AGSO RECORD 1995/72

"TASGO"
SEISMIC SURVEY 1995:
OPERATIONAL REPORT

by

T.J. BARTON¹, D.W. JOHNSTONE¹ and R. G. RICHARDSON²

¹Marine, Petroleum & Sedimentary Resources Program
Australian Geological Survey Organisation, GPO Box 378, Canberra, ACT 2601, Australia.
²Tasmanian Geological Survey, Tasmania Development and Resources,
PO Box 56, Rosny Park, Tasmania, 7018. Australia.

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## CONTENTS

### EXECUTIVE SUMMARY

1. INTRODUCTION
   1.1 Background
   1.2 Previous geophysical investigations
   1.3 Location
   1.4 Seismic Lines
   1.5 Associated Gravity Surveys (R. G. Richardson)

2. FIELD OPERATIONS
   2.1 General
   2.2 Reconnaissance
   2.3 Environmental Management Plan
   2.4 Transport of equipment to and from Tasmania
   2.5 Communications
   2.6 Line Clearing
   2.7 Surveying
   2.8 Field Safety
      2.8.1 Field Safety Recommendations
   2.9 Drilling and Explosives
      2.9.1 Drilling
      2.9.2 Explosives
   2.10 Seismic Recording
      2.10.1 Conventional SEG-D
      2.10.2 Eavesdropping on the SN368
         2.10.2.1 Eavesdropper Interface Box
         2.10.2.2 PDMA16 Interface Card
         2.10.2.3 Eavesdropper PC
   2.11 Data Processing
      2.11.1 In Field ‘VISTA’
      2.11.2 Head Office ‘DISCO / FOCUS’

3. ACKNOWLEDGMENTS

4. REFERENCES

(continued over page)
APPENDICES

1. Operational Statistics and Timetable. 35
2. Seismic Survey Personnel. 37
3. Seismic Survey Vehicles. 38
4. Recording System. 39
5. Line Recording spread parameters. 40
6. Seismic Field Tape Index 44
7. Archival Information 47
8. Environmental Management Plan. 48

FIGURES

1. Location of the TASGO seismic lines 2
2. Location map : line 95AGS-T1 3
3. Location map : line 95AGS-T2 4
4. Location map : line 95AGS-T3 5
5. Location map : line 95AGS-T4 6
6. Location map : line 95AGS-T5 7
7. CMP stack : line 95AGS-T1 26
8. CMP stack : line 95AGS-T2 27
9. CMP stack : line 95AGS-T3 28
10. CMP stack : lines 95AGS-T4 & T5 29
11. CMP stack : line 95AGS-AB 30

TABLES

1. Operational Statistics, Line Summary 36
EXECUTIVE SUMMARY

The Australian Geological Survey Organisation (AGSO) conducted a seismic reflection survey in various localities throughout Tasmania between January and April 1995. This seismic survey formed part of AGSO project ‘TASGO’ (b103201), a National Geoscience Mapping Accord (NGMA) project carried out in conjunction with the Tasmanian Geological Survey (within Tasmania Development and Resources).

The seismic survey obtained 134 km of 10 to 20 fold common mid-point (CMP) deep reflection seismic data along six traverses over an 8 week acquisition period. In addition, gravity observations were made by the Tasmanian Geological Survey at 120 m intervals along five of the lines. Statewide aeromagnetic data has been interpolated to provide profiles along each seismic line, and shot hole cuttings and water samples were taken for later analysis. The reflection crew provided support for AGSO’s refraction and tomography data acquisition which is reported separately.

In addition, a co-operative research project between AGSO and Aberfoyle Resources comprising of a “medium” resolution seismic line was shot in the vicinity of the Hellyer mine. This work will be reported separately.

Good reflectors were detected throughout the crust along all lines.

Copies of the final seismic sections for all AGSO seismic lines can be purchased through the AGSO Sales Centre, GPO Box 378, CANBERRA, ACT 2601, AUSTRALIA.
1. INTRODUCTION

1.1 Background

The TASGO project's main objectives are:

• to increase exploration, development and investment in Tasmania.
• to increase Tasmania's mineral and petroleum potential.
• to develop a tectonic framework of Tasmania's major geologic structures.

The Australian Geological Survey Organisation (AGSO) acquired 134 km of deep seismic reflection data in parts of Tasmania in the early part of 1995. The data form a sub-set of a diverse and comprehensive data set collected by the project. In addition, coincident gravity and bottom hole samples were also acquired to assist in geological interpretation. Other components of the geophysical data acquisition for this project included 1,758 line km of offshore 48 fold deep seismic data (Hill et al., 1995), a refraction and tomography experiment utilising the offshore airgun shots, and 87,000 line km of offshore aeromagnetic data.

The goals of TASGO are to improve the definition of Tasmania's minerals and petroleum potential and improve the understanding of geological controls in the distribution of these resources. The deep seismic reflection data were recorded in the mineralised Dundas Trough (lines 1 & 2), a gold-bearing portion of the Northeast Tasmania Terrane (line 3) and the Tasmania Basin (lines 4 & 5).

1.2 Previous Geophysical Investigations

Since the first regional geophysical survey in 1913, regional gravity and magnetic coverage of Tasmania have been completed (Burrett & Martin, 1989). Modern data sets, sourced from Government agencies, the University of Tasmania and exploration companies have been integrated with the regional information to provide more detailed coverage. One of the tasks of the TASGO project was to enhance these data sets by acquiring additional aeromagnetic data together with detailed seismic reflection and gravity along the seismic lines to gain a greater understanding of the arrangement of Tasmania's rock provinces at depth.

Seismic refraction studies have been conducted in Tasmania to determine crustal structure, while offshore, regional seismic reflection studies have been undertaken for petroleum exploration. Onshore seismic reflection has been limited to experimental work around ore body locations (Read, 1989). Seismic reflection profiling previously proposed throughout Tasmania (ACORP/LITSAC, undated) assisted with the location of the onshore TASGO lines.

1.3 Location

The 1995 AGSO seismic traverses were conducted in various localities around Tasmania. Fig. 1 shows the locality of all lines, i.e., line 95AGS-T1 through to 95AGS-T5 and 95AGS-AB. A brief description of each line is given in the following section. A full description of the five major lines is contained in Appendix 8, [Environmental Management Plan : AGSO seismic survey, Jan-April 1995.'(1994, unpublished)].
Figure 1. Location map, TASGO land seismic 1995
Figure 2. Location map, seismic line 95AGS-T1, Pieman Road
Figure 3. Location map, seismic line 95AGS-T2, Cradle Mountain Link Road
Figure 4. Location map, seismic line 95AGS-T3, Mathinna
Figure 5. Location map, seismic line 95AGS-T4, Ross - Woodbury Stock Route
Figure 6. Location map, seismic line 95AGS-T5, Osterely
1.4 Seismic Lines

**Line description : 95AGS-T1 (Pieman Road)**

This line was conceived with the objective of imaging the west Dundas Trough at depth. It commences 2-3 kilometres to the east from the mapped surface expression of the Arthur Lineament and continues east across the Roseberry Fault and Henty Fault Zone. This line, in conjunction with 95AGS-T2, and offshore lines on the northwest coast and west coasts will all contribute to understanding the nature of the Paleozoic-Precambrian contacts.

Fig. 2 shows the line at 1:100,000 scale. It commences in the west about 1 km west of Whaleback Ridge on the Pieman Road (also known as the Reece Dam Road or Stringers Creek Road) and continues east to its intersection with the Murchison Highway. The traverse then follows the Murchison Highway south for a distance of about 1.5 km then continues along an HEC access road to the Macintosh Dam overflow, across the spillway then northeast for another 2 km along a dam access road.

**Map sheet areas :**
- 1:250,000: Tasmania NW
- 1:100,000: Pieman, Sophia

**Line length :** 49.20 km

**Line description : 95AGS-T2 (Cradle Mountain Link Road)**

The objective of this line is the same as 95AGS-T1 and is essentially an extension of that line which could not continue farther to the east because of logistical constraints. The known geological structures intersect both lines enabling the traverses to be merged into a complete section across the entire Dundas Trough.

Fig. 3 shows the line at 1:100,000 scale. The line begins in the west at the intersection of the Murchison Highway with the Cradle Mountain Link Road. It follows the Cradle Mountain Link Road to the east and continues past the Pencil Pine Road across the Middlesex Plains and terminates at the Post Office Tree south of Daisy Dell.

**Map sheet areas :**
- 1:250,000: Tasmania NW
- 1:100,000: Sophia, Mersey

**Line length :** 36.48 km

**Line description : 95AGS-T3 (Mathinna)**

This line was an east-west transect across the north-northwest trending line of gold occurrences in the Mathinna beds of the Northeast Tasmania Terrane. Offshore, lines in the northeast were also placed to image any possible offshore continuation of this structure.
Fig. 4 shows the line at 1:100,000 scale. It begins in the west at the intersection of Upper Esk Road with Old Roses Tier Road then continues along the Mathinna Road through paddocks on “Evercreech” then onto Barnes Road and Hogans Road.

Map sheet areas:
1:250,000: Tasmania NE
1:100,000: Forester

Line length: 25.84 km

Line description: 95AGS-T4 (Ross-Woodbury Stock Route)

This line was part of an experiment to determine whether sediments within the Tasmanian Basin could be imaged beneath the cover of difficult to penetrate dolerite and to determine the depth of the Basin. This line was placed such that half was in an area of exposed sedimentary cover and the other half was overlain with surface dolerite, often difficult to image through with the seismic technique. The location of the line was chosen primarily for logistical reasons in that it was relatively straight and contained a gap in the surface dolerite cover.

Fig. 5 shows the line at 1:100,000 scale. The line begins in the north at the intersection of Auburn Road with Verwood Road then continues along a stock route to Bells Lagoon. It then continues south to Blackman River and terminates at the Midland Highway near Woodbury.

Map sheet areas:
1:250,000: Tasmania NE
1:100,000: Lake Sorell

Line length: 16.32 km

Line description: 95AGS-T5 (Osterley)

The objective for this short test line was similar to 95AGS-T4 but in a different location.

Fig. 6 shows the line at 1:100,000 scale. It begins in the north along the Victoria Valley Road between Ouse and Osterleyely and terminates approximately 5 km northeast of Ouse.

Map sheet areas:
1:250,000: Tasmania SE
1:100,000: Shannon

Line length: 4.8 km

Line description: 95AGS-AB (Hellver)

This line was an experimental mid to high resolution line in an area of known massive sulphides and located along a fairly straight portion of line 95AGS-T2. The acquisition parameters were designed to achieve increased spatial and shallow resolution and complement...
the regional scale data set. This line was later intersected by another line carried out as joint research project with Aberfoyle Resources.

This line was coincident with stations 2132-2162 of line 95AGS-T2

Map sheet areas:

1:250,000: Tasmania NE
1:100,000: Sophia

Line length: 1.2 km

1.5 Associated Gravity Survey: by R. G. Richardson (from Richardson, 1995).

As part of the TASGO project, Industry Safety and Mines (now the Tasmanian Geological Survey) acquired gravity data along the onshore seismic reflection traverses. Repeat readings showed an accuracy of better than 0.1 mgal, and comparison with previously levelled stations showed differences of 0.05 mgal or better after reduction of the data.

Base stations

All base stations used had previously been tied to Australian Geological Survey Organisation (AGSO) Isogal stations and have Isogal65 values. The base stations used were:

<table>
<thead>
<tr>
<th>Station</th>
<th>$G_{OBS}$ (Isogal65) (m/sec$^2$)</th>
<th>Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tullah</td>
<td>9.8027489</td>
<td>95AGS-T1</td>
</tr>
<tr>
<td>Que River</td>
<td>9.8017750</td>
<td>95AGS-T2</td>
</tr>
<tr>
<td>Mathinna</td>
<td>9.8025147</td>
<td>95AGS-T3</td>
</tr>
<tr>
<td>Tunbridge</td>
<td>9.8031485</td>
<td>95AGS-T4</td>
</tr>
<tr>
<td>Ross</td>
<td>9.8031257</td>
<td>95AGS-T4</td>
</tr>
<tr>
<td>Ouse</td>
<td>9.8036534</td>
<td>95AGS-T5</td>
</tr>
</tbody>
</table>

Base readings were made at least three times per day.

Gravity meter

Sodin meter number 183 was used for all readings. This meter was calibrated on the Hobart calibration range immediately prior to commencement of data acquisition and has a scale constant of 0.1014(5) mgal/scale division. Previous usage has shown this meter to have very good drift characteristics and repeatability.

Data processing

All data were corrected for linear drift between base readings. The gravity data were integrated with the height and coordinate data from the seismic line surveying and reduced to Bouguer anomalies using the 1930 International Gravity Formula and a density of 2.67 $\text{t/m}^3$. 

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10
Terrain corrections were computed to a radius of 21 km using a density of $2.67 \text{ t/m}^3$. Station numbers are of the form 9552.NNNN for line 95AGS-T1 and 9553.NNNN for the other lines.

**Statistics**

**Line 95AGS-T1 (Pieman Road)**
- 415 stations
- maximum check difference 0.07 mgal
- average maximum check difference 0.03 mgal

**Line 95AGS-T2 (Cradle Mountain Link Road)**
- 308 stations
- maximum check difference 0.08 mgal
- average maximum check difference 0.04 mgal

**Line 95AGS-T3 (Mathinna)**
- 224 stations
- maximum check difference 0.07 mgal
- average maximum check difference 0.04 mgal

**Line 95AGS-T4 (Ross-Woodbury Stock Route)**
- 138 stations
- maximum check difference 0.09 mgal
- average maximum check difference 0.06 mgal

**Line 95AGS-T5 (Osterley)**
- 41 stations
- maximum check difference 0.04 mgal
- average maximum check difference 0.02 mgal
2. FIELD OPERATIONS

2.1 General

Five 10-20 fold CMP deep seismic reflection profiles, one short test line and one high resolution line were recorded. In total 133.8 km of new seismic reflection data were acquired by this project.

The seismic lines were surveyed, shot hole drilled and recordings began with line 95AGS-T1 and finished with line 95AGS-T5. Another line, 95AGS-AB2 was also recorded in a joint research project with Aberfoyle Resources which will be reported separately. Spread and recording parameters for all TASGO lines are given in Appendices 4 and 5.

All lines were surveyed by a single contractor, Dynamic Satellite Surveys.

Shot hole drilling for lines 95AGS-T1, 95AGS-T2, and 95AGS-AB was carried out using contract drilling as access and drilling conditions were unsuitable for AGSO rigs. Lines 95AGS-T3, 95AGS-T4 and 95AGS-T5 were drilled by AGSO.

Seismic recording was done using AGSO’s SERCEL SN368 acquisition system.

The town of Tullah was used as a base for lines 95AGS-T1, 95AGS-T2 & 95AGS-AB with all personnel involved staying at the Tullah Lakeside Chalet. In addition, office facilities and phone lines were set up at the Chalet to manage operations and carry out preliminary data processing and quality control. Office rental cost was $350 per week. Accommodation was at Fingal for line 95AGS-T3, Ross/Campbell Town for line 95AGS-T4 and New Norfolk for line 95AGS-T5. Office accommodation for these three lines was based at the Fingal Community Centre at a cost of $300 for 14 days. Accommodation at Tullah was based on a subsidised travel allowance rate, with full travelling allowance paid to staff in other areas.

2.2 Reconnaissance

A feasibility study for potential locations of seismic lines was carried out in late 1993 in the preparation of the NGMA project proposal for Tasmania. This study was carried out by Tim Barton (AGSO), Keith Corbett (ISM) and David Duncan (ISM) from the November 29 to December 3, 1993. The objective was to identify logistically feasible seismic traverses in areas where the relationship of rock units could be examined at depth. In total, ten potential lines were identified as technically feasible. Some of these lines were later discarded in favour of offshore lines based on the offshore aeromagnetic data acquired as part of the project. This showed that the structures of interest continued offshore. A map of these lines is included in the ‘Tasmania NGMA Project TASGO, 1995/96’ document (Yeates et al., 1995).

A further reconnaissance of short-listed survey lines was made from the November 3 to November 11, 1994 by Kevin Wake-Dyster (AGSO) and Tim Barton (AGSO), to finalise selection of survey lines. The chosen locations are shown in Fig. 1.

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2.3 Environmental Management Plan

As part of the planning process for the seismic survey, and to comply with State regulations for conducting seismic surveys, an environmental management plan was formulated. The TASGO 'Environmental Management Plan' is appended to this report as Appendix 8.

This plan, in conjunction with letters, was sent to all stakeholders including Local and State Government authorities and property owners in late 1994. The objective of this was to inform the stakeholders and allow them time to identify any problems which the work could potentially cause in particular areas. The stakeholders contacted are listed within Appendix 8.

2.4 Transport of equipment to and from Tasmania.

All vehicles used for the survey were required to be driven from Canberra to Melbourne and then transported across Bass Strait by ferry vessels. As such only essential vehicles were taken with other vehicle requirements met locally.

The reconnaissance crew of Barton and Wake-Dyster left a Toyota station wagon in Hobart at the completion of their reconnaissance. This vehicle was retrieved by Barton on January 13 to commence line pegging on 95AGS-T1. He was supported by Takken and Crawford who arrived in Tullah on January 14 after transporting their vehicles across Bass Strait on the 'Spirit of Tasmania'.

The AGSO drilling and pre-loading crew arrived via the 'Spirit of Tasmania' on February 3 and proceeded to Fingal to begin drilling line 95AGS-T3 on February 6. The recording crew, together with their vehicles, travelled on the 'Spirit of Tasmania' overnight on February 15 then proceeded to Tullah to commence line 95AGS-T1.

The total cost of transporting 15 people and vehicles from Melbourne to Devonport on the 'Spirit of Tasmania' was $10,800.00.

The AGSO drill crew completed their work in Tasmania in late March, 1995. The drill rig and water-tanker were transported by Brambles Shipping from Burnie to Melbourne on April 4. The recording crew also used Brambles Shipping to transport their vehicles from Burnie to Melbourne on April 18. The crew then flew to Melbourne on April 18 and 19, collected the vehicles on April 19 and returned to Canberra.

The total cost for transporting 15 vehicles across Bass Strait via Brambles shipping was $9,775.00, accommodation and aircraft transport for the 15 personnel was $3,810.00.

2.5 Communications

In order to ensure that the operations of the survey ran as smoothly as possible it was recognised in the planning phase that reliable communication systems were required. For the work on the West Coast (lines 95AGS-T1,T2 & AB) a field office was set up at the Tullah Lakeside Chalet. Two telephone lines were installed to provide voice and fax communication. Express Post facilities were available at the Tullah Post Office providing next day delivery to Canberra. Two PC's were used in the office, one for clerical/scientific and administrative tasks,
the other for project management use. Also, field data processing and quality control functions were carried out in this complex using additional computing equipment. While working on lines 95AGS-T3, T4 & T5 an office was rented at the Community Centre in Fingal. This office, also with two phone lines, was configured similarly to the one at Tullah and the local post office handled the survey’s mail.

Field communication was via UHF and VHF radios. Two mobile phones were also used in areas where this service was available.

2.6 Line Clearing

Due to environmental restrictions, all lines were placed along existing roads or tracks to minimise any environmental impact of the work. For line 95AGS-T1 all of the work along the Pieman Road and Murchison Highway was done on the edge of the road as no off-road access was possible. The first 18 km of line 95AGS-T2 was also conducted on the edge of the road as significant environmental restoration had been carried out along the road verges and off road access for the drill rig was prohibited. For the remainder of the line, drilling operations were conducted on the road verge. Line 95AGS-T3 was also conducted along roadsides, but sufficient verges allowed the use of an AGSO rotary drill rig, some of the line passed through paddocks which were too soft to permit drill rig access without causing damage to the surface. Part of line 95AGS-T4 along a stock route was slashed to remove patches of Gorse (*Ulex europaeus*, a secondary weed) to minimise the possibility of spreading to other areas and improve line access. In addition, preventive measures were taken as outlined in the Mineral Exploration Code of Practice for Tasmania (Bacon, 1992). Line 95AGS-T5 was entirely along a road verge.

Permission to use the road verges was obtained from the relevant local councils and property owners as outlined in the ‘Environmental Management Plan’.

2.7 Surveying

Chaining and pegging of all lines was done by AGSO staff. This work required a minimum of two people and two vehicles to maintain productivity of 5 km to 8 km per day. Additional staff were required when traffic control was needed. Each station was marked on the road edge by green road marking paint which were the points surveyed and used for gravity readings. Wooden pegs 300 mm in length sourced from a local sawmill were placed at each station. Pegs painted white on the top 100 mm were used to denote each station and similar red pegs for shot hole locations. The shorter than normal peg length, usually 600 mm, was used to minimise visual impact of the peg from the road to reduce the incidence of them being stolen as has been the case in prior surveys. This strategy seemed to be fairly successful. The pegs were removed at the completion of operations on each line. Chaining was done using a nylon coated braided steel cable 100 m long and marked at 40 m intervals.

Surveying of the seismic lines was performed under contract by Dynamic Satellite Surveys. Survey data was supplied on PC floppy discs. The company’s report ‘DSS Report #95-36’ lists all relevant information. Included below is a copy of its ‘Summary’.
“During February, March and April 1995 Dynamic Satellite Surveys performed survey work in Tasmania on behalf of the Australian Geological Survey Organisation for their 95AGS-T seismic exploration survey.

All planned goals of the survey were reached and the survey was successfully completed with no mishaps.

Due to the rugged nature of the areas surveyed, the field work required the application of all of Dynamic Satellite Surveys’ advanced survey techniques during the data acquisition phase. The primary system utilised was kinematic GPS, with infill being obtained with the unique Rapid Elevation Meter.”

The total cost for the surveying was $27,472.04, total distance surveyed was 132.64 km, i.e., $207.06 per km.

2.8 Field Safety

Due to the nature of the terrain and the requirement to perform most of the work whilst on roads, special procedures were required to ensure the safety of personnel. All vehicles working on the line were fitted with rotating yellow beacons. Crew members wore reflective vests and were instructed on safe working practices in this environment. Crew members were directed to exercise caution when travelling on the West Coast roads as they were often very slippery.

In addition, road signs were placed at either end of the area being worked using Australian Standard AS 1742.3-1985 as a guide. Where applicable, flagmen were used to control traffic flow to ensure the safety of the workers and the travelling public. In particular, for operations on line 95AGS-T2, flagmen were required for all drilling that was conducted from the rear of the low loader and on various sections of line 95AGS-T1. For drilling operations on the other lines, traffic control consisted of road signs only, as the work in these areas was conducted on the road verge. Flagmen were used at all times during the data acquisition phase to ensure the safety of the workers and minimise noise contamination of shot records.

Consultations were held with the Department Of Transport and Works and the Hydro-Electric Commission to ensure that the practices used by the survey crew were acceptable. Potential hazards included adverse weather conditions, such as rain, snow and fog, and drivers who ignored signs and flagmen. Only minimal drilling production time was lost due to a road weather hazard on one day when visibility was less than 200 metres. Other hazards included tiger snakes. Snake bite kits were kept in each vehicle. Fortunately no member of the crew or contractors suffered a snake bite in the course of the survey.

Blasting operations presented some problems with blow outs occurring through various segments of lines. Line 95AGS-T1 caused the greatest concern and it was necessary to hire a blasting mat and a truck with a lifting crane to prevent material being blown out of the shotheole. Attempts to reduce the magnitude of the problem using reduced charge size did not substantially alleviate the problem. Deeper shotheoles was not an available option as the holes had been pre-drilled. The problem appeared to be closely related to near surface water-table levels and highly fractured igneous rocks in the vicinity of the hole. The conclusion drawn from the nature of the
blow-outs, which were not a case of the shot tamping being blown out, was that crater formation around the hole was due to ground water being compressed between the fractured rock then forced to the surface on a path of least resistance.

Overall crew safety was maintained throughout the entire operation. The only injury was a twisted ankle incurred on the Crew chief whilst inspecting a portion of line 95AGS-T2.

2.8.1 Field Safety Recommendations

The following recommendations are made for future survey operations:

(i) Operations on public roads.
   - AS 1742.3-1985 should be adhered to in relation to road signs.
   - Flashing yellow beacons should be used on all vehicles, in conjunction with flashing hazard lights.
   - Reflective vests should be worn by all crew members.
   - Flagmen should be used for all line operations when traffic volume is not low.
   - The seismic line should be worked on the side of the road which oncoming traffic uses.

(ii) Blasting Operations.
   - In regions of blow outs in hard rock terrain the use of a blasting mat should be considered.
   - Where blow outs are anticipated, detonator lead wires should be secured at the top of the hole to prevent wire being caught in overhead structures, e.g. power lines, trees etc.

(iii) General field safety.
   - The AGSO Field Safety policy should be examined to ensure that land seismic operations comply with the policy.
   - Snake bite kits should be carried in all vehicles along with the standard first aid kit.

2.9 Drilling and Explosives

2.9.1 Drilling

Drilling of line 95AGS-T1 was contracted out to Columbus Drilling, 27 Cattley St., Burnie, Tasmania. Work on this line commenced on January 23, 1995 and was completed on March 17, 1995. Columbus used a truck-mounted Atlas Copco 601 which was capable of working from either side or at the back of the truck. An Ingersoll Rand 750/250 compressor was towed behind on a trailer. The driller for Columbus was John Clayton (22 years experience) and his offsider was Alan Tuxworth.

Columbus drilled a total of 367 shot holes to a maximum depth of 12 m; a total of 4465.5 m was drilled at an average cost of $15.78 per metre. Average drilling rate was 11.77 metres per hour.
Columbus staff were accommodated at the Tullah Lakeside Chalet and worked a five-day week, returning to Burnie on weekends.

Drilling of lines 95AGS-T2, AB and 43 shot holes on line 95AGS-T1 was contracted to Maxfield Nominees Pty. Ltd. of 5 Melrose St., East Devonport, Tasmania. The drillers for Maxfield were Darren Woods and Steve Newall. Work on line 95AGS-T2 began on February 1, 1995 and final work was completed on March 17, 1995. Maxfield used an Atlas Copco 712H drilling rig which sat on the rear of a low loader. When the rig was able to operate off the road, the low loader was de-hired. A trailer-mounted compressor was towed behind a light vehicle. This was a small compressor providing air circulation for cutting removal only, as this rig was hydraulically driven. The drilling was carried out by a driller and one offider. As no access off the road was allowable for the first 18 km of line 95AGS-T2 all drilling was conducted with the rig on the low loader with the mast swung to one side of the trailer. Drilling was done on either side of the road depending upon suitable hole locations. In this instance a minimum of two flagmen and a low loader driver was also required for operations.

Maxfield drilled 362 shot holes at an average of 11.8 metres depth. Their total drilling was 4252.5 metres at an average cost of $21.75 per metre. The cost would have been cheaper, $16.70 per metre, if low loader costs are removed. Their production rate on average was 11.52 metres per hour.

Maxfield staff were also accommodated at the Tullah Lakeside Chalet and worked a six-day week, returning to Devonport on Saturday evenings.

Traffic control for drilling operations on lines 95AGS-T1 and T2 were carried out by AGSO staff.

Drilling of lines 95AGS-T3, T4 and T5 were also offered for tender. However, the quoted costs were higher than those estimated for AGSO to carry out the work itself, including transportation to and from Tasmania. AGSO staff Des Eaton and Alan Porter carried out the work using a Mayhew 1000 drill rig mounted on 6x8 Mack truck and a water tanker mounted on a Mercedes 911 5 tonne 4x4 truck.

AGSO drilled 199 holes at an average depth of 22 metres, a total of 4157 metres at an average rate of 16.05 metres per hour. The higher drilling rate, as compared to the contract work, was solely due to the different geology on the West Coast. It should also be noted that AGSO rigs were not suitable for the West Coast lines due to limited access. After completing the reflection drilling, the AGSO rig was used to drill holes for the reverse shoot refraction experiment at Osterley.

Staff were accommodated at Fingal, Ross and Ouse and a 4x4 Toyota station wagon used as a support vehicle.

Bottom hole samples were obtained by the drillers for all the lines, and sent to Hobart and Canberra for later analysis. Water samples were also collected where possible. Two litre samples were taken and subsequently sent to Hobart for analysis by the Tasmanian Geological Survey's ground water group, who also carried out conductivity measurements in open holes when possible.
2.9.2 Explosives

2 kg cartridges of ICI 'Powergel Seismic 3000' explosive were used as the seismic energy source. A 10 kg charge was selected as the best size to meet the project's objectives, although this size was reduced where shot holes were shallow. A 2 kg per hole charge was used on line 95AGS-AB.

ICI No. 8 star detonators with 3.6 m leads were used to detonate all charges. Additional shot firing wire was used to connect the charge to the blasting unit at a safe working distance. 'Scotcklok' connectors were used for this.

Explosives and detonators were stored at the ICI magazines at Hellyer for lines 95AGS-T1 and T2 and at The Cornwall Coal Company magazines at Fingal for lines 95AGS-T3, T4 and T5. Explosives were collected on a daily basis and unused quantities returned at the end of each days work.

Difficulty was experienced with holes standing up due to collapse or washing in. Over the course of the survey an average loss of 14% of the drilled depth was encountered when holes were loaded.

Holes on lines 95AGS-T1 & T2 were tamped with road metal purchased from Burnie, as insufficient cuttings were produced by the hammer drilling. Tamping for the other lines was done with drill cuttings.

2.10 Seismic Recording

The recording crew performed very well under some difficult circumstances. Poor weather conditions made work very unpleasant. A total of two working days were lost because of weather. Rain and fog during acquisition of lines 95AGS-T1 & T2 were the main contributing factors. The acquisition crew also had to contend with traffic control on all of the lines except 95AGS-T4. This, together with having to support the contract drill crew and surveying crew and supplying gravel for tamping, slowed the acquisition crew. Support was also provided for a separate refraction survey carried out by AGSO at the same time. It was a rare day that four buggies were manned and employed in reflection acquisition.

Prior to commencing acquisition on line 95AGS-T1, some tests were carried out to determine those acquisition parameters which could be altered. Parameters tested on this line, 95AGS-TEST, were a 50 Hz notch filter test and low cut filter tests. It also served the purpose of familiarising new staff and determining the best means of traffic control. Results indicated that the notch filter removed power line noise effectively. However, since the 50 Hz was not saturating the signal it was decided to do this filtering in the processing phase. A low cut filter value of 8 Hz was determined as the best to attenuate ground roll and shot-generated noise.

Spread and recording parameters for all lines are given in Appendices 4 and 5.

153 station units were available for the survey and if found to be faulty were repaired in the field and returned to the line as soon as possible. Strings of geophones, 16 to a group, were laid out in line, centred on the station. Any faulty sets of geophones were also repaired in the
field. In general, the 24 pick up and leapfrog technique was employed, (24 sets of cables, station units and geophones were moved from the back to the front of the line) to maximise recording efficiency.

On the completion of acquisition on line 95AGS-T1 & T2 two 'juggeries', locally employed, were de-hired, leaving six staff for work on the other lines.

The 'jug' crew were also responsible for removal of wooden survey marker pegs at the end of acquisition of each line.

2.10.1 Conventional SEG-D

The Sercel SN368 telemetry seismic acquisition system was operated in 120 channel configuration for the survey. Four auxiliary channels were also recorded with channel 1 being the uphole, the other three being empty. The SEG-D recordings were on 0.5 inch 9 track “Graham” brand magnetic tapes at 6250 bpi in GCR format. The tapes were 1200 feet long and could hold up to twenty-four 20 second shot records at 2 ms sampling rate. The first record on each tape was a 20 second internal sine wave test and a second ‘eof’ mark was placed at the end of each tape. A ‘cap’ test was also performed at the commencement of each day and recorded on tape.

Following is a summary of SN368 acquisition faults:

<table>
<thead>
<tr>
<th>TAPE NUMBER</th>
<th>FFID</th>
<th>ERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>95/001</td>
<td>002</td>
<td>Tape synchro</td>
</tr>
<tr>
<td>95/002</td>
<td>013</td>
<td>Synchro (line)</td>
</tr>
<tr>
<td></td>
<td>019</td>
<td>Short record (misfire)</td>
</tr>
<tr>
<td></td>
<td>024</td>
<td>Synchro (misfire)</td>
</tr>
<tr>
<td>95/004</td>
<td>059</td>
<td>F3 Tape parity</td>
</tr>
<tr>
<td></td>
<td>069</td>
<td>Tape parity</td>
</tr>
<tr>
<td></td>
<td>075</td>
<td>F3 Tape parity</td>
</tr>
<tr>
<td></td>
<td>077</td>
<td>F1 Tape parity</td>
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<td>95/005</td>
<td>081</td>
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<td>95/007</td>
<td>140</td>
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<td></td>
<td>142</td>
<td>Line parity</td>
</tr>
<tr>
<td></td>
<td>145</td>
<td>F5 Tape parity</td>
</tr>
<tr>
<td></td>
<td>146</td>
<td>F1 Tape parity, 1 Tape synchro</td>
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<tr>
<td></td>
<td>150</td>
<td>F1 Tape parity</td>
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<tr>
<td></td>
<td>156</td>
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<td>160</td>
<td>F5 Tape parity</td>
</tr>
<tr>
<td></td>
<td>170</td>
<td>1 Encoding error</td>
</tr>
<tr>
<td></td>
<td>174</td>
<td>RF transmission interrupt</td>
</tr>
<tr>
<td>95/008</td>
<td>179</td>
<td>F1 Tape parity</td>
</tr>
<tr>
<td></td>
<td>203</td>
<td>2 Tape parity</td>
</tr>
<tr>
<td>95/010</td>
<td>227</td>
<td>1 Tape synchro</td>
</tr>
<tr>
<td></td>
<td>258</td>
<td>Tape parity</td>
</tr>
<tr>
<td></td>
<td>260</td>
<td>Tape parity</td>
</tr>
<tr>
<td>TAPE NUMBER</td>
<td>FFID</td>
<td>ERROR</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>95/014</td>
<td>261</td>
<td>Tape parity</td>
</tr>
<tr>
<td></td>
<td>290</td>
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<tr>
<td></td>
<td>305</td>
<td>Tape synchro</td>
</tr>
<tr>
<td>95/015</td>
<td>313</td>
<td>Tape parity</td>
</tr>
<tr>
<td></td>
<td>322</td>
<td>Tape parity</td>
</tr>
<tr>
<td></td>
<td>327</td>
<td>Tape parity</td>
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<tr>
<td>95/017</td>
<td>358</td>
<td>Tape parity</td>
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<tr>
<td></td>
<td>360</td>
<td>Tape parity</td>
</tr>
<tr>
<td></td>
<td>365</td>
<td>Tape parity</td>
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<td>95/019</td>
<td>419</td>
<td>F7 Tape parity</td>
</tr>
<tr>
<td></td>
<td>420</td>
<td>F3 Tape parity</td>
</tr>
<tr>
<td>95/020</td>
<td>449</td>
<td>F3 Tape parity</td>
</tr>
<tr>
<td>95/021</td>
<td>452</td>
<td>Line failure at shotpoint</td>
</tr>
<tr>
<td></td>
<td>454</td>
<td>Tape parity</td>
</tr>
<tr>
<td>95/022</td>
<td>464</td>
<td>Tape synchro</td>
</tr>
<tr>
<td>95/023</td>
<td>488</td>
<td>F7 Tape parity</td>
</tr>
<tr>
<td></td>
<td>493</td>
<td>Tape synchro</td>
</tr>
<tr>
<td>95/025</td>
<td>524</td>
<td>2 Tape parity</td>
</tr>
<tr>
<td>95/026</td>
<td>559</td>
<td>Tape synchro</td>
</tr>
<tr>
<td></td>
<td>561</td>
<td>Tape synchro</td>
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<td>565</td>
<td>Tape synchro</td>
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<td></td>
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<td>Tape synchro</td>
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<tr>
<td>95/027</td>
<td>580</td>
<td>Line synchro</td>
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<tr>
<td>95/028</td>
<td>604</td>
<td>Tape synchro</td>
</tr>
<tr>
<td>95/029</td>
<td>628</td>
<td>Tape synchro</td>
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<td></td>
<td>629</td>
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<td>Tape synchro</td>
</tr>
<tr>
<td></td>
<td>635</td>
<td>Line synchro, interrupt</td>
</tr>
<tr>
<td></td>
<td>636</td>
<td>Line synchro, interrupt</td>
</tr>
<tr>
<td>95/031</td>
<td>645</td>
<td>Tape synchro</td>
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<tr>
<td></td>
<td>653</td>
<td>Tape synchro</td>
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<td></td>
<td>663</td>
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<td>95/032</td>
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<td>Tape synchro</td>
</tr>
<tr>
<td>95/034</td>
<td>720</td>
<td>Tape parity</td>
</tr>
<tr>
<td>95/037</td>
<td>787</td>
<td>Tape synchro</td>
</tr>
<tr>
<td>95/038</td>
<td>811</td>
<td>Line failure</td>
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<td></td>
<td>819</td>
<td>RF interrupt</td>
</tr>
<tr>
<td>95/040</td>
<td>830</td>
<td>Line failure</td>
</tr>
<tr>
<td></td>
<td>839</td>
<td>Tape synchro</td>
</tr>
</tbody>
</table>

Jim Whatman from ESU, AGSO made the following comments on the SERCEL SN368 errors.

Line synchro, line parity, line fail (loss of power supply to one or more station units) and R.F. (data corruption or excessive power supply noise) are externally sourced and very difficult to control.

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Tape synchro and tape parity are, I believe, a problem with reading/writing the tape which has insufficient saturation of magnetic material. This could result from either:

(i) A defect in the coating of the tape (the error can be repeated at the same spot on tape by writing another record)
(ii) The tape has lost close contact with the head during writing (reading back the original record produces a consistent error but the record can be over written with no errors).
(iii) The tape lost contact with the head during reading (reading back the record consistently produces no error)
(iv) The head is wearing and needs lapping (write currents are at full amplitude to produce barely acceptable read levels).

2.10.2 Eavesdropping on the SERCEL

An eavesdropping system was trialed for the first time in production mode during the TASGO survey. This system has three parts:

1. A real time interface (RTI) from the Sercel data cable to the PC.
2. A PDMA16 interface card and LINUX software driver which writes the digital data into memory.
3. A 486 PC running a LINUX operating system, with demux and control programs.

The system captures a copy of the SEG-D data as it is written to tape by the Sercel system.

Shane Brandon from ESU, AGSO developed the hardware and Jim Leven supervised the software development for the eavesdropper. A brief description of the hardware configuration follows:

2.10.2.1 Eavesdropper Interface Box

There are two data cables connected between the Sercel SN368 Master Control Unit (MCU) and the Sercel SN368 tape transport: the write cable carries the data to be written on tape plus several signals to control the transport, the read cable carries the data read from tape plus several signals indicating the tape transport status. Presently the Eavesdropper Interface Box monitors the data on the write cable and sends this data to the PC through a digital I/O board (MetraByte PDMA16 compatible) mounted in the PC.

Besides serving as a wiring junction, the Eavesdropper Interface Box provides electronics for three main functions:

1) First In First Out (FIFO) memory for intermediate storage of data. Data transfers via the board within the PC are performed under the control of the PC’s Direct Memory Access (DMA) controller. While the PC can perform most DMA transfers within the 6.3μs between incoming data bytes, some DMA transfers will be longer (due to the DMA controller requiring re-programming every 64 kb
transferred, and also vital PC housekeeping functions such as DRAM refreshing). Hence data arriving at these times need to be stored temporarily until the PC can catch up.

2) A controller to mediate between the FIFO memory and the PC. The difference between the average DMA transfer time and the above 6.3μs is nowhere near sufficient to allow PC software control of the FIFO. More time can be bought with a larger FIFO, but due to the large number of bytes transferred per record (3,257,598 bytes for a 20s record) the present 2 kb FIFO would buy over 12ms for any single transfer but only 4ns on a per transfer basis. A sufficiently large memory would rule out the use of a commercial FIFO adding significantly to the complexity of the design. A hardware controller is thus used to conduct the data transfer operation between the FIFO and PC by monitoring their respective status lines and asserting their control lines accordingly.

3) Signal buffering. Signals on long lines are susceptible to noise and ringing etc. Buffering is provided to reduce further degradation, re-shape the signals before use, and drive outgoing lines.

**2.10.2.2 PDMA16 interface card**

A commercial PDMA16 interface card was employed to write the digital data from the interface box into memory. This requires writing around 3.2 Mb of data to memory in 20 seconds, corresponding to a transfer rate of 160 kb s⁻¹ (within the capability of the PDMA16 interface board).

**2.10.2.3 Eavesdropper PC**

The eavesdropper PC uses a 486 DX2/66 with 16 Mb of RAM and runs a LINUX operating system. It has two SCSI disks : 420 Mb, and 1Gb, and an exabyte 8505 tape drive. A specialised driver has been written for the PDMA16 interface card by David Blackman. Custom programs have been written to enable the data acquisition, and to demultiplex the captured data.

The capture program resets the PDMA16 driver and interface box, and passes control to the PDMA16 driver. This driver writes the incoming data via DMA into kernel memory, whereafter it is written to a disk file in the SEG-D format. The demultiplex program reads this disk file and demultiplexes the data into SEG-Y format, writing the appropriate header information into the SEG-Y headers. The SEG-Y data is written to a disk file on the other disk, to ensure data security in the event of a disk failure.

At the conclusion of recording, the SEG-Y data are written to an exabyte tape in UNIX tar format, for transfer to the field processing computer at the base camp. Both the SEG-D and SEG-Y data are stored on the eavesdrop PC until this transfer has been verified. Together with the SEG-Y data, a log file of the day's acquisition is also transferred to the field geophysicist.

The eavesdropper proved a successful tool to have in the field. The most obvious advantage being the fact the SEG-D tapes did not have to be de-multiplexed with the 'Vista'
on the field processing system. Further development of the system enable the play-back of SEG-D records on the Sercel and the writing of these to the PC disc.

The following errors were reported by the Observer for the eavesdropping system:

<table>
<thead>
<tr>
<th>TAPE NUMBER</th>
<th>FFID</th>
<th>ERROR</th>
<th>DATA CAPTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>95/002</td>
<td>19</td>
<td>Short record</td>
<td>14158 ms</td>
</tr>
<tr>
<td>95/002</td>
<td>27</td>
<td>Extra 10 bytes</td>
<td>2 ms</td>
</tr>
<tr>
<td>95/005</td>
<td>95</td>
<td>Extra 2 bytes</td>
<td>2700 ms</td>
</tr>
<tr>
<td>95/007</td>
<td>146</td>
<td>Short record</td>
<td>8820 ms</td>
</tr>
<tr>
<td>95/008</td>
<td>174</td>
<td>RF interrupt</td>
<td>19256 ms</td>
</tr>
<tr>
<td>95/011</td>
<td>220</td>
<td>EV timeout</td>
<td>704 ms</td>
</tr>
<tr>
<td>95/020</td>
<td>452</td>
<td>Line interrupt</td>
<td>14 ms</td>
</tr>
<tr>
<td>95/022</td>
<td>465</td>
<td>Nil Ev</td>
<td>2 ms</td>
</tr>
<tr>
<td>95/023</td>
<td>491</td>
<td>Extra 2 bytes</td>
<td>17182 ms</td>
</tr>
<tr>
<td>95/026</td>
<td>580</td>
<td>EV short - line synchro error</td>
<td>2324 ms</td>
</tr>
<tr>
<td>95/029</td>
<td>624</td>
<td>Extra 2 bytes</td>
<td>14158 ms</td>
</tr>
<tr>
<td>95/029</td>
<td>628</td>
<td>Extra 1 byte - tape synchro</td>
<td>16438 ms</td>
</tr>
<tr>
<td>95/029</td>
<td>635</td>
<td>EV short - line interrupt</td>
<td>14 ms</td>
</tr>
<tr>
<td>95/029</td>
<td>636</td>
<td>EV short - line interrupt</td>
<td>4 ms</td>
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<tr>
<td>95/031</td>
<td>657</td>
<td>Line interrupt</td>
<td>964 ms</td>
</tr>
<tr>
<td>95/039</td>
<td>808</td>
<td>Extra byte</td>
<td>6474 ms</td>
</tr>
<tr>
<td>95/039</td>
<td>811</td>
<td>Line fail</td>
<td>18 ms</td>
</tr>
<tr>
<td>95/039</td>
<td>819</td>
<td>RF interrupt</td>
<td>3338 ms</td>
</tr>
<tr>
<td>95/040</td>
<td>830</td>
<td>EV short - line fail</td>
<td>338 ms</td>
</tr>
</tbody>
</table>

2.11 Data Processing

2.11.1 In field ‘Vista’

The 'Vista' field seismic processing system was used on the seismic survey for quality control and to produce 'Brute stacks' in the field. QC was done by reading in the SEG-Y eavesdropper tapes, concatenating the separate SEG-Y files and writing these out to exabyte tape in SEG-Y 32 bit IBM floating point format. The odd short or missing file could be demultiplexed from the SEG-D field tape on Vista and incorporated with the other data.

Uphole signals, recorded on auxiliary trace number 1, were demultiplexed separately and written onto exabyte tape. These were also concatenated and analysed on the Vista and uphole time arrivals computed.

Geometry information was taken from the SEG-Y headers, stacking velocities calculated from constant velocity analysis and datum statics applied to produce a 'brute' stack, (straight line geometry assumed).

First breaks were also picked in the field using ‘Green Mountain Geophysics’ software to compute refraction statics, but were not applied to the field processed data as crooked line geometry was not available at this point.

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Field QC also included the checking of shot geometry from the monitor records and observers reports. Loading, drilling and shot firing logs were also cross-checked for correctness in the field.

Survey information from Dynamic Satellite Surveys was checked using the 'Green Mountain Geophysics' software on the elevation profiles and x, y plots.

2.11.2 Head office 'Disco/Focus'

Full processed sections of all seismic lines were produced in-house at AGSO, at both 20 and 4 seconds two-way-time. The software used in the processing stream was provided by 'Cogniseis' and was both batch mode 'Disco' and interactive mode 'Focus'. These programs were run on an IBM RS6000 machine under a UNIX operating system.

Crooked line processing was undertaken for all lines, the CMP locations for binning being calculated from geometry distribution plots. As a rule the deep sections have a large binning window while the shallow sections were binned with an 80 metre maximum offset. Constant velocity analysis was undertaken on CMP coherency stacked data with particular emphasis placed on the top three seconds of section.

The processing stream used for the 20 second displays was:

1. Crooked line geometry definition
2. Field SEG-Y to 'Disco' format
3. Resample to 4 milliseconds
4. Quality control display and edits
5. Crooked line binning
6. Spherical divergence and gain correction
7. Statics computation (first breaks or uphole method, differing datums)
8. CMP sort
9. 50 Hz notch filter (where required)
10. Velocity analysis (cvs)
11. Normal moveout correction
12. Pre-stack NMO mute (55% stretch mute)
13. Common mid-point stack
14. Post stack balance
15. Bandpass filter
16. Time varying equalisation
17. Signal enhancement (fxdecon & digistack)
18. Display

The 4 second section processing also included pre-stack spectral equalisation to enhance high frequency near surface events. Pre-stack migration or DMO was not applied due to fold and offset variability caused by the crooked line geometry.

Profiles of residual magnetics, Bouguer gravity or residual gravity were displayed on top of all seismic sections together with the elevation.
Highly compressed displays of stack data at 1:1 scale are shown in figs. 7 to 11. All lines show data was obtained throughout the crust.
Figure 8. Processed section, Line 95AGS-T2, 10 sec twt
Figure 9. Processed section, Line 95AGS-T3, 10 sec. twt
Figure 10. Processed sections, Lines 95AGS-T4, T5, 10 sec. twt
Figure 11. Processed section, Line 95AGS-AB, 6 sec. twt
3. ACKNOWLEDGMENTS

The authors acknowledge the contributions and efforts made by all members of the 1995 TASGO seismic survey team. The co-operation and assistance from Local Government authorities, landowners, exploration companies and the Tasmanian Government are appreciated.

In particular the following organisations and people are thanked.

Survey Design
B. Drummond, T. Barton, K. Wake-Dyster (AGSO); R. Richardson, A. V. Brown (TGS).

Survey Crew

Gravity Readings
R. Richardson (ISM).

Groundwater and Cuttings Sampling
R. Donaldson (ISM), T. Barton (AGSO).

Field Office Rental
H. and J. Turnbull (Tullah Lakeside Chalet); B. Yates (Fingal Community Centre).

Surveying Contractor
P. Robinson, D. Williams, D. Brooks, B. Hedditch (Dynamic Satellite Surveys).

Environmental Issues
D. Gatehouse, C. Bacon (TGS) T. Barton (AGSO) K. Lynd, P. Rainbird, (Hydroelectric Commission) O. Hedberg and staff (Land Resources Branch) G. Williams (Forestry Tasmania) innumerable land holders.

Road Signs

Drilling Contractors
M. Lillas, Columbus Drilling (Line 1); M. Maxfield, Maxfield Nominees Pty. Ltd. (Lines 1 and 2).

Supply of Low Loader
Holloway Transport, Devonport.
Supply of Gravel
P. Beamish, Beamish Contractors, Burnie.

Explosives Licences and Use
M. Robertson, C. Bacon, D. Blackaby, J. Coffey, S. Halfacre, J. Mollison (TGS).

Explosives Supply and Shipment
M. Kelly, G. Burstow, N. Kramer (ICI)

Explosives Storage

Car Hire
Avis, Burnie, A. V. Brown (TGS)

Equipment Transhipment
M. Brown, R. Ryder (Brambles Shipping)
L. Polden (Spirit of Tasmania)

Field Communications
D. Schoe, Telecom Australia.

Data Processing

Supervision and Customer Liaison
B. Drummond (AGSO)

4. REFERENCES


### Operational Statistics and Timetable

<table>
<thead>
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<th>Event</th>
<th>Date</th>
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<td>Line pegging commenced</td>
<td>16/1/1995</td>
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<tr>
<td>Contract drilling commenced</td>
<td>23/1/1995</td>
</tr>
<tr>
<td>Contract drilling completed</td>
<td>17/3/1995</td>
</tr>
<tr>
<td>AGSO drill crew departed Canberra</td>
<td>2/2/1995</td>
</tr>
<tr>
<td>AGSO drilling commenced</td>
<td>6/2/1995</td>
</tr>
<tr>
<td>AGSO drilling completed</td>
<td>22/3/1995</td>
</tr>
<tr>
<td>AGSO drilling crew returned to Canberra</td>
<td>6/4/1995</td>
</tr>
<tr>
<td>Contract surveying commenced</td>
<td>12/2/1995</td>
</tr>
<tr>
<td>Contract surveying completed</td>
<td>11/4/1995</td>
</tr>
<tr>
<td>Recording crew departed Canberra</td>
<td>14/2/1995</td>
</tr>
<tr>
<td>Recording crew commenced acquisition</td>
<td>22/2/1995</td>
</tr>
<tr>
<td>Recording completed</td>
<td>8/4/1995</td>
</tr>
<tr>
<td>Recording crew returned to Canberra</td>
<td>20/4/1995</td>
</tr>
</tbody>
</table>

### Recording:

- **Total number of recording days worked:** 32
- **Recording days lost:**
  - Due to travel to and from Canberra: 4
  - Due to town shifts: 4
  - Due to adverse weather: 2
  - Due to instrument breakdown: 0
- **CMP fold:** 10-20
- **Total number of shots:** 765
- **Average number of production shots/recording day:** 23.9
- **Explosives used:** 7036 kg
- **Detonators used:** 809
- **Average charge/production shot (lines T1- T5):**
  - (line AB): 10 kg
  - 2 kg

### Drilling:

#### AGSO

- **Number of drilling rigs:** 1
- **Total number of rig days worked:** 33
- **Rig days lost:**
  - Due to town shifts: 4
  - Due to adverse weather: 1
  - Due to equipment breakdowns and maintenance: 1

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Shot holes:
- Total number of shot holes: 199
- Total metres drilled: 4,157.0 m
- Average depth/shot hole: 21.92 m

Average number of holes/rig/day: 6.0

MAXFIELD

Number of drilling rigs: 1
Total number of rig days worked: 35
Shot holes:
- Total number of shot holes: 362
- Total metres drilled: 4252.5 m
- Average depth/shot hole: (T1, T2) 11.57 m, (AB) 5.0 m

Average number of holes/rig/day: 10.3

COLUMBUS

Number of drilling rigs: 1
Total number of rig days worked: 41
Shot holes:
- Total number of shot holes: 367
- Total metres drilled: 4465.5 m
- Average depth/shot hole: 12.17 m

Average number of holes/rig/day: 8.9
### DRILLING

<table>
<thead>
<tr>
<th>Line</th>
<th>Explosives</th>
<th>Drilling</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Powergel (kg)</td>
<td>Dets #8 star</td>
</tr>
<tr>
<td>95AGS-T1</td>
<td>3128</td>
<td>347</td>
</tr>
<tr>
<td>95AGS-T2</td>
<td>1996</td>
<td>253</td>
</tr>
<tr>
<td>95AGS-T3</td>
<td>1000</td>
<td>104</td>
</tr>
<tr>
<td>95AGS-T4</td>
<td>684</td>
<td>69</td>
</tr>
<tr>
<td>95AGS-T5</td>
<td>198</td>
<td>21</td>
</tr>
<tr>
<td>95AGS-AB</td>
<td>30</td>
<td>15</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>7036</strong></td>
<td><strong>809</strong></td>
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### RECORDING

<table>
<thead>
<tr>
<th>Line</th>
<th>No. Shots</th>
<th>No. Days</th>
<th>Shots/day</th>
<th>Line km</th>
<th>km/day</th>
</tr>
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<tbody>
<tr>
<td>95AGS-T1</td>
<td>323</td>
<td>12</td>
<td>26.92</td>
<td>49.20</td>
<td>4.10</td>
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<tr>
<td>95AGS-T2</td>
<td>243</td>
<td>10</td>
<td>24.30</td>
<td>36.48</td>
<td>3.65</td>
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<tr>
<td>95AGS-T3</td>
<td>97</td>
<td>5</td>
<td>19.40</td>
<td>25.84</td>
<td>5.17</td>
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<tr>
<td>95AGS-T4</td>
<td>68</td>
<td>3</td>
<td>22.67</td>
<td>16.32</td>
<td>5.44</td>
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<tr>
<td>95AGS-T5</td>
<td>19</td>
<td>1</td>
<td>19.00</td>
<td>4.80</td>
<td>4.80</td>
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<tr>
<td>95AGS-AB</td>
<td>15</td>
<td>1</td>
<td>15.00</td>
<td>1.20</td>
<td>1.20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>765</strong></td>
<td><strong>32</strong></td>
<td><strong>133.8</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
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Table 1. Operational Statistics, Line Summary

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APPENDIX 2

Seismic Survey Personnel

Australian Geological Survey Organisation:

Project Leader
Seismic Field Party Leader/Geophysicist
Visiting Geophysicists
Engineer
Technical Officers (Engineering)
Field Assistants (Explosives)
Temporary Personnel
AGSO Driller
AGSO Assistant Driller
Contract Personnel:

Contract Drilling:
Driller
Assistant Driller
Contract Drilling:
Driller
Assistant Driller

Contract Surveying:
Head Surveyor
Surveyors

T. J. Barton
D. W. Johnstone
A. Owen
K. D. Wake-Dyster
J. H. Leven
B. Devenish
J. Whatman
S. Thomas
A. Crawford
S. Pardalis (Contract)
A.C. Takken
A. Cherry
R. Fisher
D. Hampton
D. Keast
P. Kebblewhite
S. Krushka
S. Nulsen
B. Ralph
G. Wright
D. Eaton
A. Porter

Columbus Drilling
J. Clayton
A Tuxworth
Maxfield Nominees Pty. Ltd.
D. Woods
R. Dransfield

Dynamic Satellite Surveys Pty. Ltd.
P. Robinson
D. Brooks
D. Williams
## APPENDIX 3

### Seismic Survey Vehicles

#### Recording:

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Make/Model</th>
<th>Registration Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recording truck</td>
<td>Mercedes 911 4X4</td>
<td>ZBE-748</td>
</tr>
<tr>
<td>Workshop/electronics truck</td>
<td>Mercedes 911 4X4</td>
<td>ZBE-689</td>
</tr>
<tr>
<td>Cable/stores truck</td>
<td>Mercedes 911 4X4</td>
<td>ZBE-687</td>
</tr>
<tr>
<td>Geophone carrier</td>
<td>Toyota Landcruiser 4X4 T/Top</td>
<td>ZRM-016</td>
</tr>
<tr>
<td>Geophone carrier</td>
<td>Toyota Landcruiser 4X4 T/Top</td>
<td>ZRM-017</td>
</tr>
<tr>
<td>Geophone carrier</td>
<td>Toyota Landcruiser 4X4 T/Top</td>
<td>ZRM-018</td>
</tr>
<tr>
<td>Geophone carrier</td>
<td>Toyota Landcruiser 4X4 T/Top</td>
<td>ZRM-020</td>
</tr>
<tr>
<td>Geophone carrier</td>
<td>Toyota Landcruiser 4X4 T/Top</td>
<td>ZRM-019</td>
</tr>
<tr>
<td>Shooting truck</td>
<td>Toyota Landcruiser 4X4 T/Top</td>
<td>ZJE-152</td>
</tr>
<tr>
<td>Personnel carrier</td>
<td>Toyota Landcruiser 4X4 S/W</td>
<td>ZJE-129</td>
</tr>
<tr>
<td>Reconnaissance vehicle</td>
<td>Toyota Landcruiser 4X4 S/W</td>
<td></td>
</tr>
<tr>
<td>Crew Chief vehicle</td>
<td>Toyota Camry</td>
<td>Leased by TGS for AGSO</td>
</tr>
</tbody>
</table>

#### Drilling:

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Make/Model</th>
<th>Registration Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling rig</td>
<td>Mayhew 1000/Mack R600, 8X6</td>
<td>ZBE-606</td>
</tr>
<tr>
<td>Drilling rig (Columbus)</td>
<td>Atlas Copco 601/MAN truck</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ingersoll Rand 750/250 compressor</td>
<td></td>
</tr>
<tr>
<td>Drilling rig (Maxfield)</td>
<td>Atlas Copco 712H, track mounted</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Atlas Copco low volume compressor</td>
<td></td>
</tr>
<tr>
<td>Drill water tanker</td>
<td>Mercedes 911 5 tonne 4X4</td>
<td>ZSU-782</td>
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<tr>
<td>Preloading truck</td>
<td>Toyota Landcruiser, 4X4, T/Top</td>
<td>ZJE-055</td>
</tr>
<tr>
<td>Stores/preloader truck</td>
<td>Toyota Landcruiser, 4X4, T/Top</td>
<td>ZJE-015</td>
</tr>
<tr>
<td>Personnel carrier</td>
<td>Toyota Landcruiser 4X4 S/W</td>
<td>ZJE-269</td>
</tr>
</tbody>
</table>

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APPENDIX 4

Recording System

Sercel SN368, S/No. 17
8 Hz GSC20D, 16 in-line per string
AGSO Interface to 486 DX2/66 PC with LINUX O/S
OYO Model 1340
OYO DFM-480
Prosol TRS-2
Seismic Image Software (Calgary, Canada) VISTA package run on a 386 PC system

Sercel SN368 acquisition settings:

Recording mode: Digital
Data format(s): Sercel Multiplexed SEG-D (9 track) PC 32 bit I.E.E.E. SEG-Y (exabyte)
Tape(s): 9 track, 6250 bpi GCR, 0.5 inch, 1200 ft, 8.5 inch reel 5 Gb 8505 exabyte (compressed data format)
Number of input channels:
  Data: 120
  Auxiliary: 4
Record length: 20 seconds
Sample rate: 2 ms
Input filters:
  Low-cut: 8 Hz @ 18 db/Oct
  Anti-alias Hi-cut: 178 Hz
  Pre-Amp Gain: 7**2

Monitor Record Playback Parameters:
  Low-cut: 12 Hz
  Hi-cut: 90 Hz
  Slope: 18 ms
  Seis Monitor Gain: 42 db
  Output Adjust: 4 db
  Gain Curve: 1
  Release Time: 10 ms
  Compression Delay: 8 ms
  Early Gain: 36 db
  AGC: 1
  Recovery Delay: 32 ms
APPENDIX 5

Line recording spread parameters

Line 95AGS-TEST

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>Active spread length</td>
<td>2400 m</td>
</tr>
<tr>
<td>Spread Type</td>
<td>Off-end</td>
</tr>
<tr>
<td>Number of channels</td>
<td>120</td>
</tr>
<tr>
<td>Station interval</td>
<td>20 m</td>
</tr>
<tr>
<td>Geophone group interval</td>
<td>20 m</td>
</tr>
<tr>
<td>Number geophones/trace</td>
<td>16</td>
</tr>
<tr>
<td>Geophone spacing</td>
<td>1.3 m</td>
</tr>
<tr>
<td>Geophone pattern</td>
<td>in-line</td>
</tr>
<tr>
<td>Line orientation</td>
<td>West - East (High SP numbers East, Trace 1 to the West)</td>
</tr>
<tr>
<td>Line length</td>
<td>2.40 km</td>
</tr>
<tr>
<td>First Geophone station</td>
<td>001 (Adjacent to Station 1777 on 95AGS-T1)</td>
</tr>
<tr>
<td>Last Geophone station</td>
<td>120 (Adjacent to Station 1837 on 95AGS-T1)</td>
</tr>
</tbody>
</table>

TESTS

(i) Power Line test: Cap test with and without 50 Hz notch filter.
(ii) Low Cut Filter comparison with notch filter out:

(a) Shotpoint at station 060
   Depth to top of charge 10.7 m
   Charge size 5 kg, water tamped
   Low Cut Filter 16 Hz

(b) Shotpoint at station 001
   Depth to top of charge 11.3 m
   Charge size 5 kg, solid tamped
   Low Cut Filter 8 Hz

(c) Shotpoint at station 120
   Depth to top of charge 6.6 m
   Charge size 6 kg, solid tamped
   Low Cut Filter Open

The test site chosen had minimal topographical variation and was relatively straight however drilling conditions were fairly poor thus further tests were ruled out due to the impact on drilling production on line 95AGS-T1.
### Line 95AGS-T1

- **Active spread length**: 4760 m
- **Spread Type**: Split Spread
- **Number of channels**: 120
- **Station interval**: 40 m
- **Geophone group interval**: 40 m
- **Number geophones/trace**: 16
- **Geophone spacing**: 2.67 m
- **Geophone pattern**: in-line
- **Shotpoint interval (nominal)**: 120 m
- **Hole depth (nominal)**: 12 m
- **Charge size**: up to 10 kg
- **CMP fold (nominal)**: 20
- **Line orientation**: West - East (High SP numbers East, Trace 1 to the West)
- **Line length**: 49.20 km
- **First Geophone station**: 1000
- **Last Geophone station**: 2230
- **First Shotpoint**: 1000
- **Last shotpoint**: 2230

### Line 95AGS-T2

- **Active spread length**: 4760 m
- **Spread Type**: Split Spread
- **Number of channels**: 120
- **Station interval**: 40 m
- **Geophone group interval**: 40 m
- **Number geophones/trace**: 16
- **Geophone spacing**: 2.67 m
- **Geophone pattern**: in-line
- **Shotpoint interval (nominal)**: 120 m
- **Hole depth (nominal)**: 12 m
- **Charge size**: up to 10 kg
- **CMP fold (nominal)**: 20
- **Line orientation**: West - East (High SP numbers East, Trace 1 to the West)
- **Line length**: 36.48 km
- **First Geophone station**: 2000
- **Last Geophone station**: 2912
- **First Shotpoint**: 2000
- **Last shotpoint**: 2912
Line 95AGS-T3

- Active spread length: 4760 m
- Spread Type: Split Spread
- Number of channels: 120
- Station interval: 40 m
- Geophone group interval: 40 m
- Number geophones/trace: 16
- Geophone spacing: 2.67 m
- Geophone pattern: in-line
- Shotpoint interval (nominal): 240 m
- Hole depth (average): 30 m
- Charge size: 10 kg
- CMP fold (nominal): 10
- Line orientation: West - East (High SP numbers East, Trace 1 to the West)
- Line length: 25.84 km
- First Geophone station: 3000
- Last Geophone station: 3646
- First Shotpoint: 3000
- Last shotpoint: 3646

Line 95AGS-T4

- Active spread length: 4760 m
- Spread Type: Split Spread
- Number of channels: 120
- Station interval: 40 m
- Geophone group interval: 40 m
- Number geophones/trace: 16
- Geophone spacing: 2.67 m
- Geophone pattern: in-line
- Shotpoint interval (nominal): 240 m
- Hole depth (average): 30 m
- Charge size: 10 kg
- CMP fold (nominal): 10
- Line orientation: North-South (High SP numbers South, Trace 1 to the North)
- Line length: 16.32 km
- First Geophone station: 4000
- Last Geophone station: 4408
- First Shotpoint: 4000
- Last shotpoint: 4408
### Line 95AGS-T5

<table>
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<tr>
<td>Spread Type</td>
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</tr>
<tr>
<td>Number of channels</td>
<td>120</td>
</tr>
<tr>
<td>Station interval</td>
<td>40 m</td>
</tr>
<tr>
<td>Geophone group interval</td>
<td>40 m</td>
</tr>
<tr>
<td>Number geophones/trace</td>
<td>16</td>
</tr>
<tr>
<td>Geophone spacing</td>
<td>2.67 m</td>
</tr>
<tr>
<td>Geophone pattern</td>
<td>in-line</td>
</tr>
<tr>
<td>Shotpoint interval (nominal)</td>
<td>240 m</td>
</tr>
<tr>
<td>Hole depth (average)</td>
<td>32 m</td>
</tr>
<tr>
<td>Charge size</td>
<td>10 kg</td>
</tr>
<tr>
<td>CMP fold (nominal)</td>
<td>10</td>
</tr>
<tr>
<td>Line orientation</td>
<td>North-South (High SP numbers South, Trace 1 to the North)</td>
</tr>
<tr>
<td>Line length</td>
<td>4.80 km</td>
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<td>First Geophone station</td>
<td>5000</td>
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<td>Last Geophone station</td>
<td>5120</td>
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<tr>
<td>First Shotpoint</td>
<td>5001</td>
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<tr>
<td>Last shotpoint</td>
<td>5120</td>
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### Line 95AGS-AB

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<th>Value</th>
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<td>Active spread length</td>
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<tr>
<td>Spread Type</td>
<td>Split Spread</td>
</tr>
<tr>
<td>Number of channels</td>
<td>120</td>
</tr>
<tr>
<td>Station interval</td>
<td>10 m</td>
</tr>
<tr>
<td>Geophone group interval</td>
<td>20 m</td>
</tr>
<tr>
<td>Number geophones/trace</td>
<td>16</td>
</tr>
<tr>
<td>Geophone spacing</td>
<td>1.3 m</td>
</tr>
<tr>
<td>Geophone pattern</td>
<td>in-line</td>
</tr>
<tr>
<td>Shotpoint interval (nominal)</td>
<td>60 m</td>
</tr>
<tr>
<td>Hole depth (nominal)</td>
<td>5 m</td>
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<tr>
<td>Charge size</td>
<td>2 kg</td>
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<tr>
<td>CMP fold (nominal)</td>
<td>20</td>
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<tr>
<td>Line orientation</td>
<td>West - East (High SP numbers East, Trace 1 to the West)</td>
</tr>
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<td>Line length</td>
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<tr>
<td>First Geophone station</td>
<td>1000</td>
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<tr>
<td>(at same location as 2132 on 95AGS-T2)</td>
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<tr>
<td>Last Geophone station</td>
<td>1118</td>
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<tr>
<td>First Shotpoint</td>
<td>1000</td>
</tr>
<tr>
<td>Last shotpoint</td>
<td>1118</td>
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## APPENDIX 6

### SEISMIC FIELD TAPE INDEX

**SEG-D (9 track)**

<table>
<thead>
<tr>
<th>Tape No.</th>
<th>Line</th>
<th>Shotpoints</th>
<th>Recording Dates</th>
<th>Record Mode</th>
<th>Survey</th>
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</thead>
<tbody>
<tr>
<td>95001</td>
<td>95AGS-T1</td>
<td>Test shots</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
</tr>
<tr>
<td>95002</td>
<td>95AGS-T1</td>
<td>1000-1075</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
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<tr>
<td>95003</td>
<td>95AGS-T1</td>
<td>1078-1159</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
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<td>95004</td>
<td>95AGS-T1</td>
<td>1162-1252</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
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<td>95005</td>
<td>95AGS-T1</td>
<td>1255-1320</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
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<td>95AGS-T1</td>
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<td>1396-1459</td>
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<td>6250 bpi GCR</td>
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<td>95008</td>
<td>95AGS-T1</td>
<td>1462-1527</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
</tr>
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<td>95009</td>
<td>95AGS-T1</td>
<td>1531-1576</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
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<tr>
<td>95010</td>
<td>95AGS-T2</td>
<td>2000-2066</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
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<tr>
<td>95011</td>
<td>95AGS-T2</td>
<td>2069-2159</td>
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<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
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<tr>
<td>95012</td>
<td>95AGS-T2</td>
<td>2161-2261</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
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<tr>
<td>95013</td>
<td>95AGS-T2</td>
<td>2264-2345</td>
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<td>6250 bpi GCR</td>
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<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
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<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
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<tr>
<td>95016</td>
<td>95AGS-T2</td>
<td>2537-2603</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
</tr>
<tr>
<td>95017</td>
<td>95AGS-T2</td>
<td>2606-2675</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
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<tr>
<td>95018</td>
<td>95AGS-T2</td>
<td>2678-2741</td>
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<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
</tr>
<tr>
<td>95019</td>
<td>95AGS-T2</td>
<td>2744-2816</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
</tr>
<tr>
<td>95020</td>
<td>95AGS-T2</td>
<td>2819-2891</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
</tr>
<tr>
<td>95021</td>
<td>95AGS-T2</td>
<td>2897-2912</td>
<td>22/02/95-22/02/95</td>
<td>6250 bpi GCR</td>
<td>TASGO 1995</td>
</tr>
<tr>
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APPENDIX 7

ARCHIVAL INFORMATION

BMR/AGSO Land seismic survey number : 139

Digital field tapes stored at Australian Archives, Mitchell, ACT under accession number A4729.

Record boxes containing monitor records and associated documentation stored Australian Archives, Mitchell, ACT under accession number A5692.

Relevant AGSO files relating to TASGO field operations :

94/1085 Land Seismic Tasmania - Surveying
94/1086 Land Seismic Tasmania
94/1087 Land Seismic Tasmania - Drilling
APPENDIX 8

ENVIRONMENTAL MANAGEMENT PLAN:
AGSO SEISMIC SURVEY, JAN-APRIL 1995

INTRODUCTION

As part of the Australian National Geoscience Mapping Accord (NGMA), the Australian Geological Survey Organisation (AGSO) proposes to conduct seismic reflection profiling over a number of regions in Tasmania in early 1995. This research is aimed at achieving a better understanding of the sub-surface structure in regions of considerable mineral resource potential. Part of the work is aimed at determining the depth of the Tasmania Basin which may have potential hydrocarbon prospectivity. Experience in other parts of Australia has shown that AGSO seismic reflection profiling techniques for investigating the deep geologic structure provides a new perspective on geologic evolution not available using other techniques.

The proposed traverses pose a number of particular technical and environmental problems in the acquisition of seismic data. All the lines are along existing roads to avoid the need for any line clearing, most of the terrain is hilly and the roads are not as straight as would be desired. All of the lines have extensive hard rock cover and areas of sensitive vegetation. These all present specific difficulties for setting recording parameters. Some of these problems will be addressed in a short series of tests along parts of these lines prior each lines acquisition.

This Environmental Management Plan has been formulated to address matters relating to the conduct of AGSO seismic work in Tasmania during January - April 1995. Fig 1 shows the location of the five proposed seismic lines. In general the work will be carried out in compliance with the AGSO Code of Environmental Practice. Some specific areas of concern relating to the proposed lines are covered in a later section of this document. Initial reconnaissance was carried out in conjunction with Industry Safety and Mines (ISM) in November 1993 and followed up by a second visit in November 1994 to finalise line placement. In conjunction with ISM matters concerning access to seismic lines, land ownership, possible environmental degradation are currently being addressed. Attached to this document are detailed descriptions of the routes for the proposed seismic lines and other pertinent information.

CO-OPERATIVE PARTNERS

The proposed 1995 Tasmanian seismic profiles will be conducted under the National Geoscience Mapping Accord (NGMA) which provides a mechanism for co-operative research and geological mapping between State and Commonwealth geoscience institutions, universities and industry.
The partners in the TASGO project are:

1. The Australian Geological Survey Organisation (AGSO), a research bureau of the Commonwealth Department of Primary Industry & Energy (DPIE).

The co-operative partners in this project are jointly responsible for the preparation of this document which was drafted by T. Barton, Project Scientist, TASGO project, AGSO.

PROPOSED SCHEDULE

It is proposed that line surveying and drilling commence in mid January 1995. Data acquisition is expected to begin in mid February. Field operations are anticipated to be completed by the end of March. Details of timing for individual lines is given in the appendices.

SPECIFIC ENVIRONMENTAL ISSUES

It is proposed to conduct the seismic survey in areas of Tasmania. Although all are along roads and road reserves, each have some special requirements. It is in the interests of all concerned that the work practices of the AGSO seismic crew and contractors engaged by AGSO do not impinge on the environment in any lasting way. To minimise impact along the Pieman Road (95AGS-T1) drilling operations will be carried out in such a way as not to cause any damage to the road pavement Little, if any, drilling is anticipated greater than 10 m from the road verge. It is most probable that the drill rig will be mounted on a low loader.

The Cradle Mountain Link Road (95AGS-T2) presents a number of special problems for shothole drilling. In particular the first 15 km of road verge has been totally rehabilitated and disturbances of the verges would interfere with this recently completed very expensive rehabilitation plan. One option being explored to minimise any impact is to drill from the road with a rig mounted on a low loader. This would require a lane closure around drilling operations and traffic control. For the remainder of the line, work would be carried out off the road verge. The technical feasibility of such an operation on this road will be determined when AGSO selects a drilling contractor for the work.

The Mathinna (95AGS-T3), Woodbury (95AGS-T4) and Ouse (95AGS-T5) lines are all along road verges and present no specific environmental difficulties which are not covered in the AGSO Code of Environmental Practice.

If you require more information please contact:

Mr Tim Barton (Seismic Crew Leader) or Mr A N (Tony) Yeates (Project Coordinator)
Telephone: (06) 249 9625 Telephone: (06) 249 9335
Fax: (06) 249 9972 Fax: (06) 249 9983
LINE DESCRIPTION : 95AGS-T1 PIEMAN RIVER ROAD

1. MAP SHEET AREAS

1:250 000 scale : Tasmania NW
1:100 000 scale : Pieman, Sophia
Special : 1:25 000 Mt. Read Volcanics Project (1986) Map 2 Geology of the Rosebery - Mt. Block area
1:25 000 Regional Geology of the Dundas - Mt. Lindsay - Mt. Ramsay area (1983) Parts 1 & 2

2. LOCAL GOVERNMENT

Waratah/Wynyard
West Coast

3. TRAVERSE DESCRIPTION

The proposed traverse commences approximately 1 km west of the Stanley River along the Pieman River road and continues to the intersection with the Murchison Highway. The line then follows the highway southeast for 2 km then continues along a HEC access road up to the Macintosh Dam wall.

The Pieman Road is an all bitumen road with very limited road verge available to allow for operations to be carried out off the road. This will require drilling operations to be carried out from the road using suitable machinery to avoid damage to the road surface. Little if any drilling is possible along the Murchison Highway section due to the traffic volume along the road and limited access to drill hole locations. The dam road presents no practical difficulties.

The nominal shot hole spacing is 120m with expected hole depths of 12 - 15m. Drilling will be carried out using a track-mounted rig, possibly on the rear of a low loader. All operations will be required to be done along the road, limiting access along the specific areas being worked to a single lane.

No line clearing will be required along any part of this traverse. No major security problems are envisioned along the Pieman or dam Roads. However, some measures will be required along the 2 km highway section. The crew will be based in Tullah for this line.

Traverse Length : 51 km

4. CONTACTS FOR OPERATIONS

Mr Kevin Lynd
Asset Co-Ordinator - West Coast Hydro Electric Commission
EBU Building
5. PROPOSED SCHEDULE OF OPERATIONS

DRILLING
Nominal hole interval : 120m
Number of holes : ~425
Nominal hole depth : 12 - 15m
Anticipated drilling rate : 10 holes/rig/day
Commence : mid January 1995
Completion : late February 1995

DATA ACQUISITION
Station interval : 40m
Group interval : 40m
No. channels : 120
Anticipated recording rate : 40 shots/day (4.8 km/day)
Commence : ~18 th February 1995
Completion : ~3 March 1995

LINE DESCRIPTION : 95AGS-T2 CRADLE MOUNTAIN LINK ROAD

1. MAP SHEET AREAS

1:250 000 scale : Tasmania NW
1:100 000 scale : Sophia, Mersey
Special : 1:25 000 Mt. Read Volcanics Project (1988) Map 7 Geology of the Back Peak - Cradle Mountain Link Road area

2. LOCAL GOVERNMENT

Waratah/Wynyard
Kentish

3. TRAVERSE DESCRIPTION

The proposed traverse commences at the intersection of the Murchison Highway and the Cradle Mountain Link Road and continues past the Pencil Pine Road across the Middlesex Plains and terminates at the Post Office Tree corner just south of Daisy Dell.

Throughout the majority of this line, the road is elevated and has little or no shoulder available for drilling operations. There is a corridor of cleared area on either side of the road for most of the line suitable for track mounted drill rigs. It is understood that the first 15 km of road has undergone extensive restoration and will require careful location of shot hole sites and rig access.
Shot hole sites will be within the road reserve, mainly along the immediate roadside, and in extremely sensitive areas some holes can be missed thus allowing minimal impact on the area. Traffic volume along this road is expected to be much greater than that along the Pieman road and thus the work is timed to be at the end of the tourist season. All of the recording work will require vehicles to work from the road and thus at any one time during operations traffic control will be employed over a 5 km section of road. All recording equipment will be deployed along the edge of the road usually within the table drains.

The nominal shot hole spacing is 120m with expected hole depths of 12 - 15m. Drilling will be carried out using track mounted rigs.

No line clearing will be required along any part of this traverse. Some security problems are envisioned along the traverse and some measures will be required whilst working along it to secure equipment. Traffic control will include road signs including Stop/Go control, flashing lights, reflective vests on authorised personnel and any other measures as advised by Transport and Works. The crew will be based in Tullah for this line.

Traverse Length : 36 km

4. CONTACTS FOR OPERATIONS

Mr Les Braid
Access Inspector - Northern Region
Dept of Transport and Works
Northern Region
PO Box 1906
LAUNCESTON
TASMANIA 7250
Phone : (003) 36 2113

Mr Jed Gillian
Environmental Planner
Dept of Transport and Works
Northern Region
PO Box 936J
HOBART
TASMANIA 7001
Phone : (002) 33 3174

5. PROPOSED SCHEDULE OF OPERATIONS

DRILLING
Nominal hole interval : 120m
Number of holes : ~300
Nominal hole depth : 12 - 15m
Anticipated drilling rate : 10 holes/rig/day
Commence : early February 1995
Completion: late February 1995

DATA ACQUISITION
Station interval: 40m
Group interval: 40m
No. channels: 120
Anticipated recording rate: 35 shots/day (4.2 km/day)
Commence: ~4th March 1995
Completion: ~14th March 1995

LINE DESCRIPTION: 95AGS-T3 MATHINNA

1. MAP SHEET AREAS
   1:250 000 scale: Tasmania NE
   1:100 000 scale: Forester

2. LOCAL GOVERNMENT

   Break O'Day

3. TRAVERSE DESCRIPTION

   The proposed traverse commences at the intersection of Upper Esk Road with Old Roses Tier Road, then continues along the Mathinna Road to Evercreech Road, then along Barnes Road and Hogans Road. Throughout the majority of this line, the roads have sufficient verge to operate rigs off the road. There are some underground Telecom cables which need to be avoided but otherwise no significant problems are anticipated. If feasible the line may be able to be redirected through some paddocks from Mathinna Road to Hogans Road to remove some bends from it.

   The nominal shot hole spacing is 240m with expected hole depths of 12 - 40m. Drilling will be carried out using a wheel based rotary rig.

   No line clearing will be required along any part of this traverse. No security problems are envisioned along the traverse. Traffic control is not expected to present any problems apart from the possibility of logging trucks working in the area. The crew will be based in Fingal or St. Marys for this line.

   Traverse Length: 27 km

4. CONTACTS FOR OPERATIONS

   UPPER ESK ROAD/MATHINNA ROAD TO BARNES ROAD

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5. PROPOSED SCHEDULE OF OPERATIONS

DRILLING
Nominal hole interval : 240m
Number of holes : ~110
Nominal hole depth : 12 - 40m
Anticipated drilling rate : 5 holes/rig/day
Commence : ~6th February 1995
Completion : ~4th March 1995

DATA ACQUISITION
Station interval : 40m
Group interval : 40m
No. channels : 120
Anticipated recording rate : 35 shots/day (8.4 km/day)
Commence : ~17th March 1995
Completion : ~21st March 1995

LINE DESCRIPTION : 95AGS-T4 ROSS - WOODBURY STOCK ROUTE

1. MAP SHEET AREAS
   1:250 000 scale : Tasmania NE
   1:100 000 scale : Lake Sorell
   Special :

2. LOCAL GOVERNMENT
   Northern Midlands Council
   Southern Midlands Council
3. TRAVERSE DESCRIPTION

The proposed traverse commences near the intersection of Auburn and Verwood Roads and continues along a stock route down to Bells Lagoon where it meets a road which continues down to the Blackman River and then into a track to the Midland Highway at Woodbury.

The nominal shot hole spacing is 240m with expected hole depths of 12 - 40m. Drilling will be carried out using a wheel based rotary rig.

Some minor line clearing in the form of slashing would be desirable along the stock route section of the line. The remainder of the line presents no operational difficulties. There are some locked gates which must remain locked when not in use. Some of the line passes close to poppy growing areas. However, it is anticipated that harvest should be complete prior to operations commencing. The crew will be based in a town within 40 minutes drive of the line.

Traverse Length : 16 km

4. CONTACTS FOR OPERATIONS

AUBURN ROAD TO BLACKMAN RIVER
Mr Wayne Chellis
Works Manager
Northern Midlands Municipality
PO Box 156
LONGFORD
TASMANIA 7300
Phone : (003) 91 1303

BLACKMAN RIVER TO WOODBURY
Mr Wayne Birieux
Works Superintendent
Southern Midlands Council
PO Box 21
OATLANDS
TASMANIA 7120
Phone : (002) 54 0011

5. PROPOSED SCHEDULE OF OPERATIONS

DRILLING
Nominal hole interval : 240m
Number of holes : ~70
Nominal hole depth : 12 - 40m
Anticipated drilling rate: 5 holes/rig/day
Commence: ~6th March 1995
Completion: ~22nd March 1995

DATA ACQUISITION
Station interval: 40m
Group interval: 40m
No. channels: 120
Anticipated recording rate: 35 shots/day (8.4 km/day)
Commence: ~23rd March 1995
Completion: ~27th March 1995

LINE DESCRIPTION: 95AGS-T5 OUSE - OSTERLEY

1. MAP SHEET AREAS

1:250 000 scale: Tasmania SE
1:100 000 scale: Shannon
Special: 1:50 000 Ouse (1994) Special ARCINFO edition

2. LOCAL GOVERNMENT

Central Highlands Council

3. TRAVERSE DESCRIPTION

The proposed traverse is along the Victoria Valley Road between Ouse and Osterley and will be 4.8 km in length. Its precise location will be determined at a later date but will be within the 10 km section as shown on the map. Part of the road is bitumen with sufficient verge to conduct drilling operations. Recording equipment will be deployed along the edge of the road.

The nominal shot hole spacing is 240m with expected hole depths of 12 - 40m. Drilling will be carried out using a wheel based rotary rig.

No line clearing is required. The line presents no operational difficulties. The crew will be based in a town within 40 minutes drive of the line.

Traverse Length: 5 km

4. CONTACTS FOR OPERATIONS

Mr Len Hills
Works Supervisor
Central Highlands Council
PO Box 20
HAMILTON
TASMANIA 7140
Phone: (002) 86 3202

5. PROPOSED SCHEDULE OF OPERATIONS

DRILLING
Nominal hole interval: 240m
Number of holes: ~20
Nominal hole depth: 12 - 40m
Anticipated drilling rate: 5 holes/rig/day
Commence: ~23rd March 1995
Completion: ~27th March 1995

DATA ACQUISITION
Station interval: 40m
Group interval: 40m
No. channels: 120
Anticipated recording rate: 35 shots/day
Commence: ~28th March 1995
Completion: ~29th March 1995