AGSO

Mundaring Geophysical Observatory, Report 1994 to 1997

by

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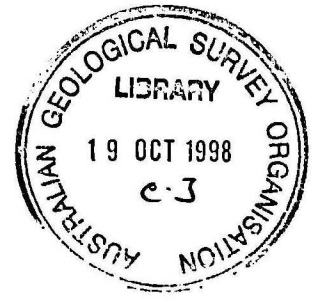

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Abstract

Annual reports detailing observatory activities have been prepared up till 1993. This report covers activity for the period 1994 to 1997. Basic programs in seismology, geomagnetism and ionospherics continued at the Mundaring Geophysical Observatory during the three year period.

Seismographs were operated at Ballidu, *Forrest*, Kellerberrin, Kununurra, Marble Bar, *Meekatharra*, Morawa, Mundaring, Narrogin, Rocky Gully and *Warburton*. Stations at Coolgardie, Nanutarra and Manton Dam (NT) were relocated at *Woolibar, Giralia and Kakadu* (NT) respectively. and a new station was opened at *Fitzroy Crossing*. The seven stations in italics were upgraded with satellite telemetry links. Magnetographs were operated at Gnangara, Learmonth and a new station was opened at Kakadu (NT). An ionosonde was operated at Mundaring in conjunction with the Ionospheric Prediction Service.

The observatory operated 7 accelerographs in the Southwest seismic zone at the beginning of 1994, however this was reduced to two by the end of 1996 as the equipment was old and unreliable. Two accelerographs installed in Perth and a further two in Darwin (NT) are part of AGSO's Urban Monitoring program. Another 11 accelerographs in WA are operated by the Water Authority.

The earthquake list (ML>2) shows details of Western Australian earthquakes located in the four year period and a summary of strong motion recording obtained is included. Fifteen isoseismal maps were prepared for felt earthquakes.

Introduction

The Mundaring Geophysical Observatory opened on 18 March 1959. Descriptions of the observatory and an outline of activity there to the end of 1993 have been given in previous records (e.g. Gregson & others, 1994). This report outlines the activity during the years 1994 to 1997. Principal events in the observatory's history are given in Appendix 1. All observatory staff listed in Table 1 contributed to this report.

Seismograph stations operating at the the end of 1997 were Ballidu, *Giralia, Fitzroy Crossing, Forrest, Kakadu (NT),* Kellerberrin, Kununurra, Marble Bar, *Meekatharra,*, Morawa, Mundaring, Narrogin, Rocky Gully *Warburton* and *Woolibar.* The stations at *Giralia, Kakadu (NT)* and *Woolibar* replaced the stations at Nanutarra (1995), Manton Dam (NT) (1995), and Coolgardie (1994). Satellite communication links were operated at the stations shown in italics above. The seismograph at Narrogin is an IRIS system (Incorporated Research Institutions for Seismology) and is operated in co-operation with the United States Geological Survey.

Of the seven accelerographs operating in the Southwest Seismic Zone at the beginning of 1994, only two remained at the end of 1997. Two accelerographs were installed in the Perth area in 1994 and a further two in Darwin in 1995 as part of an Australia wide urban monitoring program Accelerographs owned by the Water Authority (WAWA) and located at dam sites are maintained by the Water Authority are not discussed in this report.

Magnetic recording was carried out at Gnangara and Learmonth, with a new station being installed in March 1995 at Kakadu (NT). Ionospheric recording continued at Mundaring in conjunction with the Ionospheric Prediction Service.

Staff and Visitors

Observatory staff together with specific roles performed by various officers are listed in Table 1 and staff absences other than recreation leave are listed in Table 2. Other personnel associated with the observatory's operations are shown in Tables 3. P.J. Gregson was a member of the Geophysics Advisory Committee, Curtin University of Technology, and he also served on the Western Australian Department of Mines, Technical Working Group on seismicity in mines in Western Australia (1994) and a Working Group on tsunamis in Western Australia (1995). Addresses given and conferences attended and are listed in Tables 4 and 5 respectively. Visitors to the observatory are listed in Table 6. Only one work experience student attended the observatory in the period (Table 6).

Owen McConnel who had been on contract as an Electronics Technical Officer since November 1991 was made permanent, effective from 10 August 1994. Lyn van Reeken became full time on 23 March 1995 (previously 25 hours/week). The Professional Officer Class 2 position was declared redundant with a departmental down sizing, from 17 September 1996 with effect from 31 January 1997 when Vic Dent transferred to Canberra This created increased pressure on the remaining staff to maintain the program.

Two officers, Yvonne Moiler and Lyn van Reeken reached ten years service in July 1995 adding six months to the observatory Long Service Leave (LSL) credits. Staff at the observatory now have a total of 25 months LSL credits and this is increasing at 1.5 months per year.

Owen McConnel and Lyn Van Reeken were appointed the Occupational Health and Safety officer and deputy respectively in 1995. Both officers attended training courses to assist them with their duties. Yvonne Moiler continued as first aid officer, refreshing her qualification in 1996.

Seismology

Seismograph stations

Permanent seismograph stations in operation at the end of 1996 were Ballidu (BAL), Fitzroy Crossing (FITZ & FITX), Forrest (FORT), Giralia (GIRL), Kakadu, NT (KAKA), Kellerberrin (KLB), Kununurra (KNA), Marble Bar (MBL), Meekatharra (MEEK), Morawa (MRWA), Mundaring (MUN), Narrogin (NWAO), Rocky Gully (RKG) Warburton (WARB) and Woolibar (WOOL).

Station changes made during the three year period were:

Coolgardie (COOL) - closed 5 July 1994 - replaced by Woolibar (WOOL) opened 7 June 1994.

Fitzroy Crossing (FITZ or FITX) - new station opened 1 September 1994.

Manton Dam (MTN) - closed 11 March 1995 - replaced by Kakadu (KAKA) opened 4 March 1995.

Nanutarra (NANU) - closed 26 February 1995 - replaced by Giralia (GIRL) opened 12 September 1995.

An IRIS station was installed in December 1996 on Cocos Island (COCO) in the Indian Ocean by the University of California with the assistance of observatory staff.

Details of station locations are given in Table 7 and seismograph calibration data are shown in Table 8. Brief descriptions of individual station operations are given below.

The Narrogin station (NWAO) is an IRIS (Incorporated Research Institutions for Seismology) station with the additional VSP channel (very short period), which samples the output of a vertical Willmore Mk 2 seismometer at a rate of 100 samples/second. The system is event triggered and records on the IRIS data processing system.
Data from stations with satellite links is transmitted to Australian Geological Survey Organisation in Canberra. Digital data from Warburton, Woolibar, Meekatharra, Giralia and Fitzroy Crossing (from October 1996), was routinely transmitted to the Mundaring Office via a Telstra DDS line between Canberra and Mundaring. Data from other stations is available as required.

Ballidu (BAL)

1994 - Negligible record loss (<0.1%).

1995 - Record loss was 4.5% due to signal cable failure in the seismometer vault caused by corrosion.

1996 - Record loss was negligible (<0.1%).

1997 - Record loss negligible (<0.4%).

Coolgardie (COOL)

1994 - Negligible record loss (<0.1%). The station was closed on 7 July at 0300 UT having been replaced by station WOOL.

Fitzroy Crossing (FITZ - FITX)

1994 - A new digital satellite telemetered station was installed at Brooking Springs Station, about 11 km north east of Fitzroy Crossing (FITZ). The seismometer is a Guralp 3 component broad band instrument situated in a borehole at a depth of 8 metres. Data recording commenced on 1 September.

1995 - Record loss was 175 days (48%). The seismometer site was struck by lightning on 15 February, destroying both the electronics and battery vaults. The station was visited on 18 March and a temporary station FITX was established back at the homestead using a Willmore vertical short period seismometer. All was well until 12 June when the homestead generator failed delivering a very high voltage. This damaged both battery chargers and stopped recording. Due to communication problems and the lack of technical expertise of the station folk, the problem was not fixed until 02 October when the local electrician was emplyed to help fix the problem.

1996 - The 3-component broad band seismometer was re-installed on 12 September. The station was not operational for most of December as a result of problems with power, PC, IDU modems and remote equipment. A total of about 9% of record was lost.

1997 - The problems of December 1996 continued into 1997 with further complications of the remote site being flooded, damaging both the electronics and batteries. Continued bad weather meant a visit could not be made till March when recording was recommenced on 20 March. Recording was erratic with loss of signal from the remote site until a further visit in May. A new above ground equipment enclosure was installed at the remote site to facilitate easy access and prevent future flooding. The satellite dish and electronics were shifted from Brooking Springs station to the townsite. This move was made to take advantage of more reliable mains power and more technically minded operators.

Recording again became erratic in September and stopped on 26. Recording recommenced on 30 October, only to be knocked out again overnight by a lightning strike. The station was operational again on 5 November. A Critec surge protection system was installed to help alleviate the lightning problem.

Forrest (FORT)

1994 - Negligible record loss (<0.1%). The station was also down between 21 June at 0300 UT and 24 June at 0000 UT for the upgrade to a digital satellite telemetered system. The single component Willmore seismometer was retauned. The data was without timemarks until 28 June at 0200 UT.

1995 - Problems commenced in late July and continued with data being collected intermittently until the IDU was replaced on 30 October.

1996 - The station was not operational for most of April as a result of problems with power, PC, IDU and remote equipment. A total of approximately 7% of record was lost.

1997 - In July the signal appeared one-sided. Checking the seismometer, changing the remote site electronics blue box failed to rectify the problem. A visit was made on 30 July and a broken reset button fixed on the original blue box. The processor PCB was not sitting correctly in the replacement blue box. It appears as if the original fault may have been with Optus. Operation became intermittant from 22 December and failed completely on 28 December. A maintenance visit was planned for early in 1998.

Giralia (GIRL)

1995 - This new satellite telemetered station was installed on 12 September and replaced Nanutarra (NANU). The Willmore short period vertical seismometer is located on Giralia Station and the data telemetered by radio to Learmonth Solar Observatory, a distance of 45 kms, where the satellite dish is situated. The station ran well for the remainder of the year.

1996 - The station operated reasonably, with less than 1% of record loss.

1997 - The satellite indoor units (IDU) was replaced in February and April because of failures. A service visit was made in October and two additional batteries added to the remote power supply to give a greater standby supply.

Kellerberrin (KLB)

1994 - Record loss was 0.9%, mostly due to Telecom line outages.

1995 - Record loss was 0.6%, namely due to a pen translation problem (0.4%).

1996 - Record loss was 0.2%, due to power outages.

1997 - The seismometer seized up in March and April as a result of fungal growth in the gap between the coil and magnetics. This resulted in 4% record loss. A further 5% of record was lost in November as a result of failure of the VCO at the remote site..

Kakadu (KAKA)

1995 - This is another new satellite telemetered station which came on line on 4 March and replaced Manton Dam (MTN). The relay site equipment is located at the South Alligator River ranger station in the magnetic observatory hut with a radio link to a Willmore vertical short period seismometer on a hill, about 4 km distant.

All went well until the magnetic hut suffered severe lightning damage on 3 December. Operation was not restored until 31 January 1996.

1996 - The majority of record loss for the year was a result of the above lightning strike. Approximately 9% of record was lost.

1997 - The seismic signal was lost in early January. Depowering the remote electronic fixed the communication link from the remote site. However there was still no seismic signal. Half the seismometer coil was open circuit. As a temporary measure, half the coil was used until the seismometer was replaced in February. The PC was replaced twice in March/April because of loss of data. Vegetation shading the remote solar panels was cleared in May. The GPS reception failed in June and was replaced, which only partially rectified the problem. The problem was found to be water in the antenna cable and was temporarily repaired by relocating the GPS antenna. The GPS reception failed again in August and the GPS receiver, antenna and cabling was all replaced. These were fixed permantly in position during a visit in November and an additional two batteries added to the remote site to provide increased standby power. Lightning caused damage on 1 December and necessitated replacing the whole seismic system except the IDU. This included the the seismometer and one solar panel at the remote site.

Kununurra (KNA)

1994 - Record loss was high at 8.2%. Late or missed chart changes accounted for 4.8%; problems associated with power failures caused 2.2% and 1.1% (4 days) were lost when vandals damaged the lock to the door, prohibiting entry to change the chart.

1995 - Record loss was again high at 7.8%, almost all coming from late or missed chart changes. On top of this, problems with pen translation, pressure and heat affected individual components.

1996 - Record loss was very high, totalling about 20%. The most significant loss (10.2%) resulted from the operator missing or changing the chart late. Translation of the vertical component recorder pen accounted for 4.4% loss; vandalism preventing the operator access to the recorder (2.1%) and records lost in the mail (3.3%).

1997 - Record loss was again high (9%) due mainly to late or missed chart changes. A new contract was let to a new operator in October. A broken recorder pen translation cable accounted for 1% of the above loss. Until September time control had been provided to the station from the Omega system. The Omega system closed in September and a new GPS receiver was installed in October.

Manton Dam (MTN)

1994 - Record loss was low at 0.7%. A recorder gearbox failure caused 26 hours of data loss (0.3%). The rest resulted from Telecom line outages.

1995 - This station was closed on 31 March.

Marble Bar (MBL)

1994 - Record loss was 2.4%, all due to late or missed chart changes.

1995 - Record loss was 3.3%. Late chart changes accounted for 2.0% and a broken pen cable made up the rest.

1996 - Severe lightning storms in January resulted in about 6.0% of record loss. Further record loss was as a result of recorder failure, late or missed chart changes (1.3%) and power failures (1.2%).

1997 - The most significant cause of record loss was due to late changes or missed chart changes (11.4%). The operator was replaced in September. DC power failures resulted in a further 1.8% record loss. Telstra line outage in October was not fixed for three weeks (6.1%).

Meekatharra (MEEK)

1994 - There was no record loss for the year except for 8 September at 2240 to 10 September at 1000 during the upgrade to a digitally recorded satellite telemetered station. The single component Willmore seismometer was retained.

1995 - A visit was required in April to re-align the satellite dish following loss of data.

1996 - Miscellaneous equipment problems mainly related to the PC resulted in a loss of less than 2% of recording.

1997 - The cable to the GPS antenna was replaced in May as it had been partly chewed by birds. The system failed on September 18. A visit was made on 8 November and the radio transmitter at the remote site was found to be off frequency and the yagi aerial was open circuit. Adjustment and replacement rectified the problem. A further slight adjustment was required to the radio frequency on 19 November.

Morawa (MRWA)

1994 - Record loss was 1.9%. The equipment was turned off when harvesting of the paddock was in progress (1.5%). The remaining 0.4% occurred when the remote site battery charger failed. This required a visit.

1995 - Record loss was 0.5%. Most of this occurred (0.3%) when the farmer was plowing the seismometer paddock and switched the equipment off first, then forgot to switch it back on afterwards.

1996 - Record loss was 0.5% due to power failures and Telstra line outage.

1997 - Record loss was negligable. The signal was noisy intermittently in February and March from power fluctuations resulting from external sources. The seismometer was replaced in September.

Mundaring High Gain System (MUN)

1994 - There was no record loss.

1995 - Record loss was 0.9%. Power failures accounted for 0.2% and the seismometer mass sagging into it's stops caused the rest.

1996 - There was minimal record loss during the year.

1997 - Record loss was minimal during the year although there was considerable interference on the Telstra line during November and the first half of December (see below)

Mundaring World Standard System, (MUN)

1994 - Record loss was 0.5% from charts falling off the LP recorder.

1995 - Record loss was 1.5%. Power failures caused 0.8% and the remainder came from charts falling off the drum.

1996 - Record loss was less than 1% resulting from several minor problems.

1997 - Record loss was minimal. The major reason being the chart falling of one of the LP drums (0.3%). There was considerable interference on the Telstra line during November and the first half of December. Telstra carried out extensive tests on the line both hard wire and radio link without success. Eventually they isolated the problem to their standby battery charging system at the remote end.

Nanutarra (NANU)

1994 - Record loss was 2.8% (10 days), occurring when a drum drive cog stripped.

1995 - Disaster struck on 6 February. The Ashburton River flooded and covered the seismometer site. The electronics vault and battery vault filled with water, however the seismometer vault remained dry. The station was closed and later in the year, replaced by a new satellite telemetered station at Giralia (GIRL).

Narrogin (NWAO)

1994 - Record loss was 0.9% due to an earth leakage circuit breaker tripping out.

1995 - Record loss was 0.3% caused by standby battery failure at the seismometer site.

1996 - Record loss was about 2.5% due to battery failure (0.6%), DA failure (0.8%) and line and modem outages (1%).

1997 - The hard disc drive failed at the end of June and the system was out of action for two months (17%). The Omega receiver used for time control was replaced in September with a GPS receiver. The vsp triggering failed twice in the October and November requiring rebooting the LRDCU at the remote site.

Rocky Gully (RKG)

1994 - Record loss was 6.9%. Late or missed record changes accounted for 4.1%. Six day's data never arrived, presumed to be lost in the mail (1.6%). The remaining 1.2% was caused by problems with pen heat or pressure.

1995 - Record loss was 3.5%. Late or missed chart changes accounted for 2.6%, mains power failure for 0.5% and a broken pen traverse wire for the remaining 0.4%.

1996 - All the record loss (2.3%) resulted from late or missed chart changes.

1997 - The majority of record loss was due to late or missed chart change (1.5%). The Omega clock was replaced in September with a GPS clock.

Warburton (WARB)

1994 - Record loss was 5.4%. Eight day's data (2.2%) was lost due to broken or faulty pens. Another 3 days data (0.8%) was lost due to an earth leakage breaker tripping out, caused by a fault in the inverter. Another 1.2% was caused by pen heat or pressure problems. 0.4% came from signal fadeout in the FM telemetry link caused by a fault which developed in an aerial connector. The station was also off the air from 5 to 7 December (3 days or

0.8%) for the upgrade to a digital satellite telemetered system. The single component Willmore seismometer was replaced with a 3 component broad band Guralp unit.

1995 - This station operated well throughout the year.

1996 - The station operated reasonably well with 1.7% record loss due mainly to computer related problems.

1997 - Minor operational problems 03 November. A visit will be required to fix the problems as all attempts to do so remotely have not succeded. This is planned for January 1998.

Woolibar (WOOL)

1994 - A new digital satellite telemetered station was installed at Woolibar station, 15 km north of Kambalda. The seismometer is a Guralp 3 component broad band instrument which is surface mounted. Data recording commenced on 7 June. This station replaced COOL.

1995 - The satellite dish required re-aligning in early April.

1996 - This station operated well throughout the year with only 0.6% record loss.

1997 - This station operated well throughout the year with only minor record loss.

Temporary seismographs

Three portable Kelunji seismographs were operated in the Talbot Brook area approximately 12 km SW of York from 24 November to 8 December 1994 and again from 8 September to 20 November 1996, to record series of earthquakes in the area.

Following a major earthquake north of Derby on 10 August, three portable seismographs were installed in the area to monitor aftershocks. These were withdrawn from service in October. Location details are given in Table 7.

Digital data acquisition

Triggered data capture of the digital data stream from the Mundaring World Wide Seismic system continued throughout 1994 to 1997. Table 12 lists earthquakes captured. To increase the likelihood of capturing P arrivals from small distant earthquakes (up to 200 km) that triggered on the S wave, the pre-trigger time was extended from 600 to 800 samples (i.e. about 35 seconds).

Another improvement was the addition of a program (CLOCWORK) which keeps the PC clock closer to the true time. The clock is automatically adjusted each day by an amount calculated from the approximate clock rate and interval since the last adjustment. By this means the PC clock is generally within 5 seconds of the true time whereas previously errors of up to a couple of minutes occurred. This facilitated the identification of events that occurred within a short time span. A plot of counts recorded on the MUN (WWSSN) digital system versus magnitude (ML) for earthquakes in the Talbot Brook area for 1995 at a distance of 45 km is shown in Figure 1.

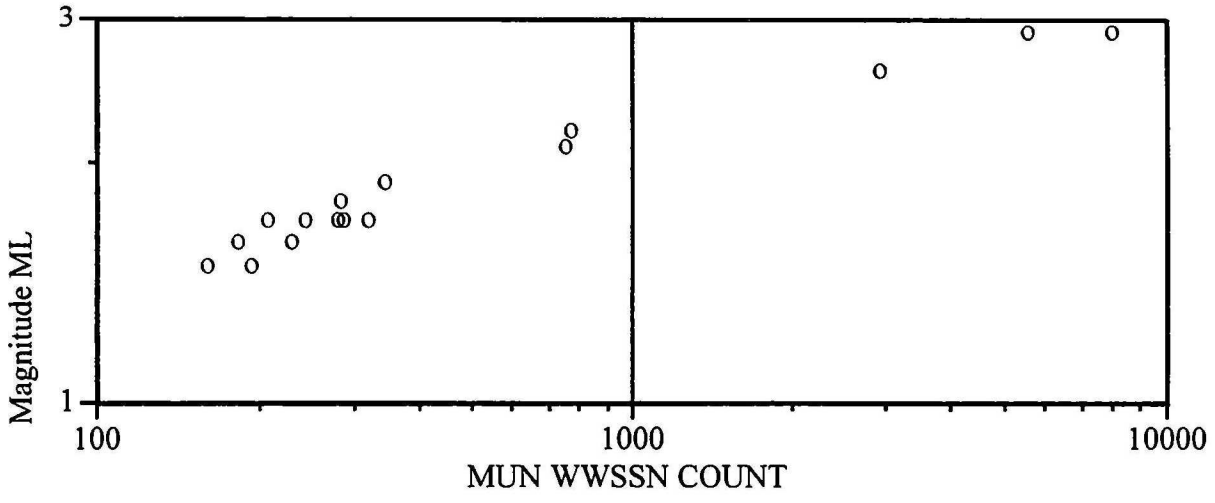


Figure 1 MUN counts v magnitude (ML) for Talbot Brook earthquakes 1995

Accelerographs

Seven accelerographs were in operation in the Southwest Seismic Zone at the beginning of 1994. Details of station locations are given in Table 9 and calibration data are shown in Table 10. Brief descriptions of individual station operations are given below. Digital and analog accelerographs were serviced at approximately monthly and three monthly intervals respectively.

All the MO2 accelerographs were withdrawn from service by the end of 1996 as they were analog, old and unreliable. Both the Teledyne A700 digital instruments were also withdrawn as they were unreliable and maintenance was too time consuming leaving only two Kelunji accelerographs in operation.

Beverley (BEM)

1994 - A Teledyne A700 accelerograph was operated at the site approximately 20 km east of Beverley. The recorder developed internal faults which caused it to "hangup" from time to time, with consequent significant periods of lost recording time. No earthquakes were recorded during the year.

1995 - As the accelerograph had long periods of downtime since it's installation in 1993. It was decided that the instrument would be better located in a more accessible location, where it could be visited more easily and more frequently. The station was therefore permanently closed in February and the accelerometer was relocated in the Cadoux area.

Cadoux (CAM)

1995 - This station was opened on 25 May, with the installation of a Teledyne-Geotech A700. The instrument was returned to Mundaring in September, when modifications were made allowing the internal battery to be changed in the field. Normal operation resumed in December.

1996 - This station was closed on 28 November and the accelerograph relocated in the Mundaring Weir seismograph vault.

Cadoux - Kalajzic (CAA)

1994 - A Kelunji accelerograph continued to operate throughout the year. There were two periods totalling 93 days when the recorded did not operate as the battery voltage was low. Numerous small local earthquakes were recorded as well as a magnitude ML 4.1 from Bonnie Rock.

1995 - The Kelunji recorder at CAA (approximately 5 km north of Cadoux) operated without significant problems. Between March and August, there was a period where false triggering became a problem, but when the earthing was improved in August, the problem went away. The operating system was upgraded from Guria V4.08A to V4.10A in May.

1996 - This station remained operational throughout the year.

1997 - This station was closed on 13 March and moved a few kilometres south where there was access to a phone line.

Cadoux - Shankland (CAS)

1994 - An MO2 accelerograph operated throughout the year except for about two months (June - July) when the battery was flat. There were no triggerings.

1995 - The MO2 recorder at this station operated normally except between May and June, when it was returned to the office for repairs after the instrument was shorted out while the battery was being changed.

1996 - The station was closed on 1 August as the equipment was old and unreliable.

Cadoux - McNamara (CMC)

1997 - This station was a replacement for CAA and commenced operation in March. A KGB unit was installed which keeps the Kelunji clock on time, using a GPS receiver. The equipment was connected to a modem which allowed data retrieval from Mundaring across a Telstra phone line. Several useful triggerings were recorded.

Goomalling (GOK)

1997 - This station was a replacement for GOO and commenced operation in March. A KGB unit was installed which keeps the Kelunji clock on time, using a GPS receiver. The equipment was connected to a modem which allowed data retrieval from Mundaring across a Telstra phone line. Dial up access was erratic and it appeared as if the vertical trigger component had lost its sensitivity, resulting in no useful triggers. The equipment was withdrawn from service on 19 November so that it could bethoroughly tested in the workshop.

Goomalling (GOO)

1994 - The Kelunji accelerograph operated throughout the year, although many false triggerings were recorded. Forty one days recording were lost due to low battery voltage. Five earthquakes were recorded, including magnitudes ML 4.1 and ML 2.8 from Bonnie Rock and the Meckering area.

1995 - The recorder operated normally, but with a relatively high number of false triggers, until September. The false triggering did not seem to be related to the trigger level being too sensitive. The battery at GOO was changed twice, in May and July. The Kelunji operating system was upgraded from Guria V4.09A to V4.10A in May. In September, a recorder destined for Darwin was installed for 5 weeks, and the frequency of false triggering decreased. The station was then closed for 6 weeks, after which the accelerograph from King's Park was installed there. The recorder has functioned normally since then.

1996 - The station operated throughout the year, however the problem with false triggerings.

1997 - This station was closed on 13 March and relocated a few kilometres north where there was acces to a phone line.

Meckering - Kelly (MEK)

1994 - The MO2 accelerograph operated normally throughout the year. A magnitude ML 2.8 earthquake near Meckering was recorded on 8 June.

1995 - The MO2 recorder at this station operated normally throughout 1995. Twenty two triggers were recorded in March, and this may have been caused by local thunder storm activity.

1996 - The station was closed on 18 November as the equipment was old and unreliable.

Meckering - Elliott (ME3)

1994 - As for Beverley, the A700 accelerograph suffered internal faults with significant periods of lost recording time. No earthquakes were recorded.

1995 - The A700 at ME3 (approximately 20 km SW of Meckering) was in operation only intermittently during the year. It was returned to the office for servicing in February and returned to the field again in June. It was returned to the office again in August for a week to replace a flat internal battery. It was returned to the office again in November for the rest of the year, while modifications were made to the instrument which would allow changing the internal battery in the field.

1996 - The station was closed on July 4 as the equipment was old and unreliable.

Quairading (QUW)

1994 - An MO2 accelerograph operated throughout the year, except for the period May to July when the connection to the solar panel was cut, possibly by sheep or parrots. No earthquakes were recorded.

1995 - There were recurring battery problems with the MO2 at this station, and the battery was changed twice (in March and August). At the time it was thought that the batteries were old and needed replacement, but it was subsequently found that the problem lay with the solar panel.

1996 - The equipment operated during the year but was old and unreliable and the station was closed on 31 December.

York (YK4)

1994 - A Kelunji accelerograph was installed south of York for a week in December. Three small aftershocks of larger November earthquakes were recorded.

Urban Monitoring

As part of an Australia wide urban monitoring program two accelerographs were installed in the Perth at Trinity college (TRI) and Kings Park (KPK). The sites were chosen to monitor the response of differing soil foundations. Trinity College is located on alluvium and fill whereas Kings Park is located on limestone.

Two accelerographs were installed in Darwin at Parliament House (DPH) and the Department of Mines and Energy Rock Store (DRS) in 1995. Details of station locations are given in Table 9 and calibration data are shown in Table 10.

East Perth Power Station (EPS)

1997 - This station was reloaced from Trinity College on 4 April and connected to a modem to enable access via a Telstra line from Mundaring.

Kings Park (KPK)

1994 - A Kelunji recorder with a Sprengnether accelerometer was installed at the Educational Centre in Kings Park on 13 April. A significant problem was experienced with false triggerings. After much testing and experimentation, the problem was basically removed in October when the instrument was resited by about 5 metres. It was concluded that the problem may have been caused by a nearby burglar alarm and sensor at the initial location.

1995 - The Kelunji recorder at KPK (Royal Kings Park, Perth) operated well until November. At this time the recorder was exchanged with the recorder from GOO. The problem with false triggers that the recorder had experienced at GOO also occurred in the new location.

1996 - The station was non-operational till June. It was upgraded on 10 July when a KGB unit and GPS timing was added to the system. A phone line was installed so that the instrument could be accessed via a modem.

1997 - Apart from a short break in March when plumbing alterations were made to the building. the equipment operated satisfactorily until December when dial-up access failed.

Trinity College (TRI)

1994 - A Kelunji recorder with a Sprengnether accelerometer was installed at the sports grandstand at Trinity College on 13 April.

The recorder initially suffered from excess triggerings, probably because the instrument had been set at a too sensitive level. This was adjusted and the instrument operated satisfactorily, but later developed problems with it's analog board. The station was closed between September and December while the instrument was sent to Melbourne for repairs.

1995 - The Kelunji recorder at TRI (Trinity College) operated well throughout 1995, except that for the first half of the year, it was probably set a little too sensitive. Because of this, there was relatively frequent triggering which seemed to be related to activities on the adjacent oval and school grounds. False triggering decreased to a more acceptable level in July when the trigger threshold was increased marginally.

1996 - Many false triggerings were recorded during the first part of the year when the adjacent school oval was being re-surfaced.

1997 - This station was closed on 31 March and relocated to East Perth Power Station where there was access to phone lines.

Parliament House (DPH - formerly DA1)

1995 - This instrument was installed in the N.T. Parliament House in May. Modem problems also affected the operation of this instrument, but it continued to record earthquakes until July, when communications with the instrument were lost. It was returned to Royal Melbourne Institute of Technology (RMIT) in August for servicing and re-installed in October, when it was renamed DPH. However, because of incorrect modem settings as with DRS, normal communications with the instrument were not established until November. A KGB unit which included GPS timing was installed at the same time.

1996 - Changes made during the year were: Disarm control reduced from 10 to 2 minutes (June 2); the sample rate increased from 20 to 100 samples per second (February 19); squelch changed from 10 to 20 and trigger settings to 4 and 2.5 (May 19); fast trigger setting from 4 to 10 (July 3).

1997 - Operation was satisfactory during the year. V4.12A eproms were installed on 25 October.

Rock Store (DRS - formerly DA2)

1995 - This Kelunji at the Rock Store of the Geological Survey in Darwin operated for only a few weeks after its installation in May, before modem problems commenced, which made communications with it difficult. It was returned to Royal Melbourne Institute of Technology (RMIT) in August for servicing and re-installed in October, when it was re-named DRS. The station was visited again in November to install a KGB unit which included GPS timing, and to make alterations to the modem settings to allow normal dial-up access. It has operated well since then.

1996 - Changes made during the year were: Disarm control reduced from 10 to 2 minutes and time out from 10 to 5 seconds (January 2); sample rate increased from 100 to 200 samples per second, fast trigger setting from 5 to 10 and squelch from 10 to 20 (July 1).

1997 - Operation was satisfactory during the year. V4.12A eproms were installed on 25 October.

Seismicity

Table 11 lists earthquakes that were located in Western Australian region in 1994 to 1997. Epicentres of earthquakes with magnitude ML 2.5 or greater are shown in Figures 2, 4, 6 and 8. In the southwest seismic zone, earthquakes of magnitude 1.5 or greater have been located where possible and are plotted in Figures 3, 5, 7 and 9. Areas of significant activity for each year are discussed below. Where zone numbers are used in the text, they refer to source zones as defined by Gaull and others (1990). More than 90% of the earthquakes were located within or just adjacent to the recognised zones.

1994 (Figure 2)

One hundred and ninety one earthquakes were located in Western Australia, of which only four earthquakes were magnitude ML 4 or greater. The largest (ML 4.3) occurred on 4 September, 75 km ENE of Zanthus in zone 5 with a magnitude (ML 4.2) occurring on 2 December, 187 km SE of Lake McKay in zone 10. The other two were near Bonnie Rock in the south-west seismic zone (ML 4.1) and offshore 680 km NW of Exmouth (ML 4.0) in zone 4. They occurred on 26 April and 11 February respectively. Of the 64 earthquake of magnitude 2.5 or greater shown in Figure 4, the majority were located within or just adjacent to defined zones.

1995 (Figure 4)

Two hundred and four earthquakes were located in Western Australia. Five earthquakes of magnitude ML 4 or greater occurred in the region of Western Australia during the year. The largest (ML 4.6) occurred on 25 August, 250km NW of Carnarvon in zone 3. A magnitude (ML 4.3) occurred on 27 December, 250km NW of Broome in zone 11. Two were off the south coast, 421km SE of Esperance (ML 4.0) on 29 April and 850km S of Albany (ML 4.0) on 15 May. A magnitude ML 4.0 on 5 April was located 106km SE of Cocklebiddy and was well outside a recognised zone.

Other significant earthquakes occurring outside zones were located near Jiggalong, 250km SSE of Marble Bar, (ML 3.0 and 2.6), 119km NNW Port Hedland (ML 3.0), 245km NNW Warburton (ML 3.7), 120km ENE Sandstone (ML 2.9), the north end of Shark Bay (ML 3.1), and approximately 70km N Kalbarri (ML 2.9 and 2.5). Two events occurred 36km SE Eneabba, to the west of the Southwest seismic zone (ML 2.5 and 2.9).

1996 - (Figure 6)

Three hundred and fifty three earthquakes were located in the region of Western Australia during 1996. This was higher than average resulting from two swarms near Kellerberrin and Talbot Brook, both in the southwest seismic zone.

There were 41 earthquakes of magnitude ML 3.0 or greater during the year, four of which had magnitudes of ML 4.0 or more. Of the latter all were offshore, except a magnitude ML 4.1 near Meckering on 21 June. Two of the offshore events were about 240 km northwest of Broome (zone 11) with magnitudes ML 4.0 and ML 4.1 in February and May respectively, and the other was 130 km south-west of Fremantle, magnitude ML 4.1 on 18 October.

There were three events in December located near mine sites which were confirmed as not being mine blasts. These were near Bellevue and Bounty mines.

1997 - (Figure 8)

Three hundred earthquakes were located in the region of Western Australia during 1997. This was slightly lower than the previous year. Although activity continued in the Kellerberrin area in the southwest seismic zone, there were not as many earthquakes as in 1996.

The largest earthquake occurred on 10 August, had a magnitude of 6.3 and was located in Collier Bay, 160 km north of Derby. It was the largest in Australia since the Tennant Creek earthquake in January 1988 and comparable to the Cadoux earthquake at Cadoux, WA (ML 6.2) in 1979.

There were 51 earthquakes of magnitude ML 3.0 or greater during the year, eight of which had magnitudes of ML 4.0 or more. Of the latter, four were offshore; two (ML 4.6 and 4.2) were 20 km N of Kellerberrin in the southwest seismic zone; one (ML 4.5) was 98 km E of Broome and the other (ML 4.2) was 268 km S of Warburton.

Southwest Seismic Zone (Zones 1 and 2)

1994 - One hundred and four earthquakes were located in the zone (Figure 3) compared to 76 in 1993. The largest (ML 4.1) occurred near Bonnie Rock and is described below. The most active area was near Talbot Brook, 12 km SSW of York. Sixteen earthquakes were located in an area 12 km W of Wyalkatchem. Meckering continued to be active with 14 earthquakes. Fourteen events were located 12 to 15 km S of Nyabing. Other active areas were Cadoux (11), Kellerberrin (8) and Quairading (8). Minor activity occurred near Kulin (4), Latham and Burakin (3), Calingiri, Bencubbin, Cunderdin, Hyden and near Albany (2 each), with single events at Perenjori, Mobumger, Bindoon, Mukinbudin, Beacon, Merredin, Wooroloo, Greenhills, Beverley, Brookton, Dumbleyung, Gnowangerup, Tambellup, Narrogin and Kojonup.

1995 - One hundred and forty two earthquakes were located in the zone (Figure 5). The largest (ML 3.5) occurred near Cadoux where 19 earthquakes were located. The most active area was approximately 28km N of Nyabing where 27 earthquakes upto magnitude 3.3 occurred mainly in April. Sixteen earthquakes were located both in the Meckering and Wyalkatchem areas. Fourteen earthquakes were located approximately 18km NW Beacon. Other active areas were Brookton, Talbot Brook and Gnowangerup (6 each), Kellerberrin and Calingiri (4 each), Quairading, Wagin and Ongerup (3 each), Wongan Hills and Katanning (2 each). Single events were located at Mt Barker, east of Albany, Tambellup, Pingrup, Lake Grace, Dumbleyung, Narrogin, Harvey, Corrigin and Dowerin.

1996 - Two hundred and six earthquakes were located in the zone (Figure 7) compared to 142 in 1995. The increase was due to two swarms near Kellerberrin and Talbot Brook which are described below. The largest, ML 4.1, occurred 5 km south-east of Meckering where 10 earthquakes were located in the vicinity. The Cadoux-Manmanning area continued to be active with 16 earthquakes. Other active areas were Wyalkatchem (11), 40 km south-west of Kojonup (7), Nyabing (5), Quairading (4), Kalannie (3), Wubin, Ballidu, Calingiri, Bonnie Rock, Darkan, Pingelly, 40 km south-west of Boyup Brook, Dumbleyoung, and Gnowangerup (2 each). Single events were located at Beacon, Burakin, Bencubbin, Williams, Katanning and Ongerup. Two small earthquakes, ML 1.9 and 1.4 occurred near Wooroloo well west of the zone.

1997 - Two hundred and twenty earthquakes were located in this zone (Figure 9) compared with 206 in 1996. Significant activity continued in the Yorkrakine area, 20 km N of Kellerberrin. There were 160 earthquakes in the magnitude range ML 1.4 to 4.6 located in this area. The largest, ML 4.6, occurred in this area on 31 August. Other active areas were Cadoux (8), Ballidu (8), Meckering (7), Calingiri (7) Mukinbudin (5), Mullewa, Quairading, Darkan and Nyabing (3 each), Wyalkatchem(2). Single events were located at Morawa, Coorow, Beacon, Miling, Burakin, Bonnie Rock, Beverley, Pingelly, Arthur River, Wagin, Pingrupand Dumbleyung.

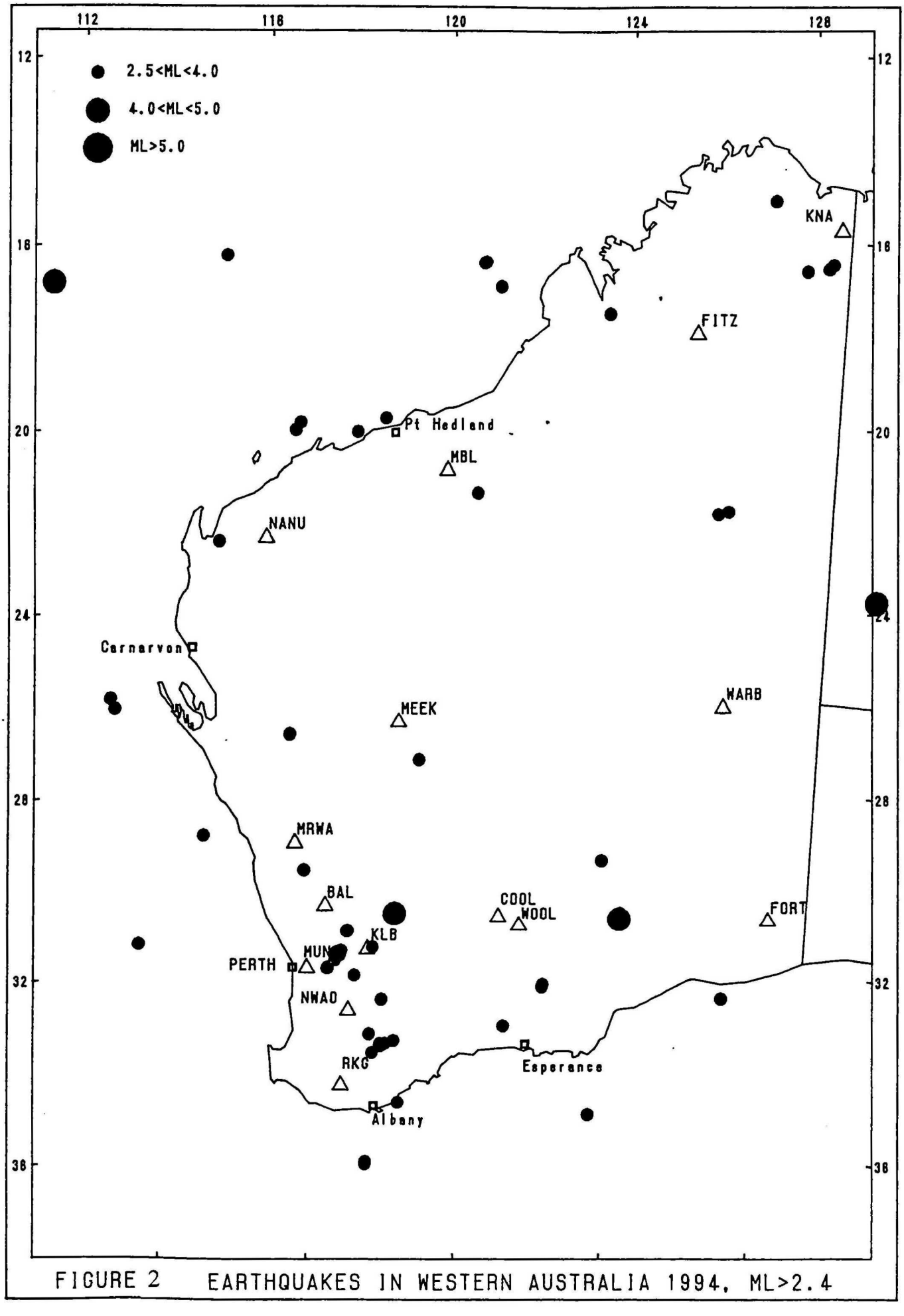


FIGURE 2 EARTHQUAKES IN WESTERN AUSTRALIA 1994, ML>2.4

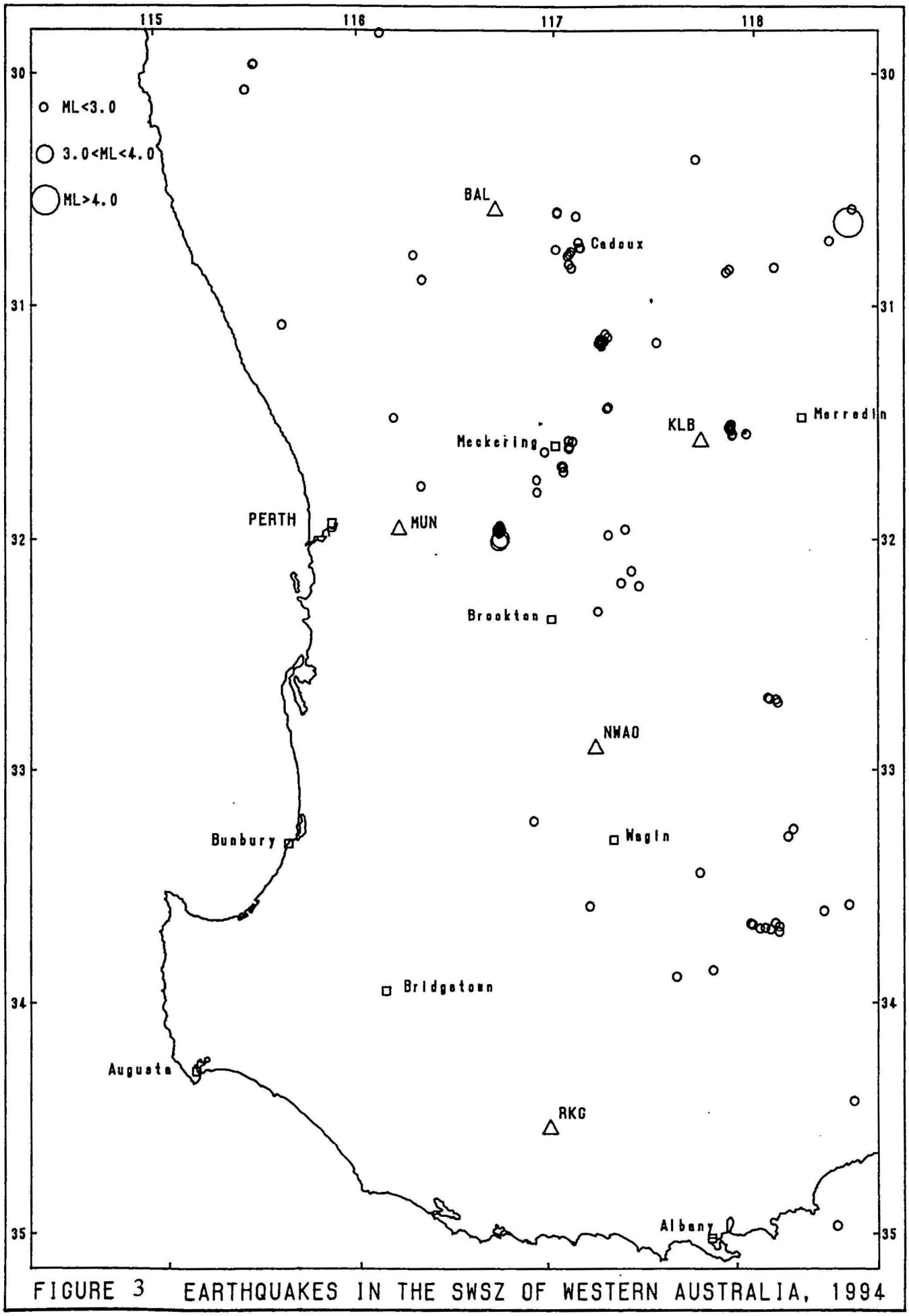


FIGURE 3 EARTHQUAKES IN THE SWSZ OF WESTERN AUSTRALIA, 1994

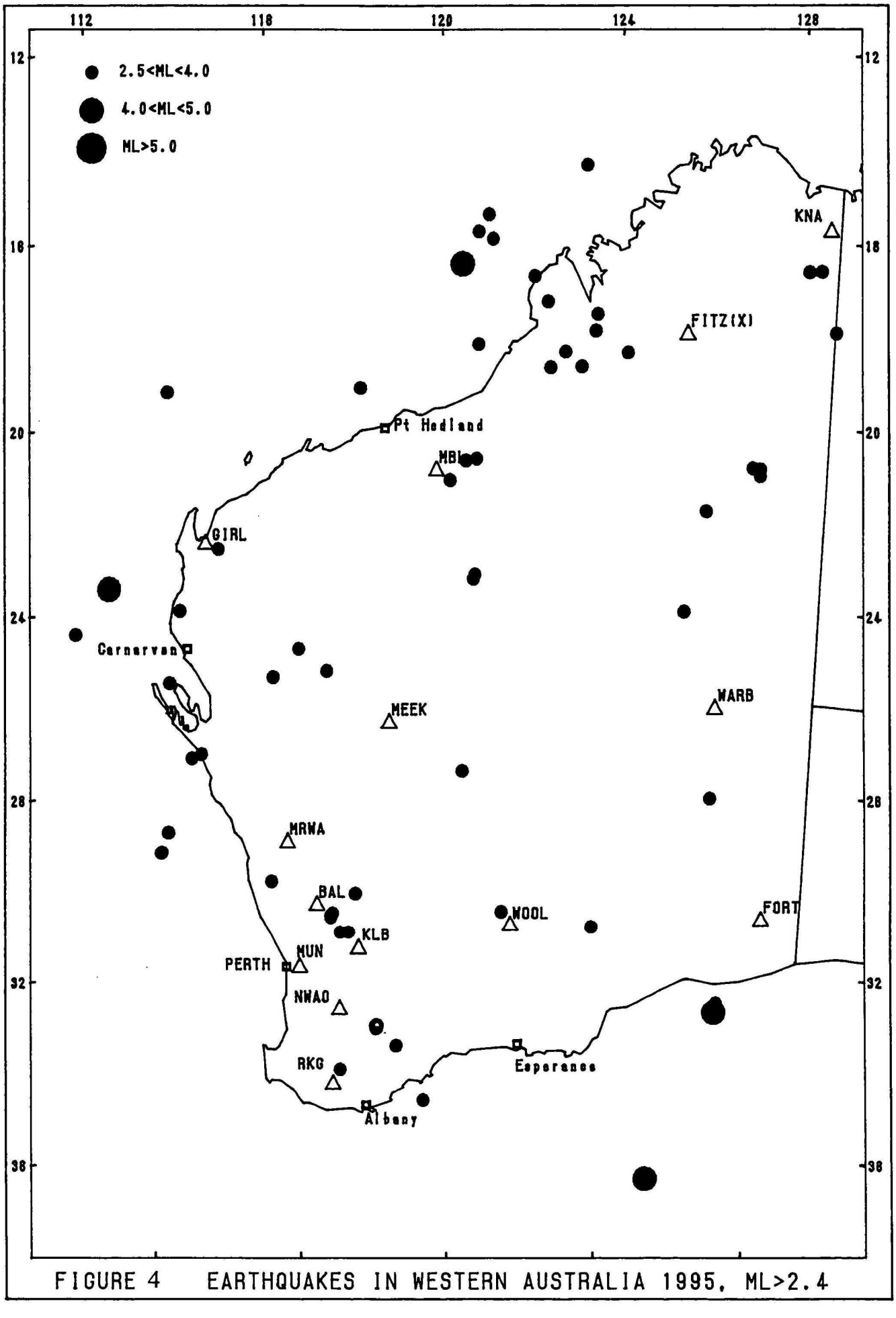


FIGURE 4 EARTHQUAKES IN WESTERN AUSTRALIA 1995, ML>2.4

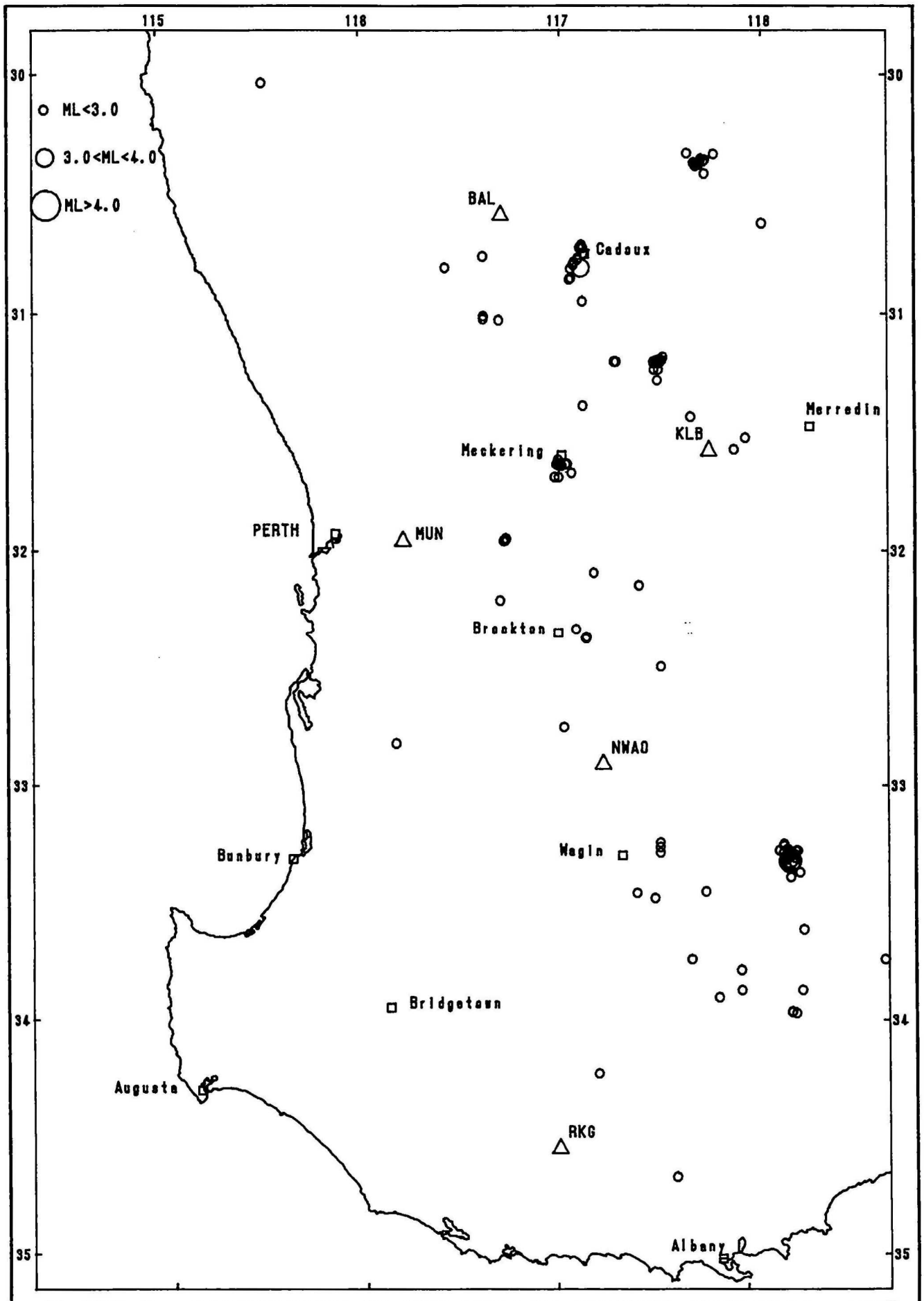


FIGURE 5 EARTHQUAKES IN THE SWSZ OF WESTERN AUSTRALIA, 1995

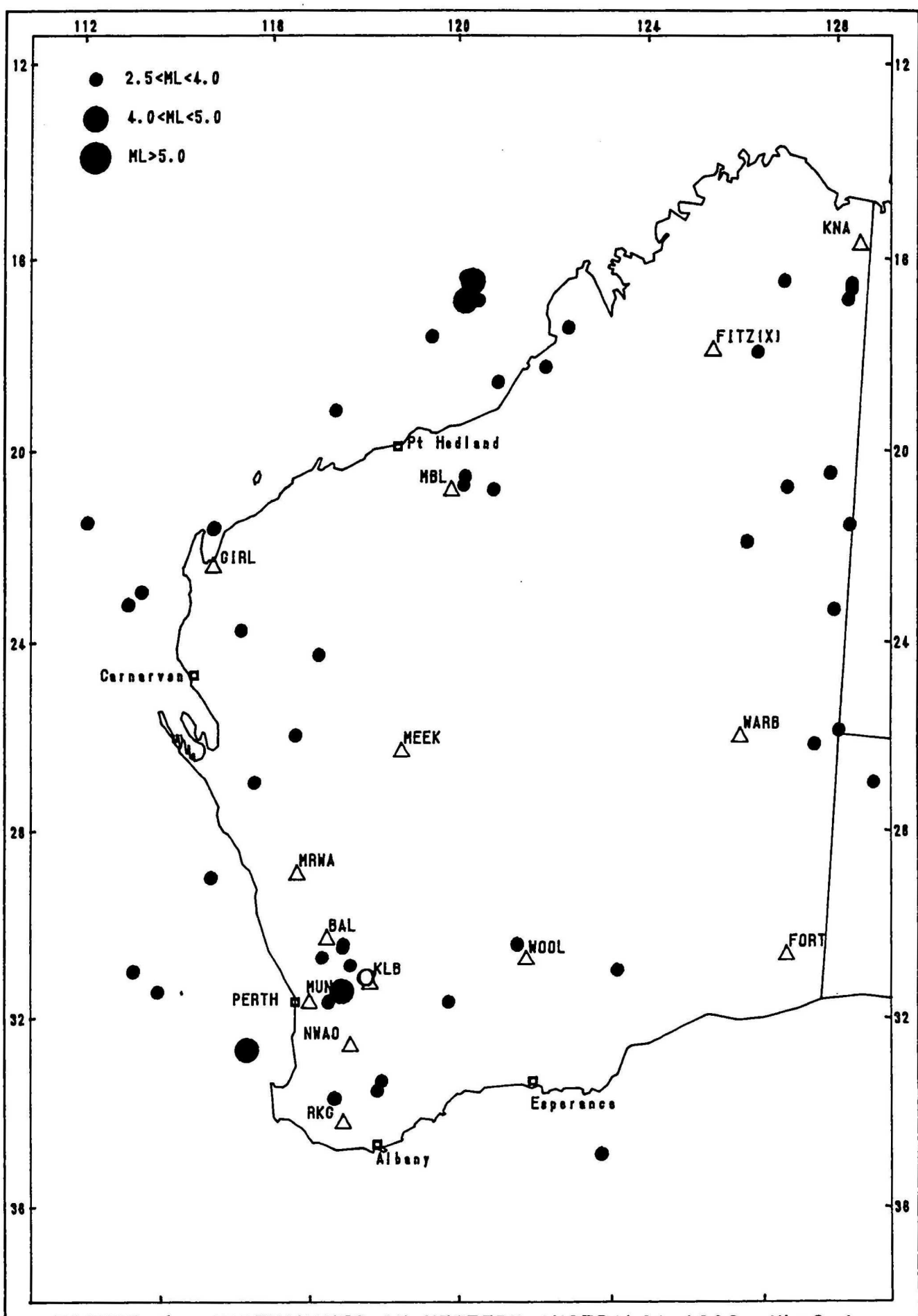


FIGURE 6 EARTHQUAKES IN WESTERN AUSTRALIA 1996, ML>2.4

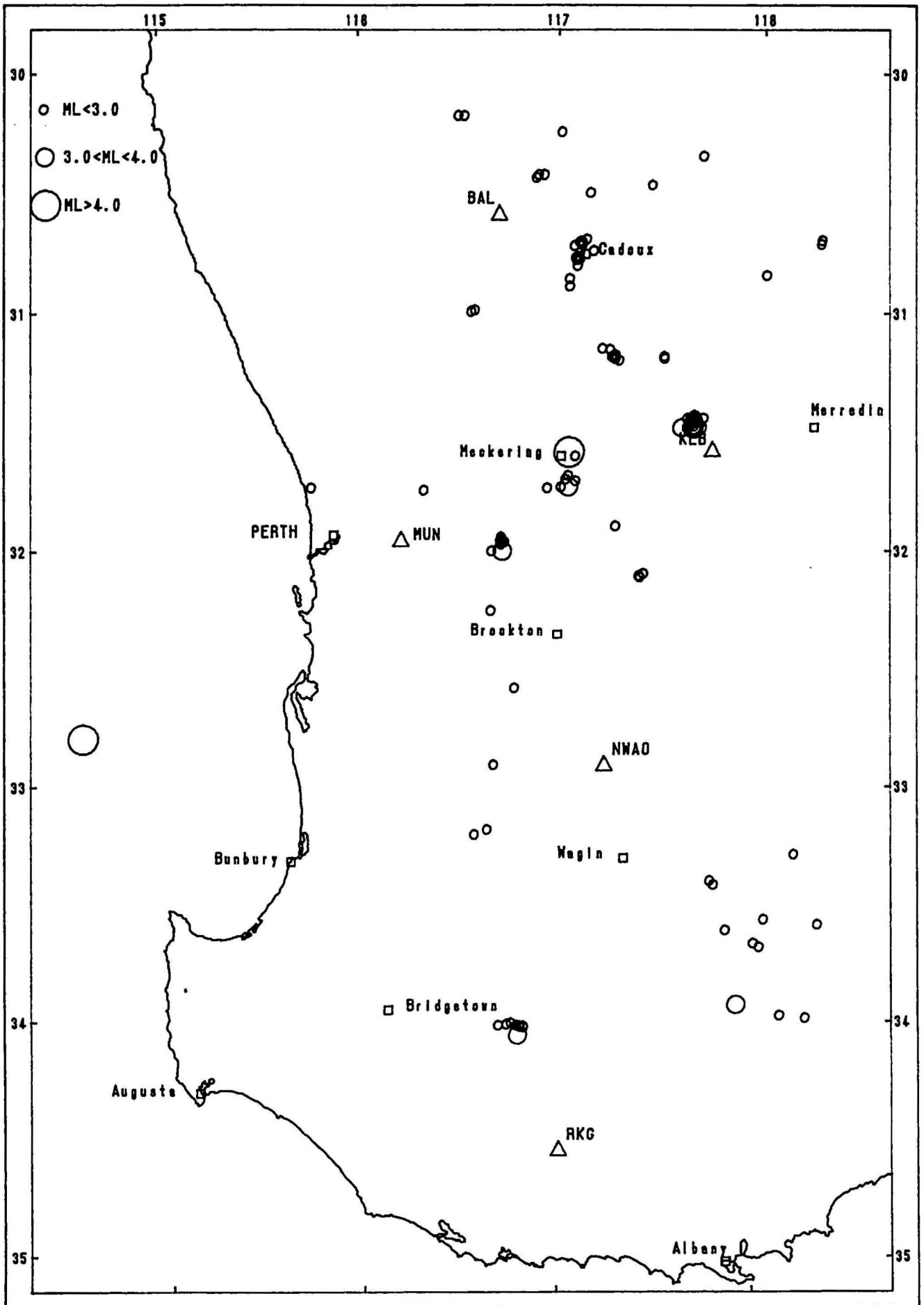


FIGURE 7 EARTHQUAKES IN THE SWSZ OF WESTERN AUSTRALIA, 1996

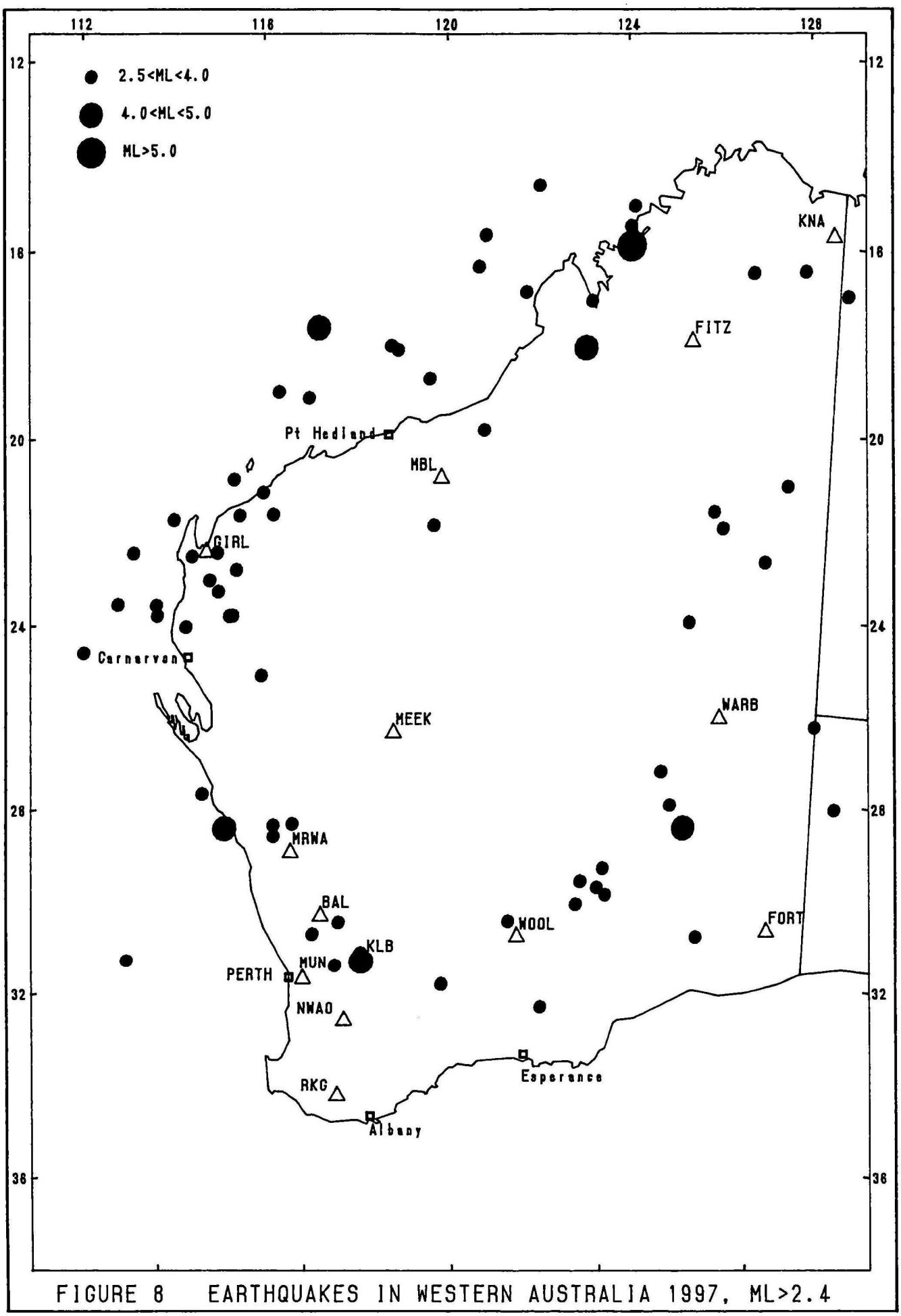


FIGURE 8 EARTHQUAKES IN WESTERN AUSTRALIA 1997, ML>2.4

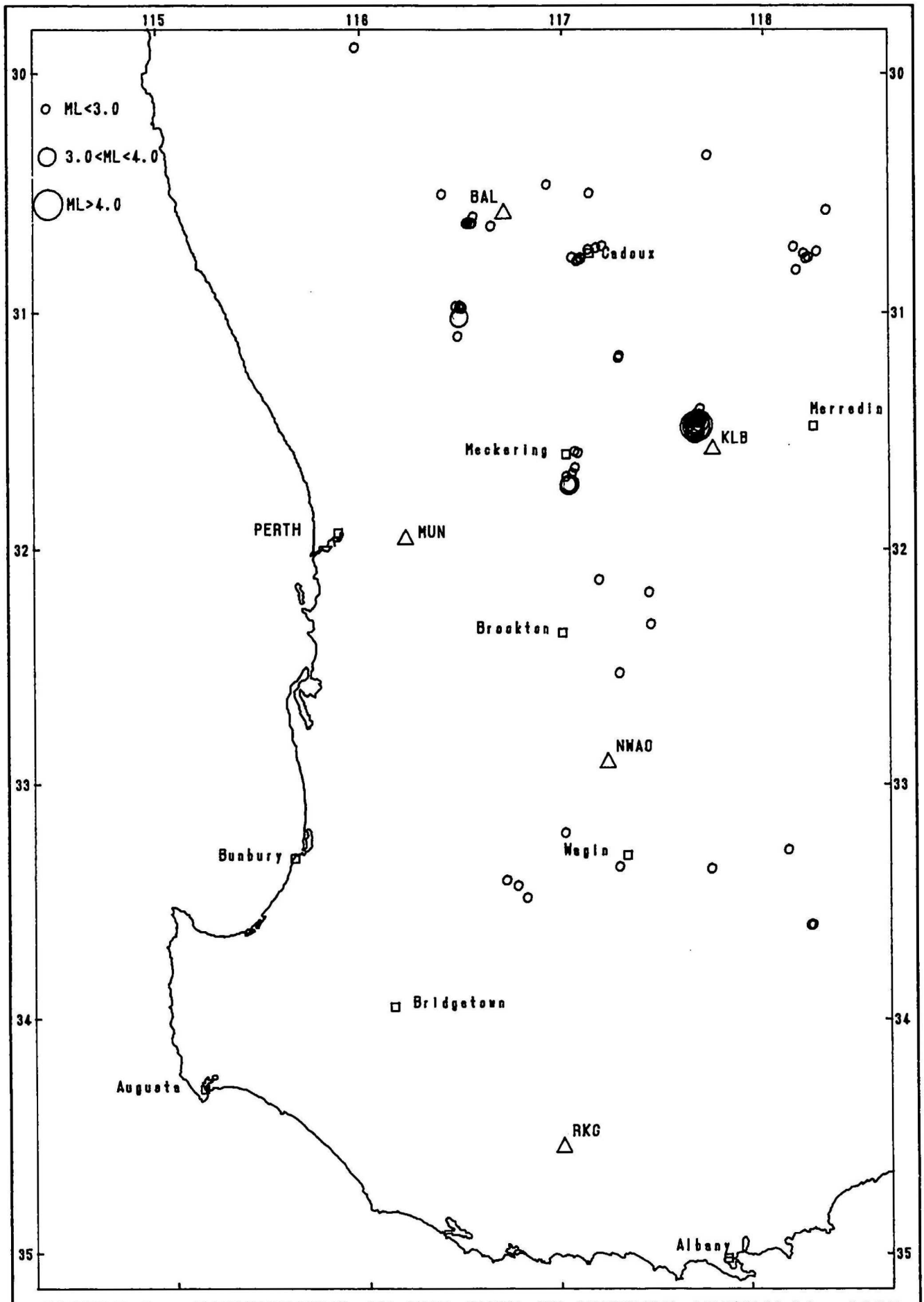


FIGURE 9 EARTHQUAKES IN THE SWSZ OF WESTERN AUSTRALIA, 1997

Off-shore (Zones 3 and 4)

1994 - Six earthquakes occurred in zone 3, off-shore from Dampier, Carnarvon and Geraldton with 6 occurring in zone 4, off-shore from Karratha, Fremantle, Albany and Esperance. All were less than magnitude 3.

1995 - Five earthquakes occurred in zone 3, off-shore from Carnarvon, Geradton and Dampier, and only one in zone 4, south-east of Esperance.

1996 - Four earthquakes occurred in zone 3, two offshore from Carnarvon, one from Geraldton and the most significant, ML 4.1, 30 km south-west off Fremantle. A magnitude ML 3.5 earthquake occurred 310 km west of Fremantle, just to the west of zone 3. Only one event (ML 3.8), 580 km south of Augusta, was recorded from zone 4 however a magnitude ML 3.2 earthquake occurred 283 km offshore from Exmouth between zones 3 and 4 and an ML 3.0 190 km SE from Esperance.

1997 - Five earthquakes occurred in zone 3 offshore from Exmouth, Carnarvon and Fremantle. Two earthquakes were located between the coast and zone 3, 38 km south-west of Kalbarri (ML 2.6) and 44 km north-west of Geraldton (ML 4.2). The latter was felt with intensities up to MM V.

South-east (Zone 5)

1994 - The 8 earthquakes in this zone were scattered throughout the zone. Four had magnitudes of 3 or more, 75 km ENE Zanthus (ML 4.3), 187 km E Warburton, 171 km SE Laverton (ML 3.2) and 55 km ESE Norseman (ML 3.0).

1995 - Three earthquakes, all less than magnitude 3, were located in the zone compared with 7 in 1994.

1996 - Only two earthquakes, both less than magnitude 2 were located in this zone.

1997 - Two earthquakes were located in this zone, the largest (ML 3.0) was 68km south-east of Norseman.

Carnarvon Basin (Zone 8)

1994 - Nine earthquakes, all of magnitude less than 3 were located in this zone.

1995 - Six earthquakes located in the zone, the largest magnitude, ML 3.4, occurring on 4 June 93km north of Carnarvon.

1996 - Only one of the 6 earthquakes located in the zone had a magnitude ML>3. This occurred on 6 September, 93 km north-east of Kalbarri and had a magnitude ML 3.6.

1997 - Three of the 14 earthquakes located in this zone had magnitudes ML 3.0 or more. The largest was 24 km east of Ningaloo, ML 3.1.

Tobin Lake (Zone 10A)

1994 - Three earthquakes were located in this area compared with 5 in 1993.

1995 - Four earthquakes ranging in magnitude from 2.8 to 3.3 occurred in the zone.

1996 - A magnitude ML 3.6 earthquake occurred 51 km east of Tobin Lake. Four other earthquakes ML 2.5 - 2.9 occurred east of the zone.

1997 - Two earthquakes (ML 3.8 and 3.6) were located 28 km north and 47 km south-east of Tobin Lake.

Offshore north west (Zone 11)

1994 - The largest of 3 earthquakes located offshore north west from Broome had a magnitude of 3.1.

1995 - Four earthquakes ranging in magnitude from 3.0 to 3.3, occurred towards the northern end of the zone.

1996 - Five earthquakes all above magnitude ML 3.0 were located in the zone, all but one towards the northern end.

1997 - Six of the 7 earthquakeslocated in this zone had magnitudes ML 3 or more.

Halls Creek Mobile Belt (Zone 14)

1994 - Seven earthquakes occurred in this belt, five approximately 80 to 90 km S of Kununurra. A magnitude ML 3.6 earthquake was located near Turkey Creek.

1995 - Eight earthquakes occurred in this belt, six of them approximately 80 to 100km south of Kununurra.

1996 - Of the 9 earthquakes located, 4 of them were approximately 80 - 100 km south of Kununurra. Two of these had magnitudes ML 3.6.

1997 - Two events occurred in the zone, ML 2.8 and 3.3. The largest earthquake that occurred during 1997, ML 6.3, occurred on 10 August in Collier Bay in the western extension of zone 14.

Earthquake swarms

Swarm near York (Talbot Brook), November 1994

A significant swarm of microearthquakes occurred about 12 km south-southwest of York (about 90 km east of Perth) in November 1994. Residents in the area reported feeling 50 tremors per day or more at the peak of the activity and the tremors attracted considerable media attention in Perth. The largest event at magnitude ML 3.0 was felt at intensity MM V-VI in the epicentral area and caused some alarm in the immediate epicentral area. The maximum intensity at York was MM III.

Most of the felt events were so small that only 19 of them ranging in magnitude from ML 1.3 to ML 3.0 could be located in the two weeks of intense monitoring. The swarm commenced with two relatively small events on 16 and 17 November (ML 1.7 and 1.9), a period of no activity, and numerous microearthquakes between 22 and 25 November. Activity then tailed off rapidly. Occasional small felt events occurred for the next 6 months after 29 November, but the only event large enough to be located in this period was an ML 1.7 event on 13 December.

Portable digital seismographs were deployed in the area within 6 hours of this event, and were operated until 1 December 1994. This assisted in improving the accuracy of the locations of many of the events, although only a handful of events were recorded on more than one of the temporary recorders. The seismograph internal clock was calibrated using an Omega time signal receiver. The clock rates were too large to provide high resolution clock corrections and the observed S-P intervals were the most useful feature in providing event location accuracy.

The best located events appeared to be less than 2 km deep (on the basis of an S-P interval of 0.1 seconds) and to be confined within an epicentral zone of about 2 km diameter. Any linearity within this zone may be a function of the distribution of the seismographs. An accelerograph was set up in the area for a week towards the end of the activity. Three microearthquakes were recorded, the largest, magnitude ML 1.3. The maximum acceleration of 140 mms^{-2} was recorded at a distance of 1 km from the ML 1.3 event.

A similar swarm occurred in the area in September 1996. The largest event in that swarm was ML 3.1 (on 18 September). Table 13 lists earthquakes recorded in the Talbot Brook area during 1994-1996.

Kellerberrin (Yorkrakine) swarm, March 1996 - December 1997

On 6 March 1996, a small (ML 1.7) earthquake occurred near the town of Yorkrakine, about 20 km N of Kellerberrin. From 10 March to mid May, more than 670 small earthquakes, ranging in magnitude from 0.5 to 3.1 were recorded from the area. Although small, many of the events were close enough to be felt strongly by residents in nearby farm houses. The largest earthquake of magnitude 3.1 occurred on 11 March and was felt with intensity MM V. The earthquake sequence dwindled for until late March 1996. There was renewed activity in March and April 1997 with magnitude 3.2 earthquakes occurring on 27 March and 24 April. Further activity occurred in late August and early September 199t. The largest earthquake ever recorded in the area, a magnitude ML 4.6, occurred on 31 August followed by 4 events with magnitudes 3.0 or more in the first 12 days of September. By the end of Decembetr 1997, 1726 earthquakes had been recorded. Figures 10 and 11 are histograms of the number of events each day and the hourly distribution for the above period. The latter shows that there is no preference to what time of day the earthquakes occur. The number of earthquakes versus magnitude is showing in Figure 12 giving the relationship :

$$\log N = 4.85 - 1.25ML$$ Where N is the number of earthquakes of magnitude ML or less.

Strain release as defined by Richter (1958) is shown in Figure 13.

Other swarms have occurred in the south-west of WA such as Arthur River 1966, Mukinbudin, Manmanning and Ongerup and Talbot Brook.

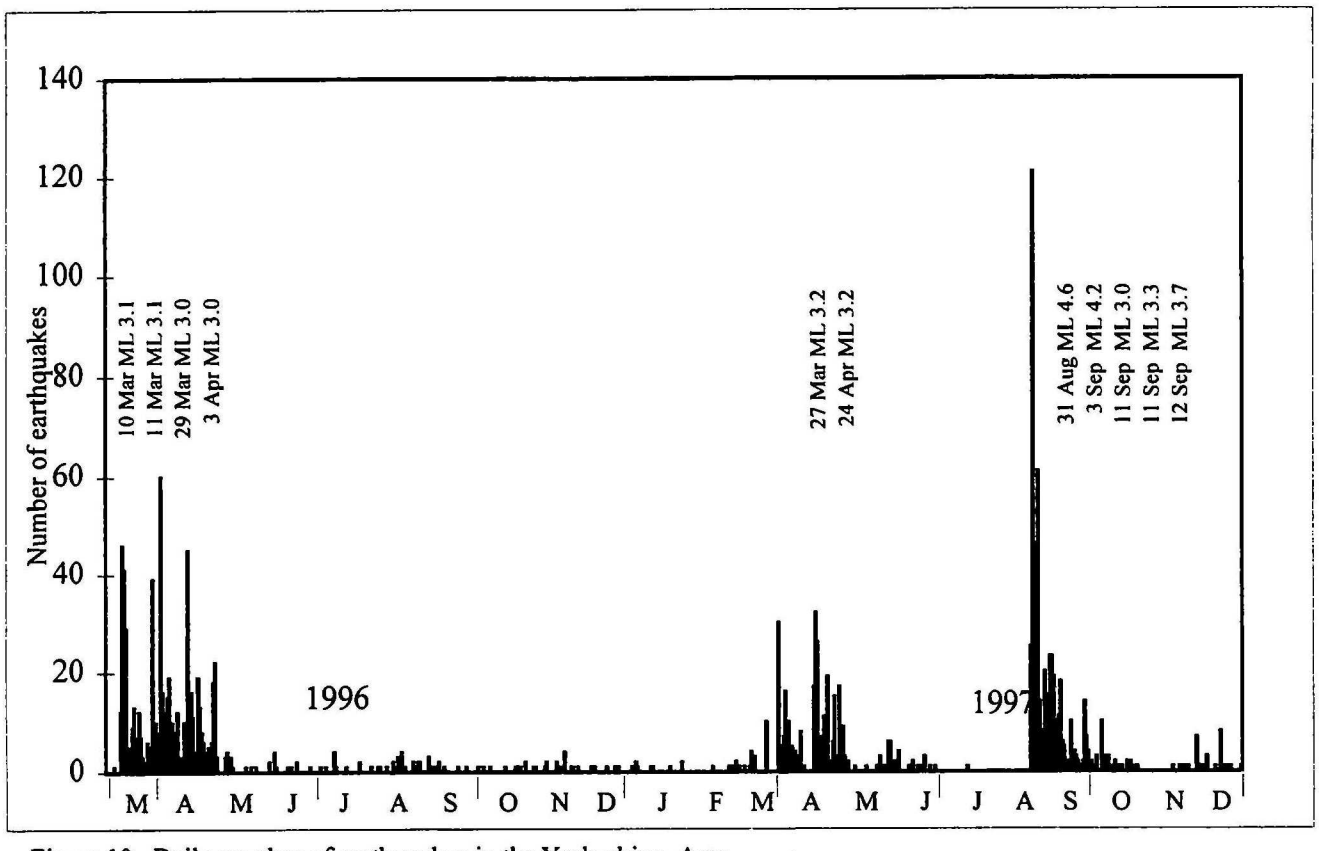


Figure 10 Daily number of earthquakes in the Yorkrakine Area

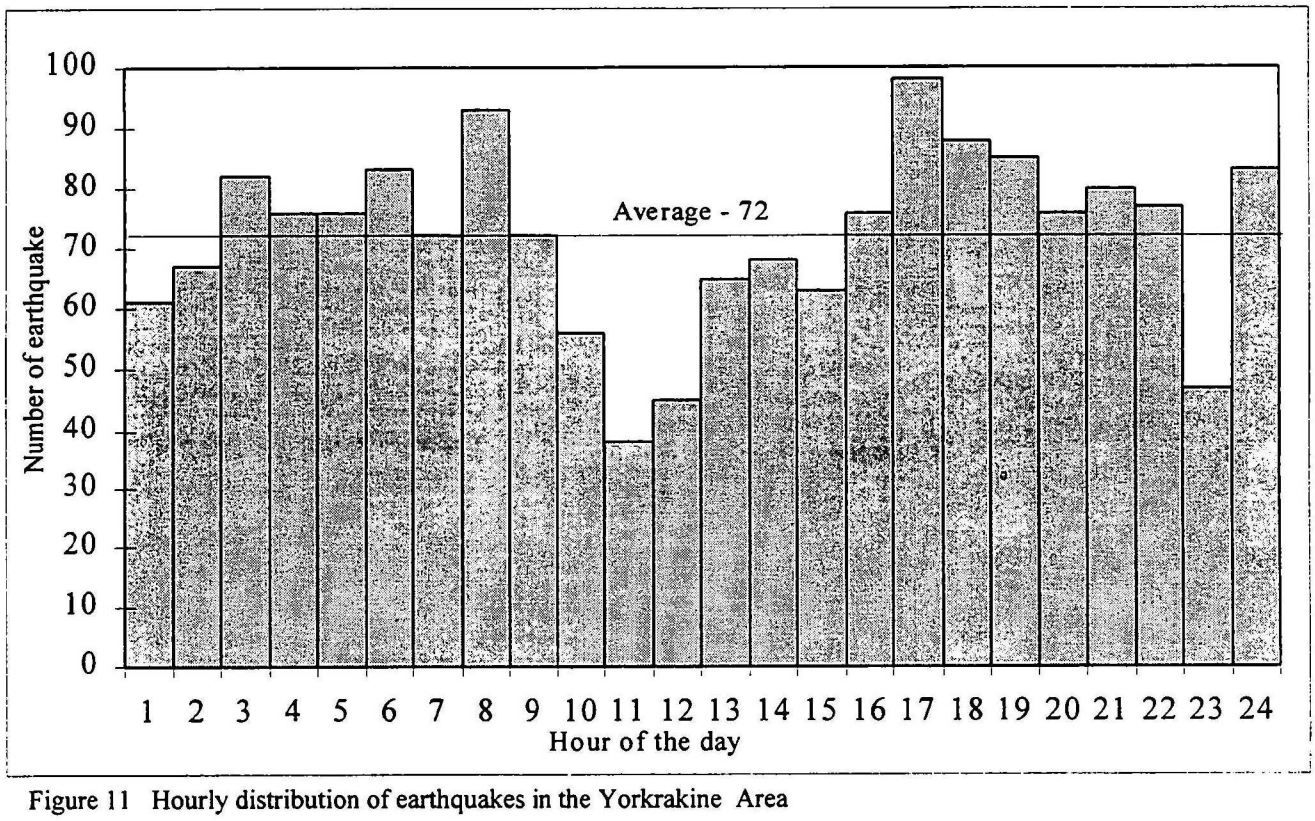


Figure 11 Hourly distribution of earthquakes in the Yorkrakine Area

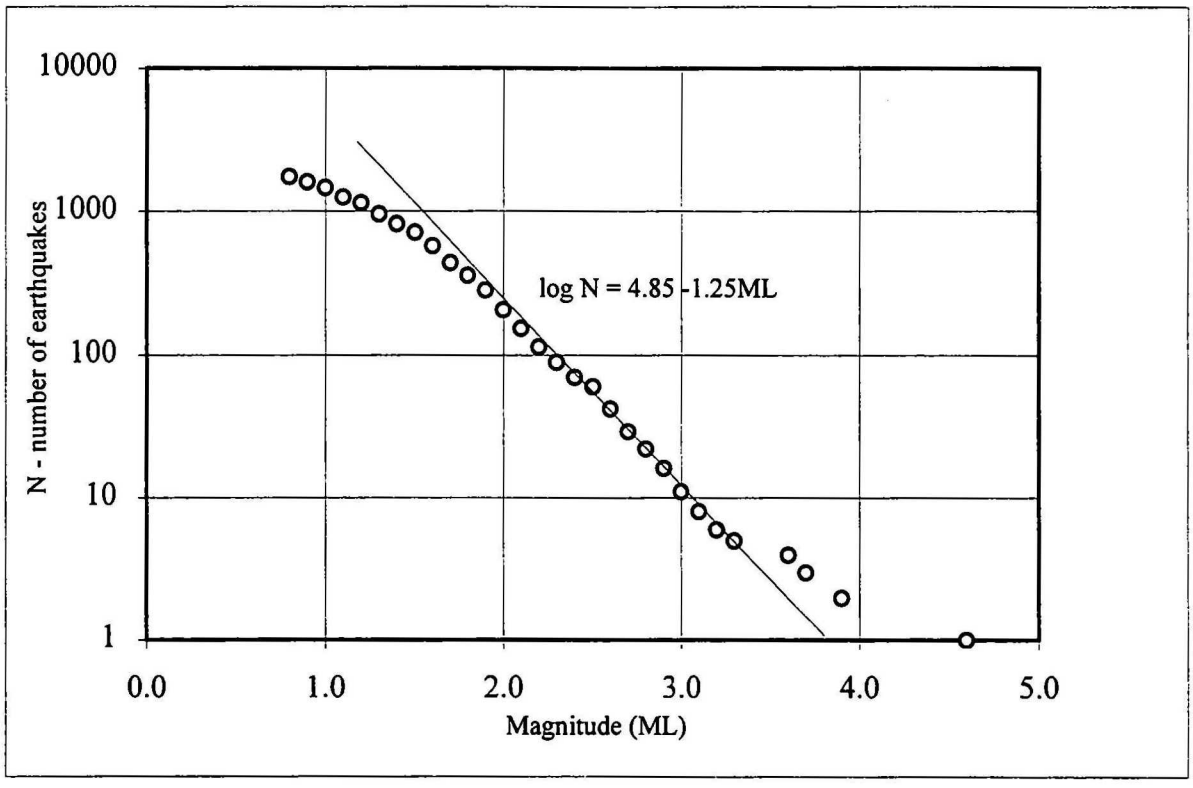


Figure 12 Magnitude/Frequency for Yorkrakine swarm

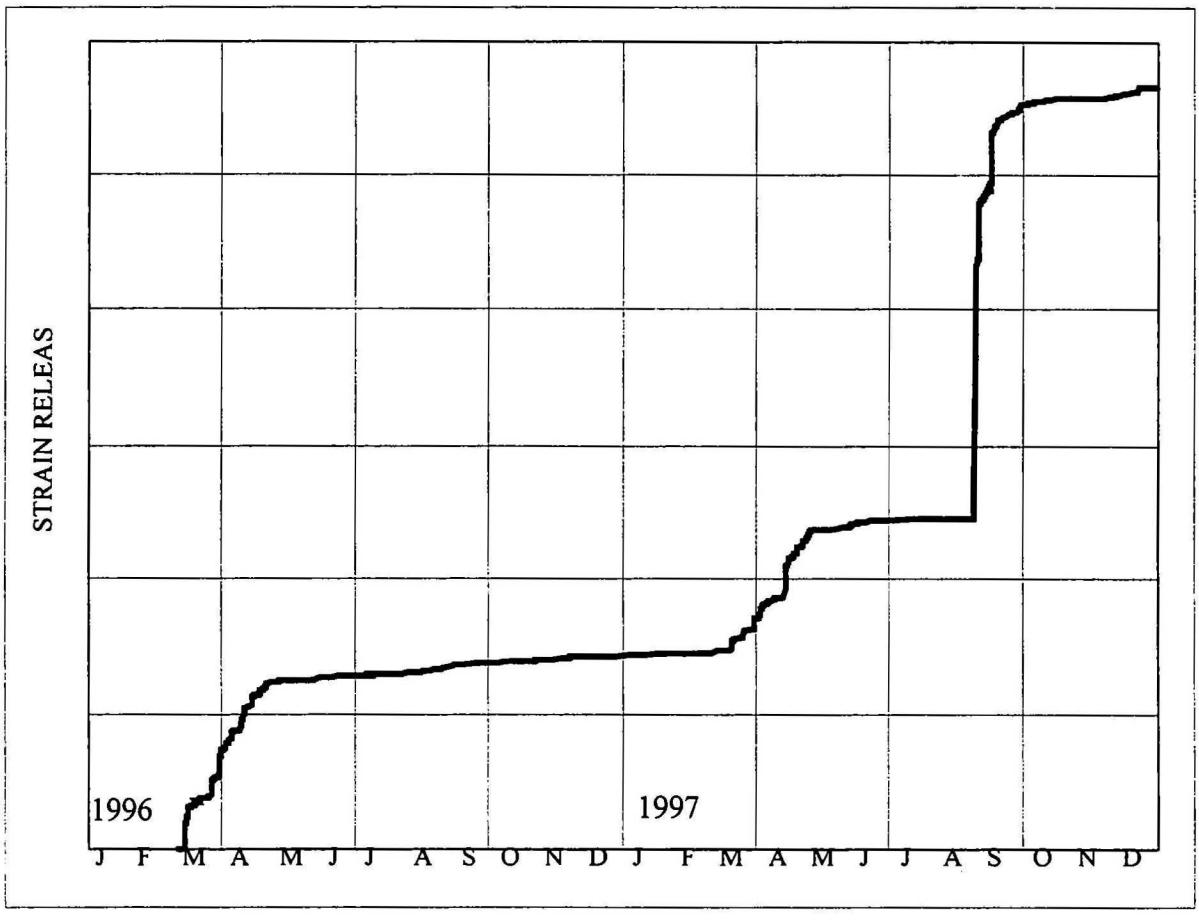


Figure 13 Strain release for Yorkrakine swarm

Earthquake intensities

Several of the earthquakes in the Southwest Seismic Zone were felt with intensities up to MM IV. Isoseismal maps were prepared for 12 earthquakes in Western Australia, one in the Banda Sea and one in the Flores Sea. Descriptions are given below.

Bonnie Rock, 26 April 1994 (Figure 14)

A magnitude ML 4.1 earthquake occurred at 11.49 p.m. (1549 UT) on 26 April. The epicentre was located 13 km south east of Bonnie Rock, 346 km north east of Perth.

Many nearby residents were woken up by the loud rumbling but no damage was reported. There were a few reports from Kalgoorlie and geraldton, 450 km from the epicentre. The radii of the V and IV isoseismals were 75 km and 150 km respectively. Strong motion recorded at Goomalling, 180 km from the epicentre. Many nearby residents were woken up by the loud rumbling but no damage was reported. There were a few reports from Kalgoorlie and Geraldton, 450 km from the epicentre. The radii of the V and IV isoseismals were 75 km and 150 km respectively. Previous activity in the region occurred at 25 km south in June 1968, 1973/74 and 1993, with the largest being a magnitude ML 4.0 on 21 June 1968.

Salmon Gums, 11 October 1994 (Figure 15)

A strong tremor on 11 Oftober at 6.34 p.m. (WST) was felt in the Esperance region up to 80 km from the epicentre. Apart from Esperance, the region is sparsely populated and therefore the tremor was not felt by many.

The epicentre was located about 50 km SW of Salmon Gums and the magnitude was ML 3.9. The maximum intensity experienced near the epicentre was MM VI. Small objects were shifted and plaster cracked on walls. The radius of the MM IV isoseismal was 40 to 50 km.

Talbot Brook, 23 November 1994 (Figure 16)

At 4.53 a.m. (WST) on 24 November, a magnitude ML 3 earthquake woke many residents in the York-Talbot Brook area. The epicentre was 12 km SSW of York, 10 km NE of Talbot Brook. No damage was reported but small objects moved and one observer reported that he thought the roof was going to "lift off". The radii of the V and VI isoseismals were 5 and 15 km respectively and the tremor was felt at least up to 25 kilometres away.

A second magnitude ML = 3.0 occurred the following morning at 4.03 a.m. (WST) on 25 November at the same location and resulted in similar effects. Both earthquakes were part of a series lasting about 3 weeks from November 16 when more than 60 earthquakes were recorded, raning in magnitude from 0.6 to 3.0 (Table 12).

Local residents felt many of these earthquake and expressed some concern. The sounds they heard ranged from loud explosions, indicating the earthquake was very close to rumblings which indicated the earthquake was further away.

Talbot Brook experienced a similar series of small earthquakes in November 1964. The largest earthquake in that series was a magnitude ML 3.8 (Everingham, 1968).

Banda Sea, 25 December 1995 (Figure 17)

An earthquake occurred in the Banda Sea (6.94°S, 129.18°E) on Christmas Day, 25 December at 0443 UT (2.15 p.m. CSST) The USGS reported the magnitude as mB 6.2 and Mw 7.1.

Intensities MM VI were reported from Saumlaki and MM IV at Ambon and Tuai in Indonesia. The earthquake was felt strongly in Australia with a maximum intensity of MM V on Bathurst Island and Darwin in the Northern Territory. In Darwin, windows and crockery rattled and small objects on shelves moved. Some people moved outside of buildings. At Nguiu on Bathurst Island, many people were woken up and windows rattled.

Two strong motion recorders in Darwin, 638 km from the epicentre, were triggered and recorded peak ground accelerations in an EW direction of 211 mms^{-2} and 112 ms^{-2} at Parliament House and the Department of Mines and Energy rock store in Winnellie respectively.

The radius of the MM IV isoseismal was 950 km with no felt reports beyond 1250 km.

Flores Sea, 17 June 1996 (Figure 18)

An earthquake occurred on 17 June in the Flores Sea (7.14° S and 122.59° E) at 1122 UT (2052 CST). The USGS reported the magnitude as mB 6.6 and Mw 7.8, with a depth of 587 km.

Some damage was reported at Kupang, Indonesia and it was felt at Laratuka and Maumere, Indonesia and Putatan in Malayasia. It was also felt in Australia with a maximum intensity MM V at Darwin. The radius of the MM IV isoseismal in Australia was approximately 1050 km. In northern Australia, the greatest distance the earthquake was felt was 1500 km from the epicentre. The earthquake was also felt in tall buildings, one each in Perth and Adelaide, 2800 km and 3450 km from the epicentre respectively.

Thirty centimetre waves were evident on the tide gauge at Cape Lambert (near Karratha, WA).

Meckering, 18 June 1996 (Figure 19)

Meckering, 110 km east of Perth was strongly shaken by an earthquake, magnitude ML 3.7 on 18 June at 1331 UT (9.31 p.m. WST). A maximum intensity MM IV was reported with windows and crockery rattling up to 35 km from the epicentre. Intensities MM III were felt in the outer eastern suburbs up to 100 km from the epicentre and 120 km to the north-west. The outer Perth suburbs east of the Darling Fault are situated on granite of the pre-Cambrian shield. There were very few reports of the earthquake being felt west of the fault.

Meckering, 21 June 1996 (Figure 20)

Three days after an earlier shaking, Meckering was again rocked by an earthquake. The magnitude of this event was ML 4.1 and occurred at 1456 UT (10.56 p.m. WST) on 21 June. It was located 5 km south east of the Meckering townsite, about 5 km closer than the earlier event. Intensities MM V were experienced with some people being woken up and there were reports of small objects overturning within 10 km of the epicentre. The average radius of the MM IV isoseismal was 105 km with an elongation of up to 20% in an easterly direction. Generally intensities experienced in Perth and inner suburbs was MM III although there were pockets of MM IV reported. It is difficult to determine the maximum distance at which the earthquake could have been felt because of the lateness of the hour.

Offshore WA, 18 October 1996 (Figure 21)

The south-western corner of Western Australia was shaken by an earthquake at 1.28 p.m. on 18 October 1996. The magnitude ML 4.1 earthquake was located offshore about 130 km south-west of Fremantle and 95 km north-northwest of Cape Naturaliste.

The maximum intensity experienced was MM IV and was generally confined to a small area of about 35 km^2 in the Cape Naturaliste area. The radius of the MM IV was 115 km. The earthquake was felt with intensity MM II at Karridale, 165 km from the epicentre in a southerly direction. There was also one report from the north-east at Gidgegannup, 180 km from the epicentre.

There were numerous reports from the MM Zone III from Gracetown and Margaret River areas on the Precambrian Shield, west of the Dunsbrough fault. It is interesting to note that apart from Bunbury (MM 2) there were no reports of the earthquake having been felt in the Perth Basin between Bunbury and Perth. A magnitude 5.2 earthquake in 1980 located about 70 km to the north-west of this earthquake resulted in similar effects. Intensities of MM 3 were generally experienced in the Basin in the Perth area with MM IV on the Pre-cambrian shield east of the Darling Fault, further away from the epicentre.

Gnowangerup, 26 October 1996 (Figure 22)

A large portion of the population of the small town of Gnowangerup, 300 km south-east of Perth, WA experienced intensity MM IV from a magnitude ML 3.7 earthquake which occurred at 4.54 p.m.(WST) on 26 October and was located 9 km W of the townsite. Windows rattled and the noise was very loud.

The radius of the MM IV isoseismal was 12 km and the earthquake was felt 30 km south-west of Kojonup, 85 km from the epicentre.

Geraldton, 8 July 1997 (Figure 23)

Residents of Geraldton, Western Australia were woken at 5.34 a.m. (9 July WST) by shaking and rumbling caused by a magnitude ML 4.2 earthquake. The location of the earthquake was in the Perth sedimentary basin, 44 km north-west of Geraldton and about 12 km off-shore from Horrocks Beach.

The maximum intensity experienced was MM V at Horrocks Beach where small objects shifted on shelves. Intensities of MM V were experienced up to 90 km from the epicentre in a north-south direction along the coastal sediments. Effects attenuated rapidly in an easterly direction with no felt reports coming from further than 60 km and none from the pre-Cambrian Shield, 110 km to the east. Although the lack of reports is partly due to the time of day when many people were asleep, the geology is thought to be the main cause.

Intensities of MM IV were felt at Dongara on the coastal sediments, 110 km from the epicentre. There were some reports received from suburbs in Perth, 430 km from the epicentre, where water slopped in swimming pools at Leeming and Gosnells.

This earthquake demonstrates that intensities in the Perth Sedimentary Basin are up to an intensity higher than in the pre-Cambrian Shield. For a magnitude ML 4.2 earthquake at Yorkrakine on the Shield, intensities MM V and MM IV were experienced up to distances of 10 km and 100 km respectively.

Geraldton (Town), 8 July 1997 (Figure24)

Geraldton, 40 to 48 km from the epicentre experienced intensities of MM IV and MM V. The intensity MM V reports were mainly confined to the coastal suburbs of Sunset Beach, Mahonets Flats, Tarcoola Beach and Bluff Point in the vicinity of the mouth of the Chapman River.

Collier Bay, 10 August 1997 (Figure 25)

A magnitude 6.3 earthquake occurred at 0920 UT (5.20pm) on 10 August near Montgomery Is at the entrance to Collier Bay in the north-west of Western Australia. It was the largest earthquake in Australia since the Tennant Creek earthquakes in January 1998. The epicentre was at the western end of the Halls Creek Mobile Zone.

MM intensities of VII were experienced at Cockatoo and Margaret Islands, about 45 kilometres from the epicentre. At Cockatoo Island concrete splayed from piers supporting buildings (Figure 26) and at Margaret Island steel poles supporting a shelter, bent at the base leaving the Walls about 150mm cockeyed at the top. Ground waves were observed and a table rose and fell. Other damage was minimal as the area is sparcely populated, however many people where frightened and the earthquake was felt over an area of 400,000 square kilometres. The radii of the MM VI andIV isoseismals were an average of 150 and 450 kilometres respectively.

At Backstein Creek, 110 kilometres from the epicentre some people swimming in a lake described the water having the appearance of boiling. They left the water in a hurry. People at Cape Leveque, 120 kilometres from the epicentre reported that the wheels of their stationery vehicle left the ground while campers at the mouth of the Fitzroy River felt their camper van rocking quite strongly

Both the accelerographs in Darwin (830 kilometres) triggered on the s-waves and recorded peak ground accelerations of 16mms^{-2} (DPH) and 13mms^{-2} (DRS).

Yorkrakine, 31 August 1997 (Figure 27)

The Yorkrakine area, 19 km north of Kellerberrin, has been seismically active since March 1996. Since then more than 1000 earthquakes ranging from ML 1.0 to ML 3.3 have been recorded.

This earthquake, a magnitude ML 4.6, occurred at 11.23 p.m. (WST) and woke many people in the vicinity. The maximum intensity, MM VI was experienced within a few kilometres of the epicentre. Residents experienced a loud explosion, followed by rumbling and shaking. Plaster walls were cracked and small objects fell of shelves. The radius of the MM V isoseismal was 50 km and the MM IV isoseismal out to 100 km from the epicentre. The earthquake was felt in some Perth suburbs, 190 km from the epicentre.

Dampier Downs, 1 September 1997 (Figure 28)

This magnitude ML 4.5 earthquake occurred at 5.48 p.m. WST and was located 40 km north-west of Dampier Downs station. Due to the sparseness of population it was poorly felt. Observers, 25 km south-west of the epicentre who were working on a windmill, climbed down when they heard an earth sound rushing towards them. They felt no shaking. Intensity MM III was experienced at Thango station, 100 km west of the epicentre. There was insufficient information to draw isoseismals.

Yorkrakine, 3 September 1997 (Figure 29)

This earthquake, magnitude ML 4.2, occurred at 1.12 p.m. WST on 3 September, three days after a magnitude ML 4.6 at the same location. The maximum intensity was MM V within a few kilometres of the epicentre. The MM IV isoseismal was up to 100 km from the epicentre. The response to this earthquake was not as good as the previous event and therefore the isoseismal are not so well defined.

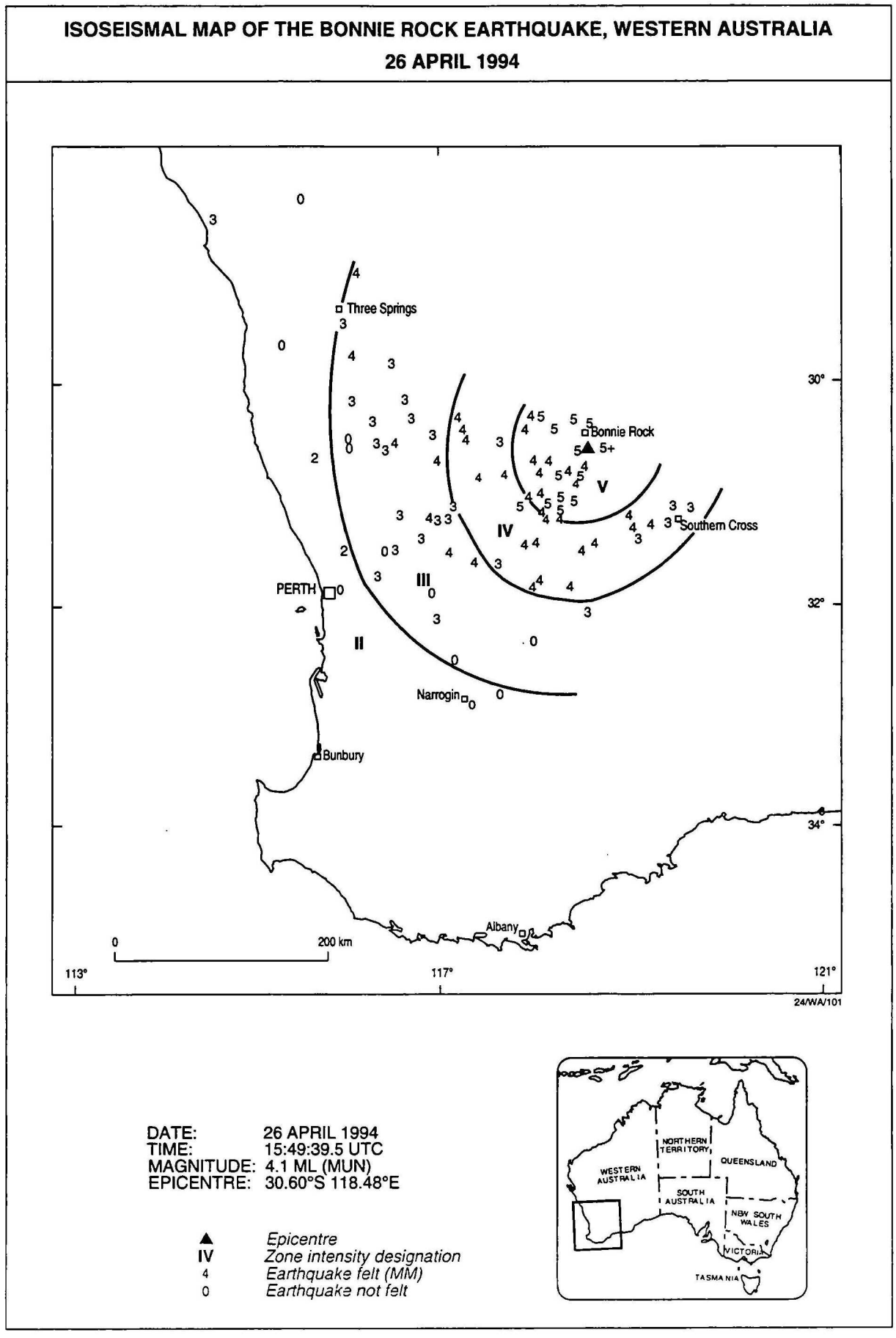


Figure 14 Isoseismal map of the Bonnie Rock Earthquake, 26 April 1994

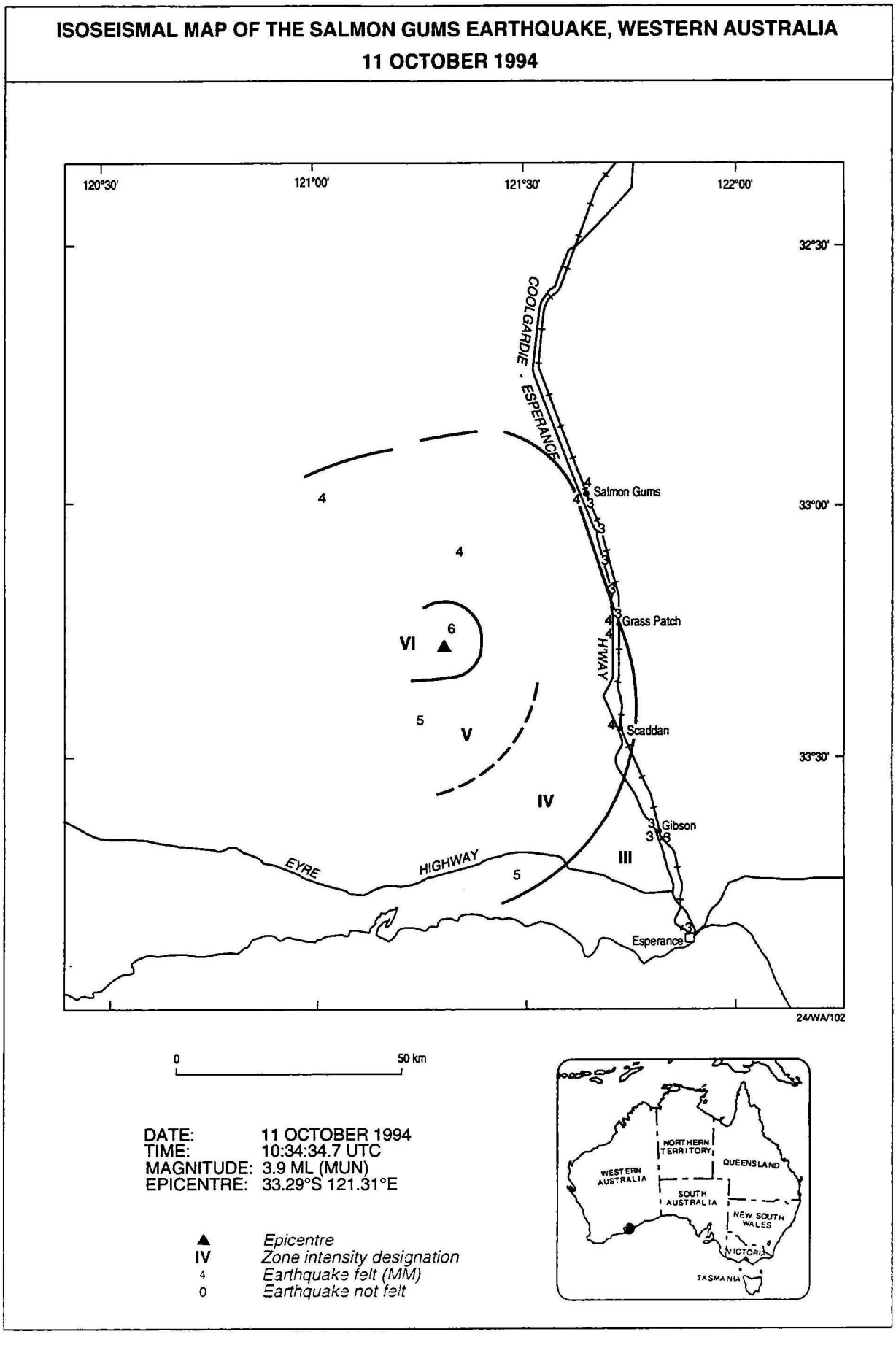


Figure 15 Isoseismal map of the Salmon Gums earthquake, 11 October 1994

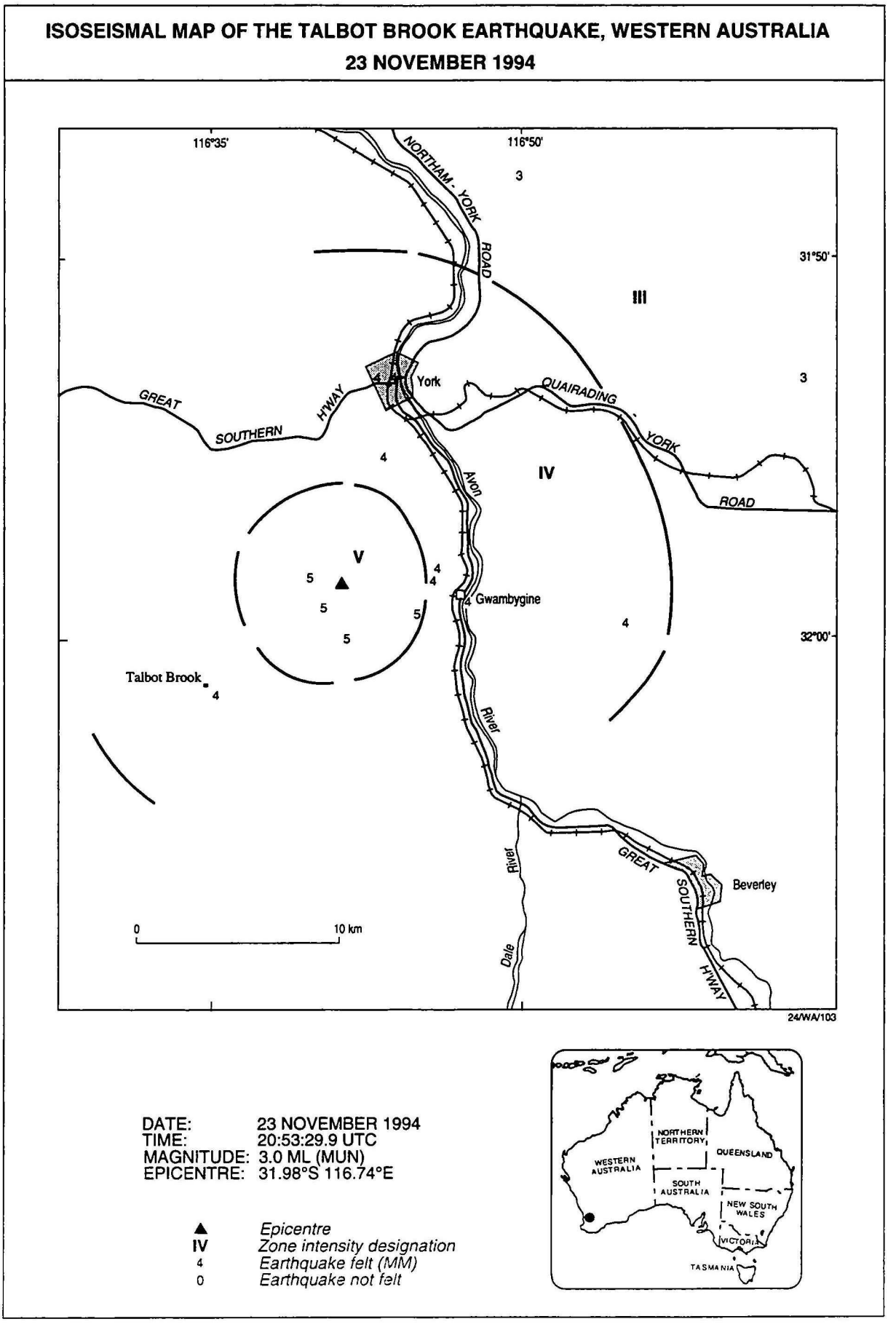


Figure 16 Isoseismal map of the Talbot Brook earthquake, 23 November 1994

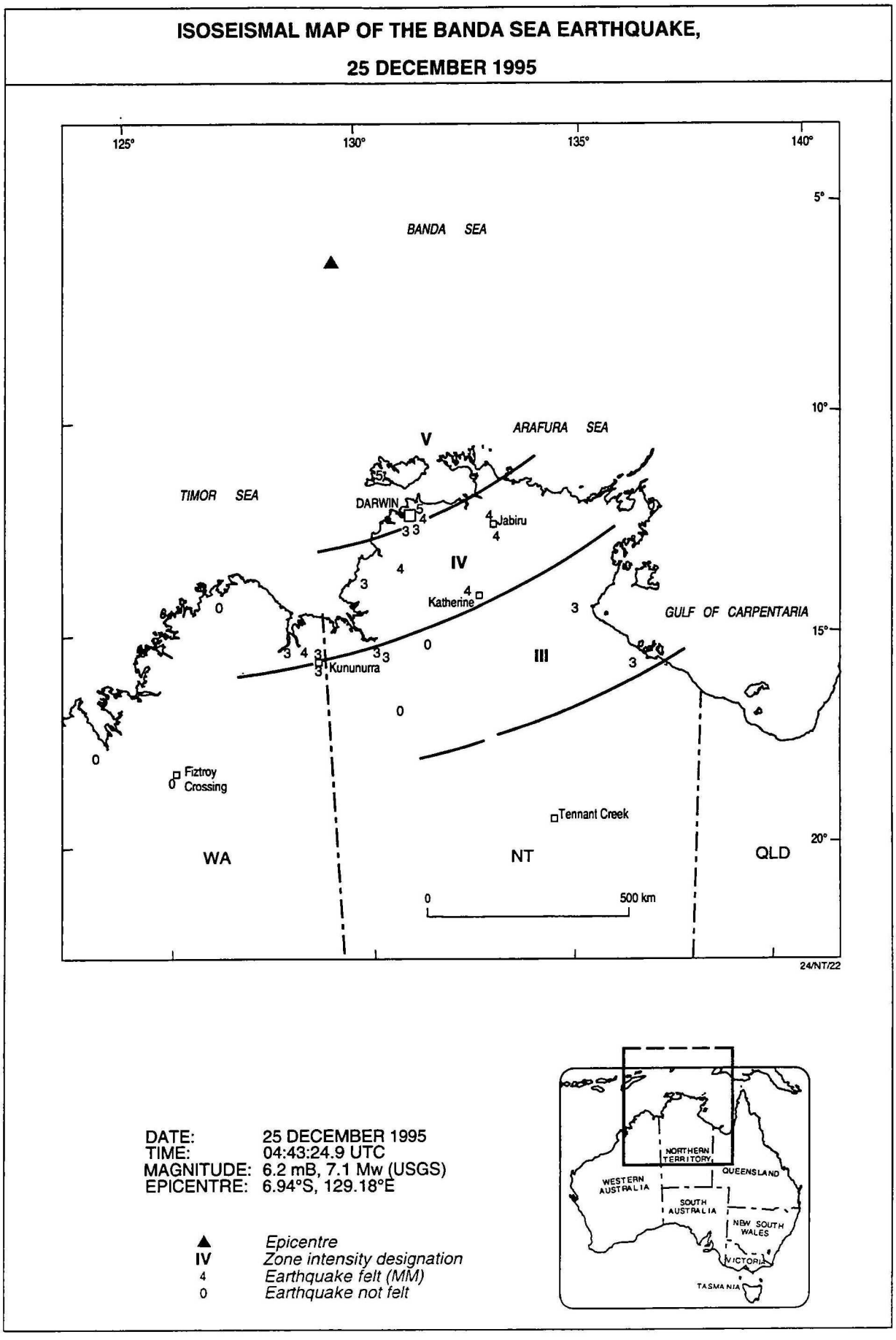
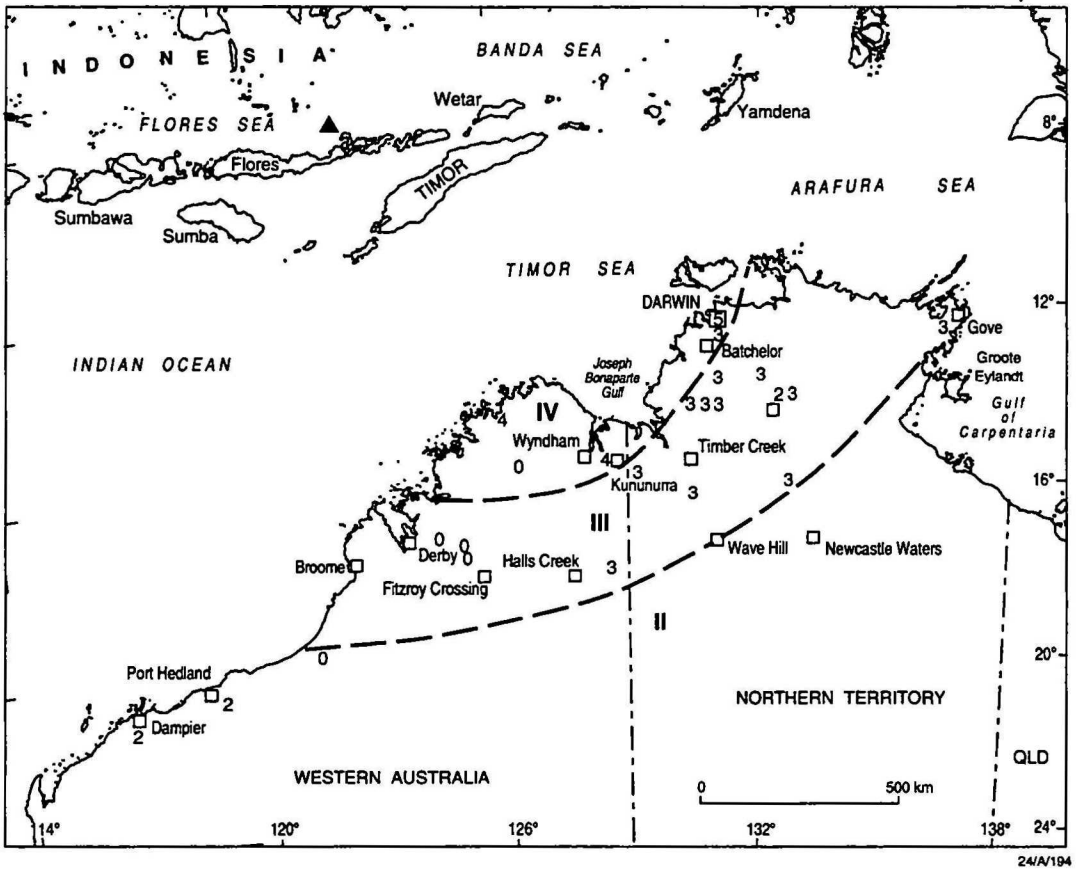


Figure 17 Isoseismal map of the Banda Sea earthquake, 25 December 1995

ISOSEISMAL MAP OF THE FLORES SEA EARTHQUAKE, 17 JUNE 1996



DATE: 17 JUNE 1996
TIME: 11:22:18.5 UTC
MAGNITUDE: 7.9 Mw
EPICENTRE: 7.14°S, 122.59°E
DEPTH: 5.87 km

▲ *Epicentre*
IV *Zone intensity designation*
4 *Earthquake felt (MM)*
0 *Earthquake not felt*

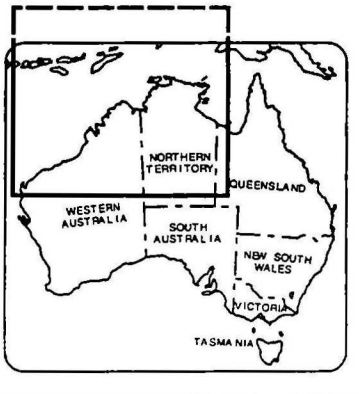


Figure 18 Isoseismal map of the Flores Sea earthquake, 17 June 1996

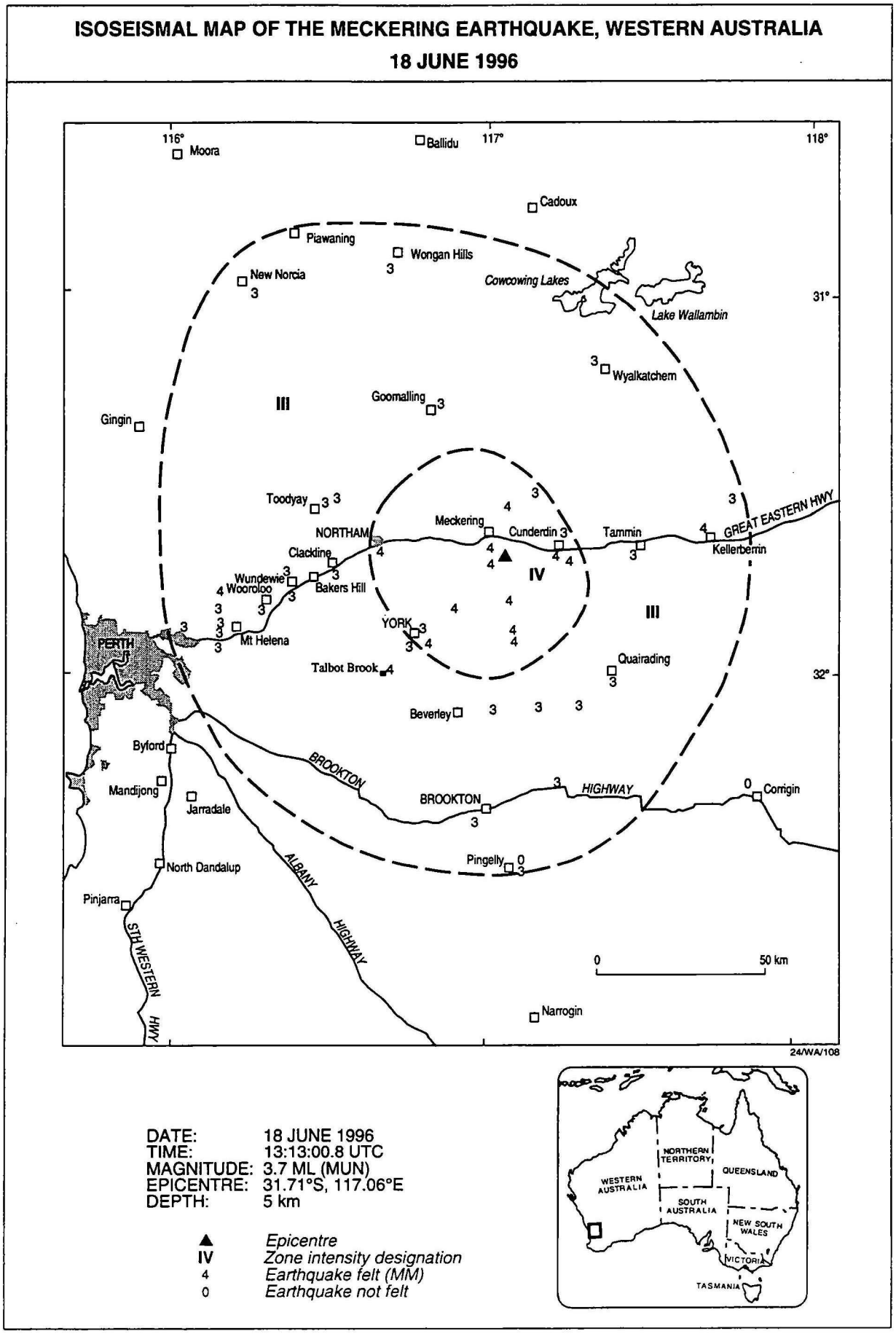
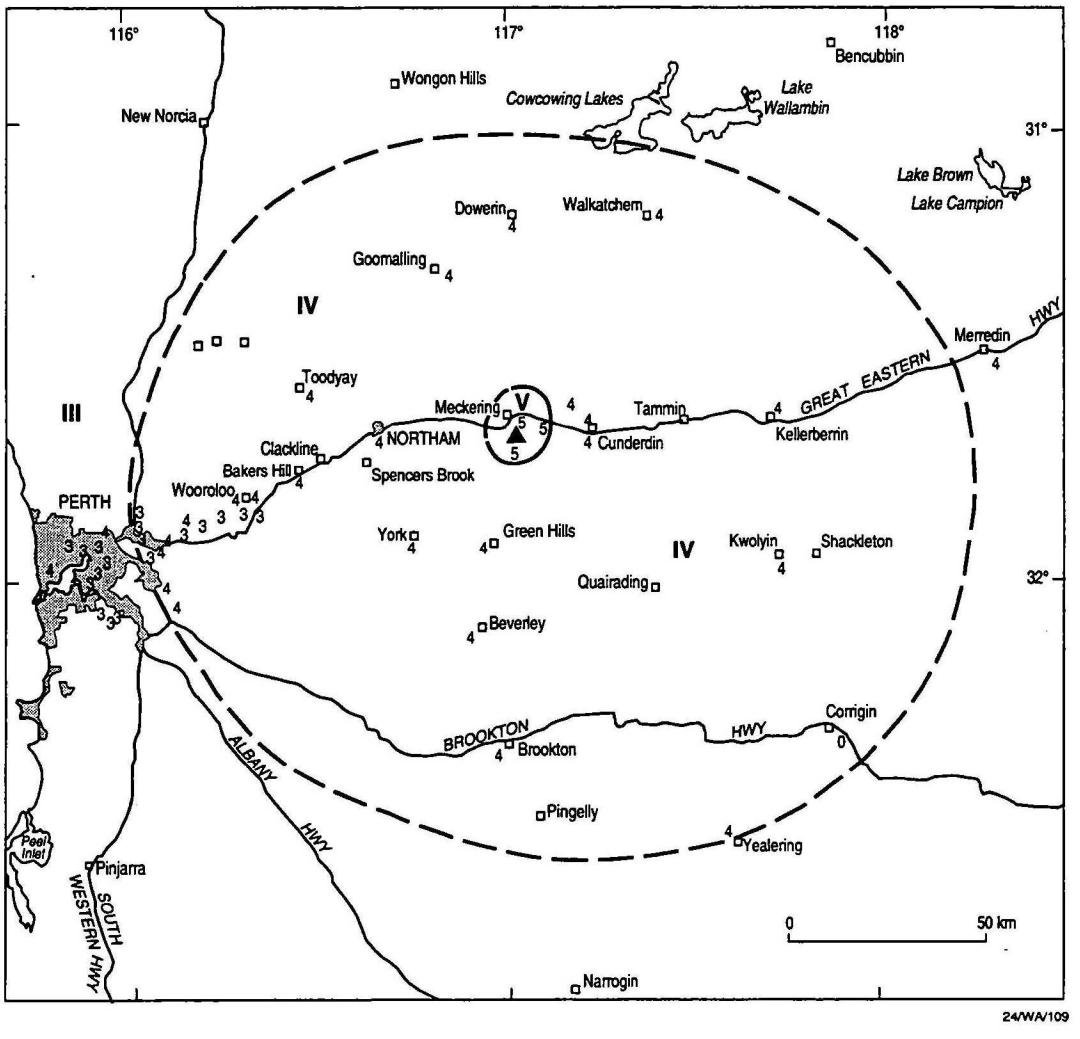


Figure 19 Isoseismal map of the Meckering earthquake, 18 June 1996

ISOSEISMAL MAP OF THE MECKERING EARTHQUAKE,WESTERN AUSTRALIA
21 JUNE 1996



DATE: 21 JUNE 1996
TIME: 14:56:59.3 UTC
MAGNITUDE: 4.1 ML (MUN)
EPICENTRE: 31.56°S, 117.06°E
DEPTH: 6 km

▲ *Epicentre*
IV *Zone intensity designation*
4 *Earthquake felt (MM)*
0 *Earthquake not felt*

Figure 20 Isoseismal map of the Meckering earthquake, 21 June 1996

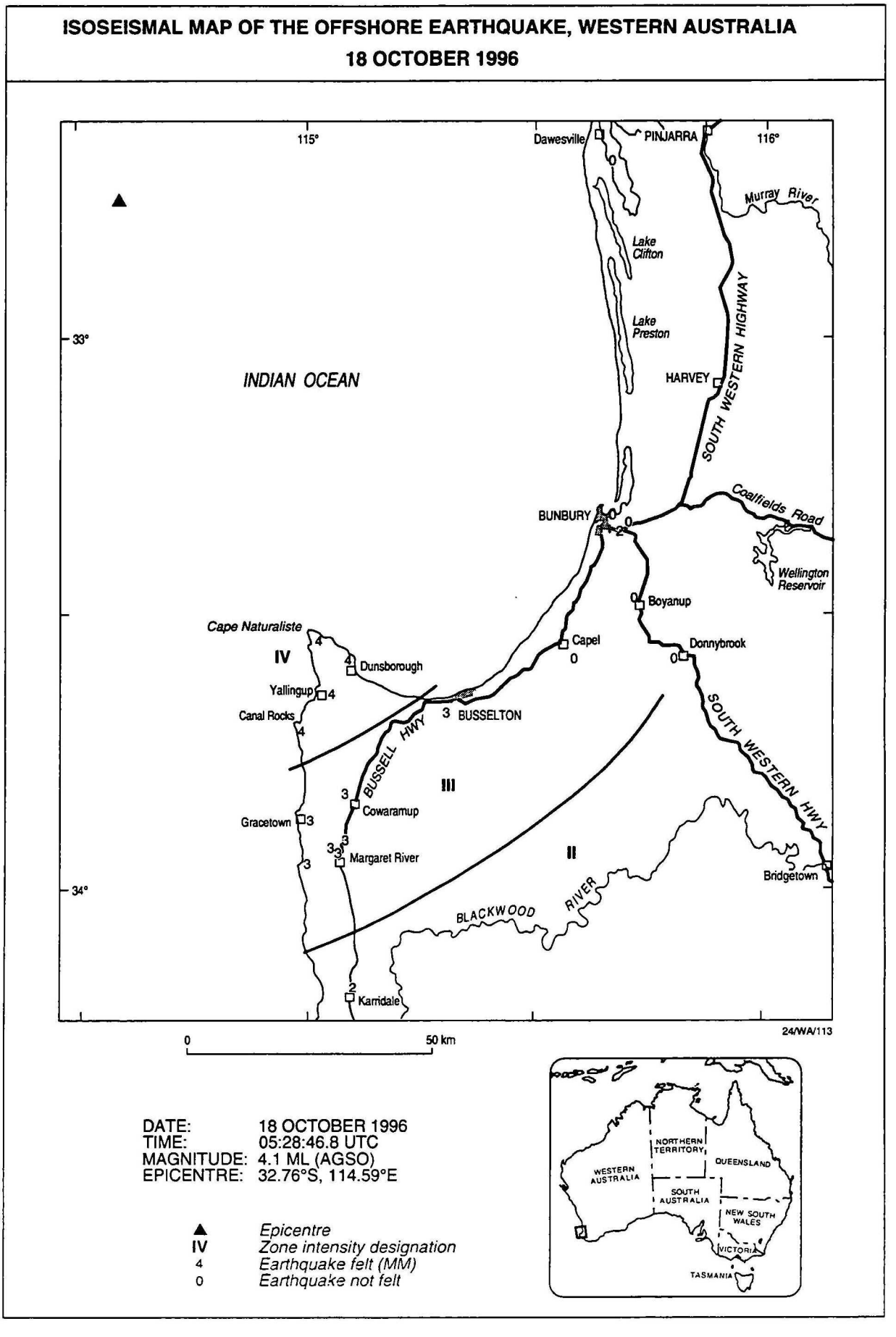


Figure 21 Isoseismal map of the offshore earthquake, 18 October 1996

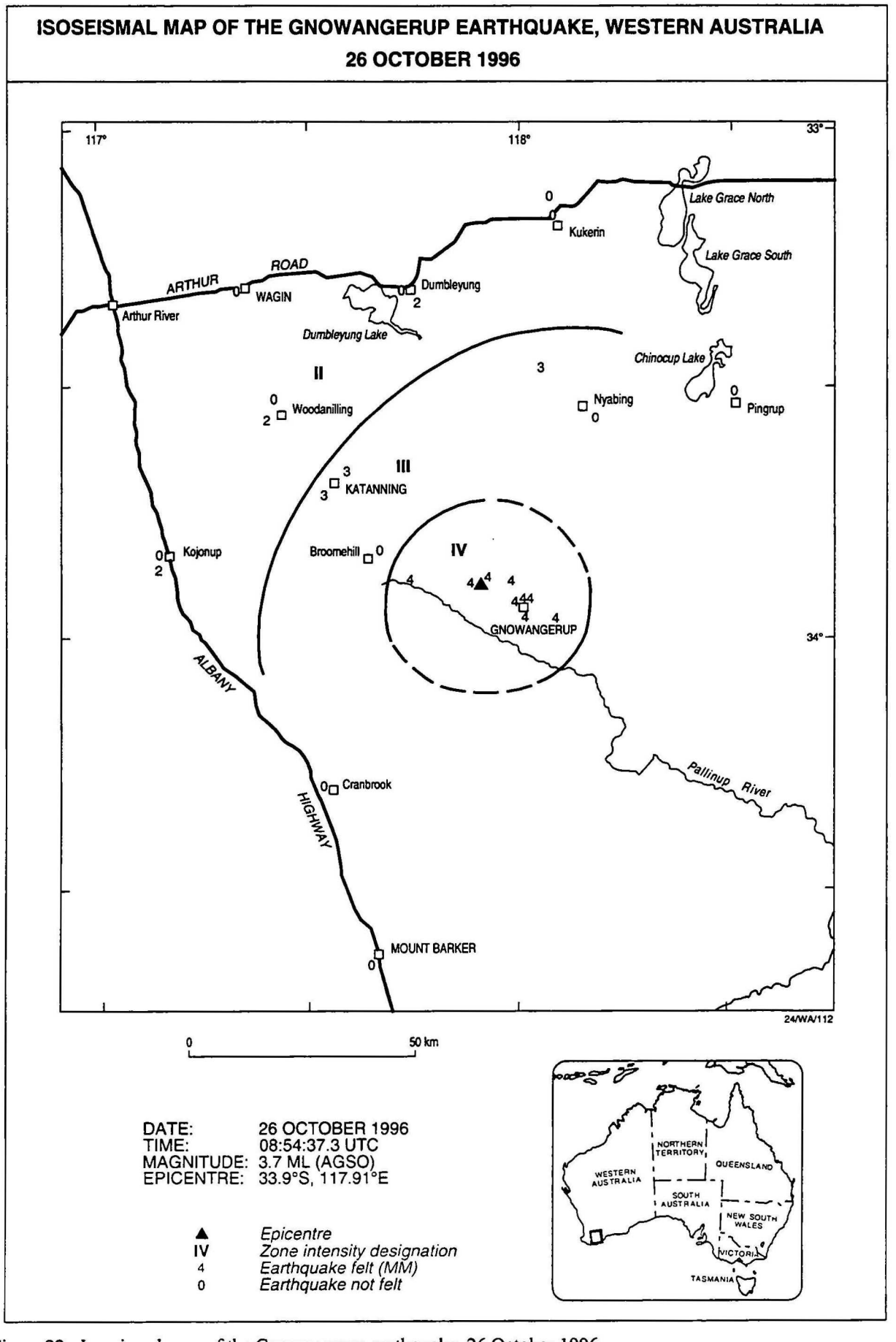


Figure 22 Isoseismal map of the Gnowangerup earthquake, 26 October 1996

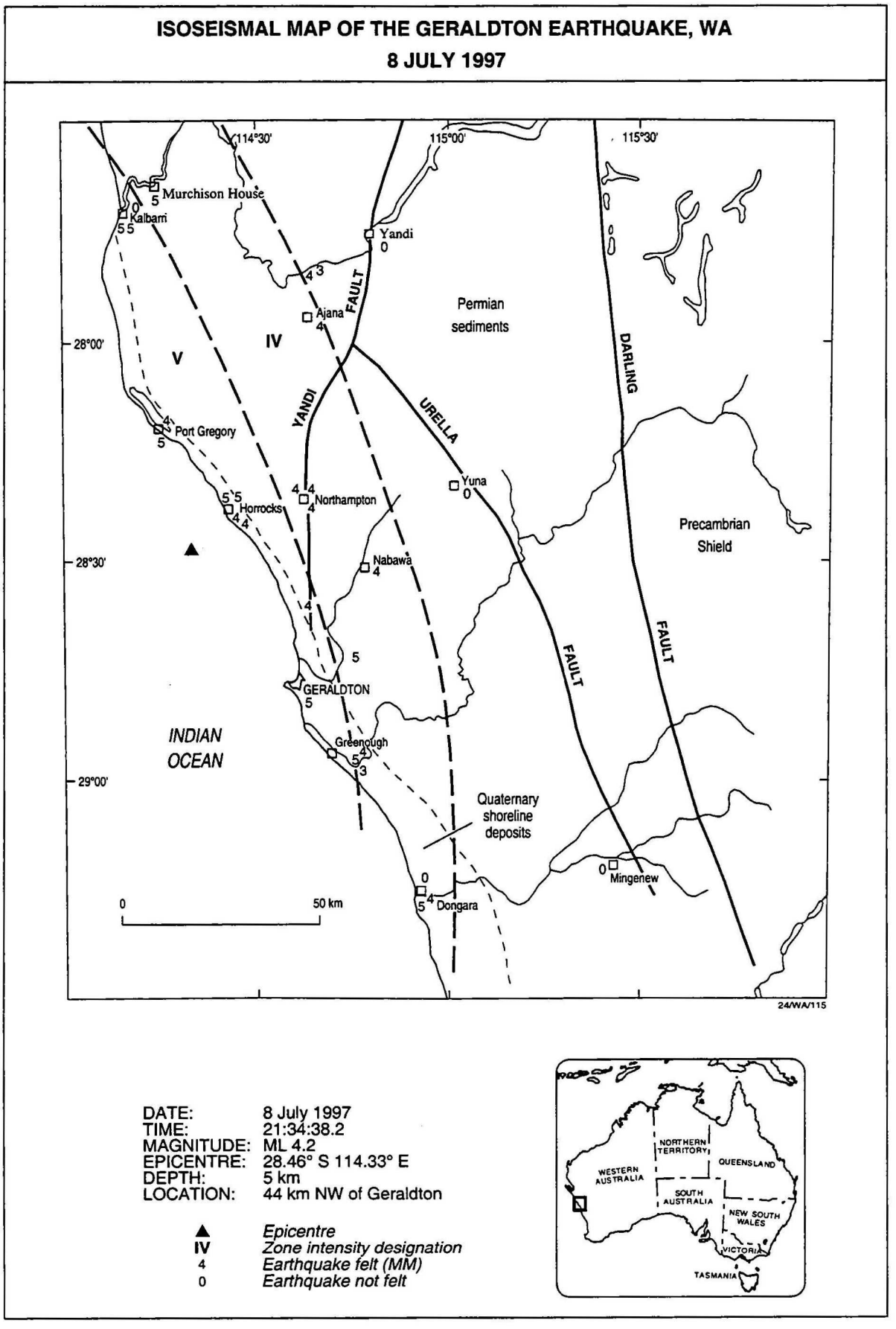
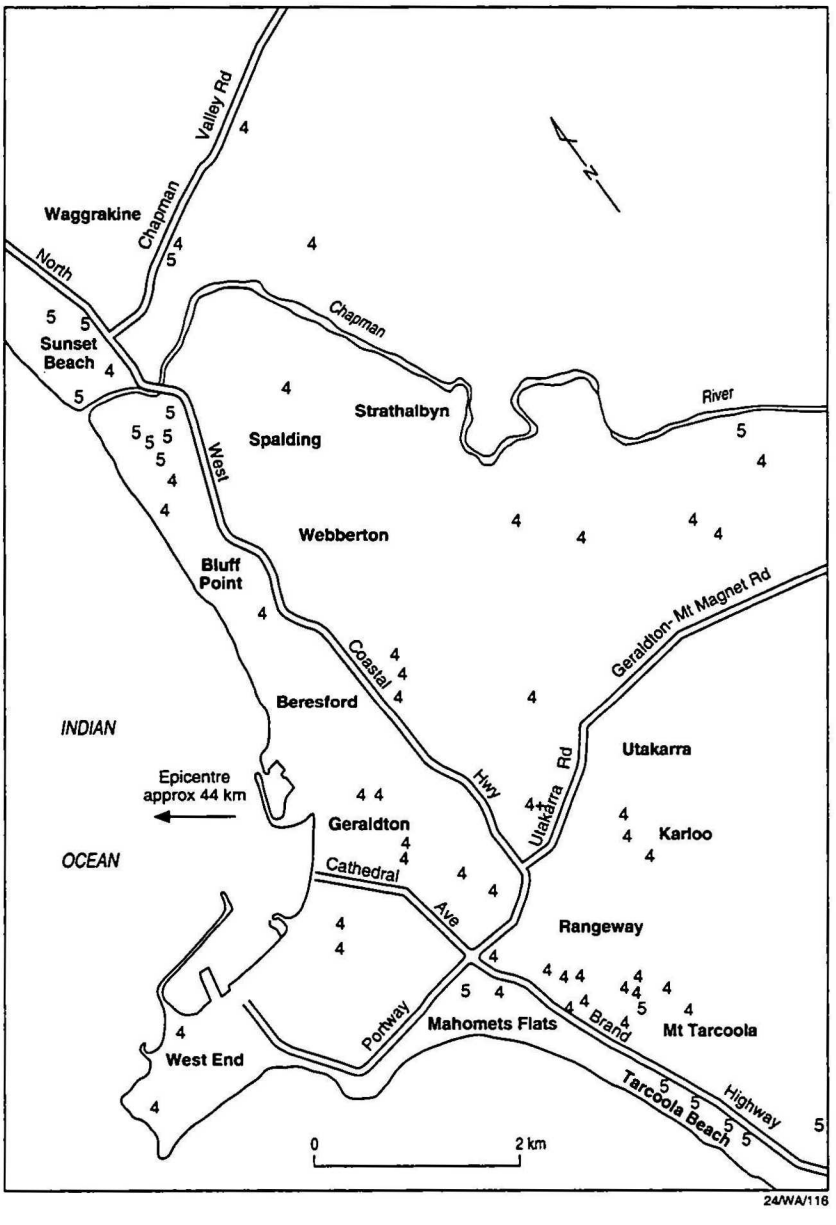


Figure 23 Isoseismal map of the Geraldton earthquake, 8 July 1997

ISOSEISMAL MAP OF THE "GERALDTON TOWNSHIP" EARTHQUAKE, WA
8 JULY 1997



DATE: 8 JULY 1997
TIME: 21:34:38.2
MAGNITUDE: ML 4.2
EPICENTRE: 28.46°S 114.33°E
DEPTH: 5 km
LOCATION: 44 km NW Geraldton

▲ *Epicentre*
IV *Zone intensity designation*
4 *Earthquake felt (MM)*
0 *Earthquake not felt*

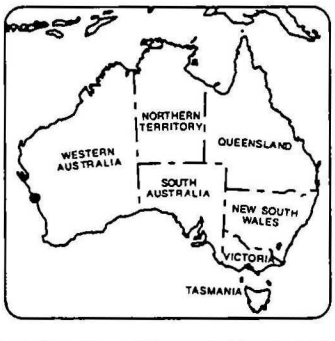
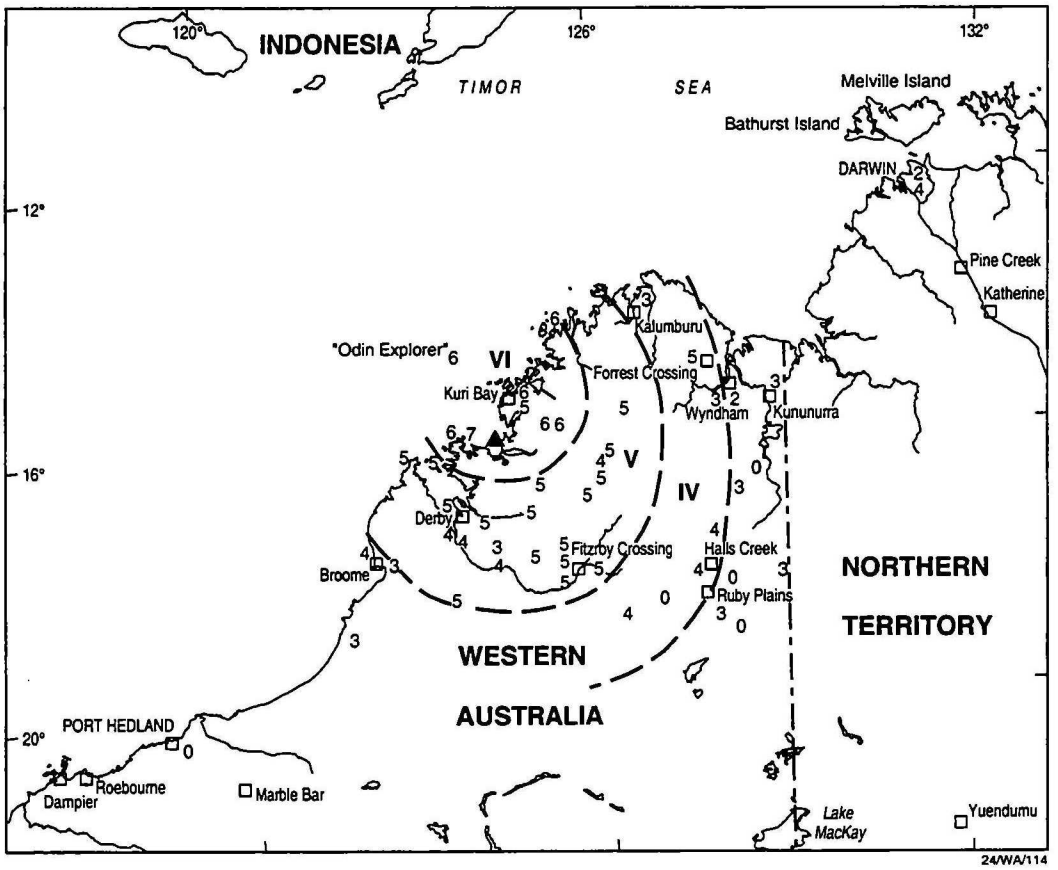


Figure 24 Isoseismal map of the Geraldton earthquake (Town), 8 July 1997

ISOSEISMAL MAP OF THE COLLIER BAY EARTHQUAKE, WA
10 AUGUST 1997



DATE: 10 August 1997
TIME: 09:20:35.2 UTC
MAGNITUDE: MW 6.3
EPICENTRE: 16.10°S 124.38°E
DEPTH: 10 km
LOCATION: 60 km E of Cockatoo Island

▲ *Epicentre*
IV *Zone intensity designation*
4 *Earthquake felt (MM)*
0 *Earthquake not felt*

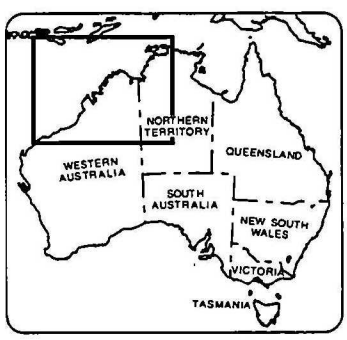


Figure 25 Isoseismal map of the Collier Bay earthquake, 10 August 1997

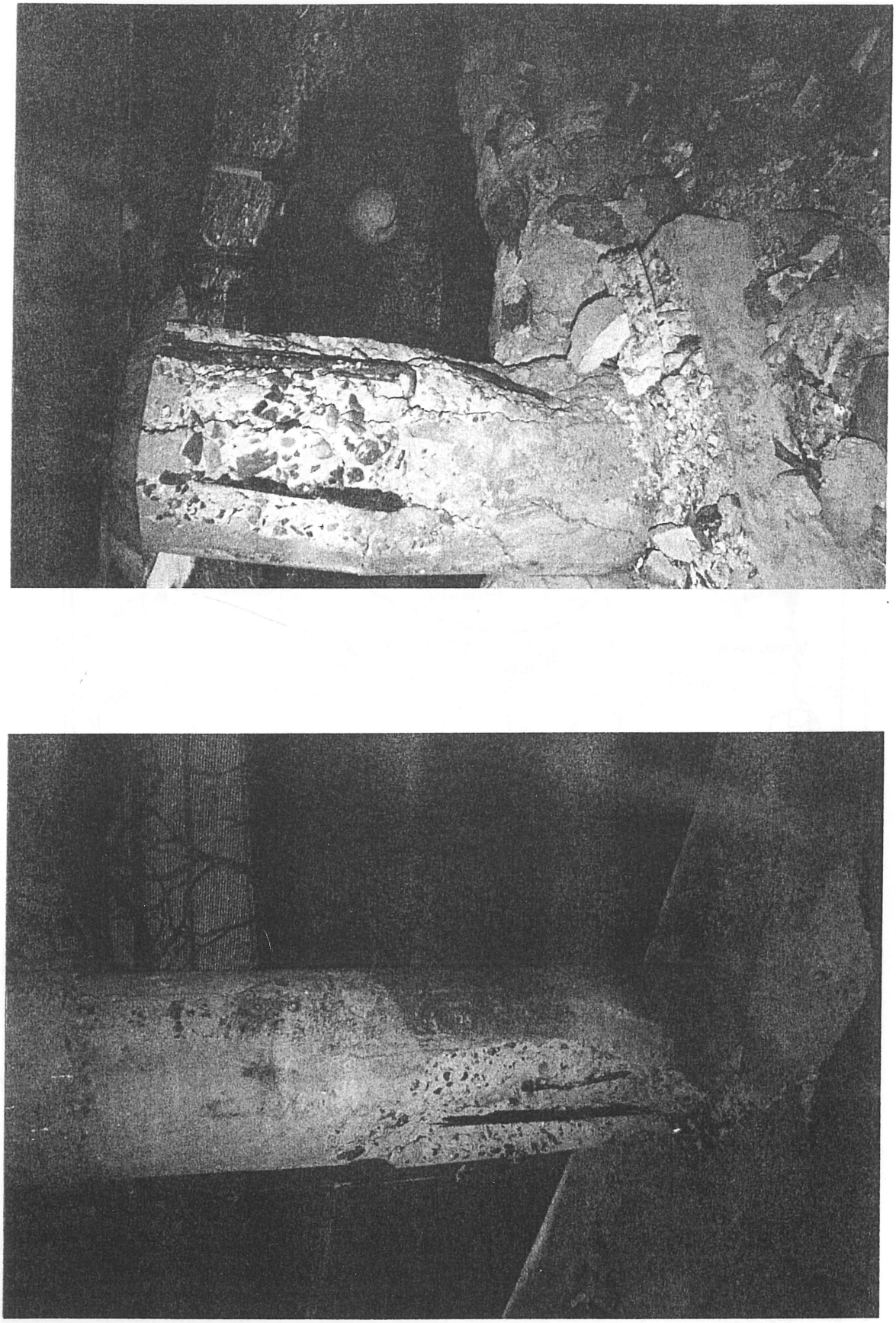


Figure 26 Damage at Cockatoo Island

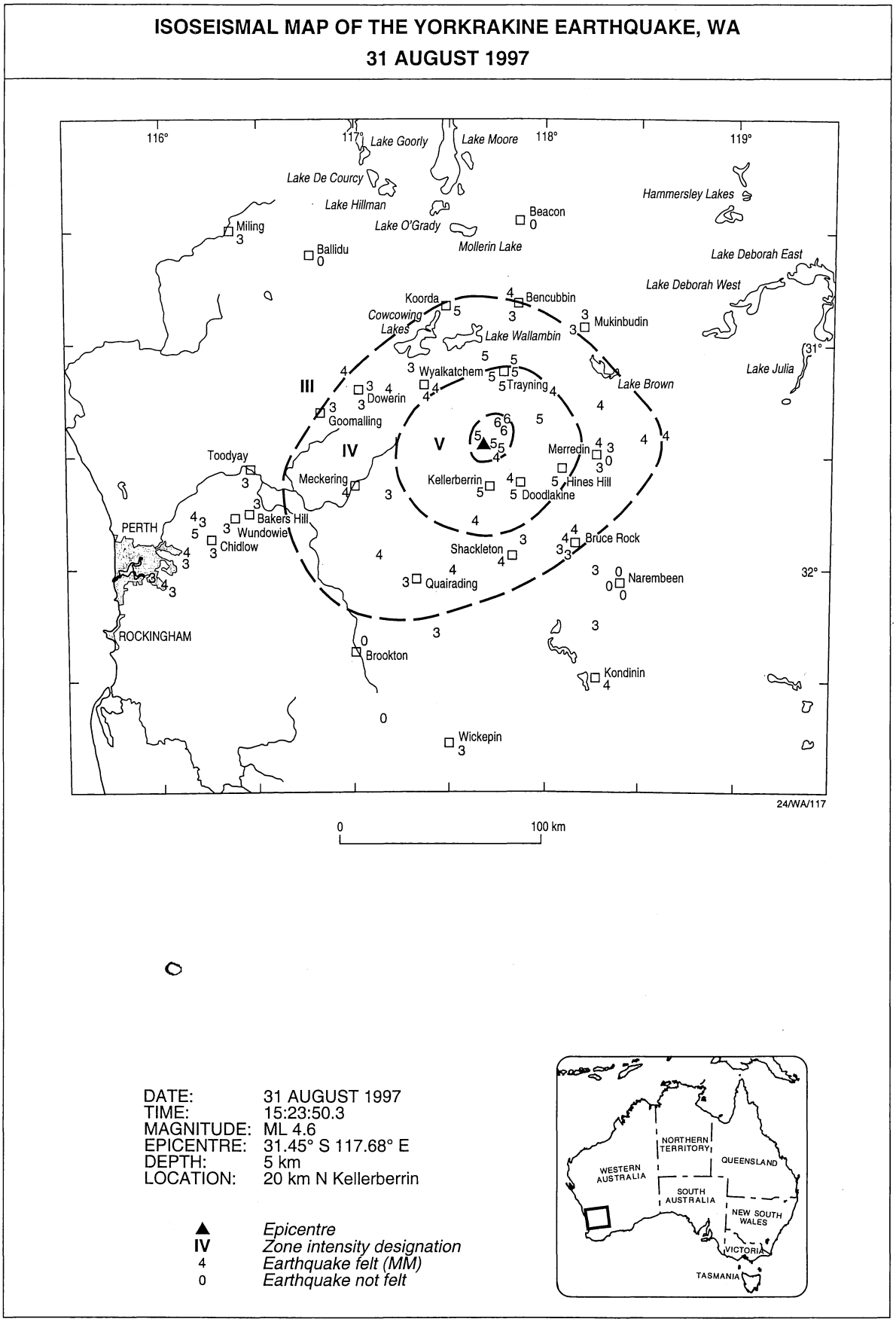
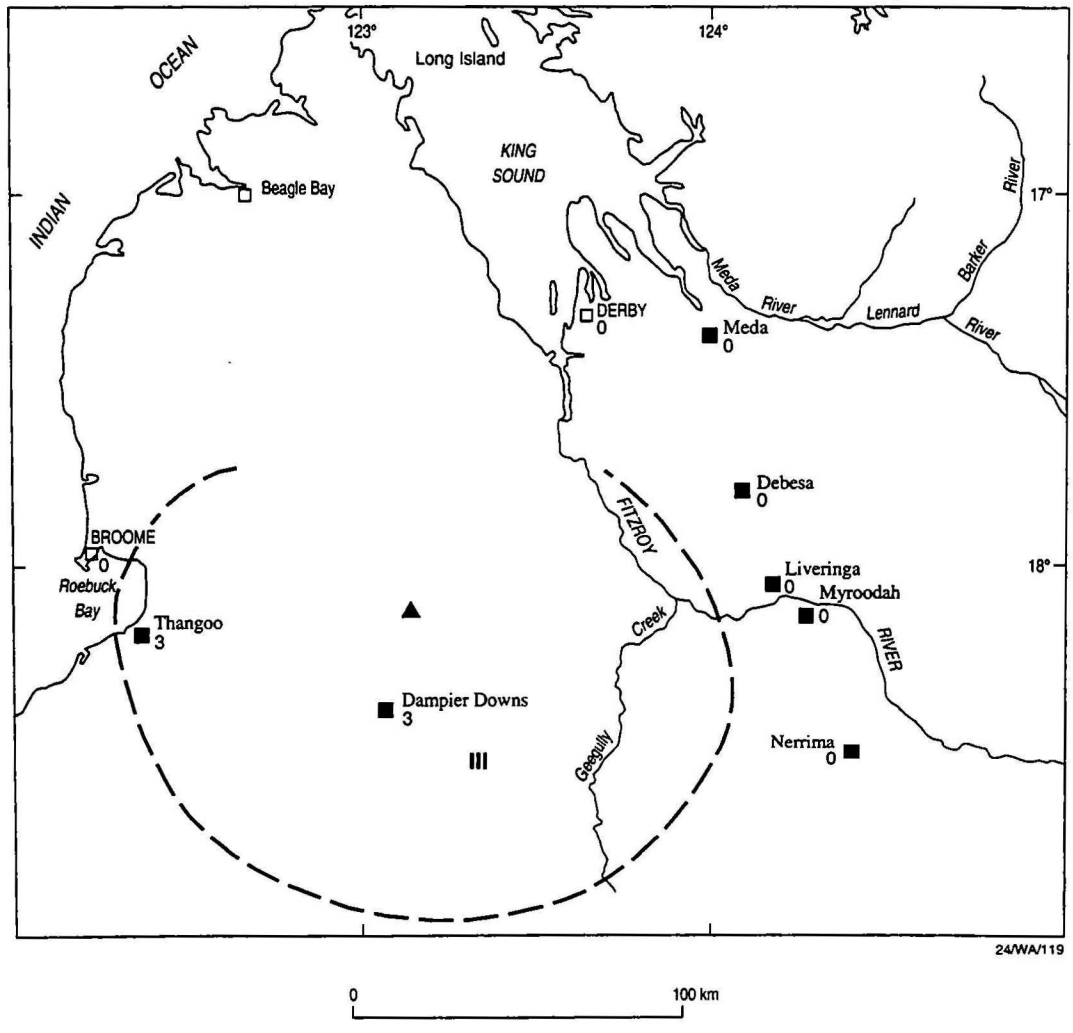


Figure 27 Isoseismal map of the Yorkrakine earthquake, 31 August 1997

ISOSEISMAL MAP OF THE DAMPIER DOWNS EARTHQUAKE, WA
1 SEPTEMBER 1997



DATE: 1 September 1997
TIME: 09:48:37.1
MAGNITUDE: ML 4.5
EPICENTRE: 18.12°S 123.14°E
DEPTH: 5 km
LOCATION: 40 km NW Dampier Downs

▲ *Epicentre*
IV *Zone intensity designation*
3 *Earthquake felt (MM)*
0 *Earthquake not felt*

Figure 28 Isoseismal map of the Dampier Downs earthquake, 1 September 1997

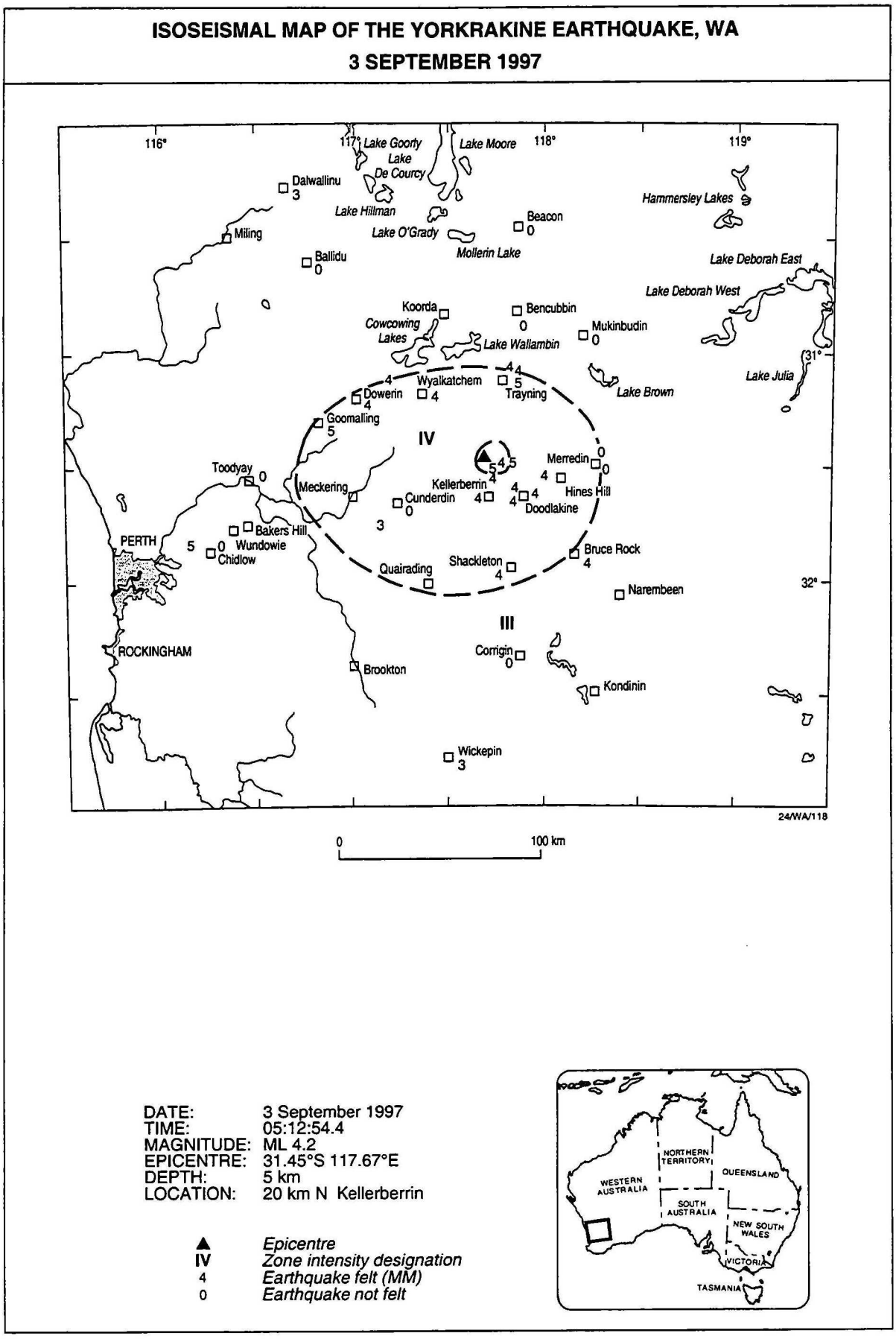


Figure 29 Isoseismal map of the Yorkrakine earthquake, 3 September 1997

Strong Motion Data

Details of strong motion recordings obtained from Western Australian earthquakes together with those recorded on the Darwin accelerographs are listed in Table 15.

1994 - Twenty three strong motion recordings were obtained during the year. All but one were digital recordings. The largest acceleration recorded was 154 mms^{-2} for a magnitude ML 1.4 Cadoux earthquake on 17 May at a distance of 2 kilometres. A magnitude ML 4.1 earthquake at Bonnie Rock on 26 April was recorded at Cadoux (128 km) and Goomalling (178 km) with peak ground accelerations of 19 mms^{-2} and 12 mms^{-2} respectively.

1995 - Twenty-six strong motion recordings were obtained during the year. All but one were digital recordings. 75% of the recordings were from earthquakes of ML < 2.1 at distances of less than 10 km with accelerations generally less than 50 mms^{-2}. The largest acceleration recorded was 1622 mms^{-2} for a magnitude ML 3.5 Cadoux earthquake on 17 May at a distance of 2 kilometres. A magnitude ML 2.9 earthquake near Cadoux on 16 March was recorded at a distance of 60km with an acceleration of 2 mm sec^{-2}.
There were 10 recordings from 9 earthquakes on the accelerographs located in Darwin. The most significant was a magnitude 6.7 Banda Sea earthquake at a distance of 636 km. This resulted in ground accelerations of 211 mm sec^{-2} and 112 mm sec^{-2} respectively at the Paliament House and DME Rock Store instruments.

1996 - Eight earthquakes in the south west resulted in 11 recordings. The largest acceleration recorded was 140 mms^{-2} for a magnitude 4.1 Meckering earthquake on 21 June at a distance of 35 km. The same earthquake was recorded in Perth at a distance of 112 km with an acceleration of 12 mms^{-2}.

Fourteen accelerograms were recorded on th Darwin accelerogrphs from 12 earthquakes. A Flores Sea earthquake (Mw 7.8) on 17 June triggered both accelerographs in Darwin at a distance of 1030 km from the epicentre. Peak accelerations were 28 mms^{-2} and 14 mms^{-2} at DPH and DRS respectively.

1997 - Ten earthquakes in the south-west resulting in 12 recordings. The largest acceleration recorded was 127mms^{-2} for a magnitude ML 2.1 Cadoux earthquake on 6 August at a distance of 4 kilometres.

A magnitude ML 4.6 earthquake near Kellerberrin on 31 August recorded peak accelerations of 15 mms^{-2}, 5 mms^{-2} and 9 mms^{-2} at distances of 92 km (CMC), 110 km (KPK) and 107 km (EPS) respectively.

The Collier Bay earthquake (MS 6.3) on 10 August was recroded in Darwin, 830 km from the epicentre with accelerations of 16 mms^{-2} (DPH) and 12 mms^{-2} (DRS).

Six earthquakes, ranging in magnitudes mB 5.1 to Mw 6.2 at distances between 611and 1033 kilometres were recorded on the Darwin accelerographs. The maximum acceleration (23 mms^{-2}) recorded resulted from a magniutde Mw 6.1 earthquake at 678 km.

Dykes and shallow earthquakes in the Yilgarn

Numerous, pronounced, roughly east-west trending aeromagnetic anomoly lineaments traversing th Yilgarn Craton for hundreds of kilometres are attributed to thindykes, largely concealed at the surface. Several of these lineaments (notably in the Hyden, Kellerberrin and Ravensthorpe 1:250,000 Sheet areas) intersect fault scarps both normally and centrally. The fault scarps are 30-50 kilometres long, and have been caused by large shallow earthquakes during the last few hundred years. To help fill in missing gaps seven proton magnetometer traverses have been carried out across the lineaments close to their intersection with the fault scarps. Results of these traverses are documented in AGSO Record 1996/55 (Everingham and Gregson, 1996).

Mining blasts in Western Australia

Mines in Western Australia which regularly used blasts of 50 tonnes or more of explosives in their operations were identified. The purpose of this was related to the AGSO Nuclear Monitoring program.

The Western Australian Department of Mines helped identify the mines concerned. Blasts of this size were likely to be confined to open pit operations. There were four likely areas:

(a) Collie coal mines (b) Pilbara iron ore mines
(c) Goldfields areas (d) ArgyleDiamond

Mines identified were Mt Whaleback; Paraburdoo; Marandoo; Channer; Tom Price; Argyle; Yarne and Mt Keith. Mt Charlotte (Kalgoorlie) very occasionally used tonnages of this size; Telfer had blasts up to 38t and the coal mine blasts were well below 50t.

Each of these companies provided details of their blasts for a three month period. The Richter magnitudes determined although scattered generally showed that magnitudes were within a range of ±0.4 independent of tonnes

of explosions. Figure 30 is a plot of tonnage v magnitude for Newman blasts recorded at Marble Bar, Nanutarra and Meekatharra which are typical of other mines.

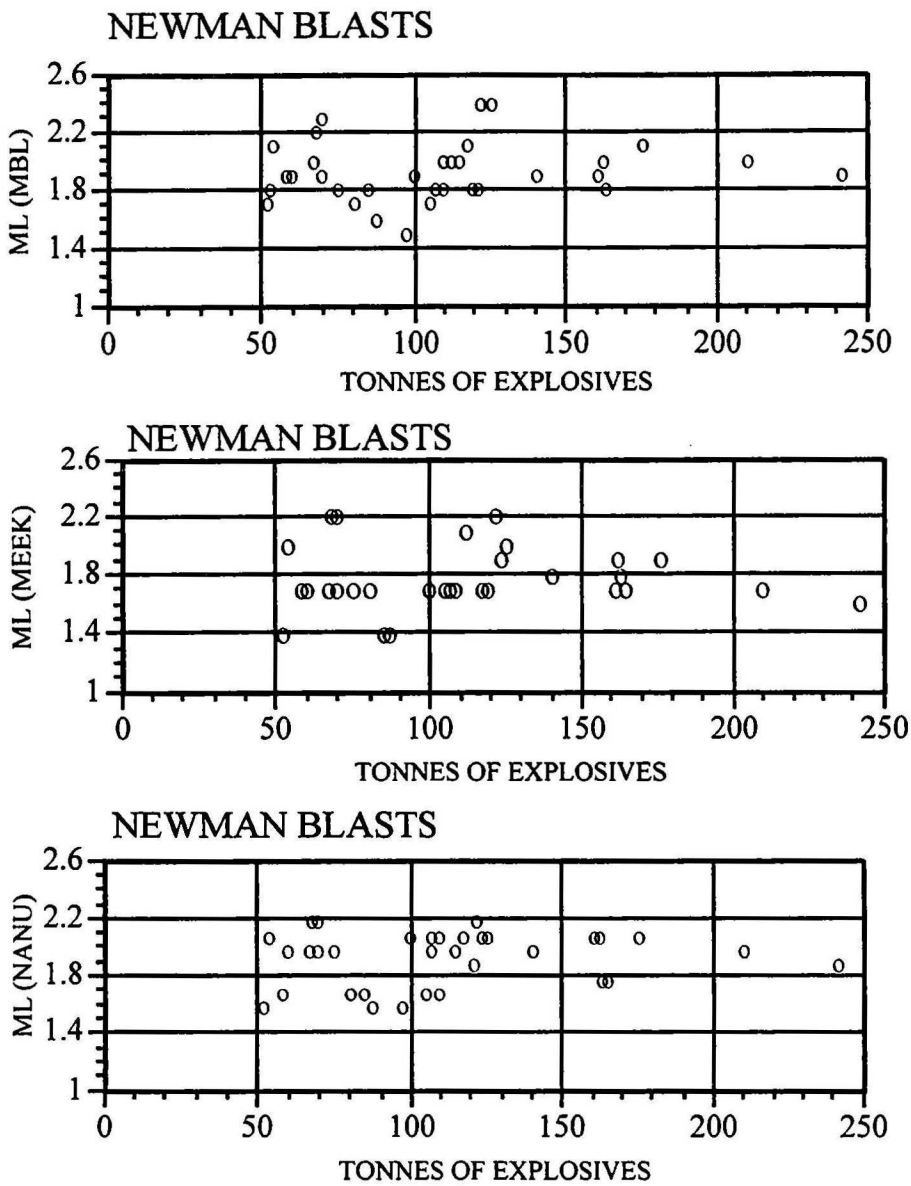


Figure 30 Magnitude v tonnage of mining blasts

Seismic activity in the vicinity of mines

A rockfall which killed a miner occurred in the Bounty gold mine, near Southern Cross, WA at about 9.30 a.m. on Thursday 10 July 1997. A Richter magnitude 2.5 seismic event occurred at 0939 a.m. WST, located 5 km south of the Bounty mine may have been associated with the rock fall. Because of the small magnitude and poor distribution of seismographs, the closest station KLB at 200 km, the location could be in error by up to 10 km.

There were several other seismic events recorded during the year that may have been associated with "rock bursts" in Bounty mine and mines in the Kambalda area.

Tsunami, 3 June 1994

A magnitude 7.2 earthquake occurred on 2 June (1817 UT) located south of Jawa, Indonesia, 10.473° S and 112.976° E. It resulted in a small tsunami along the north-west coast of Western Australia. The coast most affected was near Onslow and North West Cape where the continental shelf is narrow. The tsunami arrived about 3.5 hours after the earthquake at close to 6.00 a.m. Observational reports are shown in Figure 31 and given in Appendix 2.

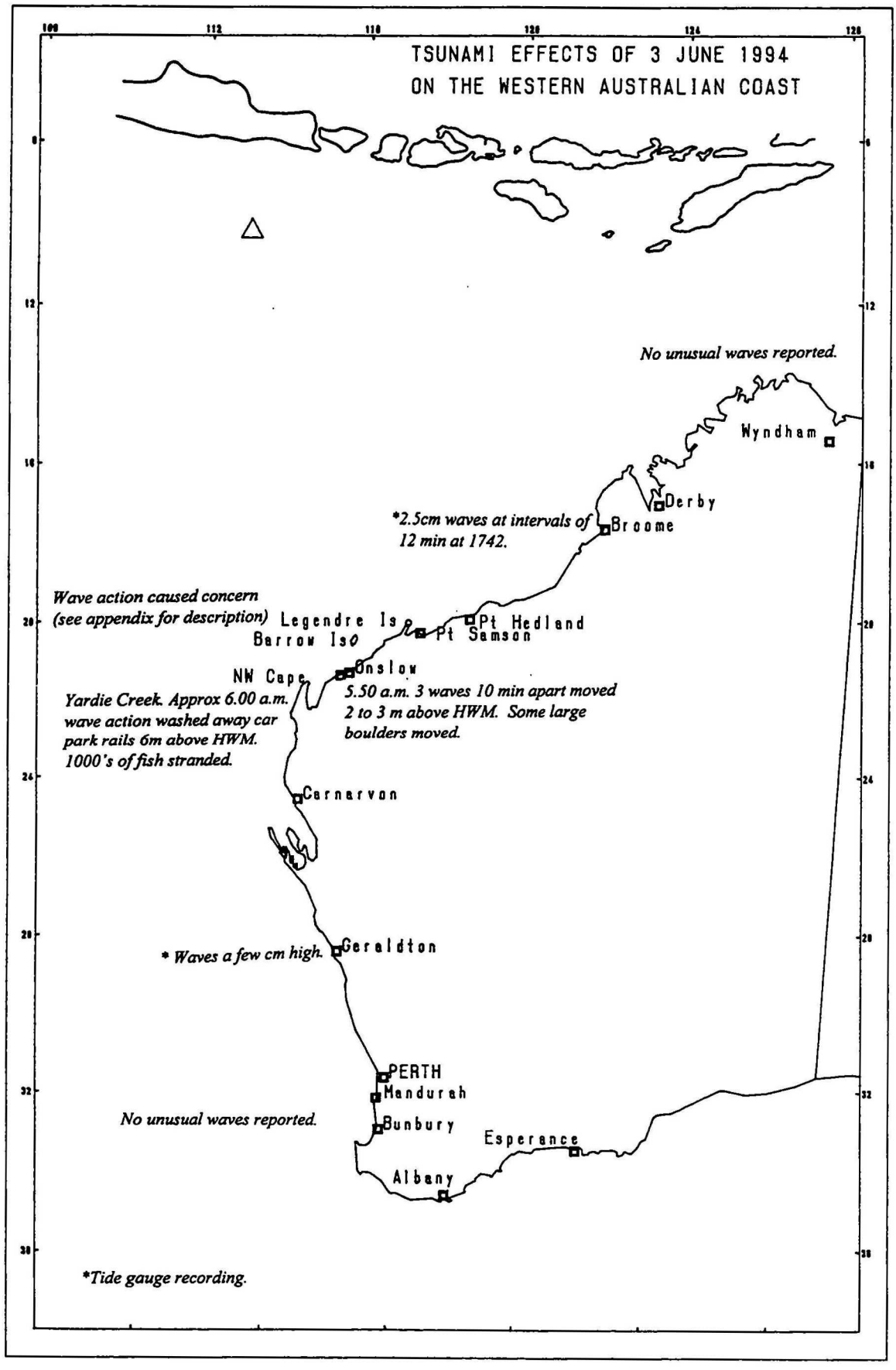


Figure 31 Tsunami effects of 3 June 1994 on the Western Australian coast

It was recorded on tide gauges operated by the Western Australian Department of Transport at Broome, Dampier, Barrow Island, Onslow and Carnarvon. The effects of this tsunami and tsunami risk in north-west Western Australia are described in more detail by Gregson and Van Reeken (1997).

Sonic Booms

When is a quake not an earthquake? When it is a sonic boom. From time to time reports are received from the public reporting feeling earthquakes but there is no evidence on the seismograms. A good example occured on 11 July 1997. From 10.15 a.m. (WST) the switchboard at AGSO's geophysical observatory at Mundaring, Western Australia was flooded with over 100 phone calls from people reporting what they thought was an earthquake. The reports were mainly of windows and glass doors rattling, pergolas swaying, swimming pool disturbances, glasses on shelves rattling and falling over. Most of the reports came from a 90 km coastal strip north of Fremantle with a narrow strip less than 15 km wide running eastwards up the Avon Valley for about 70 km from the coast to Toodyay.

The effects reported were equivalent to a Modified Mercalli intensity of MM IV and in some cases MMV. To have caused these effects over such a wide area a local earthquake would have had to have been a Richter magnitude of ML 3 or more. This would easily have been discernible on seismographs in the south-west of Western Australia. There was some minor disturbance on the Mundaring (MUN) seismograph with a double amplitude of 10mm but it was not an earthquake. The distribution of reports are shown in Figure 32 are typical of a sonic boom.

Later in the day the Royal Australian Airforce advised that they have been conducting exercises 40 km off the West Australian coast. FA18's had been flying at super-sonic speeds and cold weather had created an inversion layer which had allowed the shock waves to reach the coast. The exercises were moved further off the coast.

Meteorites

If not a sonic boom there is always the possibility of a meteorite. On 16 October 1997 just before 8.00 a.m. (WST) reports were received from the Dalwallinu area (180 km north-east of Perth) of booms and rumbles. As Dalwallinu is in the south-west seismic zone the reporters thought they were experiencing an earth tremor. There were no earthquakes recorded on the Mundaring seismograph. Further reports were received of rumbles and sightings of a bright light from areas scattered as far as North Beacon and the Perth metropolitan area. One observer from the Perth Astronomical Observatory who confirmed the event as a meteorite, described the light as being as bright as the sun.

Data distribution, publication and requests

Monthly lists of Western Australian earthquakes were distributed to interested recipients.

Numerous requests for seismic data were attended to during the period. Narrogin magnetic cartridges were sent to the Australian Seismological Centre (Canberra) where they were copied prior to being forwarded to Albuquerque Seismological Laboratory (ASL).

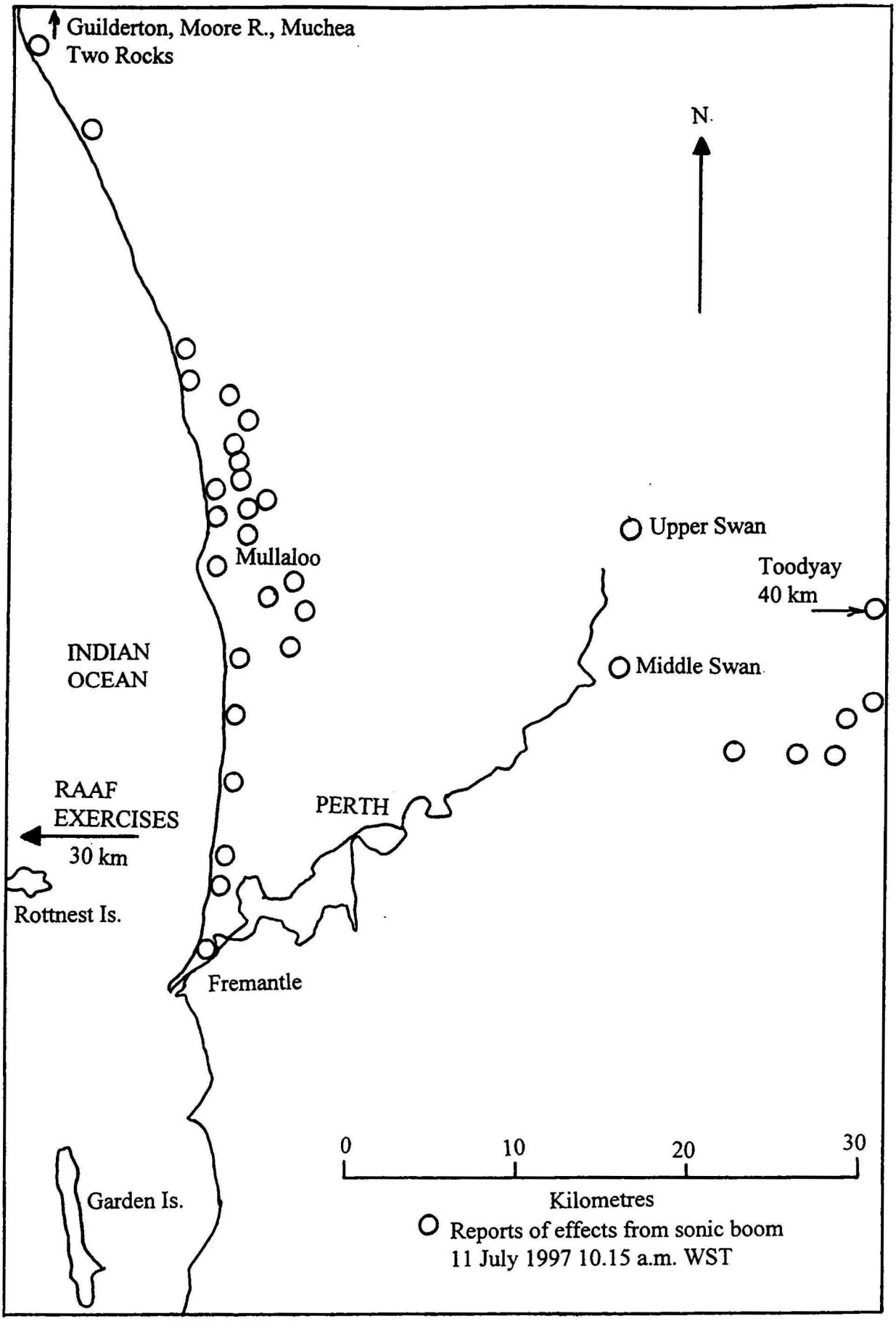


Figure 32 Sonic boom effects

Geomagnetism

Magnetic observatories operated throughout 1994 to 1997 at Gnangara (GNA) and Learmonth (LRM). A magnetic observatory was established in March 1995 at Kakadu (KDU) in the Northern Territory. Details of operations are given below.

Gnangara

Variometer

Variations in the magnetic field were monitored using an EDA FM105B three component fluxgate variometer. The vertical component was measured as normal but the two horizontal components were offset by 45° relative to the magnetic meridian, to record the (magnetic) north-east and north-west components. For computation purposes these components are designated A, B and C respectively. In addition, variations in the total intensity were monitored using an Elsec 820 PPM. One minute values (v-files) were recorded digitally on an IBM compatible 286 personal computer. From 9 September 1994, 1 second values (h-files) were also recorded. Values of X, Y and Z were computed from the recorded components.

Variations in temperature at the EDA fluxgate sensor were recorded through the use of a thermistor located in the sensor head that was connected to a Doric Trendicator thermometer. As at installation the Doric read about 16°C too high, but as baseline values were calculated to a common temperature this was not a critical problem. This was corrected in 1996 (see below).

The data were recorded digitally on a NEC APC IV computer in daily files (v-files). During 1994 the v-files were retrieved on floppy disc each week for analysis. From 1995 the v-files were retrieved daily across a dedicated Telstra line between Gnangara and the Mundaring office. This enabled the dispatch of minute values each day to Intermagnet. High resolution data (h-files) were initially retrieved weekly from Gnangara on floppy disc., but subsequently via the dedicated Telstra line.

Operations

A summary of record loss is given in Table 14.

1994 - A major storm in May disrupted the mains power supply to Gnangara for 5 days. Standby batteries did not have the capacity to last that long. Attempts to replace the batteries blew up the UPS power system. When mains power was restored it was evident that the A, B and C component boards were damaged as all components drifted off centre when recording was initiated. the component boards were replaced using the spare set from the field survey equipment. Recording lost was from 22 May 1755 UT to 31 May 0549 UT, a total of 205 hours (2.3%).

There was also a problem with the telemetering of the data back to Mundaring as a result of the storm. Initially it was thought to be a problem with the modem, but was later determined to be a fault on the COM3 board. When the power failed on June 20, the computer failed to reboot, resulting in loss of data. The data acquisition program was temporarily modified so that the computer would reboot regardless of the status of the COM3 board. Record lost was from 20 June 2254 UT to 21 June 0552 UT, 7 hours (0.1%). The board was repaired on the 24 July and the normal acquisition program and telemetry to Mundaring restored. Other record losses were minor.

1995 - The recording Elsec PPM (820) became unreliable in May and was replaced on 28 July with a Geometrics PPM 856, S/N 50707. Power failures resulted in 67 hours record loss and the hard disc filling up resulted in 36 hours loss. A new UPS power system was installed on 5 May to overcome mains power failures and operational procedures were modified to eliminate the hard disc filling up. Other record losses were minor.

1996 - Urban development to the south west of Gnangara disrupted power supplies to the observatory site several times between May and September. Backup battery supplies were depleted, resulting in lost recording totalling 130 hours. Telstra line connections were also disrupted but did not result in any loss of data. The 300 bps modems on the Telstra data line between Gnangara and Mundaring were replaced with 2400 bps modems. This improved the reliability and speeded up the data retrieval.

Modifications were made to the vault housing the EDA head, to improve it's stability between 11 and 16 November. A 600 mm diameter by 800 mm high PVC pipe was concreted into a 400 mm slab of concrete. The slab sits on three concrete piers 150 mm in diameter by 1.5 m long. The top of the vault has a 100 mm foam plug and the whole structure is covered by 300 mm of soil. The horizontal components of the EDA head are aligned

47.5° and 42.5° with respect to true north. During the modifications the first order survey EDA variometer was used to record field variations. The head (X component) was oriented in the magnetic meridian.

1997 - There was no significant record loss during the year. The PC was upgraded in April with a larger hard drive to enable data to be kept longer at Gnangara. Trace off-sets lasting from a few minutes to more than an hour evident in previous years continued in 1997.

Scale values

The EDA head was not fitted with scale value coils. The scale values previously determined were used throughout 1994-1997.

		Scale value	Count range
A (NW)	=	0.1800 nT/count	4540 to 5450
B (NE)	=	0.2000 nT/count	4080 to 5140
C (Z)	=	0.1976 nT/count	4470 to 5530
F	=	0.1000 nT/count	4900 to 5900

Temperature coefficients

Temperature coefficients were determined in 1994 by plotting baseline values at temperature versus temperature. Drifts in the baseline values in 1995, apparently due to the EDA head tilting, masked the temperature effects making it difficult to determine the coefficients other than for component C. The values for A and B determined in 1994 were used in 1995. For 1996 it was possible to redetermine coefficients for all components. The value for A, although high gave better consistancy in the baseline at 20°C than in 1995. Zero coefficients were used for the other two components. The temperature range as determined by the Doric thermograph was 25°C to 49°C.

	1994	1995	1996	1997
A (NW)	1.110 nT/°C)	- 1.110 nT/°C	- 8.40 nT/°C	-8.40 nT/°C
B (NE)	- 1.990 nT/°C)	- 1.990 nT/°C	0.0 nT/°C	0.0 nT/°C
C (Z)	+ 0.84 nT/°C)	1.140 nT/°C	0.0 nT/°C	0.0 nT/°C

The scale value for the Doric thermograph was determined by plotting temperature against counts. The value determined was consistent with that for 1993.

T°C = 0.0192 x count + 7.13

The temperature determined is not true (about 16° too high) however as baselines were calculated to a common temperature this was not a problem. The Doric temperature was used to calculate baselines at a standard Doric temperature of 20°C. On 8 April 1997at 0005 UT connections to the Doric thermograph were changed so that the temperature readings were true i.e. there was no longer a 16°C correction.

Baseline values

Adopted baseline values together with scale values, zero values and temperature coefficients are stored on a SUN computer 'roo' in files *yyyy*blv.gna in the directories /geomag2/obs/gna/*yyyy* were *yyyy* is the year. These files are backed up on 3.5" floppy discs. From 1996 the task of baseline value determination was undertaken by the Geomagnetism group in Canberra.

1994 - Baseline control was not as good as the previous year. All three EDA components showed significant drifts indicating that the EDA head was tilting. For the first 6 months, the NW baseline decreased by about 50 nT; an average of 10 nT/month. Over the same period changes in the NE and Z baselines were less significant. From the end of June the NW baseline stabilised while the NE baseline increased by about 140 nT (approximately 20 nT/month) while the Z baseline decreased by about 70 nT (approximately 10 nT/month). These changes indicated that in the last 6 months the EDA head was tilting in a NE or SW direction. An unexplained change occurred in the NW baseline towards the end of July. Two changes in the NE and Z baselines on 9 and 14 March were associated with small changes in ordinates.

The F baseline was good through the year with a variation of only 1 nT.

1995 - As for 1994 all three EDA components showed significant drifts indicating that the EDA head was tilting. From April to June the NW (A) baseline value increased by about 120 nT, then decreased by about 190 nT from June to December. From May to August the NE (B) baseline value decreased by 50 nT then increased by about 80 nT through to December. The drift in the Z (C) baseline value was not so dramatic, decreasing about 40 nT from

January to December. The NW (A) baseline value jumped by -11 nT on 30 April for reason unknown and -23 nT on 2 August when working on the installation of a new PPM.

The F baseline was good throughout the three years with variations of only 1nT.

During the year there were numerous trace offsets which lasted up to a few hours, mainly in the NW component. These were compensated for by making adjustments (E) to the baseline file.

Magnetometers

A Declination and Inclination Magnetometer (DIM) was used for weekly absolute observations of D and I. This instrument was based on a Zeiss 020B theodolite with an Elsec 810 single axis fluxgate sensor and controller. The DIM was used on pier B in the new absolute house throughout the four year period. An MNS-2 PPM was used to provide F baselines and calculated values for other components. Instruments used during the four year period are shown in Table 15.

1994 - The DIM electronic (S/N 213) became erratic and was sent to HQ for repair on 8 August. It was replaced with a spare unit (S/N 202) from the first order field equipment and was used for the remainder of the year. The MNS-2 (S/N 5) became erratic and was also sent to HQ for repair. For the period 20 September to 30 November a less sensitive Elsec 770 (S/N 211) was used for F readings. An MNS-2 (S/N 1) was used from 1 December.

1995 - The MNS 2 (S/N 1) was modified from nixie tubes to a liquid crystal display in October.

1996 - There were several different instruments used from the end of October to December 1996. These are given in Table 18.

1997 - The DIM and electronics were replaced on October 03 with DIM (S/N 355937) and a Bartington electronics unit (S/N 0725H/434)

Comparisons

Instrument differences determined by comparing the Gnangara magnetometers with other magnetometers are given in Table 16.

1994 - Comparisons were made between the Gnangara DIM (S/N 311542/213) and the first order survey DIM (S/N 308887/220) on 20 and 26 July. Simultaneous observations of D and I were made using the NE and SM piers in the old absolute house. Pier differences were eliminated by inter-changing instruments between piers.

1995 - Comparisons were made between the Gnangara DIM (S/N 311542/202) and the first order survey DIM (S/N 308887/220) in April. Simultaneous observations of D and I were made using the NE pier in the old absolute house and pier B in the new absolute house. Pier differences were determine and eliminated by inter-changing instruments between piers. F comparisons were made on 15 November between PPM's MNS 2 (S/N's 1 and 5).

PPM MNS 2 (S/N 2) was returned from headquarters after repair where it had compared with MNS 2 (S/N 3) on 30 October.

F.MNS 2 (3) - F.MNS 2(5) = +3.69 ± 1.08 nT

A survey of F variations was made over the observing pier B. Readings were taken at 50 mm separation on 8 radial directions out to 800 mm from the centre of the pier. The readings were made at the height of the DIM fluxgate, i.e. 200 mm above the pier. Results are shown in Table 18.

1996 - PPM's Elsec 770 (S/N 214), Elsec 820 (S/N 157) and Geometrics 856 (S/N 50713) were compared on 15 November.

1997 - Simultaneous comparisons were made on 22 January using DIM's 308887/220 (Field instrument) and 311542/234 (Gnangara instrument) and field PPM's Elsec 770/214 and Geometrics G856/50713.

Reference marks

The brass spike on the N (north) mark was snapped off by vandals in June 1994. The E (east) mark was used for declination observations from 7 June to 14 July 1994 when the spike was replaced on the N mark. There was a slight discrepancy in the angle between the N and E marks of 0.4' after the N spike was replaced. A new azimuth of 315° 21.7' was assigned for the N mark.

The azimuths of the auxiliary marks were checked from both the old and new absolute houses on 25 October 1995. Results were consistent with previous measurements (see Table 17).

Data reduction and publication

Raw data from Gnangara (v-files and h-files) are backed up on a zip-drive before being ftp'd daily to the Geomagnetic section in Canberra. Minute values of H, D and Z were emailed daily to Intermagnet.

Gnangara K-Indices for each week were dispatched to the Ionospheric Prediction Service (Sydney) from where they are distributed to their recipients. Components of K-Index are stored on the SUN computer 'roo'at Mundaring. Monthly and annual mean values, K-indices and storm data are given in the Australian Geomagnetic Report Series (e.g. McEwin and Hopgood, 1994, Hopgood and McEwin, 1997).

Security

Following the security upgrade in 1993 there have been no sucessful break-ins at Gnangara, although there have been several attempts and the mains power was turned off on two occasions at the meter box. The box has been padlocked more securely. The electronic security monitoring system failed when it suffered damage during a storm in May 1994. The N reference mark was damaged in June 1994 and the E mark pushed over in December 1996. There has been continual problems with windows being broken and fibro walls being trashed in the old absolute hut. In 1998 it is planned to increase security and demolish the old absolute hut but keep the old standard observing stations identifiable.

Learmonth

Variometers

An EDA model FM105B 3-component fluxgate magnetometer has been the principal variometer employed at the Learmonth observatory since its commissioning in 1986. The sensor head is oriented to monitor variations in the geomagnetic elements X, Y and Z. Average minute values of the four components were recorded digitally on a NEC APC IV computer in daily files (v-files). Variations in temperature were also recorded every minute using a thermistor located in the EDA head and a Doric thermometer. The total field F from a proton precession magnetometer (PPM) was also recorded. The PPM originally installed was an Elsec model 595. This was replaced in October 1987 with an Elsec model 820 PPM which in turn was replaced with a Geometrics PPM (856) on 8 September 1995. The continuously recording PPM served both as a backup, should any one of the X, Y or Z variometer channels become unserviceable, and as an F-check.

A small solenoid used to weekly perform a scale value calibration was located in the EDA sensor head. A constant DC in the solenoid (calibrated with the PVM coils at the Canberra Magnetic Observatory before it was sent to LRM), from a BMR Magnetograph Calibrator produced a magnetic field at the fluxgate sensors of:

8.954 nT/mA in X 10.471 nT/mA in Y, and 22.754 nT/mA in Z.

Zero values were checked weekly when absolute observations were made.

Operations

A summary of record loss is given in Table 19.

1994 - Excessive noise occurred on both the X and Y components late in March following high rainfall. The sensor vault lid was removed to check for water in the vault, but it was found to be dry. Interchanging the X and Y channels showed the problem stayed with the Y channel. The noise disappeared after about a week. The vault was reopened on 22 August and the plug to the EDA head cleaned. The problem re-occurred on 6 September and the vault was again re-opened on 9 September and the sensor plug cleaned. The vault was recovered with soil and the vault temperature variation stabilised to about 0.2 C per day. There was no further noise for the remainder of the year. On the 22 August the 3 components X, Y and Z were recentred. The NDS-1 clock was not keeping time well for a short period at the beginning of October.

1995 - The recording Elsec PPM (820) was replaced with a Geometrics PPM (856) on 8 September.

From 1996 data discs were mailed directly to the Geomagnetic Group in Canberra and therefore any operational problems were initially dealt with from there.

Scale Values

Scale values were determined at weekly intervals using the scale value coil mounted in the EDA head. It appears as if the coil must have moved when the sensor vault was opened on 22 August 1994 as the scale values changed significantly. to maintain consistency in the scale value determinations the coil constants were changed as follows:

	X	Y	Z	
From	17.908	20.942	45.508	until 22 August 1994
To	17.641	21.819	58.801	from 22 August 1994

Temperature coefficients

The scale value used for the Doric thermograph was determined by least squares analysis and the values used are shown below. The Doric thermograph stuck during the period 11 to 13 september 1994, however the counts recorded appeared to be OK. The Doric was replaced on 26 October 1994

From 1 Jan 1994 $T^{o}C = 0.0202 \times count + 4.43$

From 26 Oct 1994 $T^{o}C = 0.0202 \times count + 4.65$

From 1 Jan 1995 $T^{o}C = 0.0197 \times count + 4.87$

Temperature coefficients for the three components X, Y and Z were determined by least squares analysis but were not considered reliable due to the vault openings and changes in the thermograph in 1994 temperature coeficients were not used. As daily changes in temperature were small and coefficients low the resulting baseline control was satisfactory. This practise continued for 1995 and 1996.

Baseline values

Until the start of 1996 adopted baseline values at temperature together with scale values, zero values and temperature coefficients were stored on a SUN computer 'roo' in files *yyyy*blv.lrm in the directories /geomag2/obs/lrm/*yyyy* were *yyyy* is the year. These files are backed up on 3.5" floppy discs. From 1996 the task of baseline value determination was under taken be the Geomagnetism group in Canberra.

Magnetometers

Absolute observations for D, F and I were made at weekly intervals using a DIM and Proton Preession Magnetometer (PPM). Details of instruments used throughout the period are given in Table 20. The Elsec 770 PPM (S/N 189) with bottle were replaced on 15 April 1994 as the former had become unreliable.

Comparisons

The Learmonth magnetometers were compared through baselines with the first order survey magnetometers on three occasions. Results are shown in Table 21.

A survey of F variations was made over the observing pier in 1995. Readings were taken at 50 mm separation on 8 radial directions out to 800 mm from the centre of the pier. The readings were made at the height of the DIM fluxgate, i.e. 200 mm above the pier. Results are shown in Table 20.

Reference marks

Azimuths of the auxiliary marks were checked as shown in Table 22. The corner of the photo building was included as a new mark in 1995. Results were consistent with previous years.

Data reduction and publication

Magnetograph data was processed at Mundaring and transfered to Canberra as for Gnangara data until 1996 when the data was mailed directly from Learmonth to Canberra.. Monthly mean and annual values of field components are given in the Australian Geomagnetic Report Series (e.g. McEwin & Hopgood, 1994).

Magnetic surveys

Ed Paull re-occupied first order stations to update control on the Australian wide survey carried out in 1992 (Gregson and others, 1994). Re-occupations were made as follows:-

Eucla	25-29 June 1994		
Carnegie	2-4 July 1994	1-3 October 1996	9-11 November 1997
Derby	2-5 Dec 1994	22-24 September 1996	31 October-3 November 1997

Owen McConnel made DIM and PPM observations at Cocos Island on 18 to 21 December 1996. The observations were carried out at about 1.30am local time on successive mornings as this best represents the mean magnetic field. A new auxillary observing mark (E) was established at the southern end of the runway as station A had been contaminated. Round of angles and station F surveys were carried out.

Ionospherics

Ionosonde

Quarter-hourly sounding using a model 4B ionosonde was continued as for 1993 until 1 November 1996 when soundings were increased to 5 minute intervals.

The dual purpose transmitting and receiving antenna was abandoned on 4 August 1996 and replaced by new separate transmitting and receiving antenna.This was done to improve the quality of recording. The layout of the new antenna is shown in Figure 32.

At the same time the recording system was upgraded to record digitally with automatically being transferred to a digital cassette tape every five days. Ionograms are extracted each week onto 3.5" floppy discs and returned to the Mundaring office for preliminary scaling of 6 hourly values of f_0F_2. Film recording was continued as a back-up and the undeveloped film was sent to Ionospheric Prediction Service. This was discontinued on 1 November 1996. Eventually it is proposed to access the data using a dial-up system.

Apart from some loss of record during the changeover, the most significant loss of record was 448 hour (5.1%) resulting from the film jamming prior to installation of the digital system. Two weeks of recording were lost in 1997, one resulting from a power failure to the computer and the other as a result of operational error during routine data retrieval.

Observatory staff maintained the ionosonde, with spare parts and film being supplied by the Ionospheric Prediction Service.

Data distribution and publication

The F2 layer critical frequency at each six hours UT and local noon were scaled. The six-hourly values were sent to IPS for distribution internationally and the monthly median of the noon values was telex to the International Radio Consultative Committee (Geneva) for the determination of the index IF2. The Hourly values of all parameters are published in the IPS Series D and are distributed internationally. Ionograms are available on loan within Australia from IPS and internationally through the WDC-A.

Acknowledgements

The assistance of the daily attendants listed in Table 3 and the co-operation, for housing equipment, of Telstra (Marble Bar seismograph), Northern Territory Government (Parliament House and DME rock store - accelerographs), Kakadu National Park (Magnetic and seismic), Western Power (accelerograph), Kings Park Board (accelerograph) is hereby acknowledged. Remote seismometers and telemetry equipment were located on the properties of K. Quartermaine (Narrogin), V. Wright (Kellerberrin) and B. Smith (Ballidu) and accelerographs at K Kingston (Goomalling) and P McNamara (Cadoux).

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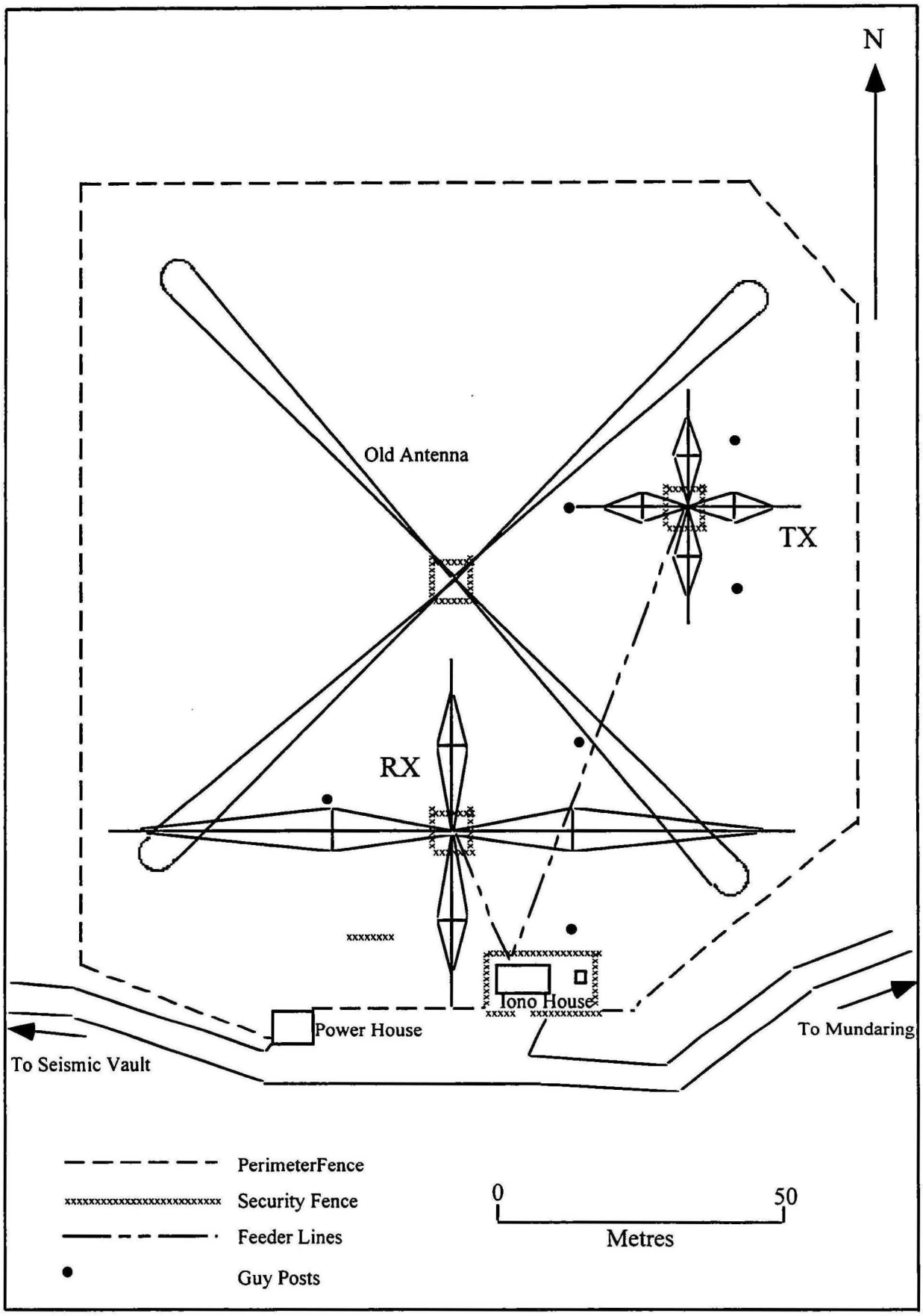

Figure 32. Mundaring ionosonde transmitting and receiving antennas

Appendix 1

Principal events Mundaring Geophysical Observatory 1957 - 1997

1957 May	Geomagnetic recording commenced at Gnangara (La Cour)
1959 Mar 18	Transfer of observatory from Watheroo to Mundaring
1959 Apr 03	Ionospheric recording commenced (Type 2 ionosonde)
1959 Jul 30	MUN seismograph recording commenced (Benioff)
1960 Mar-Oct	Atmospheric noise recording (for CSIRO)
1960 Apr 30	Eschenhagen normal magnetograph replaced La Cour at Gnangara
1960 May 01	Cossor ionosonde replaced Type 2
1960 Jun 22	Absolute magnetic observations commenced in new absolute house
1962 Jun	WWSS system commenced recording at MUN
1963 Apr 19-Dec 17	GRV seismograph operation
1963 May 30-Dec 19	NGN seismograph operation
1964 Nov 06	KLG SP seismograph recording commenced
1965 Nov 29-1966 Aug 24	LVS seismograph operation
1965 Nov	KNA SP-Z seismograph recording commenced; operation intermittent till February 1972
1967 Feb	Fremantle Region Upper Mantle Project
1967 Oct 26	MEK SP-Z seismograph recording commenced
1968 Oct-Nov 26	Field seismograph operation at Meckering
1968 Nov16-1971 Dec 31	AFMAG recording at Mundaring
1970 Jan 01	Routine analysis of KNA seismograms commenced
1970 Feb 26	IPS IIIE ionosonde replaced Cossor
1971 Feb 10-1972 Jul 31	KAA SP-Z seismograph operation
1971 Nov 30	Two MO2 accelerographs installed at Meckering
1972 Feb 29	KNA seismograph upgraded to 3 components
1972 Mar 01	MO2 accelerograph (PWD) installed at Kununurra
1972 Jun 27	Proton scalar magnetometer introduced for Z baseline control
1972 Oct 12-1975 Feb	MBT SP-Z seismograph recording
1972 Nov 16	MO2 accelerograph (PWD) at Kununurra
1973 Jan 31	Mobile SP-Z recording at various sites in SW seismic started
1973 Mar 01	MEK reduced to 3 component SP
1973 Mar 30	KLG reduced to SP-Z
1973 May 23	MUN 2 Wood Andersons installed
1973 May 25	MUN Benimore SP-Z withdrawn; Benioff SP-Z started
1974 Apr 01	Proton vector coils introduced for Z baseline control
1974 May 01	Proton vector coils introduced for H baseline control
1974 Jun 17-31	Riometer recording at Mundaring during solar eclipse
1974 Sep-1978 Jun	GLS SP-Z recording
1975 Jul 18-Nov 19	Earthtide recording at Mundaring
1975 Mar	Magnetic pulsation recording commenced at Mundaring
1975 Mar 19-Aug 15	SWV SP-Z recording
1975 Sep 02-1976 Feb 05	NWAO SP-Z recording
1976 Mar 27	NWAO Seismic Research Observatory commenced
1976 Jun	MBL SP-Z recording commenced
1976 Sep-1977 Nov 27	XMI recording
1976 Oct	Special ionospheric sounding, solar eclipse (23 Oct)
1977 Nov 28	A third MO2 accelerograph installed at Meckering
1978 Feb	A fourth MO2 accelerograph installed at Meckering
1978 Jun 27	WBN SP-Z recording commenced
1980 Jun 19	NAU SP-Z recording commenced
1981 Aug 07-1982 Mar 27	BAL SP-Z recording commenced
1981 Sep 23	KLG SP-Z recording commenced
1981 Nov 19-1982 Jun 27	Walpole SP-Z field recording
1982 Nov 26	BAL SP-Z recording commenced
1983 Aug 03	RKG SP-Z recording commenced

1984 Jun 21	MRWA SP-Z recording commenced
1986 Mar 04	First digital accelerograph (A700) installed at Cadoux
1986 Apr 30	MEK SP-Z recording transferred to MEKA
1986 May 12	KLG SP-Z recording transferred to KLGA
1986 Oct 26	Geomagnetic recording commenced at Learmonth
1987 Jan 16	Program of strong motion recording commenced on WAWA dams
1987 Jun 27	WBN SP-Z recording transferred to WARB
1987 Oct 22	NAU SP-Z recording transferred to NANU
1988 Apr	Office accommodation extended
1988 Aug 10	KLGA SP-Z recording transferred to COOL
1988 Oct 07	FORR SP-Z recording commenced
1988 Dec	Webster computer installed
1989 Sep 13	First Kelunji recording equipment installed at Dowerin
1990 - 1991	Perth microzonation project
1990 Jul 03	GNA routine AMO recording commenced
1991 Feb 10	GNA Eschenhagen magnetic recording ceased
1991 Dec 15	NWAO SRO upgraded to an IRIS system
1992 Dec 09	LRM recording upgraded to PC based.
1993 Jul	GNA - EDA fluxgate installed for routine recording.
1994 Apr 13	KPK accelerograph for urban monitoring.
1994 Apr 13	TRI accelerograph for urban monitoring.
1994 Jun 07	WOOL commenced recording - 3 component broad band , satellite communication.
1994 Jun 21	FORT upgraded to satellite communication.
1994 Jul 05	Cool SP-Z recording ceased.
1994 Sep 01	FITZ commenced recording - 3 component broad band, satellite communication.
1994 Sep 08	MEEK upgraded to satellite communication.
1994 Dec 05	WARB upgraded to 3 component broad band, satellite communication.
1995 Feb 26	NANU closed
1995 Mar 05	KAKA commenced recording - single component, satellite communication
1995 Mar 11	MTN closed
1995 May	DRS and DPH accelerographs installed for urban monitoring
1995 Sep 12	GIRL commenced recording - single component, satellite communication
1996 Dec 19	COCO comenced recording -3 component broard band, dial-up
1997 Apr 04	EPS accelerograph for urban monitoring - replaced TRI.

Appendix 2

Observed effects of the tsunami, 3 June 1994

North West Cape (Yardie Creek Caravan Park) (Observer - Chris White). Unusual wave action was first noticed at 6.15 a.m. The wave action could not have been too much earlier as 300 live stranded fish were thrown back into sea by the observer. The wave appears to have swept through a channel in the outer coral reef 750-1000 metres offshore and 300-400 m wide. This channel is offshore from a car park located in the sand hills. Treated pine log barriers (6m above normal high water mark - HWM) around the car park were washed away to heights of 7 m above HWM. Fish were found 300 m from the shore line. One large crayfish found wandering in the sandhills made a excellent evening meal. Along the beach the wave had washed over sand dunes 2.5 m high and stranded 1000's of fish. Rain coral up to 2 m across from the outer reef were dumped on the beach. It would require 10 men to shift them. Four kilometres south, boats left on the beach overnight were not affected. In Exmouth gulf, south of Learmonth, boats left on the beach were overturned.

Onslow (Observer - Steve Lewin). The observer who lives on the coast was woken up at 5.50 a.m. by what he thought was wind. However on looking out the window there was no wind but he observed swell breaking on the beach. This moved several large boulders. The water receded and a second wave at 6.00 a.m. moved above the high water mark by an estimated 2 to 3 metres. A third swell occurred approximately 10 minutes later with noticeable effect diminishing by 6.20 a.m. Similar effects were also reported from Four Mile Creek, 6 km from Onslow. A tide gauge, located on Beadon Creek sheltered by groyne, which is monitored every 15 minutes showed a 15 cm ??? between 5.45 a.m. and 6.15 a.m., peaking at 6.00 a.m..

No Name Bay - (David Brennan - Woodside Petroleum). A report was received from No Name Bay. Workers who have been re-planting vegetation in a mangrove swamp.
"On Friday morning at 6.30 a.m. they had gone to the bay as they expected low tide but found the bay full of water. It receded quickly but then came back 2 or 3 times at 10-15 minute intervals. They left the job for the day as a bad deal."

Exmouth. Waves were observed at 6.00 a.m. moving up to between 3 and 3.5 m above high water mark. The wave sounded like a roar of a train and came through a break in the reef at low tide when reef is nearly exposed. One caravan had to be moved from the beach.

Griffin Venture (Reported by Andrew Brooks - BHP) The FPSO Griffin Venture is a 100,000 deadweight tonne vessel which is moored about 60 km NW of Onslow. The mooring riser floats vertically in the water and is held in place by six anchor chains. It can therefore tilt in response to the mooring loads applied by the FPSO. At the time of the tsunami the off-take tanker was a 65,000 deadweight tonne vessel moored to the stern of the Griffin Venture by a rigid mooring hawser. A floating hose is used for off loading oil.

Steedman operate a wave rider buoy for BHP about 4 km north of the platform. This showed nothing unusual as it won't detect long period waves. Wave action was normal 6.8 to 7 sec, 1.9 m up to 3.5 m at 0400. Wind 5.9 m/s.

Table 1. Observatory Staff, 1994-1997

Officer	*Designation*	*Specific roles*
P.J. Gregson	Senior Professional Officer Class B	Officer-in-Charge.
E.P. Paull	Senior Professional Officer Class C	Vehicles Officer. Manager Webster computer system until October 1996 then Manager of computer systems.
V.F. Dent	Professional Officer Class 2#	Manager SUN computer system until October 1996. Transferred to Canberra 31 January 1997
Y.M. Moiler (Mrs)	Administrative Service Officer Grade 2 (25 hrs/week)	First Aid Officer.
L.A. Van Reeken(Mrs)	Technical Officer Grade 3 *	Archives Officer. Assistant O & Officer
O.D. McConnel	Technical Officer Grade 4	Occupational Health & Safety Officer
A. Levy (Mrs)	Technical Officer Grade 1 (25 hrs/week) to 11 March 1994	
T. Damen	Adminstrative Service Officer Grade 4 28 April to 10 July 1997	

*Lyn Van Reeken - leave without pay 1 Jan - 11 March 1994.
- Full time from 23 March 1995 (previously 25 hrs/week).
- Position reclassification to Technical Officer Grade 3 on 2 December 1996.

Position declared redundant with departmental downsizing 17 September 1996 and vacated on 31 January 1997.

Table 2. Observatory Staff Absences, 1994-1997

Nature of absence	*Number of days*			
	1994	*1995*	*1996*	*1997*
Sick leave	30	29	25	24
Special leave (including carer's leave)	8	2	3	4
Leave without pay*	9	-	2	-
Long service leave	-	-	34	11
Bereavement leave	-	2	1	1
Strong Motion (SW)	14	10	11	10
Urban monitoring (Perth)	-	6	5	5
Field (IRIS)	-	8	12	-
Field (other)	12	125	90	132
Headquarters	18	8	11	8
Training	-	34	17	4
Conferences and seminars attended	7	15	4	3
First order magnetic survey	24	-	8	16
Strike action	-	-	1	1
Study leave	-	-	11	-
Total	242	239	235	219

* Excluding Lyn Van Reeken

Table 3. Associated Personnel, 1994-1997

Name	*Nature of Duties*
A. Annear	Daily attendant, Kununurra (to 6 October 1997)
K. Jenkins	Daily attendant, Kununurra (from 7 October 1997)
J. Francis	Daily attendant, Meekatharra (to 8 July 1994)
	Satellite station operator, Meekatharra (from 8 July 1994)
J. Bartlet	Daily attendant, Nanutarra (to 24 April 1995)
R. Tregonning	Daily attendant, Marble Bar (to 8 January 1995)
C. Wilkins	Daily attendant, Marble Bar (from 9 January 1995-1 September 1997)
S. Dorrington	Daily attendant, Marble Bar (from 2 September 1997)
S. Cameron	Daily attendant, Rocky Gully
P. Ryan	Daily attendant, Manton Dam (to 31 March 1995)
C. Paget	Daily attendant, Warburton (to 10 December 1994)
D. McLean	Satellite station operator, Warburton (from 10 December 1994)
S. Taylor	Daily attendant, Forrest (to 25 January 1994)-then Satellite station operator
A. Crook	Satellite station operator, Woolibar (from 5 June 1994)
B. Fielder	Satellite station operator, Fitzroy Crossing (from 1 September 1994-4 May 1997)
G. Johnson	Satellite station operator, Fitzroy Crossing (From 5 May 1997)
J. Kennewell	Satellite station operator, Giralia (from 12 September 1995)
A. O'Dea	Satellite station operator/magnetic observer, Kakadu (from 4 March 1995 - 31 January 1996)
A. Ferguson	Satellite station operator/magnetic observer, Kakadu (from 1 February - 18 September 1996)
B. Ryan	Satellite station operator/magnetic observer, Kakadu (from 19 September 1996-4 May 1997)
A. O'Dea	Satellite station operator/magnetic observer, Kakadu (from 5 May 1997)
D. Dailey	Ground maintenance, Mundaring Observatory (to 14 September 1994)
R. Chesson	Ground maintenance, Mundaring Observatory (from 14 September 1994 - 17 May 1995)
A. Grivell	Ground maintenance, Mundaring Observatory (from 12 July - 7 August 1995)
C. Schultz	Ground maintenance, Mundaring Observatory (from 1 September 1995 - 12 January 1996)
A. McGrail	Ground maintenance, Mundaring Observatory (from 12 January 1996)
D. Dailey	Cleaning, Mundaring Observatory (to 5 September 1994)
E. Frampton	Cleaning, Mundaring Observatory (from 14 September 1994)
P. Hackett	Field hand 3-16 June 1997
E. Crawford	Work experience 30 June-4 July 1997
C. Cowe	Work experience 7-11 August 1997
A. Gallagher	Work experience 4-18 August 1997

Table 4. Addresses, 1994-1997

Officer	*Date*	*Address*
1994		
P.J. Gregson	Sep 22	"Global seismology", Curtin University.
P.J. Gregson	Sep 28	"Comparative seismicity in S E China & Australia".
E.P. Paull	Sep 22	"Global seismology", Curtin University.
V.F. Dent	Sep 28	"Attenuation of strong ground motion in Australia".
1995		
P.J. Gregson	Apr 12	"Earthquake hazard", SES Rockingham.
P.J. Gregson	Jun 6	"Earthquakes", Midland Rotary club.
P.J. Gregson	Nov 16	"Earthquake hazard" , SES seminar.
P.J. Gregson	Nov 23	"Summary of WA earthquake hazard status".
V.F. Dent	Sep 6	"Earthquakes", SES Group.
1996		
P.J. Gregson		"Earthquakes", Morley Rotary Club
P.J. Gregson	Oct 12	"Tsunami Risk in NW Australia", Mt Macedon
1997		
P.J. Gregson	Feb 19	GWN - TAFE radio educational talkback.
P.J. Gregson	Jun 01	"Earthquakes", Science Tachers Association WA, Muresk
P.J. Gregson/ L. Van Reeken	Oct 01-02	"Tsunami Risk in NW Australia", Australian Earthquake Engineering conference, Brisbane (presented by K.F. McCue).

Table 5. Conferences, Training and Committees, 1994-1997

Officer	*Date*	*Conference*
		Committees
P.J. Gregson	1994-1996	Geophysics Advisory Committee, Curtin University.
	1994	Working group on seismicity in mines in Western Australia (Mines Dept).
	1995-1996	Tsunami warning investigation group.
		Training Courses
1994		
O.D. McConnel	Mar 15-30	Satellite installation course, Canberra.
1995		
O.D. McConnel	Jan 30-Feb 3	Occupational Health & Safety course, Canberra.
L. Van Reeken	Feb 15-16	Introduction to UNIX, Curtin University.
E.P. Paull	Feb 15-16	Introduction to UNIX, Curtin University.
L. Van Reeken	May 1-19	GPM training in Canberra.
L. Van Reeken	May 29-Jun 2	Occupational Health & Safety course, Perth.
V.F. Dent	Jun 7-9	Advanced UNIX course, Curtin University.
E.P. Paull	Oct 10	First Aid Course (Basic), St John's Morley
V.F Dent	Oct 10	First Aid Course (Basic), St John's Morley
1996		
L. Van Reeken	Feb 9	First Aid Course (Basic), St John's Morley
O.D. McConnel	Feb 9	First Aid Course (Basic), St John's Morley
L. Van Reeken	Feb 13	Driving Course
E. P. Paull	Feb 13	Driving Course
O.D. McConnel	Apr 30	Driving Course
V.F. Dent	Apr 30	Driving Course
V.F. Dent	Mar 20	"Interpersonal skills"
P.J. Gregson	Apr 3	"Effective teams and strategies"
E.P. Paull	Apr 3	"Effective teams and strategies"
V.F. Dent	Apr 3	"Effective teams and strategies"
O.D. McConnel	Apr 3	"Effective teams and strategies"
L. Van Reeken	Apr 3	"Effective teams and strategies"
Y.M. Moiler	Apr 3	"Effective teams and strategies"
V.F. Dent	Oct 21	CSS Superannuation seminar
P.J. Gregson	Oct 22	PSS Superannuation seminar
E.P. Paull	Oct 22	PSS Superannuation seminar
O.D. McConnel	Oct 22	PSS Superannuation seminar
1997		
O.D. McConnel	Nov 24	RMIT Kelunji operation (Melbourne)
O.D. McConnel	Nov 27,28	Optus satellite dish installation (Sydney)
		Conferences and Seminars
1994		
P.J. Gregson	Sep 28	12th Australian Geological Convension, Perth
E. P. Paull	Sep 28	12th Australian Geological Convension, Perth
V.F. Dent	Sep 28 & 30	12th Australian Geological Convension, Perth
V.F. Dent	Nov 14 & 15	Australian Earthquake Engineering Society, Canberra
1995		
P.J. Gregson & V.F. Dent	Nov 19	Seismic Research Centre Users Group, Melbourne
P.J. Gregson & V.F. Dent	Nov 20-22	Pacific Conferencefor Earthquake Engineering, Melbourne
P.J. Gregson &V.F. Dent	Nov 23-24	International Decade for Natural Disaster Reduction & (IDNDR) - Regional earthquake hazard meeting - Melbourne.
P.J. Gregson	Nov 16	"Earthquakes", State Emergency Service

Table 5. (Cont.)

Officer	*Date*	*Conferences and seminars*
E. P. Paull, V.F. Dent & L. A. van Reeken		Seminar, Perth.
1996		
P.J. Gregson	Oct 8-11	"Mitigation of Hazards in the Indean Ocean", Mt Macedon
1997		
P.J. Gregson	Sep 15-17	GLAWR planning meeting, Canberra
O.D. McConnel	Oct 1	O H & S seminar
L.A. Van Reeken	Oct 1	O H & S seminar
P.J. Gregson	Dec 11	GLAWR planning meeting - Canberra.

Table 6. Visitors, 1994-1997

Visitor	*Institution*
1994	
Mr R. Herron	Emergency Management Australia
Mr G. Jemmeson	Bureau of Meteorology
Mr G. Foley	Bureau of Meteorology
Mr G. Ezzy	Bureau of Meteorology
Mr A. Murie	Golder Associates
Prof R. Blong	Macquarie University
Dr M. Dentith	University of WA (Geology Dept)
Mr N. Tetlaw	University of WA (Geology Dept)
Students (12)	Curtin University
Students (15)	Helena Valley PEAC
Members (12)	Rockingham Gem and Rock Club
Students	Eastern Hills Senior High School
Mr J. Nolan	Distance Education Dept.
Mr R. Luckhurst	Ionospheric Prediction Service
Mr A. Hughes	Director, International Seismological Centre
Ms J. Wolfe	Australian Geological Survey Organisation
Mr H. Hoefnagles	Australian Geological Survey Organisation
Mr W. Greenwood	Australian Geological Survey Organisation
Dr D. Denham	Australian Geological Survey Organisation
Mr T. Jones	Australian Geological Survey Organisation
Ms M. Leiba	Australian Geological Survey Organisation
Mr P. Gunn	Australian Geological Survey Organisation
Mr A. Nicholson	Australian Geological Survey Organisation
Mr B. Gaull	Guria Consulting
Rev P. White	
1995	
Robert Muirhead	EQE
George Sulc	State Emergency Service
Margaret Brooks	State Emergency Service
Dr Neil Williams	Director, Australian Geological Survey Organisation
Dr David Denham	Australian Geological Survey Organisation
T. Jones	Australian Geological Survey Organisation
A. Giffen	Australian Geological Survey Organisation
Phil Curnow	Alcoa
Helena Coles	Alcoa
Dr Holly Given	University of California
Barrie Oldfield	Men of the Trees.
Church interest group (15)	
Brian Gaull	Guria Consulting

Table 6. (Cont.)

Visitor	*Institution*
Kent Anderson	United States Geological Survey Seismogical Laboratory
Students (15)	Curtin University geophysics students
Steven Elliott	ROCLA
Dr J Rynn	Centre Earthquake Research in Australia, Queensland
Dr J. Kennewell	Ionospheric Prediction Service, Learmonth
State Emergency Group (9)	
1996	
Sonya Trewen	Work Experience student
Mr H. Mason	Geologist
Mr G. Steemson	Geological Survey of WA
Mr B. Gaull	Guria Consulting
Mr B. Munyard	Health Surveyor, Northam Shire
Dr. D. Denham	Australian Geological Survey Organisation
Mr W. Greenwood	Australian Geological Survey Organisation
Mr N. Esau	Australian Geological Survey Organisation
Mr F. Cant	Australian Geological Survey Organisation
Mr M. Oates	Australian Geological Survey Organisation
Mr P. Wong	Australian Geological Survey Organisation
Mrs E. Stroud	Discovery Learning
Mr M. Williams	Mundaring Shire
Mr T. Mitchell	Telstra
Mr J. Kennewell	Ionospheric Prediction Service, Learmonth
Mr F. O'Rourke	Bureau of Meteorology, Casey recruit
Mr A. Parker	Bureau of Meteorology, Melbourne
Mr A. Endress	University of San Diego (IRIS)
Mr T. Johnson	University of San Diego (IRIS)
I.B. Everingham	
Students (11)	PEAC
Students (15)	Curtin University geophysics students
Volunteers (12)	State Emergency Service, Kalamunda
Students (10)	Science students, TAFE, Midland
General public (70)	Conservation and Land Management "Rocks N Ruins"
1997	
Dr N. Williams	Director, AGSO
Dr.T. Powell	Deputy Director, AGSO
Ms J. Coggan	Human Resources Manager, AGSO
Mr. P. Wong	Safety officer, AGSO
Mr. P. Crosthwaite	Geomagnetism, AGSO
Mr C. Cameron	Head ESU, AGSO
Ms C. Pickup	TAFE communication
Mr. D. Fisher	TAFE
Mr M. Lee	BHP
Ms A. Murtagh-Monk	BBC
Mr J. Allen	Darling Range volunteer fire brigade
Mr G. Rennie	Fire brigade rescue
Mr M. Williams	CEO, Mundaring Shire
Mr B. Williams	Ex BMR
Mr M. Freeman	WA Dept of Mines
General public (106)	Conservation and Land Management "Rocks N Ruins"
General public (30)	Parkerville Baptist Church
Dr. M. Machette	United States Geological Survey
Dr. A. Crone	United States Geological Survey
Mr. P. De Martini	Instituto Nazionale di Geofisica, Italy
Dr M. Leonard	AGSO
Bjorn Ove	Norway Geomagnetic Institute.
Carl Peacey	DPIE, Information Technology

Table 7. Western Australian Seismograph Stations, 1994 - 1997

Code	*Station Name*	*Lat ^{o} S*	*Long ^{o} E*	*Elev*	*Opened*	*Closed*
BAL	Ballidu	30.6065	116.7072	300	82 Aug 27	
COCO	Cocos Island	12.190	96.835	0	96 Dec 19	
COOL	Coolgardie	30.8838	121.1447	500	88 Aug 10	94 Jul 07
FITX	Fitzroy Crossing	18.1090	125.6430	110	95 Mar 19	96 Sep 11
FITZ	Fitzroy Crossing	18.1020	125.6390	110	94 Sep 01	
FORT	Forrest	30.7790	128.0590	165	92 May 18	94 Jun 21
GIRL	Giralia	22.6430	114.2340	111	95 Sep 12	
KAKA	Kakadu (NT)	12.7120	132.4400	100	95 Mar 04	
KLB	Kellerberrin	31.5923	117.7600	300	81 Sep 23	
KNA	Kununurra	15.7500	128.7667	150	72 Feb 28	
MBL	Marble Bar	21.1600	119.8333	200	76 Jun 21	
MEEK	Meekatharra	26.6380	118.6150	530	92 Jun 04	
MRWA	Morawa	29.2180	115.9960	300	84 Jun 21	
MTN	Manton Dam (NT)	12.8467	131.1300	80	72 Jun 01	95 Mar 11
MGO	Mundaring Office	31.9033	116.1650	250	79 Jan 11	
MUN	Mundaring	31.9783	116.2083	253	62 Jun 01	
NANU	Nanutarra	22.5620	115.5290	300	87 Oct 22	95 Feb 26
NWAO	Narrogin	32.9267	117.2333	265	76 Mar 19	
RKG	Rocky Gully	34.5698	117.0103	300	83 Aug 03	
WARB	Warburton	26.1838	126.6430	460	87 Jun 28	
WOOL	Woolibar	31.0730	121.6780	325	94 Jun 07	
Temporary Stations						
YK1	York	31.997	116.745		94 Nov 21	94 Dec 08
					96 Sep 08	96 Nov 20
YK2	York	31.968	116.727		94 Nov 24	94 Dec 08
					96 Sep 08	96 Nov 20
YK3	York	31 993	116.720		94 Nov 29	94 Dec 01
					96 Sep 08	96 Nov 20
	Derby					
MTHY	Mount Hart	16.822	124.916		97 Aug 19	97 Oct 26
CLQY	Cape Leveque	16.932	122.932		97 Aug 20	97 Oct 26
PTJY	Pantajin	15.960	125.055		97 Aug 18	(7 Oct 26
	Cockatoo Island					

Table 8a. Seismograph (Analog Stations) Calibration Data, 1994 - 1997
Magnification (X1000)

SHORT PERIOD

Period(Sec)	*0.1*	*0.15*	*0.2*	*0.25*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*	*1.0*
BAL Z	218	301	316	291	251	171	118	78	59	41	31	24
COOL Z (to 7 Jul 95)	200	358	417	399	355	255	178	130	91	70	50	36
FORT Z (to 21 Jun 94)	207	358	402	389	343	232	151	99	63	43	29	19
KLB Z	129	239	266	245	211	147	102	73	52	40	27	21
KNA Z	135	187	200	187	164	118	86	65	49	37	28	21
KNA N, E	36	54	61	62	58	48	39	32	27	22	19	16
MBL Z (to 27 Sep 96)	480	800	863	827	733	510	352	247	173	130	92	68
MBL Z (fm 28 Sep 96)	200	456	566	574	546	402	270	173	112	73	47	30
MEEK Z (to 8 Sep 94)	242	324	371	356	318	230	166	116	86	63	47	35
MRWA Z	650	878	974	926	808	556	364	240	156	105	72	47
MTN Z (to 11 Mar)	34		180		246	240	200	157	118	87	55	40
MGO INS	.071	.089	.092	.091	.088	.078	.058	.057	.049	.043	.037	.033
MUN Z+	3	6	10	14.5	20	31	39	41	40	36	31	25
MUN HGZ	520	600	610	596	550	442	325	202	122	73	46	31
NANU Z (to 26 Feb)	480	940	1010	954	823	520	348	190	115	76	53	40
NWAO *Z	270	320	330	320	295	240	190	135	96	68	46	31
RKG Z	482	621	644	586	450	313	200	130	84	57	40	27
WARB Z (to 5 Dec 94)	900	1220	1300	1190	1010	673	430	265	176	116	78	55

LONG PERIOD

Period(Sec)	*8*	*9*	*10*	*15*	*20*	*25*	*30*	*40*	*50*	*60*	*80*	*100*
MUN Z, N, E +	.31	.34	.36	.37	.34	.25.	27.	18.	14	.11	.08	.06
NWAO Z *	0.35	0.5	0.85	1.1	4.1	5.0	5.0	4.0	3.3	2.0	1.0	0.55

\+ World Wide Standard Seismograph SP-Z, N, E LP-Z, N, E

* IRIS (Incorporated Research Institutions for Seismology) SP-Z LP-Z Analogue chart response. Digital data is 3 component broad band.

HGZ High Gain Short Period Vertical

Table 8b. Seismograph (Digital Stations) Calibration Data, 1994 - 1997
Sensitivity (nanometers/count)

Period (Sec)	*0.1*	*0.15*	*0.2*	*0.25*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*	*1.0*
FITX Z (19 Mar 95 to 11 Sep 96)	47.7	38.9	32.8	27.4	22.6	18.9	15.4	12.9	10.9	8.08	6.50	5.66
FITZ BZ (1 Sep 94 to 15 Feb 95)	-	37.5	39.5	29.1	22.8	17.1	12.1	10.3	9.04	7.80	6.80	6.39
BN	-	25.9	23.3	21.1	17.3	12.1	9.64	8.10	6.98	5.90	5.10	4.51
BE	-	23.1	16.7	17.8	14.8	11.1	8.61	7.10	6.06	5.40	4.90	4.45
FITZ BZ (fm 12 Sep 96)		37.5	39.5	29.1	22.8	17.1	12.1	10.3	9.04	7.80	6.80	6.39
BN		25.9	23.3	21.1	17.3	12.1	9.64	8.10	6.98	5.90	5.10	4.51
BE		23.1	16.7	17.8	14.8	11.1	8.61	7.10	6.06	5.40	4.90	4.45
FORT Z (fm 21 Jun 94)	-	7.78	7.31	5.46	4.91	3.46	2.66	2.02	1.62	1.25	1.02	0.84
GIRL Z (fm 12 Sep 95)	9.06	7.31	5.38	4.70	3.93	3.06	2.51	2.10	1.80	1.55	1.30	1.07
KAKA Z (fm 04 Mar 95)	11.7	25.4	17.8	19.0	16.4	12.2	10.0	8.77	7.36	6.16	5.14	4.26
MEEK Z (fm 10 Sep 94)	-	15.0	14.5	11.6	10.0	7.50	5.85	4.60	3.77	3.00	2.47	2.08
WARBBZ (fm 8 Dec 94)	-	49.5	42.7	36.4	30.6	24.3	19.7	16.3	13.1	12.7	9.60	8.92
BN	-	41.0	39.7	34.6	32.0	20.2	18.9	16.7	14.1	11.5	10.8	9.23
BE	-	-	47.8	38.3	34.5	25.4	26.8	17.3	14.4	12.7	10.6	10.0
WOOLBZ (7 Jun to 6 Oct 94)	-	25.2	23.7	18.5	17.0	12.6	10.1	8.32	7.30	6.19	5.95	5.34
BN	-	27.6	26.0	20.2	18.2	12.6	9.84	8.37	7.24	6.06	5.64	5.10
BE	-	33.8	31.8	23.5	19.6	15.1	12.2	10.4	8.54	7.63	6.52	6.23
WOOLBZ (fm 6 Oct 94)												
BN		Not available										
BE												

Table 8b. (Cont'd)

Period (Sec)			*1.0*	*1.5*	*2.0*	*3.0*	*4.0*	*5.0*	*7.0*	*10.0*
FITX	Z	(19 Mar 95 to 11 Sep 96)	5.66	1.74	0.666	0.181	804E-4	404E-4	189E-4	512E-5
FITZ	BZ	(1 Sep 94 to 15 Feb 95)	6.39	3.98	3.07	2.25	1.53	1.13	0.839	0.628
	BN		4.51	3.11	2.26	1.57	1.12	0.908	0.647	0.457
	BE		4.45	3.03	2.41	1.38	1.11	0.891	0.629	0.434
FITZ	BZ	(fm 11 Sep 96)	6.39	3.98	3.07	2.25	1.53	1.13	0.839	0.628
	BN		4.51	3.11	2.26	1.57	1.12	0.908	0.647	0.457
	BE		4.45	3.03	2.41	1.38	1.11	0.891	0.629	0.434
FORT	Z	(fm 21 Jun 94)	0.84	0.341	0.163	567E-4	247E-4	121E-4	500E-5	156E-5
GIRL	Z	(fm 12 Sep 95)	1.07	0.381	0.160	454E-4	186E-4	936E-5	358E-5	121E-5
KAKA	Z	(fm 04 Mar 95)	4.26	1.55	0.650	0.189	791E-4	396E-4	146E-4	500E-5
MEEK	Z	(fm 10 Sep 94)	2.08	0.789	0.365	0.112	479E-4	249E-4	900E-5	350E-5
WARB	BZ	(fm 8 Dec 94)	8.92	5.73	4.22	2.80	2.32	1.93	1.24	0.896
	BN		9.23	5.54	4.27	3.00	2.28	1.85	1.24	0.932
	BE		10.0	5.63	4.54	2.92	2.42	1.76	1.32	0.957
WOOL	BZ	(7 Jun to 6 Oct 94)	5.34	3.43	2.46	1.82	1.37	1.09	0.860	0.529
	BN		5.10	3.31	2.55	1.63	1.18	0.994	0.695	0.490
	BE		6.23	4.03	2.94	1.93	1.48	1.17	0.813	0.554
WOOL	BZ	(fm 6 Oct 94)								
	BN			Not available						
	BE									

Period (Sec)			*10*	*15*	*20*	*25*	*30*	*50*	*70*	*100*
FITX	Z	(19 Mar 95 to 11 Sep 96)	512E-5	163E-5	665E-6	344E-6	196E-6	-	-	-
FITZ	BZ	(1 Sep 94 to 15 Feb 95)	0.628	0.419	0.302	0.200	0.154	461E-4	178E-4	-
	BN		0.457	0.307	0.213	0.150	0.110	353E-4	136E-4	-
	BE		0.434	0.284	0.195	0.143	0.103	332E-4	129E-4	-
FITZ	BZ	(fm 11 Sep 96)	0.628	0.419	0.302	0.200	0.154	461E-4	178E-4	-
	BN		0.457	0.307	0.213	0.150	0.110	353E-4	136E-4	-
	BE		0.434	0.284	0.195	0.143	0.103	332E-4	129E-4	-
FORT	Z	(fm 21 Jun 94)	156E-5	452E-6	200E-6	107E-6	600E-7	127E-8	-	-
GIRL	Z	(fm 12 Sep 95)	121E-5	262E-6	152E-6	786E-7	442E-7	-	-	-
KAKA	Z	(fm 04 Mar 95)	500E-5	149E-5	633E-6	320E-6	187E-6	-	-	-
MEEK	Z	(fm 10 Sep 94)	350E-5	920E-6	397E-6	211E-6	116E-6	256E-7	930E-8	-
WARB	BZ	(fm 8 Dec 94)	0.896	0.600	0.448	0.359	0.288	0.170	0.102	0.061
	BN		0.932	0.628	0.466	0.366	0.297	0.174	0.113	0.061
	BE		0.957	0.577	0.469	0.380	0.316	0.184	0.108	0.065
WOOL	BZ	(7 Jun to 6 Oct 94)	0.539	0.323	0.202	0.120	873E-4	185E-4	680E-5	-
	BN		0.490	0.306	0.195	0.110	712E-4	176E-4	637E-5	-
	BE		0.554	0.342	0.215	0.132	877E-4	214E-4	793E-5	-
WOOL	BZ	(fm 6 Oct 94)								
	BN			not available						
	BE									

Table 9. Western Australian Accelerograph Locations, 1994 - 1997

Locality	*Code*	*Lat ^{o} S*	*Long ^{o} E*	*Elev*	*Foundation*	*Owner*
BEVERLEY						
Morrell	BEM	32.159	117.200	240	Alluvium	AGSO
CADOUX						
Shankland	CAS	30.810	117.132	400	Tertiary sandstone/granite	AGSO
Kalajzic M.	CAA	30.746	117.151	320	Laterite/weathered granite	AGSO
Murray's	CAM	30.841	117.076	300	Laterite/weathered granite	AGSO
McNamara	CMC	30.792	117.096	300	Laterite/weathered granite	AGSO
GOOMALLING						
Lamb	GOO	31.394	116.852	250	Granite	AGSO
Kingston	GOK	31.338	116.853	250	Granite	AGSO
MECKERING						
Elliot	ME3	31.714	117.054	200	Alluvium/Granite	AGSO
Kelly	MEK	31.694	116.982	200	Alluvium/Granite	AGSO
PERTH						
Kings Park	KPK	31.960	115.842	60	Limestone	AGSO
Trinity College	TRI	31.959	115.878	5	Clay-Alluvium	AGSO
East Perth	EPS	31.945	115.881	20	Clay-Alluvium	AGSO
QUAIRADING						
Whyte D.	QUW	31.987	117.270	300	Weathered granite	AGSO
DARWIN						
Parliament House	DPH	12.432	130.899	20	Mezozoic sandstone	AGSO
DME Rock Store	DRS	12.467	130.842	10	Mesozoic sandstone	AGSO

OWNER

AGSO Australian Geological Survey Organisation.

Table 10. Accelerograph Calibration Data 1994 - 1997

Code	*Date Of Operation*		*Inst. No.*	*Ser No.*	*Block No.*	*Calibration Data g-cm and Azimuth*		
	From	*To*				*Ia*	*Ib*	*Ic*
BEM	93 Jan 04	95 Feb 02	A700	033	ID002	1.159V	1.172V	1.167V
CAA	94 Mar 30	97 Mar 13	Kelunji	165		2.1×10^6 counts/g		
CAM	95 May 27	95 Aug 10	A700	033	ID003	1.178V	1.216V	1.187V
	95 Dec 14	96 Nov 28	A700	030	ID003	1.178V	1.216V	1.187V
CAS	85 Dec 18	96 Aug 01	MO2	296	1462	0.609	0.597	0.417
CMC	97 Mar 14		Kelunji	165		4.2×10^6 counts/g		
DPH	95 Mar 08		Kelunji			4.2×10^6 counts/g		
DRS	95 Mar 08		Kelunji			4.2×10^6 counts/g		
EPS	97 Apr 04		Kelunji	092		4.2×10^6counts/g		
GOK	97 Mar 14		Kelunji	167		4.2×10^6 counts/g		
GOO	94 Jan 06	95 Sep 29	Kelunji	057		4.2×10^6 counts/g		
	95 Sep 29	95 Nov 02	Kelunji	203		4.2×10^6 counts/g		
	95 Dec 14	97 Mar 13	Kelunji	167		4.2×10^6 counts/g		
KPK	94 Aug 22	95 Oct 25	Kelunji	167		2.1×10^6counts/g		
	95 Oct 25		Kelunji	089		4.2×10^6counts/g		
ME3	93 May 07	95 Feb 02	A700	030	ID003	1.178V	1.216V	1.187V
	95 Jun 03	95 Aug 10	A700	030	ID002	1.159V	1.172V	1.167V
	95 Aug 18	95 Nov 02	A700	033	ID002	1.159V	1.172V	1.167V
MEK	93 Apr 29	96 Nov 19	MO2	291	1196	0.590	0.560	0.394
QUW	92 Aug 31	96 Dec 31	MO2	289	1166A	0.582	0.548	0.348
TRI	94 Aug 22	97 Apr 03	Kelunji	092		4.2×10^6counts/g		

* All orientations 090, 000, Up unless shown

Table 11. Western Australian Earthquakes 1994-1997

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1994- 1- 5	0330 7.2	31.97	117.38	3	ML 1.6	QUAIRADING, 6 KM NNW
1994- 1- 7	1213 21.2	32.43	122.30	5 N	ML 3.0	NORSEMAN, 55 KM ESE
1994- 1- 7	1312 48.7	16.57	128.55	5 N	ML 2.6	KUNUNURRA, 90 KM S
1994- 1-17	2155 30.1	31.62	117.09	6	ML 2.8	MECKERING, 8 KM E
1994- 1-26	1733 22.8	32.37	122.32	5 N	ML 2.7	NORSEMAN, 54 KM ESE
1994- 1-31	0014 41.9	31.64	116.96	6	ML 2.5	MECKERING, 5 KM WSW
1994- 1-31	0148 39.7	16.57	128.62	5 N	ML 2.3	KUNUNURRA, 88 KM S
1994- 1-31	1342 8.7	30.86	117.89	5 N	ML 1.5	BENCUBBIN, 5 KM SE
1994- 2- 1	0641 2.7	30.87	117.88	4	ML 2.0	BENCUBBIN, 6KM SE
1994- 2- 5	1805 52.3	26.48	117.32	5 N	ML 2.0	MEEKATHARRA, 118KM W
1994- 2- 9	2046 21.3	33.26	118.26	1 C	ML 1.6	NYABING, 34KM NNE
1994- 2-11	0342 6.6	31.60	117.08	1 C	ML 1.5	MECKERING, 8KM ENE
1994- 2-11	2313 2.5	16.61	110.89	5 N	ML 4.0	EXMOUTH, 680KM NW
1994- 2-12	1715 0.3	21.65	120.56	5 N	ML 2.6	MARBLE BAR, 99KM SE
1994- 2-18	1624 4.2	31.50	116.18	9	ML 2.1	BINDOON, 16KM SE
1994- 2-20	1432 41.5	29.61	123.76	5 N	ML 3.2	LAVERTON, 171KM SE
1994- 2-22	2038 22.5	31.73	117.06	6	ML 1.8	MECKERING, 12KM SSE
1994- 2-25	1048 27.8	16.62	128.51	5 N	ML 2.0	KUNUNURRA, 97KM SSW
1994- 2-28	0758 10.1	15.17	127.27	5 N	ML 3.2	KUNUNURRA, 170KM NW
1994- 2-28	2138 48.5	30.79	117.09	4	ML 2.1	CADOUX, 4KM WSW
1994- 3- 1	2325 39.0	31.71	117.06	7	ML 2.3	MECKERING, 9KM SSE
1994- 3- 9	0116 27.2	32.22	117.45	1	ML 2.3	QUAIRADING, 22KM SSE
1994- 3- 9	1527 43.4	26.84	115.94	37	ML 2.8	MEEBERRIE, 14KM N
1994- 3- 9	1609 49.8	32.15	117.42	9	ML 1.4	QUAIRADING, 14KM S
1994- 3-11	0942 53.8	25.50	120.33	5 N	ML 2.3	WILUNA, 121KM N
1994- 3-12	2215 38.2	32.15	117.41	1 G	ML 2.5	QUAIRADING, 15KM S
1994- 3-14	1512 56.7	33.29	118.23	5 N	ML 1.8	NYABING, 30KM N
1994- 3-15	1751 57.5	31.14	117.27	5 N	ML 1.8	WYALKATCHEM, 11KM NW
1994- 3-17	0517 10.6	31.17	117.27	7	ML 2.1	WYALKATCHEM, 11KM W
1994- 3-17	1144 8.6	32.15	117.42	9	ML 1.4	QUAIRADING, 15KM S
1994- 3-23	0147 41.6	31.17	117.25	5 N	ML 2.5	WYALKATCHEM, 12KM W
1994- 3-23	1150 37.0	20.29	117.71	5 N	ML 3.7	PORT HEDLAND, 90KM W
1994- 3-23	1158 46.5	34.11	105.66	5 N	ML 3.0	PERTH, 990KM WSW
1994- 3-23	1313 51.5	31.19	117.25	5 N	ML 1.8	WYALKATCHEM, 12KM W
1994- 3-24	1632 14.8	29.70	116.46	5 N	ML 1.9	LATHAM, 6KM NE
1994- 3-28	0631 9.6	33.90	117.67	5 N	ML 1.9	TAMBELLUP, 15KM N
1994- 3-31	2316 1.9	31.15	117.28	8	ML 1.8	WYALKATCHEM, 10KM W
1994- 4- 1	1826 19.2	31.17	117.26	5	ML 2.5	WYALKATCHEM, 11KM W
1994- 4- 1	1834 26.1	31.17	117.26	5	ML 2.1	WYALKATCHEM, 11KM W
1994- 4- 3	0308 37.2	29.84	116.11	1 C	ML 1.8	LATHAM, 32KM W
1994- 4- 4	0258 30.0	20.06	116.40	5 N	ML 2.6	DAMPIER, 74KM NW
1994- 4- 5	0358 54.5	32.55	126.97	5 N	ML 2.6	COCKLEBIDDY, 100KM SE
1994- 4- 7	0138 1.6	29.80	116.21	1	ML 2.5	LATHAM, 22KM W
1994- 4- 7	1231 38.1	37.01	113.90	5 N	ML 2.4	AUGUSTA, 320KM S
1994- 4- 8	0608 47.4	31.18	117.25	3	ML 2.4	WYALKATCHEM, 13KM W
1994- 4-12	0643 46.6	18.13	116.37	5 N	ML 2.3	DAMPIER, 283KM N
1994- 4-15	0558 34.5	24.81	125.46	5 N	ML 2.4	WARBURTON, 185KM NW
1994- 4-18	0509 31.8	28.98	113.74	5 N	ML 2.6	GERALDTON, 90KM WSW
1994- 4-18	1937 49.3	31.17	117.25	3	ML 1.5	WYALKATCHEM, 12KM W
1994- 4-19	1125 6.9	21.92	126.55	5 N	ML 3.4	LAKE TOBIN, 43KM E
1994- 4-20	2040 53.8	20.22	116.29	5 N	ML 2.9	DAMPIER, 65KM NW
1994- 4-20	2153 43.6	33.58	118.55	5 N	ML 1.5	PINGRUP, 7KM SE
1994- 4-25	0259 15.4	16.67	120.72	5 N	ML 2.7	BROOME, 216KM NW
1994- 4-26	0408 6.1	16.48	128.63	5 N	ML 2.7	KUNUNURRA, 78KM S
1994- 4-26	1549 39.5	30.60	118.48	5 N	ML 4.1	BONNIE ROCK, 14KM SE
1994- 4-26	1634 58.3	30.59	118.50	5 N	ML 2.4	BONNIE ROCK, 14KM ESE

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1994- 5- 2	1230 19.2	26.12	111.73	5 N	ML 2.8	CARNARVON, 239KM SW
1994- 5- 2	2242 54.4	32.63	118.92	5 N	ML 1.9	HYDEN, 20KM SSE
1994- 5- 7	1346 15.0	31.18	117.24	4	ML 2.3	WYALKATCHEM, 14KM W
1994- 5- 7	1346 35.4	31.18	117.24	5 N	ML 2.3	WYALKATCHEM, 13KM W
1994- 5- 8	2116 29.5	33.92	106.80	5 N	ML 2.6	AUGUSTA, 770KM W
1994- 5- 8	2218 17.0	25.18	116.88	5 N	ML 2.0	LANDOR STN, 6KM S
1994- 5-10	2110 48.6	20.30	119.27	5 N	ML 2.2	PORT HEDLAND, 72KM E
1994- 5-11	1927 4.8	27.10	117.40	5 N	ML 1.8	MEEKATHARRA, 123KM SW
1994- 5-11	1958 5.0	33.67	118.13	5 N	ML 1.4	NYABING, 13KM S
1994- 5-11	2140 26.9	26.62	116.98	5 N	ML 2.0	MEEKATHARRA, 151KM W
1994- 5-13	0007 30.2	27.45	117.78	5 N	ML 2.0	CUE, 12KM WSW
1994- 5-13	0420 40.0	31.17	117.25	5	ML 2.8	WYALKATCHEM, 13KM W
1994- 5-17	1337 48.3	30.77	117.13	5 N	ML 1.4	CADOUX, 2KM SW
1994- 5-17	2057 15.1	31.63	117.09	5 N	ML 2.0	MECKERING, 7KM E
1994- 5-18	0240 21.9	30.91	116.33	5 N	ML 1.6	CALINGIRI, 22KM NNW
1994- 5-22	0659 49.2	33.24	116.91	5 N	ML 1.8	NARROGIN, 43KM SW
1994- 5-25	1825 50.5	16.69	120.69	5 N	ML 3.1	BROOME, 217KM NW
1994- 5-26	0747 6.7	31.17	117.25	4	ML 2.1	WYALKATCHEM, 12KM W
1994- 5-29	0104 6.6	31.60	117.11	5 N	ML 1.2	MECKERING, 11KM ENE
1994- 5-29	1218 41.9	31.56	117.99	5 N	ML 1.6	MERREDIN, 28KM WSW
1994- 6- 2	1740 11.7	26.71	122.79	5 N	ML 2.3	COSMO NEWBERRY,142KM N
1994- 6- 5	1817 41.5	31.54	117.91	5 N	ML 2.2	KELLERBERRIN, 21KM NE
1994- 6- 6	1017 36.2	33.72	118.07	5 N	ML 2.9	NYABING, 20KM S
1994- 6- 8	0613 50.3	31.70	117.06	5 N	ML 2.8	MECKERING, 10KM SE
1994- 6- 8	0622 57.5	31.70	117.05	5 N	ML 1.7	MECKERING, 9KM SE
1994- 6- 9	1233 49.5	31.17	117.53	5 N	ML 1.5	WYALKATCHEM, 14KM E
1994- 6- 9	2329 34.1	32.15	117.40	5 N	ML 1.3	QUAIRADING, 14KM S
1994- 6-10	0453 0.3	30.84	118.12	5 N	ML 1.9	MUKINBUDIN, 11KM NW
1994- 6-10	1601 3.8	31.56	117.92	5 N	ML 1.6	KELLERBERRIN, 21KM NE
1994- 6-10	1809 32.2	31.52	117.91	5 N	ML 2.0	KELLERBERRIN, 22KM NE
1994- 6-11	1202 56.9	31.54	117.90	5 N	ML 2.5	KELLERBERRIN, 20KM NE
1994- 6-11	1245 10.8	33.69	118.12	5 N	ML 2.5	NYABING, 15KM S
1994- 6-11	1453 40.1	31.56	117.92	5 N	ML 1.6	KELLERBERRIN, 20KM E
1994- 6-12	1453 31.3	23.10	114.82	5 N	ML 2.4	NANUTARRA, 95KM SW
1994- 6-13	0225 54.7	31.53	117.90	5 N	ML 1.6	KELLERBERRIN, 20KM NE
1994- 6-14	0013 56.6	31.53	117.91	5 N	ML 1.8	KELLERBERRIN, 21KM NE
1994- 6-14	0022 57.8	31.52	117.91	5 N	ML 1.8	KELLERBERRIN, 21KM NE
1994- 6-23	1355 10.1	36.24	117.63	5 N	ML 3.0	ALBANY, 139KM S
1994- 6-23	1358 10.2	36.28	117.63	5 N	ML 2.5	ALBANY, 144KM S
1994- 6-28	1947 44.8	17.20	121.07	5 N	ML 2.8	BROOME, 150KM NW
1994- 6-30	0734 42.8	27.45	119.13	5 N	ML 2.5	SANDSTONE, 61KM N
1994- 7- 1	0208 7.2	30.86	117.09	6	ML 2.0	MANMANNING, 0KM S
1994- 7- 5	2116 23.9	25.42	111.71	5 N	ML 2.4	CARNARVON, 206KM WSW
1994- 7-10	0327 59.7	33.61	118.42	5 N	ML 2.8	PINGRUP, 12KM SW
1994- 7-17	1734 29.1	30.80	116.28	3	ML 1.6	CALINGIRI, 34KM NNW
1994- 8- 1	1857 56.7	31.76	116.92	5 N	ML 1.8	MECKERING, 17KM SW
1994- 8- 3	0901 32.4	33.60	117.21	5 N	ML 1.8	KOJONUP, 26KM N
1994- 8-20	1237 56.8	32.00	117.29	5 N	ML 1.6	QUAIRADING, 11KM W
1994- 8-20	2348 9.1	32.33	117.24	5 N	ML 1.6	BROOKTON, 22KM E
1994- 8-22	0331 49.0	21.99	126.32	5 N	ML 3.4	TOBIN LAKE, 20KM E
1994- 8-26	2318 21.1	31.10	115.62	5 N	ML 1.6	MOGUMBER, 30KM W
1994- 8-30	1342 53.8	30.78	117.02	5 N	ML 1.9	MANMANNING, 11KM NW
1994- 9- 4	1301 28.5	30.69	124.25	5 N	ML 4.3	ZANTHUS, 75KM ENE
1994- 9- 4	2301 53.5	30.75	117.13	1 C	ML 1.9	CADOUX, 4KM N
1994- 9- 5	0758 39.2	33.70	118.19	5 N	ML 2.0	NYABING, 17KM S
1994- 9- 6	1906 34.0	30.82	117.07	5 N	ML 1.4	CADOUX, 8KM SW

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1994- 9-11	0412 0.2	33.66	118.17	5 N	ML 2.2	NYABING, 12KM S
1994- 9-12	0326 0.4	33.68	118.19	1 C	ML 2.5	NYABING, 15KM S
1994- 9-17	1535 35.9	30.84	117.08	4	ML 2.1	CADOUX, 9KM SW
1994- 9-18	0450 26.2	31.62	117.09	5 N	ML 1.3	MECKERING, 7KM E
1994- 9-20	2127 21.0	30.74	124.27	5 N	ML 2.7	ZANTHUS, 74KM ENE
1994- 9-23	2259 30.5	35.70	116.39	5 N	ML 2.3	WALPOLE, 86KM SSW
1994- 9-27	0803 31.5	31.45	117.28	5 N	ML 1.7	CUNDERDIN, 22KM N
1994- 9-27	1200 0.5	33.69	118.15	5 N	ML 1.8	NYABING, 16KM S
1994- 9-27	1559 11.4	31.79	116.33	9	ML 1.5	WOOROLOO, 3KM ENE
1994- 9-29	1127 41.7	20.01	118.39	5 N	ML 2.5	PORT HEDLAND, 38KM NW
1994- 9-30	0413 46.7	16.43	114.84	5 N	ML 2.5	KARRATHA, 524KM NW
1994-10- 3	0402 35.3	31.29	111.98	5 N	ML 2.5	PERTH, 374KM W
1994-10- 5	1659 30.9	33.46	117.78	1 C	ML 2.8	DUMBLEYUNG, 16KM SSE
1994-10- 8	1710 47.4	22.60	114.43	5 N	ML 2.8	LEARMONTH, 53KM SE
1994-10- 9	1501 26.7	16.65	128.07	5 N	ML 3.6	WARMUN (TURKEY CREEK)
1994-10-10	1904 25.8	32.70	118.12	5 N	ML 2.6	KULIN, 3KM SW
1994-10-11	0947 3.1	30.80	117.08	2	ML 1.6	CADOUX, 5KM SW
1994-10-11	1034 34.7	33.29	121.31	3	ML 3.9	SALMON GUMS, 47KM SW
1994-10-11	1456 47.4	33.67	118.06	2	ML 2.5	NYABING, 16KM SW
1994-10-11	2308 27.6	33.69	118.09	1 C	ML 2.2	NYABING, 16KM SSW
1994-10-12	0524 19.8	31.66	117.06	4	ML 1.2	MECKERING, 5KM SE
1994-10-12	1941 45.8	32.71	118.16	5 N	ML 2.0	KULIN, 4KM S
1994-10-15	1028 21.3	40.52	117.76	5 N	ML 2.8	ALBANY, 614KM S
1994-10-16	0752 33.2	31.60	117.10	6	ML 1.6	MECKERING, 10KM ENE
1994-10-16	2024 12.6	30.77	117.14	0	ML 1.5	CADOUX, 2KM E
1994-10-19	1756 26.3	36.41	117.10	5 N	ML 2.2	ALBANY, 170KM SSW
1994-10-19	2007 43.9	35.21	123.60	5 N	ML 3.3	ESPERANCE, 215KM SE
1994-10-27	1555 4.3	31.71	117.06	3	ML 1.7	MECKERING, 9KM SSE
1994-10-27	1804 0.9	31.45	117.29	1 C	ML 1.8	CUNDERDIN, 23KM NNE
1994-10-29	1904 21.3	32.72	118.17	3	ML 1.8	KULIN, 6KM SSE
1994-10-29	1959 38.4	32.70	118.12	4	ML 1.7	KULIN, 4KM SW
1994-10-31	0801 18.5	33.87	117.86	1 C	ML 2.6	GNOWANGERUP,15KM WNW
1994-11- 3	0641 0.5	31.17	117.25	5 N	ML 2.3	WYALKATCHEM, 12KM W
1994-11- 3	1338 51.8	25.90	111.63	5 N	ML 2.7	CARNARVON, 234KM SW
1994-11- 3	2001 26.8	34.43	118.59	5 N	ML 1.8	ALBANY, 92KM NE
1994-11- 4	1508 30.3	32.21	117.36	5 N	ML 1.6	QUAIRADING, 21KM S
1994-11- 5	2242 1.8	30.62	117.02	5 N	ML 2.0	BURAKIN, 18KM SW
1994-11- 7	1127 25.3	32.14	117.17	5 N	ML 1.3	BEVERLEY, 22KM E
1994-11-14	0908 47.5	30.61	117.02	5 N	ML 2.3	BURAKIN, 18KM SW
1994-11-14	1326 55.1	30.73	118.39	9	ML 2.6	BONNIE ROCK, 22KM S
1994-11-14	1847 53.5	31.14	121.63	5	ML 2.2	KAMBALDA, 6KM NW
1994-11-16	0508 28.0	31.99	116.73	1	ML 1.7	YORK, 13KM SSW
1994-11-17	2057 54.9	31.97	116.73	5 N	ML 1.9	YORK, 11KM SSW
1994-11-18	1344 5.8	30.86	117.01	5 N	ML 1.3	MANMANNING, 8KM W
1994-11-21	1633 34.7	29.51	116.40	5 N	ML 1.3	PERENJORI, 15KM SE
1994-11-21	1815 59.3	30.80	117.08	5 N	ML 1.8	MANMANNING, 5KM NW
1994-11-22	0855 22.0	31.98	116.74	5 N	ML 1.9	YORK, 11KM SSW
1994-11-23	0020 5.0	31.98	116.74	5 N	ML 1.8	YORK, 11KM SSW
1994-11-23	2053 29.9	31.98	116.74	5 N	ML 3.0	YORK, 11KM SSW
1994-11-23	2205 4.4	31.98	116.73	5 N	ML 1.8	YORK, 12KM SSW
1994-11-23	2222 52.8	31.98	116.73	5 N	ML 1.6	YORK, 11KM SSW
1994-11-23	2246 1.6	31.97	116.72	5 N	ML 1.7	YORK, 11KM SSW
1994-11-23	2330 49.6	31.98	116.73	5 N	ML 1.6	YORK, 11KM SSW
1994-11-24	0705 25.2	31.99	116.73	2	ML 1.3	YORK, 12KM SSW
1994-11-24	1441 26.0	31.97	116.73	1 G	ML 2.1	YORK, 11KM SSW
1994-11-24	1442 25.5	31.99	116.72	5 N	ML 1.6	YORK, 12KM SSW

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1994-11-24	1750 2.1	31.98	116.73	1 G	ML 1.6	YORK, 11KM SSW
1994-11-24	2003 21.8	31.99	116.73	5 N	ML 3.0	YORK, 12KM SSW
1994-11-24	2027 39.5	31.98	116.72	1	ML 1.6	YORK, 12KM SSW
1994-11-25	0001 20.8	31.98	116.72	1 G	ML 1.7	YORK, 11KM SSW
1994-11-25	0423 42.3	31.16	117.24	5 N	ML 1.5	WYALKATCHEM, 13KM W
1994-11-26	0329 18.7	31.98	116.72	5 N	ML 2.2	YORK, 12KM SSW
1994-11-26	0351 21.6	31.99	116.73	5 N	ML 1.9	YORK, 13KM SSW
1994-11-26	0650 55.4	29.97	115.49	5 N	ML 1.9	ENEABBA, 27KM SE
1994-11-26	1416 5.9	31.81	116.92	11	ML 2.7	GREENHILLS, 11KM NNW
1994-11-26	1552 21.4	31.98	116.72	5 N	ML 1.5	YORK, 12KM SSW
1994-11-28	0816 28.2	30.38	117.72	5 N	ML 1.5	BEACON, 16KM NW
1994-11-29	1431 34.1	31.98	116.72	1 C	ML 2.6	YORK, 12KM SSW
1994-11-29	1533 30.3	31.97	116.72	5 N	ML 1.4	YORK, 11KM SSW
1994-12- 2	1522 13.9	23.53	130.14	5 N	ML 2.7	LAKE MCKAY, 185KM SE
1994-12- 2	1942 37.0	23.54	130.17	5 N	ML 4.2	LAKE MCKAY, 187KM SE
1994-12- 2	2043 43.0	23.56	130.16	5 N	ML 2.6	LAKE MCKAY, 189KM SE
1994-12- 3	1600 13.9	30.63	117.12	5 N	ML 1.5	BURAKIN, 14KM SSW
1994-12-10	1702 23.1	34.97	118.52	1 C	ML 2.7	ALBANY, 58KM E
1994-12-13	0937 56.5	31.96	116.73	1 C	ML 1.7	YORK, 10KM S
1994-12-16	1902 27.3	33.67	118.05	1 C	ML 1.7	NYABING, 16KM SW
1994-12-23	1906 33.5	17.74	123.58	5 N	ML 2.5	DERBY, 47KM S
1994-12-24	1424 5.3	30.09	115.45	5 N	ML 2.0	ENEABBA, 34KM SE
1994-12-29	1329 57.1	32.30	119.75	5 N	ML 2.0	HYDEN, 85KM E
1995- 1- 1	2338 37.5	30.78	116.62	5 N	ML 1.5	WONGAN HILLS, 16KM NW
1995- 1- 7	0330 20.9	28.15	126.62	5 N	ML 2.8	WARBURTON, 218KM S
1995- 1- 9	0533 56.6	20.94	120.53	5 N	ML 3.5	MARBLE BAR, 85KM E
1995- 1-12	2135 2.4	33.63	118.78	5 N	ML 1.6	PINGRUP, 29KM SE
1995- 1-13	1143 14.9	33.80	117.95	1 C	ML 1.9	GNOWANGERUP, 15KM N
1995- 1-14	2114 36.1	33.24	118.70	5 N	ML 1.9	LAKE GRACE, 27KM SE
1995- 1-15	1431 15.7	31.97	116.73	5 N	ML 2.1	YORK, 12KM SSW
1995- 1-15	1729 48.1	31.98	116.72	5 N	ML 2.2	YORK, 12KM SSW
1995- 1-15	1835 55.2	31.98	116.73	5 N	ML 1.7	YORK, 11KM S
1995- 1-15	1955 12.9	31.97	116.73	5 N	ML 1.6	YORK, 9KM SW
1995- 1-15	2326 43.0	31.97	116.73	5 N	ML 1.6	YORK, 11KM S
1995- 1-20	0804 49.4	20.89	120.78	5 N	ML 3.2	SHAY GAP, 50KM SE
1995- 1-22	1555 35.5	31.69	117.07	5 N	ML 1.6	MECKERING, 9KM SE
1995- 1-23	0819 48.6	34.25	117.22	5 N	ML 2.8	CRANBROOK, 31KM W
1995- 1-27	1914 34.3	18.86	123.23	5 N	ML 3.4	BROOME, 144KM SE
1995- 1-28	0720 41.8	30.77	121.45	0 C	ML 2.8	KALGOORLIE, 3KM SW
1995- 2- 1	0955 41.5	33.74	118.69	5 N	ML 2.8	ONGERUP, 32KM NE
1995- 2- 5	1614 49.5	30.88	117.06	2	ML 2.9	CADOUX, 14KM SW
1995- 2- 5	2156 1.6	30.88	117.07	2 C	ML 1.4	CADOUX, 13KM SW
1995- 2- 6	0648 51.6	30.88	117.05	1	ML 1.8	CADOUX, 14KM SW
1995- 2- 6	1143 1.4	30.87	117.06	2 C	ML 1.5	CADOUX, 13KM SW
1995- 2- 6	1509 48.6	30.88	117.02	2 C	ML 1.4	CADOUX, 16KM SW
1995- 2-11	0812 58.5	27.21	113.90	5 N	ML 2.9	KALBARRI, 62KM NW
1995- 2-16	0640 52.9	29.32	112.79	5 N	ML 2.6	GERALDTON, 190KM WSW
1995- 2-16	1227 15.1	16.94	122.11	5 N	ML 2.8	BROOME, 115KM N
1995- 2-18	1359 35.4	30.74	117.12	5	ML 1.7	CADOUX, 4KM NNW
1995- 2-21	0126 13.9	18.89	122.51	5 N	ML 3.1	BROOME, 106KM SSE
1995- 2-23	0403 48.9	21.90	126.23	5 N	ML 3.3	TOBIN LAKE, 10KM ENE
1995- 2-23	0534 53.1	32.35	117.09	5 N	ML 1.8	BROOKTON, 9KM E
1995- 2-23	1609 0.0	16.55	128.28	5 N	ML 2.0	KUNUNURRA, 103KM SW
1995- 2-26	1117 11.6	31.59	117.89	5 N	ML 1.6	KELLERBERRIN, 16KM ENE
1995- 3- 1	1138 1.5	31.71	116.98	5 N	ML 2.1	MECKERING, 9KM S
1995- 3- 8	0823 39.7	32.77	117.03	5 N	ML 2.0	NARROGIN, 22KM NW

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1995- 3- 9	1101 23.6	30.81	117.07	5 N	ML 2.1	MANMANNING, 4KM NW
1995- 3- 9	2339 51.4	30.77	117.12	5 N	ML 1.5	CADOUX, 2KM NW
1995- 3-17	0927 24.7	18.09	123.53	5 N	ML 2.9	DERBY, 86KM S
1995- 3-19	0425 15.8	33.76	117.69	5 N	ML 1.6	KATANNING, 16KM SE
1995- 3-20	0558 0.6	32.11	117.18	5 N	ML 1.7	QUAIRADING, 23KM SW
1995- 3-27	1148 52.5	16.46	128.70	5 N	ML 2.0	KUNUNURRA, 74KM S
1995- 3-28	0135 11.8	33.33	118.18	5 N	ML 2.1	NYABING, 25KM N
1995- 3-28	0732 25.6	27.70	120.44	5 N	ML 2.9	SANDSTONE, 120KM ENE
1995- 3-29	1229 58.9	28.90	112.98	5 N	ML 2.7	GERALDTON, 161KM W
1995- 4- 1	2145 30.1	30.83	116.43	1	ML 1.5	CALINGIRI, 28 KM N
1995- 4- 5	2338 49.5	32.67	126.95	5 N	ML 4.0	COCKLEBIDDY, 106 KM SE
1995- 4- 5	2355 34.5	25.58	115.76	5 N	ML 2.7	BYRO HS, 68 KM NW
1995- 4- 6	0402 34.2	17.91	129.03	5 N	ML 2.8	HALLS CK, 150 KM E
1995- 4- 6	1807 7.8	32.67	127.00	5 N	ML 2.9	COCKLEBIDDY, 109 KM SE
1995- 4- 6	2324 50.8	33.30	118.19	4	ML 3.0	NYABING, 28 KM N
1995- 4-16	0020 12.0	33.30	118.19	5 N	ML 2.2	NYABING, 28 KM N
1995- 4-16	0027 45.3	33.29	118.22	5 N	ML 1.9	NYABING, 30 KM NNE
1995- 4-16	0104 54.0	33.31	118.19	5 N	ML 1.7	NYABING, 27 KM N
1995- 4-16	0248 8.2	33.36	118.18	5 N	ML 2.6	NYABING, 21 KM N
1995- 4-16	0311 40.7	33.31	118.20	5 N	ML 1.8	NYABING, 26 KM N
1995- 4-16	0445 24.9	33.29	118.16	5 N	ML 2.1	NYABING, 29 KM N
1995- 4-16	1321 0.6	33.30	118.18	5 N	ML 2.0	NYABING, 28 KM N
1995- 4-16	1321 28.5	33.32	118.22	5 N	ML 2.2	NYABING, 27 KM NNE
1995- 4-16	1753 38.9	33.29	118.23	5 N	ML 1.8	NYABING, 30 KM NNE
1995- 4-16	2040 44.0	33.33	118.16	5 N	ML 2.4	NYABING, 25 KM N
1995- 4-17	0533 7.0	33.29	118.17	5 N	ML 3.0	NYABING, 29 KM N
1995- 4-17	0551 1.1	33.31	118.22	5 N	ML 2.0	NYABING, 28 KM NNE
1995- 4-19	0218 54.8	33.28	118.18	1 C	ML 2.8	NYABING, 30 KM N
1995- 4-20	1204 20.7	33.29	118.20	1	ML 3.0	NYABING, 29 KM N
1995- 4-20	1212 24.5	33.32	118.19	1	ML 2.7	NYABING, 26 KM N
1995- 4-20	1247 29.4	33.30	118.18	5 N	ML 2.4	NYABING, 28 KM N
1995- 4-20	1252 41.0	33.30	118.20	5 N	ML 1.9	NYABING, 28 KM N
1995- 4-20	1311 30.1	33.28	118.18	2	ML 3.3	NYABING, 30 KM N
1995- 4-20	1316 53.8	33.31	118.19	2	ML 3.1	NYABING, 27 KM N
1995- 4-21	0004 24.8	33.40	118.20	5 N	ML 2.0	NYABING, 17 KM NNE
1995- 4-23	0729 13.3	33.29	118.14	5 N	ML 2.4	NYABING, 29 KM N
1995- 4-23	1138 34.0	33.26	118.16	5 N	ML 2.0	NYABING, 32 KM N
1995- 4-23	1539 17.3	33.27	118.16	5 N	ML 1.8	NYABING, 31 KM N
1995- 4-29	0712 3.0	36.38	125.36	5 N	ML 4.0	ESPERANCE, 421 KM SE
1995- 5- 9	0710 20.6	30.39	117.68	5 N	ML 2.4	BEACON, 19KM WNW
1995- 5-15	2229 34.9	42.43	120.10	5 N	ML 4.0	ALBANY, 850KM S
1995- 5-18	0534 8.7	32.51	117.53	1	ML 1.9	CORRIGIN, 38KM SW
1995- 5-19	1942 50.2	16.16	121.14	5 N	ML 3.3	BROOME, 232KM NNW
1995- 5-23	1213 55.7	33.38	118.25	5 N	ML 1.9	NYABING, 21KM NE
1995- 5-27	0454 30.4	30.83	117.06	5	ML 2.7	CADOUX, 10KM SW
1995- 5-27	2309 34.2	31.54	117.94	5 N	ML 1.6	KELLERBERRIN, 24KM ENE
1995- 5-28	1346 0.8	33.48	117.41	5 N	ML 1.8	WAGIN, 19KM S
1995- 6- 3	0539 13.8	32.39	117.15	5 N	ML 2.3	BROOKTON, 14KM E
1995- 6- 3	1430 46.7	32.39	117.14	1 C	ML 2.0	BROOKTON, 14KM ESE
1995- 6- 4	0608 26.0	31.68	117.05	5 N	ML 1.1	MECKERING, 6KM SE
1995- 6- 4	2036 9.0	24.12	125.80	5 N	ML 3.7	WARBURTON, 245KM NNW
1995- 6- 6	0450 17.8	34.96	119.39	5 N	ML 2.5	ALBANY, 139KM E
1995- 6- 7	1725 42.4	31.03	116.62	5 N	ML 1.4	CALINGIRI, 17KM E
1995- 6- 9	2217 29.1	31.03	116.62	5 N	ML 2.2	CALINGIRI, 17KM E
1995- 6-10	1749 56.0	31.04	116.62	5 N	ML 1.8	CALINGIRI, 16KM E
1995- 6-13	0418 19.0	31.65	117.05	5 N	ML 1.6	MECKERING, 5KM SE

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1995- 6-15	1010 52.5	32.39	117.14	5 N	ML 1.8	BROOKTON, 14KM SE
1995- 6-15	1025 8.7	32.39	117.14	5 N	ML 1.8	BROOKTON, 14KM SE
1995- 6-17	2054 35.6	29.88	125.61	5 N	ML 2.4	RAWLINNA, 129KM N
1995- 6-21	1300 34.4	30.34	117.64	2	ML 1.6	BEACON, 25KM NW
1995- 6-22	0658 58.9	30.40	117.68	5 N	ML 1.8	BEACON, 19KM W
1995- 6-22	0907 35.8	30.37	117.71	5 N	ML 2.1	BEACON, 18KM NW
1995- 6-23	0609 5.2	30.39	117.69	4	ML 1.7	BEACON, 18KM WNW
1995- 6-24	1106 55.5	30.37	117.71	3	ML 2.8	BEACON, 18KM WNW
1995- 6-24	1118 4.0	30.39	117.70	5 N	ML 2.2	BEACON, 18KM W
1995- 6-24	1143 3.6	30.43	117.73	5 N	ML 2.2	BEACON, 14KM W
1995- 6-24	1207 13.0	30.38	117.72	5 N	ML 2.2	BEACON, 16KM NW
1995- 6-24	1241 23.7	30.38	117.70	5 N	ML 2.4	BEACON, 18KM NW
1995- 6-24	1353 16.6	30.38	117.67	5 N	ML 2.3	BEACON, 20KM W
1995- 6-24	1356 9.9	30.37	117.73	5 N	ML 2.1	BEACON, 16KM NW
1995- 6-25	2023 41.5	15.64	121.05	5 N	ML 3.3	BROOME, 289KM NNW
1995- 6-26	1049 36.1	16.61	128.60	5 N	ML 2.5	KUNUNURRA, 94KM S
1995- 7- 1	1843 31.7	17.48	122.42	37	ML 3.2	BROOME, 58KM NNE
1995- 7- 3	1249 42.3	31.65	117.04	5	ML 1.7	MECKERING, 4KM SE
1995- 7- 4	0639 20.2	32.33	117.40	13	ML 1.2	QUAIRADING, 35KM S
1995- 7- 7	0928 41.7	34.69	117.62	5 N	ML 2.0	MT BARKER, 7KM SW
1995- 7-14	1928 14.6	42.47	123.26	5 N	ML 3.8	ESPERANCE, 950KM S
1995- 7-15	0222 31.4	30.06	115.55	5 N	ML 2.9	ENEABBA, 37KM SE
1995- 7-15	0331 22.3	30.05	115.52	5 N	ML 2.1	ENEABBA, 35KM SE
1995- 7-22	2318 52.6	33.88	118.27	5 N	ML 1.8	ONGERUP, 22KM NW
1995- 7-24	1407 45.3	30.63	118.01	5 N	ML 1.8	BEACON, 24KM SE
1995- 7-27	1842 54.8	31.05	116.69	5 N	ML 1.5	WONGAN HILLS, 17KM S
1995- 7-30	1549 27.4	26.31	112.85	5 N	ML 2.1	CARNARVON, 180KM SW
1995- 7-31	1548 56.0	30.79	117.10	5 N	ML 3.5	CADOUX, 3KM SW
1995- 7-31	1733 50.8	30.80	117.08	5 N	ML 1.7	MANMANNING, 4KM N
1995- 8- 1	0239 58.0	30.79	117.09	1 C	ML 1.9	CADOUX, 4KM SW
1995- 8- 2	0800 32.8	30.79	117.09	1 C	ML 1.9	CADOUX, 4KM SW
1995- 8- 5	0734 52.0	19.32	113.49	5 N	ML 3.2	EXMOUTH, 300KM NNW
1995- 8- 7	0030 18.0	21.36	120.15	5 N	ML 3.1	MARBLE BAR, 46KM ESE
1995- 8-10	2013 43.7	30.74	117.12	1	ML 2.0	CADOUX, 4KM NNW
1995- 8-15	0157 11.2	18.41	120.81	5 N	ML 3.1	BROOME, 160KM WSW
1995- 8-16	2330 38.5	30.81	117.07	3	ML 2.0	CADOUX, 9KM SW
1995- 8-17	0155 21.7	30.35	117.77	1 C	ML 1.9	BEACON, 15KM NW
1995- 8-17	1336 17.0	25.62	113.20	5 N	ML 3.1	CARNARVON, 95KM SW
1995- 8-18	0823 57.9	31.22	117.48	5 N	ML 2.0	WYALKATCHEM, 11KM ESE
1995- 8-18	1717 38.8	31.21	117.51	5 N	ML 2.2	WYALKATCHEM, 13KM ESE
1995- 8-18	2148 28.1	31.22	117.49	5 N	ML 1.7	WYALKATCHEM, 11KM ESE
1995- 8-18	2336 46.5	31.22	117.51	5 N	ML 2.6	WYALKATCHEM, 13KM ESE
1995- 8-20	0349 3.4	31.20	117.53	5 N	ML 1.7	WYALKATCHEM, 14KM ESE
1995- 8-20	1009 54.5	24.45	110.97	5 N	ML 2.6	CARNARVON, 280KM W
1995- 8-20	1327 48.4	30.80	117.07	5 N	ML 2.0	CADOUX, 6KM SW
1995- 8-21	2343 17.7	31.22	117.50	5 N	ML 1.8	WYALKATCHEM, 13KM ESE
1995- 8-22	1920 31.9	31.21	117.52	5 N	ML 2.0	WYALKATCHEM, 14KM ESE
1995- 8-22	1930 36.8	31.22	117.50	5 N	ML 1.5	WYALKATCHEM, 12KM ESE
1995- 8-25	1150 11.6	23.31	111.86	5 N	ML 4.6	CARNARVON, 253KM NW
1995- 8-26	0139 46.0	31.21	117.51	5 N	ML 1.9	WYALKATCHEM, 13KM ESE
1995- 8-29	0049 31.4	41.21	123.35	5 N	ML 3.3	ESPERANCE, 830KM S
1995- 8-29	1131 0.3	31.25	117.48	5 N	ML 1.8	WYALKATCHEM, 12KM SE
1995- 8-31	1305 56.8	33.97	118.22	5 N	ML 2.0	GNOWANGERUP, 21KM ESE
1995- 8-31	1306 19.0	33.98	118.21	5 N	ML 2.1	GNOWANGERUP, 20KM ESE
1995- 8-31	1344 38.2	33.98	118.24	5 N	ML 2.0	GNOWANGERUP, 22KM E
1995- 9- 8	0044 24.3	31.25	117.50	2	ML 2.0	WYALKATCHEM, 14KM SE

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1995- 9-10	1307 37.1	31.30	117.50	5 N	ML 2.2	WYALKATCHEM, 17KM SE
1995- 9-11	1903 4.2	25.48	117.10	5 N	ML 2.7	LANDOR, 43KM SSE
1995- 9-12	1718 39.9	17.72	123.55	5 N	ML 2.5	DERBY, 46KM S
1995- 9-15	0440 18.3	19.35	118.05	22	ML 3.0	PT HEDLAND, 119KM NNW
1995- 9-20	0206 0.9	16.63	128.63	1 C	ML 1.5	KUNUNURRA, 95KM S
1995- 9-20	2015 49.8	23.90	115.93	5 N	ML 2.4	NANUTARRA, 159KM SSE
1995- 9-26	1421 42.7	30.73	117.11	1 C	ML 1.5	CADOUX, 5KM NNW
1995- 9-26	2219 12.2	31.40	117.12	8	ML 1.6	DOWERIN, 24KM SSE
1995- 9-28	1607 32.3	30.74	117.10	1 C	ML 1.7	CADOUX, 4KM NW
1995-10- 6	1119 7.8	25.42	116.04	5 N	ML 2.1	ERONG SPRINGS, 65KM W
1995-10- 9	2317 54.1	31.21	117.50	5 N	ML 2.2	WYALKATCHEM, 12KM E
1995-10-10	1317 31.5	33.28	117.53	5 N	ML 1.7	WAGIN, 19KM E
1995-10-10	1330 28.3	33.26	117.53	5 N	ML 1.8	WAGIN, 19KM E
1995-10-10	1425 11.9	33.30	117.53	5 N	ML 1.7	WAGIN, 19 KM E
1995-10-12	0428 51.7	31.22	117.29	5 N	ML 2.0	WYALKATCHEM, 10KM SW
1995-10-15	0253 27.5	31.66	117.01	5 N	ML 1.9	MECKERING, 2 KM S
1995-10-15	0257 24.3	31.65	117.04	1	ML 2.1	MECKERING, 3KM SE
1995-10-15	1152 6.6	31.66	117.01	8	ML 2.3	MECKERING, 3KM S
1995-10-16	1124 32.7	31.65	116.99	5 N	ML 1.4	MECKERING
1995-10-16	1239 19.4	31.22	117.48	5 N	ML 1.5	WYALKATCHEM, 10KM SE
1995-10-16	1259 25.8	31.66	117.00	5 N	ML 1.5	MECKERING, 2KM S
1995-10-16	1457 36.0	31.65	116.99	5 N	ML 2.1	MECKERING, 3KM S
1995-10-16	1500 9.1	31.65	116.99	5 N	ML 1.6	MECKERING, 3KM SW
1995-10-19	0355 47.6	18.55	122.83	5 N	ML 3.3	BROOME, 90KM SE
1995-10-19	1944 3.0	23.42	120.73	5 N	ML 3.5	JIGGALONG, 9KM SW
1995-10-20	0739 29.1	24.98	116.41	5 N	ML 2.8	LANDOR 52KM W
1995-10-20	1636 48.9	23.51	120.69	5 N	ML 2.6	JIGGALONG, 20KM SW
1995-10-22	1414 7.5	33.47	117.76	2	ML 2.0	DUMBLEYUNG, 20KM S
1995-10-22	1650 2.6	27.29	113.65	5 N	ML 2.5	KALBARRI, 71KM NW
1995-10-24	1053 15.9	32.43	117.00	5 N	ML 1.4	BROOKTON, 9KM S
1995-10-27	0913 8.3	31.22	117.28	1	ML 2.7	WYALKATCHEM, 11KM SW
1995-10-27	1932 22.9	33.77	118.77	5 N	ML 1.4	ONGERUP, 35KM NE
1995-10-29	0627 55.7	33.50	117.50	5 N	ML 1.6	KATANNING, 21KM N
1995-10-29	0655 39.7	24.06	113.53	5 N	ML 3.4	CARNARVON, 92KM N
1995-11- 8	1133 31.0	31.71	117.00	5 N	ML 1.9	MECKERING, 9KM S
1995-11- 8	2155 59.5	33.92	117.84	5 N	ML 1.9	GNOWANGERUP, 15KM W
1995-11-10	1509 6.6	20.92	127.27	5 N	ML 2.8	TOBIN LAKE, 163KM NE
1995-11-11	0358 8.1	32.84	116.17	5 N	ML 1.5	HARVEY, 36KM NE
1995-11-11	2026 59.7	20.94	127.45	5 N	ML 3.0	TOBIN LAKE, 175KM NE
1995-11-17	0350 48.9	16.24	128.59	5 N	ML 2.2	KUNUNURRA, 58KM SSW
1995-11-17	1606 40.5	31.66	117.01	8	ML 2.1	MECKERING, 2KM S
1995-11-17	1756 49.1	31.65	117.00	6	ML 2.0	MECKERING, 2KM SSW
1995-11-24	0205 36.4	32.16	117.41	5 N	ML 1.7	QUAIRADING, 16KM S
1995-11-24	0609 13.2	31.43	117.68	5 N	ML 1.4	KELLERBERRIN, 22KM N
1995-11-24	1220 2.0	31.64	117.00	5 N	ML 1.6	MECKERING, 0KM FROM
1995-11-30	0505 20.4	31.45	117.66	5 N	ML 1.7	KELLERBERRIN, 21KM NW
1995-12- 9	1002 38.7	16.64	128.32	5 N	ML 2.2	KUNUNURRA, 105KM SW
1995-12- 9	1015 46.0	16.64	128.32	5 N	ML 2.7	KUNUNURRA, 105KM SW
1995-12- 9	2041 29.8	33.62	118.27	5 N	ML 1.9	NYABING, 13KM SE
1995-12-10	1252 2.6	14.56	123.24	5 N	ML 3.2	DERBY, 210KM N
1995-12-12	2311 17.4	18.53	124.28	5 N	ML 3.3	FITZROY CROSSING, 144KM
1995-12-13	1913 39.1	33.89	117.95	5 N	ML 1.7	GNOWANGERUP, 7KM NW
1995-12-14	2139 34.8	31.06	123.73	5 N	ML 2.5	ZANTHUS, 16KM ESE
1995-12-16	0156 32.6	21.08	127.45	5 N	ML 3.4	TOBIN LAKE, 166KM NE
1995-12-26	1259 8.3	22.76	114.53	5 N	ML 2.7	LEARMONTH, 72KM SE
1995-12-27	0505 52.2	16.49	120.44	5 N	ML 4.3	BROOME, 251KM NW

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1995-12-28	0629 34.1	30.97	117.12	5 N	ML 1.5	MANMANNING, 13KM S
1995-12-28	1012 25.1	32.23	116.70	1 C	ML 1.6	TALBOT BROOK, 22KM S
1995-12-28	2219 52.9	16.00	120.80	19	ML 2.6	BROOME, 269KM NNW
1996- 1- 1	1135 57.1	20.88	127.46	5 N	ML 2.9	TOBIN LAKE, 180 KM NE
1996- 1- 5	1200 35.5	31.19	117.52	5 N	ML 1.5	WYALKATCHEM, 14 KM E
1996- 1- 9	0407 20.8	23.34	112.24	0	ML 2.8	CARNARVON, 225 KM NW
1996- 1-13	0942 26.8	21.60	128.93	5 N	ML 2.5	LAKE MCKAY, 111 KM N
1996- 1-15	1900 9.6	31.72	117.09	3	ML 1.6	MECKERING
1996- 1-16	0647 52.5	30.73	117.08	5 N	ML 2.0	CADOUX, 6 KM NW
1996- 1-20	0825 2.4	31.21	117.30	5 N	ML 1.6	WYALKATCHEM,8 KM WSW
1996- 1-21	0701 31.9	30.73	117.12	5 N	ML 2.6	CADOUX
1996- 1-22	1234 1.3	21.12	120.81	5 N	ML 3.0	MARBLE BAR, 111 KM E
1996- 1-25	1031 14.6	31.75	115.75	25	ML 1.6	PERTH, 24 KM NNW
1996- 1-26	1041 44.8	19.44	117.20	5 N	ML 2.9	DAMPIER, 143 KM ENE
1996- 2- 3	0835 40.5	32.27	116.66	5 N	ML 1.7	TALBOT BROOK, 26KM S
1996- 2- 3	2124 9.1	16.58	128.78	5 N	ML 2.0	KUNUNURRA, 89KM S
1996- 2- 3	2222 55.5	33.62	117.85	5 N	ML 1.9	KATANNING, 29 KM E
1996- 2- 4	1755 27.3	18.86	120.90	5 N	ML 3.4	BROOME, 172KM SW
1996- 2- 5	0607 38.3	16.98	120.15	5 N	ML 4.1	BROOME, 247KM NW
1996- 2-14	0151 12.1	31.70	117.05	5 N	ML 1.5	MECKERING, 9 KM SE
1996- 2-21	0238 38.5	16.58	120.32	5 N	ML 4.0	BROOME, 236 KM NW
1996- 2-24	1214 17.9	30.79	117.11	5 N	ML 2.5	CADOUX, 3 KM SW
1996- 2-24	1525 31.1	31.75	117.02	5 N	ML 1.7	MECKERING, 13 KM S
1996- 2-28	1738 51.6	31.91	117.28	5 N	ML 1.7	QUAIRADING, 16 KM NW
1996- 3- 1	0702 31.3	30.79	117.09	1	ML 2.0	CADOUX, 4 KM SW
1996- 3- 1	0902 50.1	30.78	117.09	5 N	ML 1.5	CADOUX, 4 KM W
1996- 3- 1	1803 49.5	30.78	117.10	1 G	ML 1.7	CADOUX, 3 KM W
1996- 3- 2	1515 49.5	30.19	116.50	1 G	ML 1.6	WUBIN, 16 KM SW
1996- 3- 2	2231 26.1	30.19	116.53	1 G	ML 1.7	WUBIN, 14 KM SW
1996- 3- 2	2233 41.2	30.75	117.17	1 G	ML 1.6	CADOUX, 5 KM NW
1996- 3- 6	1204 2.3	31.44	117.67	3	ML 1.7	KELLERBERRIN, 21 KM N
1996- 3- 8	1701 10.6	31.20	117.52	2	ML 1.6	WYALKATCHEM, 14 KM E
1996- 3-10	1800 12.7	20.54	128.42	5 N	ML 3.0	FITZROY CR 397 KM SE
1996- 3-10	1853 0.8	31.45	117.66	1	ML 3.1	KELLERBERRIN, 21 KM N
1996- 3-10	1952 47.0	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 21 KM N
1996- 3-10	2005 44.5	31.45	117.66	1 G	ML 1.8	KELLERBERRIN, 21 KM N
1996- 3-11	0039 49.4	29.21	113.86	5 N	ML 3.0	GERALDTON, 89 KM SW
1996- 3-11	0304 20.6	31.44	117.69	1 G	ML 1.8	KELLERBERRIN, 21 KM N
1996- 3-11	0434 52.0	31.44	117.67	1	ML 2.5	KELLERBERRIN, 22 KM N
1996- 3-11	0617 49.5	31.44	117.67	1 G	ML 2.5	KELLERBERRIN, 21 KM N
1996- 3-11	0620 30.6	31.45	117.72	1 G	ML 2.3	KELLERBERRIN, 20 KM N
1996- 3-11	0624 24.5	31.45	117.61	1 G	ML 3.1	KELLERBERRIN, 22 KM N
1996- 3-11	0625 28.0	31.45	117.67	5 N	ML 1.9	KELLERBERRIN, 21 KM N
1996- 3-11	0633 47.1	31.45	117.66	2	ML 2.8	KELLERBERRIN, 21 KM N
1996- 3-11	0753 38.0	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 21 KM N
1996- 3-11	1010 41.4	31.47	117.66	3	ML 2.0	KELLERBERRIN, 18 KM N
1996- 3-11	1014 12.4	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 21 KM N
1996- 3-11	2324 35.0	16.58	127.15	5 N	ML 3.6	KUNUNURRA, 191 KM SW
1996- 3-12	0110 42.0	31.44	117.66	0	ML 1.9	KELLERBERRIN, 22 KM N
1996- 3-12	0826 32.7	31.47	117.64	3	ML 1.9	KELLERBERRIN, 19 KM NW
1996- 3-12	1232 20.0	31.45	117.67	5 N	ML 1.8	KELLERBERRIN, 21 KM N
1996- 3-12	1305 25.1	31.44	117.67	4	ML 2.2	KELLERBERRIN, 22 KM N
1996- 3-12	1806 0.2	31.45	117.67	5 N	ML 1.9	KELLERBERRIN, 21 KM N
1996- 3-12	1817 5.0	31.45	117.67	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1996- 3-12	2025 1.2	31.45	117.67	5 N	ML 1.8	KELLERBERRIN, 21 KM N
1996- 3-12	2253 42.4	31.45	117.67	2	ML 1.8	KELLERBERRIN, 20 KM N

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1996- 3-12	2316 47.6	31.45	117.68	5	ML 2.8	KELLERBERRIN, 21 KM N
1996- 3-12	2324 7.1	31.45	117.65	3	ML 1.9	KELLERBERRIN, 21 KM N
1996- 3-15	0334 3.0	31.45	117.67	5 N	ML 1.7	KELLERBERRIN, 21 KM N
1996- 3-15	1835 34.4	31.45	117.67	5 N	ML 2.1	KELLERBERRIN, 21 KM N
1996- 3-15	1901 56.4	31.45	117.67	5 N	ML 2.1	KELLERBERRIN, 21 KM N
1996- 3-17	2239 34.1	21.82	114.30	5 N	ML 3.4	EXMOUTH, 21 KM NE
1996- 3-17	2342 53.2	31.45	117.67	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1996- 3-17	2347 36.8	21.84	114.28	5 N	ML 3.4	EXMOUTH, 18 KM NE
1996- 3-17	2358 9.1	31.45	117.67	5 N	ML 1.9	KELLERBERRIN, 21 KM N
1996- 3-17	2358 16.6	31.45	117.67	5 N	ML 1.9	KELLERBERRIN, 21 KM N
1996- 3-18	1556 31.7	31.73	117.85	5	ML 1.9	KELLERBERRIN, 16 KM SE
1996- 3-18	1847 51.4	21.82	114.29	5 N	ML 2.5	EXMOUTH, 20 KM NE
1996- 3-19	0604 12.0	31.45	117.67	5 N	ML 1.9	KELLERBERRIN, 21 KM N
1996- 3-20	0836 37.0	31.45	117.67	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1996- 3-20	1444 40.2	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 21 KM N
1996- 3-21	0257 5.0	31.45	117.67	5 N	ML 1.7	KELLERBERRIN, 21 KM N
1996- 3-21	0323 26.9	31.47	117.67	6	ML 1.6	KELLERBERRIN, 19 KM N
1996- 3-21	2033 43.0	31.44	117.67	4	ML 1.7	KELLERBERRIN, 21 KM N
1996- 3-22	0035 15.9	31.45	117.67	5 N	ML 1.7	KELLERBERRIN, 21 KM N
1996- 3-22	0038 40.1	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 21 KM N
1996- 3-22	0115 3.7	31.45	117.67	5 N	ML 1.8	KELLERBERRIN, 21 KM N
1996- 3-26	0116 32.0	31.46	117.65	5	ML 1.6	KELLERBERRIN, 20 KM N
1996- 3-26	1400 54.6	23.09	112.56	5 N	ML 2.7	EXMOUTH, 208 KM SW
1996- 3-27	1446 49.0	31.45	117.67	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1996- 3-28	1449 0.6	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 21 KM N
1996- 3-29	0416 1.2	31.46	117.66	5 N	ML 2.2	KELLERBERRIN, 20 KM N
1996- 3-29	0521 32.6	31.45	117.67	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1996- 3-29	0523 56.0	31.45	117.66	1	ML 2.7	KELLERBERRIN, 21 KM N
1996- 3-29	0536 12.8	31.44	117.67	2	ML 1.7	KELLERBERRIN, 21 KM N
1996- 3-29	0541 41.0	31.44	117.67	4	ML 3.0	KELLERBERRIN, 21 KM N
1996- 3-29	0549 0.5	31.45	117.67	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1996- 3-29	0549 20.0	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 21 KM N
1996- 3-29	0612 18.9	31.44	117.68	5	ML 2.3	KELLERBERRIN, 21KM N
1996- 3-29	0632 16.5	31.44	117.67	0	ML 2.3	KELLERBERRIN, 21 KM N
1996- 3-29	0735 37.7	31.45	117.67	1	ML 2.0	KELLERBERRIN, 20 KM N
1996- 3-29	0735 44.7	31.44	117.67	4	ML 2.0	KELLERBERRIN, 21 KM N
1996- 3-29	0737 44.2	31.45	117.67	3	ML 2.0	KELLERBERRIN, 21 KM N
1996- 3-29	1321 53.4	31.46	117.68	3	ML 1.8	KELLERBERRIN, 19 KM N
1996- 3-30	0717 19.5	30.73	121.45	1 G	ML 2.8	KALGOORLIE, 3 KM NW
1996- 3-30	0724 55.6	16.68	120.16	5 N	ML 3.2	BROOME, 263 KM NW
1996- 3-30	1342 53.3	16.59	128.73	5 N	ML 2.1	KUNUNURRA, 90 KM S
1996- 3-31	0340 10.6	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 21 KM N
1996- 3-31	1144 10.0	31.45	117.67	5 N	ML 1.7	KELLERBERRIN, 21 KM N
1996- 3-31	1144 16.0	31.45	117.67	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1996- 3-31	1145 53.6	31.45	117.67	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1996- 4- 1	1507 6.2	16.59	128.23	5 N	ML 2.3	KUNUNURRA, 104 KM SW
1996- 4- 1	2127 1.8	31.45	117.67	3	ML 1.5	KELLERBERRIN, 21 KM N
1996- 4- 3	1643 13.9	31.45	117.67	3	ML 3.0	KELLERBERRIN, 21 KM N
1996- 4- 3	1652 2.0	31.44	117.66	3	ML 1.9	KELLERBERRIN, 22 KM N
1996- 4- 3	1701 35.0	31.46	117.67	3 C	ML 1.7	KELLERBERRIN, 20 KM N
1996- 4- 3	1707 54.0	31.46	117.67	4	ML 1.9	KELLERBERRIN, 20 KM N
1996- 4- 3	1709 23.6	31.45	117.69	4	ML 1.7	KELLERBERRIN, 20 KM N
1996- 4- 3	1725 42.3	31.46	117.66	4	ML 2.0	KELLERBERRIN, 20 KM N
1996- 4- 3	1729 35.4	31.46	117.67	2	ML 2.1	KELLERBERRIN, 20 KM N
1996- 4- 3	1944 47.0	31.46	117.70	1	ML 1.9	KELLERBERRIN, 19 KM N
1996- 4- 4	0233 40.0	31.46	117.67	3 C	ML 1.5	KELLERBERRIN, 20 KM N

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1996- 4- 4	1404 22.3	31.45	117.67	2	ML 2.4	KELLERBERRIN, 21 KM N
1996- 4- 5	0000 15.0	31.44	117.67	3	ML 2.2	KELLERBERRIN, 21 KM N
1996- 4- 5	0219 18.0	31.46	117.67	3 C	ML 1.5	KELLERBERRIN, 20 KM N
1996- 4- 5	0617 20.9	31.44	117.67	3	ML 2.7	KELLERBERRIN, 21 KM N
1996- 4- 6	0846 23.5	17.90	119.40	5 N	ML 3.2	PORT HEDLAND, 279 KM N
1996- 4- 7	1807 51.0	31.46	117.67	3 C	ML 1.5	KELLERBERRIN, 20 KM N
1996- 4- 7	2005 36.0	31.46	117.66	1	ML 1.5	KELLERBERRIN, 19 KM N
1996- 4- 8	0117 20.7	31.46	117.66	1	ML 2.5	KELLERBERRIN, 20 KM N
1996- 4- 8	0619 59.3	31.27	123.91	5 N	ML 2.7	ZANTHUS, 42 KM SE
1996- 4- 9	1242 11.7	31.45	117.67	2 C	ML 1.4	KELLERBERRIN, 20 KM N
1996- 4- 9	1942 21.9	31.45	117.66	1	ML 1.3	KELLERBERRIN, 21 KM N
1996- 4-10	0604 42.0	31.46	117.67	3 C	ML 1.7	KELLERBERRIN, 20 KM N
1996- 4-10	0618 43.2	31.46	117.66	2	ML 2.0	KELLERBERRIN, 20 KM N
1996- 4-10	0714 8.5	30.85	118.02	5 N	ML 2.3	BENCUBBIN, 17 KM E
1996- 4-10	1049 30.0	30.76	117.11	1	ML 1.6	CADOUX, 2 KM NW
1996- 4-10	1355 40.8	31.46	117.66	1	ML 2.0	KELLERBERRIN, 20 KM N
1996- 4-10	1632 53.6	31.46	117.66	1	ML 1.8	KELLERBERRIN, 20 KM N
1996- 4-10	1805 10.3	31.46	117.66	3	ML 2.2	KELLERBERRIN, 20 KM N
1996- 4-12	1900 0.0	31.46	117.66	5 N	ML 2.4	KELLERBERRIN, 20 KM N
1996- 4-12	1905 56.7	31.46	117.64	2	ML 2.9	KELLERBERRIN, 21 KM N
1996- 4-13	1556 34.5	31.45	117.67	2	ML 1.6	KELLERBERRIN, 20 KM N
1996- 4-17	2056 52.7	31.45	117.68	1	ML 2.5	KELLERBERRIN, 20 KM N
1996- 4-18	1659 51.5	25.92	129.00	5 N	ML 2.6	SURV GENERALS CORNER
1996- 4-18	1836 29.0	31.46	117.67	3 C	ML 1.9	KELLERBERRIN, 20 KM N
1996- 4-19	0221 48.7	31.45	117.66	1	ML 2.0	KELLERBERRIN, 20 KM N
1996- 4-19	0228 33.8	31.47	117.64	2	ML 2.2	KELLERBERRIN, 20 KM N
1996- 4-19	0229 37.4	31.45	117.66	1	ML 2.0	KELLERBERRIN, 21 KM N
1996- 4-19	0233 3.5	31.45	117.67	1	ML 2.8	KELLERBERRIN, 20 KM N
1996- 4-19	0235 7.0	31.46	117.67	3 C	ML 1.6	KELLERBERRIN, 20 KM N
1996- 4-19	1445 8.0	31.46	117.67	3 C	ML 1.6	KELLERBERRIN, 20 KM N
1996- 4-19	1447 52.0	31.46	117.67	3 C	ML 1.5	KELLERBERRIN, 20 KM N
1996- 4-19	1448 17.0	31.46	117.67	3 C	ML 1.7	KELLERBERRIN, 20 KM N
1996- 4-20	1334 33.0	31.46	117.67	3 C	ML 1.6	KELLERBERRIN, 20 KM N
1996- 4-21	0044 17.7	31.46	117.66	3	ML 2.7	KELLERBERRIN, 20 KM N
1996- 4-21	0148 53.2	31.45	117.67	1	ML 1.8	KELLERBERRIN, 20 KM N
1996- 4-21	0153 47.0	31.44	117.67	3	ML 2.5	KELLERBERRIN, 21 KM N
1996- 4-21	0204 29.4	31.45	117.67	2	ML 2.0	KELLERBERRIN, 20 KM N
1996- 4-21	1835 42.1	31.45	117.67	3	ML 1.7	KELLERBERRIN, 21 KM N
1996- 4-22	0655 46.5	31.47	117.72	5 N	ML 1.6	KELLERBERRIN, 18 KM N
1996- 4-22	0958 56.2	22.08	126.59	5 N	ML 3.6	TOBIN LAKE, 51 KM E
1996- 4-22	1716 29.7	31.45	117.68	1 C	ML 1.6	KELLERBERRIN, 20 KM N
1996- 4-23	0427 49.0	31.45	117.66	2	ML 1.5	KELLERBERRIN, 20 KM N
1996- 4-24	0941 46.3	28.82	115.50	5 N	ML 2.1	MULLEWA, 33 KM S
1996- 4-25	1011 12.5	28.08	119.10	5 N	ML 2.3	SANDSTONE, 23 KM SW
1996- 4-25	1909 18.8	31.46	117.65	2	ML 1.9	KELLERBERRIN, 20 KM N
1996- 4-25	1932 11.4	31.46	117.68	4	ML 1.3	KELLERBERRIN, 20 KM N
1996- 4-25	2009 52.2	31.44	117.67	3	ML 2.5	KELLERBERRIN, 21 KM N
1996- 4-25	2044 29.5	31.45	117.64	1 C	ML 2.1	KELLERBERRIN, 21 KM N
1996- 4-25	2212 51.1	31.45	117.66	1 C	ML 1.5	KELLERBERRIN, 21 KM N
1996- 4-26	0119 34.8	31.45	117.67	1 C	ML 1.9	KELLERBERRIN, 21 KM N
1996- 4-26	0128 52.1	31.45	117.67	1 C	ML 1.8	KELLERBERRIN, 21 KM N
1996- 4-26	0135 4.0	31.46	117.65	1	ML 2.1	KELLERBERRIN, 20 KM N
1996- 4-26	0147 38.3	31.45	117.66	1	ML 1.8	KELLERBERRIN, 21 KM N
1996- 4-26	0154 46.6	31.45	117.66	4	ML 1.5	KELLERBERRIN, 21 KM N
1996- 4-26	0353 9.2	31.43	117.67	1 C	ML 1.5	KELLERBERRIN, 22 KM N
1996- 4-27	0642 58.2	31.44	117.67	1	ML 2.0	KELLERBERRIN, 21 KM N

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1996- 4-27	0706 22.9	31.44	117.68	2	ML 1.5	KELLERBERRIN, 21 KM N
1996- 4-28	1909 54.6	24.10	115.36	5 N	ML 2.0	NANUTARRA, 175 KM S
1996- 4-28	2052 16.3	16.66	128.65	18	ML 3.0	WARMUN, 61KM NE
1996- 4-30	0807 54.8	31.44	117.66	1 C	ML 1.5	KELLERBERRIN, 21 KM N
1996- 5- 2	0043 33.5	31.44	117.66	3	ML 3.0	KELLERBERRIN, 21 KM N
1996- 5- 3	1330 0.0	31.45	117.66	3 C	ML 1.9	KELLERBERRIN, 20 KM N
1996- 5- 4	0143 0.0	31.45	117.66	3 C	ML 1.8	KELLERBERRIN, 20 KM N
1996- 5- 5	0248 24.3	31.47	117.66	2	ML 1.2	KELLERBERRIN, 19 KM N
1996- 5- 5	0514 1.4	31.46	117.68	3	ML 1.4	KELLERBERRIN, 19 KM N
1996- 5- 5	1403 29.0	31.45	117.67	1	ML 1.9	KELLERBERRIN, 20 KM N
1996- 5- 5	1509 12.8	31.44	117.69	5	ML 1.4	KELLERBERRIN, 21 KM N
1996- 5- 5	1519 20.4	31.46	117.68	1 G	ML 1.6	KELLERBERRIN, 20 KM N
1996- 5- 5	2031 0.0	31.45	117.66	3 C	ML 1.5	KELLERBERRIN, 20 KM N
1996- 5- 6	1835 1.2	31.45	117.68	2	ML 1.6	KELLERBERRIN, 20 KM N
1996- 5- 8	0120 30.7	34.03	116.80	6	ML 2.5	KOJONUP, 40 KM SW
1996- 5- 8	1454 4.8	34.04	116.82	5	ML 2.6	KOJONUP, 39 KM SW
1996- 5- 8	1623 27.2	34.03	116.81	5	ML 2.5	KOJONUP, 39 KM SW
1996- 5- 9	0220 0.0	31.45	117.66	3 C	ML 1.6	KELLERBERRIN, 20 KM N
1996- 5-10	1248 46.2	20.86	120.16	15	ML 3.4	SHAY GAP, 39 KM S
1996- 5-11	0854 0.0	31.45	117.66	3 C	ML 1.7	KELLERBERRIN, 20 KM N
1996- 5-11	2057 0.0	31.45	117.66	3 C	ML 1.8	KELLERBERRIN, 20 KM N
1996- 5-13	1557 12.9	31.45	117.66	2	ML 1.6	KELLERBERRIN, 20 KM N
1996- 5-13	2047 56.1	34.04	116.83	1	ML 2.8	KOJONUP, 37 KM SW
1996- 5-13	2052 9.4	34.03	116.83	1 C	ML 2.4	KOJONUP, 37 KM SW
1996- 5-14	0431 39.0	30.82	117.10	4	ML 1.5	MANMANNING, 4 KM N
1996- 5-14	0601 0.0	31.45	117.66	3 C	ML 1.5	KELLERBERRIN, 20 KM N
1996- 5-14	0627 0.0	31.45	117.66	3 C	ML 1.6	KELLERBERRIN, 20 KM N
1996- 5-14	2314 5.2	34.04	116.80	1 G	ML 3.0	KOJONUP, 39 KM SW
1996- 5-14	2331 36.2	34.03	116.70	1 C	ML 1.9	BOYUP BROOK, 37 KM SE
1996- 5-15	0025 6.4	34.03	116.74	1 C	ML 2.3	BOYUP BROOK, 40 KM SE
1996- 5-17	2000 52.4	33.59	118.32	1 C	ML 2.0	NYABING, 16 KM E
1996- 5-19	0054 21.2	30.44	116.93	1 C	ML 1.7	KALANNIE, 20 KM SW
1996- 5-20	1048 20.5	33.98	118.13	1 C	ML 2.4	GNOWANGERUP, 13 KM SE
1996- 5-21	2021 22.1	18.53	121.97	30	ML 3.2	BROOME, 68 KM SW
1996- 5-23	1718 1.2	31.13	111.84	5 N	ML 2.5	PERTH, 391 KM W
1996- 5-23	2213 11.7	31.45	117.67	1	ML 1.6	KELLERBERRIN, 20 KM N
1996- 5-25	1017 10.5	34.02	116.77	1 C	ML 2.4	KOJONUP, 41 KM SW
1996- 5-27	1441 22.7	32.12	117.40	9	ML 1.4	QUAIRADING, 11 KM S
1996- 5-31	2325 51.1	32.02	116.67	9	ML 1.6	TALBOT BROOK, 1 KM N
1996- 6- 1	0715 0.9	30.74	121.47	1 C	ML 3.1	KALGOORLIE, 1 KM N
1996- 6- 7	1923 26.3	25.22	117.11	5 N	ML 2.3	LANDOR, 23 KM SE
1996- 6- 9	1349 53.7	31.45	117.67	5 N	ML 1.7	KELLERBERRIN, 20 KM N
1996- 6- 9	1409 9.3	31.43	117.68	5 N	ML 1.6	KELLERBERRIN, 22 KM N
1996- 6- 9	2001 25.8	32.12	117.40	5 N	ML 1.6	QUAIRADING, 11 KM S
1996- 6-11	1347 2.7	30.51	117.16	1	ML 1.8	BURAKIN, 1 KM NW
1996- 6-17	0656 1.0	31.46	117.68	5 N	ML 2.0	KELLERBERRIN, 19 KM N
1996- 6-18	1331 0.8	31.71	117.06	6	ML 3.7	MECKERING, 10 KM SE
1996- 6-18	1712 40.3	31.97	116.71	5 N	ML 1.5	TALBOT BROOK, 7 KM NE
1996- 6-19	1519 44.7	31.98	116.72	1	ML 1.7	TALBOT BROOK, 8 KM NE
1996- 6-19	1609 28.5	30.72	117.11	5 N	ML 2.0	CADOUX, 6 KM N
1996- 6-19	1705 6.2	30.71	117.14	0	ML 2.2	CADOUX, 7 KM N
1996- 6-19	1738 33.0	30.72	117.12	5 N	ML 2.0	CADOUX, 6 KM N
1996- 6-20	1019 6.3	30.72	117.11	5 N	ML 1.7	CADOUX, 6 KM N
1996- 6-20	1223 32.1	30.72	117.11	5 N	ML 1.7	CADOUX, 6 KM N
1996- 6-20	1837 41.1	22.23	113.80	5 N	ML 2.2	LEARMONTH, 29 KM W
1996- 6-21	1456 59.3	31.56	117.06	6	ML 4.1	MECKERING, 5 KM SE

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1996- 6-22	0726 45.5	31.47	117.68	5 N	ML 1.7	KELLERBERRIN, 18 KM N
1996- 6-22	1113 25.4	31.46	117.68	5 N	ML 1.8	KELLERBERRIN, 19 KM N
1996- 6-22	1714 29.2	31.71	117.04	5 N	ML 1.6	MECKERING, 10 KM S
1996- 6-30	1646 56.9	31.98	119.73	5 N	ML 2.1	BOUNTY MINE, 14 KM N
1996- 7- 1	0104 3.8	31.89	119.86	5 N	ML 2.3	BOUNTY MINE, 25 KM N
1996- 7- 1	0237 2.5	32.19	119.74	5 N	ML 2.3	BOUNTY MINE, 9 KM S
1996- 7- 9	0926 11.0	26.99	129.94	5 N	ML 3.2	WARBURTON, 340 KM E
1996- 7-11	1152 50.3	31.71	117.07	5 N	ML 1.4	MECKERING, 10 KM SE
1996- 7-11	1156 46.3	31.71	117.06	5 N	ML 1.4	MECKERING, 10 KM SE
1996- 7-14	0839 1.6	33.69	118.02	1 G	ML 2.7	NYABING, 20 KM SW
1996- 7-14	0929 36.3	33.67	117.99	5 N	ML 2.1	NYABING, 20 KM SW
1996- 7-14	2030 7.6	31.49	117.67	5 N	ML 2.1	KELLERBERRIN, 16 KM N
1996- 7-14	2330 16.7	31.48	117.67	5 N	ML 1.9	KELLERBERRIN, 17 KM N
1996- 7-14	2355 9.4	31.46	117.68	5 N	ML 2.0	KELLERBERRIN, 19 KM N
1996- 7-15	0519 16.9	26.24	116.07	18	ML 2.9	BYRO HS, 19 KM S
1996- 7-15	0645 49.8	31.46	117.68	5 N	ML 1.9	KELLERBERRIN, 19 KM N
1996- 7-15	1253 6.2	21.58	111.42	5 N	ML 3.2	EXMOUTH, 283 KM W
1996- 7-15	1303 14.8	30.36	117.71	5 N	ML 2.4	BEACON, 19 KM NW
1996- 7-16	1857 16.3	18.08	126.63	5 N	ML 2.8	FITZROY CROSS, 109 KM E
1996- 7-22	0006 31.4	17.16	120.46	5 N	ML 3.4	BROOME, 208 KM NW
1996- 8- 2	1604 27.9	32.11	117.42	5 N	ML 1.7	QUAIRADING, 10 KM S
1996- 8- 5	1644 38.9	30.87	117.06	1 G	ML 1.9	MANMANNING, 5 KM SW
1996- 8- 7	1502 20.8	16.64	129.76	5 N	ML 2.8	KUNUNURRA, 146 KM SE
1996- 8-10	1145 51.8	32.60	116.78	1	ML 1.8	PINGELLY, 29 KM W
1996- 8-11	1220 41.4	31.77	116.35	1 G	ML 1.4	WOOROLOO, 6 KM NE
1996- 8-12	0105 36.4	30.70	118.29	5 N	ML 1.7	BONNIE ROCK, 20 KM S
1996- 8-18	1142 39.8	35.21	123.67	5 N	ML 3.0	ESPERANCE, 190 KM SE
1996- 8-18	1913 8.9	31.47	117.68	5 N	ML 2.1	KELLERBERRIN, 18 KM N
1996- 8-19	0800 18.4	31.46	117.67	1	ML 3.0	KELLERBERRIN, 20 KM N
1996- 8-19	0920 9.8	31.47	117.68	5 N	ML 1.4	KELLERBERRIN, 18 KM N
1996- 8-19	0924 9.0	31.47	117.67	5 N	ML 2.3	KELLERBERRIN, 18 KM N
1996- 8-19	1536 58.1	31.46	117.69	5 N	ML 1.7	KELLERBERRIN, 19 KM N
1996- 8-19	1933 41.2	31.45	117.69	5 N	ML 1.3	KELLERBERRIN, 20 KM N
1996- 8-20	1454 27.3	31.47	117.68	5 N	ML 2.0	KELLERBERRIN, 18 KM N
1996- 8-21	1255 19.9	31.47	117.69	5 N	ML 1.8	KELLERBERRIN, 18 KM N
1996- 8-21	1309 54.0	31.46	117.69	5 N	ML 2.4	KELLERBERRIN, 19 KM N
1996- 8-21	1446 11.9	31.46	117.69	5 N	ML 1.4	KELLERBERRIN, 19 KM N
1996- 8-26	0703 28.1	31.46	117.70	5 N	ML 1.6	KELLERBERRIN, 18 KM N
1996- 8-26	2328 50.2	31.47	117.67	5 N	ML 1.6	KELLERBERRIN, 19 KM N
1996- 8-27	1715 26.7	31.48	117.66	5 N	ML 2.2	KELLERBERRIN, 18 KM N
1996- 8-29	0254 1.6	31.46	117.70	5 N	ML 1.4	KELLERBERRIN, 19 KM N
1996- 8-29	0845 58.1	32.12	117.41	5 N	ML 1.8	QUAIRADING, 12 KM S
1996- 8-29	1214 36.5	21.03	120.13	5 N	ML 3.7	MARBLE BAR, 42 KM E
1996- 8-31	1907 26.4	31.48	117.65	5 N	ML 2.2	KELLERBERRIN, 17 KM N
1996- 9- 2	0546 16.0	16.56	128.65	1 C	ML 3.0	WARMUN, 69 KM NE
1996- 9- 3	1039 41.2	31.46	117.67	2	ML 2.0	KELLERBERRIN, 19 KM N
1996- 9- 3	1618 59.6	31.47	117.65	1 C	ML 2.0	KELLERBERRIN, 19 KM N
1996- 9- 4	1746 51.4	31.47	117.66	2	ML 2.2	KELLERBERRIN, 19 KM N
1996- 9- 6	2024 49.0	27.24	115.05	5 N	ML 3.3	KALBARRI, 98 KM NE
1996- 9- 8	1639 54.7	31.46	117.69	2	ML 2.1	KELLERBERRIN, 19 KM N
1996- 9- 8	1646 41.5	31.46	117.68	2	ML 1.9	KELLERBERRIN, 19 KM N
1996- 9- 8	2329 33.7	31.45	117.69	2	ML 2.3	KELLERBERRIN, 20 KM N
1996- 9-10	1334 25.2	31.75	116.95	5	ML 2.3	MECKERING, 15 KM S
1996- 9-12	0525 23.4	31.46	117.66	4	ML 2.0	KELLERBERRIN, 19 KM N
1996- 9-14	2014 29.6	31.45	117.67	2	ML 1.6	KELLERBERRIN, 20 KM N
1996- 9-17	2047 38.9	31.97	116.72	1	ML 2.3	TALBOT BROOK, 8 KM NE

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1996- 9-17	2303 32.0	31.97	116.71	2	ML 2.5	TALBOT BROOK, 8 KM NE
1996- 9-18	0008 9.1	31.97	116.72	3	ML 2.9	TALBOT BROOK, 8 KM NE
1996- 9-18	0041 15.4	31.97	116.72	0	ML 2.4	TALBOT BROOK, 8 KM NE
1996- 9-18	0053 2.7	31.97	116.72	1	ML 2.0	TALBOT BROOK, 8 KM NE
1996- 9-18	0057 25.9	31.97	116.72	1 C	ML 2.1	TALBOT BROOK, 8 KM NE
1996- 9-18	0701 37.5	31.98	116.72	1 C	ML 2.9	TALBOT BROOK, 8 KM NE
1996- 9-18	0714 43.6	31.97	116.72	1 C	ML 2.7	TALBOT BROOK, 9 KM NE
1996- 9-18	0725 55.3	31.96	116.72	1 C	ML 2.2	TALBOT BROOK, 8 KM NE
1996- 9-18	0847 28.8	31.96	116.72	1 C	ML 1.8	TALBOT BROOK, 9 KM NE
1996- 9-18	1405 9.5	31.97	116.72	1 C	ML 1.8	TALBOT BROOK, 8 KM NE
1996- 9-18	1512 56.5	31.97	116.72	1 C	ML 1.6	TALBOT BROOK, 9 KM NE
1996- 9-18	1613 51.6	31.97	116.72	1 C	ML 1.7	TALBOT BROOK, 8 KM NE
1996- 9-18	1730 15.4	31.97	116.72	1 C	ML 2.1	TALBOT BROOK, 8 KM NE
1996- 9-18	1840 34.6	31.97	116.71	1 C	ML 1.9	TALBOT BROOK, 7 KM NE
1996- 9-18	2003 22.3	31.99	116.72	1 C	ML 1.7	TALBOT BROOK, 6 KM NE
1996- 9-18	2335 54.5	31.98	116.72	1 C	ML 3.1	TALBOT BROOK, 8 KM NE
1996- 9-18	2338 54.7	31.96	116.72	1 C	ML 2.1	TALBOT BROOK, 8 KM NE
1996- 9-18	2356 16.8	31.97	116.72	1 C	ML 1.7	TALBOT BROOK, 8 KM NE
1996- 9-20	0658 36.4	31.16	117.22	6	ML 2.0	WYALKATCHEM, 16 KM W
1996- 9-22	1621 55.6	30.72	118.29	5 N	ML 1.6	BONNIE ROCK, 22 KM S
1996- 9-22	1730 7.2	31.53	117.93	0	ML 1.7	KELLERBERRIN, 23 KM NE
1996- 9-26	0116 54.4	31.97	116.72	1	ML 1.5	TALBOT BROOK, 8 KM NE
1996-10- 1	1711 57.9	31.98	116.73	0	ML 2.0	TALBOT BROOK, 8KM NE
1996-10- 2	1932 5.1	31.98	116.71	5 N	ML 1.5	TALBOT BROOK, 7KM NE
1996-10-11	0229 29.3	31.47	117.65	2	ML 2.3	KELLERBERRIN, 19KM NW
1996-10-11	1914 60.0	33.57	118.04	5 N	ML 1.6	NYABING, 10KM W
1996-10-13	1436 30.4	32.36	117.38	5 N	ML 1.3	PINGELLY, 34KM NE
1996-10-14	2039 24.4	15.66	127.95	5 N	ML 1.9	KUNUNURRA, 85KM W
1996-10-14	2100 33.7	33.22	116.58	5 N	ML 1.7	DARKAN, 18KM NW
1996-10-18	0528 46.8	32.76	114.59	5 N	ML 4.1	FREMANTLE, 130KM SW
1996-10-18	2127 21.7	42.50	119.88	5 N	ML 3.2	ALBANY, 850KM S
1996-10-22	0338 55.3	30.26	117.02	5 N	ML 1.8	KALANNIE, 16KM NW
1996-10-23	1823 40.0	16.60	128.65	5 N	ML 3.6	KUNUNURRA, 91KM S
1996-10-26	0854 37.3	33.90	117.91	1 G	ML 3.7	GNOWANGERUP, 9KM W
1996-10-27	1616 40.9	31.17	117.26	5 N	ML 1.7	WYALKATCHEM, 12KM W
1996-10-29	2214 0.8	33.30	118.19	5 N	ML 1.9	NYABING, 29KM N
1996-10-29	2237 32.7	33.09	120.89	5 N	ML 2.3	SALMON GUMS, 73KM W
1996-10-30	0154 38.8	31.46	117.66	5 N	ML 1.6	KELLERBERRIN, 20KM N
1996-10-30	0736 33.2	31.46	117.66	5 N	ML 1.7	KELLERBERRIN, 19KM N
1996-11- 2	0708 7.0	32.92	116.68	5 N	ML 1.7	WILLIAMS, 22 KM NW
1996-11- 8	0038 37.6	24.00	114.85	5 N	ML 2.8	CARNARVON, 155 KM NE
1996-11- 9	0455 43.2	31.62	117.09	1 C	ML 2.0	MECKERING, 8 KM E
1996-11-16	0621 38.3	31.45	117.68	3	ML 3.3	KELLERBERRIN, 20 KM N
1996-11-16	0927 38.4	31.45	117.68	1	ML 2.3	KELLERBERRIN, 21 KM N
1996-11-19	0208 48.9	31.44	117.69	2	ML 1.6	KELLERBERRIN, 21 KM N
1996-11-23	1954 50.5	31.47	117.66	2	ML 2.5	KELLERBERRIN,18 KM NNW
1996-11-23	2013 45.0	31.96	119.70	2	ML 2.1	BOUNTY MINE, 17 KM N
1996-11-24	1608 30.2	24.03	114.69	5 N	ML 2.2	CARNARVON, 140 KM NE
1996-11-25	1341 8.7	30.48	117.46	5 N	ML 2.2	KALANNIE, 35 KM ESE
1996-11-27	1506 5.1	33.41	117.77	2	ML 1.7	DUMBLEYUNG, 11 KM SSE
1996-11-27	2116 14.3	30.44	116.90	5 N	ML 1.6	BALLIDU, 22 KM NE
1996-11-28	0035 5.9	30.45	116.89	5 N	ML 2.0	BALLIDU, 20 KM NE
1996-11-28	1253 30.8	31.45	117.69	5 N	ML 1.4	KELLERBERRIN, 20 KM N
1996-11-28	1406 40.5	31.45	117.70	5 N	ML 1.6	KELLERBERRIN, 20 KM N
1996-11-30	1738 39.5	24.56	116.68	5 N	ML 3.1	LANDOR, 67 KM N
1996-12- 2	1828 26.9	39.17	113.25	5 N	ML 3.8	AUGUSTA, 580 KM SW

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1996-12- 3	0755 12.7	32.00	119.75	1 G	ML 3.1	BOUNTY MINE, 11 KM N
1996-12- 6	0401 41.6	23.40	128.70	5 N	ML 2.9	LAKE MCKAY, 93KM S
1996-12- 7	1443 52.0	27.70	120.46	5 N	ML 2.4	BELLEVUE MINe,11 KM SW
1996-12- 9	1419 20.0	30.90	117.06	5 N	ML 2.0	MANMANNING, 7 KM SW
1996-12-10	0602 12.3	26.25	128.45	5 N	ML 3.4	WARBURTON, 187 KM E
1996-12-13	2208 55.1	31.20	117.28	5 N	ML 1.8	WYALKATCHEM, 10 KM W
1996-12-14	0915 39.3	33.20	116.64	5 N	ML 2.2	DARKAN, 19 KM NW
1996-12-15	0548 42.1	31.76	116.33	8	ML 1.9	WOOROLOO, 5 KM NE
1996-12-17	1102 5.6	31.00	116.59	5 N	ML 2.8	CALINGIRI, 16 KM NE
1996-12-20	0611 39.2	31.01	116.57	3	ML 2.8	CALINGIRI, 14 KM NE
1996-12-21	2009 57.2	33.43	117.79	5 N	ML 1.6	DUMBLEYUNG, 13 KM SE
1996-12-22	0842 44.1	33.99	118.26	5 N	ML 1.9	ONGERUP, 20 KM W
1996-12-22	0910 16.6	31.19	117.28	5 N	ML 1.8	WYALKATCHEM, 9 KM W
1996-12-22	1611 29.8	31.20	117.27	5 N	ML 1.8	WYALKATCHEM, 10 KM W
1996-12-26	1555 12.4	31.20	117.27	5 N	ML 1.5	WYALKATCHEM, 11 KM W
1996-12-29	0745 1.5	16.89	128.58	5 N	ML 2.8	WARMUN, 42 KM E
1996-12-29	0924 4.8	31.61	112.39	19	ML 3.2	FREMANTLE, 310 KM W
1996-12-31	0149 23.4	31.20	117.28	5 N	ML 2.6	WYALKATCHEM,10 KM WSW
1996-12-31	0619 16.0	31.21	117.28	5 N	ML 2.2	WYALKATCHEM, 10 KM W
1997- 1- 1	2103 18.4	30.79	117.09	6	ML 1.7	CADOUX, 4 KM SW
1997- 1- 9	1510 51.6	31.47	117.66	2	ML 2.1	KELLERBERRIN, 19 KM N
1997- 1-16	2234 7.7	31.19	117.28	7	ML 1.8	WYALKATCHEM, 9 KM W
1996-12-31	1504 20.6	17.71	122.46	5 N	ML 3.2	BROOME, 38 KM NE
1997- 1-19	0928 15.8	31.20	117.28	6	ML 2.0	WYALKATCHEM, 10 KM W
1997- 1-22	1504 28.3	23.66	112.05	17	ML 2.8	CARNARVON, 213 KM NW
1997- 1-26	2153 25.4	29.91	115.97	9	ML 1.7	COOROW, 5 KM SW
1997- 2- 1	1435 34.0	30.48	116.92	5 N	ML 1.8	BALLIDU, 19 KM NE
1997- 2- 4	1531 34.9	31.48	117.66	5 N	ML 1.9	KELLERBERRIN, 17 KM N
1997- 2- 5	1455 57.7	29.85	123.27	5 N	ML 3.3	ZANTHUS, 134 KM N
1997- 2- 6	1356 17.2	30.13	123.92	5 N	ML 3.3	ZANTHUS, 105 KM N
1997- 2-17	2214 40.1	30.73	118.16	5 N	ML 1.8	MUKINBUDIN, 21 KM N
1997- 2-18	0311 34.6	32.14	117.18	5 N	ML 1.8	BEVERLEY, 24 KM E
1997- 2-18	2009 41.2	32.64	122.35	5 N	ML 2.0	NORSEMAN, 72 KM SE
1997- 2-20	1445 43.6	15.95	120.86	5 N	ML 3.5	BROOME, 267 KM NW
1997- 2-21	0826 8.6	27.41	125.24	5 N	ML 2.8	WARBURTON, 195 KM SW
1997- 2-21	0932 14.7	24.03	114.73	5 N	ML 2.8	CARNARVON, 142 KM NE
1997- 2-22	0848 40.1	21.76	126.33	12	ML 3.8	TOBIN LAKE, 28 KM NE
1997- 2-24	1822 37.4	27.87	113.87	9	ML 2.6	KALBARRI, 38 KM SW
1997- 3- 3	0305 47.5	16.60	127.00	5 N	ML 3.3	HALLS CREEK, 194KM NNW
1997- 3- 7	0814 45.7	31.46	117.66	5 N	ML 2.7	KELLERBERRIN, 20KM N
1997- 3- 9	1705 32.4	31.45	117.68	5 N	ML 1.5	KELLERBERRIN, 20KM N
1997- 3-12	0918 23.9	33.37	117.77	5 N	ML 2.0	DUMBLEYUNG, 7KM SE
1997- 3-14	1512 41.3	32.32	117.46	5 N	ML 1.4	QUAIRADING, 34KM S
1997- 3-14	1801 25.1	32.33	117.45	5 N	ML 1.5	QUAIRADING, 34KM S
1997- 3-17	1447 0.0	30.75	121.47	1 N	ML 2.3	KALGOORLIE, ROCKBURST
1997- 3-17	1448 0.0	30.75	121.47	1 N	ML 2.6	KALGOORLIE, ROCKBURST
1997- 3-18	2254 2.7	31.46	117.69	5 N	ML 1.7	KELLERBERRIN, 19KM N
1997- 3-18	2254 28.5	31.47	117.70	5 N	ML 2.5	KELLERBERRIN, 18KM N
1997- 3-18	2311 22.1	31.46	117.70	5 N	ML 1.6	KELLERBERRIN, 18KM N
1997- 3-18	2316 4.5	31.46	117.71	5 N	ML 1.7	KELLERBERRIN, 19KM N
1997- 3-18	2325 28.0	19.01	119.59	5 N	ML 3.3	PT HEDLAND, 178KM NE
1997- 3-18	2342 47.1	31.47	117.69	5 N	ML 1.7	KELLERBERRIN, 18KM N
1997- 3-20	1650 30.3	31.47	117.69	2	ML 2.2	KELLERBERRIN, 18KM N
1997- 3-22	0358 57.3	29.15	115.81	4	ML 2.3	MORAWA, 20KM NW
1997- 3-26	1640 27.3	31.46	117.69	5 N	ML 2.8	KELLERBERRIN, 19KM N
1997- 3-26	1653 16.8	31.46	117.70	5 N	ML 2.0	KELLERBERRIN, 19KM N

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1997- 3-26	1657 16.8	31.47	117.69	5 N	ML 2.1	KELLERBERRIN, 18KM N
1997- 3-26	2119 0.7	31.47	117.68	5 N	ML 1.9	KELLERBERRIN, 18KM N
1997- 3-26	2130 23.1	31.46	117.70	5 N	ML 2.0	KELLERBERRIN, 19KM N
1997- 3-26	2211 8.7	31.47	117.67	5 N	ML 2.0	KELLERBERRIN, 18KM N
1997- 3-27	0352 35.1	31.47	117.68	5 N	ML 3.2	KELLERBERRIN, 18KM N
1997- 3-27	0452 10.9	31.47	117.69	5 N	ML 2.1	KELLERBERRIN, 18KM N
1997- 3-27	0611 14.7	31.46	117.70	5 N	ML 1.9	KELLERBERRIN, 18KM N
1997- 3-27	0614 18.8	31.47	117.67	5 N	ML 3.3	KELLERBERRIN, 18KM N
1997- 3-27	0628 22.1	31.48	117.68	5 N	ML 2.5	KELLERBERRIN, 17KM N
1997- 3-27	0631 4.5	31.46	117.70	5 N	ML 2.5	KELLERBERRIN, 19KM N
1997- 3-27	0633 11.4	31.46	117.69	5 N	ML 1.9	KELLERBERRIN, 19KM N
1997- 3-26	1657 16.8	31.47	117.69	5 N	ML 2.1	KELLERBERRIN, 18KM N
1997- 3-26	2119 0.7	31.47	117.68	5 N	ML 1.9	KELLERBERRIN, 18KM N
1997- 3-26	2130 23.1	31.46	117.70	5 N	ML 2.0	KELLERBERRIN, 19KM N
1997- 3-26	2211 8.7	31.47	117.67	5 N	ML 2.0	KELLERBERRIN, 18KM N
1997- 3-27	0352 35.1	31.47	117.68	5 N	ML 3.2	KELLERBERRIN, 18KM N
1997- 3-27	0452 10.9	31.47	117.69	5 N	ML 2.1	KELLERBERRIN, 18KM N
1997- 3-27	0611 14.7	31.46	117.70	5 N	ML 1.9	KELLERBERRIN, 18KM N
1997- 3-27	0614 18.8	31.47	117.67	5 N	ML 3.3	KELLERBERRIN, 18KM N
1997- 3-27	0628 22.1	31.48	117.68	5 N	ML 2.5	KELLERBERRIN, 17KM N
1997- 3-27	0631 4.5	31.46	117.70	5 N	ML 2.5	KELLERBERRIN, 19KM N
1997- 3-27	0633 11.4	31.46	117.69	5 N	ML 1.9	KELLERBERRIN, 19KM N
1997- 3-27	0758 5.6	31.46	117.69	5 N	ML 2.9	KELLERBERRIN, 19KM N
1997- 3-27	1134 31.6	31.47	117.69	5 N	ML 1.8	KELLERBERRIN, 18KM N
1997- 3-27	1352 5.7	31.47	117.68	5 N	ML 1.8	KELLERBERRIN, 18KM N
1997- 3-27	1658 19.0	31.48	117.68	5 N	ML 3.0	KELLERBERRIN, 17KM N
1997- 3-27	1708 25.5	31.47	117.68	5 N	ML 2.4	KELLERBERRIN, 18KM N
1997- 3-27	1714 1.9	31.48	117.69	5 N	ML 2.0	KELLERBERRIN, 17KM N
1997- 3-28	0222 24.7	31.48	117.69	5 N	ML 1.6	KELLERBERRIN, 17KM N
1997- 3-28	0552 25.6	31.47	117.67	5 N	ML 1.6	KELLERBERRIN, 18KM N
1997- 3-28	0916 24.1	31.45	117.72	5 N	ML 1.6	KELLERBERRIN, 20KM N
1997- 3-29	0725 15.3	31.46	117.67	5 N	ML 2.3	KELLERBERRIN, 19KM N
1997- 3-30	1719 2.5	31.44	117.70	5 N	ML 1.8	KELLERBERRIN, 21KM N
1997- 4- 3	0739 59.0	31.47	117.70	5 N	ML 2.0	KELLERBERRIN, 18 KM N
1997- 4- 3	0744 20.3	31.46	117.68	5 N	ML 2.1	KELLERBERRIN, 19 KM N
1997- 4- 3	0746 5.7	31.46	117.69	5 N	ML 1.7	KELLERBERRIN, 19 KM N
1997- 4- 3	0832 50.7	31.49	117.67	5 N	ML 1.5	KELLERBERRIN, 17 KM N
1997- 4- 3	0905 45.2	31.47	117.68	5 N	ML 1.8	KELLERBERRIN, 19 KM N
1997- 4- 6	0221 23.5	24.03	114.81	5 N	ML 2.6	CARNARVON, 149 KM NE
1997- 4- 6	1811 3.4	31.49	117.67	5 N	ML 1.9	KELLERBERRIN, 16 KM N
1997- 4- 6	2053 25.6	31.47	117.69	5 N	ML 1.5	KELLERBERRIN, 18 KM N
1997- 4- 6	2145 32.7	31.47	117.68	5 N	ML 1.5	KELLERBERRIN, 18 KM N
1997- 4- 7	0224 42.5	31.48	117.68	5 N	ML 1.6	KELLERBERRIN, 17 KM N
1997- 4- 7	0552 43.0	31.49	117.67	5 N	ML 2.0	KELLERBERRIN, 16 KM N
1997- 4- 9	0321 42.0	31.47	117.67	3	ML 2.2	KELLERBERRIN, 18 KM NNW
1997- 4-13	0808 6.5	31.47	117.68	5 N	ML 2.1	KELLERBERRIN, 18 KM N
1997- 4-16	1724 30.9	30.75	117.13	5 N	ML 1.7	CADOUX, 2 KM N
1997- 4-21	1337 44.2	22.73	113.90	5 N	ML 3.1	NINGALOO, 24 KM E
1997- 4-24	2012 18.3	31.46	117.67	1	ML 3.2	KELLERBERRIN, 19 KM N
1997- 4-24	2017 27.3	31.46	117.70	5 N	ML 1.9	KELLERBERRIN, 18 KM N
1997- 4-24	2306 40.6	31.46	117.68	5 N	ML 2.9	KELLERBERRIN, 19 KM N
1997- 4-25	0039 42.5	31.46	117.68	5 N	ML 2.8	KELLERBERRIN, 19 KM N
1997- 4-25	0137 49.5	31.48	117.67	5 N	ML 2.1	KELLERBERRIN, 18 KM N
1997- 4-25	0138 30.3	31.47	117.67	5 N	ML 2.5	KELLERBERRIN, 18 KM N
1997- 4-25	0159 23.6	31.47	117.68	5 N	ML 2.1	KELLERBERRIN, 18 KM N
1997- 4-25	0324 14.4	31.47	117.68	5 N	ML 2.1	KELLERBERRIN, 18 KM N

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1997- 4-25	0421 51.6	31.47	117.67	5 N	ML 2.2	KELLERBERRIN, 18 KM N
1997- 4-25	1328 10.9	25.34	115.45	5 N	ML 2.7	GASCOYNE JUNCTION
1997- 4-25	1900 42.4	30.52	117.13	5 N	ML 1.7	BURAKIN, 4 KM W
1997- 4-26	1409 18.2	31.47	117.69	5 N	ML 1.7	KELLERBERRIN, 18 KM N
1997- 4-30	0225 35.1	31.46	117.67	5 N	ML 2.3	KELLERBERRIN, 19 KM N
1997- 4-30	1713 6.4	31.47	117.67	5 N	ML 1.6	KELLERBERRIN, 18 KM N
1997- 5- 2	1236 3.4	31.46	117.66	3	ML 2.0	KELLERBERRIN, 19 KM NNW
1997- 5- 4	0531 47.8	30.83	118.17	1 G	ML 1.9	MUKINBUDIN, 11 KM NNW
1997- 5- 7	0319 45.6	31.45	117.68	0	ML 2.1	KELLERBERRIN, 20 KM N
1997- 5- 9	0631 16.5	44.29	118.01	5 N	ML 4.3	ALBANY, 1030 KM S
1997- 5-10	0107 39.0	31.41	117.69	5 N	ML 1.7	KELLERBERRIN, 24 KM N
1997- 5-10	2135 5.9	31.45	117.66	1 C	ML 1.7	KELLERBERRIN, 20 KM NNW
1997- 5-11	0213 17.2	31.46	117.66	3	ML 2.5	KELLERBERRIN, 20 KM NNW
1997- 5-11	0251 5.6	31.47	117.66	2	ML 2.0	KELLERBERRIN, 19 KM NNW
1997- 5-13	2107 9.8	44.52	118.28	5 N	ML 3.2	ALBANY, 1060 KM S
1997- 5-14	0715 33.2	31.45	117.67	1	ML 1.6	KELLERBERRIN, 20 KM NNW
1997- 5-18	0835 52.3	23.74	112.97	5 N	ML 3.0	CAPE CUVIER, 66 KM NW
1997- 5-21	1158 52.9	14.90	122.07	5 N	ML 3.2	BROOME, 340 KM N
1997- 5-27	2022 52.5	30.58	118.32	5 N	ML 1.9	BONNIE ROCK, 7 KM SW
1997- 6- 2	1924 38.5	31.46	117.68	1	ML 2.6	KELLERBERRIN, 19 KM NNW
1997- 6- 6	0617 15.6	24.16	125.81	5 N	ML 3.0	WARBURTON, 232 KM NNW
1997- 6- 7	2009 46.8	31.45	117.69	2	ML 1.7	KELLERBERRIN, 20 KM N
1997- 6- 8	1110 49.9	31.45	117.69	1 C	ML 1.8	KELLERBERRIN, 20 KM N
1997- 6-12	1447 32.6	31.44	117.70	1	ML 2.0	KELLERBERRIN, 21 KM N
1997- 6-12	1534 2.7	31.60	117.06	5 N	ML 1.7	MECKERING, 6 KM ENE
1997- 6-13	0504 33.3	31.44	117.71	1	ML 1.8	KELLERBERRIN, 21 KM N
1997- 6-13	2222 30.2	17.00	129.18	5 N	ML 2.8	WARMUN, 102 KM E
1997- 6-18	0515 22.3	31.71	117.02	6	ML 1.9	MECKERING, 9 KM S
1997- 6-19	2222 53.4	16.64	120.70	5 N	ML 3.0	BROOME, 220 KM NW
1997- 6-21	0559 10.7	30.52	116.40	1 G	ML 1.5	MILING, 7 KM SE
1997- 6-21	2233 38.6	31.47	117.68	2	ML 2.0	KELLERBERRIN, 18 KM N
1997- 6-28	0100 33.9	23.51	114.47	13	ML 3.0	MINILYA, 64 KM NE
1997- 6-28	0144 8.1	23.51	114.48	5 N	ML 2.3	MINILYA, 64 KM NE
1997- 6-28	0400 3.9	31.46	117.70	2	ML 1.8	KELLERBERRIN, 19 KM N
1997- 6-28	1447 18.8	32.54	117.29	1 C	ML 2.0	PINGELLY, 20 KM E
1997- 6-28	2141 4.8	31.61	117.08	6	ML 1.5	MECKERING, 7 KM ENE
1997- 6-29	1437 59.2	22.19	119.65	5 N	ML 2.7	ROY HILL, 55 KM NW
1997- 6-30	1739 10.9	30.79	117.08	2	ML 1.9	CADOUX, 6 KM WSW
1997- 7- 1	0606 11.8	21.42	115.64	5 N	ML 3.2	ONSLOW, 59 KM NNE
1997- 7- 8	2134 38.2	28.46	114.33	5 N	ML 4.2	GERALDTON, 44 KM NW
1997- 7-10	0139 15.9	32.15	119.76	1 G	ML 2.5	BOUNTY MINE
1997- 7-10	0139 16.0	32.14	119.76	1 G	ML 2.5	BOUNTY MINE, 5 KM S
1997- 7-11	0552 55.1	30.78	117.05	5 N	ML 1.6	CADOUX, 8 KM W
1997- 7-23	1617 41.8	31.47	117.67	5 N	ML 1.7	KELLERBERRIN, 19 KM N
1997- 7-23	1829 48.7	22.11	126.54	5 N	ML 3.6	TOBIN LAKE, 47 KM SE
1997- 7-29	0742 56.5	28.45	125.80	5 N	ML 4.2	WARBURTON, 268 KM S
1997- 7-29	2303 46.9	28.14	125.47	5 N	ML 2.9	WARBURTON, 248 KM SW
1997- 7-31	1914 10.6	17.32	123.28	5 N	ML 3.0	DERBY, 37 KM W
1997- 8- 3	0117 25.8	28.60	116.06	5 N	ML 2.9	GERALDTON, 142 KM E
1997- 8- 6	2032 9.3	30.79	117.09	5 N	ML 2.1	CADOUX, 4 KM SW
1997- 8- 8	0640 5.5	36.37	120.66	5 N	ML 2.3	ALBANY, 295 KM SE
1997- 8- 9	2136 10.9	21.14	128.02	5 N	ML 2.7	LAKE MCKAY, 172 KM NNW
1997- 8-10	0920 33.5	15.93	124.17	44	ML 6.3	COCKATOO IS, 62 KM E
1997- 8-10	1231 52.0	15.29	124.23	7	ML 3.5	COCKATOO IS, 68 KM E
1997- 8-11	1412 32.1	15.71	124.15	20	ML 3.8	COCKATOO IS, 71 KM NE
1997- 8-11	1903 33.0	33.50	116.81	5 N	ML 2.1	DARKAN, 20 KM SE

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1997- 8-12	1811 52.4	24.66	111.13	5 N	ML 3.0	CARNARVON, 285 KM W
1997- 8-14	0855 8.2	16.04	124.28	6	ML 3.2	COCKATOO IS, 71 KM E
1997- 8-16	2252 35.4	22.67	114.48	5 N	ML 2.6	EXMOUTH, 91 KM S
1997- 8-17	0514 21.6	28.62	115.59	5 N	ML 2.6	MULLEWA, 13 KM SE
1997- 8-17	1305 35.3	17.15	121.78	5 N	ML 3.1	BROOME, 102 KM NW
1997- 8-20	1341 40.4	33.37	117.29	5 N	ML 1.9	WAGIN, 6 KM SW
1997- 8-20	1817 2.1	17.70	117.02	5 N	ML 4.0	DAMPIER, 328 KM N
1997- 8-22	1805 21.3	33.45	116.77	5 N	ML 1.8	DARKAN, 14 KM S
1997- 8-24	0225 18.7	33.60	118.30	5 N	ML 1.8	NYABING, 15 KM E
1997- 8-25	1025 2.0	30.80	117.07	5 N	ML 1.7	MANMANNING, 6 KM NW
1997- 8-27	0904 31.2	30.78	118.22	5 N	ML 2.2	MUKINBUDIN, 16 KM N
1997- 8-27	0924 38.5	30.77	118.23	5 N	ML 1.8	MUKINBUDIN, 17 KM N
1997- 8-27	0927 17.6	30.75	118.27	5 N	ML 2.4	MUKINBUDIN, 20 KM N
1997- 8-30	1244 34.5	31.45	117.69	5 N	ML 2.7	KELLERBERRIN, 20 KM N
1997- 8-30	1245 46.3	31.47	117.65	5 N	ML 2.6	KELLERBERRIN, 19 KM N
1997- 8-30	1251 21.8	31.45	117.69	5 N	ML 2.8	KELLERBERRIN, 20 KM N
1997- 8-30	1855 27.7	18.30	118.69	5 N	ML 3.3	PT HEDLAND, 222 KM N
1997- 8-30	1941 53.6	31.46	117.69	5 N	ML 2.1	KELLERBERRIN, 19 KM N
1997- 8-30	1945 15.4	31.46	117.68	5 N	ML 2.6	KELLERBERRIN, 19 KM N
1997- 8-30	1948 0.6	31.45	117.70	5 N	ML 1.8	KELLERBERRIN, 20 KM N
1997- 8-30	2056 40.0	31.45	117.70	5 N	ML 2.1	KELLERBERRIN, 20 KM N
1997- 8-31	0143 42.4	29.98	123.68	5 N	ML 2.5	ZANTHUS, 117 KM N
1997- 8-31	0800 57.5	31.46	117.67	5 N	ML 2.9	KELLERBERRIN, 20 KM N
1997- 8-31	0811 15.3	31.46	117.67	5 N	ML 2.6	KELLERBERRIN, 20 KM N
1997- 8-31	1523 50.3	31.45	117.68	5 N	ML 4.6	KELLERBERRIN, 20 KM N
1997- 8-31	1530 59.8	31.46	117.69	5 N	ML 2.3	KELLERBERRIN, 19 KM N
1997- 8-31	1533 55.2	31.46	117.69	5 N	ML 2.3	KELLERBERRIN, 19 KM N
1997- 8-31	1541 32.2	31.46	117.68	5 N	ML 2.0	KELLERBERRIN, 19 KM N
1997- 8-31	1550 31.6	31.45	117.68	5 N	ML 3.6	KELLERBERRIN, 20 KM N
1997- 8-31	1555 25.9	31.46	117.68	5 N	ML 2.7	KELLERBERRIN, 19 KM N
1997- 8-31	1603 51.0	31.47	117.67	5 N	ML 2.1	KELLERBERRIN, 19 KM N
1997- 8-31	1604 42.4	31.45	117.69	5 N	ML 1.8	KELLERBERRIN, 21 KM N
1997- 8-31	1613 47.2	31.45	117.70	5 N	ML 2.0	KELLERBERRIN, 20 KM N
1997- 8-31	1642 36.3	31.47	117.68	5 N	ML 2.6	KELLERBERRIN, 18 KM N
1997- 8-31	1645 16.0	31.46	117.70	5 N	ML 1.9	KELLERBERRIN, 19 KM N
1997- 8-31	1757 46.5	31.45	117.69	5 N	ML 1.8	KELLERBERRIN, 20 KM N
1997- 8-31	1829 36.3	31.46	117.69	5 N	ML 1.8	KELLERBERRIN, 19 KM N
1997- 8-31	1901 38.6	31.45	117.68	5 N	ML 1.9	KELLERBERRIN, 20 KM N
1997- 8-31	2122 33.0	31.47	117.71	5 N	ML 1.9	KELLERBERRIN, 17 KM N
1997- 8-31	2123 14.2	31.47	117.70	5 N	ML 2.5	KELLERBERRIN, 18 KM N
1997- 9- 1	0258 50.1	31.46	117.68	5 N	ML 2.9	KELLERBERRIN, 19 KM N
1997- 9- 1	0339 29.9	31.47	117.70	5 N	ML 2.2	KELLERBERRIN, 18 KM N
1997- 9- 1	0845 7.9	31.46	117.69	5 N	ML 1.9	KELLERBERRIN, 19 KM N
1997- 9- 1	0948 37.1	18.12	123.14	5 N	ML 4.5	BROOME, 98 KM E
1997- 9- 1	1104 55.8	31.47	117.68	5 N	ML 1.8	KELLERBERRIN, 18 KM N
1997- 9- 1	1230 21.7	31.47	117.69	5 N	ML 2.3	KELLERBERRIN, 18 KM N
1997- 9- 1	1405 35.2	31.47	117.70	5 N	ML 2.2	KELLERBERRIN, 18 KM N
1997- 9- 2	0909 43.5	31.45	117.68	5 N	ML 1.8	KELLERBERRIN, 20 KM N
1997- 9- 2	0910 4.5	31.44	117.64	5 N	ML 2.0	KELLERBERRIN, 22 KM N
1997- 9- 2	1007 6.2	31.46	117.69	5 N	ML 2.1	KELLERBERRIN, 19 KM N
1997- 9- 3	0507 17.9	31.45	117.69	5 N	ML 2.8	KELLERBERRIN, 20 KM N
1997- 9- 3	0512 54.4	31.45	117.67	5 N	ML 4.2	KELLERBERRIN, 20 KM N
1997- 9- 3	0556 18.2	31.48	117.66	5 N	ML 2.0	KELLERBERRIN, 18 KM N
1997- 9- 3	0627 2.7	31.44	117.69	5 N	ML 1.7	KELLERBERRIN, 21 KM N
1997- 9- 3	0641 5.1	31.46	117.68	5 N	ML 2.0	KELLERBERRIN, 19 KM N
1997- 9- 3	0702 20.3	31.45	117.69	5 N	ML 2.2	KELLERBERRIN, 21 KM N

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1997- 9- 3	1004 48.6	31.45	117.71	5 N	ML 2.5	KELLERBERRIN, 20 KM N
1997- 9- 4	1859 22.5	31.47	117.68	5 N	ML 2.1	KELLERBERRIN, 18 KM N
1997- 9- 5	0617 40.7	31.46	117.69	5 N	ML 1.9	KELLERBERRIN, 19 KM N
1997- 9- 5	1152 59.2	20.11	120.82	5	ML 2.8	MARBLE BAR, 162 KM NE
1997- 9- 5	2047 8.3	31.44	117.69	5 N	ML 1.8	KELLERBERRIN, 21 KM N
1997- 9- 6	1235 8.9	33.22	117.02	5 N	ML 2.2	ARTHUR RIVER, 14 KM N
1997- 9- 6	1301 37.6	31.45	117.68	5 N	ML 1.7	KELLERBERRIN, 21 KM N
1997- 9- 6	2051 56.3	31.44	117.71	5 N	ML 2.6	KELLERBERRIN, 21 KM N
1997- 9- 7	0356 17.7	31.45	117.68	5 N	ML 1.9	KELLERBERRIN, 20 KM N
1997- 9- 7	0403 41.3	31.47	117.69	5 N	ML 1.8	KELLERBERRIN, 18 KM N
1997- 9- 8	1919 26.4	31.46	117.68	5 N	ML 2.0	KELLERBERRIN, 19 KM N
1997- 9- 9	1441 0.7	30.35	117.72	5 N	ML 1.8	BEACON, 18 KM NW
1997- 9- 9	1844 21.3	31.47	117.66	5 N	ML 2.1	KELLERBERRIN, 19 KM N
1997- 9-11	1506 21.5	31.43	117.72	5 N	ML 1.9	KELLERBERRIN, 22 KM N
1997- 9-11	1619 38.8	30.97	126.26	5 N	ML 3.0	RAWLINNA, 90 KM E
1997- 9-11	1641 36.2	31.43	117.70	5 N	ML 3.0	KELLERBERRIN, 22 KM N
1997- 9-11	1641 50.8	31.44	117.68	5 N	ML 3.3	KELLERBERRIN, 21 KM N
1997- 9-11	1645 45.1	31.44	117.69	5 N	ML 2.9	KELLERBERRIN, 21 KM N
1997- 9-11	1654 4.8	31.44	117.68	5 N	ML 2.7	KELLERBERRIN, 21 KM N
1997- 9-11	1745 12.3	31.45	117.68	5 N	ML 2.1	KELLERBERRIN, 20 KM N
1997- 9-11	2128 38.6	31.44	117.70	5 N	ML 2.0	KELLERBERRIN, 21 KM N
1997- 9-11	2141 12.8	31.47	117.67	5 N	ML 1.9	KELLERBERRIN, 19 KM N
1997- 9-12	0008 20.4	31.45	117.67	5 N	ML 3.7	KELLERBERRIN, 21 KM N
1997- 9-12	1822 33.3	21.11	114.96	37	ML 3.7	ONSLOW, 60 KM N
1997- 9-12	1854 50.6	31.44	117.68	5 N	ML 2.5	KELLERBERRIN, 21 KM N
1997- 9-13	1114 13.2	31.46	117.66	5 N	ML 2.0	KELLERBERRIN, 19 KM N
1997- 9-13	1114 27.9	31.45	117.68	5 N	ML 2.0	KELLERBERRIN, 20 KM N
1997- 9-13	1158 6.4	24.22	113.65	5 N	ML 2.9	CAPE CUVIER, 28 KM E
1997- 9-15	1218 1.3	31.47	117.66	5 N	ML 2.5	KELLERBERRIN, 19 KM N
1997- 9-15	1323 16.5	33.29	118.17	5 N	ML 2.0	NYABING, 29 KM N
1997- 9-16	0414 33.5	31.45	117.70	5 N	ML 1.7	KELLERBERRIN, 20 KM N
1997- 9-16	1530 56.5	31.44	117.71	5 N	ML 1.7	KELLERBERRIN, 21 KM N
1997- 9-17	0717 33.7	31.44	117.70	5 N	ML 1.8	KELLERBERRIN, 21 KM N
1997- 9-18	1909 17.8	31.45	117.67	5 N	ML 2.7	KELLERBERRIN, 20 KM N
1997- 9-26	0810 49.3	22.79	127.56	5 N	ML 2.9	LAKE MCKAY, 117 KM W
1997- 9-29	0602 13.9	22.69	115.26	5 N	ML 2.3	NANUTARRA, 30 KM SW
1997- 9-29	1721 0.6	31.46	117.71	5 N	ML 2.1	KELLERBERRIN, 19 KM N
1997- 9-30	0329 49.4	31.47	117.68	5 N	ML 1.7	KELLERBERRIN, 18 KM N
1997- 9-30	1636 51.2	31.44	117.69	5 N	ML 1.5	KELLERBERRIN, 21 KM N
1997- 9-30	1738 50.9	31.45	117.67	5 N	ML 1.6	KELLERBERRIN, 20 KM N
1997- 9-30	1742 47.0	31.45	117.68	5 N	ML 2.1	KELLERBERRIN, 21 KM N
1997- 9-30	2012 53.1	31.47	117.69	5 N	ML 1.7	KELLERBERRIN, 18 KM N
1997-10- 1	1846 9.7	31.45	117.69	5 N	ML 1.7	KELLERBERRIN, 20 KM N
1997-10- 2	0933 16.9	23.05	114.93	5 N	ML 3.0	NANUTARRA, 82 KM SW
1997-10- 4	1938 30.3	19.24	116.10	5 N	ML 2.7	DAMPIER, 170 KM NW
1997-10- 6	2132 26.9	31.67	117.06	5 N	ML 1.6	MECKERING, 7 KM SE
1997-10-10	1717 34.2	19.38	116.79	5 N	ML 3.2	DAMPIER, 141 KM N
1997-10-11	0259 13.9	33.60	118.29	5 N	ML 2.1	NYABING, 14 KM SE
1997-10-17	1010 57.0	31.40	111.70	5 N	ML 2.6	FREMANTLE, 378 KM W
1997-10-19	1859 25.8	28.85	115.58	5 N	ML 2.7	MULLEWA, 36 KM S
1997-10-21	0746 36.1	29.56	123.82	5 N	ML 2.6	ZANTHUS, 165 KM N
1997-10-22	0324 12.1	28.77	115.77	5 N	ML 1.9	MULLEWA, 38 KM SE
1997-10-22	1255 44.5	21.92	113.50	5 N	ML 2.9	EXMOUTH, 65 KM W
1997-10-22	1824 18.8	31.45	117.71	5 N	ML 1.6	KELLERBERRIN, 20 KM N
1997-10-23	0810 48.3	22.91	115.07	12	ML 2.0	NANUTARRA, 61 KM SW
1997-10-27	1655 56.6	32.26	119.77	0	ML 2.0	BOUNTY MINE, 17 KM S

Table 11. (Cont'd)

UT Time	*UT Date*	*Lat°S*	*Long°E*	*Depth*	*Mag*	*Place*
1997-11-2	0718 12.3	28.07	129.61	5 N	ML 2.7	WARBURTON, 369 KM SE
1997-11-2	1218 19.9	33.69	118.76	5 N	ML 1.9	PINGRUP, 30 KM SE
1997-11-2	1824 33.0	21.89	115.86	5 N	ML 2.5	NANUTARRA, 80 KM NE
1997-11-6	1532 34.3	31.44	117.67	5 N	ML 2.1	KELLERBERRIN, 21 KM N
1997-11-7	1836 22.0	30.76	118.21	5 N	ML 1.9	MUKINBUDIN, 18 KM N
1997-11-8	1101 51.7	31.44	117.69	5 N	ML 2.7	KELLERBERRIN, 21 KM N
1997-11-8	1456 45.6	32.19	117.44	5 N	ML 1.8	QUAIRADING, 20 KM S
1997-11-10	1753 19.1	23.25	114.28	5 N	ML 2.8	GIRALIA, 68 KM S
1997-11-10	2046 37.0	31.46	117.69	5 N	ML 1.8	KELLERBERRIN, 19 KM N
1997-11-10	2046 43.9	31.46	117.65	5 N	ML 2.1	KELLERBERRIN, 20 KM N
1997-11-10	2049 28.1	31.45	117.68	5 N	ML 1.7	KELLERBERRIN, 20 KM N
1997-11-10	2049 40.1	31.46	117.66	5 N	ML 1.9	KELLERBERRIN, 19 KM N
1997-11-10	2056 26.4	31.47	117.67	5 N	ML 1.9	KELLERBERRIN, 18 KM N
1997-11-10	2120 58.7	31.46	117.70	5 N	ML 1.5	KELLERBERRIN, 19 KM N
1997-11-10	2121 26.7	31.47	117.66	5 N	ML 1.7	KELLERBERRIN, 19 KM N
1997-11-11	1226 20.3	16.50	128.17	5 N	ML 3.5	KUNUNURRA, 100 KM SW
1997-11-16	0043 1.7	31.92	119.71	0	ML 2.0	BOUNTY MINE, 21 KM N
1997-11-18	0146 31.5	31.47	117.66	5 N	ML 2.0	KELLERBERRIN, 18 KM N
1997-11-18	0257 5.4	30.66	116.64	5 N	ML 1.9	BALLIDU, 14 KM SW
1997-11-19	1426 49.7	22.58	112.49	5 N	ML 3.7	EXMOUTH, 184 KM SW
1997-11-20	0144 17.4	18.38	118.86	5 N	ML 3.3	PT HEDLAND, 214 KM N
1997-11-20	0950 19.9	26.27	128.98	5 N	ML 2.7	WARBURTON, 241 KM E
1997-11-20	1602 41.8	22.78	113.81	5 N	ML 2.3	GIRALIA, 46 KM W
1997-11-24	1139 27.3	31.70	117.05	7	ML 3.0	MECKERING, 9 KM SSE
1997-11-24	1140 38.9	31.71	117.04	5 N	ML 3.2	MECKERING, 9 KM S
1997-11-24	2200 47.8	30.65	116.52	1 G	ML 2.3	BALLIDU, 25 KM W
1997-11-28	0219 24.4	32.14	119.76	1	ML 2.2	BOUNTY MINE, 5 KM S
1997-12-3	1944 4.1	31.47	117.67	5 N	ML 2.2	KELLERBERRIN, 19 KM N
1997-12-7	0509 34.2	30.64	116.53	5 N	ML 1.7	BALLIDU, 23 KM W
1997-12-7	1333 33.0	30.65	116.54	5 N	ML 2.0	BALLIDU, 22 KM W
1997-12-7	1748 21.4	30.99	116.49	5 N	ML 2.6	CALINGIRI, 11 KM N
1997-12-7	1750 9.9	31.00	116.49	5 N	ML 3.0	CALINGIRI, 10 KM N
1997-12-8	0147 58.0	31.00	116.50	5 N	ML 2.4	CALINGIRI, 10 KM NE
1997-12-8	0724 50.7	30.99	116.46	5 N	ML 2.0	CALINGIRI, 10 KM N
1997-12-8	1459 50.6	30.65	116.55	5 N	ML 2.0	BALLIDU, 22 KM W
1997-12-8	1738 35.9	30.75	117.17	3	ML 2.7	CADOUX, 4 KM NE
1997-12-8	1748 37.1	30.74	117.20	5 N	ML 2.3	CADOUX, 7 KM NE
1997-12-8	2343 25.6	30.65	116.53	5 N	ML 1.8	BALLIDU, 24 KM W
1997-12-9	0730 11.7	30.62	116.55	5 N	ML 1.9	BALLIDU, 21 KM W
1997-12-9	1059 46.4	31.00	116.48	5 N	ML 1.9	CALINGIRI, 10 KM N
1997-12-10	0313 14.3	30.34	123.17	5 N	ML 2.6	ZANTHUS, 85 KM NW
1997-12-14	1836 8.7	23.94	112.98	84	ML 3.3	CAPE CUVIER, 50 KM NW
1997-12-14	2137 33.8	33.43	116.71	5 N	ML 1.6	DARKIN, 11 KM S
1997-12-16	2007 10.0	31.47	117.68	5 N	ML 1.9	KELLERBERRIN, 18 KM N
1997-12-18	2112 13.4	31.69	117.05	0	ML 1.5	MECKERING, 8 KM S
1997-12-19	1443 0.7	31.46	117.71	5 N	ML 1.6	KELLERBERRIN, 19 KM N
1997-12-19	1551 49.6	31.45	117.71	5 N	ML 1.8	KELLERBERRIN, 19 KM N
1997-12-20	0725 6.4	30.70	121.47	1	ML 2.0	KALGOORLIE, 5 KM N
1997-12-23	1011 2.5	21.88	115.06	5 N	ML 3.4	ONSLOW, 29 KM S
1997-12-28	1556 52.7	32.62	122.31	5 N	ML 3.0	NORSEMAN, 68 KM SE
1997-12-29	1754 3.0	31.11	116.47	5 N	ML 1.6	CALINGIRI, 5 KM SE
1997-12-31	0405 40.3	30.99	116.49	5 N	ML 2.3	CALINGIRI, 11 KM N

Table 12. Earthquakes captured on WWSS digital system, 1994 -1997

Date	*Time ut*	*Locality*	*Dist (km)*	*Max amp(cnts)*	*Ml*
1994					
Jan 31	0014	Meckering	80	483	2.5
Feb 18	1624	Bindoon	54		2.1
Mar 09	1609	Quairading	109	576	2.3
Mar 12	2215	Quairading	115	615	2.5
Mar 17	0517	Wyalkatchem	133	203	2.1
Apr 01	1826	Wyalkatchem	134	957	2.5
Apr 08	0608	Wyalkatchem	133	629	2.4
Apr 26	1549	Bonnie rock	265	7285	4.1
May 07	1346	Wyalkatchem	132	387	2.3
May 13	0420	Wyalkatchem	133	1311	2.8
Jun 05	1817	Kellerberrin	168	219	2.2
Jun 06	1017	Nyabing	260	267	2.9
Jun 08	0622	Meckering	86		2.8
Jun 11	1202	Kellerberrin	168		2.5
Jun 11	1245	Nyabing	260		2.5
Jun 23	1355	Albany	494	373	3.0
Jul 01	0208	Manmanning	150		2.0
Jul 10	0327	Nyabing	275	268	2.8
Sep 04	1301	Zanthus	779	544	4.3
Sep 12	0326	Nyabing	260	377	2.5
Sep 17	1535	Cadoux	147	408	2.1
Oct 05	1659	Dumblyung	221	948	2.8
Oct 10	1904	Kulin	196	181	2.6
Oct 11	1034	Salmon Gums	501	1161	3.9
Oct 11	1456	Nyabing	255	281	2.5
Oct 27	1555	Meckering	86		1.7
Oct 31	0801	Gnowangerup	260	407	2.6
Nov 03	0641	Wyalkatchem	133	266	2.3
Nov 14	0908	Burakin	170	185	2.3
Nov 16	0508	York	49	209	1.7
Nov 22	0855	York	49	342	1.9
Nov 23	2053	York	49	7984	3.0
Nov 23	2205	York	49	285	1.8
Nov 23	2222	York	49	231	1.6
Nov 23	2246	York	49	280	1.7
Nov 23	2330	York	49	184	1.6
Nov 24	1441	York	49	751	2.1
Nov 24	1442	York	49	162	1.5
Nov 24	2003	York	49	5546	3.0
Nov 24	2027	York	49	246	1.7
Nov 25	0001	York	49	287	1.7
Nov 26	0329	York	49	770	2.2
Nov 26	0351	York	49	668	1.9
Nov 26	1416	Greenhills	70	1125	2.7
Nov 26	1552	York	49	194	1.5
Nov 29	1431	York	49	2943	2.6
Dec 10	1702	Albany	395	328	2.7
Dec 13	0937	York	49	318	1.7

Table 12 (cont'd)

Date	*Time ut*	*Locality*	*Dist (km)*	*Max amp(cnts)*	*Ml*
1995					
Jan 15	1431	York	49	686	2.1
Jan 15	1729	York	48	876	2.2
Jan 15	1835	York	49	178	1.7
Jan 15	1955	York	49	157	1.6
Jan 23	0819	Cranbrook	270	784	2.8
Feb 01	0955	Ongerup	303	222	2.8
Feb 05	1614	Cadoux	146	702	2.9
Mar 09	1101	Manmanning	153	153	2.1
Mar 21	0702	Perth	20	853	2.0
Apr 06		Dumbleyung	220	737	2.7
Apr 16	0248	Nyabing	240	356	2.6
Apr 17	0533	Nyabing	240	499	3.0
Apr 19	0218	Nyabing	235	322	2.8
Apr 20	1204	Nyabing	237	610	3.0
Apr 20	1247	Nyabing	236	189	2.4
Apr 20	1311	Nyabing	235	1196	3.3
Apr 20	1316	Nyabing	237	535	3.1
Apr 29	0712	Esperance	975	634	4.0
Apr 30		Meteorite	?	178	
May 15	2229	Albany, 850 km s	1210	236	4.0
May 27	0454	Cadoux	151	857	2.7
Jun 03	0539	Brookton	99	271	2.3
Jun 09	2217	Calingiri	112	192	2.2
Jun 24	1106	Beacon	229	479	2.8
Jul 15	0222	Eneabba	222	231	2.9
Jul 31	1548	Cadoux	157	5064	3.5
Aug 18	2336	Wyalkatchem	149		2.6
Aug 25	1150	Carnarvon	1052	2836	4.6
Oct 15	1152	Meckering	84	276	2.3
Oct 16	1457	Meckering	82	150	2.1
Oct 27	1913	Wyalkatchem	132	259	2.7
Nov 08	1133	Meckering	80	173	1.9
1996					
Jan 25	1031	Perth		334	1.6
Feb 24	1215	Cadoux		216	2.5
Mar 10	1853	Kellerberrin	150	1455	3.1
Mar 11	0041	Geraldton		298	3.0
Mar 11	0435	Kellerberrin	150	516	2.5
Mar 11	0618	Kellerberrin	150	437	2.5
Mar 11	0624	Kellerberrin	150	902	3.1
Mar 11	0634	Kellerberrin	150	761	2.8
Mar 12	2317	Kellerberrin	150	872	2.8
Mar 29	0524	Kellerberrin	150	469	2.7
Mar 29	0542	Kellerberrin	150	633	3.0
Apr 03	1643	Kellerberrin	150	961	3.0
Apr 05	0617	Kellerberrin	150	353	2.7
Apr 08	0117	Kellerberrin	150	283	2.5
Apr 12	1906	Kellerberrin	150	658	2.9

Table 12 (cont'd)

Date	*Time ut*	*Locality*	*Dist (km)*	*Max amp(cnts)*	*Ml*
1996					
Apr 17	2057	Kellerberrin	150	245	2.5
Apr 19	0233	Kellerberrin	150	528	2.8
Apr 21	0154	Kellerberrin	150	203	2.5
Apr 25	2010	Kellerberrin	150	309	2.5
May 02	0044	Kellerberrin	150	553	3.0
May 08	1624	Kojonup	300	235	2.5
May 13	2048	Kojonup	300	368	2.8
May 13	2052	Kojonup	300	166	2.4
May 14	2315	Kojonup	300	826	3.0
May 25	1018	Kojonup	300	200	2.4
Jun 18	1331	Meckering	80	20814	3.7
Jun 19	1520	York	49	256	1.7
Jun 21	1457	Meckering	80	21185	4.1
Aug 19	0801	Kellerberrin	150	799	3.0
Aug 31	1909	Kellerberrin	150	209	2.2
Sep 06	2025	Kalbarri	550	267	3.6
Sep 17	2047	York	49	1068	2.3
Sep 17	2303	York	49	1774	2.5
Sep 18	0008	York	49	0714	2.9
Sep 18	0714	York	49	3799	2.7
Sep 18	0725	York	49	868	2.2
Sep 18	1405	York	49	848	1.8
Sep 18	1513	York	49	180	1.6
Sep 18	1614	York	49	270	1.7
Sep 18	1730	York	49	560	2.1
Sep 18	1840	York	49	303	1.9
Sep 18	2003	York	49	253	1.7
Sep 18	2336	York	49	10475	3.1
Sep 18	2339	York	49	582	2.1
Sep 19	0444	York	49	181	1.6
Oct 01	1711	York	49		2.0
Oct 02	1933	York	49	164	1.5
Oct 11	0229	Kellerberrin	150	262	2.3
Oct 18	0528	Off Mandurah	90	6462	4.1
Oct 26	0856	Gnowangerup	280	28263	3.7
Nov 16	0622	Kellerberrin	150	1065	3.3
Nov 23	1955	Kellerberrin	150	207	2.5
Dec 14	0915	Darkan	145		2.2
1997					
Feb 18	0311	Beverley	95		1.8
Mar 07	0814	Kellerberrin	150		2.7
Mar 26	1640	Kellerberrin	150		2.8
Mar 27	0352	Kellerberrin	150		3.2
Mar 29	0725	Kellerberrin	150		2.3
Apr 09	0321	Kellerberrin	150		2.2
Apr 24	2012	Kellerberrin	150		3.2
Apr 30	0223	Kellerberrin	150		2.3
May 10	0107	Kellerberrin	150		1.7

Table 12 (cont'd)

Date	*Time ut*	*Locality*	*Dist (km)*	*Max amp(cnts)*	*Ml*
1997					
Jun 12	1447	Kellerberrin	150		2.0
Jul 08	2134	Geraqldton	440		4.2
Aug 10	0920	Collier Bay	1900		6.3
Aug 30	1945	Kellerberrin	150		2.6
Aug 31	1523	Kellerberrin	150		4.6
Sep 01	0258	Kellerberrin	150		2.9
Sep 03	0507	Kellerberrin	150		2.8
Sep 03	0512	Kellerberrin	150		4.2
Sep 05	0617	Kellerberrin	150		1.7
Sep 11	1641	Kellerberrin	150		3.3
Sep 12	0008	Kellerberrin	150		3.7
Sep 15	1218	Kellerberrin	150		2.5
Nov 08	1101	Kellerberrin	150		2.7

Table 13. Accelerogram data, 1994 -1997

Date	*Time*	*Lat°S*	*Long°E*	*ML*	*Site*	*H/E*	*C*	*T*	*Acc*
UTC						*km*		*Sec*	*mms $^{-2}$*
Western Australian Accelerograms									
94 01 17	2155	31.62	117.09	2.8	GOO	34/34	SZ	0.040	8
							SN	0.035	12
							SE	0.040	18
94 04 26	1549	30.60	118.48	4.1	CAA	128/128	PZ	0.050	6
							PN	0.080	4
							PE	0.050	5
							SZ	0.070	8
S Values may not be maximum							SN	0.050	19
							SE	0.040	12
					GOO	178/178	PZ	0.040	3
							PN	0.040	3
							PE	0.050	5
S Values are not maximum							SZ	0.050	6
							SN	0.040	8
							SE	0.040	12
94 04 30	0326	30.7	117.1	<1.0	CAA	2/.2	SZ	0.020	22
							SN	0.025	94
							SE	0.020	78
94 04 30	1628	30.7	117.1	<1.0	CAA	2/.2	SZ	0.025	15
							SN	0.030	52
							SE	0.020	64
94 04 30	1638	30.7	117.1	<1.0	CAA	2/.2	SZ	0.030	4
							SN	0.035	13
							SE	0.025	14
94 05 07	1346	31.18	117.24	2.3	GOO	44/44	SZ	0.030	2
							SN	0.030	3
							SE	0.040	3
94 05 12	2059	30.7	117.1	<1.0	CAA	2/.2	SZ	0.030	5
							SN	0.045	16
							SE	0.030	13
94 05 17	1315	30.7	117.1	<1.0	CAA	2/.2	SZ	0.040	4
							SN	0.030	16
							SE	0.020	16
94 05 17	1337	30.7	117.1	1.4	CAA	2/.2	SZ	0.040	34
							SN	0.035	154
							SE	0.020	107
94 05 18	0249	30.7	117.1	<1.0	CAA	2/.2	SZ	0.040	4
							SN	0.040	16
							SE	0.025	14
94 05 18	0317	30.7	117.1	<1.0	CAA	2/.2	SZ	0.040	4
							SN	0.025	23
							SE	0.020	20
94 06 08	0613	31.71	117.06	2.8	MEK	7/7	SZ	0.02	97
							SN	0.02	110
							SE	0.02	106
94 06 08	0613	31.71	117.06	2.8	GOO	40/40	PZ	0.035	3
							PN	0.030	3
							PE	0.030	3
							SZ	0.040	9
							SN	0.040	19
							SE	0.040	24
94 09 04	2301	30.74	117.13	1.9	CAA	2/2	SZ	0.050	29
							SN	0.050	49
							SE	0.040	51

Table 13. (Cont.)

Date	*Time*	*Lat°S*	*Long°E*	*ML*	*Site*	*H/E*	*C*	*T*	*Acc*
UTC						*km*		*Sec*	*mms^{-2}*
94 09 04	2301	30.74	117.13	1.9	CAA	2/2	SZ	0.050	29
							SN	0.050	49
							SE	0.040	51
94 09 17	1535	30.84	117.08	2.1	CAA	12/11.5	SZ	0.02	4
							SN	0.02	8
							SE	0.02	12
94 10 11	0947	30.80	117.09	1.6	CAA	9/8.5	SZ	0.04	16
							SN	0.02	59
							SE	0.02	33
94 10 14	1458	30.8	117.1	<1.0	CAA	3/3	SZ	0.025	2
							SN	0.025	7
							SE	0.025	3
94 10 16	2024	30.77	117.14	1.5	CAA	3/2.8	SZ	0.025	41
							SN	0.025	141
							SE	0.025	114
94 11 26	1416	31.81	116.92	2.7	GOO	47/47	SZ	0.030	8
							SN	0.030	9
							SE	0.030	11
94 12 01	1347	31.98	116.72	1.2	YK4	1.0/0.8	SZ	0.020	21
							SN	0.020	36
							SE	0.020	40
94 12 01	2105	31.98	116.72	1.2	YK4	1.0/0.8	SZ	0.020	29
							SN	0.020	23
							SE	0.020	19
94 12 01	2130	31.98	116.72	1.3	YK4	1.0/0.8	SZ	0.020	85
							SN	0.020	137
							SE	0.020	134
95 02 05	1614	30.88	117.06	2.9	CAA	17/17	SZ	0.090	6
							SN	0.060	8
							SE	0.060	12
95 02 05	1614	30.88	117.06	2.9	GOO	60/60	SZ	0.045	1
							SN	0.045	2
							SE	0.045	2
95 02 06	0648	30.88	117.05	1.8	CAA	17/17	SZ	0.080	1
							SN	0.060	1
							SE	0.060	2
95 02 18	1359	30.74	117.12	1.7	CAA	4/3.3	SZ	0.035	23
							SN	0.025	82
							SE	0.020	89
95 03 09	1101	30.81	117.07	2.1	CAA	10/10	SZ	0.040	23
							SN	0.020	95
							SE	0.040	96
95 03 09	2339	30.77	117.12	1.5	CAA	4/3.5	SZ	0.050	5
							SN	0.040	5
							SE	0.050	6
95 05 27	0454	30.83	117.06	2.7	CAM	2/2	SZ	0.030	1622
							SN	0.030	960
							SE	0.030	1235
95 05 27	0454	30.83	117.06	2.7	CAA	13/13	SZ	0.060	24
							SN	0.040	41
							SE	0.030	33
95 05 27	0454	30.83	117.06	2.7	GOO	65/65	SZ	0.040	6
							SN	0.036	7
							SE	0.038	8

Table 13. (Cont.)

Date	*Time*	*Lat°S*	*Long°E*	*ML*	*Site*	*H/E*	*C*	*T*	*Acc*
UTC						*km*		*Sec*	*mms $^{-2}$*
95 07 31	1548	30.79	117.10	3.5	CAS	4/4	PZ	0.033	122
							PN	-----	---
							PE	0.027	88
							SZ	0.045	265
							SN	-----	---
							SE	0.045	388
95 07 31	1548	30.79	117.10	3.5	CAA	6/6	PZ	0.035	122
							PN	0.035	55
							PE	0.040	71
							SZ	0.040	157
							SN	0.030	170
							SE	0.040	484
95 07 31	1548	30.79	117.10	3.5	CAM	7/7	SZ	0.030	565
							SN	0.030	378
							SE	0.030	674
95 07 31	1733	30.79	117.09	1.7	CAA	7/7	SZ	0.020	4
							SN	0.020	13
							SE	0.025	10
95 08 01	0239	30.79	117.09	1.9	CAA	7/7	SZ	0.020	9
							SN	0.020	27
							SE	0.030	30
95 08 02	0800	30.79	117.09	1.9	CAA	7/7	SZ	0.040	11
							SN	0.040	14
							SE	0.035	33
95 08 08	0744	(30.7	117.1)	<1.0	CAA	2/2	SZ	0.040	4
							SN	0.040	23
							SE	0.030	6
95 08 10	2013	30.73	117.15	2.0	CAA	2/2	SZ	0.040	23
							SN	0.040	99
							SE	0.030	50
95 08 11	0522	(30.7	117.1)	<1.0	CAA	2/2	SZ	0.025	14
							SN	0.030	49
							SE	0.030	29
95 08 16	2330	30.79	117.10	2.0	CAA	7/7	SZ	0.040	20
							SN	0.045	40
							SE	0.035	69
95 08 18	2336	(30.7	117.1)	1.2	CAA	2/2	SZ	0.025	21
							SN	0.025	74
							SE	0.025	52
95 08 20	1327	30.78	117.10	2.0	CAA	6/6	SZ	0.025	5
							SN	0.025	30
							SE	0.030	25
95 09 20	0002	(30.7	117.1)	<1.0	CAA	4/4	SZ	0.050	2
							SN	0.030	5
							SE	0.040	5
95 09 29	1607	30.75	117.11	1.7	CAA	4/4	SZ	0.060	3
							SN	0.050	8
							SE	0.050	7
95 10 05	0133	30.7	117.1	<1.0	CAA	8/8	SZ	0.030	9
							SN	0.020	25
							SE	0.030	17
95 10 12	1607	30.7	117.1	<1.0	CAA	8/8	SZ	0.030	7
							SN	0.020	13
							SE	0.030	11

Table 13. (Cont.)

Date	*Time*	*Lat°S*	*Long°E*	*ML*	*Site*	*H/E*	*C*	*T*	*Acc*
UTC						*km*		*Sec*	*mms $^{-2}$*
95 10 16	0345	30.7	117.1	<1.0	CAA	6/6	SZ	0.030	4
							SN	0.030	9
							SE	0.030	3
96 01 16	0647	30.73	117.08	2.0	CAA	7/7	SZ	0.040	12
							SN	0.040	64
							SE	0.040	30
96 01 21	0701	30.73	117.12	2.6	CAA	4/4	SZ	0.040	33
							SN	0.045	123
							SE	0.040	60
96 02 24	1214	30.79	117.11	2.5	CAA	6/6	SZ	0.030	26
							SN	0.030	52
							SE	0.030	80
96 03 01	0702	30.79	117.09	2.0	CAA	7/7	SZ	0.040	15
							SN	0.035	21
							SE	0.030	43
96 0302	2233	30.75	117.17	1.6	CAA	3/3	SZ	0.040	46
							SN	0.040	90
							SE	0.030	30
96 03 11	0624	31.45	117.61	2.8	CAA	90/90	SZ	0.050	0.7
							SN	0.050	1.1
							SE	0.050	1.0
96 06 18	1331	31.7	117.1	3.7	GOO	40/40	PZ	0.034	5
							PN	0.039	6
							PE	0.039	5
							SZ	0.048	21
							SN	0.035	40
							SE	0.044	35
96 06 18	1331	31.71	117.06	3.7	CAA	108/108	PZ	0.130	2
							PN	0.095	4
							PE	0.078	3
							SZ	0.186	2
							SN	0.178	4
							SE	0.184	4
96 06 21	1456	31.56	117.06	4.1	GOO	35/35	PZ	0.039	10
							PN	0.058	18
							PE	0.038	15
							SZ	0.035	48
							SN	0.037	117
							SE	0.038	140
96 06 21	1456	31.56	117.06	4.1	CAA	103/103	PZ	0.118	6
							PN	0.111	4
							PE	0.133	3
							SZ	0.198	8
							SN	0.195	12
							SE	0.135	5
96 06 21	1456	31.56	117.06	4.1	TRI	112/112	SZ	0.230	4
							SN	0.246	11
							SE	0.293	9
97 03 27	0614	31.47	117.67	3.3	CMC	93/93	PZ	0.102	1
							PN	0.102	1
							PE	0.102	0
							SZ	0.082	1
							SN	0.082	2
							SE	0.082	1

Table 13. (Cont.)

Date *UTC*	*Time*	*Lat°S*	*Long°E*	*ML*	*Site*	*H/E* *km*	*C*	*T* *Sec*	*Acc* *mms $^{-2}$*
							LZ	0.089	1
							LN	0.089	2
							LE	0.089	1
97 04 16	1724	30.75	117.13	1.7	CMC	5/4	PZ	0.023	4
							PN	0.027	5
							PE	0.023	6
							SZ	0.023	4
							SN	0.024	1
							SE	0.023	12
97 06 30	1739	30.79	117.08	1.9	CMC	4/3	PZ	0.021	39
							PN	0.021	22
							PE	0.021	21
							SZ	0.035	9
							SN	0.030	40
							SE	0.024	41
97 08 06	2032	30.79	117.09	2.1	CMC	4/3	PZ	0.021	11
							PN	0.021	9
							PE	0.021	9
							SZ	0.025	42
							SN	0.025	127
							SE	0.025	88
97 08 25	1025	30.80	117.03	1.7	CMC	4/3	PZ	0.018	34
							PN	0.018	17
							PE	0.018	16
							SZ	0.023	7
							SN	0.023	23
							SE	0.023	29
97 08 31	1523	31.45	117.68	4.6	CMC	92/92	PZ	0.367	3
							PN	0.367	3
							PE	0.367	2
							SZ	0.251	5
							SN	0.251	13
							SE	0.251	15
97 08 31	1523	31.45	117.68	4.6	KPK	110/110	SZ	0.179	5
							SN	0.179	2
							SE	0.179	3
97 08 31	1523	31.45	117.68	4.6	EPS	107/107	SZ	0.169	3
							SN	0.169	4
							SE	0.169	9
97 08 31	1550	31.45	117.68	3.6	CMC	92/92	PZ	0.029	1
							PN	0.029	1
							PE	0.029	0
							SZ	0.083	2
							SN	0.083	3
							SE	0.083	3
97 09 03	0513	31.45	117.67	4.2	CMC	92/92	PZ	0.056	4
							PN	0.056	3
							PE	0.056	1
							SZ	0.087	4
							SN	0.087	6
							SE	0.087	8
97 12 08	1738	30.75	117.17	2.7	CMC	8/8	PZ	0.027	2
							PN	0.025	5
							PE	0.022	3

Table 13. (Cont.)

Date *UTC*	*Time*	*Lat°S*	*Long°E*	*ML*	*Site*	*H/E* *km*	*C*	*T* *Sec*	*Acc* *mms $^{-2}$*
							SZ	0.036	13
							SN	0.030	29
							SE	0.019	22
97 12 08	1748	30.74	117.20	2.3	CMC	11/11	PZ	0.031	1
							PN	0.031	1
							PE	0.031	2
							SZ	0.029	6
							SN	0.023	16
							SE	0.021	12

Darwin Accelerograms

Date *UTC*	*Time*	*Lat°S*	*Long°E*	*Mag*	*Site*	*H/E* *km*	*C*	*T* *Sec*	*Acc* *mms $^{-2}$*
95 03 19	2355	4.15	135.09	7.0 Mw	DPH	1030/1030	Z		3
							N		2
							E		2
95 04 02	0521	7.48	129.44	4.8 mB	DPH	574/572	Z		2
							N		2
							E		3
95 04 25	1613	6.80	129.90	4.1 mB	DPH	640/640	Z		1
							N		1
							E		1
95 05 10	1843	7.35	129.26	4.2 mB	DPH	612/592	Z		2
							N		3
							E		5
95 05 14	1136	8.40	125.08	7.1 Mw	DPH	775/774	Z		2
							N		4
							E		3
95 05 19	1710	6.10	130.41	5.5 mB	DPH	720/706	Z		5
							N		5
							E		7
95 12 19	2333	3.70	140.30	6.2 mB	DPH	1421/1421	Z		2
							N		2
							E		5
95 12 25	0444	6.94	129.18	7.1 mw	DPH	655/638	Z		74
							N		126
							E		211
95 12 25	0444	6.94	129.18	7.1 Mw	DRS	655/638	Z		70
							N		85
							E		112
96 01 17	2237	6.12	138.58	5.8 mB	DPH	765/764	SZ	0.190	4
							SN	0.210	6
							SE	0.260	6

Table 13. (Cont.)

Date *UTC*	*Time*	*Lat°S*	*Long°E*	*Mag*	*Site*	*H/E* *km*	*C*	*T* *Sec*	*Acc* *mms $^{-2}$*
96 01 23	0029	6.55	129.41	4.7 mB	DPH	672/670	SZ	0.150	2
							SN	0.150	2
							SE	0.170	3
96 02 02	0256	7.56	127.67	4.6 mB	DPH	644/644	SZ	0.130	3
							SN	0.140	3
							SE	0.130	4
96 02 03	2346	7.40	128.38	5.0 mB	DPH	664/621	SZ	0.170	3
							SN	0.200	3
							SE	0.180	5
96 02 17	1018	6.95	125.21	5.9 mB	DPH	1035/890	SZ	0.220	2
							SN	0.230	3
							SE	0.290	2
96 03 05	2346	7.14	129.09	4.6 mB	DPH	635/617	SZ	0.220	2
							SN	0.220	2
							SE	0.220	4
96 03 15	1117	7.46	128.26	4.8 mB	DPH	640/625	SZ	0.210	2
							SN	0.210	3
							SE	0.210	5
96 03 29	1355	7.25	128.59	4.6 mB	DPH	642/630	SZ	0.200	2
							SN	0.210	2
							SE	0.210	3
96 04 02	1024	7.20	129.07	4.9 mB	DPH	620/610	SZ	0.150	2
							SN	0.140	3
							SE	0.140	4
96 04 05	1159	6.86	128.55	5.1 Mb	DPH	671/670	SZ	0.150	3
							SN	0.160	4
							SE	0.160	
96 06 17	1122	7.14	122.59	7.8 Mw	DPH	1247/1100	SZ	0.186	28
							SN	0.248	23
							SE	0.268	26
96 06 17	1122	7.14	122.59	7.8 Mw	DRS	1185/1030	SZ	0.191	14
							SN	0.273	11
							SE	0.515	12
							LZ	1.465	5
							LN	1.465	4
							LE	2.104	6
96 08 22	0535	7.12	123.38	5.8 Mw	DPH	1199/1040	SZ	0.160	3
							SN	0.220	2
							SE	0.260	2
96 08 22	0535	7.12	123.38	5.6 mB	DRS	1199/1040	SZ	0.260	1
							SN	0.260	2
							SE	0.260	2
97 01 04	1329	7.36	128.34	5.2 mB	DPH	649/631	SZ	0.249	4
							SN	0.249	4
							SE	0.249	7
97 01 04	1329	7.36	128.34	5.2 mB	DRS	649/631	SZ	0.166	3
							SN	0.166	4
							SE	0.166	5

Table 13. (Cont.)

Date	*Time*	*Lat°S*	*Long°E*	*Mag*	*Site*	*H/E*	*C*	*T*	*Acc*
UTC						*km*		*Sec*	*mms $^{-2}$*
97 01 17	1120	8.90	123.45	6.2 Mw	DPH	1039/1033	SZ	0.179	7
							SN	0.179	7
							SE	0.179	10
97 01 17	1120	8.90	123.45	6.2 Mw	DRS	1039/1033	SZ	0.208	3
							SN	0.208	4
							SE	0.208	15
97 08 10	0920	15.97	124.32	6.3 MS	DPH	830/830	SZ	0.099	13
							SN	0.124	11
							SE	0.143	16
97 08 10	0920	15.97	124.32	6.3 MS	DRS	830/830	SZ	0.125	6
							SN	0.096	13
							SE	0.164	12
97 09 06	0032	6.00	130.60	5.1 mB	DPH	769/755	SZ	0.110	4
							SN	0.110	4
							SE	0.110	4
97 09 06	0032	6.00	130.60	5.1 mB	DRS	769/755	PZ	0.266	2
							PN	0.249	4
							PE	0.249	4
							SZ	0.114	3
							SN	0.393	2
							SE	0.104	2
97 09 26	1550	5.38	128.99	6.0 Mw	DPH	818/778	SZ	0.109	2
							SN	0.100	2
							SE	0.096	2
97 09 26	1550	5.38	128.99	6.0 Mw	DRS	818/778	SZ	0.540	2
							SN	0.540	2
							SE	0.540	2
97 10 17	0055	7.29	128.90	5.3 mB	DRS	625/611	PZ	0.099	2
							PN	0.125	2
							PE	0.085	1
							SZ	0.200	2
							SN	0.200	4
							SE	0.200	8
97 11 03	1920	6.79	129.10	6.1 Mw	DPH	717/678	PZ	0.110	15
							PN	0.130	7
							PE	0.101	8
							SZ	0.223	12
							SN	0.279	21
							SE	0.291	23
97 11 03	1920	6.79	129.10	6.1 Mw	DRS	717/678	PZ	0.084	18
							PN	0.072	8
							PE	0.072	12
							SZ	0.147	13
							SN	0.269	15
							SE	0.251	30

Table 14 Data loss at Gnangara 1994 to 1997

Period					*Reason*
1994					
May 22	1655	to	May 31	0549	Electrical storm caused power outage and equipment damage.
Jun 20	2254	to	Jun 22	0552	Damage to telemetry chip on PC: Could'nt reboot after power loss.
Aug 03	1400	to		1600	
Sep 19	1325	to		1400	
Sep 20	0000	to	Sep 27	0145	(1 second data) Initial dificulties with retrieval program resulted in data being erased.
Dec 28	0000	to	Dec 31	2359	(1-second data) Power outage: system did not restart.
1995					
Jan 10					Power outage; system did not restart.
Feb 06					Power outage; system did not restart
Feb 23					Power outage; system did not restart
Mar 07		to	Mar 09		Recording disc full.
Mar 15					Power outage; system did not restart
Jul 16					Recording disc full.
Sep 07					Power outage; system did not restart
Sep 08					Recording disc full.
1996					
Feb 09	2131	to		2313	?
Mar 09	0619	to		0916	Power outage
	2300	to		2359	Power outage
Apr 11	1455	to		1512	?
May 11	0759	to	May 12	0124	Power outage
May 16	2355	to	May 17	0306	Power outage
May 30	1958	to		2359	Power outage
May 31	2303	to		2359	Power outage
Jun 16	0051	to		0635	Power outage
Jul 11	0233	to		0647	Power outage
Sep 10	0140	to	Sep 11	0026	Power outage
Sep 14	2343	to	Sep 15	0230	Power outage
Oct 04	1925	to		2055	?
Nov 11	0000	to	Nov 15	2359(F only)	Temporary variometer
1997					
Jul 19	0505	to		0729	Power outage
Sep 04	0627	to		0758	Power outage

Table 15 Gnangara - Absolute instruments

Used from	*Component*	*Instrument*	*Serial No.*	*Correction*
1986 Jan 01	H	PVM MNS-2	B/5/Z#	0.0 nT
1986 Jan 01	D	Askania	509319	0.5'
		Circle	580135	
1986 Jan 01	Z	PVM MNS-2	B/5/Z#	0.0 nT
1991 Jan 01	D & I	DIM	313837	0.0'
1991 Jan 01	F	PPM Elsec 770	215	0.0 nT
1993 May 01	H	PVM Elsec	B/212/Z#	0.0 nT
1993 May 01	D	Askania	509319	0.5'
		Circle	580135	
1993 May 01	Z	PPM Elsec 770	215	0.0 nT
1993 Sep 01	D & I	DIM	311542/213	0.0'
1993 Sep 01	F	MNS-2	5	0.0 nT
1994 Aug 08	D & I	DIM	311542/202	0.0'
1994 Sep 20	F	Elsec 770	211	0.0 nT
1994 Dec 01	F	MNS-2	1	0.0 nT
1996 Jul 31	F	MNS-2	5	0.0 nT
1996 Oct 31	D & I	DIM	311542/220	0.0'
1996 Oct 31	F	Elsec 770	214	0.0 nT
1996 Nov 20	D & I	DIM	311542/213	0.0'
1996 Nov 20	F	MNS-2	5	0.0 nT
1996 Dec 17	F	Geometrics 856	50713	0.0 nT
1996 Dec 17	D & I	DIM	311542/234	0.0'
1997 Oct 03	D & I	DIM	355937/0725H/434	0.0 nT

Table 16 Gnangara - Instruments comparisons 1994 - 1997

Date	*Instruments*	*difference*	*No. of Obs*
Instrument differences			
1994 Jul 20, 26	D.DIM 311542/213 - D.DIM 308887/220	0.22'	10
1994 Jul 20, 26	I.DIM 311542/213 - I.DIM 308887/220	-0.03'	10
1995 Apr 06	D.DIM 311542/220 - D.DIM 308887/220	0.01 +/- 0.03'	5
1995 Apr 11	D.DIM 311542/220 - D.DIM 308887/220	0.14 +/- 0.06'	16
1995 Apr 06	I.DIM 311542/220 - I.DIM 308887/220	-0.00 +/- 0.01'	5
1995 Apr 11	I.DIM 311542/220 - I.DIM 308887/220	-0.04 +/- 0.06'	16
1995 Apr 11	F.MNS/2 (1) - F.Geometrics 1024	0.6 nT	50
1995 Nov 15	F.MNS/2 (1) - F.MNS/2 (5)	1.0 nT	50
1996 Nov 15	F.MNS-2/ (5) - F.Geometrics G856/50713	-1.3 nT	20
1996 Nov 15	F.MNS-2/ (5) - F.Elsec 820/157	-2.6 nT	20
1996 Nov 15	F.MNS-2/ (5) - F.Elsec 770/214	-3.5 nT	20
1997 Jan 22	D.Dim 311542/234 - D.DIM 308887/220	0.05 +/- 0.2'	8
1997 Jan 22	D.Dim 311542/234 - D.DIM 308887/220	0.13 +/- 0.2	8
1997 Jan 22	F.Geometrics G856/50517 - Elsec 770/214	-2.1 nT	70
Pier differences			
1994 Jul 20,26	D.(Pier NE) - D.(Pier SM)	0.70'	10
	I. (Pier NE) - I .(Pier SM)	0.16'	10
1995 Apr 06	D.(Pier B) - D.(Pier NE)	1.92 +/- 0.03'	5
1995 Apr 11	D.(Pier B) - D.(Pier NE)	1.14 +/- 0.05'	16
1995 Apr 06	I. (Pier B) - I .(Pier NE)	-0.98 +/- 0.01'	5
1995 Apr 11	I. (Pier B) - I .(Pier NE)	-1.03 +/- 0.02	16
1995 Apr 11	F.(Pier B) - F (Pier NW)	23.3 nT	50
1997 Jan 22	D.(Pier B) - D.(Pier NE)	1.85 +/- 0.2'	8
1997 Jan 22	I.(Pier B) - I.(Pier NE)	-1.05 +/- 0.2'	8

Table 17 Gnangara - Azimuths of reference marks

Date	*E*	*N*
1993 Aug	165°52.8'	315°21.3'
1994 Jul 14	165°52.8'	315°21.7'
1995 Oct 25	165°52.8'	315°21.7'

Table 18. Absolute pier F survey

*D**	*N*	*NE*	*E*	*SE*	*S*	*SW*	*W*	*NW*
Gnangara (25 Mar 1995)		58,500 nT plus tabular values						
0	10.0	10.0	11.0	12.0	13.0	14.0	14.0	14.0
50	10.0	9.0	12.0	11.9	11.9	14.0	12.9	16.0
100	11.9	9.0	11.9	9.9	10.9	14.9	11.9	15.9
150	11.9	7.9	12.9	11.8	11.8	13.9	11.8	17.9
200	12.9	8.9	11.8	10.8	10.8	14.9	10.7	16.8
250	11.9	7.9	9.8	12.7	10.7	15.8	10.7	17.8
300	10.8	6.9	9.7	11.6	9.7	16.8	10.6	18.8
350	10.8	7.8	9.7	11.6	9.6	15.8	9.5	18.7
400	10.8	5.8	8.6	13.5	8.6	17.7	9.5	18.7
450	11.7	7.8	9.6	12.5	7.5	18.7	8.4	19.6
500	11.7	6.8	8.5	11.4	7.5	18.6	6.4	18.6
550	10.7	6.7	7.5	13.4	7.4	19.6	7.3	19.5
600	10.6	6.7	7.4	13.3	6.4	20.6	6.2	19.5
650	11.6	5.7	7.4	12.2	6.3	20.5	6.2	19.5
700	10.6	5.7	8.3	13.2	5.3	21.5	5.1	20.4
750	11.6	5.6	8.3	14.1	5.2	22.5	4.0	20.4
800	12.5	5.6	8.2	14.1	5.2	22.4	3.0	19.3
Learmonth (4 Apr 1995)		53,300 nT plus tabular values						
0	33.0	22.0	33.0	33.0	33.0	33.0	33.0	33.0
50	35.0	34.0	34.0	33.0	34.0	34.0	33.0	34.0
100	35.0	34.0	33.0	31.0	32.0	32.0	34.0	33.0
150	35.0	34.0	32.0	31.0	31.0	33.0	33.0	33.0
200	34.0	34.0	34.0	32.0	32.0	33.0	32.0	34.0
250	34.0	35.0	34.0	32.0	32.0	33.0	33.0	33.0
300	34.0	35.0	33.0	30.0	31.0	33.0	32.0	33.0
350	34.0	35.0	33.0	30.0	31.0	33.0	32.0	33.0
350	34.0	34.0	33.0	31.0	31.0	31.0	32.0	33.0
400	34.0	34.0	32.0	31.0	32.0	31.0	31.0	33.0
450	34.0	35.0	32.0	31.0	30.0	32.0	31.0	33.0
500	33.0	34.0	32.0	31.0	31.0	32.0	32.0	32.0
550	34.0	35.0	32.0	31.0	31.0	31.0	31.0	33.0
600	33.0	34.0	32.0	32.0	32.0	32.0	32.0	31.0
650	32.0	33.0	32.0	31.0	32.0	31.0	31.0	33.0
700	32.0	33.0	32.0	30.0	31.0	30.0	30.0	31.0
750	33.0	35.0	33.0	31.0	32.0	31.0	30.0	33.0
800	33.0	34.0	32.0	32.0	32.0	32.0	30.0	31.0

* Radial distance in millimetres from the centre of the pier at a height of 200 mm.

Table 19. Data loss at Learmonth 1994 to 1997

Period					*Reason*
1994					
Jan 01	0000	to	Jan 12	0402	F channel lost.
Feb 09	1404	to	Feb 23	0520	F channel lost.
Feb 11	2357	to	Feb 12	0008	
Mar 28	2153	to		2241	Y component contaminated.
Mar 29	0130	to		0150	Y component contaminated.
	1527	to		2003	Y component contaminated.
Mar 30	0435	to		2359	Y component contaminated.
Mar 31	0000	to		0830	Y & Z components contaminated.
May 05	1040	to	May 06	0130	Long power outage.
Aug 21	0115	to		0458	Data contaminated during maintenance.
Sep 08	0232	to		0324	Data contaminated whilst vault opened.
1995					
Jan 15	2353	to		0245	Power outage
Feb 23	1018	to		2244	Power outage
Feb 25	2202	to		2400	Power outage
Apr 16	0531	to	Apr 16	0900	Power outage ?
Aug 29	0000	to		2359	Maintenance
Aug 30	0310	to		2359	Maintenance
Nov 05	1852	to	Nov 07	0117	Unknown
Nov 22	0000	to		0245	Unknown
1996					
Mar 13	2358	to	Mar 14	0122	Computer failure
Aug 13	1048	to	Aug 14	0122	Computer failure
1997					
Neglibible					

Table 20. Learmonth - absolute instruments

Used From	*Component*	*Instrument*	*Serial No.*	*Correction*
1986 Nov 30 D	DIM	311847		0
1986 Nov 30 I	DIM	311847		0
1986 Nov 30 F	PPM	Elsec 770	189	0
1991 Aug 14 D	DIM	353758		0
1991 Aug 14 I	DIM	353758		0
1994 Apr	F	PPM Elsec 770	212	0

Table 21. Learmonth - instrument comparisons, 1994 - 1997

Date	*Instruments*			*Difference*	*No. of Obs.*
1994Aug 20,21	D.DIM353758/214	-	D.DIM308887/220	0.0' ± 1.0	10
	I.DIM353758/214	-	I.DIM308887/220	0.1' ± 1.0	10
1995 Mar 23	D.DIM353758/214	-	D.DIM308887/220	-0.2' ± 0.07	4
1995 Mar 23	I.DIM353758/214	-	I.DIM308887/220	-0.06' ± 0.01	4
1995 Mar 23	F.PPM212	-	F.PPM1024	0.15 nT ± 1 nT	70
1996 Sep 05	F.Elsec 212	-	F.Elsec 214	2.2 ± 0.5	75
Calculated differences					
1994 Aug 20, 21	F.PPM212	-	F.PPM211	0.7 ± 0.6 nT	50
1995 Mar 23	X.DIM353758/214	-	X.DIM308887/220	1.9 nT ± 0.7	4
1995 Mar 23	Y.DIM353758/214	-	Y.DIM308887/220	1.7 nT ± 0.7	4

Table 22 Learmonth - Azimuths of reference marks

Date	*Windsock*	*Optical Building*	*Sonde Tower*	*NDB Tower*	*Photo Building*
1994 Sep*	283° 02.3'	17°55.5'	-	195°52.15'	
1986 Nov 21	283° 02.3'	17°55.5'	-	195°52.3'	
1987 Oct 27	283° 02.3'	17°55.5'	-	195°52.1'	
1988 Aug 26	283° 02.3'	17°55.5'	-	-	
1994 Aug 21	283° 02.3'	17°55.5'	-	195°52.2'	
Adopted	**283° 02.3'**	**17°55.5'**	-	**195°52.3'**	