless Line 1


SP ..... Station point locality with number
588/6 .... Mineral exploration drillhole
MOOMBA GAS FIELD 164km
COTTON BUSH HILL(P.O.)
Compressor Station № 2
Waterhole
Yard
Keg Dam
Keachey Tank
Strzelecki Track
Landing Ground
Mount Hopeless O.S.
Lake Crossing Bore
SP 2656
SP 2580
SP 2460
SP 2416
SP 1991
SP 1591
SP 1176
SP 863
SEISMIC LINE 01
MT HOPELESS
Mt Hopeless Dam
Creek
(Mount Hopeless)
Petermarra Bore
Arkaroola Road
Yerila Water (P.O.)
Yerila Tank
LAKE CALLABONNA
Gas pipeline DC transformer
Lake Callabonna Fossil Reserve
MULLIGAN HILL
126·3m
MOUNT HOPELESS
588/5
588/6
588/7
Old exploration tracks
Yerila
Ligneous Bore
0 5 10km
Figure 7
DETAILS OF MT HOPELESS SEISMIC LINE 01
SADME 92-459

CALLABONNA

Lake Crossing Bore

Montecollina Bore
14.9km NE

ELEVATION IN METRES

2200 2225 2250 2275 2300 2325 2350 2375 2400 2425 2450 2475 2500 2525 2550 2575 2600 2625 2653

0.00 QUATERNARY

TERTIARY

CRETACEOUS

? Oodnadatta Formation

? Coorikiana Sandstone

Bulldog Shale

MARREE SUBGROUP

TD

Cadna-Owie Formation

Unconformity

Pre-Mesozoic Bedrock

1.00

10 8 6 4 2 0 FOLD

HORIZONTAL SCALE 1:10 000

Figure 8(1)

MOUNT HOPELESS LINE 1
SEISMIC SECTION
SHEET 1 OF 5

SADME 92-460A

Adjoins sheet 2

1650 1675 1700 1725 1750 1775 1800 1825 1850 1875 1900 1925 1950 1975 2000 2025 2050 2075 2100 2125 2150 2175 2200 2225

CAINOZOIC

?Oodnadatta Formation

? Coorikiana Sandstone

Bulldog Shale

Cadna-Owie Formation

Pre-Mesozoic Bedrock

Figure 8(2)
MOUNT HOPELESS LINE 1
SEISMIC SECTION
SHEET 2 OF 5

Adjoins sheet 3

Adjoins sheet 1

SADME 92-460B

BLANCHE LINEAMENT / FAULT ZONE

CAINOZOIC

?Oodnadatta Formation

? Coorikiana Sandstone

Bulldog Shale

Cadna-Owie Formation

Pre-Mesozoic Bedrock

?Precambrian-early Palaeozoic event

Figure 8(3)
MOUNT HOPELESS LINE 1
SEISMIC SECTION
SHEET 3 OF 5

Adjoins sheet 4

Adjoins sheet 2

SADME 92-460C

CAINOZOIC

?Oodnadatta Formation

? Coorikiana Sandstone

Bulldog Shale

Cadna-Owie Formation

Pre-Mesozoic Bedrock

Figure 8(4)
MOUNT HOPELESS LINE 1
SEISMIC SECTION
SHEET 4 OF 5

Adjoins sheet 5

Adjoins sheet 3

SADME 92-460D

PLATE 1: Signing the Site Clearance Agreement with the Aboriginal Heritage Representatives from the Flinders Ranges Aboriginal Heritage Consultative Committee. L to R: B Coulthard, G Coulthard (Chairman FRAHCC) and M Sheard (SADME).

PLATE 2: Bulldozer with Geoflex cord spool/feeder assembly and hydraulic ripper tyne. The vegetation here is 'old man' salt bush.

PLATE 3: Bulldozer ploughing in the geoflex detonating cord during the experimental work near Moppa Collina Channel. Note that the dozer blade is raised to avoid uprooting the salt bush vegetation.

PLATE 4: Firing a shot, the shot man's vehicle (green) near the charge and the recording vehicle (white to the RHS.

PLATE 5: Preloading at the seismic line mid point. Note the dozer blade is raised to minimise ground surface disturbance. Vegetation here was limited to scatterd grass and low herbs.

PLATE 6: View towards Mt Hopeless looking SW along the line which passes to the LHS of Mt Hopeless. A silcrete ridge capping (at centre skyline) was bypassed. Vegetation here is limited to scattered low salt bush, low thorny herbs and along drainage lines are stunted trees.

APPENDIX 1

SITE CLEARANCE AGREEMENT

A SITE CLEARANCE AGREEMENT

BETWEEN

THE SOUTH AUSTRALIAN MINES AND ENERGY DEPARTMENT

AND

COMMUNITY REPRESENTATIVES

ABORIGINAL HERITAGE SITES

Proposed seismic line, Mt Hopeless Tank area, CALLABONNA

($110/day)

We the undersigned acknowledge the receipt of $220.00 each for the purpose of inspecting the proposed seismic line operation site situated 3 km SE of Mt Hopeless and running SW of the Strzelecki Track via Lake Crossing Bore and Mt Hopeless Tank.

The actual seismic line and camp site layout are indicated on the attached Plan.

3

We agree that significant Aboriginal heritage sites ~~have not~~*/have* been identified but that no* Aboriginal heritage areas lie within the remaining proposed seismic line area. These are indicated on the attached map and will be avoided.

ABORIGINAL HERITAGE REPRESENTATIVES

SIGNED L.J. Coulthard DATE 5-3-91

SIGNED B.L. Coulthard DATE 5-3-91

SADME REPRESENTATIVES

SIGNED M.J. Shearer DATE 5-3-91

SIGNED [signature] DATE 5.3.91

(* strike out which ever does not apply).

G02530

DEPARTMENT OF MINES AND ENERGY

26 February 1991

FROM: M.J. SHEARD
REGIONAL GEOLOGY

TO: FLINDERS RANGES
ABORIGINAL HERITAGE
CONSULTATIVE COMMITTEE

SUBJECT: PROPOSED SEISMIC LINE ON CALLABONNA 1:250 000 MAP SHEET

PROPOSAL: 33 km of single seismic line on 6838 Moolawatana, CALLABONNA.

LOCATION: Between gridpoints 6710.3732 and 6734.3938 passing west of but as close as possible to 'Lake Crossing Bore' and 'Mt Hopeless Tank'.

ACCESS: From Strzelecki track and Mt Hopeless Track, See attached Plan.

OBJECTIVES:

- Nature of the Blance Lineament/Fault. This is a major feature trending NW-SE across CALLABONNA passing SW of Lakes Blanche and Callabonna. It forms the hypothetical boundary between the Warburton and Arowie Basins, and also a major faunal boundary. The proposed line will bisect this feature at ~ 90°
- Basement topography, structure, depth.
- Presence or absence of Cambrian (Warburton Basin limestones and shales)
- Structure within the Mesozoic (ie faults)
- Structural disturbance within the Tertiary - faulting, drag folding.

PROPOSED METHODS:

- Surveyed line between grid points with pegs at 100 m intervals.
- Single line seismic using buried geoflex exploding cable (depth ~ 0.7 m)
- Cable burial by ploughing in with a D6 Bulldozer.
- Minimal line clearance, Bulldozer will maintain blade well above ground keeping surface disturbance to a minimum. Large trees will be gone around and creek disturbance avoided (in keeping with standard practice).
- Sites of Aboriginal significance avoided.

RESOLUTION: Geophone spacing 2.5m and recording as a 12 Fold Stack with a 96 geophone array.

TIMING: VELSEIS of Brisbane ready to proceed 6/3/91 dependent on site inspections.

DEPARTMENT OF ENVIRONMENT: No objections to proposal, advice on 27/2/91 in writing.

M. J. Sheard

M.J. SHEARD

Phone (08) 274 7616

MJS:AM

APPENDIX 2

VELSEIS OPERATIONS REPORT, INCLUDING PROCESSING REPORT

OPERATIONS REPORT

CALLABONNA SEISMIC SURVEY

MOUNT HOPELESS / LAKE CALLABONNA DISTRICT

SOUTH AUSTRALIA

FOR

THE SOUTH AUSTRALIAN DEPARTMENT OF MINES AND ENERGY

MARCH, 1991

VELSEIS PTY LTD
Integrated Seismic Technologies

TABLE OF CONTENTS

APPENDICES

1. INTRODUCTION

1.1 GENERAL

The REGIONAL GEOLOGY BRANCH of the South Australian Department of Mines and Energy, contracted Velseis Pty. Ltd. from Brisbane, to acquire and process data from a single seismic line in the Mount Hopeless/Lake Callabonna area of South Australia, in March, 1991.

The line was recorded using explosive cord. (ICI Redcord)

1.2 LOCATION/ACCESS

The line ran approximately north east, south west with the north eastern end starting just to the south of the Strzlecki Track, between Lake Blanche and Lake Callabonna. The line continued to the south west, past Lake Crossing Bore, Mount Hopeless Tank and passed about one kilometer to the south east of Mount Hopeless.

Access to the line (approximately 33 kilometers long) was gained from the Strzlecki Track and Mount Hopeless Track.

1.3 TERRAIN

There was little elevation change along the line with the exception of a gradual upward slope towards the SW end. Surface conditions varied from gibber type country with some low, weathered ridges, to sandy, salt bush flats.

1.4 WEATHER

The weather was generally fine, with light breezes. However, strong winds towards the end of the survey produced an unacceptable signal to noise ratio (charge sizes would have been increased had the cord plough not left the area) so it was decided to record at night, when the wind had died down.

1.5 LOGISTICS

The crew used a camp which was rented from Wreckair in Adelaide. The camp was established at a creek, about 0.5 kilometers off the Strzlecki Track (on the southern side) near the NE end of the line. The access track to the No. 2 compressor station, for the Gidgealpa/Adelaide Natural Gas Pipeline, was a further eight kilometers NE along the Strzlecki Track. SADME provided two caravans for their own use.

Fuel was collected in drums from Lyndhurst by the crew during mobilisation. One trip was made to Lyndhurst (approx. 180km from camp) to refill the fuel drums before the survey was completed and to purchase supplies.

Water was drawn from the bore at No.2 compressor station.

3. LINE CLEARING AND CORD PLOUGHING

Line Clearing and Cord Ploughing was contracted to Bundara Pastoral Company of Peterborough.

Minimal line clearing was required. The bulldozer was able to scrape salt bush off the line and carry out minor surface smoothing during the cord ploughing operation.

A device was fabricated and fitted to the bulldozer ripper unit to enable a Redcord reel to run freely and supply a continuous length of cord. When the bulldozer reached the shot point flag, the ripper was lifted and cord was capped according to ICI instructions, using only one detonator. The ripper was then lowered so that the primed section was planted to the greatest extent possible, without placing undue strain on the cord. At the beginning of the cord ploughing run, a knot was tied in the end of the cord in order to help prevent the cord from being pulled along the trench.

ICI Redcord was supplied by SADME from their stock. Detonators were purchased by SADME and supplied to Velseis. Cord cutting tools, bell wire, tape etc were supplied by Velseis Pty. Ltd. The ripper attachment for dispensing Redcord was fabricated in Brisbane by Velseis.

4. EQUIPMENT/PERSONNEL

4.1 SURVEY EQUIPMENT

- Nissan Patrol 4x4
- Sokkisha 3FR Semi Total Station
- Survey Chains, Stadia Rods, Compasses etc.
- Survey Pin Markers, Flagging, Star Pickets etc.

4.2 LINE CLEARING/CORD PLOUGHING EQUIPMENT

- Liebherr Bulldozer with Hydraulic Ripper (approximately equivalent to a Caterpillar D-6)
- Ripper Attachment for Redcord dispensing
- Low Loader
- Service Vehicle
- Caravan, Generator and Camp Equipment

4.3 RECORDING CREW VEHICLES

- Toyota Landcruiser 4x4 Recording Vehicle (Air/Cond.)
- 2 Toyota Landcruiser 4x4 Cable/Geophone Vehicles
- John Deere AMT600 All Terrain Vehicle with Trailer

5. RECORDING

5.1 ENERGY SOURCE

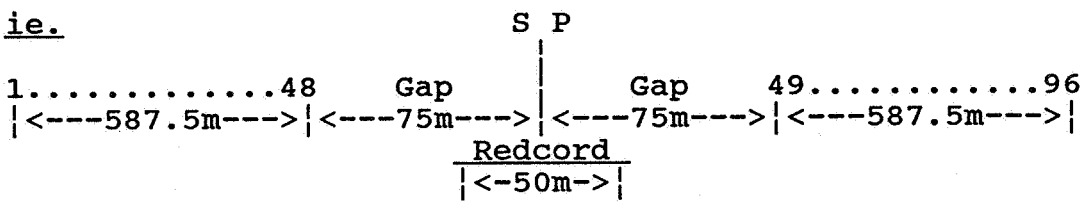
A charge of 50 metres of ICI Redcord, 10 grams/metre, (single length) capped with a single detonator in the centre and ploughed to an average depth of 0.5 metres, was used for each shot. Cord ploughing proceeded well ahead of the recording crew and the cord bulldozer was demobilised while recording was in progress.

A reduction in energy was experienced towards the SW end of the line. The signal to noise ratio was further affected by strong winds. The charge size could not be increased because the cord ploughing bulldozer was no longer available, so recording operations were re-scheduled at night in order to escape the wind effects.

5.2 SPREAD GEOMETRY

Line Identification	:	Callabonna Line - 01
Line Direction/Progress	:	NE ----> SW
Live Geophone Stations	:	2,656(NE) to 29(SW))
Shot Points	:	2,657(NE) to 16(SW)
Spread Type	:	96 trace, symmetrical split
Spread Layout	:	662.5-75-0-75-662.5 metres

ie.



5.3 RECORDING PARAMETERS

Recording	:	96 Trace, IFP, SEG-B Output
Sample Rate/Record Length	:	2 milliseconds / 2 seconds
Record Filters	:	Low Cut - 25Hz, 12db/oct High Cut - 187.5Hz, 72db/oct
Coverage	:	600%
Shot Point Interval	:	100 metres
Group Interval	:	12.5 metres
Geophone Pattern	:	Six in line over 12.5 metres
Geophone Frequency	:	30 Hertz

6.1 RECORDING SYSTEM cont....

8) Four auxiliary channels are available for recording ancillary information (such as confirmation time break and uphole signals).

9) Safety interlocks to avoid the recording of corrupted data.

6.2 PRINCIPAL SPECIFICATIONS

- Noise, approx. equal to 0.15uV at 42db fixed gain
- Fixed gain variable between channels, approx. equal to 0.2% (Low cut filters out)
- IFP Linearity 0.05%
- DC Offset 0.2uV
- Distortion < 0.1%
- Dynamic Range > 80db
- Crosstalk > 80db

6.3 VELCOM - INTELLIGENT FIELD CAMERA

This system replaces the conventional camera used in standard seismic data acquisition systems and at the same time has the ability to field demultiplex the seismic data stream.

In principle, the SERCEL SN338 HR acquisition system operates in its designed configuration as far as the buffer output of the A/D converters. At this point in the data flow, Velseis has introduced the interface unit VELCOM, which channels data, data validation, data strobe and status monitor lines from the SERCEL into an IBM 80386 PC based computer system. Lines are also available from the unit to control the operation mode of the SERCEL and other peripherals. This enables full field diagnostic and instrument tests to be analaysed by VELCOM.

The VELCOM system provides a field monitor, data demultiplex on an IBM-PC based screen within five seconds of firing the shot.

Prior to the acquisition cycle, the operator interacts with the computer, via the keyboard, for information regarding spread parameters, ie. position of the shot and position of the geophones. Shot and geophone depths (if applicable) are also integrated onto the PC based seismic database during the recording process, for each individual trace. Line survey and elevation data are also integrated.

7. TIME TABLE OF EVENTS

Survey Crew

26 Feb 91	:	On stand-by due to job delay
27/2 to 01/3	:	Mobilisation to Lake Eyre South
02/3 to 08/3	:	Working on WMC prospect
09/3	:	Mobilise Lake Eyre to Mt. Hopeless /Surveyor scouting with M. Sheard
10/3 to 16/3	:	Pegging, Scouting and Surveying
17/3 to 18/3	:	Demobilisation to Brisbane
19/3	:	Survey Calcs in Brisbane office

Recording Crew

27/2 to 01/3	:	Mobilisation to Lake Eyre South
02/3 to 12/3	:	Working on WMC prospect
13/3	:	Mobilise Lake Eyre South to Mt. Hopeless
14/3	:	Bulldozer on site (demobed. 18/3?) Experimental/Production recording
15/3 to 22/3	:	Production recording, breakdown, standby for wind, recorded on night of 22/3.
23/3 to 24/3	:	Demobilisation via Noccundra to Brisbane

DATA PROCESSING cont....

BANDPASS FREQUENCY FILTER

Band-pass frequency filtering of a seismic trace involves the application of a zero-phase filter. This filter band limits the amplitude spectra without modifying the phase spectrum of the seismic trace.

For this seismic data set, a band-pass filter of 10/20 Hz Lo-cut to 85/95 Hz Hi-cut was implemented.

This filter was applied prior to Deconvolution so to suppress ground roll and high frequency ambient noise that would otherwise contaminate the signal autocorrelation, hence improving the final result of Deconvolution.

DECONVOLUTION

Pre-stack predictive deconvolution is aimed at improving the temporal resolution by collapsing the effective source wavelet contained in the seismic trace to a spike.

By way of autocorrelation algorithms and trials, a predictive lag of 8 milliseconds has been applied to the seismic data.

BANDPASS FREQUENCY FILTER

A band-pass filter of 15/20 Hz Lo-cut to 80/90 Hz Hi-cut was applied after deconvolution so as to minimise the introduced high frequency energy.

AMPLITUDE EQUALIZATION

For this survey a post-deconvolution AGC used a time gate of 300 milliseconds.

VELOCITY ANALYSIS

Normal move-out (NMO) is the basis for determining velocities from seismic data. Computed velocities can in turn be used to correct for NMO so that reflections are aligned in the traces of a Common Depth Point gather before stacking.

Stacking velocities are picked directly from both Constant Velocity Gather (CVG) and Constant Velocity Stack (CVS) panels. The velocity chosen is that which exhibits ideal move-out correction and best stack response respectively.

Velocity Analyses were performed at approximately 450 metre intervals.

DATA PROCESSING cont....

COHERENCY FILTER

A coherency or median filter is applied as a post stack process so to reject anomalous values such as noise bursts.

The median filter is applied horizontally to an array of data seismic samples. These samples are then ordered from small to large values. The median of the series is then substituted for the pre-ordered centre value.

The effect of the median filter may be controlled by altering the horizontal size of the pre-ordered data sample array and also allowing a percentage mix of both pre-median and post-median values.

For this seismic survey the number of horizontal data samples used for the median calculation were 9 traces and the percentage mix was set to 60% of pre-median and 40% of post-median values.

AMPLITUDE EQUALIZATION

For this survey a post stack AGC used a time gate of 400 milliseconds.

APPENDIX 1

LIST OF SEG-B FIELD TAPES

TAPE NO.	01	FILES	903	TO	911	(EXPERIMENTAL)
		FILES	200	TO	240	(PRODUCTION)
TAPE NO.	02	FILES	241	TO	291	
TAPE NO.	03	FILES	292	TO	342	
TAPE NO.	04	FILES	343	TO	391	
TAPE NO.	05	FILES	392	TO	440	
TAPE NO.	06	FILES	441	TO	490	
TAPE NO.	07	FILES	491	TO	540	
TAPE NO.	08	FILES	541	TO	589	
TAPE NO.	09	FILES	590	TO	637	
TAPE NO.	10	FILES	638	TO	643	

APPENDIX 2

LIST OF PERMANENT MARKERS

LOCATION	EASTING	NORTHING	ELEVATION
Lake Crossing Bore (approx stn no 2416)	391 472.13	6731 155.43	11.35m
Station No. 1591	384 109.03	6723 938.22	24.70m
Station No. 1176	380 406.04	6720 305.93	31.32m
Station No. 963	378 409.12	6718 545.89	39.94m
Drill Hole 588/6 (Past end of line)	371 097.63	6712 016.14	91.40m

APPENDIX 3

SURVEY ORIGINS / LINE LOCATION

The following Trig. Stations were used for survey control:

T1/592	AMG Co-ordinates	:	Easting - 397 407.979 Northing - 6736 406.751
	Geographical Co-ords:		29 29 51.2908 south lat. 139 56 29.8299 east long.
	Elevation	:	38.20m
T1/602	AMG Co-ordinates	:	Easting - 371 670.181 Northing - 6713 471.039
	Geographical Co-ords:		29 42 07.7235 south lat. 139 40 24.4031 east long.
	Elevation	:	125.80m

Location and survey information for these Trig. Stations was provided by AUSLIG (Australian Surveying and Land Information Group). Both Trig. Stations were established by The South Australian Department of Lands in 1965.

CALLABONNA LINE - 01 LINE END CO-ORDINATES

STATION NO. 2656 - EASTING : 393 585.1
NORTHING : 6733 284.4

STATION NO. 016 - EASTING : 369 719.8
NORTHING : 6710 533.9

CALLABONNA LINE - 01 SUN SHOTS

Three Sun Shots were taken during the survey. One was taken along the traverse from Trig. Station No. T1/592 and two were taken on the line itself.

11 March, 1991 Sun Shot taken at C (between stations 1960 and 1840).
29 35 06 south lat.
139 50 00 east long.

15 March, 1991 Sun Shot taken at Station No. 744.
29 39 55 south lat.
139 44 00 east long.

16 March, 1991 Sun Shot taken approx. 520m SW along traverse from T1/592 to NE end of line.
29 30 06 south lat.
139 56 22 east long.

HIGH RESOLUTION

SEISMIC REFLECTION SURVEYS

for

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

Lake Frome Callabonna area
South Australia

Energy Source : Geoflex

SCHEDULE, TERMS AND OPERATING CONDITIONS

December 1990 - March 1991

VELSEIS PTY LTD

Integrated Seismic Technologies

1. PROVISION OF SERVICES AND SCOPE OF WORK

A. In respect of the Department of Mines and Energy South Australia, hereinafter known as the Company, seismic program at Lake Frome/Callabonna area, the Contractor agrees to make available personnel and equipment to conduct high resolution seismic reflection survey using geoflex as an energy source under the terms and conditions herein defined and described.

B. The contractor shall ensure that the equipment is maintained in a serviceable condition. All equipment shall remain at the Contractor's risk during transportation, storage and operation.

C. Programmed lines will be located and surveyed by Company prior to recording. Contractor can provide this service at $900.00 per day including mobilisation, demobilisation, line clearing supervision, levelling and permanent marker installation. Costs of pegs, tags, marker paint etc are deemed reimbursable expenses.

D. At the completion of each surveyed area, Contractor shall provide the following;

(1) Magnetic tapes of the data recorded
(2) A complete and accurate observer's report covering the survey.
(3) Copies of field monitors if requested
(4) A brief technical report describing equipment and parameters used during survey, together with maps and sketches as required to support the observer's report.

E. Program changes may be effected upon agreement between the representatives of the Company and Contractor.

F. Daily, weekly and monthly checking of the equipment recommended by the manufacturers will be diligently carried out.

G. Crew will work a six (6) day on, one (1) day off schedule. The seventh day is at no charge to the Company and is used for equipment maintenance. All rates apply to a ten (10) hour work day including travel to and from the site to crew accommodation.

2. EQUIPMENT TO BE PROVIDED BY CONTRACTOR

The Contractor shall provide the following equipment:

- One Toyota four wheel drive recording vehicle with mounted, air-conditioned recording cab and independent power system for battery charging and air-conditioning.
- Two toyota four wheel drive cable and geophone vehicles.
- One John Deere 5 wheel All Terrain cable/geophone vehicle.
- One seismic recorder, Sercel Model SN338HR, 96 channel with 2 millisecond sample rate, 187Hz alias filter
- One tape unit
- One VELCOM PC based field monitor and camera system
- One Rota-Long Switch
- 200 geophone arrays Sensor SM-7, 30Hz, 6 per array
- 20 seismic cables, 162 metres, 12 takeouts at 13.5 metres complete with extension cables
- Three radios incorporating shooting system
- All ancillary equipment, radios,jumper cables and necessary spare parts
- Magnetic tapes and recording paper

Any equipment requested by the Company which is not included in the above list and is provided by the Contractor shall be charged at cost plus 5% handling fee.

3. PERSONNEL TO BE PROVIDED BY CONTRACTOR

One Field Supervisor - as deemed necessary by Contractor
One Party Manager/Observer
One Line Supervisor
One Licenced Shotfirer
Five Line crew

4. COMPENSATION

Point of origin of Contractor's equipment and personnel shall be from Brisbane, Queensland.

Compensation to the Contractor for services, equipment and personnel to be provided under this agreement shall be as detailed hereunder and includes crew messing and accommodation.

A.(i) Mobilisation/demobilisation charge for Seismic Crew,

$14,625.00

This charge applies for the establishment on site of the seismic reflection equipment listed above together with the seismic crew personnel.

(ii) Mobilisation/demobilisation charge for One Survey Crew,

$900.00 per day

This charge applies for the mobilisation and demobilisation of one survey crew consisting of one Surveyor, one Rodman, one four wheel drive vehicle and Survey Instruments.

(iii) Mobilisation/demobilisation of Dozer,

$2,200.00

This charge applies for the establishment on site of the Dozer (Liebherr type similar to a D6), Operator and includes modifications to a ripper to allow for burial of Geoflex cable.

B. Production Rate; Seismic recording, $3,600.00 per day
Surveying Crew, $900.00 per day
Dozing/Line Clearing, $800.00 per day

Applies to those days spent on seismic data acquisition, surveying, surveyor on preparation of maps and computations and dozer line clearing.

C. Stand-by Rate

Seismic crew	$2,900.00 per day
Survey crew	$540.00 per day

This rate applies to those days lost because of weather or other factors not under the control of the Contractor.

D. Down Time — No charge

Time lost because of equipment breakdown or other factors attributable to the Contractor.

E. Data Processing

Rate applies to computer time on VELSEIS processing system in Brisbane. Charges will be $18.50 per record for 96 trace line recording at 1200% acquisition. A charge of $175.00 per metre will be charged for each metre of film used in the production of final film transparency sections. Courier and facsimile charges are also deemed reimbursable expenses.

F. Consulting — $65.00 per hour

Rate applies to consulting in field program design both in the office and on site during contract. Costs incurred, including airfares, rental vehicles, facsimiles etc, incurred in providing this service are reimbursable.

5. TO BE PROVIDED BY THE COMPANY

The Company shall provide or pay for a representative on site for the duration of the survey. Line clearing, explosives, detonators, bell wire and their shipment and storage are reimbursable expenses.

6. TAXES, LEVIES, ETC.

The Company shall be responsible for payment of all Government levies, duties and taxes relating to provision of the services and equipment herein except payroll tax and taxes on income.

7. METHOD OF PAYMENT

The Company will be invoiced at the end of the survey or at the end of each calendar month, dependent on which is applicable, and payment shall be made within thirty days of receipt of any invoice from the Contractor. Where reimbursement by the Company is "at cost" Contractor shall provide verification of such cost.

8. PERIOD OF AGREEMENT

Agreement shall commence as per attached schedule and continue in effect for a period sufficient for completion of the program, or upon a period of time agreed to by Company and Contractor.

9. FORCE MAJEURE

Neither the Company nor the Contractor shall be liable for failure of or delay in performance of any obligations that result from "force majeure", which term shall include acts of God, strikes, lockouts or other industrial disturbances, wars, blockades, insurrections, riots, landslides, lightning, earthquakes, storms, floods, fire, the elements, the order of any governmental authority having jurisdiction and any other cause, whether of the kind hereinmentioned or otherwise, not within the control of the party and which by exercise of due diligence such party was or is unable to avoid or overcome.

The Contractor will inform the Company by the fastest means possible and confirm by letter when a state of Force Majeure exists and similarly inform the Company when this state ceases to exist and operations can be resumed.

10. COMPLIANCE WITH LAWS AND REGULATIONS

The Contractor shall comply with all statutes, laws, by-laws, regulations and directions of any government, State or Federal or local authority or other entity having jurisdiction in relation to any aspect of the work.

11. INDEMNITIES

A. Contractor hereby agrees with the Company to indemnify and hold harmless the Company against all liability arising directly or indirectly in connection with this Agreement, and or incidental to loss of or damage to property of, or injury to or death of employees of the Contractor or of its sub-contractors.

B. The Company hereby agrees with Contractor to indemnify and hold harmless the Contractor and its sub-contractors against liability arising directly or indirectly in connection with this Agreement, for injury to or death of persons employed by the Company, regardless of cause or fault wholly or in part by or of any party so indemnified or held harmless.

12. INSURANCE

The Contractor shall at all times during the currency of this Agreement and at its own expense have in effect the following insurances:

A. Employers' Liability Insurance in respect of claims by all persons employed by the Contractor in the work.

B. Comprehensive General Liability in respect of injury to or death of personnel or destruction or damage of property - $5,000,000 any one accident/ unlimited in all.

C. Insurance against loss or damage to the survey equipment for its full insurable value - $425,000.

D. Comprehensive insurance for automotive equipment subject to Legal Liability Limitation Clause - $5,000,000.

13. INDEPENDENT CONTRACTOR

Contractor shall be an independent contractor, maintaining complete control over Contractor's men and operations at all times.

14. PROFESSIONAL SECRECY

A. The Contractor acknowledges that it is and that all its employees and sub-contractors are jointly and severally bound by obligations of professional secrecy and agrees that all records, survey books, maps and reports relative to the measurements, their results and their interpretation are and shall remain the exclusive property of the Company.

B. The Contractor shall not nor shall any of its agents, servants, or employees, or agents, servants or employees of the Company's sub-contractors, communicate to a third party nor publish in whole or in part, any such records, survey books, maps or reports, or any information relative to the survey without securing a previous authority in writing from the Company either during the term of the agreement or at any time thereafter.

C. In a similar way, the Company agrees not to divulge to any person what it may or could learn about the Contractor's own techniques, and to take all necessary precautions to prevent any of its servants, agents or employees from disclosing such information to anyone.

PETROMIN N.L. EXOIL NL & TRANSOIL NL → ENVELOPE 1626

Western Nuclear Holes

Hole #	Depth	COORDINATES LATITUDE	LONGITUDE	100,000 Map	
588/6	(837')	29° 44·03'	139° 41·04'	6838	via G.P.S unit
		29° 42·911'	139° 40·052'		
588/7	(845')	29° 45·41'	139° 39·64'	6838	" " "
		29° 43·230	139° 39'·391		
588/8	(548')	29° 46·73	139° 38.26'	6838	
588/9	(488')	29° 48·01'	139° 36·91'	6838	
588/5	(shallow)	29° 42·69'	139° 42·46	6838	
		29° 42·586'	139° 40·746'		via G.P.S. unit.
		E	N.		
Lake Crossing Bore		391757	6731218	6838	WW0006
		E	S		
		139° 52·793'	29° 32 ·668'		via G.P.S. unit.
Montecollina Bore		401974	6747133	6839	WW0003
Gunpowder Bore		368188	6697673	6838	WW0018

DRILLED 1970

29°40'

29°40'

588-1
200'

588-4
410' A

Mt. Hopeless

2.78 km

588-2
200'

588-5 Found
290' A (S 29°42'.586, E 139°46'.746)

588-3
845'

588-6
837'
(S29°42'.911, E 139°40'.052)
Found

x Lygnum well

29°45'

588-21
740'

588-7
845'
Found
(S 29°43'.230, E 139°39'.391)

Yerila Creek

588-22
200'A

588-38
710'
135.5-138
2.5'/025%

588-8
598'

Mt. Yerila

Creek

588-12
474'

12th Station

588-39
395'

588-9
488'

588-13
813

588-30
386'A

588-31
450 A

588-32
602'A

588-33
628' A

588-34
520'

588-10
240'
porphyritic Qtz Monzonite.

588-14
442'

588-35
628'

29°50'

135'

5 km

Gunpowder bore

Copied from Envelope 1626

10:1 km = 15.6 cm.

GPS Coordinates. ( )

PROCEDURES TO FOLLOW FOR EXPLOSIVE SOURCED SEISMIC LINE WORK.

Buried detonating cord (red-cord, ICI) source

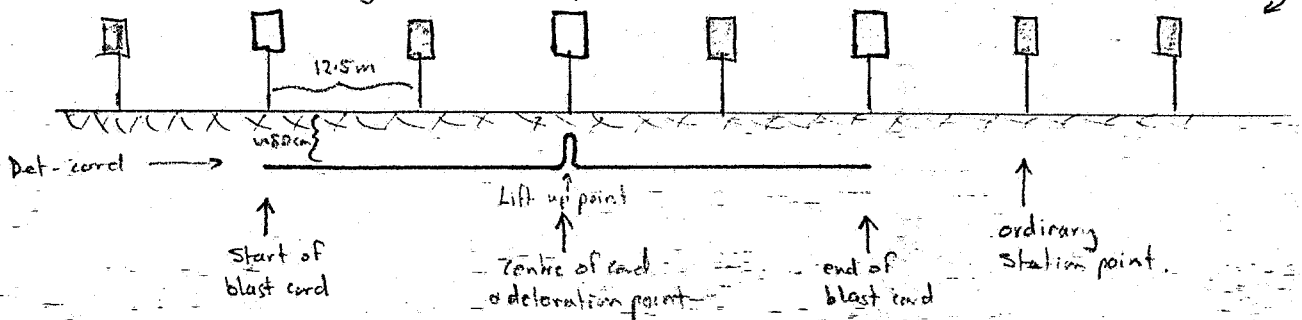
PRE LINE WORK MUSTS

1. Notify Land Holder in writing of proposal so that problems with stock, crops, fences, pipelines, dams, roads etc can be avoided.
2. Notify Environment Department if line likely to cross or approach Reserves, Parks or sensitive areas
3. Notify Aboriginal Heritage Branch of D.E.P. for checking by them & traditional owners for sacred sites, burial sites, camps, tool workshops, corrobboree sites etc. Most of these can usually be avoided by the line.
4. Ask Drafting (Bill Mitchell) to go over proposed route using air photos and prepare a strip terrain/vegetation map & hazard zones (ie: escarpments, main drainage lines, etc). B/W photo enlargements of 1:20,000 useful.
5. Check out explosives/blasters permits required, weight limits for explosive trucks & drivers required. >60 kg powder equivalent 2 drivers needed, >265 Kg powder equivalent means vehicle cannot be left unattended or stationary within a built up area. Vehicle permits to carry explosives (inc. dets) required.
6. Check with Depot on availability of drivers, trucks, Magazines, permits etc in addition to normal gear requirements.
7. Chase up water availability for camp, drilling etc.
8. Find out what special requirements that the Bulldozer may need. and give Dozer Manual ← to operator → (SANTOS)
9. Check with the DME Magazines @ Greenhill Quarries re dets etc. already in house.

LINE WORK

1. Follow SANTOS/DELHI procedures for line clearing — 2 books on vegetation recognition & arid area procedures.
2. Check on all road, fence dam pipeline etc. crossed by line and their locations with respect to shot points. Some may have to be missed or moved to avoid conflict.
3. Correct handling of explosives — wood aluminium or copper tools — NO steel permitted due to sparks. Copper knives @ Glenside in Seismic Box

4. When laying det cord watch out for errors in pin flag or peg markers especially around sites where shots have to be moved or dropped out. Errors in pin flag colour sequence can occur — human error. See below ↙



Mt Hopeless Seismic Line 01 configuration.

Station points 12.5 m apart or 8/100 m
Geophones 2.5 m apart
Shot points 100 m centrepoint to centre point
Shot length 50 m ∴ red flags every 50 m

} yields a 6 fold stack.

5. Keep a daily Log of progress faults, down time, accidents etc & check against company daily operations sheets.
6. Keep an eye on shots as recorded — can usually view each one in the Dog Box just post firing. Ask for days run of print outs each day to see how reflectors are behaving & if time get a BRUTE stack done. A good run @ Mt Hopeless gave 7.2 km/day line shot & recorded.
7. Allow 1/2 to 3/4 day for experimental work to be carried out — determines ground roll, air blast & other noise characteristics, ground coupling, charge size etc.
8. Obtain copies of Surveyors Mud maps (made for linemen to avoid obstacles) to get station point locations to pipes, dams, sacred sites, rds & fences. These maps are very useful for locating altered & missed shot points.
9. Drive the line at completion of shooting to make sure all unnecessary pickets, pegs, pin flags, flagging etc are removed and any fences are repaired.
10. Check that numbered tagged star pickets are in place at start & finish of line, at each track crossing and at 5km intervals in between these.

SAG. Taken from Petroleum Act, 1940 & Regulations, 1989.

(3) A wooden stake, spike, pin or other pointed object must not, in the performance of any geophysical or geological operation, be driven into the carriageway of a road or track.

(4) Where a seismic survey is to be carried out in the vicinity of a building or public utility, all reasonable steps must be taken to ensure that the operation does not cause any damage, or inconvenience any person.

Marking seismic lines

113. A permanent marker must be set in place at the intersections of survey lines, at the intersection of a survey line and a road that has been formed or graded, and at intervals on each survey line of not more than five kilometres.

Shot points near buildings and public utilities

114. (1) Unless otherwise approved by the Director, a shot point must not be located within—

(a) in the case of a shot hole—100m;

(b) in the case of a vibratory or other surface seismic source—20m,

of a well, production facility, pipeline, monument, building or heritage item or site, or public utility.

(2) If a seismic line is to cross a pipeline—

(a) reasonable notice of the proposed crossing must be given to the owner of the pipeline;

(b) the owner must be given a reasonable opportunity to inspect the site and to consider the implications of the proposed crossing;

and

(c) if appropriate, an earth ramp must be constructed over the pipeline before earth-moving equipment or heavy vehicles begin crossing the pipeline.

Shot hole temporary plug

115. Unless the Director otherwise approves, when a drilling crew is so far in advance of a firing crew that a shot hole will not be fired immediately after completion of the drilling, a temporary plug or cover must be placed in or over the shot hole until the firing crew is ready to fire the charge.

Permanent shot hole plugs

116. (1) Unless the Director otherwise approves, a shot hole must be suitably plugged with consolidated earth after firing, and the disturbed area restored, so far as is practicable, to its original state.

(2) Any damage caused by the cave-in or collapse of a shot hole must be restored.

Uncontrolled flow of water

117. (1) If a flow of artesian water is encountered during seismic drilling operations, or is detected at a subsequent time, it must be controlled.

(2) The Director must be notified of the flow, and the steps taken to control it.

(3) The Director may require that additional steps be taken to control the flow.

ICI Australia Operations Pty Ltd

Detonating Cord

1. Guidelines for Use of Detonating Cords

1.1 Select a detonating cord that has the physical and performance characteristics, including explosive core load, consistent with correct blasting techniques and the type of explosives, primers being used.

1.2 Handle detonating cords with the same respect as is given to other explosive products.

1.3 Handle and use detonating cords with care to avoid damaging or severing the cord prior to firing.

1.4 Avoid loops, sharp kinks or angles that direct the cord back towards the oncoming line of detonation.

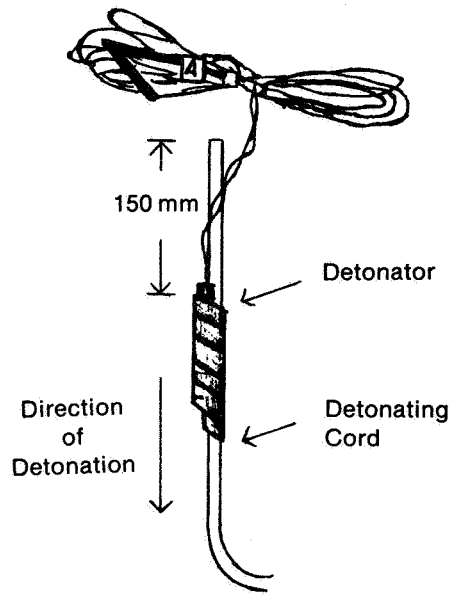
1.5 Detonating cords should always be cut with a sharp knife or an approved cutting tool. Pliers, shears, hand crimpers or similar tools should not be used.

1.6 When using detonating cords in wet conditions care should be taken to avoid moisture penetration in the ends of the detonating cord lines.

2. Initiation of Detonating Cords

Detonating cords are initiated by an electric or No. 8 plain detonator firmly attached with adhesive tape to the side of the cord at least 150 mm from the cut end. The detonator must point along the detonating cord towards the explosive charge and must be firmly fixed so that the base charge of the detonator is in close contact with the side of the detonating cord. The figure illustrates a method of making these connections. Half second or short delay detonators can be used to initiate detonating cords where the technique of delay firing with electric detonators is employed.

They should be attached firmly in the same manner as plain or electric detonators.

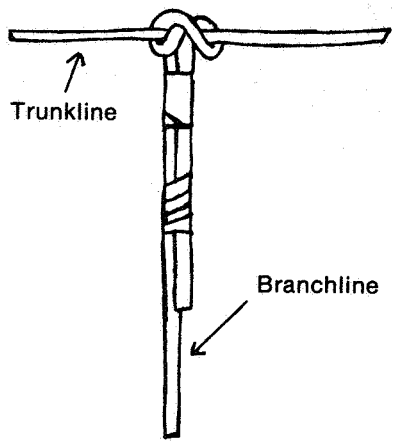


3. Connecting Detonating Cord Lines

For connecting branch and downlines to trunklines, and connecting lengths of detonating cord, the following methods are recommended.

3.1 **Clove Hitch**

Connect the branchline or downline to the trunkline using a clove hitch. Pull tight and if desired, tape the end to the branchline to prevent the knot loosening, as illustrated.



Fax: (062) 51 6806 Telex: AA 62230
Telephone: (062) 52 7099

FAX TRANSMISSION **AUSLIG**

TO: Mike Cresk FAX: 07 393 5457

TELEPHONE: 07 893 1602

FROM: Jim Stead FAX: 06 2516806

TELEPHONE: 06 252 5284 No. of PAGES: 12
(including this page)

MESSAGE

SUBJECT: Trig & Bench Mark Information.

As discussed on the phone.

- Data base output for Trigs:
  T1/592
  T1/602
- Copies of levelling Section output for the area you are interested in.

The Bench mark numbering is different to that on the 250,000 map.

If you can identify on the ground the BMs you are interested in we may be able to get more information.

Stead

22/2/91

Warning: Facsimilies on thermal paper can be highly unstable. If the accompanying documents contain authorisations or other important information they should be copied to good quality paper before filing or otherwise storing.

6839/ 1044

C Status : 0 [104153] Last update 9/85 Printed 22/ 2/19
Type : TRIG/TRAV STN.
Coords Ht: 29 29 51.2908 139 56 29.8299 38.800
Zone E N 54 397407.979 6736406.751

Accuracy : SECOND AGD84 : LEVELLED AHD UNCONFI
Maps : HS4- 6 6839 States : SA
Other obs:
Rel info : OLD VALUES : CLARKE.

Visited : 1965
Mark : IRON PLUG IN GROUND
Beacon : NONE
Access : 4 WD VEHICLE, 0 HOURS 0 MINUTES CLIMB ON TIME
Summary : SA 1965
Horz adj : Origin COOPER/245 All COOPER/245

Vert adj : SA LANDS,TRIGHT
Photo : NONE

T 1 / 602

6838/ 1128

C Status : 0 [104251] Last update 9/85 Printed 22/ 2/1
Type : TRIG/TRAV STN.
Coords Ht: 29 42 07.7235 139 40 24.4031 125.80
Zone E N 54 371679.181 6713471.039

Accuracy : SECOND AGD84 : TRIG AHD CONFIR
Maps : HS4- 6 6839 States : SA
Other obs:
Rel info : OLD VALUES : CLARKE.
ECCE TO MT HOPELESS

Visited : 1965
Mark : BRONZE PLAQUE IN CONCRETE AT SURFACE
Beacon : ECCENTRIC CAIRN
Access : 4 WD VEHICLE, 0 HOURS 0 MINUTES CLIMB ON TIME
Summary : SA 1965
Horz adj : Origin COOPER/244 All COOPER/244

Vert adj : TRIGHT
Photo : NONE

① → ② 228 1741

T1/592

Original Station Established by: S.A.Dept. of Lands Date: 1965

Existing Station Marked by: Date:

Reference Books: EP 1088

Cadastral Location: State S.A. Country/District

Parish/Hundred Allotment/Section/Portion

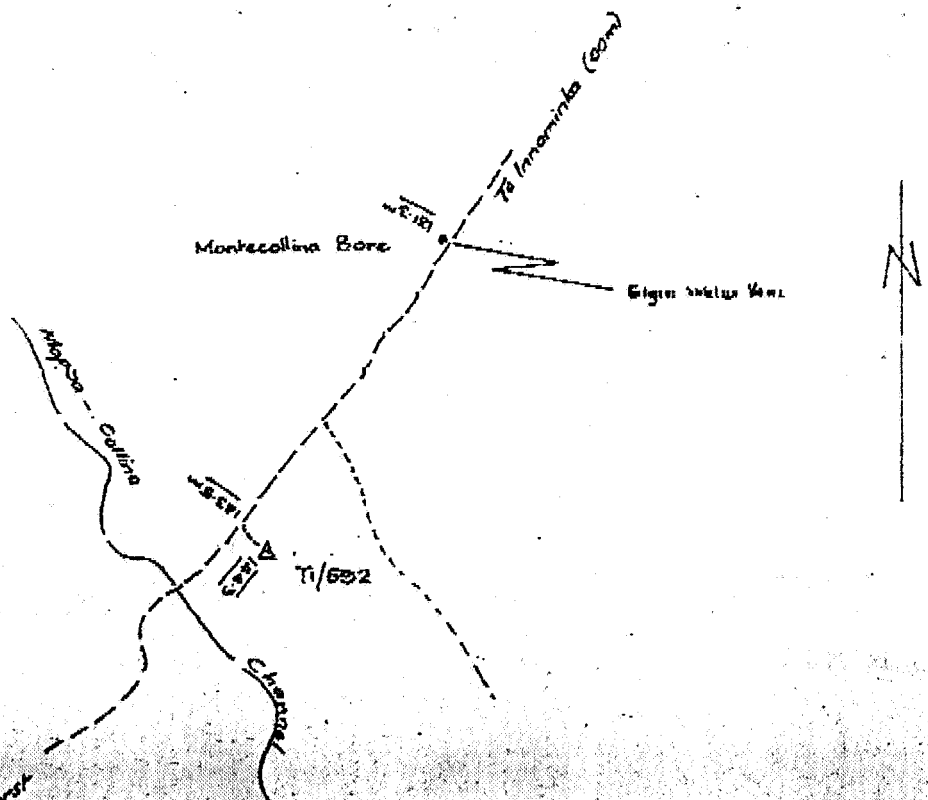
Particulars of station marking and beacon: Not beaconed.

G.M. ½" G.I. pipe 14' below and 7' above nat.surface stamped with aluminium plates.

R.M. ½" G.I. pipes 7' below and 7' above nat.surface marked with stamped aluminium plates.

Access and Locality Sketch:

From cairn, 00m, at Innamincka Township, travel south along the Strzelecki track towards Lyndhurst. Pass Daralingie Well and Hut at 54.2m, Murta Well at 73.2m, and Montecollina Bore turnoff at 135.5m. At 143.5m, turn left off the Strzelecki track and travel to the station at 144.3m.



Cadastral Connections & Reference Marks

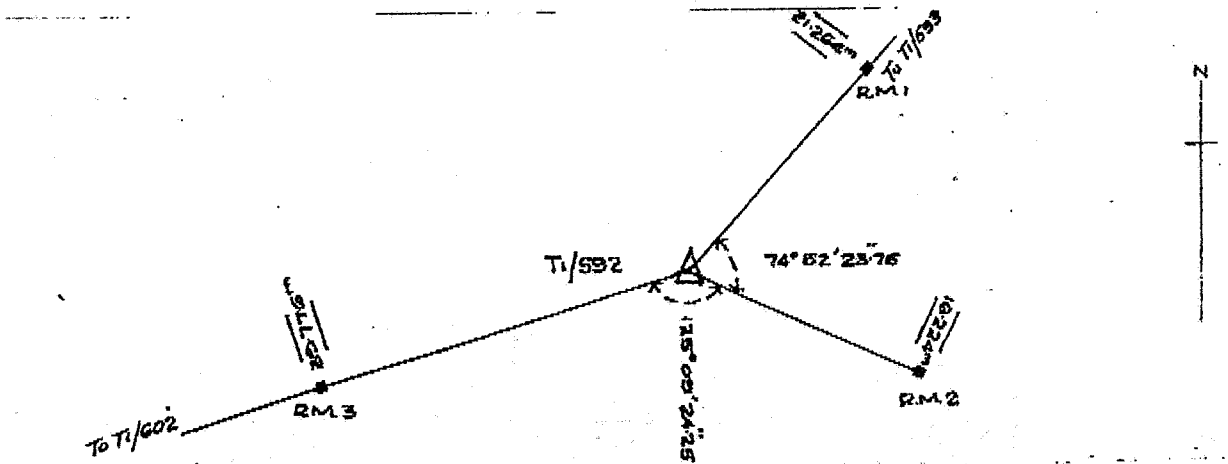
AR COORDINATES: Australian Map Grid In Metres

ARING=ADJ AZIMUTH + CONVERGENCE

HEIGHTS in Metres on the Australian Height Datum

HEIGHTS in Metres above Mean Sea Level.

The latest coordinates and adjustments
appear on
National Geodetic Data Base
information summaries
obtainable from
The Geodetic Services Section
AUSLIG
PO Box 2 Belconnen ACT 2616



Cadastral Connections & Reference Marks.

ence Books: BP 1066

T1/602

Cadastral Location: State S.A. Country/District

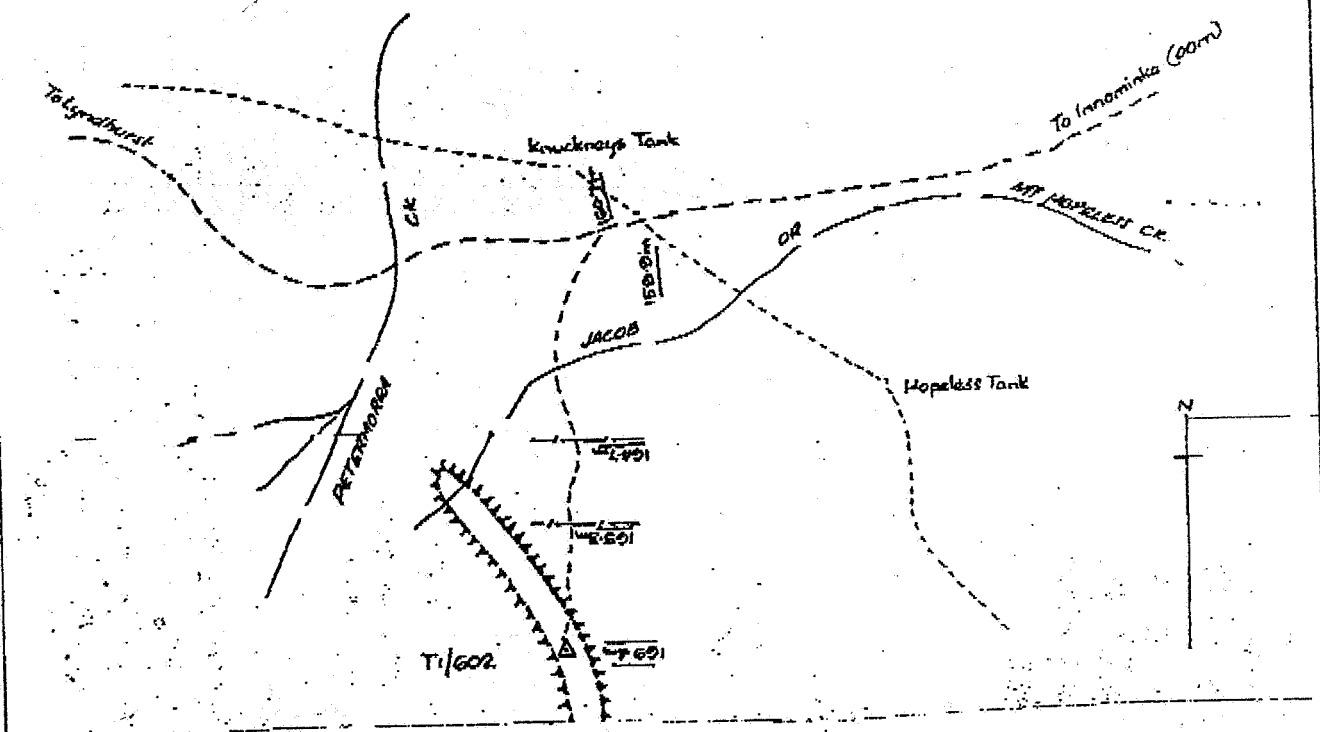
Parish/Hundred Allotment/Section/Portion

Particulars of station marking and beacon:

G.M. S.A.Dept. of Lands national control point plaque set in concrete at natural surface.
Sub-surface mark:- Iron pin in concrete 1'6" below N.S.
R.M. ½" G.I. pipes 2'6" long and 6" above N.S.

Access and Locality Sketch:

From cairn, 00m, at Innaminka Township, travel south along the Strzelecki track towards Lyndhurst passing Daralingie Well and Hut at 54.2m, Murta Well at 73.2m, Montecolline Bore turnoff at 135.5m, and the Mt.Hopeless mailbox at 159.9m. At 160.7m, turn left off the track and travel across country, crossing old fences at 164.7m and 165.3m. Keep travelling to station at 169.4m.
Original station, Mt.Hopeless, is marked by a stone cairn.



tralian Geodetic Datum. 1966

R COORDINATES: Australian Map Grid: In Metres T1/602

RING=ADJ AZIMUTH + CONVERGENCE. HEIGHTS: In Metres above ~~Mean Sea Level~~ AHD

T1 602 SECTION SA 67 7 SERIAL 22

OUTH	LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
9.42	7.7092	139 40 24.4095	54	371670.348	6713471.481	-0 39 26.59	~~128.6~~ 125.8

	SERIAL		ADJ AZIMUTH	ADJ LENGTH
	T1	611 21	249 7 17.34	45507.516
REARY POINT ECC.	T2	6738 23	301 59 46.86	20265.443

Geodetic Data Base

HOPELESS ECC = T1 602 SECTION COOPER SERIAL 64

OUTH	LATITUDE	EAST LONGITUDE	ZONE	EASTING	NORTHING	CONVERGENCE	HEIGHT
9 42	7.7092	139 40 24.4095	54	371670.348	6713471.483	-0 39 26.59	~~128.6~~ 125.8

	SERIAL		ADJ AZIMUTH	ADJ LENGTH
	T1	592 63	48 57 2.10	34482.525
DISTANCE ECC =	T1	611 66	249 7 17.33	45507.516

Stone Cairn is on 176°M from G.M. and is 7' high.

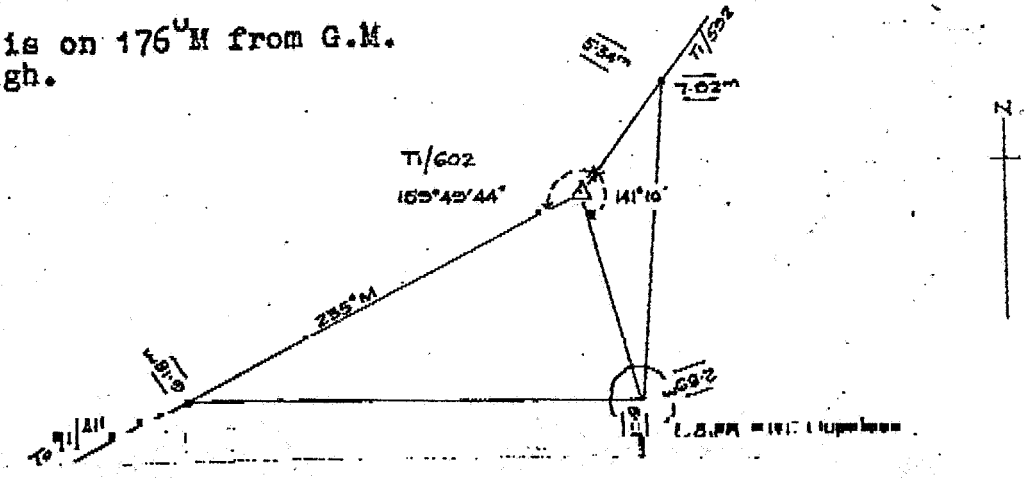


Photo Identification:

PROGRAM AMENDED 01/02/74
COMPUTED 28/10/76

NATIONAL LEVELLING ADJUSTMENT OF AUSTRALIA
PREPARED FOR THE NATIONAL MAPPING COUNCIL BY
THE DIVISION OF NATIONAL MAPPING

LINEAR ADJUSTMENT BETWEEN PREVIOUSLY ADJUSTED JUNCTION POINTS ,62 AND 58

SECTION 58- 62
THIRD ORDER LEVELLING
PRIMARY SECTION

AUSTRALIAN HEIGHT DATUM 1971
SOUTH AUSTRALIA

BENCHMARKS FROM A	TO B	DISTANCE KMS	HEIGHT DIFFERENCES OBSERVED	ORTHOMETRIC METRES	ADJUSTED	CORR	LATITUDE OF B	LONGITUDE	LOCATION OF B	ADJUSTED HT IN METRES OF B
	3455						29 34	139 49	PETERMORRA	33.766
3455	3456	6.9	-6.7754	-6.7754	-6.7787	-.0020	29 34	139 51		26.988
3456	3457	3.7	-4.8603	-4.8603	-4.8629	-.0026	29 32	139 53		22.125
3457	3458	3.5	-9.9569	-9.9569	-9.9594	-.0025	29 31	139 54		12.165
3458	3459	5.6	-8.8843	-8.8843	-8.8883	-.0040	29 31	139 57		3.277
3459	3460	4.5	12.0414	12.0414	12.0382	-.0032	29 30	139 58		15.315
3460	3461	4.7	-9.7121	-9.7121	-9.7154	-.0033	29 27	139 58		5.600
3461	3462	4.2	.3652	.3652	.3622	-.0030	29 25	139 59		5.962
3462	3463	3.9	1.6151	1.6151	1.6123	-.0028	29 22	139 59		7.575
3463	3464	2.7	2.8136	2.8136	2.8117	-.0019	29 20	139 59		10.386
3464	3465	4.8	-.1935	-.1935	-.1969	-.0034	29 18	139 59		10.189
3465	3466	4.2	.7483	.7483	.7453	-.0030	29 16	139 58		10.935
3466	3467	6.9	1.5862	1.5862	1.5813	-.0049	29 13	139 59		12.516
3467	3468	4.0	1.6715	1.6715	1.6687	-.0028	29 11	140 00		14.185
3468	3469	6.2	2.0412	2.0412	2.0382	-.0030	29 08	140 00		16.223
3469	3470	6.0	1.1366	1.1366	1.1324	-.0042	29 06	139 59		17.355
3470	3471	3.4	.5541	.5541	.5517	-.0024	29 05	139 59		17.907
3471	3472	4.8	.8632	.8632	.8598	-.0034	29 03	140 00		18.767
3472	3473	3.5	.5197	.5197	.5172	-.0025	29 01	140 01		19.284
3473	3474	3.7	4.2254	4.2254	4.2228	-.0026	29 00	140 03		23.507
3474	3475	5.6	-4.4287	-4.4287	-4.4327	-.0040	28 58	140 04		19.074
3475	3476	3.5	1.3896	1.3896	1.3871	-.0025	28 57	140 06		20.461
3476	3477	4.3	-.4770	-.4770	-.4800	-.0030	28 56	140 08		19.981
3477	3478	4.8	3.5000	3.5000	3.4966	-.0034	28 54	140 08		23.478
3478	3479	3.7	-3.6168	-3.6168	-3.6194	-.0026	28 52	140 09		19.858
3479	3480	6.5	1.8498	1.8498	1.8466	-.0032	28 50	140 10		21.705
3480	3481	5.4	1.2945	1.2945	1.2910	-.0035	28 48	140 11		22.996
3481	3482	4.7	2.5942	2.5942	2.5909	-.0033	28 46	140 12		25.587
3482	3483	5.0	2.7466	2.7466	2.7431	-.0035	28 44	140 13		28.330

58-62

3483	3484	4.3	-.5435	-.5435	-.5465	-.0030	28 41	140 15			27.783
3484	3485	3.5	-2.9203	-2.9203	-2.9228	-.0025	28 38	140 17			24.861
3485	3486	4.8	2.8228	2.8228	2.8194	-.0034	28 35	140 18			27.680
3486	3487	5.3	1.2174	1.2174	1.2137	-.0037	28 32	140 19			28.894
3487	3488	4.5	1.0802	1.0802	1.0770	-.0032	28 30	140 19			29.971
3488	3489	4.8	1.9571	1.9571	1.9537	-.0034	28 29	140 20			31.924
3489	3490	4.7	-.5654	-.5654	-.5687	-.0033	28 28	140 22			31.356
3490	3491	4.8	1.2165	1.2165	1.2131	-.0034	28 25	140 24			32.569
3491	3492	5.3	1.3484	1.3484	1.3447	-.0037	28 23	140 25			33.914
3492	3493	3.4	.2088	.2088	.2064	-.0024	28 21	140 26			34.120
3493	3494	4.4	.8336	.8336	.8304	-.0032	28 18	140 27			34.950
3494	3495	4.3	.7803	.7803	.7773	-.0030	28 15	140 28			35.728
3495	3496	3.2	.1875	.1875	.1852	-.0023	28 13	140 30			35.913
3496	3497	4.2	1.0580	1.0580	1.0550	-.0030	28 11	140 30			36.968
3497	3498	4.3	.3633	.3633	.3603	-.0030	28 10	140 31			37.328
3498	3499	4.7	1.1817	1.1817	1.1784	-.0033	28 09	140 32			38.507
3499	3500	5.3	.9016	.9016	.8979	-.0037	28 06	140 35			39.404
3500	3501	4.0	1.0942	1.0942	1.0914	-.0028	28 05	140 35			40.496
3501	3502	5.3	.7644	.7647	.7610	-.0037	28 02	140 36			41.257
3502	3503	3.7	.6888	.6888	.6862	-.0026	28 00	140 38			41.943
3503	3504	3.5	1.2433	1.2433	1.2408	-.0025	27 59	140 39			43.184
3504	3505	4.0	.9754	.9754	.9726	-.0028	27 58	140 40			44.156
3505	3506	4.3	.3414	.3414	.3384	-.0030	27 57	140 41			44.495
3506	3507	4.7	1.2250	1.2250	1.2217	-.0033	27 55	140 42			46.716
3507	3508	3.5	2.1409	2.1409	2.1384	-.0025	27 53	140 43			47.855
3508	3509	4.7	.6151	.6151	.6118	-.0033	27 52	140 44			48.467
3509	3510	3.7	.9290	.9290	.9264	-.0026	27 50	140 44			49.393
3510	3511	4.3	3.6478	3.6481	3.6451	-.0030	27 45	140 45	IGNANINCKA		53.038
SUMMATION		245.0	19.4445	19.4451	19.2720	-.1731					

58-62

PROGRAM AMENDED 01/02/74
COMPUTED 28/10/76

NATIONAL LEVELLING ADJUSTMENT OF AUSTRALIA
PREPARED FOR THE NATIONAL MAPPING COUNCIL BY
THE DIVISION OF NATIONAL MAPPING

LINEAR ADJUSTMENT BETWEEN PREVIOUSLY ADJUSTED JUNCTION POINTS 63 AND 62

SECTION 62 - 63
THIRD ORDER LEVELLING
PRIMARY SECTION

AUSTRALIAN HEIGHT DATUM 1971
SOUTH AUSTRALIA

BENCHMARKS FROM A	TO B	DISTANCE KMS	HEIGHT DIFFERENCES OBSERVED	ORTHOMETRIC METRES	ADJUSTED	CORR	LATITUDE OF B	LONGITUDE	LOCATION OF B	ADJUSTED HT IN METRES OF B
							30 05	140 02	NOOLAWACANA	9.872
	4968									9.806
4968	4967	0.0	-.0664	-.0664	-.0664	0.0000	30 05	140 02		9.614
4967	4969	0.0	-.1920	-.1920	-.1920	0.0000	30 05	140 02		18.817
4969	4970	5.0	9.2040	9.2040	9.2039	-.0001	30 08	140 01		24.489
4970	4971	5.1	5.6714	5.6717	5.6716	-.0001	30 00	139 59		29.490
4971	4972	5.0	5.0012	5.0012	5.0011	-.0001	29 57	139 58		40.411
4972	4974	5.0	10.9207	10.9207	10.9206	-.0001	29 57	139 56		39.964
4974	4975	0.0	-.4465	-.4465	-.4465	0.0000	29 57	139 56		44.145
4975	4976	5.0	4.1806	4.1806	4.1805	-.0001	29 58	139 54		47.943
4976	4977	5.0	3.7984	3.7984	3.7983	-.0001	29 52	139 52		60.829
4977	4978	5.0	12.8860	12.8860	12.8859	-.0001	29 51	139 50		49.098
4978	4979	4.7	-11.7311	-11.7311	-11.7312	-.0001	29 49	139 48		47.725
4979	4980	0.0	-1.3728	-1.3728	-1.3728	0.0000	29 49	139 48		48.209
4980	4981	0.0	.4840	.4840	.4840	0.0000	29 49	139 48		51.496
4981	4982	5.1	3.2873	3.2876	3.2875	-.0001	29 46	139 48		37.395
4982	4983	5.0	-14.1010	-14.1010	-14.1011	-.0001	29 44	139 49		35.058
4983	4984	4.8	-2.3372	-2.3372	-2.3373	-.0001	29 42	139 51		21.982
4984	4986	5.0	-13.0756	-13.0756	-13.0757	-.0001	29 40	139 50		21.824
4986	4985	0.0	-.1579	-.1579	-.1579	0.0000	29 40	139 50		21.844
4985	4987	0.0	.0198	.0198	.0198	0.0000	29 40	139 50		24.672
4987	4988	5.0	2.8279	2.8279	2.8278	-.0001	29 38	139 49		27.550
4988	4989	5.0	2.8865	2.8865	2.8864	-.0001	29 36	139 48		35.286
4989	4991	7.7	7.7279	7.7279	7.7277	-.0002	29 34	139 45		36.279
4991	4990	0.0	.9927	.9927	.9927	0.0000	29 34	139 45		35.792
4990	4992	0.0	-.4871	-.4871	-.4871	0.0000	29 34	139 45		33.766
4992	3455	.5	-2.0257	-2.0257	-2.0257	-.0000	29 34	139 49	PETERNORRA	
SUMMATION		= 77.9	23.8948	23.8957	23.8940	-.0017				

62-63

PROGRAM AMENDED 01/02/74
COMPUTED 28/10/76

NATIONAL LEVELLING ADJUSTMENT OF AUSTRALIA
PREPARED FOR THE NATIONAL MAPPING COUNCIL BY
THE DIVISION OF NATIONAL MAPPING.

LINEAR ADJUSTMENT BETWEEN PREVIOUSLY ADJUSTED JUNCTION POINTS , 69 AND 62

SECTION 62- 69
THIRD ORDER LEVELLING
PRIMARY SECTION

AUSTRALIAN HEIGHT DATUM 1971
SOUTH AUSTRALIA

BENCHMARKS FROM. A	TO B	DISTANCE KMS	HEIGHT DIFFERENCES OBSERVED	ORTHOMETRIC METRES	ADJUSTED	COER	LATITUDE OF B	LONGITUDE OF B	LOCATION OF B	ADJUSTED HT IN METRES OF B
	1629						30 14	138 19	LYNDHURST	125.462
1629	3408	4.5	24.4733	24.4727	24.4696	-.0031	30 17	138 22		149.932
3408	3409	3.7	3.6609	3.6612	3.6586	-.0026	30 15	138 25		153.480
3409	3410	2.9	-2.0793	-2.0790	-2.0810	-.0020	30 14	138 27		151.399
3410	3411	1.9	2.2211	2.2211	2.2198	-.0013	30 14	138 29		153.619
3411	3412	6.4	24.3742	24.3742	24.3698	-.0044	30 14	138 31		177.989
3412	3413	5.0	28.6076	28.6076	28.6041	-.0035	30 14	138 34		206.593
3413	3414	4.2	-7.0598	-7.0595	-7.0624	-.0029	30 13	138 36		199.530
3414	3415	3.5	-8.6027	-8.6024	-8.6048	-.0024	30 12	138 38		190.926
3415	3416	4.3	12.5782	12.5785	12.5755	-.0030	30 11	138 42		203.501
3416	3417	4.5	-.9851	-.9854	-.9885	-.0031	30 12	138 45		202.513
3417	3418	3.7	6.2079	6.2085	6.2059	-.0026	30 10	138 48		208.719
3418	3419	2567 3.9	-30.7116	-30.7113	-30.7140	-.0027	30 09	138 50		178.005
3419	3420	2.1	-3.3156	-3.3153	-3.3168	-.0015	30 08	138 52		174.688
3420	3421	6.6	-20.9587	-20.9584	-20.9630	-.0046	30 07	138 53		153.725
3421	3422	3.7	-11.2066	-11.2056	-11.2092	-.0026	30 07	138 55		142.516
3422	3423	3.9	-9.7496	-9.7493	-9.7520	-.0027	30 05	138 58		132.764
3423	3424	2534 5.0	-9.9127	-9.9124	-9.9159	-.0035	30 03	138 59		122.848
3424	3425	3.9	-6.1100	-6.1097	-6.1124	-.0027	30 01	139 00		116.735
3425	3426	3.7	-7.1323	-7.1320	-7.1346	-.0026	29 59	139 01		109.601
3426	3427	4.8	5.3346	5.3349	5.3316	-.0033	29 56	139 02		114.932
3427	3428	4.3	-3.2473	-3.2470	-3.2500	-.0030	29 54	139 03		111.682
3428	3429	6.3	6.4965	6.4971	6.4929	-.0042	29 51	139 03		118.175
3429	3430	3.5	13.6453	13.6456	13.6432	-.0024	29 49	139 03		131.818
3430	3431	3.0	-17.0570	-17.0575	-17.0603	-.0028	29 47	139 03		114.758
3431	3432	4.2	-11.8717	-11.8714	-11.8743	-.0029	29 44	139 03		102.884
3432	3433	3.0	-5.8131	-5.8128	-5.8155	-.0027	29 42	139 03		97.068
3433	3434	4.7	-.1957	-.1954	-.1987	-.0033	29 39	139 03		96.870
3434	3435	3.2	-12.2679	-12.2679	-12.2701	-.0022	29 38	139 03		84.599

62-69

3435	3436	3.1	-1.5691	-1.5668	-1.5710	-.0022	29 35	139 03			83.029
3436	3438	7.4	14.4176	14.4176	14.4125	-.0051	29 36	139 08			97.441
3438	3441	11.3	-15.9487	-15.9487	-15.9565	-.0078	29 37	139 16			81.484
3441	3445	12.4	7.5700	7.5703	7.5617	-.0086	29 34	139 23			89.046
3445	3446	3.5	-11.0734	-11.0734	-11.0758	-.0024	29 34	139 28			77.970
3446	3447	4.5	-12.9558	-12.9558	-12.9589	-.0031	29 35	139 30			65.011
3447	3448	3.4	-16.6754	-16.6756	-16.6778	-.0024	29 36	139 32			46.334
3448	3449	4.7	4.1118	4.1118	4.1085	-.0033	29 38	139 34			50.442
3449	3450	4.2	-1.2143	-1.2143	-1.2172	-.0029	29 39	139 36			49.225
3450	3451	3.9	-4.3321	-4.3321	-4.3348	-.0027	29 38	139 38			44.890
3451	3452	3.2	-1.6959	-1.6958	-1.6981	-.0022	29 37	139 41			43.192
3452	3454	11.6	8.9351	8.9351	8.9280	-.0081	29 36	139 46			52.120
3454	3455	6.0	-18.3496	-18.3496	-18.3540	-.0044	29 34	139 49	PETERBORKA		33.765
SUMMATION		195.7	-91.5667	-91.5663	-91.6960	-.1359					

62-69

VELSEIS

DATE: 11/3/91

CLIENT: ______ AREA: ______ LINE: ______

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz angle	Vert angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 2192	00 00 00	90 08 15	700.19		-1.67 1.06		
	180 00 00	269 51 50					
⊼ 2136					1.745	14.64	(1.04)
2128		89 42	100.0		2.00		
2120		89 49	200.0		"		
2112		89 52	300.0		"		
			400.		"		2015 old fence : Gravel line Pegs
2096		89 52	500.0		"		
2088		89 51 30	600.0		"		
FS 2072	180 06 45	89 51 40	800.21	800.22	+1.94 2.00		
	00 06 30	270 08 20					
BS 2136	00 00 00	90 11 50			-2.75 1.04		
	179 59 50	269 48 15					
⊼ 2072					1.77	16.49	(1.07)
2064		89 52	100.0		2.00		
2056		89 53	200.0		"		
2048		89 56	300.0		"		
2040		89 53 30	400.0		"		
2032		89 55	500.0		"		
2024		89 55 30	600.0		"		
2016		89 55	700.0		"		
FS 2008	179 54 25	89 55 00	800.20	800.20	+1.16 2.00		
	359 54 15	270 05 00					

VELSEIS

DATE: 16/3/91

CLIENT: SAOME AREA: LINE:

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
			SUNSHOT	∅			
BS T1/592	00 00 00						
	21 00 55	63 45 45	26 14 15				0817
	26 56 15	63 39 20	26 20 40				-9.5
	26 53 30	63 35 25	26 24 35				
	26 50 30	63 31 15	26 28 45				
	20 17 30	29 14 20	27 14 20				
	20 14 10	29 19 00	27 19 00				
	20 10 30	29 24 15	27 24 15				
	20 06 05	29 30 25	27 30 25				0821
FS	180 00 00						
	27 03 40		26 52 02				

VELSEIS

DATE: 16/3/91

CLIENT: SAOME AREA: CALABONGA LINE: Mt HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS Ro	00 00 00						Radio MAST
	180 00 05						
⊼ T1 592					1·51	38·57	(1·77) 38·2
T1 602	57 02 40						RM Good
	237 02 35						
FS α	57 15 35	90 30 10	518·82	518·80	2·00 −4·55		
	237 15 25	269 29 50					
BS T1/592	00 00 00	89 26 20			1·71 +5·10		
	180 00 05	270 33 55					
⊼ α					1·76	38·51	
FS β	179 36 25	91 01 20	1484·75	1484·515	2·00 −26·50		
	359 36 15	268 58 35					
BS α	00 00 00	89 00 55			1·04 +25·55		
	180 00 00	269 59 15					
⊼ β					1·69	7·04	(1·07)
FS γ	183 13 05	90 00 05	1220·56	1220·55	2·00 +0·01		
	3 13 00	270 00 10					
BS β	00 00 00	90 01 40			1·09 −0·39		
	179 58 55	269 58 20					
⊼ X					1·61	6·91	(1·00)
	114 12 55	90 08 55					
FS E	284 12 45	269 51 20	790·99	790·99	2·00 −3·02		

VELSEIS

DATE: 16/3/92

CLIENT: SAOMC AREA: LINE:

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS X	00 00 00	89 53 10	790.99		+1.60 1.00		
	179 59 55	270 07 05					
X E					1.67	4.57	(1.07)
FS G	183 26 20	89 49 05	546.42	546.42	2.00 +1.75		
	3 26 15	270 11 10					
BS E	00 00 00	90 13 45			-2.16 1.57		
	179 59 50	269 46 35					
X F					1.73	6.03	
FS: Mr Hobbs A	269 06 10	89 51 35	366.46	366.46	+0.26 2.00		
	29 06 15	270 02 25					
					-0.09 1.67		
BS F	000 00 0	90 01 00					
	180 00 00	269 59 20					
X A					1.73	6.04	
FS R6	35 20 20						Radio Mast
	215 20 20						

VELSEIS

DATE: 11/3/92

CLIENT: JAOMC AREA: CALABASAS LINE: MT. HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS RD	00 00 00						MAST A CPs 2
	179 59 45						
~~2656 T~~					1.75	6.04	(182)
2656	114 47 30	89 16	55.96	55.96	2.00		E.O.L
2655	"	89 58	68.5		"		"
2649		89 55	143.5		"		
2648		89 56	156.0		"		WIND
2640		89 55	256.0		"		
2632		89 55 30	356.0		"		
2628		89 55 30	406.0		"		
2627		89 56	418.5		"		
2625		89 54 30	443.5		"		
2624		89 56 30	456.0		"		
2616		89 56 40	556.0		"		
2613		89 55 20	593.5		"		
2611		89 55	618.5		"		
2610		89 58	630.8		"		
2608		89 56	655.9		"		
2600		89 56	756.0		"		
2592		89 55	856.0		"		
2584		89 54 20	956.0		"		
2576		89 53	1056.0		"		
2575		89 53 15	1068.7		"		
2574		89 53 45	1081.9		"		MEETS OF ROAD INTO CS 2
2573		89 53 25	1093.6		"		
2568		89 53 30	1156.0		"		
FS 2563	111 38 00	89 53 20	1218.525	1218.515	2.00 +2.27		

291 37 50 360 00 10

515

VELSEIS

DATE: 11/3/91

CLIENT: SADME AREA: CALLABONNA LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS A	00 00 00	90 06 20	1218.53		2.32 / 1.82		
	179 59 55	269 53 15					
⊼ 2563					1.705	8.27	1.58
2560		89 29	37.5		2.00		
2552		89 50	137.5		"		"
2544		89 50	237.5		"		
2541		89 50	275.0		"		
2536		89 45	337.5		"		
2530		89 46 20	412.5		"		
2529		89 41 30	425.0		"		
2528		89 45	437.5		"		
2525		89 46	475.0		"		TRACK ROAD BETWEEN 2525 - 2524
2524		89 49	487.5		"		
2520		89 53 30	537.5		2.00		
2517		89 51 30	575.0		2.90		
2512		89 52 30	637.5		2.90		
2509		89 54 20	675.0		2.00		
2504		89 52 10	731.5		"		
FS 2487	179 49 35	89 47 25	950.33	950.30	2.00 +3.48		
	359 49 30	270 12 35					

VELSEIS

DATE: 11/3/91

CLIENT: SAOME AREA: LINE: MT. HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz angle	Vert angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 2563	00 00 00	90 13 00	950.33		-3.62 1.58		
	179 59 55	269 46 30					
2495 2496		90 40	112.65		2.00		WOOL
2494		90 54	87.6		"		
2491		91 10	50.1		"		"
2488		91 30	12.6		2.00		
T 2487					1.75	11.60	(1.57)
2486		89 57	12.3		2.00		
2480		90 23	87.3		"		
2478		90 32	112.3		"		
2476		90 37	137.8		"		
2472		90 27	187.3		"		
2466		90 16	262.3		"		
2464		90 14	287.3		"		
2463		90 14	299.8		"		
2462		90 13	312.3		"		TRACK ALONG FENCE 2462 Centre of GATE 2m SE Track
2461		90 12	324.8		"		
2456		90 09	387.2		"		2460 Fence
2454		90 09	412.2		"		2458 (Fencing) Road
2453		90 08	424.7		"		
2452		90 07	437.2		"		
2448		90 06 30	487.2		"		
2440		90 05	587.2		"		
2432		90 04 30	687.1		"		
2424	179 38 00	90 04 30	787.1		"		
FS 2415	179 38 10	90 01 00	899.43	899.43	2.00 -0.28		
	359 39 05	269 58 50					

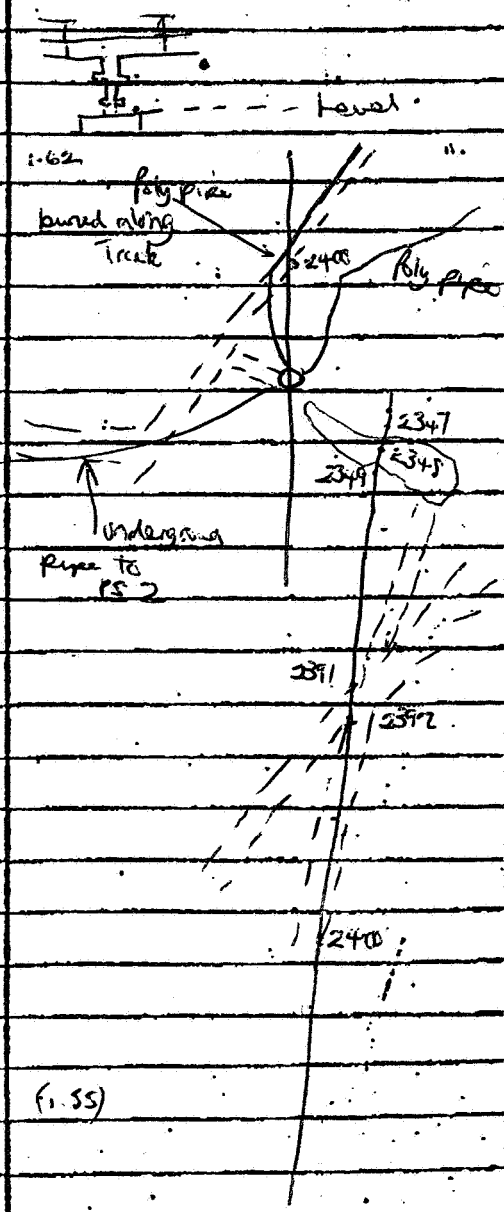
VELSEIS

DATE: 11/3/91

CLIENT: SADME AREA: LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 2481	00 00 00	90 01 25	899.43		-0.44 1.07		
	179 59 45	269 58 00					
2417		91 00	25.0		2.00		
Arc Cross. 6	00 13 50	93 50 00	12.13	12.11	0.64	11.52	
∧ 2415					1.79	11.18	
2414		91 17	12.5		2.00		
2413		91 05	25.0		"		
2409		90 20	75.0		"		
2408		89 58	87.5		"		
2407		90 00	100.0		"		
2405		90 01	125.0		"		
2403		90 02	150.0		"		
2400		90 04	187.5		"		
2392		90 03	287.5		"		
2384		90 00 30	387.6		"		
2376		90 01 30	487.5		"		
2368	180 00 50	90 04 30	587.5		"		
FS B	180 28 05	90 03 00	675.575	675.58	-0.62 2.00		
	00 28 05	269 56 45					
BS 2415	00 00 00	89 57 45			+0.37 1.62		
	180 00 05	270 01 30					
∧ B					1.78	10.50	(1.55)
2360	152 26	89 22	13.1		2.00		
2356		89 47	62.1		"		
2354		90 02	87.6		"		
2352		89 59	112.2		"		
2350		90 01	137.2		"		
~~2349~~		~~90 00~~	~~149.7~~		"		
2347		90 01	174.7		"		
2344	176 55	90 00	212.17		"		
2339		90 00	274.7		"		
2338		89 55	287.2		"		
FS 2320	178 52 10 358 52 05	89 55 05 270 04 45	511.75	511.75	+0.72 2.00		



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VELSEIS

DATE: 11/3/91

CLIENT: SAOME AREA: LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS B	00 00 00	90 05 40	511.75		-0.87 1.55		
	180 00 00	269 53 55					
2336		90 04	200.0		2.00		
2333		90 07	162.5		"		
2330		90 07	125.0		2.00		"
X 2320					1.72	11.10	(1.10)
2312		89 34	100.0		2.00		
2304		89 42	200.0		"		
2296		89 47	300.05		"		GRAVEL PLAIN
2288		89 49 30	400.0		"		
FS 2280	181 04 35	89 51 35	500.07	500.07	+1.21 2.00		
	1.04 35	270 08 10					
BS 2320	00 00 00	90 12 15			-1.79 1.16		
	179 59 45	269 47 35					
X 2280					1.725	12.15	1.06
2272		89 54	100.0		2.00		GRAV. PLAIN
2264		89 56	200.0		"		
2256		89 52	300.0		"		
2248		89 55	400.0		"		
2240		89 55	500.0		"		
FS 2232	179 44 50	89 55 30	600.23	600.23	+0.79 2.00		
	359 44 40	270 04 30					

VELSEIS

DATE: 11/3/91

CLIENT: _____ AREA: _____ LINE: _____

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 2280	00 00 00	90 08 10	600.23		−1.40 1.06		
	180 00 15	269 52 10					
⊼ 2232					1.25	12.77	(1.05). BOND
2224		89 43	100.0		2.00		
2216		89 49	200.0		"		
2208		89 53	300.0		"		
2205		89 53	337.5		"		
2204		89 52	350.0		"		STAY TO W SIDE OF LINE
2202		89 50	375.0		"		
2201		89 49	387.5		"		
2200	184 16	89 50	400.0		"		BOND NOSE 2184 SMOOTH SIDE
2199		89 49	412.5		"		
2198		89 51	425.0		"		NO BOND UGHNESS
2197		89 49	437.5		"		
2196		89 50	450.0		"		ETC 2202
2195		89 49	462.5		"		
FS 2192	184 48 05	89 52 05	499.99	499.98	2.00 +1.16		BOND
	4 47 55	270 08 05					
BS 2232	00 01 00	90 12 10			−1.78 1.05		
	180 01 00	269 47 40					
⊼ 2192					1.71	13.78	1.05
2184		89 54	100.0		2.00		
2176		89 56	200.0		"		
2168		89 57	300.0		"		
2160		89 55 30	400.0		"		
2152		89 56	500.0		"		
2144		89 56	600.0		"		
FS 2136	175 50 20	89 55 00	700.185	700.19	2.00 +1.03		
	355 50 20	270 05 05					

VELSEIS

DATE: 11/3/91

CLIENT: SADME AREA: LINE: Mt HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz angle	Vert angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 2012	00 00 00	90 08 20	800.20		-1.93 1.07		
	179 59 55	269 51 45					
⊼ 2008					1.73	17.89	GRAVEL PLAIN
2008		89 27	100.0		2.00		
1992		89 30	900.0		"		
1984		89 48	300.0		"		
1976		89 52	400.0		"		
1968		89 52	500.0		"		
FS 1960	179 53 05	89 51 55	599.99	599.99	+1.43 2.00		
	359 53 00	270 08 15					
BS 2008	00.00 00	90 06 10			-1.19 2.00		
	179 59 50	269 53 35					
⊼ 1960					1.70	18.87	(1.08) 1950 END OF GRAVEL PLAIN
1952		89 50	100.0		2.00		
1951		89 53	112.5		"		
1949		90 06	137.5		"		
1948		90 18	150.0		"		
1945		90 20	187.5		"		
1944		90 23	200.0		"		
1942		90 18	225.0		"		
1939		90 17	262.5		"		1939 1ST CREEK MAIN
1936		90 13	300.0		"		1935 SMALL TRIB.
1934		90 13 30	325.0		"		
1928		90 09	400.0		"		ACROSS STK
1927		90 09 30	412.5		"		
1926		90 11	425.0		"		
1922		90 06	475.0		"		
1921		90 08	487.5		"		
1920		90 07	500.0		"		
1912		90 05 30	600.0		"		
1905		90 05 30	687.5		"		
1904	180 08	90 04 30	700.0		"		
FS C	178 59 05 358 59 55	90 03 10 269 56 50	726.865	726.860	2.00		-0.67

VELSEIS

DATE: 11/3/91

CLIENT: SOMS AREA: LINE: MT HORSLESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS			SUNSHOT @ C				
BS 1960	00 00 00						
	228 43 50	75 48 10	14 11 50				1724
	228 39 50	75 55 05	14 04 55				
	228 37 00	75 59 30	14 00 30				
	228 34 10	76 04 40	13 55 20				-9.5
	48 53 50	284 04 10	14 04 10				
	48 56 35	283 58 40	13 58 40				
	48 47 40	283 53 35	13 53 35				
	48 44 25	283 47 50	13 47 50				1727
FS 1960	180 00 00						
	228 43 55		13 59 36				

VELSEIS

DATE: 11/3/96

CLIENT: SAOME AREA: LINE: Mt HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 1960	00 00 00	89 59.15	726.865		+0.17 1.08		
	180 00 00	270 00 50					
⊼ C					1.72	17.98	
FS D	167 44 00	90 01 50	97.915	97.915	-0.05 2.00		AGD STN
	347 44 00	269 58 05					
BS C	00 00 00	89 49 35		97.913	+0.29 1.72		1903 START OF TIMBER
	180 00 05	270 10 10					
⊼ D					1.74	17.66	(0.99) SHOULD BE ABLE TO FOLLOW
1899	341 54	89 43	69.7		2.00		CREEK 1904
1888	219 28	89 55	87.3		"		1891 END OF TIMBER
1886		89 52	104.6		"		
1885		89 56	122.0		"		WASHOUT
1884		89 52	139.0		"		
1873		89 51.30	269.0		"		
1864		89 54.30	380.8		"		
1856		89 55	480.4		"		
1848		89 52	580.2		"		
FS 1840	197 06 45	89 50 40	680.09	680.08	+1.83 2.00		
	17 06 45	270 09 10					

VELSEIS

DATE: 12/3/91

CLIENT: _____ AREA: _____ LINE: _____

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS D	00 00 00	90 12 45	680-09		-2.51 0.99		
	180 00 06	269 47 25					
⊼ 1840					1·74	19.33	(1.05)
1832		89 48	100·0		2·00		
1824		89 50	200·0		"		
1816		89 55	300·0		"		
1808		89 55 30	400·0		"		
1800		89 56 30	500·0		"		
1792		89 58	600·0		"		Gravel
FS 1784	176 49 45	89 58 50	700·16	700·16	+0.21 2·00		P.A.V
	356 49 40	270 00 55					
BS 1840	00 00 00	90 04 40			-0.95 1·05		
	179 59 45	269 55 20					
⊼ 1784					1·71	19.45	(1.05)
1776		89 47	100·0		2·00		
1768		89 52	200·0		"		
1760		89 52 30	300·0		"		
1752		89 53 30	400·0		"		
1744		89 57 40	500·0		"		
1736		90 00 10	600·0		"		
FS 1728	180 01 05	89 59 05	700·26	700·26	+0.20 2·00		
	00 00 55	270 01 00					

VELSEIS

DATE: 12/3/91

CLIENT: _____ AREA: _____ LINE: _____

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 1784	00 00 00	90 04 50	700 26		-0.95 1.05		
	179 59 55	269 55 30					
✕ 1728					1·75	19.53	(1.09)
1720		89 29	100·0		2·00		
1712		89 38	200·0		"		
1704		89 43	300·0		"		
1696		89 47	400·1		"		gravel
1688		89·49	500·1		"		flat
1680		89 50	600·2		"		
FS 1672	180 00 40	89 51 05	700·24	700·24	2·00 +1.82		
	00 00 35	270 08 55					
BS 1728	00 00 00	90 12 40			-2.57 1.09		
	179 59 50	269 47 25					
✕ 1672					1·72	21·28	(1.10)
1664		89 45	100 0		2·00		
1656		89 48	200·0		"		
1648		89 49	300·1		"		
1640		89 49	400·2		"		
1632		89·49	500·2		"		
1624		89 47 30	600·2		"		
FS 1616	179 58 40	89 46 45	700·31	700·31	2·00 +2.70		
	359 58 35	270 13 15					

VELSEIS

DATE: 12/3/91

CLIENT: SADRE AREA: LINE: MT HERCULES

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 1672	00 00 00	90 15 55	700.31		-3.23 1.10		
	179 59 50	269 44 20					
T 1616					1.71	23.80	(1.07)
1608		89 31	100.0		2.00		
1600		89 45	200.0		"		
1593		89 47	287.5		"		
1592		89 49	300.0		"		ROAD TO MT HERCULES TANK
PM 1591	179 55 15	89 46 55	312.585	312.53	2.00	24.70	NOD DAM
1584		89 47	400.0		"		
1576		89 52 30	500.1		"		
1568		89 57 30	600.0		"		
FS 1560	179 57 30	89 52 40	700.07	700.07	2.00 +1.51		
	359 57 20	270 07 30					
FS X	244 10 40	89 28 15	383.27	383.26	2.00 +3.53		
	64 10 35	270 31 35					
BS 1616	00 00 00	90 35 20			-3.96 1.07		
	179 59 50	269 24 20					
T X					1.72	27.01	(1.08)
	150 03 50	90 03 05					
FS BM	330 03 40	89 56 50	808.63	808.62	2.00 -0.74		
BS X	000 00	89 59 35			1.08 +0.12		
	179 59 45	270 00 35					
T Y					1.785	26.15	(1.10)
	282 40 40	89 51 55					
FS BM	22 40 30	270 08 10	656.59	656.59	2.00 +1.55		

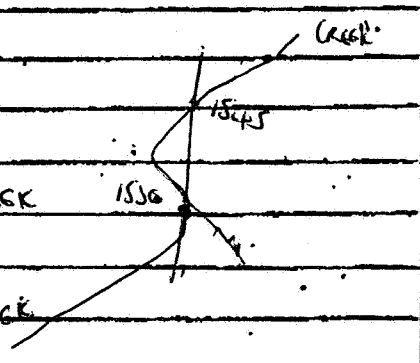
VELSEIS

DATE: 12/3/91

CLIENT: SADME AREA: LINE: Mt HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 1616	00 00 00	90 09 55	700.07		-2.05 1.07		
	179 59 45	269 49 45					
△ 1560					1.76	25.09	(1.08)
1554		91 16	750		2.00		
1553		91 28	87.5		"		
1552		91 49	100.0		"		
1551		91 47	112.5		"		
1550		91 47	125.0		"		
1549		91 28	137.5		"		
1547		90 59	162.5		"		
1546		90 53	175.0		"		
1545		91 11	187.5		"		
1544		90 47	200.0		"		
1536		90 25	300.0		"		
1528		90 21	400.0		"		
1520		90 14	500.0		"		
1512		90 08 30	600.0		"		
1504	179 46	90 04 40	700.0		"		
1496		90 03 40	800.0		"		
1488		90 01 30	900.0		"		
1480		90 00 50	1000.0		"		
1472		89 59 45	1100.0		"		
1464		89 58 55	1200.0		"		
FS 1456	179 44 45	89 58 45	1300.18	1300.18	2.00 +0.43		
	359 41 40	270 01 00					



VELSEIS

DATE: 2/3/91

CLIENT: SAOME AREA: CALABONNA LINE:

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 1560	00 00 00	90 02 55	1300.8		-1.06 1.98		
	180 00 00	269 57 15					
X 1456					1.76	25.37	1.08 • ON PIPELINE
1448		89 46	100.0		2.00		
1440		89 47	200.0		"		"
1432		89 43	300.0		"		
1424		89 42	400.0		"		
1416		89 43	500.0		"		
1408		89 44	600.2		"		
1400		89 45 30	700.2		"		
1392		89 45 30	800.2		"		GRAD
1384		89 44 55	900.3		"		PAD
1376		89 45 00	1000.3		"		
1368		89 45 25	1100.3		"		
1360		89 46 00	1200.3		"		
1352					"		
FS 1344	179 43 50	89 47 15	1400.59	1400.57	2.00 +5.21		
	359 43 50	270 12 50					
BS 1456	00 00 00	90 15 25			-6.33 1.08		
	180 00 00	269 44 20					
X 1344					1.75	30.69	(108)
1336		89 45	100.0		2.00		
1328		89 50	200.0		"		
1320		89 52	300.0		"		
1312		89 52	400.0		"		
1304		89 53 40	500.0		"		
1296		89 55	600.0		"		
1288		89 53 30	700.0		"		
1280		89 53 30	800.0		"		
FS 1272	180 06 15	89 53 50	900.18	900.18	2.00 +1.61		
	00 06 10	270 06 05					

VELSEIS

DATE: 13/3/91

CLIENT: SAOME AREA: CALCARINA LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 1348	00 00 00	90 09 05	900.18		-2.36 1.08		
	179 59 55	269 50 05					
⊼ 1272					1.71	32.23	(1.10)
1264		90 06	100.0		2.00		
1256		90 28	200.0		"		"
1248		90 17	300.0		"		
1240		90 11 30	400.0		"		
1232		90 08 45	500.0		"		
1224		90 06 30	600.0		"		
1216		90 03 45	700.0		"		
1208		90 02 15	800.0		"		
FS 1200	179 46 25	90 02 50	900.26	900.26	2.00 -0.73		BENCH
	359 46 15	269 57 15					
BS 1272	00 00 00	89 59 30			+0.17 1.10		
	180 00 05	270 00 45					
⊼ 1200					1.71	31.33	(1.64)
1192		89 48	100.0		2.00		
1184		89 56	200.0		"		
PM 1178	183 15 50	89 56 45	300.02	300.02	2.00	31.32	ON MAIN ROAD TO ARKAROOLA
1175		89 59	312.5		"		
1168		90 00	400.0		"		
1160		89 58	500.0		"		
1152		89 57 30	600.0		"		
1144		89 56 15	700.0		"		
1143		89 58	712.5		"		
1142		89 56	725		"		
1140		89 55 30	750		"		
1136		89 56	800.0		"		
1128		89 55 45	900.0		"		
1120		89 55	1000.0		"	+1.96	
FS 1112	183 04 10 3 04 00	89 53 50 270 06 05	1100.18	1100.17	2.00		

VELSEIS

DATE: 12/3/91

CLIENT: SHOME AREA: CALCABONNA LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 1200	00 00 00	90 08 10	1100.18		-2.60 1.04		
	180 00 15	269 51 55					
T 1112					1.72	38.13	(1.10)
1104		89 45	100.0		2.00		
1096		89 44	200.0		"		"
1088		89 29	300.0		"		
1080		89 28	400.0		"		GRAVEL PLAIN
1072		89 28	500.0		"		
1064		89 30 20	600.0		"		
1056		89 32	700.0		"		
1048		89 33	800.0		"		
1040		89 32 15	900.0		"		
1032		89 30 15	1000.0		"		
1024		89 23 40	1100.0		"		
FS 1016	180 20 25	89 21 05	1200.20	1200.13	+13.57 2.00		
	00 20 25	270 38 50					
BS 1112	00 00 00	90 40 55			-14.24 1.10		
	180 00 00	269 19 20					
T 1016					1.75	46.57	1.04
1008		91.45	100.0		2.00		
1003		91 37	162.5		"		
1000		91 15	200.0		"		
996		91 09	280.0		"		
992		91 09	300.0		"		
984		91 04	400.0		"		
976		90 49	500.0		"		

VELSEIS

DATE: 14/3/91

CLIENT: SAGME AREA: CALIFORNIA LINE: Mt HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
972		90 47	550.0		2.00		
968		90 37 30	600.0		"		
PM 963	180 44 25	90 33 10	662.30	662.27	2.00	39.94	ON FENCE
960		90 28 45	700.0		"		
952		90 20 30	800.0		"		
944		90 12 20	900.0		"		
936		90 06 50	1000.0		"		
928		90 01 30	1100.0		"		
920		89 55 20	1200.0		"		
912		89 51 40	1300.0		"		
904		89 48 20	1400.0		"		
TB 896	180 39 40	89 43 25	1500.13	1500.11	2.00 +7.31		
	00 39 30	2 16 55					
							GRAVEL
BS 106	00 00 00	90 18 30			-8.11 1.04		WITH
	179 59 55	269 41 20					NAILS
T 896					1765	58.79	(1.06)
888		90 [illegible]	100.0		2.00		
880		90 06	200.0		"		
872		89 55	300.0		"		
864		89 50	400.0		"		
857		89 41	487.5		"		
856		89 43 20	550.0		2.00		
848		89 52 45	600.0		2.90		
846		89 53	625.0		3.20		
840		89 41 15	700.0		2.00		
TS 832	179 47 10	89 36 20	799.98	799.96	2.00 +5.50		

VELSEIS

DATE: 15/3/91

CLIENT: _____ AREA: _____ LINE: _____

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz angle	Vert angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
		SHOT SP.		744			
BS 832	00 00 30						
	24 48 35	60 42 35	29 37 25				0832
	24 48 10	60 35 25	29 24 35				-9.5
	24 40 05	60 31 25	29 28 35				
	24 36 50	60 27 05	29 32 55				
	205 00 35	300 22 55	30 22 55				
	204 56 55	300 28 00	30 28 00				
	204 53 40	300 32 15	30 32 15				
	204 50 20	300 36 25	30 36 25				0836
FS 832	180 00 35						
	24 48 46		29 57 53				

VELSEIS

DATE: 15/3/91

CLIENT: SADME AREA: GAWLER RNGS LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz angle	Vert angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 896	00 00 00	90 26 00	799.98		-6.03 1.06		
	179 59 55	269 34 10					
T 832					1.73	59.10	(1.85)
824		90 08	100.0		2.00		
820		90 20	150.0		"		
816		89 47	200.0		"		
808		89 47	300.0		"		
800		89 49	400.0		"		
792		89 45 30	500.0		"		
784		89 42	600.0		"		
776		89 42 20	700.0		"		
768		89 43 20	800.0		"		
760		89 44	900.0		"		
752		89 44 40	1000.0		"		
FS 744	179 48 55	89 47 15	1100.23	1100.22	+4.10 2.00		
	359 48 60	270 12 50					
BS 832	00 00 00	90 13 50			-4.45 1.85		
	180 00 05	269 46 00					
T 744					1.75	63.29	1.06
736		89 46	100.0		2.00		
728		90 13	200.0		"		
718		90 25	325.0		"		
717		90 28	337.5		"		
716		90 28	350.0		"		
715		90 23	362.5		"		
712		90 14	400.0		"		

VELSEIS

DATE: 15/3/91

CLIENT: SAGASE AREA: CALABONGA LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz angle	Vert angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
704		90 12	500.0		2.00		
T01		90 12	537.5		"		
696		90 18	600.0		"		
694		90 20	625.0		2.00		
692		90 18 20	650.0		2.98		Grass
688		90 15 20	700.0		2.90		Long
680		90 05 20	800.0		2.00		With
FS 672	179 52 10	90 04 30	900.07	900.07	2.00 -1.18		Stony
	359 52 00	269 55 30					Ck
SS 744	00 00 30	89 58 10			1.06 +0.48		
	180 00 20	270 01 50					
T 672					1.75	61.99	(1.00)
664		89 49	100.0		2.00		
656		89 59	200.0		"		
648		89 54	300.0		"		
645		90 06	337.5		"		
644		90 00	350.0		"		
640		89 51	400.0		"		
632		89 42	500.0		"		
624		89 35 30	600.0		"		
616		89 31	700.0		"		
608		89 27 30	800.0		"		
FS 600	180 04 05	89 27 40	900.20	900.16	2.00 +8.44		
	00 04 00	270 32 20					

VELSEIS

DATE: 15/3/94

CLIENT: SADME AREA: COLLAROY LINE: MT HOLLESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 612	00 00 00	90 34 55	900.20		-9.11 1.06		
	180 00 05	269 25 15					
⊼ 600					1.755	70.30	(1.06)
592		90 21	100.0		2.00		
584		90 17	200.0		"		
576		90 14	300.0		"		
568		90 07	400.0		"		
560		90 00	500.0		"		
552		89 57	600.0		"		
544		89 56 30	700.0		"		
FS 536	180 37 55	89 55 40	800.30	800.30	2.00 +1.03		
	00 37 45	270 04 30					
BS 600	00 00 00	90 07 30			-1.71 1.06		
	180 00 15	269 52 45					
⊼ 536					1.70	71.22	(1.06)
528		89 25	100.0		2.00		
520		89 48	200.0		"		
516		89 51	250.0		"		
515		89 55	262.5		"		DCP CK BC
513		89 46	287.5		"		
512		89 45	300.0		"		
505		89 45	387.5		"		
504		89 49	400.0		"		
496		89 45 30	500.0		"		
488		89 41	600.0		"		
480		89 36 20	700.0		"		
472		89 33	800.2		"		
FS 464	179 53 15	89 32 30	900.21	900.18	2.00 +7.20		
	359 53 15	270 27 30					

VELSEIS

DATE: 15/3/91

CLIENT: SADAG AREA: LINE: MT HORNESS

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz angle	Vert angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 536	00 00 30	90 29 55	900.21		-7.79 1.06		
	180 00 20	269 30 25					
T 464					1.745	78.23	(1.06)
456		89 32	100.0		2.00		
448		89 31	200.0		"		
440		89 37	300.0		"		
432		89 29	400.0		"		
424		89.19	500.0		"		
FS 420	179 31 05	89 13 10	549.88	549.835	+7.49 2.00		
	359 31 05	270 46 50					
BS 464	359 59 50	90 50 15			-8.02 1.06		
	179 59 40	269 10 00					
T 420					1.76	85.50	(1.07)
419		91 57	12.5		2.00		
415		95.26	62.5		"		
414		95 22	75.0		"		
411		94 35	112.5		"		
406		93 31	175.1		"		
403		92 56	212.6		"		
400		92 44	250.1		"		
394		92 23	325.1		"		
393		92 20	337.6		"		SH. CREEK 93-94 " 90-91
391		92 09	362.6		"		
390		92 02	375.1		"		
389		91 57	387.6		"		
388		92 00	400.1		"		MAIN CK BD

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1480	24.7	1500		1520	22.8
1481		1501		1521	
1482		1502		1522	
1483		1503		1523	
1484		1504	24.0	1524	
1485		1505		1525	
1486		1506		1526	
1487		1507		1527	
1488	24.5	1508		1528	22.4
1489		1509		1529	
1490		1510		1530	
1491		1511		1531	
1492		1512	23.4	1532	
1493		1513		1533	
1494		1514		1534	
1495		1515		1535	
1496	24.1	1516		1536	22.7
1497		1517		1537	
1498		1518		1538	
1499		1519		1539	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1420		1440	25.9	1460	
1421		1441		1461	
1422		1442		1462	
1423		1443		1463	
1424	27.2	1444		1464	25.3
1425		1445		1465	
1426		1446		1466	
1427		1447		1467	
1428		1448	25.5	1468	
1429		1449		1469	
1430		1450		1470	
1431		1451		1471	
1432	26.6	1452		1472	25.0
1433		1453		1473	
1434		1454		1474	
1435		1455		1475	
1436		1456	25.4	1476	
1437		1457		1477	
1438		1458		1478	
1439		1459		1479	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1360	30.2	1380		1400	28.2
1361		1381		1401	
1362		1382		1402	
1363		1383		1403	
1364		1384	29.2	1404	
1365		1385		1405	
1366		1386		1406	
1367		1387		1407	
1368	30.0	1388		1408	28.0
1369		1389		1409	
1370		1390		1410	
1371		1391		1411	
1372		1392	28.6	1412	
1373		1393		1413	
1374		1394		1414	
1375		1395		1415	
1376	29.7	1396		1416	27.6
1377		1397		1417	
1378		1398		1418	
1379		1399		1419	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1300		1320	31.1	1340	
1301		1321		1341	
1302		1322		1342	
1303		1323		1343	
1304	31.4	1324		1344	30.7
1305		1325		1345	
1306		1326		1346	
1307		1327		1347	
1308		1328	31.0	1348	
1309		1329		1349	
1310		1330		1350	
1311		1331		1351	
1312	31.4	1332		1352	
1313		1333		1353	
1314		1334		1354	
1315		1335		1355	
1316		1336	30.9	1356	
1317		1337		1357	
1318		1338		1358	
1319		1339		1359	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1240	30.6	1260		1280	32.1
1241		1261		1281	
1242		1262		1282	
1243		1263		1283	
1244		1264	31.8	1284	
1245		1265		1285	
1246		1266		1286	
1247		1267		1287	
1248	30.5	1268		1288	31.9
1249		1269		1289	
1250		1270		1290	
1251		1271		1291	
1252		1272	32.2	1292	
1253		1273		1293	
1254		1274		1294	
1255		1275		1295	
1256	30.3	1276		1296	31.4
1257		1277		1297	
1258		1278		1298	
1259		1279		1299	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1180		1200	31.3	1220	
1181		1201		1221	
1182		1202		1222	
1183		1203		1223	
1184	31.3	1204		1224	30.9
1185		1205		1225	
1186		1206		1226	
1187		1207		1227	
1188		1208	31.5	1228	
1189		1209		1229	
1190		1210		1230	
1191		1211		1231	
1192	31.4	1212		1232	30.7
1193		1213		1233	
1194		1214		1234	
1195		1215		1235	
1196		1216	31.3	1236	
1197		1217		1237	
1198		1218		1238	
1199		1219		1239	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1120	32.6	1140	32.1	1160	31.3
1121		1141		1161	
1122		1142	31.9	1162	
1123		1143	31.5	1163	
1124		1144	31.8	1164	
1125		1145		1165	
1126		1146		1166	
1127		1147		1167	
1128	32.3	1148		1168	31.0
1129		1149		1169	
1130		1150		1170	
1131		1151		1171	
1132		1152	31.5	1172	
1133		1153		1173	
1134		1154		1174	
1135		1155		1175	31.1
1136	32.1	1156		1176	31.3
1137		1157		1177	
1138		1158		1178	
1139		1159		1179	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1060		1080	36.6	1100	
1061		1081		1101	
1062		1082		1102	
1063		1083		1103	
1064	38.1	1084		1104	33.3
1065		1085		1105	
1066		1086		1106	
1067		1087		1107	
1068		1088	35.6	1108	
1069		1089		1109	
1070		1090		1110	
1071		1091		1111	
1072	37.5	1092		1112	33.1
1073		1093		1113	
1074		1094		1114	
1075		1095		1115	
1076		1096	33.8	1116	
1077		1097		1117	
1078		1098		1118	
1079		1099		1119	

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CLIENT : SAOME AREA : CALLABONNA LINE : Mt HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1000	42.0	1020		1040	40.2
1001		1021		1041	
1002		1022		1042	
1003	41.7	1023		1043	
1004		1024	44.6	1044	
1005		1025		1045	
1006		1026		1046	
1007		1027		1047	
1008	43.3	1028		1048	39.2
1009		1029		1049	
1010		1030		1050	
1011		1031		1051	
1012		1032	41.6	1052	
1013		1033		1053	
1014		1034		1054	
1015		1035		1055	
1016	46.6	1036		1056	38.6
1017		1037		1057	
1018		1038		1058	
1019		1039		1059	

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CLIENT : SADME AREA : CALLABONNA LINE : Mt HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
940		960	40.5	980	
941		961		981	
942		962		982	
943		963		983	
944	43.1	964		984	38.9
945		965		985	
946		966		986	
947		967		987	
948		968	39.8	988	
949		969		989	
950		970		990	
951		971		991	
952	41.6	972	39.8	992	40.3
953		973		993	
954		974		994	
955		975		995	
956		976	39.2	996	41.4
957		977		997	
958		978		998	
959		979		999	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
880	53.2	900		920	48.1
881		901		921	
882		902		922	
883		903		923	
884		904	51.2	924	
885		905		925	
886		906		926	
887		907		927	
888	53.2	908		928	46.0
889		909		929	
890		910		930	
891		911		931	
892		912	49.6	932	
893		913		933	
894		914		934	
895		915		935	
896	53.8	916		936	44.4
897		917		937	
898		918		938	
899		919		939	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
820	58.0	840	57.5	860	
821		841		861	
822		842		862	
823		843		863	
824	58.6	844		864	54.7
825		845		865	
826		846	53.7	866	
827		847		867	
828		848	53.9	868	
829		849		869	
830		850		870	
831		851		871	
832	59.1	852		872	54.0
833		853		873	
834		854		874	
835		855		875	
836		856	56.0	876	
837		857	56.3	877	
838		858		878	
839		859		879	

VELSEIS

DATE: 15/3/91

CLIENT: SADME AREA: LINE:

FIELD TRAVERSE OBSERVATIONS

ation #	Horiz angle	Vert angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
87		91 49	412.5		2.00		
386		91 45	425.0		"		
84		91 35	450.0		"		
379		91 17	512.5		"		
373		90 46	587.5		"		
371		90 40 30	612.5		"		
368		90 46 30	650.0		"		
363		90 25 30	712.5		"		
356		90 11	800.0		"		
349		90 11 45	887.5		"		
346		90 15 10	925.0		2.00		
344		90 17 15	950.0		3.64		
343		90 17 00	962.5		3.90		Max ok BG
341		90 13 10	987.5		3.64		
335		90 06	1062.3		2.00		Rocky o/crop
334		90 03 10	1074.80	1074.80	"		
316	180 43 15	89 51 50		1299.66	2.00 +3.16		
	00 43 10	270 08 35					

VELSEIS

DATE: 15/3/91

CLIENT: SAOME AREA: CALCABONNA LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

ation #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
S 420	00 00 00	90 10 30		1299.66	3.94 1.07		
	180 00 05	269 49 40					
334		91 01	224.895	224.86	2.00		
333		91 01	212.5		"		GUD OF ROCKS
328		91 39	150.0		"		"
319		90 48	37.5		2.00		
316					1.75	88.59	(1.605)
314		90 22	25.0		2.00		
312		91 55	50.0		"		
311		92 26	62.5		"		
310		91 38	75.0		"		
308		91 32	100.0		"		
306		90 39	125.0		"		
304		90 13	150.0		"		
296		89 37	250.0		"		300 ABBD STIC 25M E
294		89 49	275.0		"		293 296 check points
291		89 42	312.5		"		
290		89 43	325.0		"		SM. DRY CK BED
288		89 33	350.0		"		
287		89 33	362.5		"		
283		89 12	412.5		"		
S 282	180 18 45	89 11 20	424.65	424.61	2.00 +6.01		BEND - ON ACCESS TRACK
	00 18 40	270 48 35					

VELSEIS

DATE: 15/3/94

CLIENT: SADME AREA: CALLABONNA LINE: MT HOPELESS

FIELD TRAVERSE OBSERVATIONS

tation #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
BS 316	00 00 00	90 52 00	424·65		-6·42 1·105		
	179 59 55	269 08 00					
282					1·74	94·37	
T1/602	278 33 30	88 58 15	581·67	586·85	2·00 +31·06		MT HOPELESS TRIG T1/602
	98 33 20	273 01 50					
280		89 02	25·0		2·00		
272		90 47	125·0		"		
264		90 51	225·0		"		
261		90 50	262·5		"		
256		90 42	325·0		"		
251		90 48	387·5		"		
248		90 39	425·0		"		
240		90 23 45	525·0		"		
FS 232	173 00 40	90 17 45	624·83	624·805	2·00 -3·21		
	353 00 30	269 42 15					
BS 282	00 00 00	93 00 30	581·65	586·835	1·74 -30·83		
	180 00 00	266 59 40					
R' TRG					1·70	125·20	125·08
G1 PIR	259 46 25						
TO 592							
G1 PIR	100 12 45						

VELSEIS

DATE: 15/3/91

CLIENT: SADME AREA: LINE:

FIELD TRAVERSE OBSERVATIONS

tation #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
S 282	00 00 00	89 41 35	624.82		F3.34 1.74		
	179 59 55	270 18 20					
232					1.76		(1.08)
226		91 19	75.0		2.00		Fence - Down 50m
224		90 55	100.0		"		
218		90 08	175.0		"		
216		90 13	200.0		"		
212		90 34	250.0		"		
207		90 36	312.5		"		
203		90 14	362.5		"		
200		90 18	400.0		"		
195		90 10	462.5		"		
191		89 49	512.5		"		
S 188	179 57 10	89 44 30	549.66	549.66	2.00 1.24		
	359 57 00	270 15 30					
BS 232	00 00 00	90 18 20			2.13 1.08		
	180 00 05	269 41 45					
188					1.82	93.22	1.05
184		90 25	50.0		2.00		
SH 588/6	178 53 25	90 5 45	125.15	125.135	2.00	91.06	OPPOSITE 178
176		90 50	180.0		"		
171		90 40	212.5		"		
164		90 53	~~250~~ 300		"		
160		90 49	350.0		"		
156		90 54	400.0		"		
150		90 37	475.0		"		
FS 118	180 01 30	90 20 10	814.83	814.81	2.00		
	00 01 10	269 40 05					

VELSEIS

DATE: 15/3/91

CLIENT: SADME AREA: LINE: Mt Hopeless

FIELD TRAVERSE OBSERVATIONS

ation #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
35 188	00 00 25	89 42 50			1.05		
	180 00 15	270 17 25					
149		90 02 30	387.4		2.00		
146		90 36	350.0		"		
143		90 53	312.5		"		
136		91 03	225.0		"		
132		90 58	175.0		"		
130		91 06	150.0		"		
129		91 20	137.5		"		
128		91 11	125.0		"		
121		90 17	37.5		2.00		
118					1.75		(1.61)
116		89 49	25.0		2.00		
110		91 54	100.0		"		
107		92 03	137.5		"		
105		92 01	152.5		"		
104		92 09	175.0		"		
103		91 58	187.5		"		
96		91 06	275.0		"		
95		90 56	287.5		"		
88		90 38	375.0		"		
86		90 35	400.0		"		
79		90 06 30	487.5		"		
S 77	180 18 10	90 05 05	512.13		2.00		
	00 17 55	269 55 05					

VELSEIS

DATE: 15/3/91

CLIENT: SAORI AREA: CALLAGHAN LINE: Mt Holdsworth

FIELD TRAVERSE OBSERVATIONS

Station #	Horiz Angle	Vert Angle	Slope dist	Horiz dist	Hgt of target	R.L.	Remarks
118	00 00 00	89 54 20			1.61		
	179 59 50	270 05 55					
77					1.70		
76		90 44	12.5		2.00		
73		94 16	50.0		"		
70		93 50	87.5		"		Rocks on Gravel
69		93 35	100.0		"		
64		92 24	162.5		"		
63		92 12	175.0		"		
56		91 34	262.5		"		
48		91 06	362.5		"		
46		91 00	387.5		"		
45		91 01	400.0		"		
40		90 55	462.5		"		
32		90 49	562.4		"		
24		90 47 10	662.4		"		
20		90 47 30	712.4		"		
19		90 48 45	724.9		"		Riverbed
18		90 46	737.4		"		
16	179 43 20	90 42 05	762.40	762.34	2.00		E.O.L

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2620		2640	6.2	2660	
2621		2641		2661	
2622		2642		2662	
2623		2643		2663	
2624	6.3	2644		2664	
2625	6.5	2645		2665	
2626		2646		2666	
2627	6.3	2647		2667	
2628	6.3	2648	6.0	2668	
2629		2649	6.0	2669	
2630		2650		2670	
2631		2651		2671	
2632	6.3	2652		2672	
2633		2653		2673	
2634		2654		2674	
2635		2655	5.8	2675	
2636		2656 E.O.L	6.5	2676	
2637		2657		2677	
2638		2658		2678	
2639		2659		2679	

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CLIENT : SADME AREA : CALLABONNA LINE : MT. HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2560	8·3	2580		2600	6·7
2561		2581		2601	
2562		2582		2602	
2563	8·3	2583		2603	
2564		2584	7·5	2604	
2565		2585		2605	
2566		2586		2606	
2567		2587		2607	
2568	8·2	2588		2608	6·6
2569		2589		2609	
2570		2590		2610	6·2
2571		2591		2611	6·7
2572		2592	7·1	2612	
2573	8·0	2593		2613	6·6
2574	7·9	2594		2614	
2575	8·0	2595		2615	
2576	8·1	2596		2616	6·3
2577		2597		2617	
2578		2598		2618	
2579		2599		2619	

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SURVEY · ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2500		2520	9.0	2540	
2501		2521		2541	8.8
2502		2522		2542	
2503		2523		2543	
2504	9.8	2524	9.6	2544	8.7
2505		2525	9.9	2545	
2506		2526		2546	
2507		2527		2547	
2508		2528	9.9	2548	
2509	9.2	2529	10.3	2549	
2510		2530	9.7	2550	
2511		2531		2551	
2512	8.5	2532		2552	8.4
2513		2533		2553	
2514		2534		2554	
2515		2535		2555	
2516		2536	9.5	2556	
2517	8.5	2537		2557	
2518		2538		2558	
2519		2539		2559	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2440	10.5	2460		2480	10.7
2441		2461	10.2	2481	
2442		2462	10.1	2482	
2443		2463	10.1	2483	
2444		2464	10.2	2484	
2445		2465		2485	
2446		2466	10.1	2486	11.3
2447		2467		2487	11.6
2448	10.4	2468		2488	11.0
2449		2469		2489	
2450		2470		2490	
2451		2471		2491	10.3
2452	10.4	2472	9.8	2492	
2453	10.3	2473		2493	
2454	10.3	2474		2494	9.9
2455		2475		2495	
2456	10.3	2476	9.8	2496	10.0
2457		2477		2497	
2458		2478	10.3	2498	
2459		2479		2499	

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SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2380		2400	10.8	2420	
2381		2401		2421	
2382		2402		2422	
2383		2403	10.9	2423	
2384	10.9	2404		2424	10.4
2385		2405	10.9	2425	
2386		2406		2426	
2387		2407	11.0	2427	
2388		2408	11.0	2428	
2389		2409	10.5	2429	
2390		2410		2430	
2391		2411		2431	
2392	10.7	2412		2432	10.4
2393		2413	10.5	2433	
2394		2414	10.7	2434	
2395		2415	11.2	2435	
2396		2416 Approx L.C Bore		2436	
2397		2417	10.5	2437	
2398		2418		2438	
2399		2419		2439	

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SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2320	11.1	2340		2360	10.4
2321		2341		2361	
2322		2342		2362	
2323		2343		2363	
2324		2344	10.3	2364	
2325		2345		2365	
2326		2346		2366	
2327		2347	10.2	2367	
2328		2348		2368	10.3
2329		2349	10.3	2369	
2330	10.6	2350	10.2	2370	
2331		2351		2371	
2332		2352	10.4	2372	
2333	10.5	2353		2373	
2334		2354	10.2	2374	
2335		2355		2375	
2336	10.6	2356	10.5	2376	10.9
2337		2357		2377	
2338	10.7	2358		2378	
2339	10.3	2359		2379	

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SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2260		2280	12.2	2300	
2261		2281		2301	
2262		2282		2302	
2263		2283		2303	
2264	12.1	2284		2304	11.9
2265		2285		2305	
2266		2286		2306	
2267		2287		2307	
2268		2288	12.1	2308	
2269		2289		2309	
2270		2290		2310	
2271		2291		2311	
2272	12.1	2292		2312	11.6
2273		2293		2313	
2274		2294		2314	
2275		2295		2315	
2276		2296	12.0	2316	
2277		2297		2317	
2278		2298		2318	
2279		2299		2319	

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SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2200	13.7	2220		2240	12.7
2201	13.8	2221		2241	
2202	13.6	2222		2242	
2203		2223		2243	
2204	13.3	2224	13.00	2244	
2205	13.2	2225		2245	
2206		2226		2246	
2207		2227		2247	
2208	13.1	2228		2248	12.6
2209		2229		2249	
2210		2230		2250	
2211		2231		2251	
2212		2232	12.8	2252	
2213		2233		2253	
2214		2234		2254	
2215		2235		2255	
2216	13.1	2236		2256	12.6
2217		2237		2257	
2218		2238		2258	
2219		2239		2259	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2140		2160	14.1	2180	
2141		2161		2181	
2142		2162		2182	
2143		2163		2183	
2144	14.3	2164		2184	13.7
2145		2165		2185	
2146		2166		2186	
2147		2167		2187	
2148		2168	13.8	2188	
2149		2169		2189	
2150		2170		2190	
2151		2171		2191	
2152	14.2	2172		2192	13.8
2153		2173		2193	
2154		2174		2194	
2155		2175		2195	14.1
2156		2176	13.7	2196	13.9
2157		2177		2197	14.0
2158		2178		2198	13.7
2159		2179		2199	13.9

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CLIENT : SADME AREA : CALLABONNA LINE : Mt HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2080		2100		2120	15.0
2081		2101		2121	
2082		2102		2122	
2083		2103		2123	
2084		2104	15.3	2124	
2085		2105		2125	
2086		2106		2126	
2087		2107		2127	
2088	15.9	2108		2128	14.9
2089		2109		2129	
2090		2110		2130	
2091		2111		2131	
2092		2112	15.1	2132	
2093		2113		2133	
2094		2114		2134	
2095		2115		2135	
2096	15.6	2116		2136	14.6
2097		2117		2137	
2098		2118		2138	
2099		2119		2139	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
2020		2040	17.1	2060	
2021		2041		2061	
2022		2042		2062	
2023		2043		2063	
2024	17.1	2044		2064	16.5
2025		2045		2065	
2026		2046		2066	
2027		2047		2067	
2028		2048	16.7	2068	
2029		2049		2069	
2030		2050		2070	
2031		2051		2071	
2032	17.1	2052		2072	16.5
2033		2053		2073	
2034		2054		2074	
2035		2055		2075	
2036		2056	16.7	2076	
2037		2057		2077	
2038		2058		2078	
2039		2059		2079	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1960	18.9	1980		2000	18.3
1961		1981		2001	
1962		1982		2002	
1963		1983		2003	
1964		1984	18.4	2004	
1965		1985		2005	
1966		1986		2006	
1967		1987		2007	
1968	18.5	1988		2008	17.6
1969		1989		2009	
1970		1990		2010	
1971		1991		2011	
1972		1992	19.1	2012	
1973		1993		2013	
1974		1994		2014	
1975		1995		2015	
1976	18.3	1996		2016	17.4
1977		1997		2017	
1978		1998		2018	
1979		1999		2019	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1900		1920	17.6	1940	
1901		1921	17.5	1941	
1902		1922	17.8	1942	17.4
1903		1923		1943	
1904	17.7	1924		1944	17.2
1905	17.5	1925		1945	17.5
1906		1926	17.2	1946	
1907		1927	17.5	1947	
1908		1928	17.5	1948	17.8
1909		1929		1949	18.3
1910		1930		1950	
1911		1931		1951	18.8
1912	17.7	1932		1952	18.9
1913		1933		1953	
1914		1934	17.3	1954	
1915		1935		1955	
1916		1936	17.4	1956	
1917		1937		1957	
1918		1938		1958	
1919		1939	17.3	1959	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1840	19.3	1860		1880	
1841		1861		1881	
1842		1862		1882	
1843		1863		1883	
1844		1864	18.1	1884	17.7
1845		1865		1885	17.5
1846		1866		1886	17.6
1847		1867		1887	
1848	18.8	1868		1888	17.5
1849		1869		1889	
1850		1870		1890	
1851		1871		1891	
1852		1872		1892	
1853		1873	18.1	1893	
1854		1874		1894	
1855		1875		1895	
1856	18.1	1876		1896	
1857		1877		1897	
1858		1878		1898	
1859		1879		1899	17.7

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1780		1800	19.6	1820	
1781		1801		1821	
1782		1802		1822	
1783		1803		1823	
1784	19.5	1804		1824	19.7
1785		1805		1825	
1786		1806		1826	
1787		1807		1827	
1788		1808	19.6	1828	
1789		1809		1829	
1790		1810		1830	
1791		1811		1831	
1792	19.6	1812		1832	19.4
1793		1813		1833	
1794		1814		1834	
1795		1815		1835	
1796		1816	19.5	1836	
1797		1817		1837	
1798		1818		1838	
1799		1819		1839	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1720	20.2	1740		1760	19.8
1721		1741		1761	
1722		1742		1762	
1723		1743		1763	
1724		1744	19.6	1764	
1725		1745		1765	
1726		1746		1766	
1727		1747		1767	
1728	19.5	1748		1768	19.6
1729		1749		1769	
1730		1750		1770	
1731		1751		1771	
1732		1752	20.0	1772	
1733		1753		1773	
1734		1754		1774	
1735		1755		1775	
1736	19.3	1756		1776	19.5
1737		1757		1777	
1738		1758		1778	
1739		1759		1779	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1660		1680	21.1	1700	
1661		1681		1701	
1662		1682		1702	
1663		1683		1703	
1664	21.4	1684		1704	20.8
1665		1685		1705	
1666		1686		1706	
1667		1687		1707	
1668		1688	20.9	1708	
1669		1689		1709	
1670		1690		1710	
1671		1691		1711	
1672	21.3	1692		1712	20.6
1673		1693		1713	
1674		1694		1714	
1675		1695		1715	
1676		1696	20.8	1716	
1677		1697		1717	
1678		1698		1718	
1679		1699		1719	

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Telephone (07) 376 5544
Fax (07) 376 6939

CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1600	24.4	1620		1640	22.3
1601		1621		1641	
1602		1622		1642	
1603		1623		1643	
1604		1624	23.3	1644	
1605		1625		1645	
1606		1626		1646	
1607		1627		1647	
1608	24.4	1628		1648	22.0
1609		1629		1649	
1610		1630		1650	
1611		1631		1651	
1612		1632	22.7	1652	
1613		1633		1653	
1614		1634		1654	
1615		1635		1655	
1616	23.8	1636		1656	21.7
1617		1637		1657	
1618		1638		1658	
1619		1639		1659	

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Fax (07) 376 6939

CLIENT : SADME AREA : CALLABONNA LINE : Mr HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
1540		1560	25.1	1580	
1541		1561		1581	
1542		1562		1582	
1543		1563		1583	
1544	22.1	1564		1584	25.1
1545	21.0	1565		1585	
1546	22.2	1566		1586	
1547	22.1	1567		1587	
1548		1568	24.0	1588	
1549	21.3	1569		1589	
1550	21.0	1570		1590	
1551	21.4	1571		1591	24.7
1552	21.7	1572		1592	24.5
1553	22.6	1573		1593	24.6
1554	23.2	1574		1594	
1555		1575		1595	
1556		1576	24.6	1596	
1557		1577		1597	
1558		1578		1598	
1559		1579		1599	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
760	63.2	780		800	60.1
761		781		801	
762		782		802	
763		783		803	
764		784	62.1	804	
765		785		805	
766		786		806	
767		787		807	
768	62.8	788		808	60.0
769		789		809	
770		790		810	
771		791		811	
772		792	61.0	812	
773		793		813	
774		794		814	
775		795		815	
776	62.6	796		816	59.6
777		797		817	
778		798		818	
779		799		819	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
700		720		740	
701	61.2	721		741	
702		722		742	
703		723		743	
704	61.3	724		744	63.3
705		725		745	
706		726		746	
707		727		747	
708		728	62.3	748	
709		729		749	
710		730		750	
711		731		751	
712	61.4	732		752	63.5
713		733		753	
714		734		754	
715	60.6	735		755	
716	60.2	736	63.5	756	
717	60.3	737		757	
718	60.7	738		758	
719		739		759	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
640	62.8	660		680	61.9
641		661		681	
642		662		682	
643		663		683	
644	61.8	664	62.1	684	
645	61.2	665		685	
646		666		686	
647		667		687	
648	61.8	668		688	60.0
649		669		689	
650		670		690	
651		671		691	
652		672	62.0	692	58.8
653		673		693	
654		674		694	59.5
655		675		695	
656	60.8	676		696	60.0
657		677		697	
658		678		698	
659		679		699	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
580		600	70·3	620	
581		601		621	
582		602		622	
583		603		623	
584	69·1	604		624	66·1
585		605		625	
586		606		626	
587		607		627	
588		608	69·4	628	
589		609		629	
590		610		630	
591		611		631	
592	69·4	612		632	64·4
593		613		633	
594		614		634	
595		615		635	
596		616	67·7	636	
597		617		637	
598		618		638	
599		619		639	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
520	71.6	540		560	70.1
521		541		561	
522		542		562	
523		543		563	
524		544	70.9	564	
525		545		565	
526		546		566	
527		547		567	
528	71.7	548		568	69.3
529		549		569	
530		550		570	
531		551		571	
532		552	70.7	572	
533		553		573	
534		554		574	
535		555		575	
536	71.2	556		576	68.8
537		557		577	
538		558		578	
539		559		579	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
460		480	75.8	500	
461		481		501	
462		482		502	
463		483		503	
464	78.2	484		504	72.2
465		485		505	72.6
466		486		506	
467		487		507	
468		488	74.3	508	
469		489		509	
470		490		510	
471		491		511	
472	77.3	492		512	72.2
473		493		513	72.1
474		494		514	
475		495		515	71.3
476		496	73.1	516	71.6
477		497		517	
478		498		518	
479		499		519	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
400	73.3	420	85.5	440	80.0
401		421		441	
402		422		442	
403	74.4	423		443	
404		424	84.0	444	
405		425		445	
406	74.5	426		446	
407		427		447	
408		428		448	79.7
409		429		449	
410		430		450	
411	76.3	431		451	
412		432	81.6	452	
413		433		453	
414	78.3	434		454	
415	79.3	435		455	
416		436		456	78.8
417		437		457	
418		438		458	
419	84.8	439		459	

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CLIENT : SAOME AREA : CALLAGONDA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
340		360		380	
341	79.9	361		381	
342		362		382	
343	78.7	363	80.1	383	
344	78.9	364		384	72.8
345		365		385	
346	81.3	366		386	72.3
347		367		387	72.2
348		368	76.5	388	71.3
349	82.3	369		389	72.1
350		370		390	72.0
351		371	78.1	391	71.7
352		372		392	
353		373	77.4	393	71.5
354		374		394	71.7
355		375		395	
356	82.8	376		396	
357		377		397	
358		378		398	
359		379	73.8	399	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
280	94.5	300		320	
281		301		321	
282	94.4	302		322	
283	94.1	303		323	
284		304	87.8	324	
285		305		325	
286		306	86.9	326	
287	91.2	307		327	
288	91.1	308	85.7	328	84.0
289		309		329	
290	90.0	310	86.2	330	
291	90.0	311	85.7	331	
292		312	86.7	332	
293		313		333	84.6
294	89.2	314	88.2	334	84.4
295		315		335	83.5
296	90.0	316	88.6	336	
297		317		337	
298		318		338	
299		319	87.8	339	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
220		240	90.5	260	
221		241		261	90.3
222		242		262	
223		243		263	
224	89.1	244		264	90.8
225		245		265	
226	89.0	246		266	
227		247		267	
228		248	89.3	268	
229		249		269	
230		250		270	
231		251	88.7	271	
232	91.0	252		272	92.4
233		253		273	
234		254		274	
235		255		275	
236		256	90.2	276	
237		257		277	
238		258		278	
239		259		279	

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CLIENT : SAOME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
160	88·0	180		200	88·7
161		181		201	
162		182		202	
163		183		203	89·3
164	88·3	184	92·6	204	
165		185		205	
166		186		206	
167		187		207	87·5
168		188	93·2	208	
169		189		209	
170		190		210	
171	90·5	191	92·4	211	
172		192		212	88·3
173		193		213	
174		194		214	
175		195	89·4	215	
176	90·8	196		216	90·0
177		197		217	
178		198		218	90·3
179		199		219	

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

SURVEY ELEVATIONS

Station	R.L.	Station	R.L.	Station	R.L.
100		120		140	
101		121	87.5	141	
102		122		142	
103	81.3	123		143	82.9
104	81.2	124		144	
105	82.0	125		145	
106		126		146	84.1
107	82.8	127		147	
108		128	85.2	148	
109		129	84.5	149	87.5
110	84.4	130	84.9	150	87.8
111		131		151	
112		132	84.8	152	
113		133		153	
114		134		154	
115		135		155	
116	87.8	136	83.6	156	86.7
117		137		157	
118	88.0	138		158	
119		139		159	

ELEVATIONS

CLIENT: SAOME AREA : CALLA BONNA Line: MT HOPELESS

Stations	R.L.
96	82.5
95	83.1
88	83.6
86	83.7
79	86.9
77	87.0
76	86.6
73	83.0
70	80.9
69	80.5
64	79.9
63	80.0
56	79.5
48	79.8
46	80.0
45	79.6
40	79.3
32	78.8
24	77.7
20	77.8
19	76.5
18	76.9
16	77.5

VELSEIS
PO Box 116 Doncaster Australia 4078
Telephone (07) 376 5644
Fax (07) 376 0630

CLIENT: SADME **AREA:** CALLABONNA **LINE NO:** MT HOPELESS

Station	Easting	Northing	R.L.
Ti 1592	397 467.979	673 6406.751	
α	397 019.45	6736 063.12	
β	395 914.52	6735 072.19	
γ	394 961.77	6734 309.72	
ε	394 397.30	6733 755.86	
δ	393 985.11	6733 397.33	
A	393 626.62	6733 321.70	
2563	392 764.29	6732 461.17	
2487	392 093.82	6731 788.01	
2415	391 463.30	6731 146.87	
B	390 985.77	6730 669.19	

VELSEIS
PO Box 116 Doncaster Old Australia 4078
Telephone (07) 375 5544
Fax (07) 375 6430

CLIENT: SADME **AREA:** CALLABONNA **LINE NO:** MT HOPELESS

Station	Easting	Northing	R.L.
.2320	390 631·26 (.21)	6730 300·28 (.23)	
.2280	390 278·14 (.51)	6729 946·35 (.30)	
2232	389 856·17 (.56)	6729 519·67 (.61)	
2192	389 476·18 (.34)	6729 194·89 (.83)	
.2136	388 978·58 (9.02)	6728 702·51 (.45)	
2072	388 408·82 (9.29)	6728 140·88 (.81)	
2008	387 839·98 (40.48)	6727 578·32 (.25)	
1960	387 414·32 (.84)	6727 155·66 (.79)	
C	386 907·81	6726 634·57	
D	386 856·05	6726 551·48	
1840	386 342·63 (3.21)	6726 105·71 (.64)	

VELSEIS
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Fax (07) 376 6030

CLIENT: SADME **AREA:** CALLABONNA **LINE NO:** Mt HOPELESS

Station	Easting	Northing	R.L.
1784	385 840.25	6725 618.24	
1728	385 337.63	6725 130.88	
1672	384 834.92	6724 643.64	
1616	384 332.34	6724 156.16	
1560	383 830.28	6723 668.50	
1456	382 902.62	6722 757.91	
1344	381 907.94	6721 772.34	
1272	381 267.48	6721 140.05	
1200	380 629.47	6720 505.19	
1112	379 809.37	6719 772.19	
1016	378 910.05	6718 977.90	

VELSEIS
PO Box 116 Doris Dist Australia 4078
Telephone (07) 376 5544
Fax (07) 376 5639

CLIENT: SAOME **AREA:** CALLABONNA **LINE NO:** MT HOPELESS

Station	Easting	Northing	R.L.
.896	377 774.55	6717 998.11	
.832	377 170.97	6717 473.38	
T44	376 343.16	6716 749.02	
672	375 667.32	6716 154.88	
.600	374 990.87	6715 561.28	
536	374 383.69	6715 040.19	
464	373 701.95	6714 452.66	
420	373 288.63	6714 090.24	
316	372 300.95	6713 245.92	
282	371 976.78	6712 971.82	
T1/602	371 668.85	6713 471.23	
	371 670.181	6713 471.039	

SAOME

SUNSHOT 11/3/91 @ C

Lab S 29 35 06
Long 139 50 00

Mean obs V 13 59 36
- ref 3 53
13 55 43

Mean H 228 43 55

Mean Ro 00 00 00

UT of obs 7 56 11/3/91

Dec = S 3 52 ~~22~~ 00

$$\cos Az = \frac{\sin Dec - \sin V \sin Lab}{\cos V \cos Lab}$$

$$= \frac{-0.0675 - (0.2407 \times -0.4937)}{0.9706 \times 0.8696} = \frac{0.0513}{0.8441} = 0.0608$$

Az = 360 - 86 30 55
= 273 29 05
-H = 228 43 55

Az Ro = 44 45 10

Corr = - 34 33

Geo Az = 44 10 37 C → 1960

44 11 03

SADME

SUNSHOT 15/3/91 @ SP 744

Lat S 29 39 ~~43~~ 55

Long 139 44 ~~15~~ 00 CM 141°

Mean obs V = 29 57 53

- ref 1 41

= 29 56 12

Mean H 24 48 46

Mean Ro 00 00 32

Ut of obs 23 04 14/3/91

Dec = S 2 26 13

$$\cos Az = \frac{\sin Dec - \sin V \sin Lat}{\cos V \cos Lat}$$

$$= \frac{-0.0425 - (0.4990 \times -0.4949)}{0.8666 \times 0.8690} = \frac{0.2044}{0.7530} = 0.2715$$

Az = 74 14 ~~47~~ 38

H = 24 48 14

Az Ro 49 26 ~~33~~ 24

Corr - 37 ~~29~~ 36

GRO Az ~~48 49 04~~ 48 48

SAOME.

SUNSHOT 16/3/91 @ α

Lat. S 29 30 06
Long. 139 56 22.5

Mean obs V = 26 52 02
- Ref = - 1 54
= 26 50 08

Mean H = 27 03 40

Mean Ro 00 00 00

UT of OBS 22 49 (15/3/91)

Dec = S 2 02 45

$$\cos Az = \frac{\sin Dec - \sin V \sin Lab}{\cos V \cos lab}$$

$$= \frac{-0.0357 - (0.4514 \times -0.4924)}{0.8921 \times 0.8703} = \frac{0.1866}{0.7764} = 0.2404$$

Az = 76 05 34

-H = -27 03 40.

Az Ro = 49 01 54

-conv = - 31 20

Geo Az = 48 30 34

VELSEIS
PO Box 116 Dora Old Australia 4076
Telephone (07) 376 3644
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CLIENT : SADME AREA : CALLABONNA LINE : MT. HOPELESS

Traverse Computations

Station	Horiz angle	Bearing	Adjusted Bearing	Horiz Dist
Ti/602				
		48 17 41	48 17 41	
Ti/592	00 12 52			
		228 30 33	228 30 32	518·80
α	179 36 17			
		228 06 50	228 06 48	1484·515
β	183 13 02			
		231 19 52	231 19 49	1220·55
γ	174 12 52			
		225 32 44	225 32 39	790·99
ε	183 26 20			
		228 59 04	228 58 58	546·42
δ	209 06 17			
		258 05 21	258 05 14	366·46
A	146 58 22			
		225 03 43	225 03 35	1218·515
2563	179 49 35			
		224 53 18	224 53 08	950·30
2487	179 38 10			
		224 31 28	224 31 17	899·43
2415				

341 463·30 6131 140 87

VELSEIS
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CLIENT : SADME AREA : CALLABONNA LINE : MT. HOPELESS

Traverse Computations

Station	Horiz angle	Bearing	Adjusted Bearing	Horiz Dist
2487				
		224 31 28	224 31 17	
2415	180 28 12			
		224 59 40	224 59 28	675.58
B	178 52 05			
		223 51 45	223 51 31	511.75
2320	181 04 35			
		224 56 20	224 56 05	500.07
2280	179 44 52			
		224 41 12	224 40 56	600.23
2232	184 47 52			
		229 29 04	229 28 47	499.98
2192	175 49 20			
		225 18 24	225 18 06	700.19
2136	180 06 38			
		225 25 02	225 24 42	800.21
2072	179 54 25			
		225 19 27	225 19 06	800.20
2008	179 53 05			
		225 12 32	225 12 10	599.99
1960				

3x7 . 2 4 32 6727 55.66

VELSEIS
PO Box 116 Doncaster Australia 3108
Telephone (03) 376 3644
Fax (03) 376 0830

CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

Traverse Computations

Station	Horiz angle	Bearing	Adjusted Bearing	Horiz Dist
2008				
		225 12 32	225 12 10	
1960	178 59 05			
		224 11 37	224 11 13	726·86
C	161 44 00			
		211 55 37	211 55 16	97·914
D	197 06 42			
		229 02 19	229 02 02	680·08
1840	176 49 42			
		225 52 01	225 51 47	700·16
1784	180 01 08			
		225 53 18	225 52 59	700·26
1728	180 00 40			
		225 53 53	225 53 42	700·24
1672	179 58 42			
		225 52 35	225 52 28	700·31
1616	179 57 30			
		225 50 05	225 50 01	700·07
1560	179 41 50			
		225 32 00	225 31 55	1300·18
1456				

382 902·59

6722 757·92

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

Traverse Computations

Station	Horiz angle	Bearing	Adjusted Bearing	Horiz Dist
1560				
		225 32 00	225 31 55	
1456	179 43 50			
		225 15 50	225 15 49	1400.57
1344	180 06 12			
		225 22 02	225 22 04	900.18
1272	179 46 22			
		225 08 24	225 08 30	900.26
1200	183 04 02			
		228 12 26	228 12 35	1100.17
1112	180 20 17			
		228 32 43	228 32 56	1200.13
1016	180 39 35			
		229 12 18	229 12 36	1500.11
896	179 47 12			
		228 59 30	228 59 50	799.96
832	179 48 55			
		228 48 25	228 48 48	1100.22
744	179 52 02			
		228 40 27	228 40 50	900.07
672				

[illegible] 67.30 [illegible] 154.89

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CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

Traverse Computations

Station	Horiz angle	Bearing	Adjusted Bearing	Horiz Dist
744				
		228 40 18	228 40 39 50	
672	180 03 42			
		228 44 00	228 44 09 32	900.16
600	180 37 48			
		229 21 48	229 22 21 20	800.30
536	179 53 08			
		229 14 56	229 15 4 41 28	900.18
464	179 30 40			
		228 45 36	228 46 45 17 08	549.835
420	180 43 27			
		229 29 03	229 29 8 28 35	1299.66
316	180 18 40			
		229 47 43	229 48 7 02 15	424.61
282	278 33 28			
		328 21 11	328 21 20 30 43	586.84
TRIG TI/602				

371 668 22 6713 472 26

85 1 23

VELSEIS
PO Box 116 Doveton Old Australia 4076
Telephone (07) 376 3644
Fax (07) 376 0630

CLIENT : SADME AREA : CALLABONNA LINE : MT HOPELESS

Traverse Computations

Station	Horiz angle	Bearing	Adjusted Bearing	Horiz Dist
316				
		229 47 02	229 47 02	
282	173 00 38			
		222 47 40	222 47 32	624.805
232	179 57 08			
		222 44 48	222 44 35	549.66
188	180 01 18			
		222 46 06	222 45 40	874.81
118	180 17 42			
		223 03 48	223 03 15	512.13
77	179 43 20			
		222 47 08	222 46 26	762.34
16				

Co-ords AMG

Elev AHD

VELSEIS
PO Box 118 Doris Old Australia 4078
Telephone (07) 376 5544
Fax (07) 376 6838

CLIENT: SADME **AREA:** CALLABONNA **LINE NO:** MT HOPELESS

PERMANENT MARKER LIST

Station	Easting	Northing	R.L.
LAKE CROSSING BORE	391 472·13	6131 155·43	11·35
PM 1591	384 109·03	6123 938·22	24·70
PM 1176	380 406·04	6120 305·93	31·32
PM 963	378 409·12	6118 545·89	39·94
PM OH 588/6	371 097·63	6112 016·14	91·40

CO-ORDS AMG

VELSEIS
PO Box 146 Dural Old Australia 4076
Telephone (07) 376 5644
Fax (07) 376 5639

CLIENT: SADME **AREA:** CALLABONNA **LINE NO:** MT HOPELESS

Station	Easting	Northing	R.L.
2656	393 585.1	6733 284.4	
2563	392 764.5	6732 461.1	
2487	392 094.1	6731 788.0	
2415	391 463.6	6731 146.8	
2344	390 844.4	6730 511.3	
2320	390 631.6	6730 300.2	
2280	390 278.5	6729 946.3	
2232	389 856.6	6729 519.7	
2200	389 555.0	6729 257.0	
2192	389 476.6	6729 194.8	

VELSEIS
PO Box 118 Doris Old Australia 4078
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Fax (07) 376 4838

CLIENT: SADME **AREA:** CALLABONNA **LINE NO:** MT HOPELESS

Station	Easting	Northing	R.L.
2136	388 979.0	6728 702.5	
2012	388 409.3	6728 140.8	
2008	387 840.5	6727 578.3	
1960	387 414.8	6727 155.6	
1840	386 343.2	6726 105.6	
1784	385 840.8	6725 618.2	
1728	385 338.3	6725 130.8	
1672	384 835.6	6724 643.6	
1616	384 333.0	6724 156.1	
1560	383 831.0	6723 668.4	
1456	382 903.4	6722 757.8	

VELSEIS
PO Box 116 Doncaster Victoria 3108
Telephone (03) 376 5544
Fax (03) 376 6030

CLIENT: SADME **AREA:** CALLABONNA **LINE NO:** MT HOPELESS

Station	Easting	Northing	R.L.
1344	381 908.8	6721 772.2	
1272	381 268.3	6721 139.9	
1200	380 630.4	6720 505.1	
1112	379 810.3	6719 772.1	
1016	378 911.0	6718 977.8	
896	377 745.6	6717 998.0	
832	377 172.0	6717 473.2	
744	376 344.3	6716 748.9	
672	375 688.4	6716 154.6	
600	374 992.0	6715 561.1	
536	374 384.9	6715 040.0	

VELSEIS
PO Box 116 Doncaster Old Australia 4078
Telephone (07) 376 5644
Fax (07) 376 5638

CLIENT: SADME **AREA:** CALLABONNA **LINE NO:** MT. HOPELESS

Station	Easting	Northing	R.L.
.464	373 703·1	6714 452·5	
.420	373 289·9	6714 090·1	
316	372 302·2	6713 245·7	
282	371 978·1	6712 971·6	
·232	371 553·7	6712 513·2	
188	371 180·8	6712 109·6	
118	370 586·9	6711 467·5	
77	370 237·4	6711 093·4	
16	369 719·8	6710 533·9	

OBSERVER'S DAILY DIARY

CLIENT WMC / SADME

SURVEY TYPE Dyn Reflection	AREA/PROSPECT →	
DAY/DATE 13.3.91	STN. INT. (m) 12.5	CONTRACT # 160

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	

CREW		
TIMES Start	Finish	Total Hours

TIME SUMMARY

TRAVEL to: from:		WEATHER
PRODUCTION	Total	
STANDBY		
	Total	FIELD CONDITIONS
DOWNTIME		
	Total	

COMMENTS Mobilise Lake Eyre South to Mt. Hopeless.

Signed: Observer _____ Client Representative M J Sheard

OBSERVER'S DAILY DIARY

VELSEIS PTY LTD

CLIENT SADME

SURVEY TYPE Cordex Reflection		AREA/PROSPECT MT. HOPELESS
DAY/DATE 14.3.91	STN. INT. (m) 12.5	CONTRACT # 160

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	
01	2656	2520	1677m

CREW Tim, Gerard, Phil, Mick, Janice, Andy, Russell Don.		
TIMES Start 7.30am.	Finish 18.00pm.	Total Hours 10.5

TIME SUMMARY

TRAVEL to: .25 from: .25	.5	WEATHER Fine, light breeze
PRODUCTION 4.25	Total 4.25	
STANDBY EXPTL'S	5	
	Total	FIELD CONDITIONS SALT BUSH FLATS
DOWNTIME .75		
	Total	

COMMENTS Commenced experimentals on Eastern end of line. Changed to 2 sec records. Dozer commenced pre-loading. Recording commenced after dozer reached .75km ahead of spread.

3x [illegible]

Signed: Observer [signature]

Client Representative M. J. Sheard

OBSERVER'S DAILY DIARY

CLIENT SADME

SURVEY TYPE	Corder Reflection	AREA/PROSPECT	Mt. Hopeless
DAY/DATE	15.3.91	STN. INT. (m)	12.5
CONTRACT #	160		

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	
01	2520	2240	3500

CREW		
Tim, Sean, Jamie, Russell, Andy, Don. Phil-Dyer		
TIMES Start 6.30am	Finish 16.30pm	Total Hours 10pm

TIME SUMMARY

TRAVEL to: .5 from: .5	1	WEATHER Fine, Shill
PRODUCTION 8.0	Total 8	
STANDBY Nil		
	Total	FIELD CONDITIONS Salt Bush into open Gibber
DOWNTIME 1.0	1	
	Total	

COMMENTS

No Problems all day with Encoder/Decoder Misfired Terminally. Unable to get it operational Shut down for repairs.

M.T.M

Signed: Observer _____ Client Representative M. J. Sheard

OBSERVER'S DAILY DIARY

CLIENT SADME

SURVEY TYPE Colder Reflection	AREA/PROSPECT MT Hopeless	
DAY/DATE 16 Fri. 3.91	STN. INT. (m) 12.5	CONTRACT # 160

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	
01	2240	1952	3600m

CREW Tim, Jame, Gerard, Andy, Don, Russell, Phil

TIMES Start 7.45am	Finish 16.00	Total Hours 8¼

TIME SUMMARY Chargeable 6.0hrs.

TRAVEL to: .5 from: .5	1 Total	WEATHER Fine, Still	
PRODUCTION 5			
STANDBY Nil	Total	FIELD CONDITIONS open gibber	
DOWNTIME 2.25	2.25 Total		

COMMENTS

Delayed start due phone calls Brisbane. Persevered with Blaster. Many Misfires Shut down early as unable to make Decoder/Encoder fire. (Worked ok 9.0pm) Mick & Tommy completed Sweeping today. (145 litres Diesel)

Signed: Observer [signature] Client Representative M. J. Sleeman

OBSERVER'S DAILY DIARY

CLIENT SAOME

SURVEY TYPE	AREA/PROSPECT	
Colder Reflection	Mt Hopeless	
DAY/DATE 17.3.91	STN. INT. (m) 12.5	CONTRACT # 160

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	
01	1952	1712	3000m

CREW		
Jim, Jamie, Jerod, Andy, Don, Russell Phil		
TIMES Start 7.00am	Finish 17.30	Total Hours 10.5

TIME SUMMARY

Chargeable 4.5 hrs.

TRAVEL to: .25 from: .25	1 Total	WEATHER Fine, Breezy
PRODUCTION 4.0		
STANDBY Nil	Total	FIELD CONDITIONS Open Gibber
DOWNTIME 4.5	4.5 Total	

COMMENTS

Decoder faulty first thing. Back to camp stripped it from truck. Worked OK. Replaced in system with independant pwr.

Misfires intermittantly all afternoon.

Dozer completed line this afternoon.

Observer _____ Client Representative M. J. Sheard

OBSERVER'S DAILY DIARY

CLIENT SADME

SURVEY TYPE		AREA/PROSPECT MT HOPELESS
DAY/DATE 18.3.91	STN. INT. (m) 12.5	CONTRACT # 160

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE START	SHOT POINT/RAM SEGMENT/GEOPHONE FINISH	TOTAL METRES
01	1712	1136	7200m

CREW		
Tim, Jamie, Gerard, Andy, Phil, Dan Dissell		
TIMES Start 6.00	Finish 16.30	Total Hours 10.5

TIME SUMMARY

TRAVEL to: ~~.5~~ from: .4	.8	WEATHER Fine, Hot Breezy
PRODUCTION 9.7	Total 9.7	
STANDBY Nil	Total	FIELD CONDITIONS OPEN RIBBER
DOWNTIME Nil	Total	

COMMENTS

No problems all day.
Minor number of blaster misfires.

Signed: Observer [signature] Client Representative M. J. Sherrard

OBSERVER'S DAILY DIARY

VELSEIS PTY LTD

CLIENT SADDLE

SURVEY TYPE	GRIDDER REFRACTION	AREA/PROSPECT	MT HOPELESS
DAY/DATE	19.3.91	STN. INT. (m)	12.5
CONTRACT #	160		

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE START	SHOT POINT/RAM SEGMENT/GEOPHONE FINISH	TOTAL METRES
01	1136	656	6000m.

CREW		
Tim, Jane, Gyrad, Phil, Andy, Don, Russell		
TIMES Start 7.00	Finish 17.00	Total Hours 10.0

TIME SUMMARY

TRAVEL to: .5 from: .5	1 Total	WEATHER Fog, Gusty Wind in Afternoon
PRODUCTION 9		
STANDBY Nil	Total	FIELD CONDITIONS Gilber Ridges.
DOWNTIME Nil	Total	

COMMENTS

No problems all day.
Wind came on strong this afternoon.

Signed: Observer _____ Client Representative M. J. Sheard

OBSERVER'S DAILY DIARY

VELSEIS PTY LTD

CLIENT SADME

SURVEY TYPE	AREA/PROSPECT	
Coldex Reflection	Mt Hopeless	
DAY/DATE 20.3.91	STN. INT. (m) 12.5	CONTRACT # 160

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	

CREW Tim, Gerard, Andy, Phil, Janice, Don, Russell

TIMES Start	Finish	Total Hours 10.0

TIME SUMMARY

TRAVEL to: from:	Total	WEATHER Fine, Very Windy
PRODUCTION		
STANDBY	Total	FIELD CONDITIONS
DOWNTIME 10.0	10 Total	

COMMENTS STANDBY, HIGH Winds.

Signed: Observer _____ Client Representative _____

OBSERVER'S DAILY DIARY

CLIENT ~~TOA~~ SADME

SURVEY TYPE	AREA/PROSPECT	
Coober Pedy Extension	MT HOPELESS	
DAY/DATE 21.3.91	STN. INT. (m) 12.5	CONTRACT # 160

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	
01	656	352	3800m

CREW		
Tim, James, Jamie, Phil, Andy, Don Russell		
TIMES Start 8.00am	Finish 6.00pm	Total Hours 10

TIME SUMMARY

TRAVEL to: .75 from: .75	1.5	WEATHER Windy early,
PRODUCTION 4.0	Total 4	
STANDBY		
4.5	Total 4.5	FIELD CONDITIONS open gibber slopes.
DOWNTIME N.I.		
	Total	

COMMENTS

Very Windy First Thing This Morning. Quietened Down Lunchtime So Attempted Production. Records Always Marginal Due Expert Low Energy And/or Wind.

Signed: Observer _____ Client Representative M. J. Sheard

OBSERVER'S DAILY DIARY

CLIENT SADME

SURVEY TYPE CORONA DELINEATION		AREA/PROSPECT MT HOPELESS
DAY/DATE 22.3.91	STN. INT. (m) 12.5	CONTRACT # 160

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	
01	352	16	4200m

CREW Tim, Jamie, Phil, Read, Andy, Don, Russell

TIMES Start	Finish	Total Hours 10hrs Production

TIME SUMMARY + 10hrs STANDBY

TRAVEL to: .75 from: .75	1.5 Total	WEATHER Windy, daytime Shell at night
PRODUCTION 9.25		
STANDBY 10.0	10 Total	FIELD CONDITIONS Gilber slopes.
10hrs.		
DOWNTIME .75	.75 Total	
Blaster Misfires		

COMMENTS Very Windy All Day. Again Decided To Try Working At Night. Set Out 6.15 6pm & Completed Line, Picked Up & Home By 5.00am 23.3.91

Signed: Observer [signature] Client Representative [signature]

OBSERVER'S DAILY DIARY

CLIENT SAGME

SURVEY TYPE		AREA/PROSPECT
DAY/DATE 23.3.91	STN. INT. (m)	CONTRACT #

PRODUCTION SUMMARY

LINE	SHOT POINT/RAM SEGMENT/GEOPHONE		TOTAL METRES
	START	FINISH	

CREW Tim, Jamie, Spud, Phil, Andy, Dan, Russell

TIMES Start	Finish	Total Hours

TIME SUMMARY

TRAVEL to: from:	Total	WEATHER
PRODUCTION		
STANDBY	Total	
	Total	FIELD CONDITIONS
DOWNTIME	Total	
	Total	

COMMENTS MOBILISED MT HOPELESS TO NOCUNDRA. PACKED UP CAMP.

Signed: Observer _____ Client Representative _____

APPENDIX 3

Project Personnel and Equipment Movements (March 1991)

The surveyor arrived on site on the 9th with an inspection of benchmarks and key geographical features done the same day. Line layout work commenced on the 10th. Camp buildings and messtent arrived on the 11th and were set up ready to use. The camp cook and water tanker arrived on the 12th. All crews (SADME, VELSEIS and BULLDOZER) arrived late on the 13th ready to commence next day.

Experiments were carried out on the 14th and line pre loading commenced late morning. Line surveying was completed and permanent markers installed by the 16th. Preloading of the line was completed by the 18th. Seismic work continued to early morning of the 23rd and included 2 days lost as down time due to electronics failure and 2 days standby time lost due to strong winds.