AGSO

DEEP CRUSTAL SEISMIC SURVEY, CIRCUM-TASMANIA AND SOUTH TASMAN RISE: AGSO SURVEY 148/159 POST-CRUISE REPORT

by

P.J. Hill, K. Webber & Survey 148/159 Shipboard Party

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AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

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SUMMARY

A 4-week deep crustal seismic and geophysical acquisition program using RV *Rig Seismic* was conducted off Tasmania in March 1995. The survey comprised two components, (i) a circum-Tasmania series of lines (Survey 148) that form part of the 'TASGO' National Geoscience Mapping Accord (NGMA) Project, and (ii) several lines over the northern South Tasman Rise (STR) (Survey 159), forming part of AGSO's Continental Margins Program (CMP).

The TASGO marine seismic acquisition was a sub-program of a larger NGMA project which includes onshore reflection seismic transects, refraction/tomographic studies, and aeromagnetic surveys (both onshore and offshore). By integrating the results of the various acquisition programs, the TASGO project aims to map, in 3-D, the principal structural and tectonic elements that make up the Tasmanian craton, and to provide a better understanding of the evolution of this crustal block.

The deep seismic profiles shot over the northern STR region complement recent investigations of this poorly-surveyed region, particularly the 1994 RV *L'Atalante* swath-mapping / moderate-penetration GI-gun seismic survey and February 1995 RV *Rig Seismic* sampling cruise (Survey 147). This part of the southern Australian margin developed in the Jurassic and continued its evolution through the Cretaceous by a poorly-understood sequence of rift phases and wrench movements. The completed seismic work, integrated with the previous studies, will, (i) improve our knowledge of the deep structure and crustal architecture of this complex part of the southern margin, (ii) provide structural data to constrain and help develop kinematic models for the plate tectonic evolution of the region, and (iii) contribute to assessment of the petroleum potential of this frontier area.

Seismic acquisition was by 192-channel, 4800 m streamer and 50-litre airgun array. Data collected are 48-fold with 16 second record length. Gravity, total-field magnetics, 3.5 kHz high resolution seismic and 12 kHz bathymetry data were also acquired. During the survey the airguns acted as seismic source for a network of seismic receiver stations set up throughout Tasmania for refraction and tomographic imaging studies. The airgun shots were recorded at onshore stations over distances of at least 100 km.

The ship left Hobart for the survey area on 1 March and completed the cruise in Sydney on 29 March 1995.

A large part (3900 m) of the streamer was lost in the evening of 21 March. It was lost in high seas several hours into a 200-km tow from the northern STR to shelter near Tasman Head. A four-day search for the streamer by *Rig Seismic* and 2 aircraft proved fruitless. The TASGO program had been completed, but only about a quarter of the full STR program had been shot. The streamer loss meant premature termination of the reflection seismic program. As it turned out, unfavourable sea conditions (rough seas and heavy, 3-5 m SW-W swell) persisted for much of the time while the ship was in the northern STR area after the loss. This would have forced a revision of much of the remaining STR program. It is unlikely that the highest priority lines, those running across principal structural trends, could

have been completed. These lines were oriented in the swell direction and thus would have been susceptible to high levels of streamer swell noise.

Total seismic production during Survey 148/159 was 2203 line-km. The 13 TASGO lines amounted to 1758 km and the 3 STR lines totalled 445 km. In addition, an 84-km seismic refraction transect for the TASGO onshore stations was shot. For this transect the airgun arrays were fired at 50 m intervals between way-points 44° 30.0'S 145° 50.0'E and 43° 48.0'S 146° 13.8'E (from the lower continental slope off southern Tasmania to near Maatsuyker Island on the shelf).

The single-channel monitor records showed steeply-dipping basin-forming faults and 2-4 s twt of sedimentary section (?Cretaceous and younger) in the southern Boobyalla Sub-Basin (Bass Basin) and in the King Island, Strahan and Port Davey Sub-basins of the Sorell Basin. The western boundary of the dolerite-intruded Tasmania Basin was mapped. The unprocessed data yielded no clear evidence of prominent intra-basement structure. A major 2-km high, NW-trending ridge on the lower continental slope off SW Tasmania was shown to be a massive basement fault-block. A triangular-shaped abyssal plain immediately to the SW and adjacent to the COB, is underlain by at least 4 km of (?wrench) deformed sediment. Crustal blocks at the northwestern tip of the STR are tilt blocks with internal stratification.

INTRODUCTION

The Marine, Petroleum and Sedimentary Resources Division of AGSO conducted a major deep crustal seismic and geophysical program off Tasmania and over the northern South Tasman Rise in March 1995 (Enclosures 1 and 2; Figure 1). The data acquisition was done using AGSO's research vessel *Rig Seismic* (Appendix 1).

The acquisition program (Hill and Yeates, 1995) comprised two parts:-

1. a 'TASGO' component, a series of transects around the coast of Tasmania that form part of the Tasmania National Geoscience Mapping Accord (NGMA) Project, and
2. an AGSO Continental Margins Program (CMP) component, consisting of several regional transects over the northern South Tasman Rise (STR).

The main aim of the marine TASGO study is to map crustal structure at depth around the periphery of Tasmania. Correlation with onshore geology, together with results of other components of the NGMA project, such as aeromagnetics, onshore deep seismic reflection and refraction tomography, will lead to a much better understanding of the 3-D structural and tectonic architecture of Tasmania as a whole, and its geological evolution through time.

The transects over the northern STR were designed to investigate the deep structure and tectonic evolution of this part of the southern continental margin of Australia. This work is an integral part of studies of this area currently being undertaken and follows the recent (February/March 1994) AGSO swath-mapping and geophysical survey using the French RV *L'Atalante* (Exon et al., 1994; Figures 2 and 3) and a *Rig Seismic* geological sampling program undertaken in February 1995 (AGSO Survey 147 - Exon (1995)).

Both the TASGO and STR surveys were designed to provide fundamental geological data to assist exploration for, and management of mineral and petroleum resources in the Tasmanian region.

The seismic acquisition was by 4800 m streamer and 50 litre airgun source, collecting 48-fold data and 16 second records. Appendix 2 provides the main seismic acquisition parameters. Gravity, magnetics and bathymetry data were also collected.

For seismic refraction and tomographic studies of Tasmanian crustal structure, the airgun shots acted as seismic source for a network of 43 onshore recording stations throughout Tasmania (Figure 1; station locations provided by Clive Collins). The 37 temporary stations were set up by AGSO's Land Seismic Group especially to record shots from the marine survey.

A full list of survey and equipment specifications is shown in Appendix 3. The ship had a complement of 33 (Appendix 4), comprising 18 AGSO personnel, 14 AMSA crew and a Tasmanian fisherman who was on board to facilitate operations in the main fishing grounds.

CRUISE OBJECTIVES

As described in the cruise proposal (Hill and Yeates, 1995), the objectives of the survey were as follows.

TASGO

- Map, in 3-D, offshore extensions of major Tasmanian crustal structures that have been mapped geologically or geophysically onshore.

- Investigate the nature, geometry and origins of major crustal features revealed by recent TASGO offshore/onshore aeromagnetic surveys.

- Establish the crustal architecture and nature of tectonic provinces around the periphery of Tasmania, and investigate the petroleum and mineral resource implications.

- Map the crustal structure of Tasmania by refraction tomography using the airguns as seismic source and shore-based receiving stations.

STR

- Map the deep crustal structure of the STR and East Tasman Plateau (ETP), and investigate how these features relate to the Tasmanian craton.

- Determine the structure of the continental slope southwest of Tasmania, particularly the geometry of continental tilt-blocks which appear to be present out to water depths of more than 4000 metres.

- Examine the relationships between the direction of lithospheric extension, the azimuth of the seafloor spreading phases, and the formation of the transform margin along southwest Tasmania and the STR.

- Map the crustal structure of the northern and western flanks of the STR, and investigate the basement blocks which lie between it and the Tasmanian slope.

- Establish whether the deep-water basin between the ETP and the STR is oceanic or floored by highly extended continental crust; determine the opening/extension direction.

- Map the structure, stratigraphy and depth extent of deep sedimentary basins on the southwest Tasmanian margin, on the STR and its northern flanks and between the ETP and Tasmania.

- Assess the petroleum potential of these basins.

- Deduce a kinematic evolution for the STR and account for its anomalous position in some plate reconstructions.

- Improve our understanding of the evolution of the Australian southern and southeastern margins, particularly the way in which it may have affected the age and formation of petroleum source rocks and the development of migration paths.

GEOLOGICAL BACKGROUND AND PREVIOUS INVESTIGATIONS

An account of the plate tectonic setting of the Tasmania / STR region and the known geology of the offshore area west and south of Tasmania is provided by Hill and Yeates (1995). Included in their report is a history and summary of pre-1994 marine geological and geophysical studies conducted in the Tasmanian region. For background information, the reader is referred to this report and the references quoted therein. Williams (1989) provides a summary and synthesis of Tasmanian geology.

EXECUTION OF SEISMIC PROGRAM

The ship left Hobart in the evening of 1 March and headed south to the start of the first TASGO line. After all systems were operational, shooting began SSW of South West Cape at the western end of line TASGO95-15 at 1550 hrs on 3 March. The survey continued northwards off the east coast of Tasmania, east to west off the north coast and then south down the west coast. The circum-navigation and completion of the TASGO survey was accomplished on 16 March at 0521 hrs (line TASGO95-14 finished).

The first line of the STR program (STR95-A) was begun off Port Davey at 2153 hrs on the same day. The reflection seismic program ended on the evening of 21 March when a large part of the streamer was lost in high seas about 140 km SSW of Tasmania. After an unsuccessful 4-day search for the streamer, *Rig Seismic* headed NNE towards Maatsuyker Island shooting a refraction transect (STR95-Y). The ship then steamed for Sydney, via the east coast of Tasmania, arriving at 0800 hrs on 29 March.

A detailed day-by-day account of the survey is given in the following section (Cruise Narrative). Way-points used in navigating the TASGO lines are provided in Table 3; Table 4 gives the STR way-points. The time-annotated track map (Enclosure 1) shows the survey progress and geophysical coverage, while the preliminary shot-point map (Enclosure 2) indicates the reflection seismic coverage achieved.

The TASGO survey was run in an anticlockwise direction around Tasmania. This direction was chosen to avoid excessive streamer feather angles and/or to avoid excessive speed over the ground (making the shot rate too high) in the passages between mainland Tasmania and King Island and also mainland Tasmania and Flinders Island (Banks Strait). Strong tidal currents flow through these passages. Therefore, in these passages it was preferable to shoot the lines in a westerly direction, against the main current flow.

Non-linear parts of lines (eg. on TASGO95-1 and TASGO95-4) were shot as a series of dog-legs, with 10-km segments of line deviating by no more than 10°. This would allow continuity of processing within acceptable error limits through the line deviations.

A representative from the Tasmanian fishing industry, Greg Rainbird of St Helens, was on board to liaise with local fishermen in order to minimise disruption to fishing activities and avoid damage to deployed geophysical gear. Fishermen were also given advance notice of the survey through an article in the December 1994 / January 1995 edition of "Fishing Today" (p. 19-20), and also by written brief distributed by the Tasmanian Fishing Industry Council (Hobart). During the survey, advice on *Rig Seismic* movements were periodically provided by fax to several fish processors and Melbourne Radio so that fishermen could be kept informed through their radio schedules.

There was much less fishing activity in the vicinity of the seismic lines than anticipated pre survey. During the entire survey, there were no sightings of fishing gear (eg. floats or lines) in the water. The only encounters with fishing boats were off NW Tasmania. The fishermen on these boats (crayfish and shark) co-operated by staying clear of the seismic lines after Greg Rainbird communicated with them by radio.

Weather and sea conditions were generally good for the first half of the TASGO survey. Conditions deteriorated significantly from the time the ship was off the mid west coast of Tasmania (Cape Sorell area) and remained unfavourable until the end of the STR survey over the northern South Tasman Rise. During this time winds were commonly 20-35 knots from the SW-W. Of greatest significance to the seismic operations was the persistent heavy (2½-4 m), long-period SW swell. This generated high levels of low-frequency swell noise in the streamer. The swell noise was highest on lines aligned in the swell direction, and several times lower on lines oriented across the swell direction (i.e. parallel to the swell crests and troughs). It made little difference whether the ship was travelling into or with the heavy swell; streamer noise levels were high in both cases.

The problem of significant swell noise was first encountered on rounding the NW tip of Tasmania. Noise levels were reduced by increasing the depth of the streamer. For line TASGO95-6A and subsequent lines (except the last), the streamer depth was increased to 12 m (streamer depth was 10 m on all earlier lines, except TASGO95-1 on which streamer depth was also 12 m). On the last line (STR95-B), the streamer depth was increased to 15 m. On the STR lines, swell noise was further reduced by increasing the low-cut filter setting from 4 to 8 Hz, at the expense of some loss in low frequency signal.

In all, about 2 days were lost due to bad weather. Line STR95-Z, oriented roughly across the prevailing swell direction, was added to the program to make good use of ship time while waiting for sea conditions to ease sufficiently to make a start on STR95-B. The fact that adverse weather conditions were experienced did not come as a surprise. In the cruise proposal (Hill and Yeates, 1995), it was stated "significant down-time could be experienced due to.....bad weather (notorious on the West Coast)" and "Gales and large swells (4-5 m not uncommon) may hamper operations at the higher latitudes over the STR".

The 13 TASGO lines amounted to 1758 km and the 3 STR lines totalled 445 km, making total reflection seismic production achieved during the survey 2203 line-km. The refraction seismic transect, STR95-Y, was 84 km long.

CRUISE NARRATIVE

0000 UTC (GMT) = 1100 hrs local (26 March and onwards 0000 UTC = 1000 hrs).

Wednesday 1 March

Pre-cruise and safety meeting of AGSO and AMSA crew was held at 1000 hrs.

Rig Seismic sailed from Princes Wharf, Hobart, at 1800 hrs and headed for the survey area to the south of Tasmania. The weather was good and seas slight.

It was estimated that about 1½ - 2 days work on the guns, bundles and other gun-array related jobs was required before shooting could commence. The extra work was required because the port call in Hobart had been short (2½ days) and the ship had to be reconverted to seismic operations after the previous cruise (Survey 147), which was geological. Work required included reinstalling the aft part of the port monorail, strengthening the port bulkhead at the point of attachment of the monorail, rebuilding all 32 solenoids, replacing wire rope on a tugger winch and the running-in of two compressor diesels which had recently been overhauled. Being one gun mechanic and one electronics technician short on this survey increased the workload per man in making the systems operational.

The extra time required to prepare the arrays allowed the ship to transit farther west than originally proposed and to start the survey at the western end of line TASGO95-15 (rather than -1). This would permit an easy link into the first high-priority line (A) of the STR survey, following the TASGO circum-navigation. It would also mean that line TASGO95-15, located at the southern tip of Tasmania and so exposed to the full brunt of the 'Roaring 40s', would be completed while weather conditions were good.

Thursday 2 March

Deployment of the seismic streamer began at about 0000 hrs.

The usual testing and calibration checks of the streamer and birds (depth controllers) continued throughout the day. The ship slowly proceeded west at about 2 knots. A channel, which had been dead on the previous seismic survey, was fixed (fault was traced to shorted pins at a connector). The repaired tension cell was installed between the tow leader and the first stretch section.

The bulkhead at the port monorail was reinforced and welded, the solenoids were reconditioned and installed, and the port bundle was re-attached to the array.

The weather was fine and sunny all day, with slight seas on a 1 m swell. The weather outlook for the next day or two was also favourable.

At ~2100 hrs the ship closely crossed path with a lone yacht heading up the West Coast. Radio contact was made and the yacht sailed across the bow of the ship (and not across the towed streamer!).

The sausage buoys of the gun-arrays were placed in position ready for deployment.

Friday 3 March

The ship was positioned west of the starting way-point of line TASGO95-15. The streamer was retrieved in the early hours of the morning to check that the tailbuoy was okay and not entangled with anything such as discarded fishing gear or kelp. The end channels had been noisy, apparently due to jerking of the tailbuoy. Whatever may have fouled the tailbuoy was gone by the time the tailbuoy was retrieved. During recovery of the streamer, a leaking connector that had resulted in a number of noisy channels was cleaned and fixed.

Streamer deployment began again at ~0700 hrs. A minor leak in the skin of a section was patched.

Fire drill was held at 1100 hrs.

Steamed west to begin the run-in to the start of line TASGO95-15. All seismic channels, except #21 and #176, were okay. #21 had a weak response, while #176 was u/s (open circuit or shorted). The port array was deployed and test shooting at ~1300 hrs. Port gun #3 had a minor leak; port #15 was u/s. The starboard guns were performing well.

Shooting of the first line, TASGO95-15, started at 1550 hrs. All systems were operating well. Weather and sea conditions continued to be very good for this area. Weather was fine and sunny; seas slight on a 2 m SW swell.

Steve Hall, telephoning from Canberra, stated that the shots were being recorded by the seismograph at Scotts Peak Dam, about 100 km to the north. Telemetered signal from this station is displayed and recorded at AGSO.

Saturday 4 March

Line TASGO95-15 was completed at 0737 hrs. The guns had been functioning well, despite the 4-week lay-up during the previous geological cruise. The arrays were fully within specifications, though 2 in each array had been switched off by the end of the line due to minor problems (minor air leak and electrical fault). Seas had risen to moderate/rough overnight with 20-25 knot winds from the E-NE.

Started line TASGO95-1 at 1215 hrs. Seas had risen to rough with wave height of 1.5-2 m and winds had verred northerly and were blowing at about 25 knots. Streamer depth was increased to 12 m to reduce noise levels.

Winds picked up in the afternoon to 30-35 knots NNE.

In the late evening going past Tasman Island, seas were very rough with winds to 35 knots from the north. Ship's speed was often down to 4 knots. Streamer depth was within specifications and channel noise levels satisfactory (mean ~10-15 μB). Three of the 32 guns were out of action.

The gravity meter started making excessive noise as noted during Cruises 137 and 146 (?gyro problem). It was switched off at 2129 hrs to avoid damage.

Sunday 5 March

The weather moderated overnight. By mid-morning, the weather was fine with 15-20 knot winds from the north. Seas were moderate on a 1-2 m swell from the north. Mean streamer noise was 5-10 μB. A total of 4 guns were down by 0800 hrs.

The northerly winds picked up during the day producing rough, oncoming seas. Ship's speed was ~4.5 knots during most of the day. Greater speed was not possible without triggering the streamer tensiometer (alarm set at 2050 kg). A 2-3 knot current appeared to be flowing north to south along the coast. Towards evening, winds dropped slightly to ~15 knots.

Monday 6 March

The magnetometer fish was pulled aboard towards the end of line TASGO95-1 because of shallowing water. Line TASGO95-1 was completed at 0813 hrs. By the end of the line, 9 guns were out of action, but the arrays were still fully within specifications. When inspected on board, the arrays appeared in good condition despite the 375 km run and 44 hours in the water. The usual type of maintenance work was required. Three of the steel bundle clamps in the middle of the starboard array were broken (metal fractures) and had to be replaced.

The weather was overcast in the morning with some light showers. The wind blew at 5-10 knots from the NE and seas were moderate on a 1-2 m swell.

The magnetometer output had become noisy towards the end of the line. In an attempt to reduce noise levels, the sensor was drained, cleaned and refilled with white spirit.

Line TASGO95-4 was started at 1416 hrs. As the day progressed and the ship steamed westward into Banks Strait, the seas settled down to slight-moderate on a low swell. In the confines of Banks Strait, around 1830-1900 hrs, ship's speed was down to as little as 1.8 knots due to strong tidal currents from the west. Reduced speed was necessary to avoid tripping the streamer tension cell alarm (set at 2050 kg). Late that evening, with changing tide and in the more open waters of Bass Strait, ship's speed could be increased to 5.6 knots. Streamer noise levels were very low at 2-3 μB.

Tuesday 7 March

In the morning the weather was overcast and seas moderate. The wind was from the NE at 10-15 knots. Streamer noise levels continued to be very low at ~2.5 μB mean. Ship's speed was about 5.6 knots, making up for earlier slow progress through Banks Strait.

At 1030 hrs the ship was off the Tamar Estuary (Georgetown).

Line TASGO95-4 ended at 1242 hrs. Four of the 32 guns were out of action by the end of the line, mainly with electrical problems (open circuit sensors and solenoids).

Shooting of line TASGO95-5 began at 1818 hrs off Devonport. Winds were 15 knots from the NE and seas 1 m in height. The start was delayed because one set of metal bands securing the sections in the middle part of the starboard sausage buoy slipped off as the array was being launched and had to be refitted.

Wednesday 8 March

Weather conditions remained fairly good overnight, with moderate seas on a 1-2 m NE swell. The ship made good speed of about 5.5 knots average. The sky was overcast in the morning and there were a few light showers.

Just north of Three Hummock Island, a moderately strong tidal current was encountered. Fortunately it was from behind this time, thus enabling a speed of about 5.5 knots to be maintained. Streamer feather angles were up to 13° for a short time.

At end of line TASGO95-5, 6 guns were down - the starboard array was most affected. Line TASGO95-5 was completed at 1059 hrs. Recovery of the guns was slowed by the need to repair a burst hydraulic line on the port side.

After looping and doing maintenance on the gun strings, acquisition on line TASGO95-6 was started at 1657 hrs. For this line an additional way-point was put in at 40° 18.4'S 144° 10.0'E to bring the line a little farther south of Reid Rocks. This was to make sure that the streamer was sufficiently far from the reef, particularly in the event of an excessive feather angle to starboard. The Natmap 1:250,000 map showed the South Reid Rocks a little south of their position on the Hydrographic chart; Greg Rainbird also indicated that the reef was more extensive than shown on the chart.

The weather at the start of the line was overcast with light variable winds; sea state was moderate - quite good acquisition conditions.

The weather quickly deteriorated in the early evening. A strong 30 knot southwesterly wind developed and seas became very rough. At about 2000 hrs, the front part of the streamer, particularly sections 4, 5 and 6, lifted to several metres depth and could not be brought deeper. Setting the streamer depth to 12 m was tried but without success. The front sections were known to be a little buoyant. It was decided to add lead to sections 1-8 and then loop back on the line and reshoot from the point at which the streamer began to lift (~2000 hrs). Acquisition was stopped at 2125 hrs.

Thursday 9 March

Overnight the front end of the streamer was brought aboard twice. The first time to add 2 kg lead to sections 1-8. The second time to add an additional 3 kg to some sections which were still found to be too buoyant.

The streamer was fully deployed at 0725 hrs, and the ship was turned back on line. The new part of line TASGO95-6 was designated TASGO95-6A.

A 30 knot wind blew from the SW and seas were heavy (2-3 m swell). The streamer was set to 12 m depth because of the swell and because #1 section was running a little deep. Recommenced acquisition on line at 0854 hrs. Streamer noise was 6-8 μB.

Deeper water along the western end of this line allowed the magnetometer to be deployed and magnetics data were again collected.

Ended line TASGO95-6-A at 1859 hrs. Four guns were down (but arrays within specification). Seas were rough with a 2 m swell from the SW.

Transited to the start of line TASGO95-7. Two fishing boats were in the area. A minor deviation in the transit was required to avoid craypots set by one of the boats.

Friday 10 March

Line TASGO95-7 was started at 0023 hrs in favourable sea conditions. There was a 15 knot wind from behind (SW) and seas were moderate on a moderate swell. The streamer was retained at 12 m depth. Line TASGO95-7 was completed at 0837 hrs.

The arrays were brought in and serviced. The run-in to the start of line TASGO95-8 took place at about 1130 hrs. Birds 5, 7 and 14 were not responding to commands (wing angles were stuck in either full dive or surface) with the result that the streamer was out of specification. It was decided to abort the line and pull the streamer in to check the birds and replace batteries. The streamer was retrieved to the tailbuoy because both the GPS and radar transponder had stopped working on 7 March, probably due to a power problem.

On retrieving the streamer, section #8 was found to be holed, and was replaced. Water in the streamer was probably the cause of channel #58 being bad.

[Tony Yeates in Canberra reported that our shots off Devonport had been recorded at the Tasmanian seismograph station at Sheffield, about 25 km inland.]

At 1825 hrs the tailbuoy was back in the water. The radar transponder was working, but the GPS was not updating. The tailbuoy was brought back on board.

Some time was spent in checking and redoing electrical wiring. The GPS problem was isolated to a corroded connector from the antenna. The tailbuoy was redeployed at 2246 hrs.

Saturday 11 March

On running the streamer out again ready for the start of line, section #15 was found to be holed and had to be replaced. An extra loop was needed to prevent overshooting the way-

point. Acquisition on line TASGO95-8 started at 0712 hrs. The streamer was set at 12 m depth because of the large (2½-3 m) swell that was running from the SW. Otherwise weather conditions were good (seas moderate, light winds) and streamer noise levels were quite satisfactory at 8-12 μB mean. The tailbuoy GPS was now working, but the radar transponder was not.

There was a general increase in sea height towards the end of the line. The swell was about 3½ m from the SW, topped by confused seas of about 1½ m resulting from NE winds of 10-15 knots. Mean streamer noise was about 40 μB. Line TASGO95-8 was completed at 1629 hrs.

The arrays were checked during the turn and found to be in good condition. TASGO95-9 was started at 2009 hrs. All channels were okay and noise levels were extremely low, about 2 μB mean. The swell had died down a little since the end of line TASGO95-8, but the main reason for the significantly lower noise levels was the change in course, with the ship now heading across, rather than into, the swell direction. The wind was 15 knots from the north.

Just after the start of line, we encountered a cray-boat about to set pots across our planned track. The fishermen were contacted by radio and co-operated by moving out of our path.

Sunday 12 March

A weather front from the west hit the ship at ~0430 hrs with winds of up to 50 knots. Wild seas with a 3 m swell were generated. A couple of hours later the wind had decreased to 20 knots from the west. The weather was overcast with rain squalls. Streamer noise was relatively low at 10 μB mean.

This line took the ship's track parallel to and about 2.5 km off the steep granite coastal cliffs at the base of Mt Heemskirk. The seismic data showed strong events at ~3 s, presumeably echoes off the cliffs.

End of line TASGO95-9 was at 1038 hrs. The SW wind had again picked up by the end of the line and was blowing 35 knots, gusting to 40 knots at times. The seas were very high with breaking swell.

Line TASGO95-10 was started at 1227 hrs, but the streamer was very noisy (~40 μB and higher). An attempt was made to reduce the noise level by increasing the streamer depth from 12 to 15 m and by decreasing ship's speed to 4 knots. The streamer became unstable in depth, with part of it approaching the surface. It was decided at ~1330 hrs to abort the line and to restart it with new way-points that would bring it more parallel to the prevailing WSW swell. There was some difficulty in retrieving the gun arrays. Because there was no easing in the bad weather conditions (4-5 m swell from WSW and winds of 35-40 knots) and to avoid damage to the gun strings it was decided at ~ 1500 hrs to suspend seismic operations until the weather improved. Rain squalls and high seas continued into the night. The latest weather map indicated that strong SW-W winds could continue for another day or two, with another front on the way.

Monday13 March

The sea state had moderated by first light and it was decided to proceed to the start of TASGO95-10 (original line) and commence shooting if conditions allowed. There was still a large SW swell of about 2.5 m, but seas were down to about 1 m. Line TASGO95-10 was started at 1042 hrs with the streamer at 12 m depth. Because of the favourable orientation of the line parallel to the swell, noise levels were okay at 10-20 μB. In the afternoon there was a heavy swell from the west and rough seas. A 25 knot wind blew from the west; skies were mainly overcast and occasional squalls passed through. Noise levels remained fairly low, however, at 10-15 μB. The line was completed at 1623 hrs, and since seas had abated streamer noise was down to 10 μB mean.

Line TASGO95-11 was commenced at 2120 hrs in slightly improved sea conditions - moderate seas and moderate/heavy swell with a 15-20 knot wind from the west. Streamer noise was relatively high (50-60 μB mean) as the ship headed obliquely across the prevailing westerly swell direction.

Tuesday 14 March

At the end of line TASGO95-11 (0356 hrs), the ship turned straight into line TASGO95-12, on which shooting began at 0501 hrs. Weather conditions were fairly normal for this area, with occasionall rain squalls and 15 knot winds from the west. There was a heavy westerly swell of about 3 m and rough seas. The swell wavelength was of the same order as the ship's length. Even with ship's speed down to 4.5 knots and the streamer at 12 m depth, swell noise levels were still high, around 50 μB. The wind speed had increased to about 20 knots towards the end of the line.

Line TASGO95-12 was finished at 1106 hrs. At the end of line (off Trial Harbour), it had been planned to turn straight into line TASGO95-13. But at 1150 hrs, during the turn, the rope securing the starboard sausage buoy broke making it was necessary to retrieve the array and loop back to the start of line. Line TASGO95-13 was started at 1409 hrs. Streamer depth was 12 m.

Noise levels were 50-70 μB. In the late afternoon, seas were rough on a heavy (3 m) swell from the SW; wind speed was 20 knots from the SW.

Ship's speed averaged 4.5 knots.

The gravity meter was turned on and was operational again at 1945 hrs. It was no longer emitting the same disconcerting noise and seemed to be functioning normally.

Line TASGO95-13 was completed at 2226 hrs.

Wednesday 15 March

Line TASGO95-14 was started at 0333 hrs. Streamer noise was relatively low at 10-15 μB mean.

At around midday streamer noise was low (~10 μB). Sea conditions remained much the same, with a 2-4 m swell from the SSW and rough seas. The wind was southerly at 20 knots, moderating in the late afternoon to 10-15 knots.

In the evening, the wind dropped to 10 knots with seas moderate, but the swell remained large.

Thursday 16 March

End of line TASGO95-14 was at 0521 hrs. The streamer was then brought on board. This marked the end of the TASGO sub-program.

After the streamer was aboard, the ship headed to Port Davey at full speed (9.5 knots) to disembark Greg Rainbird. His assistance was not required for the deep-water STR leg which was beyond conventional fishing grounds. Arrangements had been made to transfer him to the cray-fishing boat "Climax" anchored in the shelter of Whalers Point. He would be taken to the local airstrip next morning to fly by light aircraft to Cambridge airport (Hobart).

The ship went into Port Davey, and at 1315 hrs Greg was picked up by waiting 15' outboard-powered dinghy. *Rig Seismic* immediately returned to the open sea to resume the survey. Maintenance work was completed on the tailbuoy, particularly to restore operation of the GPS and radar transponder. The streamer was then redeployed.

Line STR95-A was started at 2153 hrs. Winds were moderate from the N-NW, a 2-3 m swell came from the SW and seas were rough. Because of swell noise, the input low-cut filter setting was increased to 8 Hz (from the 4 Hz previously used). Mean streamer noise was 15-20 μB initially, but increased several hours later to 20-25 μB as seas rose overnight.

Friday 17 March

By morning (~0700 hrs) noise levels were down to ~15 μB as the weather improved. Seas were moderate on a 2-2½ m swell from the SW; wind was 10-15 knots from the SSW. At around midday the swell increased a little to about 3 m and there was a corresponding slight increase in streamer noise to ~20 μB. Ship's speed averaged ~4.6 knots. STR95-A was completed at 2233 hrs.

Saturday 18 March

In the morning (~0800 hrs), seas were rough with both swell (2½-3 m) and wind (30 knots) from the west. Weather was cloudy with occasional light showers.

On the run-in to line STR95-B noise levels due to the swell were excessive (50 μB and greater, even with the 8 Hz low-cut). It was decided to run a new line STR95-Z that was

parallel to the swell, with the intention of returning to STR95-B once the sea conditions had improved. Way-points for STR95-Z were 45° 17.0' 144° 54.5' and 44° 03.0' 144° 25.0'.

STR95-Z was started at 2003 hrs, about 4 km before the first way-point. The weather and seas were much as at the start of STR95-B, WSW heavy swell (3 m) and 25 knot WSW wind. However, streamer noise was only about 10 μB mean, 1/5 of the earlier noise levels. This highlighted the strong dependence of streamer noise on line orientation relative to swell direction.

Sunday 19 March

In the morning (~0700 hrs) the wind was SW-W at 15-25 knots, seas moderate-rough on a 2-2½ m swell from the west. Mean streamer noise was quite low at 4-5 μB. Wind and seas rose towards the end of the line and noise levels increased slightly to 5-7 μB. Line STR95-Z was completed at 1220.

The arrays were recovered, and the ship steamed south to the start of a new line, STR95-Y (later reassigned), leading to the start of STR95-B. Way-points for the proposed new line were 44° 29.5' 144° 37.0' and 44° 55.0' 143° 48.0'.

On reaching the start of this line at ~2045 hrs, seas were very rough on a heavy SW swell (~3 m); wind was 35 knots (with higher gusts) from the west. Streamer noise varied considerably but was mainly in the range 25-50 μB. Because of the high noise levels, it was decided not to shoot the line, and to proceed instead directly to the start of STR95-B.

Monday 20 March

In the morning, seas were still very rough with westerly winds of 30 knots and swell of 3 m from the same direction. Ship's speed during the transit was about 4 knots due to the rough conditions. While heading into the seas on nearing the starting point of line STR95-B, the streamer depth was increased to 15 m. Streamer noise decreased to ~30 μB from values of ~40 μB, recorded when the streamer was at 12 m depth.

At midday, wind strength increased further to 30-35 knots; wave height was 3-4 m. Streamer noise remained at about 30 μB.

During the run-in to the line, there was a significant improvement in weather conditions. The wind turned to NW with speed down to 20 knots and wave height was down to ~2 m. Streamer noise had decreased to about 20 μB. Shooting of STR95-B began at 1610 hrs.

In the evening, weather conditions deteriorated a little with 30 knot WNW winds, heavy swell from the west and rough seas. Mean streamer noise was ~25 μB.

Tuesday 21 March

At around 0230-0300 hrs, the front part of the streamer became unstable in depth and arched close to the surface. It was decided to loop back on the line and reshoot that section. While loopng back onto the line, it was planned to retrieve the front end of the streamer in order to change batteries in birds #1-4. However, the weather rapidly deteriorated - with 40 knot westerly winds, very rough seas and very heavy swell. With no improvement in weather conditions likely for at least the next 24 hours, it was decided at ~0800 hrs to attempt recovery of the entire streamer while slowly steaming east with seas astern. Recovery of the streamer began at ~0840 hrs.

At ~1500 hrs an Operations decision was made to run for shelter at Tasman Head (~200 km NE) with most of the streamer deployed. Nine active sections plus the 3 stretch sections (and tension cell) had been wound on the small port reel. The main part of the streamer had been transferred across to the large starboard reel and connected to a stretch section that was already attached to the tow leader on this reel. A further stretch section was added, making a total of 2 at the head of the actives.

At 1732 hrs the streamer was lost. It parted at the front of the near stretch section. The connector and 3 short strain wires were all that remained of the stretch section. The wire terminations had apparently been torn out of the brass wire/rope adaptor. At 0630 UTC just before the streamer parted, the ship's position was 44° 38.16'S 145° 22.75'E and tailbuoy position was 44° 39.75'S 145° 19.52'E.

The ship turned about and headed for the tailbuoy using GPS positions transmitted from the tailbuoy. Visual contact was made shortly after. From the way the tailbuoy was being tugged partly underwater by the tailbuoy rope, it was clear that the streamer was still attached. There was a strong westerly blowing (~35 knots) and seas were very rough on a heavy W swell (~4 m). The tailbuoy was hooked by grappling irons from the BBQ deck on the port side. An attempt was made to guide the tailbuoy to the stern of *Rig Seismic*. However, the securing ropes and apparently the tailbuoy rope became fouled beneath the hull due to the heavy surge. The ropes parted (?cut by the propeller or on protrusions, eg. rudder, under the hull) and the tailbuoy ended up drifting away. The tailbuoy was not being pulled down by the tailbuoy rope as before, indicating that the streamer was probably no longer attached. Several more attempts were made to secure the tailbuoy and bring it around to the back deck, but all failed. Recovery was abandoned at ~2030 hrs as it become too dark to keep the tailbuoy in view.

Wednesday 22 March

At first light the search for tailbuoy and streamer was resumed in an area to the NE of where the streamer was lost. During the day there was a very heavy W swell and very rough seas. Wave/ swell height was 3-6 m. The weather was fine and clear with strong westerly winds of 25-35 knots.

The tailbuoy was sighted at 1400 hrs. It was upside-down, as last seen before it was lost in the darkness the night before. Its location was 44° 36.2' 145° 24.4', indicating that it drifted about 10 km in a NE direction since the streamer was lost. It was brought aboard at ~1500 hrs. It was badly damaged; the radar transponder and GPS antenna were missing. A

short length (~2 m) of tailbuoy rope was still attached. It was badly frayed at the loose end. The equipment compartments were flooded.

At ~1630 hrs a charted aircraft joined the search.

The search was halted at night-fall.

Thursday 23 March

The search resumed in the morning in the area NE of where the streamer was lost. A large 4-pronged grappling hook had been welded overnight and was used in the morning to try and snag the streamer. It was connected to the wire rope on the geological winch. A heavy (1 tonne) coring weight ('bomb') was attached a few metres beneath the hook to provide adequate tension in the wire for proper spooling operation and to keep it at depth while towing. 3000 m of wire were let out. The hook assembly was towed at 1.5-2 knots initially, but later at ~3 knots.

An aircraft from Hobart joined the search and was in the area at ~0830 hrs. The air search continued until dusk, with two aircraft from Cambridge involved.

The weather during the day was mainly overcast with occasional rain squalls. The seas had settled a little since the day before. Seas were rough on a heavy (3 m) swell; winds were W-WNW at ~30 knots.

Friday 24 March

The streamer search continued. Rough seas and heavy swell; WSW winds at 30 knots. Cloudy with showers. Two aircraft were involved in the search during the day.

Winds increased to 45 knots in the afternoon.

One of the airborne observers reported that an area of ocean on the western side of the search grid had an 'anomalous' appearance (?Sol-T slick). *Rig Seismic* investigated, but without result.

Saturday 25 March

The morning was fine and clear, with a 25 knot SW wind and moderate-rough seas on a heavy swell.

Aircraft searched again, concentrating on an area to the north of the main area previously covered. Low cloud and drizzle set in during the afternoon and the air search was abandoned.

At nightfall the visual shipboard search was abandoned and the grappling hook plus the 3000 m wire out were recovered. The gear was aboard by ~2000 hrs.

Clocks retarded 1 hour at midnight (now 0000 UTC = 1000 hrs local)

Sunday 26 March

Shooting of a refraction transect for onshore recording stations was commenced at 0031 hrs at way-point 44° 30.0'S 145° 50.0'E. Both arrays were fired at 50 m intervals. The transect was completed at way-point 43° 48.026'S 146° 13.781'E near Maatsuyker Island at 0824 hrs.

The ship then began the transit to Sydney via the east coast of Tasmania.

Monday 27 March to Wednesday 29 March

Rig Seismic in transit to Sydney. The ship berthed at Darling Harbour Berth 9 at 0800 hrs on Wednesday 29 March. This marked the end of the cruise. A ship-shore gravity tie was made while the ship was in port.

EQUIPMENT, DATA ACQUIRED AND SURVEY PARAMETERS

A detailed list of equipment and survey specifications is contained in Appendix 3. Navigation and positioning was by Racal Multifix differential GPS. The positioning accuracy of this system is better than 5 m.

All survey co-ordinates are based on the World Geodetic System 1984 (WGS84) with ellipsoid parameters:- semi-major axis (a) 6378137.000 m and flattening (f) 1/298.257223563.

Appendix 5 is a list of the digital non-seismic data acquired and the channel allocations. These data were acquired at 10 second intervals.

Information on the shipboard navigation geometry and seismic acquisition offsets is provided in Appendix 6.

Seismic

Diagrams of the recording geometry, streamer geometry and source geometry for both TASGO and STR survey are shown in Appendices 7, 8 and 9, respectively.

Detailed acquisition information on each of the seismic lines is given in the line summary logs, attached as Appendix 10 (TASGO) and Appendix 11 (STR). Information contained in these logs is presented in summary form as Table 1 (TASGO) and Table 2 (STR).

The seismic data were recorded on tape in modified SEG-Y format (Appendix 12).

Gravity, Magnetics and Bathymetry

The periods when gravity and magnetic data were recorded during the survey are indicated in Table 5; also shown in this table are the magnetometer sensor offsets. Bathymetry data were recorded during the entire survey on both or either 3.5 / 12 kHz echo-sounders.

The gravity meter was turned off between days 063-073 due to a suspected problem with the gyro. Thus no gravity data were collected on the TASGO survey along the east and northern coasts of Tasmania between Tasman Island and Cape Sorell.

Because of shallow water, the magnetometer sensor was brought aboard (and no magnetic data collected) during the TASGO survey off Tasman Island, off the northern coast of Tasmania and inshore in the Cape Sorell area. During this survey the magnetometer was generally slightly noisier (~5 nT p-p) than it should be. The sensor cable was showing signs of wear and tear and the electronics equipment is old. These factors may have contributed to the higher noise levels.

Ship-shore gravity ties were made in Hobart at the start of the cruise and again in Sydney at the end of the cruise (Appendix 13).

PRELIMINARY RESULTS

Profiles TASGO95-15 and TASGO95-1 (southern part), located across the continental shelf of southern and SE Tasmania, typically show up to several hundred metres of well-stratified, flat-lying ?late Cainozoic section overlying a prominent, rough (eroded) basement or bedrock unconformity. Areas of thickest sediment, about 500 m, were recorded south of Tasman Peninsula and east of Schouten Island. In general, no pronounced seismic structure is discernable within basement/bedrock in the single-channel monitor sections. Multiple trains in the shallow water (100-150 m depth) data tend to mask possible deeper reflection events.

Intra-'basement' reflections are observed in profile TASGO95-15 to the south of South Cape. The strata, which are folded and faulted, dip to the east and are truncated at the major unconformity surface. This location probably coincides with the western boundary of the Carboniferous-Triassic Tasmania Basin. This is supported by onshore geology trends and also the new 1994 AGSO aeromagnetics, which indicate that this area is at the western limit of the Jurassic dolerites.

Along the northern part of the east coast of Tasmania (Freycinet Peninsula and northwards), the seismic data show a thin (0 - several hundred metres) section of young (?late Cainozoic) sediments overlying high-velocity basement. From onshore geology, the basement rocks probably comprise Devonian granites. There is no convincing evidence in the monitor records of seismic structure below the basement surface.

Line TASGO95-4 crossed the far southern part of the Boobyalla Sub-basin (Early Cretaceous and younger) of the Bass Basin (Figure 3). The seismic profile shows a series

tilted fault blocks as horsts and graben with up to 3.0 s twt of sediment fill. The seismic character of the basal sequence suggests volcaniclastics or alluvial fan deposits. The deepest (3.0 s twt) and most spectacular structure is a large half-graben (Figure 4) located just northeast of Waterhouse Island. A large roll-over anticline is associated with the ?NW-trending boundary fault. The top of the footwall block lies close to the seafloor.

Line TASGO95-5 (western side of offshore northern Tasmania) shows up to 400 m of well-stratified Bass Basin section over apparent basement. High-velocity units appearing in the data every so often at the seabed or shallow sub-bottom depth are probably Tertiary basalt flows.

All four seismic profiles TASGO95-6, 7, 8 and 9 show parts of the Cretaceous and younger Sorell Basin that extends along the length of the west Tasmanian continental margin (Figure 3). Lines TASGO95-7 and TASGO95-8 both cross the main depocentre of the King Island Sub-basin (of the Sorell Basin). The depocentre is located beneath the southwestern parts of these lines. At least 3 s twt of gently dipping section is present. As seen in the profiles, the depocentre lies within a half-graben bounded to the northeast by a major, steeply-dipping normal fault. Clam 1 well is located on the shallower, hinged part of the half-graben (Figure 5). Steeply-dipping, ?wrench-related structures are seen to several seconds twt in the middle and western parts of profile TASGO95-6. The thickness of associated basin development is not clear in the monitor sections, but there appears to be at least 2 s twt of sedimentary section present in places.

Line TASGO95-9 is located roughly along-strike of major faults that form the eastern boundary of the Sorell Basin. Accordingly, basement structures seen in the seismic profile show some complexity. Generally 1-2 s twt of flat-lying to gently-folded section is present along much of the line. Local fault-bounded depocentres may contain 3 s or more of section.

Line TASGO95-9 took the ship parallel to and about 2.5 km offshore of the steep and rugged granite (Devonian) coastal cliffs at the base of Mt Heemskirk just north of Trial Harbour. The seismic data showed strong events at ~3 s and more, presumably lateral echoes off the cliffs.

Lines TASGO95-10 to 13 cross the Strahan Sub-basin of the Cretaceous and younger Sorell Basin. Line TASGO95-10 is a strike line and TASGO95-11 to 13 are dip lines. 1-3 s twt of well-stratified sedimentary section overlies a complex of basement blocks. High basement relief is due to large-throw, high-angle normal faulting and tilting of blocks (?wrench tectonics). At least 3 s twt of section is present beneath the middle part of line TASGO95-13, which is located across the depocentre of the Strahan Sub-basin. The upper part of the section (late Tertiary), towards the shelf edge, contains seaward prograding sequences. There is some erosional truncation of strata at the seabed on the upper continental slope.

Line TASGO95-14, located off SW Tasmania, crossed over parts of both the Strahan and Port Davey Sub-basins of the Sorell Basin. The northwestern end of the seismic profile (Figure 6) shows 2.0 s twt of Strahan Sub-basin section over a high-relief, blocky basement. The upper continental slope is incised by the heads of several canyons. These canyons are more well-developed downslope and form part of a very extensive system mapped by

L'Atalante in 1994 (Exon et al., 1994). At least 1.2 s twt of Port Davey Sub-basin section appears in the profile off Low Rocky Point. Steeply-dipping events extend to time-depths of several seconds twt in this area. This could indicate a very thick sedimentary section, though it is possible that these events are reflections and diffractions off the major steeply-dipping, NNW-trending faults that form the eastern boundary of the Sorell Basin in this area.

The STR95-A monitor seismic section shows at least 2 s twt of Port Davey Sub-basin section beneath the outer shelf and upper continental slope. 3 s twt or more could be present here. The mid and lower continental slope is underlain by up to 2.0 s twt of well-stratified section. Basement comprises high-relief fault-blocks. A large, 2 km high, NW-trending ridge on the lower slope is clearly a basement block. Survey 147 recovered metamorphics (gneiss and schist) from the western scarp of this ridge. A triangular-shaped abyssal plain SW of the ridge (Figure 3) is underlain by a very thick (3^+ s twt), ?wrench-deformed sedimentary section (Figure 7). A low basement block (?continental) at the western side of this area forms part of the N-S Tasman Fracture Zone. To the west, basement is clearly oceanic in character. The oceanic crust is overlain by 0-0.5 s twt of section, comprising an older sequence of contorted /wavey beds (contourites or wrench deformation) and a younger, horizontally-layered sequence (pelagics).

Line STR95-Z is oriented roughly N-S and crosses an area of large fault-blocks at the extreme NW tip of the STR and the triangular plain mentioned above. The seismic profile (Figure 8) confirms the presence of at least 3 s twt of well-stratified section beneath the plain. It also reveals that the blocks are tilt-blocks with internal stratification.

The very long 192-channel streamer used in the survey provided a large range in source-receiver offsets (~200-5000 m). Thus the shot records (gathers) provide the basis for valuable refraction studies of the sub-bottom velocity structure at intervals as close as 50 m (the shot spacing). Refraction velocities scaled from the shot records are apparent velocities because reversed profiles are not obtained. The velocities can be corrected for dip using the reflection profiles, or if the reflection data show sub-horizontal layering (as is frequently the case) the measured velocities can be assumed to represent true refraction velocities.

Julie Aspin examined shot playback records and scaled refraction velocities at intervals of about 5 km on most the TASGO lines. Velocities in shallow basement were typically in the range 4500-6500 m/s, in contast to much lower velocities of 2000-3500 m/s recorded in the upper parts of deep, relatively young basins (Cretaceous and younger - Sorell and Boobyalla).

ACKNOWLEDGEMENTS

We thank the master, Bob Hardinge, and AMSA crew of the *Rig Seismic* for their close co-operation and very professional operation of the survey vessel. Greg Rainbird, with his great experience and knowledge of the local fishing industry and fishing grounds, made a significant contribution by providing helpful advice and communicating with local fishermen to prevent damaging encounters between *Rig Seismic* and fishing boats and their gear.

Mark Webster produced the Petroseis plots in this report. Barry Willcox is thanked for reviewing the draft report.

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Hill, P.J. and Yeates, A.N., 1995 - Circum-Tasmania and South Tasman Rise: cruise proposal for deep crustal seismic data acquisition, 1995. *Australian Geological Survey Organisation, Record* 1995/13.

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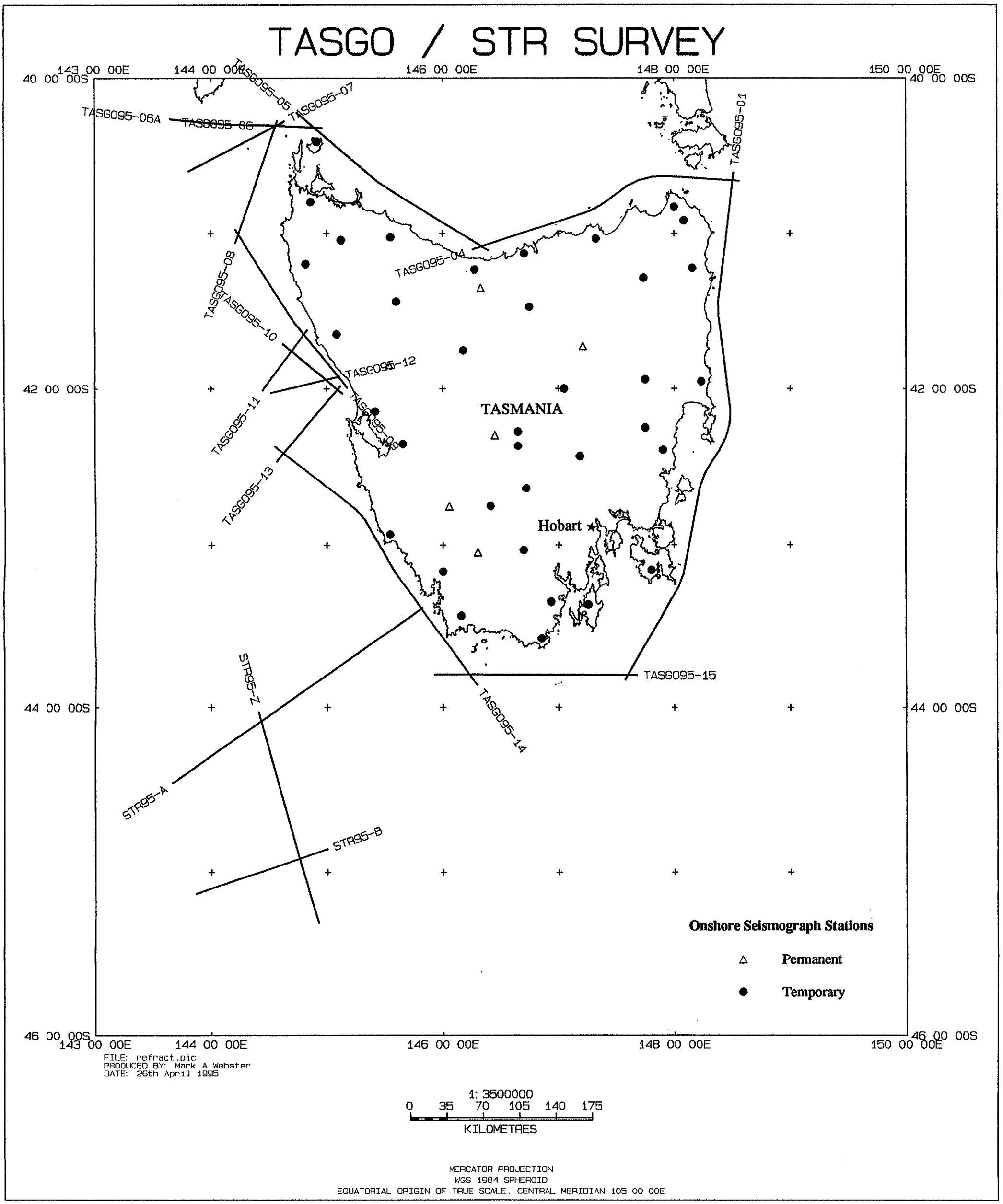


FIGURE 1. Location of TASGO and STR deep seismic lines off Tasmania; also shown are the locations of onshore seismograph stations that were in place to record the airgun shots.

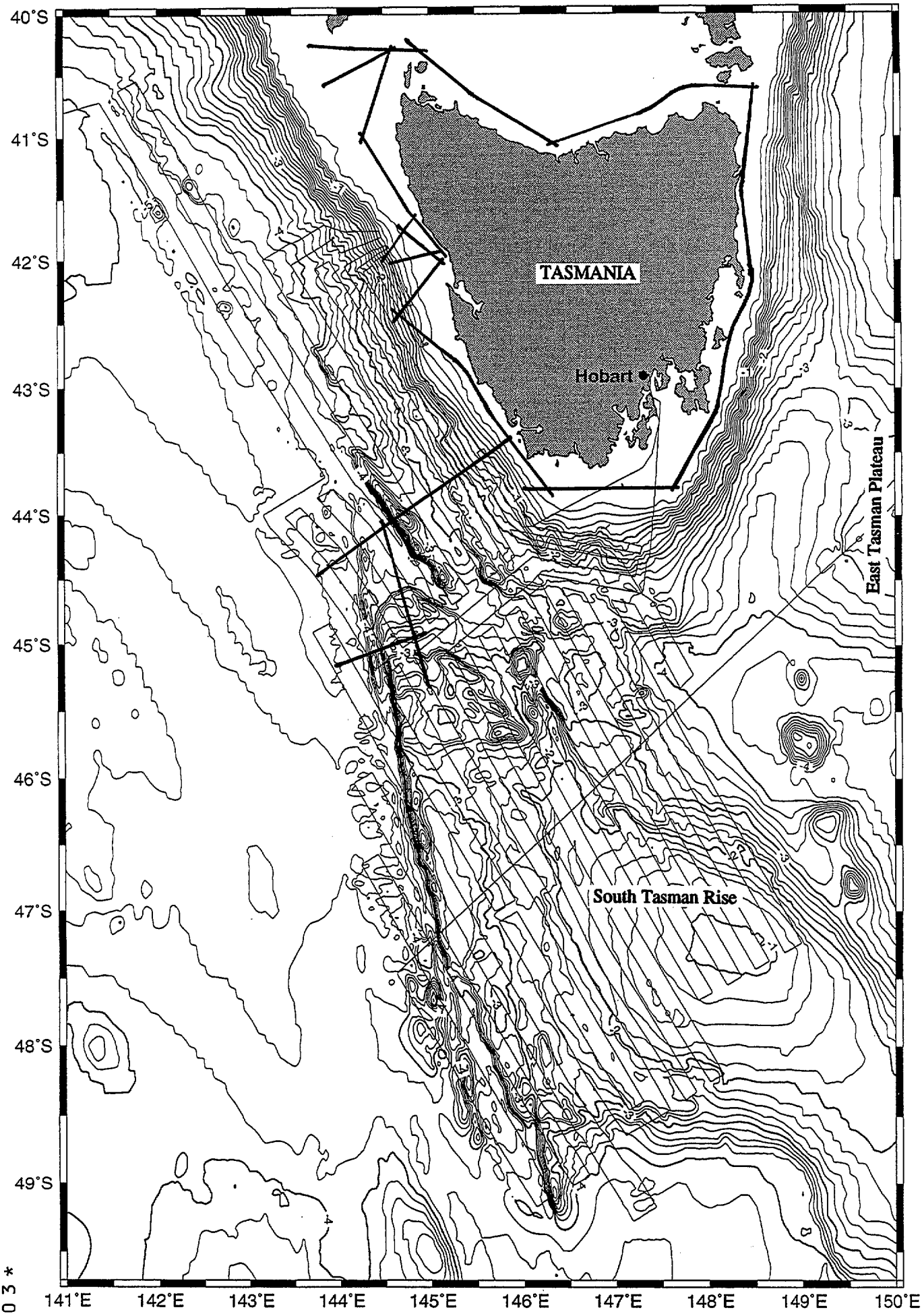


FIGURE 2. *Rig Seismic* TASGO/STR lines in relation to 1994 *L'Atalante* tracks (fine lines) and to detailed bathymetry of the South Tasman Rise and offshore Tasmanian region. The bathymetric contours are from merged conventional bathymetric data (ETOPO5, 5'x5' grid) and *L'Atalante* swath bathymetry (Exon et al., 1994). Contour annotation is in km; contour interval is 200 m.

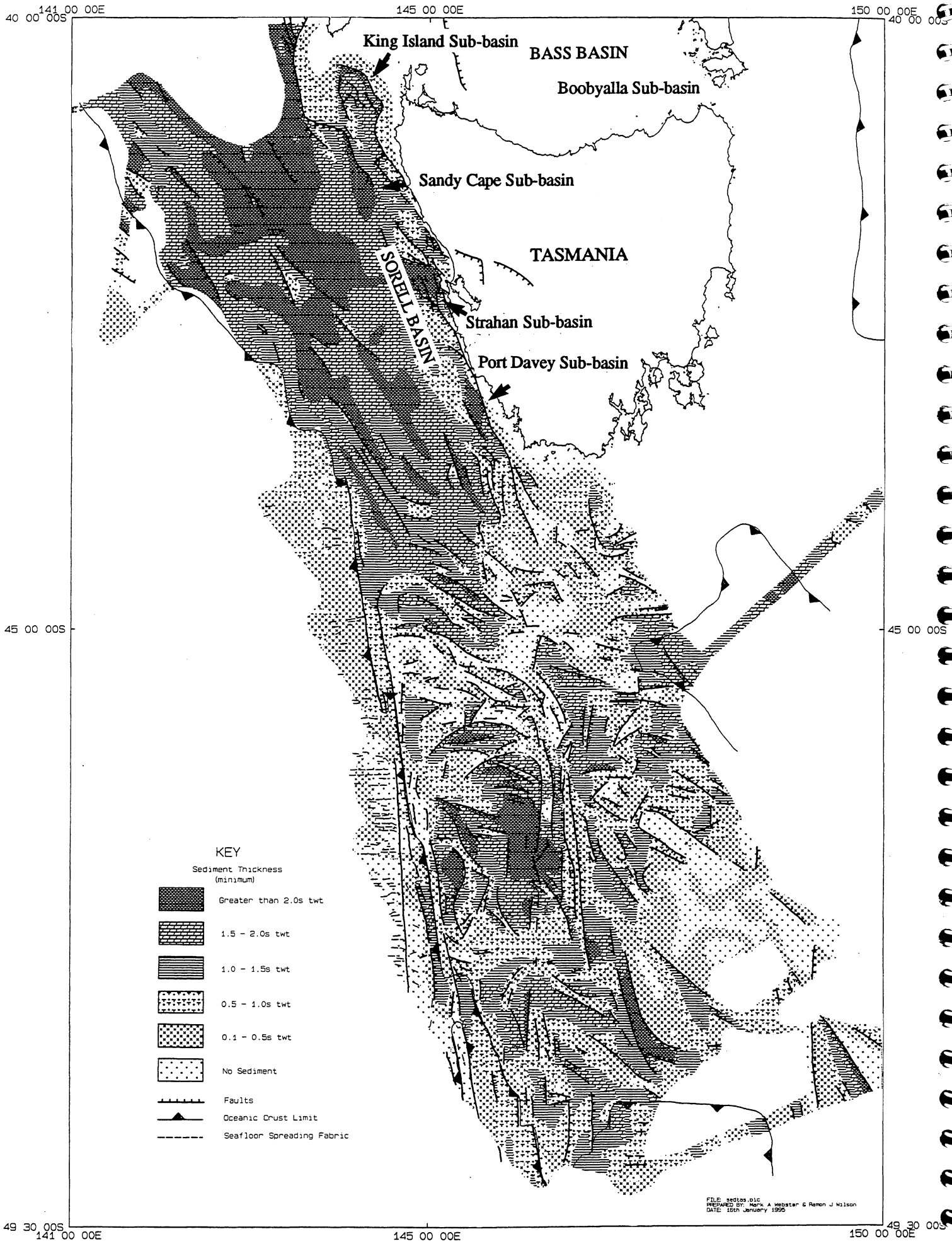


FIGURE 3. Sediment thickness and structure map of offshore west Tasmania and the South Tasman Rise based mainly on interpretation of *L'Atalante, Sonne, Rig Seismic* and oil company reflection seismic data.

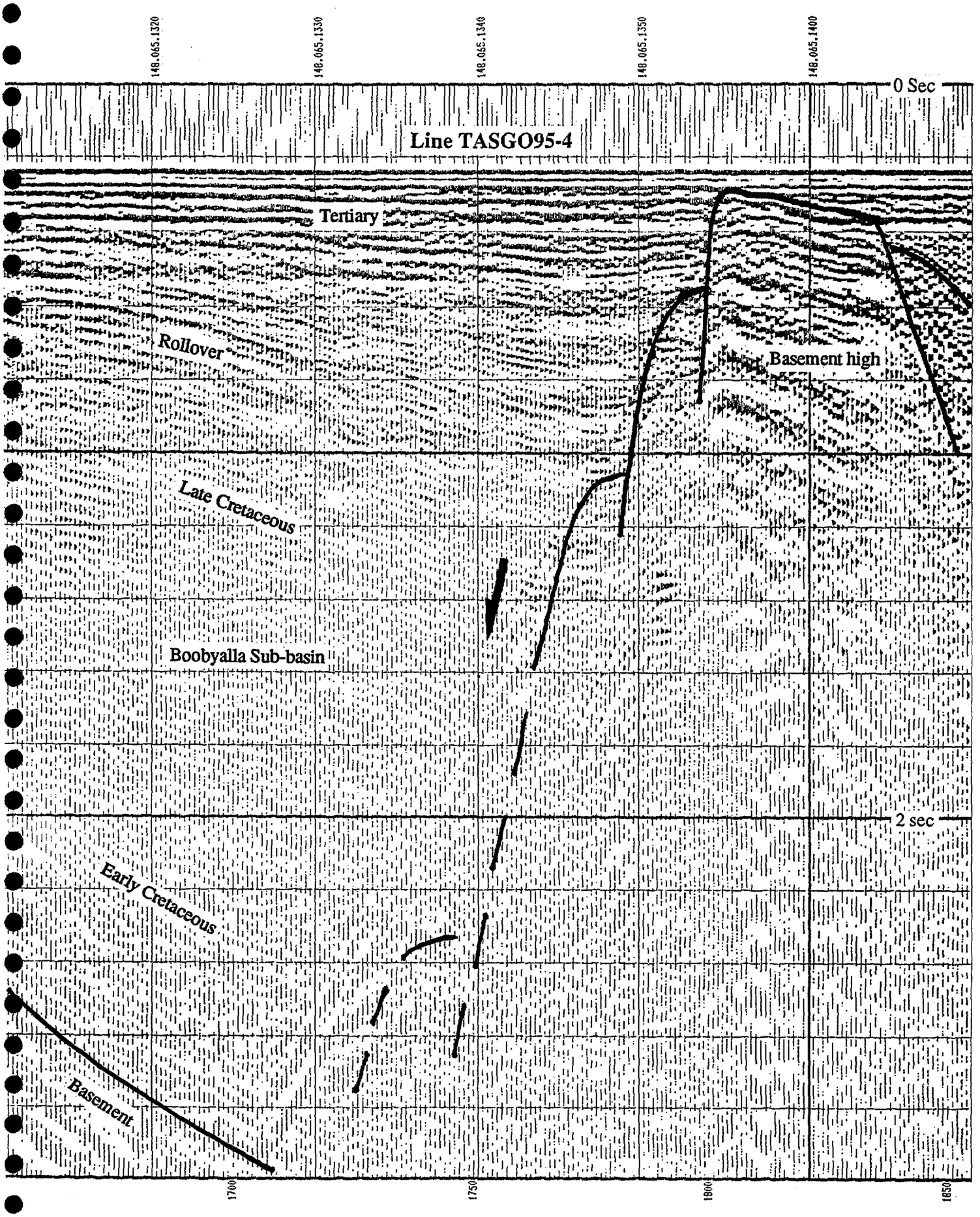


FIGURE 4. Major half-graben in the southern Boobyalla Sub-basin (line TASGO95-4 single-channel monitor record).

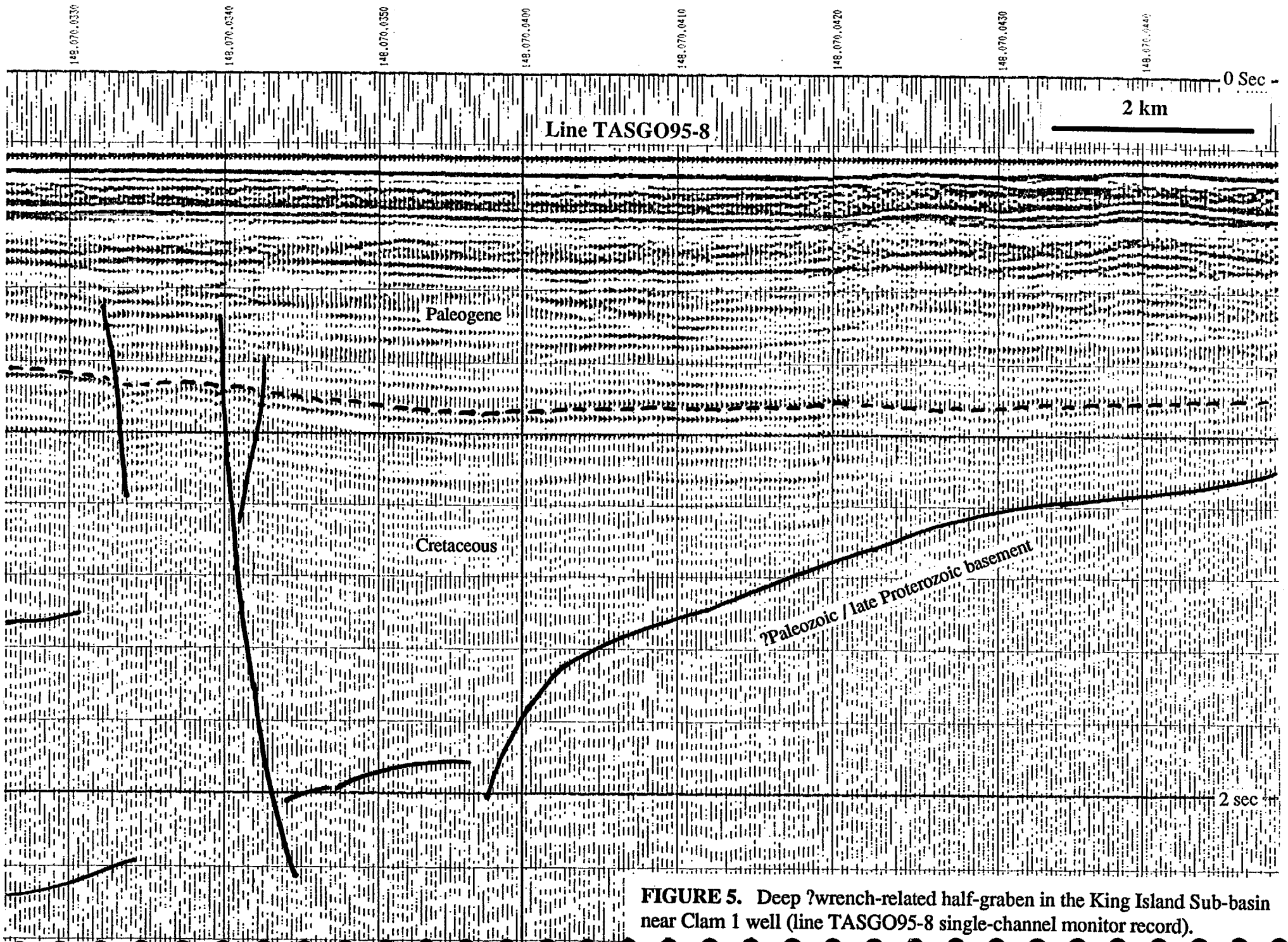


FIGURE 5. Deep ?wrench-related half-graben in the King Island Sub-basin near Clam 1 well (line TASGO95-8 single-channel monitor record).

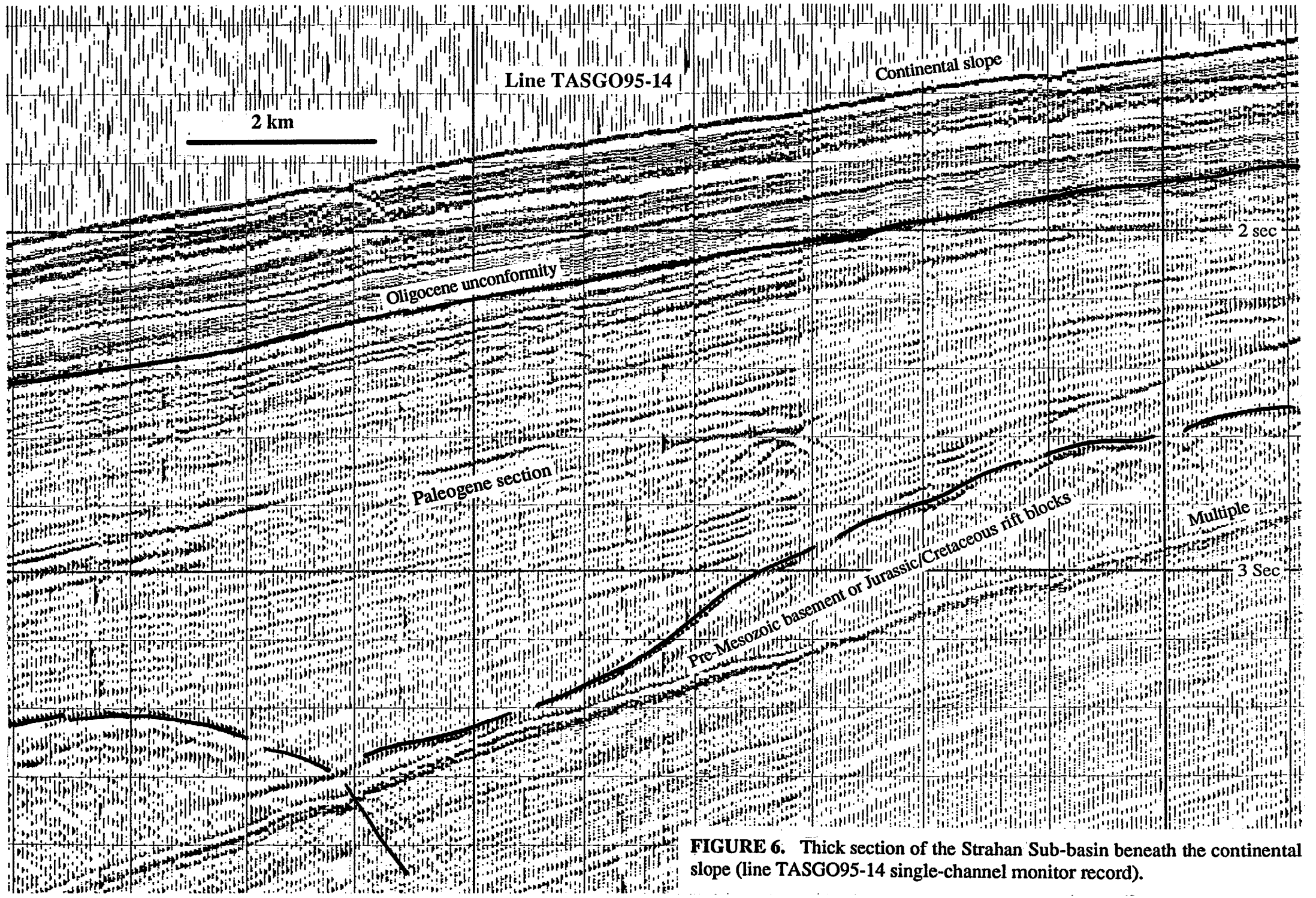


FIGURE 6. Thick section of the Strahan Sub-basin beneath the continental slope (line TASGO95-14 single-channel monitor record).

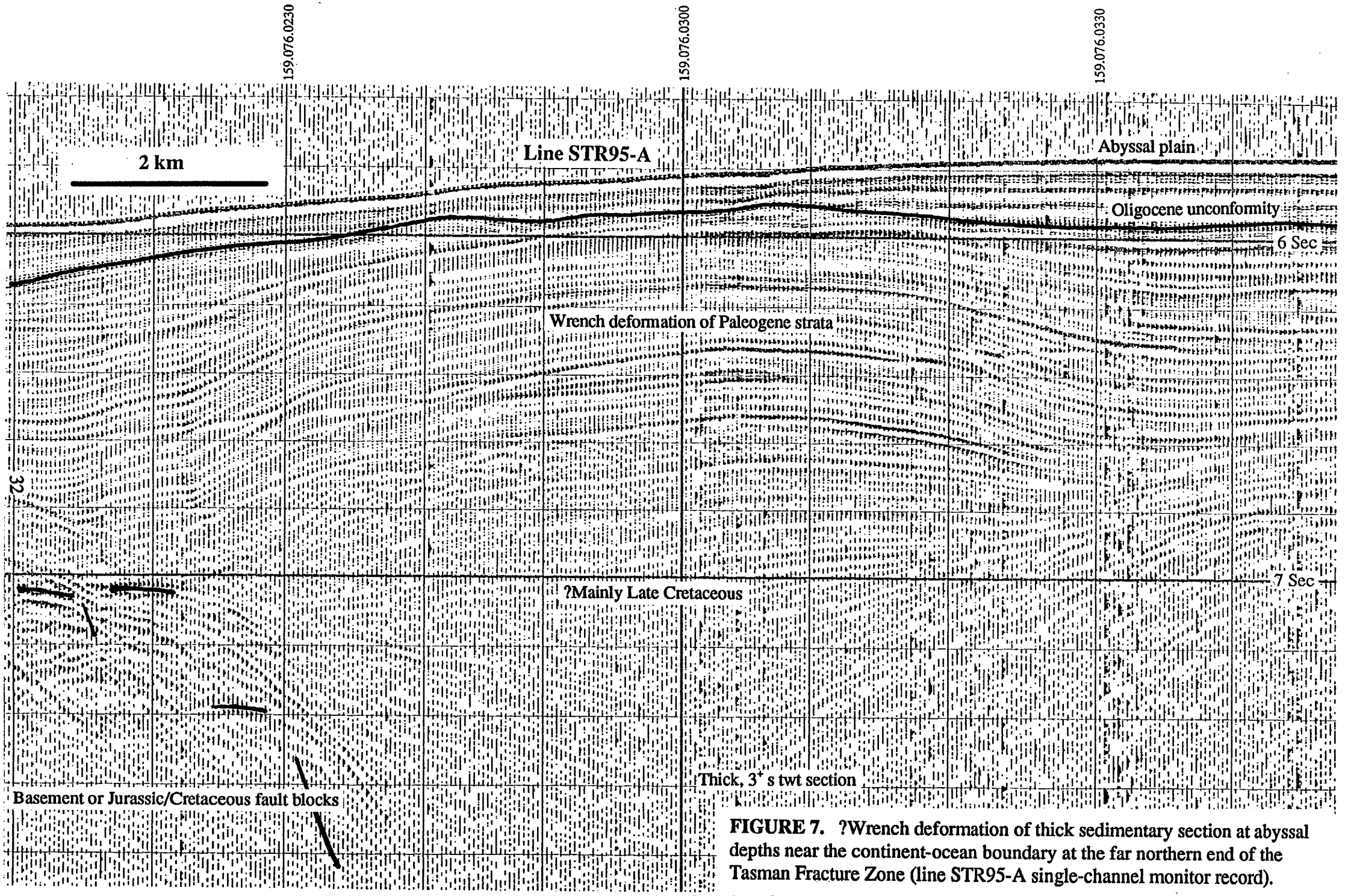


FIGURE 7. ?Wrench deformation of thick sedimentary section at abyssal depths near the continent-ocean boundary at the far northern end of the Tasman Fracture Zone (line STR95-A single-channel monitor record).

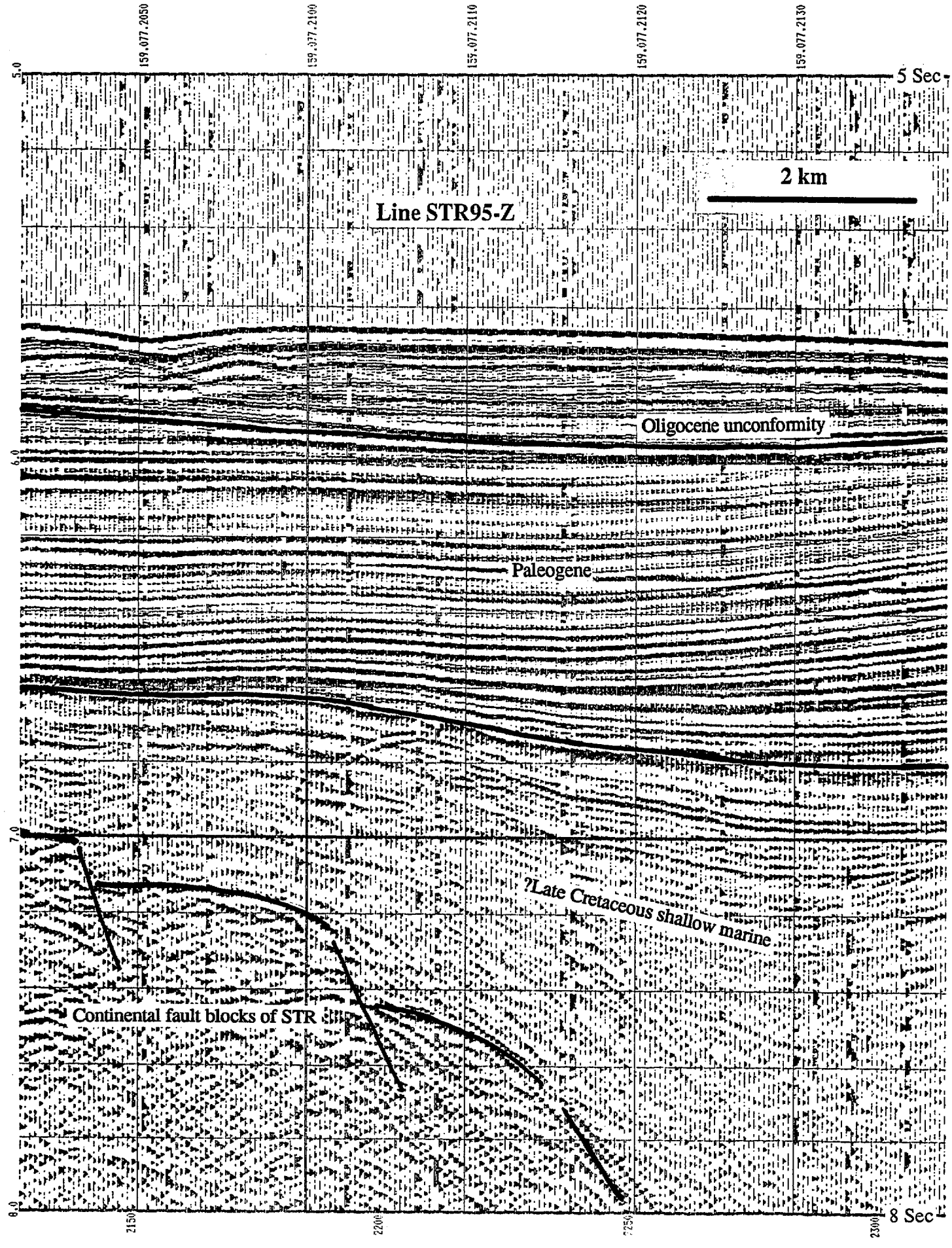


FIGURE 8. Thick, well-stratified sedimentary section at abyssal depths at the extreme NW tip of the South Tasman Rise (line STR95-Z single-channel monitor record).

AGSO MARINE Rig Seismic

SURVEY 148 TASGO Survey - AGSO

TABLE 1
TASGO Seismic Line Summary

AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Start and stop times and positions refer to FSP and LSP

Line Name	Seq. No	Date	Start time	Stop time	Dir	Start Position	Stop Position	FSP	LSP	FCSP	LCSP	Charge km	Total km	First Tape	Last Tape
TASGO95-15	1	3/03/95	062.0450	062.2037	090	43 47.999S 145 55.512E	43 48.156S 147 40.462E	100	2915	100	2915	140.80	140.80	1	45
TASGO95-1	2	6/03/95	063.0056	064.2113	031	43 49.773S 147 34.512E	40 36.857S 148 30.992E	100	7607	100	7607	375.40	516.20	46	162
TASGO95-4	3	6/03/95	065.0316	066.0142	274	40 39.997S 148 33.780E	41 06.123S 146 15.630E	100	4203	100	4203	205.20	721.40	163	226
-	4	Seq 4 accidentally missed - not a recorded line										0.00	721.40		
TASGO95-5	5	7/03/95	066.0718	066.2359	301	41 06.448S 146 23.722E	40 13.705S 144 44.556E	100	3518	100	1634	170.95	892.35	227	280
TASGO95-6	6	8/03/95	067.0557	067.1025	273	40 19.602S 144 57.620E	40 18.616S 144 26.950E	100	970	100	654	27.75	920.10	281	295
TASGO95-6A	7	8/03/95	067.2154	068.0759	273	40 18.863S 144 38.054E	40 16.200S 143 38.986E	1594	3333	1655	3333	83.95	1004.05	296	323
TASGO95-7	8	10/03/95	068.1323	068.2137	060	40 36.297S 143 48.698E	40 17.082S 144 37.993E	100	1665	100	1665	78.30	1082.35	324	348
TASGO95-8	9	11/03/95	069.2012	070.0529	200	40.17.021S 144 34.573E	41 03.475S 144 12.763E	100	1926	100	1926	91.35	1173.70	349	378
TASGO95-9	10	11/03/95	070.0909	070.2338	148	40 58.479S 144 12.872E	41 59.566S 145 10.448E	100	2877	100	2877	138.90	1312.60	379	422
TASGO95-10	11	13/03/95	071.2342	072.0523	310	42 02.016S 145 08.135E	41 42.995S 144 37.314E	100	1206	100	1206	55.35	1367.95	423	440
TASGO95-11	12	13/03/95	072.1020	072.1658	217	41 37.729S 144 49.915E	42 00.647S 144 26.793E	100	1163	150	1163	50.70	1418.65	441	457
TASGO95-12	13	14/03/95	072.1801	073.0006	077	42 01.580S 144 30.970E	41 55.431S 145 06.475E	100	1107	100	1107	50.40	1469.05	458	474
TASGO95-13	14	14/03/95	073.0303	073.1126	220	41 59.103S 145 06.922E	42 28.217S 144 34.009E	100	1508	132	1508	68.85	1537.90	475	497
TASGO95-14	15	15/03/95	073.1633	074.1822	128	42 22.499S 144 33.101 E	43 51.819S 146 17.668E	100	4509	100	4509	220.50	1758.40	498	567

AGSO MARINE Rig Seismic

TABLE 1 (cont.)

Survey 148 TASGO Survey - AGSO

AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

LINE NAME	SEQ.NO	REMARKS/TIE POINTS
TASGO95-15	1	None
TASGO95-1	2	SPs out-of-synch between SPs 1545 to 1767; Gravity off after 063.1029; mag off between 063.1048-1204, after 064.1753
TASGO95-4	3	P2 & S2 DTs U/S at SOL. P3 & S3 gun sensors low amplitude. Cable depth back at 10m.
-	4	Seq. no. 4 accidentally missed - not a recorded line
TASGO95-5	5	P2 DT U/S. P3 gun sensors low amplitude. SP #s resynched from SP 1985 to 103. 1 SP missed. Non standard gun config from 066.16 36 @ SP110.
TASGO95-6	6	P2 DT U/S, P2, S3, gun sensors low signal; Line aborted due to cable rising above 6m.
TASGO95-6A	7	Cable depth @12m due to weather. SP 2145 ch21 fixed by rotating slip rings. Magnetometer deployed at SP1656. Non-standard gun config stbd 2-4-3-1 at SP3161.
TASGO95-7	8	Cable depth @ 12m due to weather. Bird 5 U/S. Port &Stbd #3 gun sensors U/S from SOL. At SP 376 port 1 DT became intermittent.
TASGO95-8	9	Cable depth @ 12m due to weather. Swell noise at SOL&EOL. Source offset 218m not correct in header until SP810. Port 1 gun DT U/S, SP1348 bad traces & SP1349 not rec'd.
TASGO95-9	10	Port D/T 1 , Port &Stbd gun sensor U/S at SOL.
TASGO95-10	11	Cable depth @12m. Port & Stbd 3 gun sensors U/S.
TASGO95-11	12	Cable depth @12m. FSP at 1nm of preplot line due to shallow water. Large swell for whole line. Port & Stbd gun sensors U/S.
TASGO95-12	13	Cable depth @ 12m. Port 1 gun DT U/S. Port & Stbd 3 gun sensors U/S.
TASGO95-13	14	Cable depth @12m. Strong swell noise for entire line. Port 1 gun DT U/S, Port & Stbd gun sensor U/S. Gravity meter on at 08.45 .
TASGO95-14	15	Cable depth @12m. Stbd 1 gun DT U/S. 3 doglegs on line.

AGSO MARINE Rig Seismic

SURVEY 159 South Tasman Rise

Start and stop times and positions refer to FSP and LSP

Line Name	Seq. No	Date	Start time	Stop time	Dir	Start Position	Stop Position	FSP	LSP	FCSP	LCSP	Charge km	Total km	First Tape	Last Tape
STR95-A	0100	13/03/95	075.1053	076.1133	236	43 23.503S 145 49.402E	44 27.292S 143 39.886E	100	4295	100	4295	209.800	209.80	1	66
STR95-Z	0200	18/03/95	077.0903	078.0120	344	45 19.077S 144 55.337E	44 01.676S 144 24.481E	20	3001	20	3001	149.100	358.90	67	113
STR95-B	0300	20/03/95	079.0510	079.1990	071	45 08.010S 143 51.998E	44 51.325S 144 59.956E	100	1990	100	1990	86.050	444.95	114	143

TABLE 2
STR Seismic Line Summary

AGSO MARINE Rig Seismic

Survey 159 **South Tasman Rise**

AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

LINE NAME	SEQ. NO	REMARKS/TIE POINTS
STR95-A	0100	Low cut filter 8Hz. Tailbuoy intermittent
STR95-Z	0200	Low cut filter at 8Hz. FSP 4 km before preplot SOL at client request.
STR95-B	0300	First 500 m of cable between 10-15 m for whole line. Line aborted 94.50km after preplot SOL due to cable rising to the surface.

TABLE 2 (cont.)

TABLE 3
Way-points for TASGO Survey

Line	Way-point	Latitude / Longitude (deg., min.)
TASGO95-1	1	43° 49.77' S 147° 34.52' E
TASGO95-1	2	43° 16.17' S 148° 01.77' E
TASGO95-1	3	43° 11.02' S 148° 04.77' E
TASGO95-1	4	42° 38.43' S 148° 13.17' E
TASGO95-1	5	42° 33.52' S 148° 15.65' E
TASGO95-1	6	42° 28.70' S 148° 19.27' E
TASGO95-1	7	42° 24.08' S 148° 23.43' E
TASGO95-1	8	42° 19.23' S 148° 26.57' E
TASGO95-1	9	42° 13.85' S 148° 28.73' E
TASGO95-1	10	42° 08.78' S 148° 29.17' E
TASGO95-1	11	41° 32.18' S 148° 23.10' E
TASGO95-1	12	41° 26.72' S 148° 22.83' E
TASGO95-1	13	41° 38.22' S 148° 30.77' E
TASGO95-4	1	40° 39.98' S 148° 33.78' E
TASGO95-4	2	40° 38.20' S 147° 55.85' E
TASGO95-4	3	40° 38.42' S 147° 49.03' E
TASGO95-4	4	40° 39.77' S 147° 41.82' E
TASGO95-4	5	40° 41.93' S 147° 35.47' E
TASGO95-4	6	40° 48.98' S 147° 22.25' E
TASGO95-4	7	40° 51.57' S 147° 15.80' E
TASGO95-4	8	41° 05.72' S 146° 17.30' E
TASGO95-5	1	41° 06.45' S 146° 23.72' E
TASGO95-5	2	40° 40.22' S 145° 26.25' E
TASGO95-5	3	40° 14.60' S 144° 45.95' E
TASGO95-6	1	40° 19.60' S 144° 57.62' E
TASGO95-6	2	40° 18.70' S 144° 33.75' E
TASGO95-6	3	40° 18.40' S 144° 10.00' E
TASGO95-6	4	40° 16.33' S 143° 40.80' E
TASGO95-7	1	40° 17.70' S 144° 36.37' E
TASGO95-7	2	40° 18.70' S 144° 33.75' E
TASGO95-7	3	40° 36.30' S 143° 48.70' E
TASGO95-8	1	40° 17.02' S 144° 34.57' E
TASGO95-8	2	40° 18.70' S 144° 33.75' E
TASGO95-8	3	41° 02.18' S 144° 13.38' E

Table 3 (cont.)

Line	Way-point	Latitude / Longitude (deg., min.)
TASGO95-9	1	40° 58.48' S 144° 12.87' E
TASGO95-9	2	41° 35.28' S 144° 43.82' E
TASGO95-9	3	41° 55.43' S 145° 06.50' E
TASGO95-9	4	41° 58.43' S 145° 09.37' E
TASGO95-10	1	41° 43.88' S 144° 38.75' E
TASGO95-10	2	42° 02.02' S 145° 08.13' E
TASGO95-11	1	41° 36.93' S 144° 50.72' E
TASGO95-11	2	41° 59.53' S 144° 27.92' E
TASGO95-12	1	42° 01.58' S 144° 30.97' E
TASGO95-12	2	41° 55.43' S 145° 06.50' E
TASGO95-13	1	41° 59.10' S 145° 06.92' E
TASGO95-13	2	42° 27.15' S 144° 35.22' E
TASGO95-14	1	42° 22.50' S 144° 33.10' E
TASGO95-14	2	42° 46.07' S 145° 14.30' E
TASGO95-14	3	42° 50.17' S 145° 19.48' E
TASGO95-14	4	43° 10.00' S 145° 35.03' E
TASGO95-14	5	43° 50.70' S 146° 16.52' E
TASGO95-15	1	43° 48.00' S 145° 55.52' E
TASGO95-15	2	43° 48.15' S 147° 38.55' E

Note: These are way-points used during the survey for navigation along lines. These points (particularly the start and stop way-points) do not necessarily define final (post-cruise) line locations.

TABLE 4
Way-points for STR Survey

Line	Way-point	Latitude / Longitude
STR95-A	1	43° 23.5' S 145° 49.4' E
STR95-A	2	44° 00.6' S 144° 34.6' E
STR95-A	3	44° 26.5' S 143° 41.5' E
STR95-Z	1	45° 17.0' S 144° 54.5' E
STR95-Z	2	44° 03.0' S 144° 25.0' E
STR95-B	1	45° 08.0' S 143° 52.0' E
STR95-B	2	43° 10.0' S 151° 46.0' E
STR95-Y*	1	44° 30.00'S 145° 50.00'E
STR95-Y*	2	43° 48.03'S 146° 13.78'E

* Guns only for refraction recording on shore

Note: These are way-points used during the survey for navigation along lines. These points (particularly the start and stop way-points) do not necessarily define final (post-cruise) line locations.

Time (UTC) ddd hhmm	Magnetometer on & sensor offset* (m)	Magnetometer off	Gravity meter on/off	Comments
062 0130	253			Gravity meter on before leaving Hobart wharf
063 1029				Gravity meter turned off due to noisy gyro
063 1048				Water depth ≤ 100 m
063 1204	253			
064 1654				Magnetometer noisy
064 1754				Water depth ≤ 100 m and servicing required
068 0556	253			Log book shows 200m tow, sheet 253
069 0126				
069 1922	253			
070 2334				Shallow water
071 2220	250			
072 0825				
072 1135	253			
072 2339				
073 0309	253			
073 0845				Gravity meter turned on
074 1905				
075 1015	253			
079 2043				

* Distance behind stern of ship

TABLE 5
Magnetometer and Gravity Meter On/Off Periods and Magnetometer Sensor Offsets

APPENDIX 1
Information on Research Vessel *Rig Seismic*

RV *Rig Seismic* is a seismic research vessel with dynamic positioning capability, chartered and equipped by AGSO to carry out the Continental Margins Program. The ship was built in Norway in 1982 and arrived in Australia to be fitted out for geoscientific research in October 1984. It is registered in Newcastle, New South Wales, and is operated for AGSO by the Australian Maritime Safety Authority (AMSA).

Owner:		Galerace Limited	
Radio call sign:		VMMR	
Official number:		851492	
Gross Registered Tonnage:		1545 tonnes	
Length, overall:		72.5 metres	
Beam:		13.8 metres	
Draft:		6.0 metres	
Nett tonnage:		421 tonnes	
Displacement tonnage:		3000 tonnes	
Engines:	Main:	Norma KVMB-12	2640 H.P./825 r.p.m.
	Aux:	3 x Caterpillar	564 H.P./482 KVA
		1 x Mercedes	78 H.P./56 KVA
	Shaft generator:		AVK 1000 KVA; 440 V/60 Hz
	Side Thrusters:		2 forward, 1 aft, each 600 H.P.
Cruising speed:		10 knots	
Maximum speed:		13 knots	
Propellers:		1 x Variable pitch	
Fuel capacity:		483.55 tonnes	
Fresh water capacity:		107.98 tonnes	
Water maker:		10 tonnes per day	
Radar:		Furuno FAR-2832S 10cm (ARPA)	
		Furuno FR-2020 3cm	
Gyro compass:		Sperry Mk 37	
Helicopter deck:		20 metres diameter, rear mounted.	
		Markings as per AGA 7 General Conditions.	
		Suitable for Bell 206B Longranger / Squirrel	
Accommodation:		38 single cabins, 3 double cabins	
		42 persons total	
Hospital:		1 berth	
Life boats:		2 x enclosed 40-man motor-driven lifeboats	
Life rafts:		4 x 20-man inflatable	
		1 x 6-man inflatable	
Communications:		Inmarsat C	
		Sailor MF radio	
		2 x VHF fixed antenna radios	
		4 x VHF hand-held radios	
		4 x Motorola UHF hand-held radios	

Aircraft radio
27 MHz citizen's band radio
Bridge mobile telephone
Inmarsat A (2 identification numbers)
3 x general use mobile telephones
Facsimile

Contact numbers

Inmarsat (Indian /Pacific Satellite):	872-1545120 (telephone/telex)
	872-1545121 (fax/data)
Mobile telephone:	018 898 200 (telephone)
	018 620 515 (telephone)
	018 632 656 (fax)

APPENDIX 2
Survey 148/159 Seismic Acquisition: General Description and Main Parameters

TASGO

Survey Name:	TASGO95
Survey Number:	148
Area:	Tasmania
Survey Vessel:	RV *Rig Seismic*
Type of Survey:	Reflection seismic
Mode of Acquisition:	2D
Primary Navigation:	Racal 1 Multifix Version 1.3 DGPS
Secondary Navigation:	Racal 2 Multifix Version 2.0 DGPS
Shot-point Mode:	Distance based
Streamer:	Single analogue streamer
Streamer Length:	4800 m
Group Length	25 m
Number of Channels	192
Streamer depth:	10.0 m (Seq 001-003, 005-006) 12.0 m (Seq 007-015)
Energy Source:	High pressure air source
Source Type:	Sleeve guns - 3000 cu. inch, 1800 psi
Source Depth:	10.0 m
Shot-point Interval:	50.0 m
Nominal Fold:	4800%
Record Length:	16 seconds
Sample Interval:	2 milliseconds

Passband:	4-180 Hz
Number of Lines:	13
Line Sequences:	15
Total line-km:	1758.40
Start of Record to Gun Timebreak:	60.0 milliseconds

STR

Survey Name:	STR95
Survey Number:	159
Area:	Tasmania, South Tasman Rise
Survey Vessel:	RV *Rig Seismic*
Type of Survey:	Reflection seismic
Mode of Acquisition:	2D
Primary Navigation:	Racal 1 Multifix Version 1.3 DGPS
Secondary Navigation:	Racal 2 Multifix Version 2.0 DGPS
Shot-point Mode:	Distance based
Streamer:	Single analogue streamer
Streamer Length:	4800 m
Group Length	25 m
Number of Channels	192
Streamer depth:	12.0 m (Seq 0100 & 0200) 15.0 m (Seq 0300)
Energy Source:	High pressure air source
Source Type:	Sleeve guns - 3000 cu. inch, 1800 psi
Source Depth:	10.0 m

Shot-point Interval:	50.0 m
Nominal Fold:	4800%
Record Length:	16 seconds
Sample Interval:	2 milliseconds
Passband:	8-180 Hz
Number of Lines:	4
Line Sequences:	0100-0400 (Seq 0400 was guns only for refraction recording on shore)
Total line-km:	444.95
Start of Record to Gun Timebreak:	60.0 milliseconds

APPENDIX 3
Survey and Equipment Specifications

Seismic Recording System

Instrument type:	MUSIC Recording System
Manufacturer:	AGSO
Serial number:	150964
Recorded seismic data channels:	192 per streamer
Recorded auxiliary channels:	16 per streamer Channels 193-194: Dummy Channels 195-202: Near-field gun signatures Channels 203-207: Water-break phones Channel 208: Sonobuoy (not used)
Streamer front channel number:	1
Sample interval:	2 milliseconds
Low-cut filter / slope:	4 Hz (TASGO)or 8 Hz (STR) at 18 dB/octave
High-cut filter / slope:	180 Hz at 140 dB/octave
Record length:	16 seconds
Recording medium:	High density cartridges 3480 (Fujitsu M2481 drive)
Recording format:	Demultiplexed (modified) SEG-Y
Recording density / speed:	37871 bpi 18 track / 39.37 ips (1000 mm/sec)
Recording polarity:	Pressure increase = negative number on tape
External header format:	N/A
Maximum input RMS:	+/- 7.07 volts
A/D linearity:	0.20%
Accuracy of gain ranging:	0.25%
Channel-channel accuracy:	0.40%
Harmonic distortion:	0.01% at 3200 mV 31.25 Hz / 0.22% at 1 mV 31.25 Hz
Multi-trace plotter:	Epson DFX-8000 printer
Time difference between first scan recorded and timebreak:	60.0 milliseconds

Seismic Streamer

Streamer:	Fjord Instruments analogue streamer
Manufacturer:	Fjord Instruments
Length (active):	4800 m
Active section length:	100 m
Number of active sections:	48
Active groups:	192 (configured by in-streamer program plugs)
Hydrophones per group:	40
Group length:	25 m
Group interval:	25 m

Hydrophone group sensitivity:	88 Volts/Bar
Hydrophone type:	Transformerless charge-coupled Teledyne T-1
Depth transducer type:	N/A (using cable leveller depths)
Cable levellers (birds):	25 x Syntron RCL-3
Cable leveller positions:	Group: 1, 9, 17, 25, 33, 41, 49, 57, 65, 73, 81, 89, 97, 105, 113, 121, 129, 137, 145, 153, 161, 169, 177, 185, head of tail stretch
Cable compasses:	5 x Syntron RCU-831 fluxgate vector magnetometer externally mounted
Cable compass positions:	Group: 29, 69, 109, 149, 189
Water-break detectors:	5 x T-1 phones
Water-break positions:	Group: 1, 49, 97, 145, 189
Towing depth:	10.0 ± 1.5 m (TASGO Seq 001,2,3,5,6) 12.0 ± 1.5 m (TASGO Seq 007-015) 12.0 ± 1.5 m (STR Seq 0100 & 0200) 15.0 ± 2.0 m (STR Seq 0300)

Seismic Source

Source type:	3000 cu. inch (50 litre) sleeve airgun array
Airgun type:	HGS sleeve airgun
Number of sub-arrays:	2
Number of guns per sub-array:	10 active plus 6 spare Cluster 1: 4 active, 2 spare Cluster 2: 3 active, 2 spare Cluster 3: 2 active, 1 spare Cluster 4: 1 active, 1 spare
Length of source array:	13.5 m
Gun spacing:	0.5 m between individual guns in clusters 2.5 m between clusters in each sub-array
Width of source array (sub-array spacing):	15 m
Nominal air pressure:	1800 psi ±10%
Depth sensors:	4 per sub-array
Near-field phones:	1 per gun cluster
Number of active guns:	20 (10 per sub-array)
Number of spare guns;	12 (6 per sub-array)
Compressors:	6 x A-300 300 scfm Price compressors (4 in use, 2 as back-up)
Gun timing unit:	AGSO GCM
Timing tolerance:	±2.0 milliseconds
Shotpoint interval:	50.0 m
Nominal shooting speed:	5.0 knots
Towing depth:	10.0 ± 1.5 m

Navigation/Positioning and Geophysical Data Acquisition (non-seismic)

Navigation/Acquisition system:	AGSO DAS - Data Acquisition System
Data storage:	Andataco 4320NT cartridge drives
Primary navigation:	Racal Multifix Version 1.3 Differential Global System
Positioning	
Primary navigation equipment:	Receiver: Trimble 4000DS Demod: Racal Skyfix Satellite Differential Demodulator 2402 Medium: Racal Inmarsat satellite dish Frequency: 72.475 MHz Reference Station: Sydney, Melbourne, Adelaide, Perth
Secondary Navigation:	Racal Multifix Version 2.0 Differential Global System
Positioning	
Secondary Navigation Equipment:	Receiver: Trimble 4000DS Demod: Racal Skyfix Satellite Differential Demodulator 2402 Medium: Racal Inmarsat satellite dish Frequency: 82.475 MHz Reference Station: Sydney, Melbourne, Adelaide
Tertiary Navigation:	Sonar doppler / gyro dead reckoning
Tertiary navigation equipment:	Magnavox MX 610 (dual-axis) sonar doppler Sperry Mk 37 gyrocompass
Additional navigation equipment:	Raytheon DSN 450 sonar doppler Magnavox MX 100 GPS
Echo sounders:	Raytheon CESP III 3.5 kHz (2 kW), 16 transducer sub-bottom profiler, and 12 kHz (2 kW)
Gravity:	Bodenseewerk Geosystem KSS-31 Marine Gravity Meter
Magnetics:	Geometrics G801/G803 proton magnetometer

APPENDIX 4
Shipboard Personnel

AGSO Personnel

Peter Hill	Project Representative
Kevin Webber	Ship Manager
Norm Johnston	Systems Expert
Maria De Deuge	Quality Control / Systems Expert
Glen Heal	Systems Expert
Donna Cathro	Scientific Officer
Julie Aspin	Scientific Officer
Mark Timms	Electronics Technician
Owen Hann	Electronics Technician
Jim Bedford	Science Technician
John Ryan	Science Technician
Steven Ridgway	Science Technician
Greg Atkinson	Science Technician
Fenji Stradwick	Science Technician
Steve Wiggins	Mechanical Technician
Andrew Hislop	Mechanical Technician
Andy Hogan	Mechanical Technician
Andrew Hinds	Mechanical Technician

AMSA Crew of the *Rig Seismic*

R.N. Hardinge (Bob)	Master
W.H. Orgill (Bill)	Chief Officer
I. Moodie (Ian)	Second Officer
R.W. Thomas (Roger)	Chief Engineer
R.D. Heaton (Russ)	Second Engineer
R.A. Dickman (Bob)	Electrical Engineer
B.P. Noble (Nobby)	Chief Integrated Rating
S. Fanias (Shane)	Integrated Rating
J. Perry (Jim)	Integrated Rating
D.A. Kane (Dave, Biggles)	Integrated Rating
G.R. Conley (Geoff)	Chief Steward / Cook

T. Thompson (Tom)	Cook
A.Z. Clark (Adrian)	Catering Attendant
A.C. Blackman (Clive)	Catering Attendant

Adviser, Liasion with Tasmanian Fishermen

Greg Rainbird	Tasmanian professional fisherman (shark and crayfish) and member of the Tasmanian Rock Lobster Fishing Association

APPENDIX 5
Non-seismic Data Acquisition Channels

The following is a list of channel allocations for the non-seismic data collected during Survey 148.

Channel	Description
1	Survey and Julian day number from VMS clock (sss.ddd)
2	Acquisition UTC from VMS clock (.hhmmss)
3	GPS - VMS clock difference (seconds)
4	Latitude (radians), best estimate
5	Longitude (radians), best estimate
6	Speed (knots), best estimate
7	Course (degrees), best estimate
8	Magnetometer no. 1 (nT)
9	Magnetometer no. 2 (nT)
10	Depth from 12 kHz echo sounder (metres)
11	Depth from 3.5 kHz echo sounder (metres)
12	F/A Magnavox sonar doppler
13	P/S Magnavox sonar doppler
14	F/A Raytheon sonar doppler
15	P/S Raytheon sonar doppler
16	Paddle log
17	Not used
18	Instrument room gyro (degrees)
19	Bridge gyro (degrees)
20	Not used
21	MX100 time (hhmmss.s)
22	MX100 latitude (radians)
23	MX100 longitude (radians)
24	MX100 height above geoid (metres)
25	MX100 speed (knots)
26	MX100 course (degrees)
27	MX100 number of satellites
28	MX100 uncertainty
29	MX100 spare
30	MX100 spare
31	Racal # 1 UTC time of record (hhmmss.s)
32	Racal # 1 UTC time of record - time of fix (ss.s)
33	Racal # 1 latitude (radians)
34	Racal # 1 longitude (radians)
35	Racal # 1 height (metres)
36	Racal # 1 speed (knots)
37	Racal # 1 course (degrees)
38	Racal # 1 number of satellites
39	Racal # 1 PDOP

40 Racal # 1 HDOP
41 Racal # 1 3-D position error 1-sigma (metres)
42 Racal # 1 2-D position error 1-sigma (metres)
43 Racal # 1 diff quality (0=no corr, 1=bad, 9=good)
44 Racal # 1 flag (see below)
45 Racal # 1 time since last correction (mmss)
46 Best latitude, raw (radians)
47 Best longitude, raw (radians)
48 Std devs of raw latitude (metres)
49 Std devs of raw longitude (metres)
50 Not used
51 Racal # 2 UTC Time of record (hhmmss.s)
52 Racal # 2 UTCTime of record - time of fix (ss.s)
53 Racal # 2 Latitude (radians)
54 Racal # 2 Longitude (radians)
55 Racal # 2 height (metres)
56 Racal # 2 speed (knots)
57 Racal # 2 course (degrees)
58 Racal # 2 number of satellites
59 Racal # 2 PDOP
60 Racal # 2 HDOP
61 Racal # 2 3-D position error 1-sigma (metres)
62 Racal # 2 2-D position error 1-sigma (metres)
63 Racal # 2 Diff quality (0=no corr, 1=bad, 9=good)
64 Racal # 2 flag (see below)
65 Racal # 2 time since last correction (mmss)
66 Not used
67 Not used
68 Cross-course error (CCE) (n miles)
69 Start-of-line (SOL) (n miles)
70 End-of-line (EOL) (n miles)
71 Latitude (radians) sonar doppler 1
72 Longitude (radians) sonar doppler 1
73 Speed (knots)
74 Heading (degrees)
75 Latitude (radians) sonar doppler 2
76 Longitude (radians)
77 Speed (knots)
78 Heading (degrees)
79 Latitude (radians) paddle log
80 Longitude (radians)
81 Speed (knots)
82 Heading (degrees)
83 Navigation type (see below)
84 Gravity (mGal)
85 ACX (m/s/s)
86 ACY (m/s/s)
87 Sea state
88 Unused

89	Unused
90	Unused
91	Tailbuoy time (hhmmss.s)
92	Tailbuoy latitude (radians)
93	Tailbuoy longitude (radians)
94	Tailbuoy altitude (m)
95	Tailbuoy number of satellites
96	Tailbuoy uncertainty
97	Tailbuoy diff latitude (radians)
98	Tailbuoy diff longitude (radians)
99	Tailbuoy feather angle (degrees)
100	Tailbuoy distance (n miles)

.....

Racal dGPS "flag" is a 5 digit number n1, n2, n3, n4, n5 where
→

n1: Operating Mode	0 = no solution 1 = 4 SV 2 = 3 SV + altitude aiding 3 = 3 SV + clock aiding 4 = 2 SV + altitude aiding + clock aiding 5 = all in view
n2: Receiver Code	7 = C/A, L1 only, carrier aided
n3: Receiver Dynamics	0 = static, 1....9 represents low....high
n4: Position Quality	0....9 represents bad....good
n5: Differential Quality	0 = no correction, 1....9 represents bad....good

Navigation Type	= 1	Racal 1 differential
	= 2	Racal 2 differential
	= 3	Racal 1 non-differential
	= 4	Racal 2 non-differential
	= 5	Dead reckoning
	= 6	MX100 GPS
	= 7	Radio navigation

APPENDIX 6
Shipboard Navigation Geometry and Seismic Acquisition Offsets

The centre-line of the vessel, forward of the main navigation mast, in-line with the foward end of the monkey island, was designated as the NRP Navigation Reference Point, and for navigation purposes, this was the point that the vessel was steered by. The NRP was positioned 51.2 metres forward of the stern for the survey. All the following offsets are stated with reference to the NRP. The offsets are negative to port and behind the NRP, and positive to starboard and forward of the NRP. Height values are referenced to the mean vessel water-line, and are negative below the water-line and positive above. All measurements are in metres.

TASGO

Offsets Referenced to NRP	Height Above (+) Below (-)	Offset Fwd (+) Aft (-)	Offset Stbd (+) Port (-)	Line Sequences
Centre of Stern at Water-line	+ 0.00	- 51.20	+ 0.00	(001 - 015)
DGPS Receiver Antenna 1	+ 14.80	- 9.00	+ 1.30	(001 - 015)
DGPS Receiver Antenna 2	+ 14.80	- 9.00	+ 0.30	(001 - 015)
Magnavox GPS Antenna	+ 13.80	- 0.20	+ 3.68	(001 - 015)
Centre of Source Array	- 10.00	- 87.95	+ 0.00	(001 - 015)
Centre of Near Trace	- 10.00 - 10.00	-315.95 -305.95	+ 0.00 + 0.00	(001 - 008) (009 - 015)
Nominal Centre of Source To Centre Near Trace Distance			228.00 218.00	(001 - 008) (009-015)

STR

Offsets Referenced to NRP	Height Above (+) Below (-)	Offset Fwd (+) Aft (-)	Offset Stbd (+) Port (-)	Line Sequences
Centre of Stern at Water-line	+ 0.00	- 51.20	+ 0.00	(0100-0400)
DGPS Receiver Antenna 1	+ 14.80	- 9.00	+ 1.30	(0100-0400)
DGPS Receiver Antenna 2	+ 14.80	- 9.00	+ 0.30	(0100-0400)
Magnavox GPS Antenna	+ 13.80	- 0.20	+ 3.68	(0100-0400)
Centre of Source Array	- 10.0	- 88.0	+ 0.0	(0100-0400)
Centre of Near Trace	- 10.0 - 10.0	-306.0 -326.0	+ 0.0 + 0.0	(0100-0200) (0300)
Nominal Centre of Source To Centre Near Trace Distance			218.0 238.0	(0100 - 0200) (0300)

THE ABOVE STREAMER AND GUN OFFSETS ARE BASED ON STATIC MEASUREMENTS ONLY.

AGSO

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

AGSO Marine

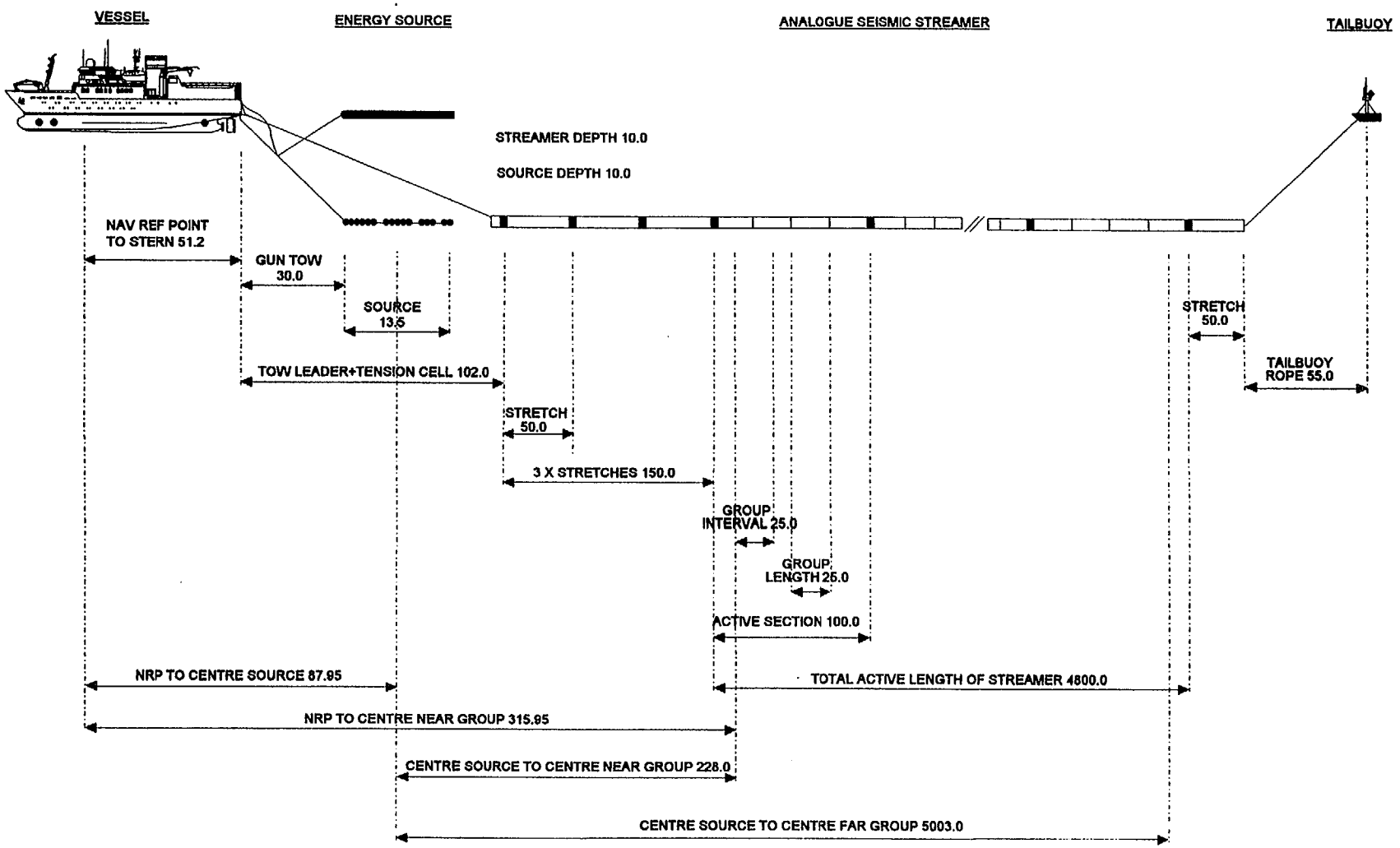
R/V Rig Seismic

Recording Geometry

Drawing valid for line sequence 1, 3,5,6 Seq 4 not recorded

Cruise 148

TASGO



APPENDIX 7
Recording Geometry
(this and next 4 pages)

AGSO

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

AGSO Marine

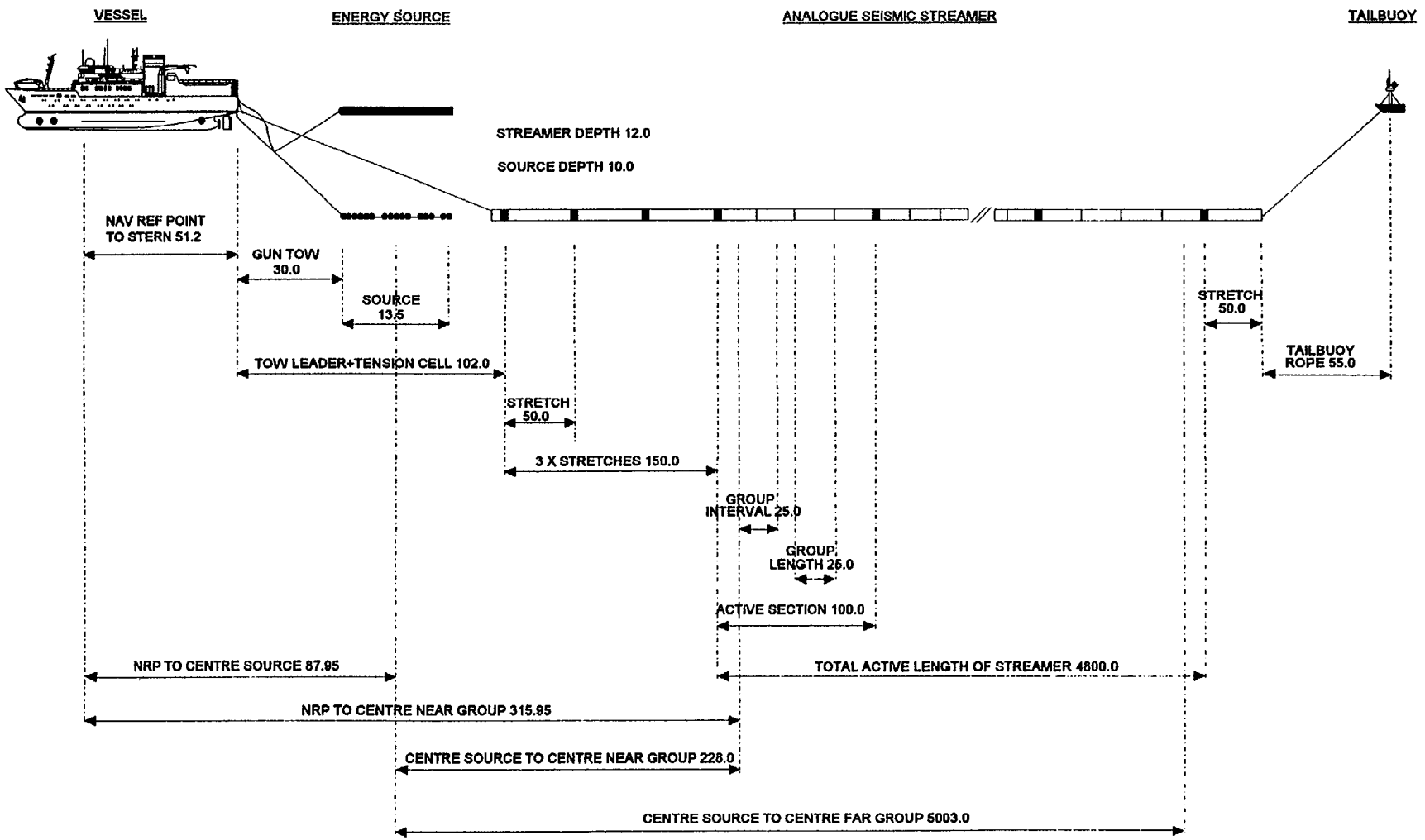
R/V Rig Seismic

Recording Geometry

Drawing valid for line sequence 7, 8 ,2

Cruise 148

TASGO



AGSO

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

AGSO Marine

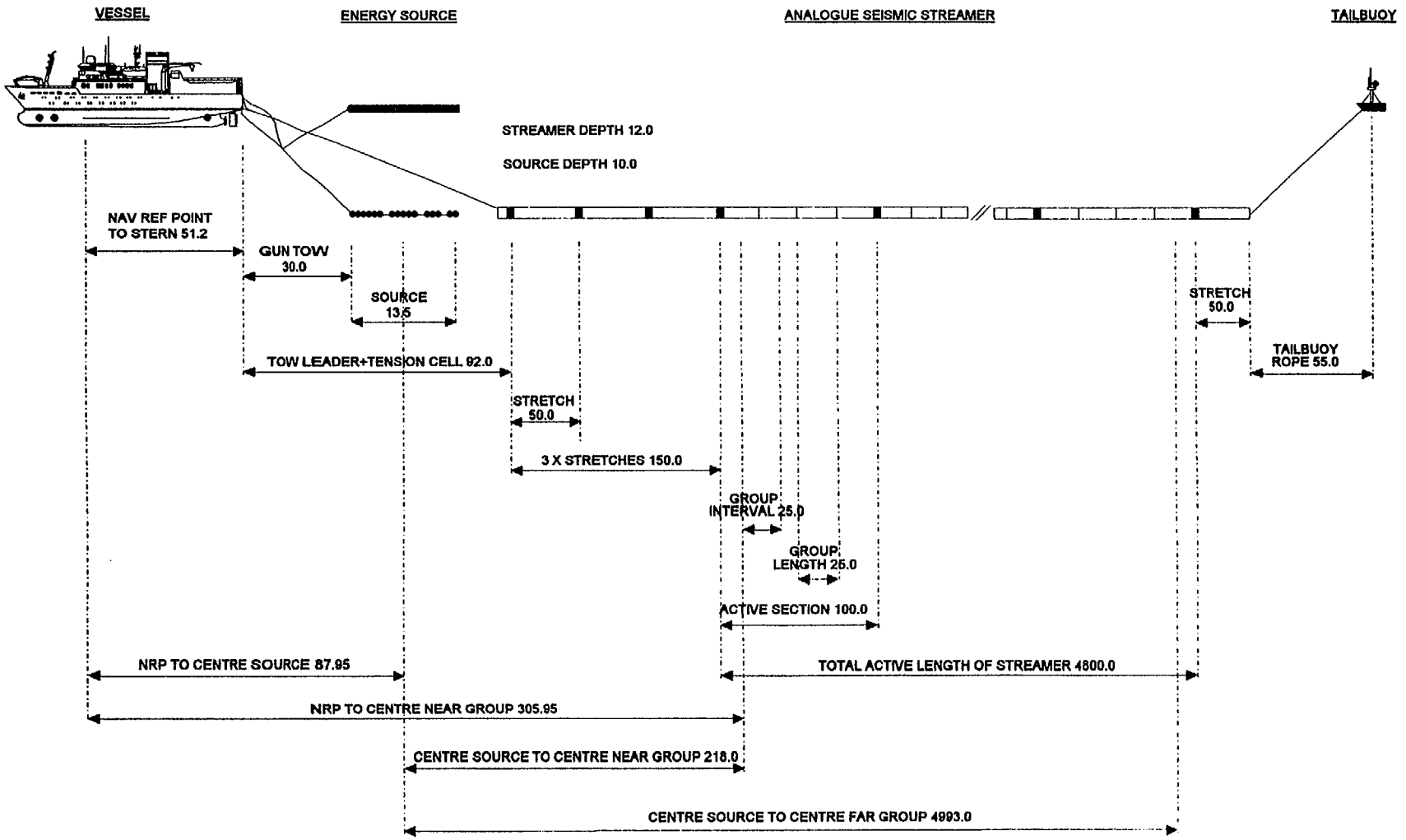
R/V Rig Seismic

Recording Geometry

Drawing valid for line sequence 9 to 15

Cruise 148

TASGO



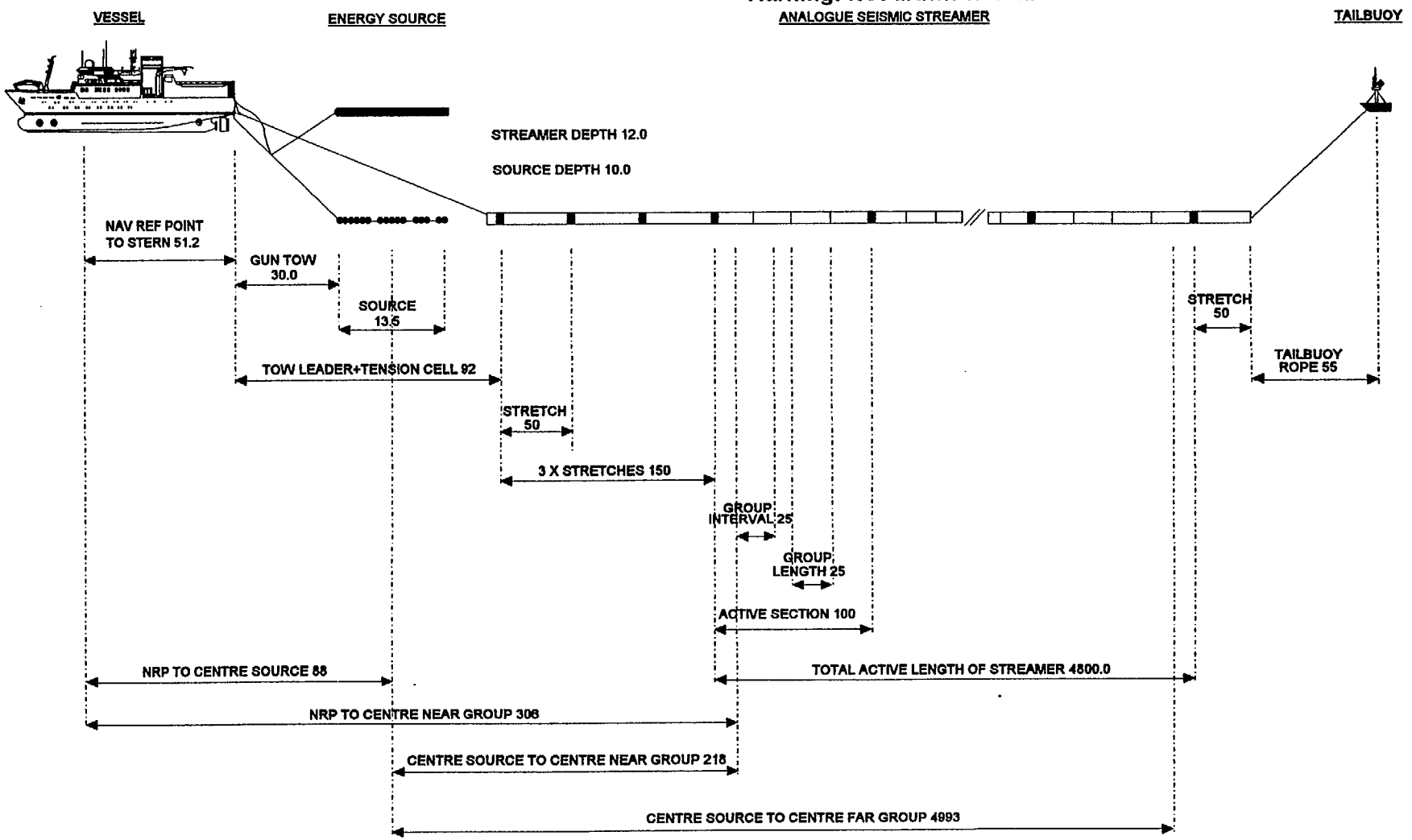
AGSO Marine R/V Rig Seismic

Recording Geometry

Cruise 159 South Tasman Rise

Drawing valid for line sequence 0100,0200

Warning: Not drawn to scale



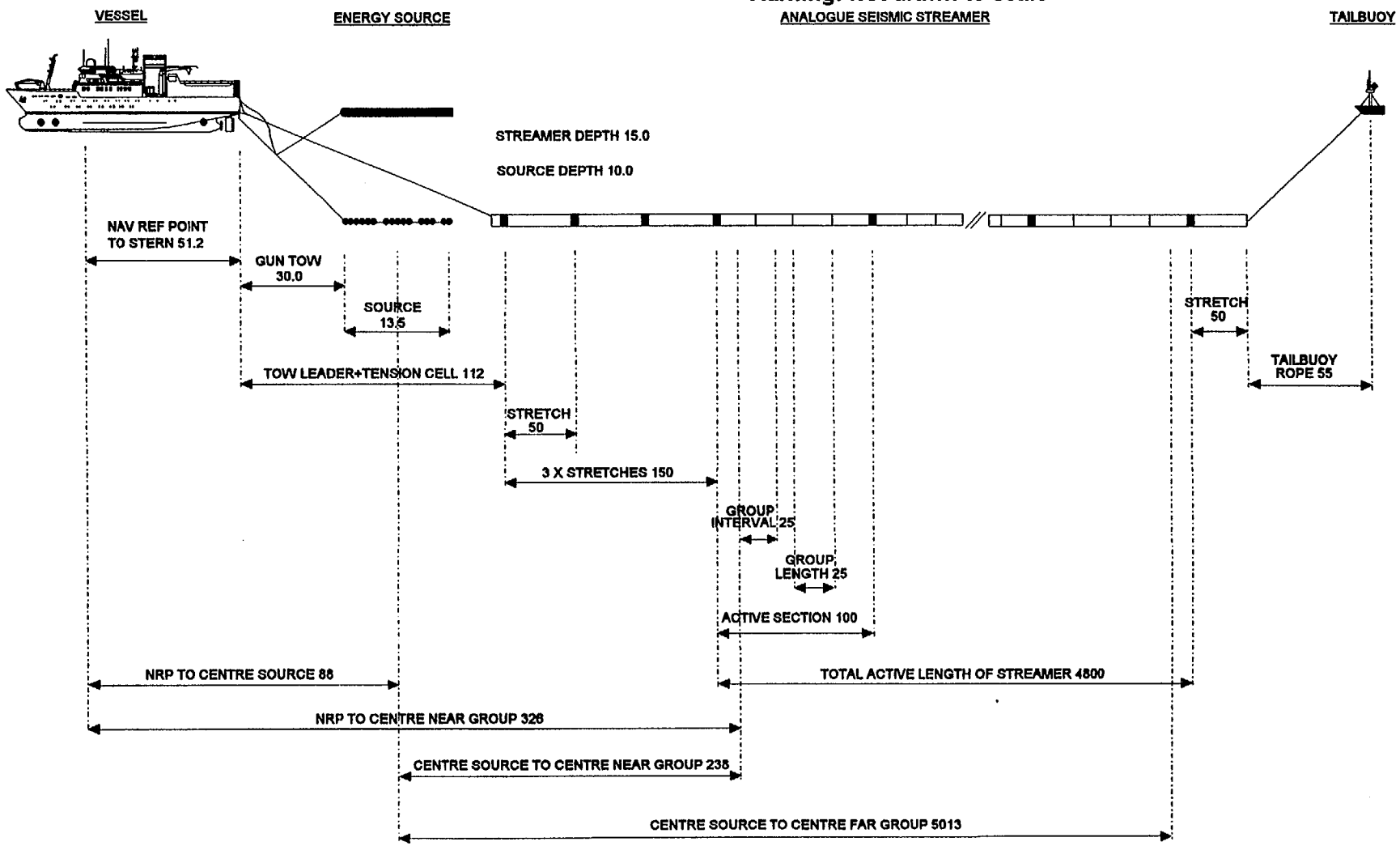
AGSO Marine Recording Geometry Cruise 159

R/V Rig Seismic

Drawing valid for line sequence 0300

South Tasman Rise

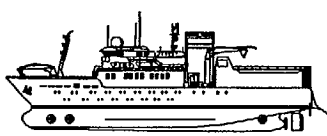
Warning: Not drawn to scale



Streamer Geometry

AGSO Marine
R/V Rig Seismic

Cruise 148/159
TASGO/STR



4800 METER ACTIVE STREAMER
192 CHANNELS
25 METER HYDROPHONE GROUPS
48 x 100 METER ACTIVE SECTIONS
4 CHANNELS PER SECTION

KEY:
- RCL-3 CABLE LEVELLER BIRD
- RCU-831 CABLE COMPASS
- WB — WATERBREAK DETECTOR
- n-nn — CHANNEL NUMBERS

TOW LEADER	T.C.	STR 1	STR 2	STR 3	ACTIVE 1	ACTIVE 2	ACTIVE 3	ACTIVE 4
					WB 1-4	5-8	9-12	13-16

ACTIVE 5	ACTIVE 6	ACTIVE 7	ACTIVE 8	ACTIVE 9	ACTIVE 10	ACTIVE 11	ACTIVE 12	ACTIVE 13	ACTIVE 14
17-20	21-24	25-28	29-32	33-36	37-40	41-44	45-48	WB 49-52	53-56

ACTIVE 15	ACTIVE 16	ACTIVE 17	ACTIVE 18	ACTIVE 19	ACTIVE 20	ACTIVE 21	ACTIVE 22	ACTIVE 23	ACTIVE 24
57-60	61-64	65-68	69-72	73-76	77-80	81-84	85-88	89-92	93-96

ACTIVE 25	ACTIVE 26	ACTIVE 27	ACTIVE 28	ACTIVE 29	ACTIVE 30	ACTIVE 31	ACTIVE 32	ACTIVE 33	ACTIVE 34
WB 97-100	101-104	105-108	109-112	113-116	117-120	121-124	125-128	129-132	133-136

ACTIVE 35	ACTIVE 36	ACTIVE 37	ACTIVE 38	ACTIVE 39	ACTIVE 40	ACTIVE 41	ACTIVE 42	ACTIVE 43	ACTIVE 44
137-140	141-144	WB 145-148	149-152	153-156	157-160	161-164	165-168	169-172	173-176

ACTIVE 45	ACTIVE 46	ACTIVE 47	ACTIVE 48	TAIL STRETCH	TAILBUOY ROPE
177-180	181-184	185-188	WB 189-192		

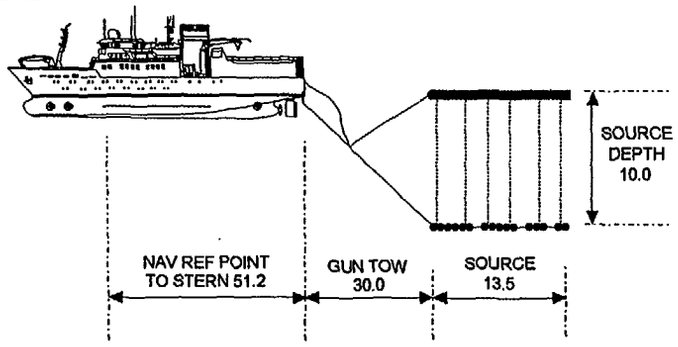
THE BIRDS, COMPASSES AND WATER BREAK PHONES ARE LOCATED 6.25 METRES FROM THE FRONT OF THE INDICATED SECTIONS

AGSO Marine R/V Rig Seismic

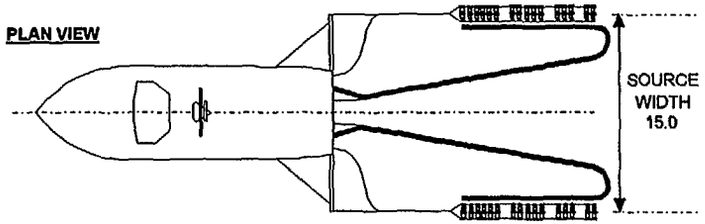
Source Geometry

Cruise 148/159 TASGO/STR

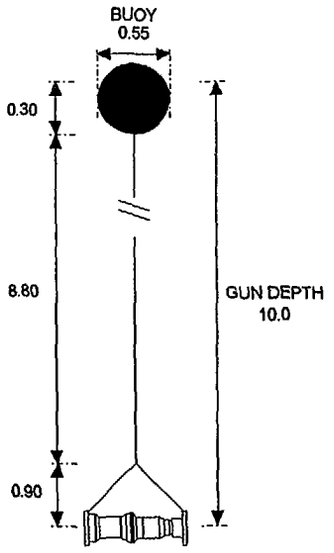
SIDE VIEW



PLAN VIEW



FRONTAL VIEW



ENERGY SOURCE ARRAY DETAILS

3000 CUBIC INCH SLEEVE GUN SOURCE ARRAY

2 SUB-ARRAYS

32 GUNS IN TOTAL

16 GUNS PER SUB-ARRAY (10 ACTIVE - 6 SPARE)

150 CUBIC INCHES PER GUN AT NOMINAL 1800 PSI

4 HYDROPHONES AND 4 DEPTH TRANSDUCERS PER SUB-ARRAY

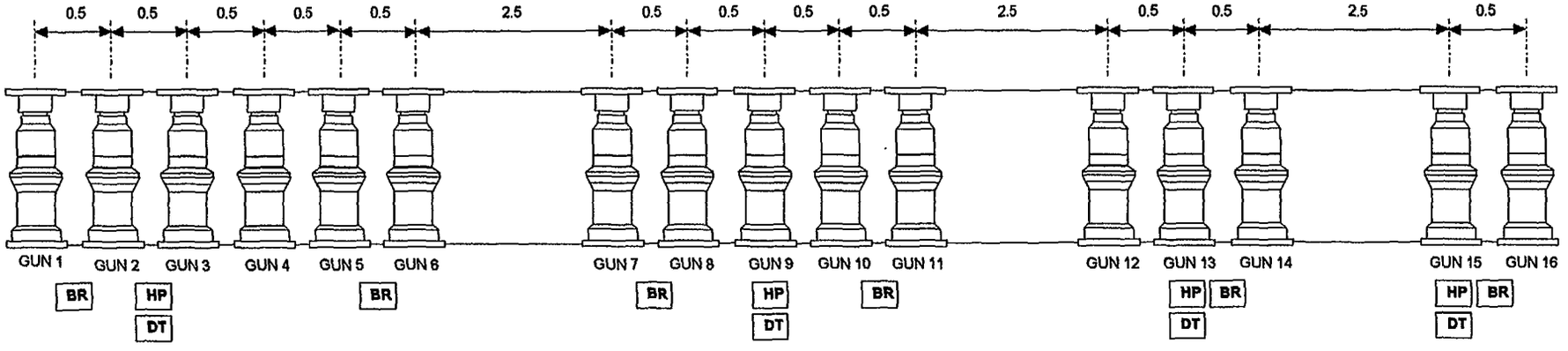
ALL SUB-ARRAY GUNS ARE SUSPENDED FROM ONE SAUSAGE BUOY

GUNS ARE HUNG IN THE WATER HORIZONTALLY

KEY

BR BUOY ROPE HP HYDROPHONE DT DEPTH TRANSDUCER

SUB-ARRAY LAYOUT



AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

LINE SUMMARY LOG

R/V RIG SEISMIC

Line Sequence 001
Sheet 1 of 7

Client: AGSO
Survey no: 148
Survey Name: TASGO

Date 3-3-95
Observers F.S.
Checked By DB MD

Line Name TASG095-15

Direction ϕ90°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	ϕ62·043719	60	148/ϕϕ1	1
SOL Noise test	ϕ62·043719	60		
First shot point (FSP)	ϕ62·045010	100	148/ϕϕ1	1
First chargeable SP (FCSP)	ϕ62·045010	100		
Last chargeable SP (LCSP)	ϕ62·2ϕ37ϕ9	2915		
Last shot point (LSP)	ϕ62·2ϕ37ϕ9	2915	148/ϕ44	2
EOL Noise test	ϕ62·203851	2920		
Acquisition stop	ϕ62·204556	2941	148/045	2

	Start of Line	End of Line
Source to near trace offset (m)	228 m	228 m
Wind direction and speed	variable 2kt	N 2 knots
Swell direction and height	SW 2.5m	NE/SSW 2 M
Average noise (uBar)	3 uB	11 mb
Near 16 trace noise (uBar)	6 uB	13 mb.
Feather angle (degrees)	1°	±2°
Water depth (m)	570	161
Latitude	- 43° 47.9989 S	- 43° 48.156 S ✓
Longitude	- 145° 55.5119 E	- 147° 40.462 E ✓
Source volume (cu ins)	3000	3ϕϕϕ
Disabled guns from full array	nil	NIL
Bad cable depths (bird no.)	nil	NIL
Bad traces	21 low signal.	21 low signal
intermittent	175 cross feed from 176	175 cross feed from 176
	176 leakage noise	176 Leakage
Number of non-recorded SPs		0
Number of gun misfire SPs		47
Number of parity error SPs		0
Percentage of bad SPs		1.7%
Chargeable kilometres		140.8 km

Primary navigation: RACAL 1 Multi-fix 1.3ϕ
Secondary navigation: RACAL 2 Multi-fix 2·ϕ

Racal 1 DGPS tape no. 01 — Nav folder no. 001
Racal 2 DGPS tape no. 01 — DAS tape no. 02
Echo sounder 12 kHz Y/N Y — Transducer depth 6
Echo sounder 3.5 kHz Y/N Partial — Transducer depth 45

Gravity recorded Y/N Y
Magnetics recorded Y/N Y
Mag dist from stern (m) 253
12 kHz chart no. 001
3.5 kHz chart no. 001

Comments: SP 100 - 158 : source - 1st trace offset incorrectly recorded in tape binary header.
3.5KHz Echo operational at 062.0620

APPENDIX 10
Line Summary Logs, TASGO Seismic Lines
(this and next 13 pages)

LINE SUMMARY LOG

AGSO AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

R/V RIG SEISMIC

Line Sequence 002
Sheet 1 of 14

Client: AGSO
Survey no: 148
Survey Name: TASGO

Date 4/3/95
Observers FS
Checked By JB MD

Line Name TASGO95-1 Direction 31° → 7°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	063.005638	50	148/46	2
SOL Noise test	063.005829	55		
First shot point (FSP)	063.011500	100	148/46	2
First chargeable SP (FCSP)	063.011500	100		
Last chargeable SP (LCSP)	064.211347	7607		
Last shot point (LSP)	064.211347	7607	148/162	6
EOL Noise test	064.211516	76.12		
Acquisition stop	064.211838	7622	148/162	6

	Start of Line	End of Line
Source to near trace offset (m)	228m	228m
Wind direction and speed	NNE 25kt	E 10kt
Swell direction and height	1½m NNE 2m.	ESE 1½m
Average noise (uBar)	33 μB. *	3.7 MB
Near 16 trace noise (uBar)	28 μB.	5.7 MB
Feather angle (degrees)	0°	10°
Water depth (m)	155	37.8m
Latitude	43° 49.773S	40° 36.857 S
Longitude	147° 34.512 E	148° 30.992 E
Source volume (cu ins)	3000	3000
Disabled guns from full array	nil	nil
Bad cable depths (bird no.)	nil	nil
Bad traces	* 21 low signal until SP 500 (approx)	58 after SP 5700 (approx)
	175 cross feed from 176	175 cross feed from 176
	176 leakage	176 leakage
Number of non-recorded SPs		3
Number of gun misfire SPs		122
Number of parity error SPs		0
Percentage of bad SPs		1.7%
Chargeable kilometres		375.4 Km

Primary navigation: RACAL 1 MULTIFIX 1.3
Secondary navigation: RACAL 2 MULTIFIX 2.0

Racal 1 DGPS tape no. 001 Nav folder no. 002
Racal 2 DGPS tape no. 001 DAS tape no. 3→4
Echo sounder 12 kHz Y/N Y Transducer depth 6
Echo sounder 3.5 kHz Y/N Y Transducer depth 4.5

Gravity recorded Y/N Y PARTIAL
Magnetics recorded Y/N Y PARTIAL
Mag dist from stern (m) 253
12 kHz chart no. 1
3.5 kHz chart no. 2

Comments: * Noisetest done @ SP 89 average noise = 8.8 μB, 16 trace noise = 10 μB. Cable set to 12m due to swell noise
STBD Gun DT u/s on SOL. Speed erratic due to weather

* SYSTEM ERROR CAUSED SP NUMBERS TO RESYNCH TWICE DURING DOGLEGS AS FOLLOWS:

(continuous shots; missed shots; shots fired)

RECORDED SP:	····	1545	1546	—	103	104	·····	309	310	—	—	1757	1758	···
SP # SHOULD BE:	···	1545	1546	1547	1548	1549	·····	1753	1754	1755	1756	1757	1758	····

LINE SUMMARY LOG

R/V RIG SEISMIC

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Client: AGSO
Survey no: 148
Survey Name: TASGO

Line Sequence 3
Sheet 1 of 8

Date 6-3-95
Observers F.S.
Checked By J.R.

Line Name TASG095-4

Direction 274°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	065.025920	50	148/163	6
SOL Noise test	065.030236	59		
First shot point (FSP)	065.031605	100	148/163	6
First chargeable SP (FCSP)	065.031605	100		
Last chargeable SP (LCSP)	066.011442	4203		
Last shot point (LSP)	066.011442	4203	148/226	8
EOL Noise test	066.0143	4207		
Acquisition stop	066.0144	4209	148/226	8

	Start of Line	End of Line
Source to near trace offset (m)	228m	228m
Wind direction and speed	NE @ 8kt.	E 15K
Swell direction and height	Sea ½m swell E@1m	Sea 1M Swell E 1.5M.
Average noise (uBar)	2 uB.	3.2 µB
Near 16 trace noise (uBar)	6 uB.	7.6 µB.
Feather angle (degrees)	-7°	-2°
Water depth (m)	45m	27m
Latitude	40 39.9975	41 06.1235
Longitude	148 33.780 E	146 15.630E
Source volume (cu ins)	3000 psi	3000 psi
Disabled guns from full array	nil	nil
Bad cable depths (bird no.)	nil	nil
Bad traces	58 - no signal.	58 - no signal.
		155 - noisy from approx tape 211 (leakage spikes).
Number of non-recorded SPs		Ø
Number of gun misfire SPs		64
Number of parity error SPs		Ø
Percentage of bad SPs		1.6%
Chargeable kilometres		205.2 km.

Primary navigation: Racal 1 Multifix v1.3
Secondary navigation: Racal 2 multifix v2.Ø

Racal 1 DGPS tape no. 01 — Nav folder no. 1
Racal 2 DGPS tape no. 01 — DAS tape no. 05
Echo sounder 12 kHz Y/N Y — Transducer depth 6
Echo sounder 3.5 kHz Y/N Y — Transducer depth 4.5

Gravity recorded Y/N N
Magnetics recorded Y/N N
Mag dist from stern (m) 253
12 kHz chart no. 002
3.5 kHz chart no. 002

Comments: Port #2 & Stbd #2 gun DT's u/s on SOL. Port #3 & Stbd #3 gun sensors low amp. Cable back at 10m for this line.

Note: All times on this page should be formatted as DDD.HHMMSS

*SEQ 4 ACCIDENTALLY MISSED - NOT A RECORDED LINE

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

LINE SUMMARY LOG

R/V RIG SEISMIC

Client: AGSO
Survey no: 148
Survey Name: TASGO

Line Sequence 5 *
Sheet 1 of 8
Date 7/3/95
Observers GA/F.S
Checked By J.B MD.

Line Name TASG095-5

Direction 301

	Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
	Acquisition start	066.0703	50	148/227	8
	SOL Noise test	066.0705	56		
	First shot point (FSP)	066.0718	100	148/227	8
	First chargeable SP (FCSP)	066.0718	100		
	Last chargeable SP (LCSP)	066.2359	1634		
*	Last shot point (LSP)	066.2359	1634	148/280	10
	EOL Noise test	067.0001	1640		
	Acquisition stop	067.0002	1644	148/280	10.

	Start of Line	End of Line
Source to near trace offset (m)	228	228
Wind direction and speed	NE 16kt.	WNW 10-15kn
Swell direction and height	NE 1.5m Sea 1m.	E 1-2 M.
Average noise (uBar)	2 μB.	2 μB.
Near 16 trace noise (uBar)	5 μB.	7.9 μB
Feather angle (degrees)	+1°	-10
Water depth (m)	24	51.6.
Latitude	41 06.4485	40 13.705S
Longitude	146 23.722 E	144 44.556 E.
Source volume (cu ins)	30000.	2850
Disabled guns from full array	nil	1 (STBD 3-4-1-1 config).
Bad cable depths (bird no.)	nil	nil
Bad traces	58 no signal.	58
Number of non-recorded SPs		3
Number of gun misfire SPs		202
Number of parity error SPs		0
Percentage of bad SPs		5.9%
Chargeable kilometres		170.95 km.

Primary navigation	Racal 1 Multifix v 1.3			Gravity recorded Y/N	N
Secondary navigation	Racal 2 Multifix v 2.0			Magnetics recorded Y/N	N
Racal 1 DGPS tape no.	2	Nav folder no.	1	Mag dist from stern (m)	253
Racal 2 DGPS tape no.	2	DAS tape no.	6	12 kHz chart no.	2
Echo sounder 12 kHz Y/N	Y	Transducer depth	6	3.5 kHz chart no.	3
Echo sounder 3.5 kHz Y/N	Y	Transducer depth	4.5		

Comments: Start 2 DT u/s. Port 3 gun sensor low amplitude.
NON STANDARD GUN CONFIGURATION FROM 066, 1636 (SP 110) ONWARDS

* OPERATOR ERROR CAUSED SP NUMBERS TO RESYNCH ON DOGLEG AS FOLLOWS:

.... • • x (missed shot) • • (shots fired) ....

RECORDED SP : ..... 1984 1985 — 103 104 1634

SP # SHOULD BE : 1984 1985 1986 1987 1988 3518

LINE SUMMARY LOG

R/V RIG SEISMIC

Line Sequence 6
Sheet 1 of 5

Client: AGSO
Survey no: 148
Survey Name: TASGO

Date 8-3-95
Observers FS/Geo.
Checked By LR MD

Line Name TASG095-6

Direction 273°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	Ø67·Ø538	5Ø	148/281	1Ø
SOL Noise test	Ø67·Ø54Ø	54		
First shot point (FSP)	Ø67·Ø557	1ØØ	148/281	1Ø
First chargeable SP (FCSP)	Ø67·Ø557	1ØØ		
Last chargeable SP (LCSP)	067. 0851	654		
Last shot point (LSP)	067· 1025	970	148/295	10
EOL Noise test				
Acquisition stop	067· 1025	970	148/295	10

	Start of Line	End of Line
Source to near trace offset (m)	228	228
Wind direction and speed	SW 18K	SW 30K
Swell direction and height	NE 1·5M Sea 1M.	SW 2M.
Average noise (uBar)	3uB.	8 µB. 7 Shot 675
Near 16 trace noise (uBar)	6uB.	9 µB } Taken as LCSP closest.
Feather angle (degrees)	-1°	-2°
Water depth (m)	44m	50m
Latitude	40 19·602S	40 18·616S
Longitude	144 57·620 E	144 26·950E
Source volume (cu ins)	3ØØØ	3000
Disabled guns from full array	nil	Nil
Bad cable depths (bird no.)	nil	Nil
Bad traces	58 - no signal.	58 No Signal
	162 Low Signal	162 Low Signal.
Number of non-recorded SPs		0
Number of gun misfire SPs		26
Number of parity error SPs		0
Percentage of bad SPs		3%
Chargeable kilometres		27·75 KM.

Primary navigation: Racal 1 multifix v 1·3
Secondary navigation: Racal 2 multifix v 2·0

Racal 1 DGPS tape no.	002	Nav folder no.	002	Gravity recorded Y/N	N
Racal 2 DGPS tape no.	002	DAS tape no.	07	Magnetics recorded Y/N	N
Echo sounder 12 kHz Y/N	Y	Transducer depth	6	Mag dist from stern (m)	253
Echo sounder 3.5 kHz Y/N	Y	Transducer depth	4·5	12 kHz chart no.	003
				3.5 kHz chart no.	003

Comments: Port #2 gun D/T u/s. Port #3 & Stbd #3 gun sensors low signal.
LINE ABORTED DUE TO CABLE RISING TO 6m AND HIGHER.

Note: All times on this page should be formatted as DDD.HHMMSS

AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

LINE SUMMARY LOG

R/V RIG SEISMIC

Client: AGSO
Survey no: 148
Survey Name: TASGO

Line Sequence 7
Sheet 1 of 6

Date 8-3-95
Observers SR JA
Checked By JR MD

Line Name TASG095-6A

Direction 273°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	067.213943	1544	148/296	10
SOL Noise test	067.215215	1587		
First shot point (FSP)	067.215419	1594	148/296	10
First chargeable SP (FCSP)	067.221149	1655		
Last chargeable SP (LCSP)	068.075944	3333 ✓		
Last shot point (LSP)	068.0759	3333	148/323	11
EOL Noise test	068.0801	3338		
Acquisition stop	068.0802	3340	148/323	11

	Start of Line	End of Line
Source to near trace offset (m)	228	228
Wind direction and speed	SSW 30-35 Kts	SW 20 Kt.
Swell direction and height	SW 2-3m	SW 2-3m Sea 1½m
Average noise (uBar)	23.147 µB	13 µB.
Near 16 trace noise (uBar)	26.763 µB	7 µB.
Feather angle (degrees)	-9°	-2°
Water depth (m)	49.6m	93 M
Latitude	40° 18.863 S	40° 16.2005
Longitude	144° 38.054 E	143° 38.986E
Source volume (cu ins)	3000	3000 (non std. config)
Disabled guns from full array	nil	nil (stbd 2-4-3-1)
Bad cable depths (bird no.)	nil	nil
Bad traces	58 no signal.	162 (120Hz noise)
	21 Low amplitude.	58 no signal
	114 noisy (intermittent).	114 noisy intermittent
Number of non-recorded SPs		0
Number of gun misfire SPs		97
Number of parity error SPs		0
Percentage of bad SPs		5.5%
Chargeable kilometres		83.95

Primary navigation: Racal 1 multifix v 1.3
Secondary navigation: Racal 2 multifix v 2.0

Racal 1 DGPS tape no. 02 Nav folder no. 002
Racal 2 DGPS tape no. 02 DAS tape no. 007
Echo sounder 12 kHz Y/N Y Transducer depth 6
Echo sounder 3.5 kHz Y/N Y Transducer depth 4.5

Gravity recorded Y/N N
Magnetics recorded Y/N * Partial.
Mag dist from stern (m) 253
12 kHz chart no. 3
3.5 kHz chart no. 3/4

Comments: SOL - Cable depth set to 12m Due to weather
SP 2145 Chan 21 fixed by rotating reel (slip rings) a little.
* Magnetometer Deployed at SP 1656
Non-standard gun config (stbd 2-4-3-1) at SP 3161

Note: All times on this page should be formatted as DDD.HHMMSS

LINE SUMMARY LOG

R/V RIG SEISMIC

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Client: AGSO
Survey no: 148
Survey Name: TASGO

Line Sequence 8
Sheet 1 of 5

Date 10/8/95
Observers GA, D.C.
Checked By JB MD

Line Name TASG095-7

Direction 60°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	068·130554	50	148/324	11
SOL Noise test	068·131523	76		
First shot point (FSP)	068·132355	100	148/324.	11
First chargeable SP (FCSP)	068·132355	100		
Last chargeable SP (LCSP)	068·213719	1665		
Last shot point (LSP)	068·213719	1665	148/348	12
EOL Noise test	068·213832.	1668.		
Acquisition stop	068·214127	1674	148/348	12

	Start of Line	End of Line
Source to near trace offset (m)	228	228.
Wind direction and speed	SW 18 kn	SW-W 20-25kn.
Swell direction and height	sea 1½m swell SW 2½m	swell SW 1-2m.
Average noise (uBar)	16·868 µB.	7.436 µB
Near 16 trace noise (uBar)	12·818 µB.	5·194 µB
Feather angle (degrees)	-4°	0°
Water depth (m)	75·1 /	58·1 /
Latitude	40·36·297 /	40·17·982 /
Longitude	143·48·698 /	144·37·993 /
Source volume (cu ins)	3006	3000
Disabled guns from full array	nil	nil
Bad cable depths (bird no.)	B5	B·5
Bad traces	58, 176 (intermittent noise). 162 - low amplitude.	58, 162.
Number of non-recorded SPs		0
Number of gun misfire SPs		67.
Number of parity error SPs		0
Percentage of bad SPs		4·28% /
Chargeable kilometres		78·3 km. /

Primary navigation: Racal 1 multifix v 1·3
Secondary navigation: Racal 2 multifix v 2·0

Racal 1 DGPS tape no. 2 — Nav folder no. 3
Racal 2 DGPS tape no. 2 — DAS tape no. 8
Echo sounder 12 kHz Y/N Y — Transducer depth 6
Echo sounder 3.5 kHz Y/N Y — Transducer depth 4·5

Gravity recorded Y/N N
Magnetics recorded Y/N Y
Mag dist from stern (m) 253.
12 kHz chart no. 3
3.5 kHz chart no. 4

Comments: CABLE AT 12m FOR WHOLE LINE DUE TO WEATHER.
Bird s/s 068·1450 sp376 pl dt s/s intermittent PORT & STARBOARD #3 GUN SENSORS u/s FROM START OF LINE.

Note: All times on this page should be formatted as DDD.HHMMSS

LINE SUMMARY LOG

AGSO AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

R/V RIG SEISMIC

Line Sequence 9
Sheet 1 of 6

Client: AGSO
Survey no: 148
Survey Name: TASGO

Date 11/3/95
Observers ES, GA/JB
Checked By AR

Line Name 148TASG095-8

Direction 200°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	069·195650	50	148/349	12
SOL Noise test	069·195823	55		
First shot point (FSP)	069·201255	100	148/349	12
First chargeable SP (FCSP)	069·201255	100		
Last chargeable SP (LCSP)	070·052942	1926		
Last shot point (LSP)	070·052942	1926	148/37	13
EOL Noise test	070.0536	1949		
Acquisition stop	070.0539	1955	148/378	13

	Start of Line	End of Line
Source to near trace offset (m)	218 M	218.
Wind direction and speed	SW 10kn	NW 20kn.
Swell direction and height	SW 2-3M ½ M sea.	SW 4M Sea 1M.
Average noise (uBar)	25.084 µB.	35 µB
Near 16 trace noise (uBar)	15.6 µB.	35 µB
Feather angle (degrees)	1°	-1°
Water depth (m)	67.2 m	115M
Latitude	40·17·021 S	40·03·475 S
Longitude	144·34·573 E	144·12·763 E
Source volume (cu ins)	3000	3000
Disabled guns from full array	nil	Nil
Bad cable depths (bird no.)	nil	Nil
Bad traces	168 intermittant	168
Number of non-recorded SPs		1
Number of gun misfire SPs		63
Number of parity error SPs		0
Percentage of bad SPs		3.4
Chargeable kilometres		9135km

Primary navigation: Racal 1 multifix V1·3
Secondary navigation: Racal 2 multifix V2.0

Racal 1 DGPS tape no. 2 — Nav folder no. 3
Racal 2 DGPS tape no. 2 — DAS tape no. 9
Echo sounder 12 kHz Y/N Y — Transducer depth 6
Echo sounder 3.5 kHz Y/N part Y — Transducer depth 4·5

Gravity recorded Y/N N
Magnetics recorded Y/N Y
Mag dist from stern (m) 253
12 kHz chart no. 3
3.5 kHz chart no. 4

Comments: 2nd noise test at SOL shot 56 with cable at 10m, shot 94 & 95 cable at 12m. Source to near trace offset 218m. Not correct in header until S.P 819. Port #1 gun DI u/s. Strong swell noise at SOL & EOL SP. 1348 only traces 1–139 recorded.

Note: All times on this page should be formatted as DDD.HHMMSS

LINE SUMMARY LOG

R/V RIG SEISMIC

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Client: AGSO
Survey no: 148
Survey Name: TASGO

Line Sequence 10
Sheet 1 of 7
Date 11/3/95
Observers FS. GA DC
Checked By dR

Line Name TASGO 95-9 Direction 148°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	070 0854	50	148/379	13
SOL Noise test	070 0904	83		
First shot point (FSP)	070.090935	100	148/379	13.
First chargeable SP (FCSP)	070.090935	100		
Last chargeable SP (LCSP)	070.233846	2877		
Last shot point (LSP)	070.233846	2877	148/422	15
EOL Noise test	070.233926	2879		
Acquisition stop	070.234108	2883	148/422.	15

	Start of Line	End of Line
Source to near trace offset (m)	218m	218m
Wind direction and speed	NW 15Kn.	SW 35Kn
Swell direction and height	WSW 3-4M Sea 1M.	SW 3m
Average noise (uBar)	3.	11.5μB.
Near 16 trace noise (uBar)	3	49.7μB.
Feather angle (degrees)	+5°	0
Water depth (m)	107M.	35.4m
Latitude	40 58.479S	41 59.565S
Longitude	144 12.872E	145 10.448E.
Source volume (cu ins)	3000	3000
Disabled guns from full array	Nil	Nil
Bad cable depths (bird no.)	Nil	Nil
Bad traces	Nil 168 intermittant	168 intermittant.
Number of non-recorded SPs		1.
Number of gun misfire SPs		12
Number of parity error SPs		nil
Percentage of bad SPs		4.46%
Chargeable kilometres		138.9 km.

Primary navigation: Racal 1 multifix v1.3
Secondary navigation: Racal 2 multifix v2.0

Racal 1 DGPS tape no.	2	Nav folder no.	3	Gravity recorded Y/N	N
Racal 2 DGPS tape no.	2	DAS tape no.	10	Magnetics recorded Y/N	Y
Echo sounder 12 kHz Y/N	Y	Transducer depth	6	Mag dist from stern (m)	253
Echo sounder 3.5 kHz Y/N	N	Transducer depth	4.5	12 kHz chart no.	3
				3.5 kHz chart no.	4

Comments: Port DT1 u/s at SOL, Port3+STBD3 Gun Sensor u/s at SOL
*SP880 missed Due to a surge in speed.

Note: All times on this page should be formatted as DDD.HHMMSS

LINE SUMMARY LOG

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

R/V RIG SEISMIC

Line Sequence 11
Sheet 1 of 5

Client: AGSO
Survey no: 148
Survey Name: TASGO

Date 13/03/95
Observers SR
Checked By JR

Line Name TASG095-10

Direction 310°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	071.2329	55	148/423	15
SOL Noise test	071.2340	91		
First shot point (FSP)	071.234242	100	148/423	15
First chargeable SP (FCSP)	071.234242	100		
Last chargeable SP (LCSP)	072.052303	1206		
Last shot point (LSP)	072.052303	1206.	148/440	15
EOL Noise test	072.052400	1208		
Acquisition stop	072.052716	1219	148/440	15

	Start of Line	End of Line
Source to near trace offset (m)	218m	—
Wind direction and speed	W 30-35 Kts	WNW 20K
Swell direction and height	W 3-4m	WSW 4M.
Average noise (uBar)	6μB	17 μB
Near 16 trace noise (uBar)	17μB	29
Feather angle (degrees)	0°	+30
Water depth (m)	53.5m	130M.
Latitude	42° 2.016 S	41° 42.995 S
Longitude	145° 8.135 E	144 37.314 E
Source volume (cu ins)	3000	3000
Disabled guns from full array	nil	NIL.
Bad cable depths (bird no.)	nil	Nil
Bad traces	155, Leakage Intermittent 168 noise leakage.	114, 151, 168, 155.
Number of non-recorded SPs		1
Number of gun misfire SPs		45
Number of parity error SPs		0
Percentage of bad SPs		4%
Chargeable kilometres		55.35

Primary navigation: Racal I Multifix 1-3
Secondary navigation: Racal II Multifix 2

Racal 1 DGPS tape no. 002
Racal 2 DGPS tape no. 002
Echo sounder 12 kHz Y/N Y
Echo sounder 3.5 kHz Y/N N

Nav folder no. 003
DAS tape no. 011
Transducer depth 6.0
Transducer depth 4.5

Gravity recorded Y/N N
Magnetics recorded Y/N Y
Mag dist from stern (m) 250m
12 kHz chart no. 004
3.5 kHz chart no. 004

Comments: Pt 3 & Stbd 3 Gun hydros not working
Cable depth at 12m at SOL.
Channels 151, 168, 155 showing intermittent Leakage.

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LINE SUMMARY LOG

R/V RIG SEISMIC

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Client: AGSO
Survey no: 148
Survey Name: TASGO

Line Sequence 12
Sheet 1 of 5 6

Date 13/3/95
Observers FS. GA
Checked By dR

Line Name TASG095-11

Direction 217°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	Ø72·1Ø16	9Ø	148|441	15
SOL Noise test	—	—		
First shot point (FSP)	Ø72·1Ø2Ø	1ØØ	148|441	15
First chargeable SP (FCSP)	Ø72·1Ø38	15Ø		
Last chargeable SP (LCSP)	072.1655	1163		
Last shot point (LSP)	072.1655	1163	148/457	16
EOL Noise test	072.1658	1170		
Acquisition stop	072.1705	1189	148/457	16

	Start of Line	End of Line
Source to near trace offset (m)	218m	218m
Wind direction and speed	W @ 25-30kt.	WSW 25 Kts
Swell direction and height	SW @ 2-3m	WSW 3-4 m
Average noise (uBar)	63 μB. End of record noise	23 μB
Near 16 trace noise (uBar)	63 μB. End of record noise	35 μB
Feather angle (degrees)	53° (vessel late turning onto line)	-2°
Water depth (m)	66m	1691 m
Latitude * 100	41° 37.729S	42° 0.647
Longitude	144° 49.915E	144° 26.793
Source volume (cu ins)	3ØØØ	3ØØØ
Disabled guns from full array	nil	nil
Bad cable depths (bird no.)	nil	nil
Bad traces	151 noise leakage. 168 noise leakage 155 leakage at ~SP 261	151, 168, 155
Number of non-recorded SPs		0
Number of gun misfire SPs		31
Number of parity error SPs		0
Percentage of bad SPs		3.0 %
Chargeable kilometres		50.7 km

Primary navigation: Racal 1 Multifix 1.3
Secondary navigation: Racal 2 Multifix 2

Racal 1 DGPS tape no.	3	Nav folder no.	3	Gravity recorded Y/N	N
Racal 2 DGPS tape no.	3	DAS tape no.	12	Magnetics recorded Y/N	Y
Echo sounder 12 kHz Y/N	Y	Transducer depth	6m	Mag dist from stern (m)	250
Echo sounder 3.5 kHz Y/N	Y	Transducer depth	4.5m	12 kHz chart no.	4
				3.5 kHz chart no.	4

Comments: FSP 100 was 1 mile past preplot SOL due to shallow water large amount swell noise @ SOL. Front of cable hard to maintain spec depth due to swell. Noise High at SOL Due to vessel being late turning onto line. Cable --at 12m due to Wx

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LINE SUMMARY LOG

R/V RIG SEISMIC

Line Sequence 013
Sheet 1 of 5

Client: AGSO
Survey no: 148
Survey Name: TASGO

Date 14-03-95
Observers SR
Checked By HR MD

Line Name TASG095-12

Direction 77°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	072.1744	50	148/458	16
SOL Noise test	072.1757	89		
First shot point (FSP)	072.1801	100	148/458	16
First chargeable SP (FCSP)	072.1801	100		
Last chargeable SP (LCSP)	Φ73.ΦΦΦ6	11Φ7		
Last shot point (LSP)	Φ73.ΦΦΦ6	11Φ7	148/474	16
EOL Noise test	Φ73.ΦΦΦ6	11Φ9		
Acquisition stop	Φ73.ΦΦΦ8	111Φ	148/474	16

	Start of Line	End of Line
Source to near trace offset (m)	218m	218m
Wind direction and speed	WSW 25 Kts	WSW 25-30 Knots
Swell direction and height	WSW 3-4m	SW 2-3m
Average noise (uBar)	35μB	30μB
Near 16 trace noise (uBar)	81μB	79μB
Feather angle (degrees)	-1°	-3°
Water depth (m)	1403m	47.5m
Latitude	42°1.580	41°55.451
Longitude	144°30.970	145°6.475
Source volume (cu ins)	3000	3000
Disabled guns from full array	nil	nil
Bad cable depths (bird no.)	nil	nil
Bad traces	151, 168, 150 Traces All showing intermittent noise leakage	151, 168, 150 All showing intermittent noise leakage
Number of non-recorded SPs		0
Number of gun misfire SPs		31
Number of parity error SPs		0
Percentage of bad SPs		2.8%
Chargeable kilometres		50.4 Km

Primary navigation: Racal I - Multifix 1·3
Secondary navigation: Racal II - Multifix 2

Racal 1 DGPS tape no.	003	Nav folder no.	004	Gravity recorded Y/N	N
Racal 2 DGPS tape no.	003	DAS tape no.	12	Magnetics recorded Y/N	Y/PARTIAL
Echo sounder 12 kHz Y/N	Y	Transducer depth	6	Mag dist from stern (m)	250
Echo sounder 3.5 kHz Y/N	Y	Transducer depth	4.5	12 kHz chart no.	004
				3.5 kHz chart no.	005

Comments: Port 3 & Stbd 3 gun hydros not working at SOL
Port 1 gun d/t u/s.
Cable at 12m for whole line.

Note: All times on this page should be formatted as DDD.HHMMSS

LINE SUMMARY LOG

R/V RIG SEISMIC

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

Client: AGSO
Survey no: 148
Survey Name: TASGO

Line Sequence 14
Sheet 1 of 5

Date 14-3-95
Observers ~~FB~~. GA.
Checked By ~~DR~~ GH

Line Name TASG095-13

Direction 220°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	Ø73·Ø247	60	148/475	16
SOL Noise test	not done due to late turn onto line.			
First shot point (FSP)	Ø73·Ø303	100	148/475	16
First chargeable SP (FCSP)	Ø73·Ø315	132		
Last chargeable SP (LCSP)	Ø73·112634	1508		
Last shot point (LSP)	Ø73·112634	1508	148/497	17
EOL Noise test	Ø73·113307	1526		
Acquisition stop	Ø73·113731	1537	148/497	17

	Start of Line	End of Line
Source to near trace offset (m)	218	218
Wind direction and speed	SW 18kt	SSW 35 Kn.
Swell direction and height	2m Swell SW 2½m	SW 4-5 M.
Average noise (uBar)	58 µB @ SP 140	46µB
Near 16 trace noise (uBar)	58 µB @ SP 140	145 µB
Feather angle (degrees)	40° (due to late turn)	-1°
Water depth (m)	51m	1717 M.
Latitude	41 59·103 S	42. 28·217 S
Longitude	145 06·922 E	144 34·009 E
Source volume (cu ins)	30000	30000
Disabled guns from full array	nil	Nil
Bad cable depths (bird no.)	nil	Nil
Bad traces	154 leakage 155 noisy	Consistent leakage spike - 151 Intermit leakage spikes - 155, 116
Number of non-recorded SPs		NIL
Number of gun misfire SPs		44
Number of parity error SPs		0
Percentage of bad SPs		3.1
Chargeable kilometres		68.85

Primary navigation: Racal 1 Multifix v 1·3
Secondary navigation: Racal 2 Multifix v 2·Ø

Racal 1 DGPS tape no.	3	Nav folder no.	3	Gravity recorded Y/N	Ypartial
Racal 2 DGPS tape no.	3	DAS tape no.	13	Magnetics recorded Y/N	Y
Echo sounder 12 kHz Y/N	Y	Transducer depth	6	Mag dist from stern (m)	253
Echo sounder 3.5 kHz Y/N	Y	Transducer depth	4·5	12 kHz chart no.	4
				3.5 kHz chart no.	5

Comments: Port #1 gun DIT up. Swell noise @ SOL & through entire line. Cable Depth set at 12m. Gravity meter on at 0848 utc

Note: All times on this page should be formatted as DDD.HHMMSS

AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

LINE SUMMARY LOG

R/V RIG SEISMIC

TASG095-14.
Line Sequence 15
Sheet 1 of 8

Client: AGSO
Survey no: 148
Survey Name: TASGO

Date 15·3·95
Observers
Checked By

Line Name TASG095-14 Direction 128

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	073·161311	50	498	148/17
SOL Noise test	073·163348	101		
First shot point (FSP)	073·163323	100	498	148/17
First chargeable SP (FCSP)	073·163323	100		
Last chargeable SP (LCSP)	074·182213	4509		
Last shot point (LSP)	074·182213	4509	566.	148/19
EOL Noise test	074·183123	4538		
Acquisition stop	074·183243	4541	4567	148/19.

	Start of Line	End of Line
Source to near trace offset (m)	218	218.
Wind direction and speed	S 30kn	variable.
Swell direction and height	SW 4m sea 2m	SW 3M
Average noise (uBar)	9.3 µB	28.293 µB
Near 16 trace noise (uBar)	8.2 µB	65.881 µB
Feather angle (degrees)	-1	0
Water depth (m)	1677.1	157.3M
Latitude	42 22.499	43 51.819
Longitude	144 33.101	146 17.668.
Source volume (cu ins)	3000	3000
Disabled guns from full array	Nil	nil.
Bad cable depths (bird no.)	nil	19(sp295)
Bad traces	155, 154, 168	155 intermittant, 154 crossfeed. 168 intermittant
Number of non-recorded SPs		nil
Number of gun misfire SPs		28
Number of parity error SPs		0
Percentage of bad SPs		0·6%
Chargeable kilometres		220·5 km

Primary navigation: RACAL 1 Multifix v1.3
Secondary navigation: RACAL 2 Multifix v2.0

Racal 1 DGPS tape no.	3	Nav folder no.	3	Gravity recorded Y/N	Y
Racal 2 DGPS tape no.	3	DAS tape no.	Ø14	Magnetics recorded Y/N	Y
Echo sounder 12 kHz Y/N	Y	Transducer depth	6	Mag dist from stern (m)	253
Echo sounder 3.5 kHz Y/N	Y	Transducer depth	4·5	12 kHz chart no.	4
				3.5 kHz chart no.	5

Comments: stbd 1 dtl/s. 3 Doglegs. Cable Depth at 12m

Note: All times on this page should be formatted as DDD.HHMMSS

LINE SUMMARY LOG

R/V RIG SEISMIC

Line Sequence 0100
Sheet 1 of 8

Client: AGSO
Survey no: 159
Survey Name: STR

Date 16-3-95
Observers FS/DC, Ga
Checked By JB, MD.

Line Name STR95-A Direction 236°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	075.1036	50	159|1	1
SOL Noise test	—	—		
First shot point (FSP)	075.1053	100	159|1	1
First chargeable SP (FCSP)	075.1053	100		
Last chargeable SP (LCSP)	076.1133	4295		
Last shot point (LSP)	076.1133	4295	159|66	3
EOL Noise test	076.1143	4323		
Acquisition stop	076.1145	4329	159|66	3

	Start of Line (FSP)	End of Line (LSP)
Wind direction and speed	NW 35 Kn.	W 10 Kn.
Swell direction and height	W 3-4M.	W 2M. Sea 0.5M
Average noise (uBar)	—	41 uB
Near trace noise (uBar)	—	60 uB.
Feather angle (degrees)	-11	0°
Water depth (m)	120 m	4803 M.
Latitude	43 23.503 S	44° 27.292'
Longitude	145 49.402 E	143° 39.886'
Source volume (cu ins)	3000	3000
Disabled guns from full array	nil	nil
Bad cable depths (bird no.)	nil	nil
Bad traces	168 noise leakage.	93, 155, 168, 168 - leakage spikes on all - intermittently on 108

Source to near trace offset (m) 218m
Operating streamer depth (m) 12m

Primary navigation Racal multifix v1.3
Secondary navigation Racal 2 multifix v2.0

Number of non-recorded SPs 0
Number of gun misfire SPs 53
Number of parity error SPs 0
Percentage of bad SPs 1.2%
Chargeable kilometres 209.8km

Racal 1 DGPS tape no. 001
Racal 2 DGPS tape no. 001
Echo sounder 12 kHz Y/N Y
Echo sounder 3.5 kHz Y/N Y

Nav folder no. 001
DAS tape no. 001
Transducer depth 6M
Transducer depth 4.5M

Gravity recorded Y/N Y
Magnetics recorded Y/N Y
Mag dist from stern (m) 253M.
12 kHz chart no. 001
3.5 kHz chart no. 001

Comments: Low cut filter 8Hz, Tailbuoy intermittent.

APPENDIX 11
Line Summary Logs, STR Seismic Lines
(this and next 2 pages)

AGSO
AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

LINE SUMMARY LOG

R/V RIG SEISMIC

Line Sequence 0200
Sheet 1 of 7

Client: AGSO
Survey no: 159
Survey Name: STR

Date 18-3-95
Observers ~~FS~~
Checked By SR . MD.

Line Name STR95-Z Direction 344°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	077·0856	1	159|67	3
SOL Noise test	077·0900	10		
First shot point (FSP)	077·0903	20	159|67	3
First chargeable SP (FCSP)	077·0903	20		
Last chargeable SP (LCSP)	078·012005	3001		
Last shot point (LSP)	078·012005	3001	159|113	4
EOL Noise test	078·012101	3022		
Acquisition stop	078·012951	3030	159|113	4

	Start of Line (FSP)	End of Line (LSP)
Wind direction and speed	SSW 25Kn.	W 30K.
Swell direction and height	W 3M Sea 1M	WSW 3M Sea 2M.
Average noise (uBar)	13uB.	4uB
Near trace noise (uBar)	6uB.	5uB.
Feather angle (degrees)	1°	-3°
Water depth (m)	2063 M	4347.
Latitude	45 19·077	44 1·6765
Longitude	144 55·337	144 24·481 E
Source volume (cu ins)	3000	3000
Disabled guns from full array	nil	NIL
Bad cable depths (bird no.)	nil	Nil
Bad traces	(155, 168, 114) noise Leakage	44 Noise. 168, 155. Noise Leakage 114, Noise Leakage

Source to near trace offset (m) 218m
Operating streamer depth (m) 12m

Primary navigation Racal I (M1·3)
Secondary navigation Racal II (M2)

Number of non-recorded SPs 0
Number of gun misfire SPs 44
Number of parity error SPs 0
Percentage of bad SPs 1·5
Chargeable kilometres 149·10

Racal 1 DGPS tape no. 01
Racal 2 DGPS tape no. 01
Echo sounder 12 kHz Y/N Y
Echo sounder 3.5 kHz Y/N Y

Nav folder no. 01
DAS tape no. 02
Transducer depth 6m
Transducer depth 4.5m

Gravity recorded Y/N Y
Magnetics recorded Y/N Y
Mag dist from stern (m) 253m
12 kHz chart no. 01
3.5 kHz chart no. 01

Comments: Low-cut filter at 8Hz at SOL. FSP 4km before preplot SOL at client request.

Note: All times on this page should be formatted as DDD.HHMM.SS

LINE SUMMARY LOG

AUSTRALIAN GEOLOGICAL SURVEY ORGANISATION

R/V RIG SEISMIC

Line Sequence 0300
Sheet 1 of 6

Client: AGSO
Survey no: 159
Survey Name: STR

Date 20-3-95
Observers JS.
Checked By MR MD.

Line Name STR95-13 Direction 071°

Line Information	Time (UTC)	Shot Point	Tape Number	Box No.
Acquisition start	079.045250	50	159/114	4
SOL Noise test	079.045332	52		
First shot point (FSP)	079.051007	100	159/114	4
First chargeable SP (FCSP)	079.051007	100		
Last chargeable SP (LCSP)	079.150321	1820		
Last shot point (LSP)	079.160253	1990	159/143	5
EOL Noise test	—	—		
Acquisition stop	079.160253	1990	159/143	5

	Start of Line (FSP)	End of Line (LSP)
Wind direction and speed	WNW 30 Km	W 45 kts
Swell direction and height	W 4m Sea 2m	W 4m
Average noise (uBar)	26 µB	48 µB
Near 16trace noise (uBar)	28 µB.	81 µB
Feather angle (degrees)	6	7°
Water depth (m)	4803m	2749 m
Latitude	45° 08.070 S	44°51.325 S
Longitude	143 51.998 E	144° 59.956 E
Source volume (cu ins)	3000	3000
Disabled guns from full array	nil	nil
Bad cable depths (bird no.)	1, 25	1, 25
Bad traces	49, 50, 108, 190 all dead 168, noise Leakage	49, 50, 108, 155, (noisy). 168, 190,

Source to near trace offset (m) 238m
Operating streamer depth (m) 15m

Primary navigation Racal 1 (M 1.3)
Secondary navigation Racal 2 (M 2)

Number of non-recorded SPs 0
Number of gun misfire SPs 48
Number of parity error SPs 0
Percentage of bad SPs 2.8%
Chargeable kilometres 86.05km

Racal 1 DGPS tape no. 1
Racal 2 DGPS tape no. 1
Echo sounder 12 kHz Y/N Y
Echo sounder 3.5 kHz Y/N Y

Nav folder no. 1
DAS tape no. 3
Transducer depth 6
Transducer depth 4.5

Gravity recorded Y/N Y
Magnetics recorded Y/N Y
Mag dist from stern (m) 253m
12 kHz chart no. 2
3.5 kHz chart no. 2

Comments: First 600m of cable between 10->15m for whole line.
LGSP 44 52.821S 144 53.856E LINE ABORTED 94.50 km AFTER PREPLOT SOL BECAUSE OF CABLE RISING TO SURFACE

Note: All times on this page should be formatted as DDD.HHMM.SS

APPENDIX 12
Seismic Data Format

The AGSO field tapes are written in a modified SEG-Y format.

The records are written in 16-bit fixed point format (sample code 3) as defined in the report "Recommended Standards for Digital Tape Formats", *Geophysics*, vol 40, No 2 (April 1975), p. 344-352.

The first 3200 bytes on each tape comprise the ASCII reel identification header.

The next 400 bytes are the binary coded block part of the reel identification header.

The 240-byte trace headers are in 16-bit fixed point format and are standard for the non-optional words.

The trace data are in AGSO's Instantaneous Floating Point (IFP) format.

Definition of Tape Headers

Binary reel header for SEG-Y format magnetic tapes

WORD	DESCRIPTION	FORMAT
1-2	SURVEY NUMBER	I-32
3-4	LINE NUMBER (only one line per tape)	I-32
5-6	TAPE NUMBER	I-32
7	NUMBER OF SEISMIC TRACES PER SHOT	I-16
8	NUMBER OF AUXILIARY CHANNELS	I-16
9	SAMPLE INTERVAL (microsecs)	I-16
10	SAMPLE INTERVAL (microsecs) (for original recording)	I-16
11	NUMBER SAMPLES PER DATA TRACE	I-16
12	NUMBER SAMPLES PER DATA TRACE (for original recording)	I-16
13	DATA FORMAT CODE 1. floating point (4 bytes) 3. fixed point (2 bytes) ?. floating point (2 bytes)	I-16
14	CDP FOLD	I-16
15	TRACE SORTING 1. as recorded (preset to this)	I-16
16	VERTICAL SUM CODE 1. no sum (preset to this)	I-16
17-26	unassigned	
27	AMPLITUDE RECOVERY METHOD	I-16

	1. none (preset to this)	
28	MEASUREMENT SYSTEM	I-16
	1. metres	
29-200	unassigned	

Standard portions of SEG-Y format used by MPSR Division

WORD	DESCRIPTION	FORMAT
1-2	TRACE SEQUENCE NO. WITHIN LINE	I-32
3-4	TRACE SEQUENCE NO. ON TAPE	I-32
5-6	FIELD SHOT POINT NUMBER	I-32
7-8	CHANNEL NUMBER WITHIN SHOT	I-32
9-14	unassigned	
15	TRACE IDENTIFICATION CODE	I-16
	*1 - seismic data	
	*2 - dead	
	*3 - dummy	
	4 - time break	
	5 - uphole (land only)	
	6 - sweep	
	7 - timing	
	*8 - water break	
	*9 - oscillator test	
	*10 - noise test	
	*11 - cable/oscillator test	
	*12 - airgun signature	
	*13 - airgun shuttle sensor	
	*14 - sonobouy	
	*15 - amplifier test	
	*16 - low cut filter test	
	*17 - high cut filter test	
	*18 - amplifier impulse test	
	*19 - amplifier cross-talk test	
	Note: * indicates implemented in this system	
16	NO. OF VERTICALLY STACKED TRACES	I-16
	(preset to 1)	
17	NO. OF HORIZONTALLY STACKED TRACES	I-16
	(preset to 1)	
18	DATA USE	I-16
	1. production (preset to this)	
	2. test data	
19-20	DISTANCE FROM SOURCE TO RECEIVER	I-32
	(negative value as opposite to travel direction)	
21-22	GROUP DEPTH (negative as below sea level)	I-32
23-24	SURFACE ELEVATION AT SOURCE	I-32
	(preset to 1)	

25-26	SOURCE DEPTH (negative as below sea level)	I-32
27-28	DATUM ELEVATION AT RECEIVER GROUP	I-32
29-30	DATUM ELEVATION AT SOURCE	I-32
31-32	WATER DEPTH AT SOURCE	I-32
33-34	WATER DEPTH AT GROUP	I-32
35	DEPTH SCALAR (preset to -10)	I-16
36	CO-ORDINATE SCALER (preset to 1)	I-16
37-53	unassigned (see below)	
54	LAG TIME B (Time from start of recording to initiation of energy source in millisecs)	I-16
55	RECORDING DELAY (millisecs)	I-16
56-57	unassigned	
58	NUMBER OF SAMPLES IN RECORD	I-16
59	SAMPLE INTERVAL (microsecs)	I-16
60	GAIN TYPE OF FIELD INSTRUMENT 1. fixed gain (preset to this) 3. floating point gain	I-16
61	TRACE AMPLIFIER GAIN	I-16
62-74	unassigned	
75	LOW-CUT FILTER FREQUENCY	I-16
76	HIGH-CUT FILTER FREQUENCY	I-16
77	LOW-CUT FILTER SLOPE db/octave (preset at 18 dB/octave)	I-16
78	HIGH-CUT FILTER SLOPE db/octave (preset at 72 dB/octave)	I-16
79	SHOT INSTANT - year data recorded	I-16
80	SHOT INSTANT - day of year	I-16
81	SHOT INSTANT - hour of day	I-16
82	SHOT INSTANT - minute of hour	I-16
83	SHOT INSTANT - second of minute	I-16
84	TIME BASE CODE 1. local 2. GMT (preset to this) 3. other	I-16
85-90	unassigned	

Usable words in SEG-Y trace header (non-standard) - April 1993

WORD	DESCRIPTION	FORMAT
37	NUMBER OF SOURCE GUNS	I-16
38	GUN TRIGGER DELAYS FOR "CHANNEL" GUN IN 10ths OF MILLISECS	I-16
39	GUN FIRING DELAYS - TRIGGER DELAYS FOR "CHANNEL" GUN IN 10ths OF MILLISECS	I-16
40	GUN FIRING ERROR FOR "CHANNEL" GUN	

	IN 10ths OF MILLISECS	I-16
41	NUMBER OF CABLE BIRD DEPTH SENSORS	I-16
42	DEPTH OF "CHANNEL" BIRD IN 10ths OF METRE	I-16
43	NUMBER OF CABLE BIRD WING ANGLES	I-16
44	ANGLE OF "CHANNEL" BIRD WING IN 10ths DEGREE	I-16
45	NUMBER OF CABLE COMPASSES	I-16
46	ANGLE OF "CHANNEL" COMPASS IN 10ths DEGREE	I-16
47	NUMBER OF GUN DEPTHS	I-16
48	DEPTH OF "CHANNEL" GUN SENSOR IN 10ths METRE	I-16
91	SHOT INSTANT - fraction of sec (msecs)	I-16
92	INTERVAL FROM LAST SHOT (msecs)	I-16

MARINE GRAVITY TIE DATA BOOKING SHEET

& Pre SURVEY #148

	SURVEY # 147 A	DATE 27/02/95	Julian day	58		GMT diff(hrs) 11	QUALITY CONTROL CHECK #1	
	AREA	observer(s)	PORT	scale factor		METER & #	LOAD LINE	Name	
	Elizabeth St.	6491.026	Hobart	0.1021		W 140	5.4m	Date	
	STATION	isogal number	TIME	reading	wharf ht (ASL)	STN. VALUE		ships gr. value	REMARKS
A	WHARF		15:21	644.1		micrometers/sec		119.50	Wharf Ht. 3.26m
B	Gate		15:29	650.8					
C	Elizabeth St. Wharf	6491.026	15:40	633.2					Wharf Ht. 3.17m
A	WHARF		15:54	648.4				119.35	Wharf Ht. 3.25m
B			16:00	654.0					
C			16:10	634.3					Wharf Ht. 3.04m
A	WHARF		16:23	647.3				119.31	Wharf Ht. 3.1m
B									
C									
A	WHARF								
B									
C									
A	WHARF								

2. A detailed and accurate diagram of the wharf station and excentre is to accompany this form.

3. The originals of this form, the diagram and a copy of the navlog printout are to return to Canberra.

HOBART

APPENDIX 13
Gravity Tie Data, Pre-cruise (Hobart) and Post-cruise (Sydney)
(this and next 6 pages)

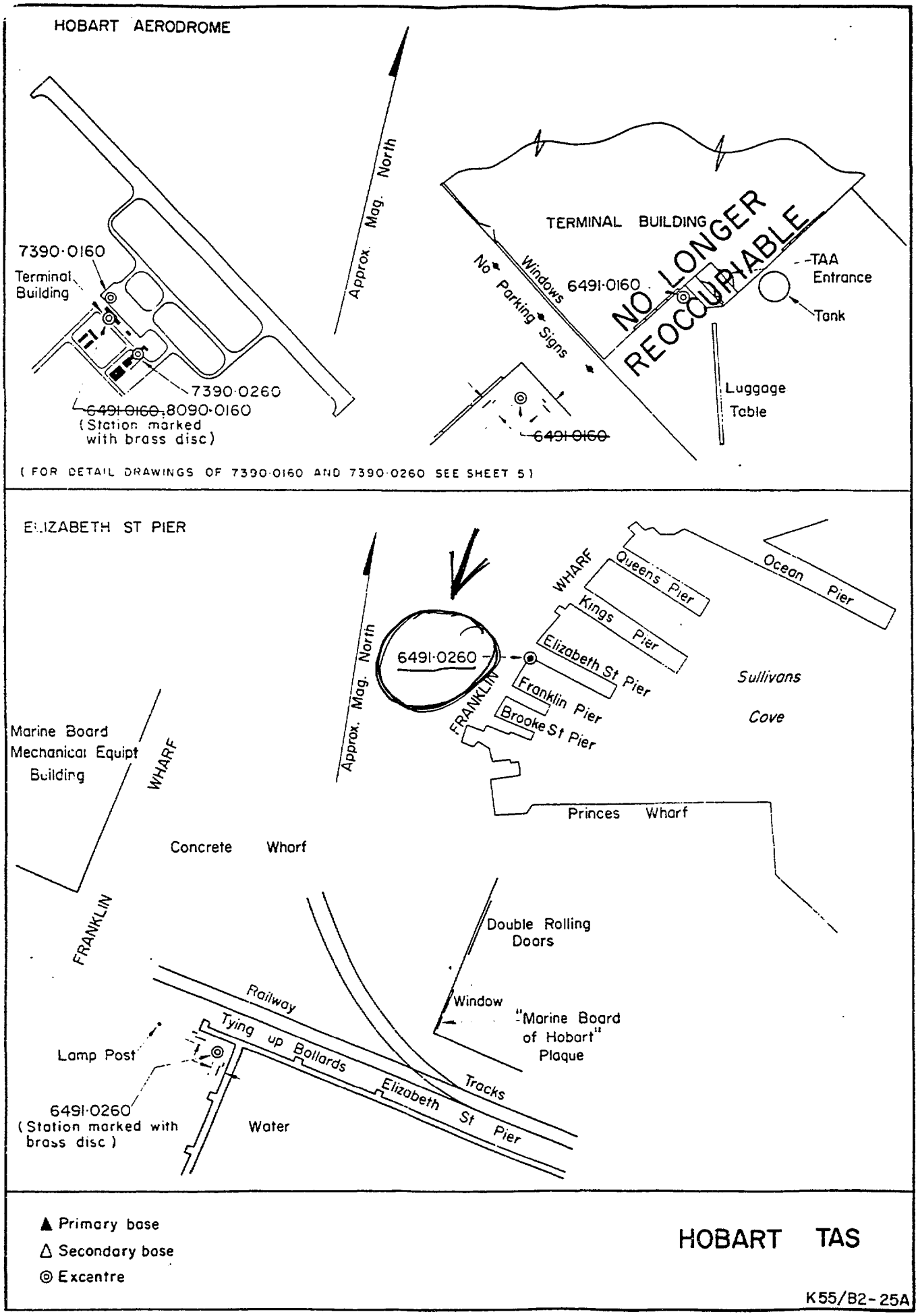
MARINE GRAVITY TIE DATA BOOKING SHEET

							GMT diff(hrs)		
	SURVEY #148	DATE29/2/95		Julian day				QUALITY CONTROL CHECK #1	
	AREA	observer(s)	PORT	scale factor		METER & #	LOAD LINE	Name	
	ELIZABETH ST	J RYAN	HOBART	0.1021		W 140	4.40	Date	
	STATION	isogal number	TIME	reading	wharf ht (ASL)	STN. VALUE		ships gr. value	REMARKS
A	WHARF		10 28	641.3	2.20	micrometers/sec		119.00	
B	GATE		10 34	648.0					
C	ELIZABETH STWARF	6491.026	10 55	628.9		9804372.5			
A	WHARF		11 04	645.2	2.30			119.14	
B			11 11	649.7					
C			11 20	629.3					
A	WHARF		11 31	645.5	2.30			119.01	
B			11 41	645.3					
C			11 51	629.9					
A	WHARF		12 00	646.5	2.60			119.10	
B			12 09	648.9					
C									
A	WHARF								

2. A detailed and accurate diagram of the wharf station and excentre is to accompany this form.

3. The originals of this form, the diagram and a copy of the navlog printout are to return to Canberra.

HOBART



GRAVITY STATIONS
AUSTRALIAN NATIONAL GRAVITY NETWORK

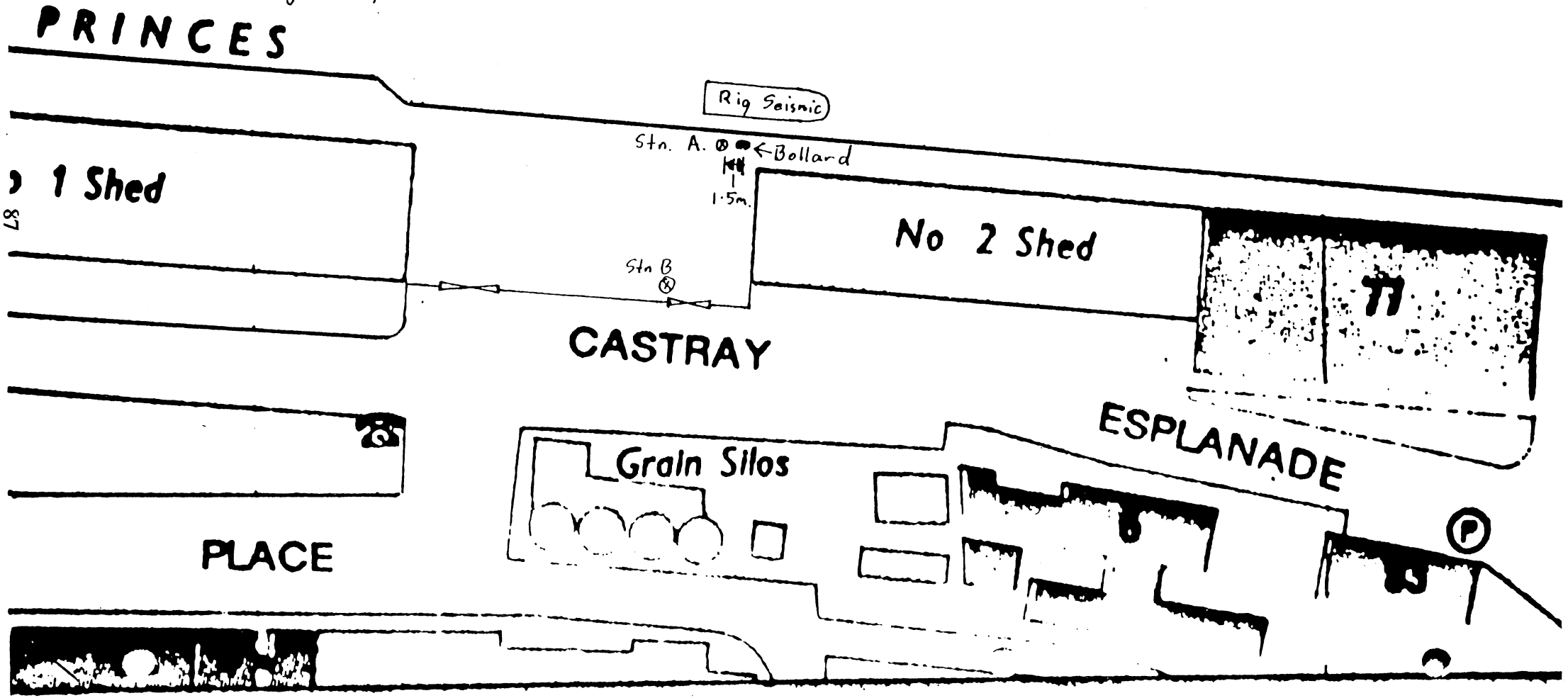
Cruise 148
TASGO

N

Stn A is on #2 berth Princes Wharf 1.5m. West of the bollard nearest the western corner of #2 shed.

Stn B is adjacent to the West gate post of the Eastern gate leading into # 1 and #2 berth on Princes Wharf

Stn C is gravity Stn # 6491.0260 adjacent to Elizabeth st. Wharf.



MARI. : GRAVITY TIE DATA BOOKING .EET

QUALITY CONTROL C. :K (*1)

	SURVEY: 148/159	DATE: 29/03/95	GMT diff(hrs)					Name	
	area	observer(s)	port	scale factor		meter & s/no	load line	Date	
		SR DC JA				W 140	5.4	m	
	station	isogal number	local time	reading	wharf ht (ASL)	station value		ships gr value	remarks
A	WHARF ship	~~43900105~~	1018	1113.8	2.00m				
B	shed #9		1025	1119.2					
C	isogal st	93900105	1045	1118.4					
A	WHARF		1056	1115.6	2.25m				
B	shed #9		11.05	1122.6					
C			1110	1118.5					
A	WHARF		1118	1116.3	2.40m				
B			1125	1124.7					
C			1132	1110.6					
A	WHARF		1136	1116.5	2.45m				
B			1142	1121.0					
C			1146	1114.7					
A	WHARF		1150	1121.3	2.65m				

***Notes:**

1. This form is to be checked by a QC person before the tie is considered complete
2. A detailed and accurate diagram of the wharf station and excentre is to accompany this form
3. The originals of this form, the diagram and a copy of the navlog printout are to return to Canberra.

DARLING HARBOUR
SYDNEY

1/07/93

88

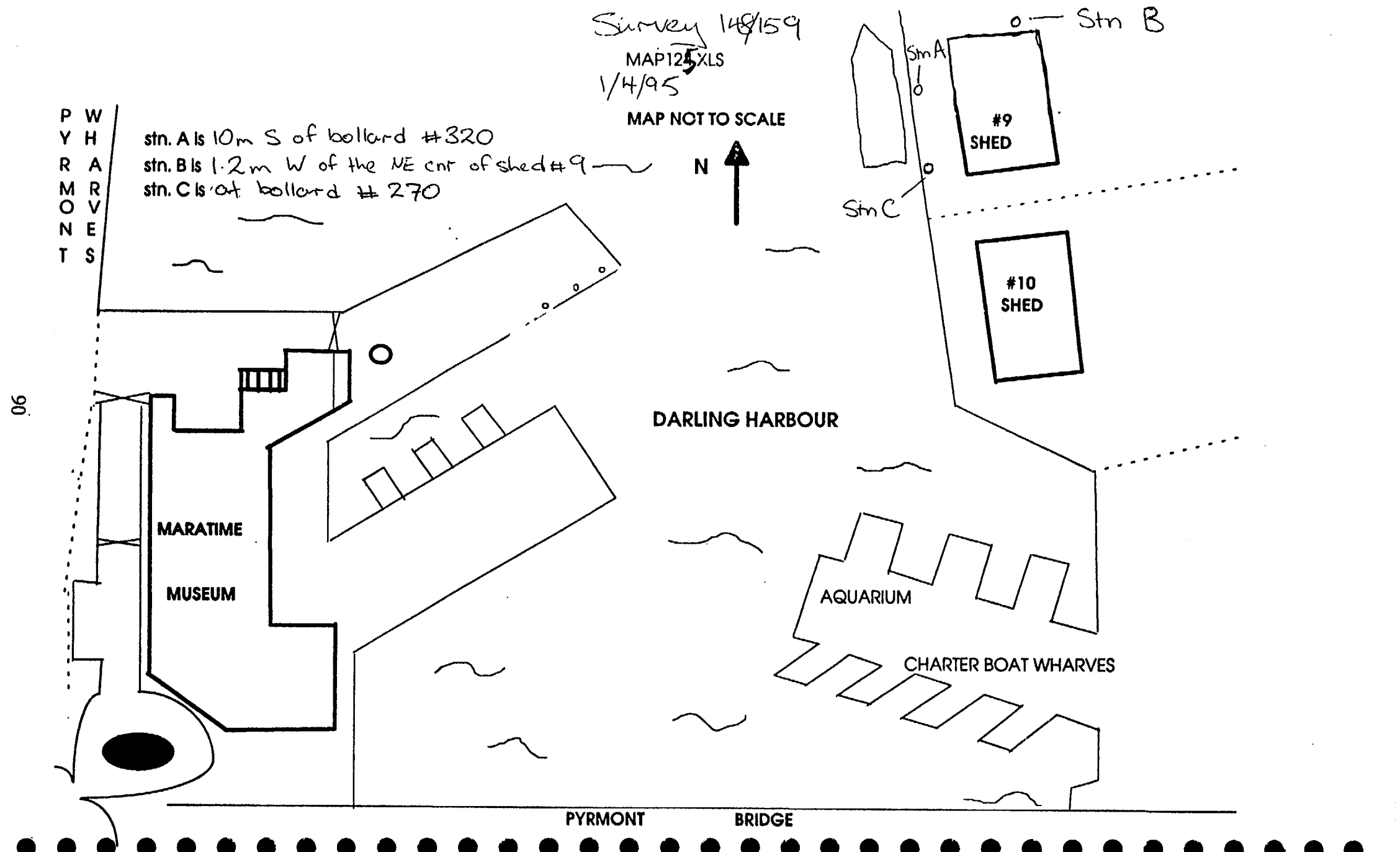
MARI. E GRAVITY TIE DATA BOOKING S EET								QUALITY CONTROL C. CK (*1)	
	SURVEY: 148/159	DATE: 01/04/95	GMT diff(hrs)					Name	
	area	observer(s)	port	scale factor		meter & s/no	load line	Date	01/04/95
	Tasmania	SR	Darling Hbr	0.1097		121 MW 548	5.4	m	
	station	isogal number	local time	reading	wharf ht (ASL)	station value		ships gr value	remarks
A	WHARF		1200	1182.3	2.10m			-649.93	
B			1209	1189.3					
C		93900105	1216	1185.7					
A	WHARF		1222	1185.2	2.20m			-649.71	
B			1226	1190.1					
C			1233	1186.3					
A	WHARF		1240	1186.3	2.30m			-649.74	
B			1245	1190.8					
C			1249	185.6					
A	WHARF		1254	1186.3	2.45m			-649.64	
B			1302	1190.7					
C			1310	1186.8					
A	WHARF		1314	1186.0	2.45m			-649.57	

***Notes:**

1. This form is to be checked by a QC person before the tie is considered complete
2. A detailed and accurate diagram of the wharf station and excentre is to accompany this form
3. The originals of this form, the diagram and a copy of the navlog printout are to return to Canberra.

DARLING HARBOUR
SYDNEY

1/07/93

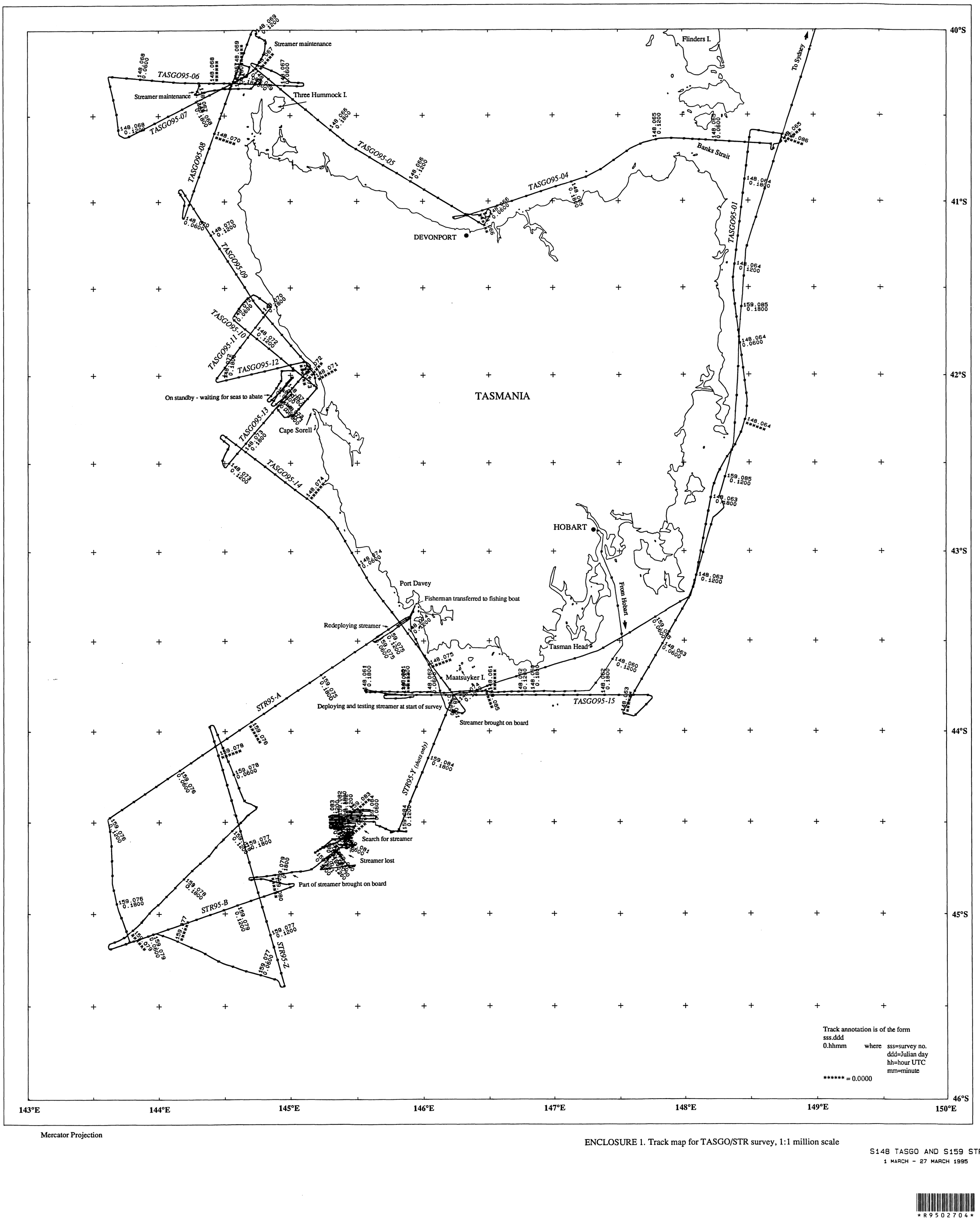

Survey 148/159
MAP125.XLS
1/4/95
MAP NOT TO SCALE
N
Stn B
Stn A
Stn C
stn. A is 10m S of bollard #320
stn. B is 1·2m W of the NE cnr of shed #9
stn. C is at bollard # 270
PYRMONT WHARVES
#9 SHED
#10 SHED
DARLING HARBOUR
MARATIME MUSEUM
AQUARIUM
CHARTER BOAT WHARVES
PYRMONT BRIDGE

S148 TASGO AND S159 STR

1 MARCH - 27 MARCH 1995

SCALE 1:1000000

AUSTRALIAN GEOLOGICAL SURVEY

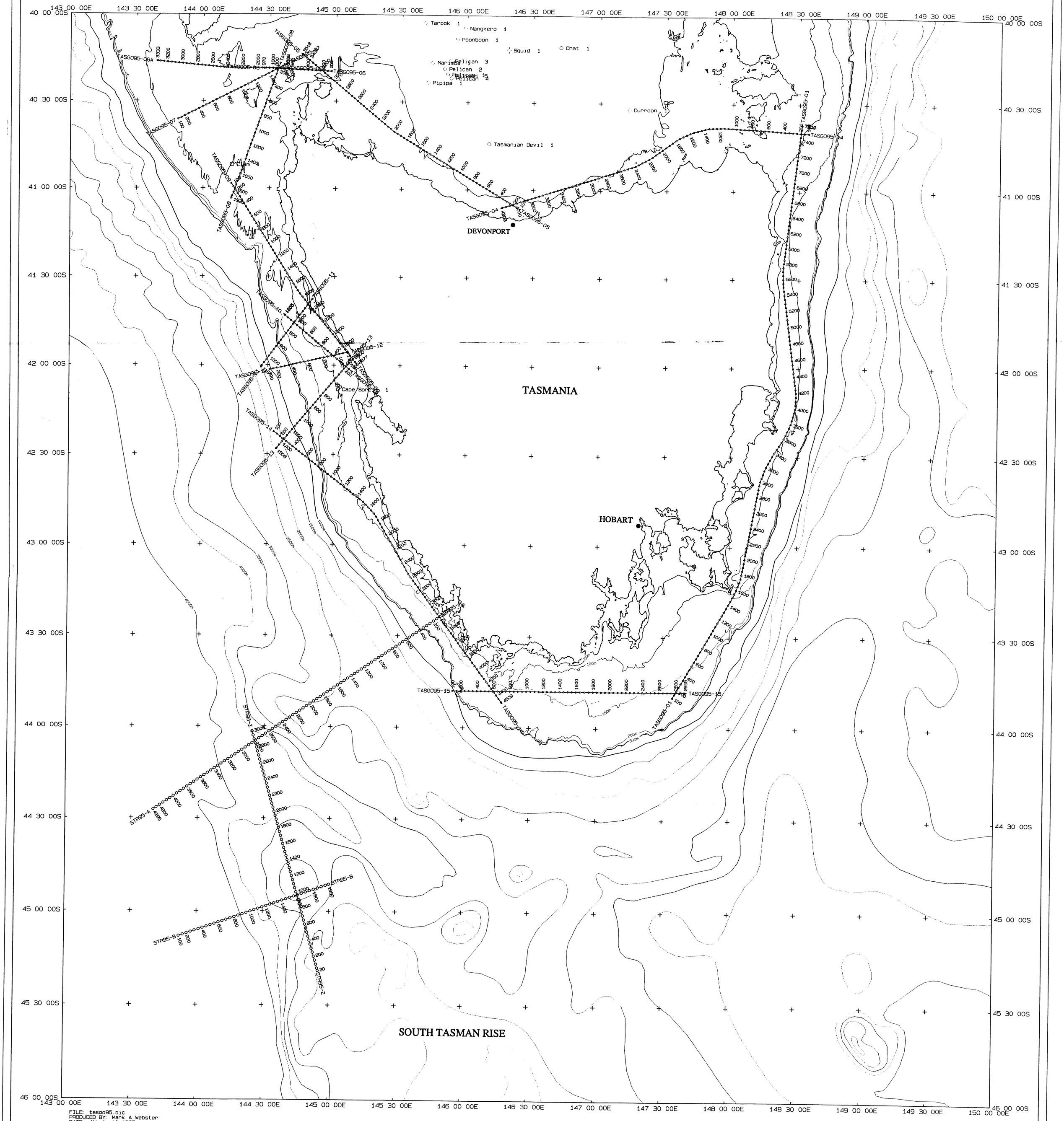


Track annotation is of the form
sss.ddd
0.hhmm where sss=survey no.
ddd=Julian day
hh=hour UTC
mm=minute
****** = 0.0000

Mercator Projection

ENCLOSURE 1. Track map for TASGO/STR survey, 1:1 million scale

S148 TASGO AND S159 STR
1 MARCH - 27 MARCH 1995



FILE: tasgo95.dic
PRODUCED BY: Mark A Webster
DATE: 4th April 1995

1: 1000000
0 20 40 60 80 100
KILOMETRES

MERCATOR PROJECTION
WGS 1984 SPHEROID
LATITUDE OF TRUE SCALE 44 00 00S. CENTRAL MERIDIAN 145 30 00E

50-300 m bathymetric contours based on NATMAP 1:250 000 sheets
1000-4500 m contours based on GEBCO

ENCLOSURE 2. Preliminary reflection seismic shot-point map for TASGO/STR survey, 1:1 million scale