BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD

RECORD 1987/13

MUNDARING GEOPHYSICAL OBSERVATORY

ANNUAL REPORT 1985

by

P.J. Gregson, E.P. Paull, V.F. Dent, B.A Gaull, G. Woad & B.J. Page

RECORD 1987/13

MUNDARING GEOPHYSICAL OBSERVATORY

ANNUAL REPORT 1985

by

P.J. Gregson, E.P. Paull, V.F. Dent, B.A Gaull, G. Woad & B.J. Page

CONTENTS

TABLES

FIGURES

SUMMARY

Basic programmes in geomagnetism, ionospherics and seismology continued at the Mundaring Geophysical Observatory during 1985. The main instruments were an Eschenhagen normal-run magnetograph, an IPS type 4B ionosonde, a Worldwide Standard Seismograph, and a Seismic Research Observatory.

Seismographs were operated at Ballidu, Kalgoorlie, Kellerberrin, Kununurra, Marble Bar, Meekatharra, Morawa, Mundaring, Nanutarra, Rocky Gully, Narrogin and Warburton.

The annual earthquake (ML>2) list shows details of 159 Western Australian earthquakes, 75 of which occurred in the Southwest Seismic Zone. More than 450 minor earthquakes (ML<2.0) were recorded in the Southwest Seismic Zone.

Isoseismal maps were prepared for earthquakes that occurred 50 km SE of Norseman on 28 July, near Cadoux on 10 October and 27 November and in the Timor Sea on 23 October.

1. INTRODUCTION

The Mundaring Geophysical Observatory opened on 18 March 1959, and now controls seismological recording at Ballidu, Kalgoorlie, Kellerberrin, Kununurra Marble Bar, Meekatharra, Morawa, Mundaring, Nanutarra, Narrogin Rocky Gully and Warburton; magnetic recording at Gnangara and ionospheric recording at Mundaring. The seismograph at Narrogin is a Seismic Research Observatory (SRO) and is operated in co-operation with the United States Geological Survey.

Descriptions of the Observatory and an outline of activity there to the end of 1984 have been given in previous records (e.g. Gregson & others 1985) and principal events in the observatory's history are given in the Appendix 1.

P.J. Gregson, E.P. Paull, V.F. Dent, B.A. Gaull, G. Woad and B.J. Page have contributed to this report.

2. STAFF AND VISITORS

1985 observatory staff is listed in Table 1, and other personnel associated with the observatory's operations in Table 2. Staff absences, for reasons other than recreation leave are summarised in Table 3, and conferences attended and addresses given, in Table 4. P.J. Gregson was a member of the Geophysics Advisory Committee, Western Australia Institute of Technology and the seismological data base sub-committee of the Accreditation Technical Experts Natural Disasters (ATEND).

B.A. Gaull (Geophysicist Class 3) was transferred to the Observatory from Canberra on 24 October. He is assigned to the earthquake risk and prediction programs.

M.A. Bousfield (Clerical Assistant Grade 3) resigned on 18 January. The position was filled with a part-time clerical assistant (18 3/4 hours/week) and a part-time technical assistant (18 hours/week). Both these positions are temporary with the view of them becoming permanent during 1986. In addition two temporary part-time technical assistants were employed for periods of 21 and 23 weeks respectively.

Visitors to the observatory during 1985 are listed in Table 5.

3. GEOMAGNETISM

An Eschenhagen 20mm/hr magnetograph operated continuously at Gnangara recording the three components D, H, and Z. Progress on the installation of an Elsec Automatic Digital Magnetograph (ADM) continued slowly.

Eschenhagen magnetograph

The magnetograph operated satisfactorily throughout the year. There was no loss of record although there was some partial fogging on a few hours of record.

As in previous years, the Z scale value drifted during the year. It changed from 5.86 nT/mm in April to a peak in July of 6.40 nT/mm; the drift reversed between August and November.

The Z baseline values changed abruptly by about 10 nT on five occasions in March and April. These was no apparent reason for these changes. There were no abrupt changes in either H and D scale or baseline values.

Adopted scale and baseline values for 1985 are given in tables 8 and 9 respectively.

The standard deviations of the observed baseline and scale values were:

Element	Baseline value	Scale value
D	1.4nT (0.19 min)	-
H	1.14nT	0.013nT/mm
Z	1.43nT	0.033nT/mm

Values were similar to those obtained in previous years.

Eschenhagen magnetograph tests

Temperature coefficients. Values of qH = 0.0 nT/^{o}C and qZ = 3.2 nT/^{o}C derived from 1981 data and confirmed from 1982 to 1984 baseline plots were used throughout 1985.

The drift in Z scale value showed a good correlation with temperature. Least-squares analysis gave the following relation:

$SZ = SZ_{o} - 0.05(t-20)$ nT/mm

where SZ_{o} is the scale value at 20^{o}C.

Orientation. Orientation tests were carried out on all variometers on 9 July. The results shown in Table 10 are consistent with the previous test carried out on 3 August 1983.

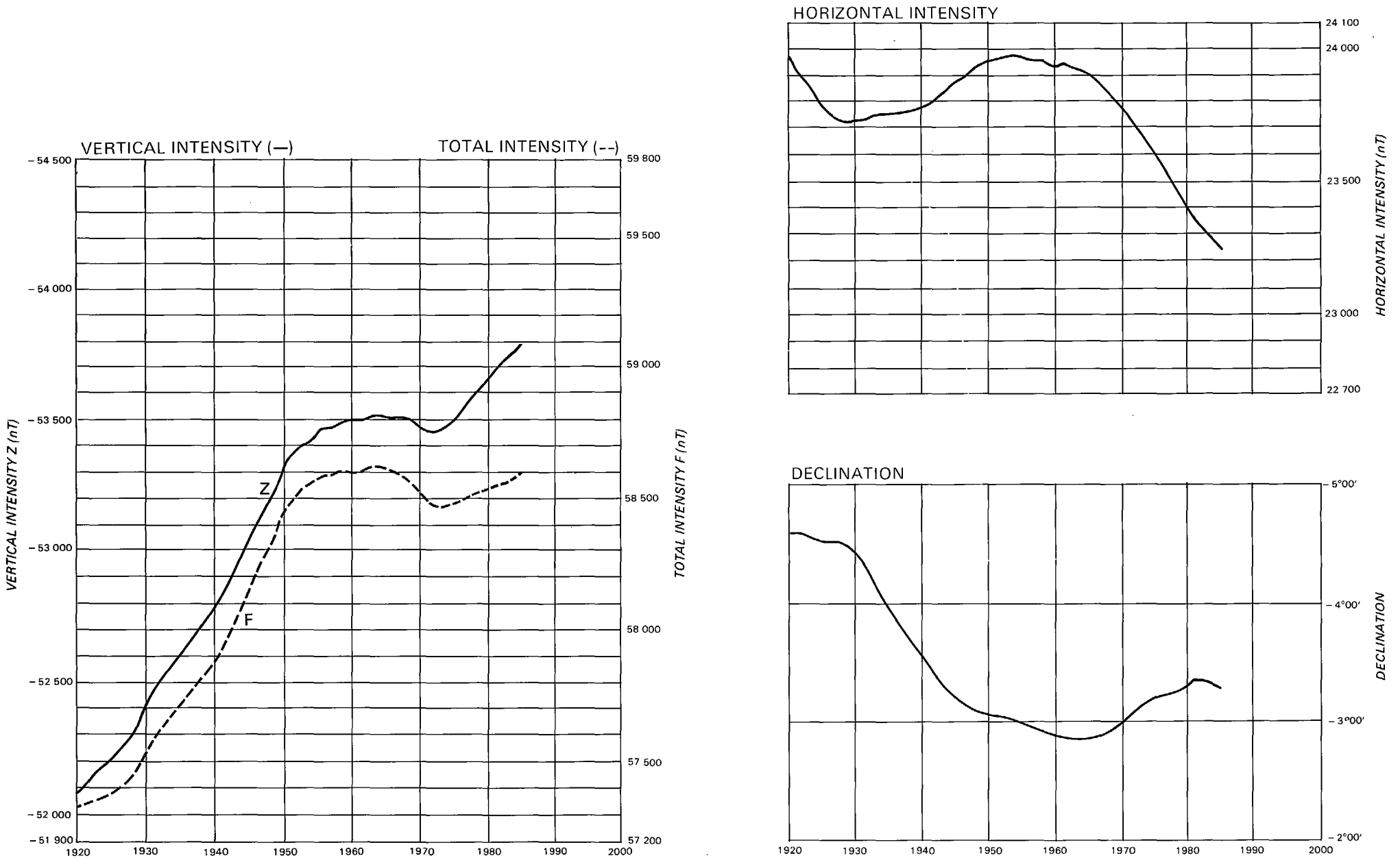
Parallax. No tests were performed during 1985 and it was assumed that the parallax remained unchanged from previous years. During 1973 it had been found that the parallax on variation trace time-mark spots (but not on baseline spots or hour lines) was zero on all components. The parallax for other time-marks can be measured from the trace time-marks.

Scale values. A magnetograph calibrator MCO2 was used in conjunction with Helmholtz coils to determine H and Z scale values once weekly. A D scale value of 1.09 min/mm was determined on 9 July.

Automatic digital magnetograph

The installation of an Elsec automatic magnetic observatory at Gnangara progressed slowly. Installation was hampered by excessive noise which contributed to scattered readings of F, D and I on successive minutes. Spurious pulses to the controller resulted in odd length blocks of data being recorded on the magnetic tape. The spurious pulses were also attributed to excessive noise. Systematic earthing of each control unit showed some improvement in readings.

A fault developed in the magnetometer necessitating it being sent to head-quarters for repair and testing. When it was returned to Gnangara other programs and insufficient technical officer time did not allow a concentrated effort to complete installation. It is planned that this should continue early in 1986.



Values before 1959 are Watheroo values adjusted to Gnangara by application of station differences: GNA–WAT = D: –14.3′; H: –918 nT; Z: – 1256 nT (D scale is equal to H, Z and F scale in nT)

Fig. 1 Geomagnetic annual mean values 1919-1985

Magnetometers

Absolute observations for D, H, and Z values were made at weekly intervals. An Askania magnetometer (S/N 309319, circle 580135) was used throughout the year for D observations. A proton vector magnetometer (PVM B/5/Z) was used for combined observations of F and Z values (cancellation method). The PVM consisted of Elsec vector coils (set B), an MNS-2 proton-precession magnetometer (S/N 5) and sensor (S/N Z). H values were calculated from F and Z values.

Preliminary corrections used during the year were:

(a) PVM B/5/Z : H OnT, Z OnT

(b) Askania declinometer 509319 (circle 580135) : +0.5 minutes.

Comparisons. No instrument comparisons were made during 1985.

Reference Marks

The relative angles between reference marks were checked on 24 August. They were consistent with previous observations. Table 11 shows the observed values since the installation of the reference marks in 1982.

Accessory equipment

The Askania H visual variograph at Mundaring office was operated throughout the year with minor record losses.

A magnetic pulsations tape recorder was operated at the Weir site for the University of Newcastle, until 28 February when it was returned to Newcastle.

Data reduction and publication

Magnetograms and reduction data were prepared in monthly batches about six weeks after the end of the month and sent to headquarters for reduction to mean hourly values.

Adopted scale values and baseline values are listed in Tables 8 and 9 respectively.

Monthly and annual mean values of H, D, Z, F and K-index for 1985 are listed in Table 6. The field values were derived from the five local quiet days each month by scaling a mean ordinate for each component from each magnetogram. The F value was calculated from H and Z values. Annual values and secular variation for all components since 1975 are shown in Table 7. Figure 1 shows the graphs of annual mean values 1919 - 1985. Apart from D, recent trends in secular variation continued during 1985 with H decreasing by 15 nT, Z decreasing in magnitude by 36 nT and the calculated mean value of F rising by 26 nT during 1985. The mean value of D became more easterly by 1.1 minutes.

The routine distribution and publication of data continued as for 1984 with the exception of weekly K-index data. K-indices for each week are now telexed to the Ionospheric Prediction Service (Sydney). They are then distributed by telex to recipients. Components of K-index are stored on magnetic tape at headquarters.

Requests for geomagnetic data attended to during the year are listed in Table 16.

4. IONOSPHERICS

A quarter-hourly sounding schedule was continued throughout the year using a model 4B ionosonde. Five minute soundings were made from 14 to 21 October to correspond with an international project. The ionosonde spare components and film were supplied by the Ionospheric

Record loss was 1.5% almost entirely caused by film jamming in the cassette and running out of film.

There were no major technical problems during the year, and only some slight adjustments to the the picture frame size and focus were necessary.

Data distribution and publication

The F2 layer critical freqency 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 telexed to the International Radio Consultative Committee (Geneva) for the determination of the index IF2. The weekly film was sent to IPS Sydney for scaling of the remaining parameters. 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.

5. SEISMOLOGY

Seismograph stations

Permanent seismograph stations were operated throughout 1985 at Ballidu (BAL), Kalgoorlie (KLG), Kellerberrin (KLB), Kununurra (KNA), Marble Bar (MBL), Meekatharra (MEK), Morawa (MRWA), Mundaring (MUN), Nanutarra (NAU), Narrogin (NWAO), Rocky Gully (RKG), and Warburton (WBN).

An insensitive seismograph was operated in the Mundaring office.

The number of earthquakes reported from each station in 1985 were:

BAL 721; KLB 987; KLG 512; KNA 1799; MBL 1468; MEK 1522;
MRWA 1147; MUN 1059; NAU 1398; NWAO 931; RKG 496; WBN 1627;
TOTAL: 13,667

A summary of seismograph calibration data used during 1985 for all stations is given in Table 13.

Brief descriptions of individual station operations during 1985 are given below and a summary of record losses in Table 12.

Ballidu (BAL). A lightning strike in March damaged the AS320 amplifier resulting in fifteen days record loss. The amplifier and 1700 Hz voltage control oscillator (VCO) were replaced on 12 April. The seismograph was recalibrated. Apart from this problem the station operated well.

Kellerberrin (KLB). This station operated satisfactorily during the year with minor record losses due to problems with DC power to the remote pre-amplifier, pen translation and line outages.

The AS330 pre-amplifier was changed to a 42.50 amplifier on 25 November. This was part of the program to standardise all outstations to 42.50 amplifiers. The seismograph was recalibrated.

Kalgoorlie (KLG). This station operated satisfactorily throughout the year. The major causes of record loss were the operator either changing the record late or not at all and mains AC power failure.

Kununurra (KNA). This station operated with a photographic recording system until 25 March. Only two components were recorded during this period as the east-west seismometer was at Mundaring for tests in preparation for converting the station to visual operation. The only operational problem during this period was with the recorder drum translation. 198 hours of record were lost as a result of this fault.

The seismograph was converted to visual operation on 27 March. The existing Geotech short-period seismometers were retained and were coupled to Geotech 42.50 pre-amplifiers feeding into Geotech AR320 amplifiers and recording on old style helicorders.

Two helicorders were used, one to record the vertical component (60mm/min) and the other to record both the horizontal components (30mm/min). Both helicorders were modified by fitting new pen motors driven by the AR320 amplifiers. Standard control equipment for time control and power supply, as used at all observatory outstations, was also installed.

A suspension spoke was broken on the E-W seismometer when repairs were being made to the vault lid. The E-W component was not recorded for 28 days while the seismometer was returned to Mundaring for repairs.

The seismograph was recalibrated at the time of conversion.

Marble Bar (MBL). The major reason of record loss at Marble Bar was failure of the DC power system at the remote site during March. The solar panels and associated metering circuits were inefficient and were replaced with a new Solarex X100GT panel.

In April existing 42.50 pre-amplifier with 1400 Hz VCO was exchanged for one with a 2040 Hz VCO and the XD410 discriminator changed with a model 46.12. These changes eliminated the excessive trace drift problems that had been experienced in 1984. The change resulted in an intermittent short term interference, the source of which could not be identified. Although annoying it did not interfere significantly with recording.

The seismograph was recalibrated.

Meekatharra (MEK). This station ran well during the year.

Morawa (MRWA). In February a lightning strike damaged the pre-amplifier. This resulted in 11 days record loss and was the major reason for record loss. Otherwise the station ran well. In July a plague of mice caused havoc in the control console. The console was mouse proofed following repairs.

Mundaring (MUN). The WWSSN seismograph continued to operate exceptionally well as in previous years. The only significant problem was failure of the SP recorder drive which necessitated the respositioning of the drive motor and clutch.

Planning and preparations commenced to telemeter data from the Mundaring Weir site to the office and record visually instead of photographically. This

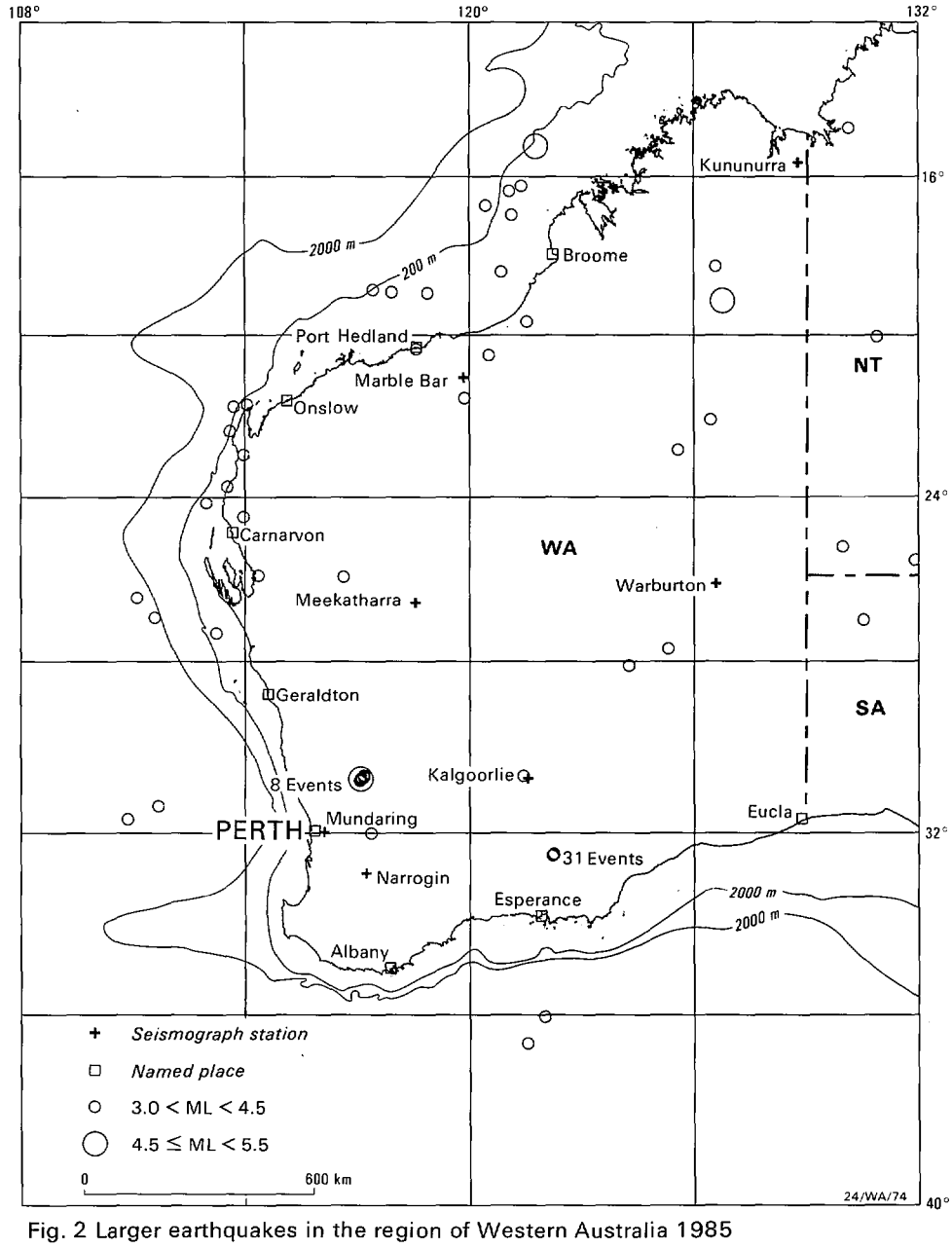


Fig. 2 Larger earthquakes in the region of Western Australia 1985

change was proposed to significantly reduce recording costs and eliminate daily visits to the Weir site.

The supplementary seismograph also continued to operate exceptionally well during the year with minimal record loss. The three channel insensitive vertical seismograph located in the office operated well during the year apart from some trace drift originating from the active filter.

Nanutarra (NAU). Late or not changing the seismogram resulted in nearly 4% record loss during the year. Time control was usually only fair. There were no major instrumental problems.

Narrogin (NWAO). This station operated exceptionally well with less than 1% record loss. The only significant equipment problem was failure of the inverter in the uninteruptable power supply.

Rocky Gully (RKG). About 2% of recording was lost resulting from late record change, clock failure, pen translation and AC power failure.

Warburton (WBN). Recording was disrupted for about five weeks after the seismometer cable was severed in September. Ten days of recording were lost when the recorder pen broke.

Accelerographs

Two MO2 accelerographs were operated near Meckering in the Southwest Seismic Zone until the 13 November. These instruments were then re-deployed to the Cadoux area in mid December. Completion date on development of a microprocessor - trigger/timer system for use in existing analogue accelerographs, in BMR workshops (Canberra) has been postponed again to early 1986.

The three accelerographs operated by Telecom in their Wellington Street Telephone Exchange, Perth were removed on 6 November. After maintenance including replacement of an IC in the time mark generator board (SMA-1 S/N 4273). They were re-installed on 4 December with new batteries and film (purchased by Telecom).

The State Public Works Department (PWD) continued to operate their accelerograph at Mundaring Weir but both instruments at the Ord River Dam are no longer serviceable.

Preparations were made for the installation in early 1986 of the first digital accelerograph purchased by BMR - an A700 from Teledyne-Geotech. A concrete pad was poured at Cumming's farm (new owner J. Kalajzic) at Cadoux.

Tabulation of location of accelerographs in 1985 are shown Table 17. There was one triggering during 1985 and data is given in Table 18.

Seismicity

Table 14 lists 159 earthquakes of magnitude ML = 2.0 or greater which occurred in Western Australia in 1985. Epicentres of those with magnitude ML = 3 or greater are shown in Figure 2.

Southwest Seismic Zone. During 1985 there were 75 earthquakes with ML $\geqslant$ 2 located in the Southwest Seismic Zone (see Figure 3). The activity was widely spread throughout the zone ranging from Morawa in the north to Merredin in the east and Dumbleyung in the south. The largest earthquake was near Cadoux on 27 November with a magnitude ML = 4.5. Thirty-two other tremors were recorded in the Cadoux area. This compares with 25 for 1984 and 57 for 1983.

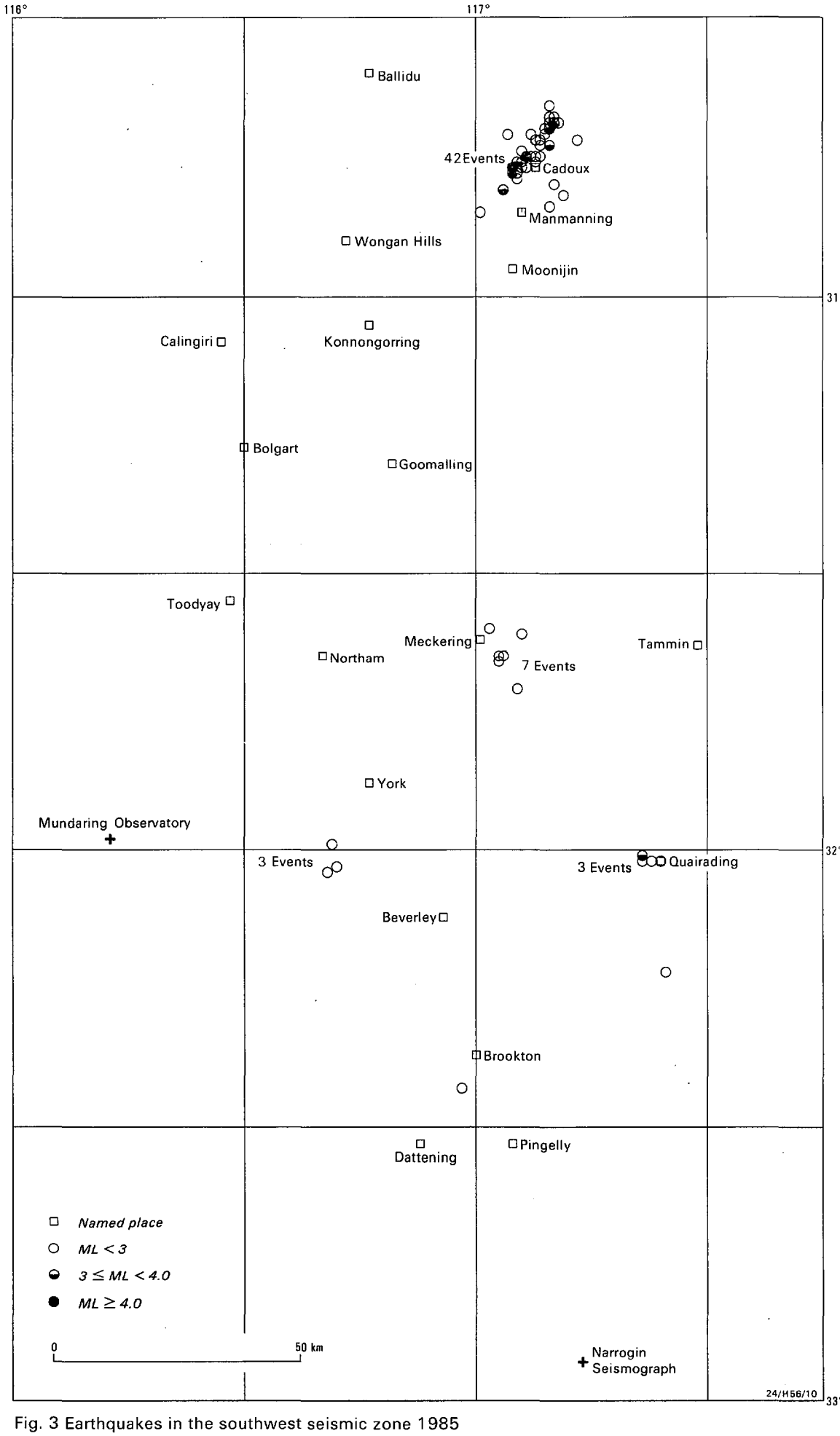


Fig. 3 Earthquakes in the southwest seismic zone 1985

Kununurra. During 1985, three small tremors (ML 1,2, 2.3, 2.4) occurred in the region of Kununurra. Two were about 100 km south and the other 13 km west of the town. The Ord River Dam lies 37 km south of Kununurra.

Offshore. Twenty-eight earthquakes were located offshore during 1985, (see Table 14) the largest being of magnitude ML = 5.3, located 300 km NNE of Broome on 13 March. There were no real concentrations of earthquakes in any area, the activity being more or less evenly spread along the coastline.

Other areas. Fifty-four earthquakes were located on land, apart from the areas mentioned above (see Table 14). The largest, with magnitude ML = 5.6 occurred on 28 July 50 km SE of Norseman. This was also the largest earthquake for the year overall. Twenty-nine aftershocks were recorded in the magnitude range ML 3.0 to 4.6.

A magnitude ML = 5.0 earthquake occurred on 23 July, 90 km WSW of Christmas Creek in the Kimberlies. By way of a contrast no aftershocks were observed.

Earthquake intensities and isoseismal maps

Isoseismal maps were prepared for four earthquakes during 1985 from information received from the distribution of questionnaires.

Maximum intensities for other felt earthquakes are shown in Table 14.

July 28 (Figure 4). At 3.39 p.m. WST (0739 UT) an earthquake of magnitude ML = 5.6 occurred 50 km south-east of Norseman in Western Australia. The earthquake was felt over a wide area of 120,000 sq km and up to 200 km from the epicentre.

Because the epicentre was remote from populated areas there was no damage recorded. The highest intensity reported was MM V at Norseman, the nearest town to the epicentre, where there were reports of small objects on shelves being shifted. One report was received from Broomhill, 450 km west of the epicentre, where it was observed that the water slopped in a fish tank located in a timber-frame house.

A hundred questionnaires were distributed but the areal coverage was poor owing to the sparseness of population. The response was about 50% from which an isoseismal map was prepared (Gregson and others, 1986).

Sixteen aftershocks of magnitude ML>3 occurred within a month, the largest two being July 28, 4.07 p.m. (0807 UT), ML = 4.5 and August 14, 12 noon (0400 UT), ML = 4.6.

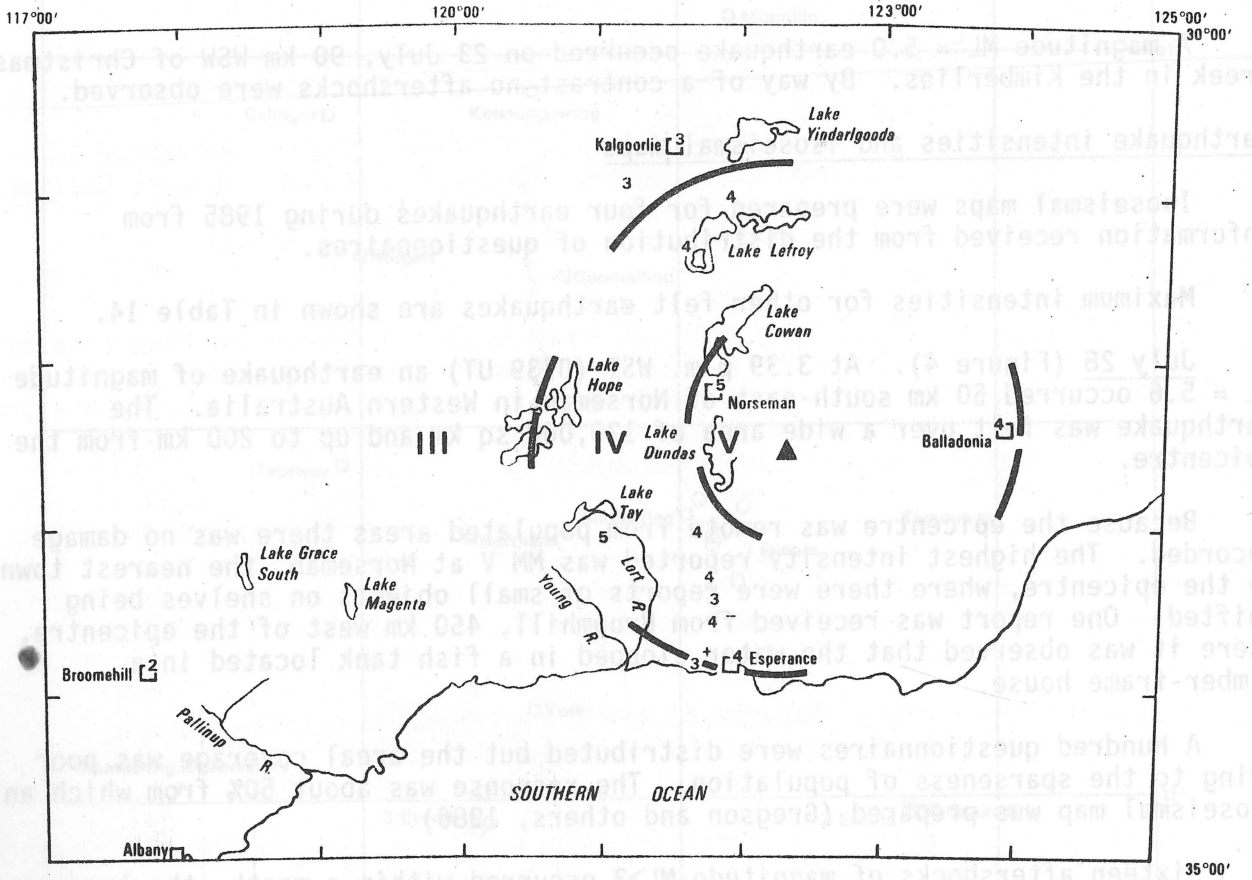
October 10 (Figure 5). At 9.34 p.m. WST (1334 UT) on 10 October an earthquake of magnitude ML = 4.3 occurred near Cadoux in the South West of Western Australia. The epicentre was 3 km north west of the Cadoux townsite.

The isoseismal map was prepared from eighty returned questionnaires and reported information.

An intensity of MMV was experienced in the Cadoux area over an area of radius 40 km. The earthquake was felt over an area of 50,000 sq km and up to 200 km to the south west (Gregson and others, 1986).

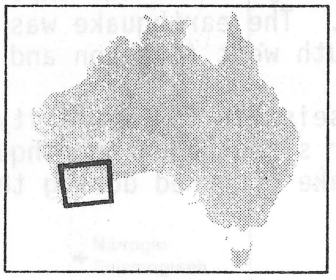
The isoseismals for intensity MMIV and MMV were significantly larger than for a similar sized Cadoux earthquake on 24 January 1982. This may be because this earthquake occurred during the evening compared with near midday for the one

ISOSEISMAL MAP OF THE NORSEMAN EARTHQUAKE, WESTERN AUSTRALIA 28 JULY 1985



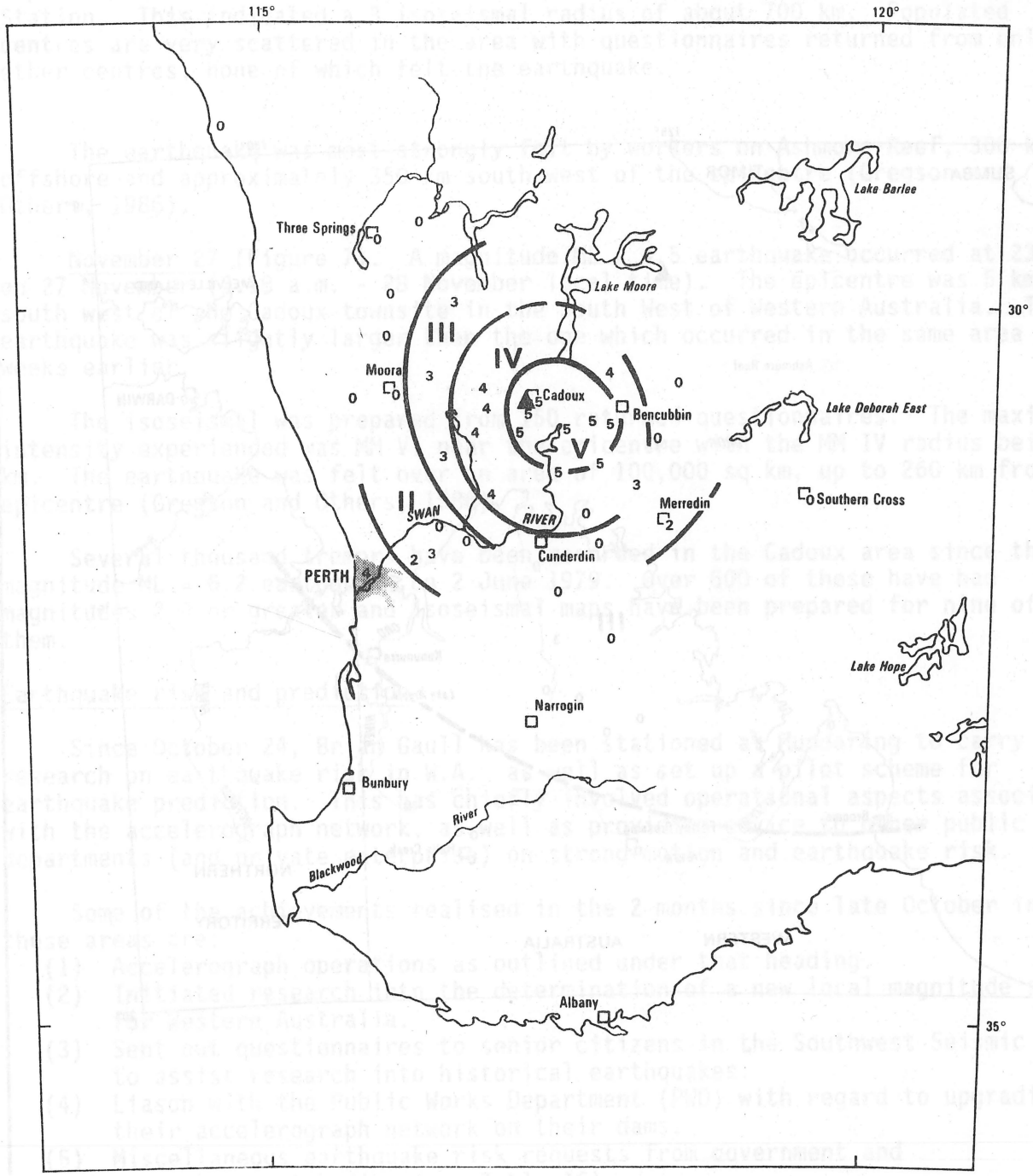
DATE : 28 JULY 1985
TIME : 07:39:47.3 UT
MAGNITUDE : 5.6 ML (MUN)
EPICENTRE : 32.51°S, 122.22°E
DEPTH : 10 km

▲ EPICENTRE
IV ZONE INTENSITY DESIGNATION (MM)



24/WA/71

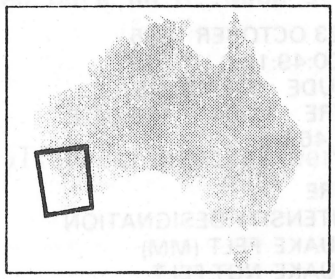
ISOSEISMAL MAP OF THE CADOUX EARTHQUAKE, WESTERN AUSTRALIA
10 OCTOBER 1985



0 200 km

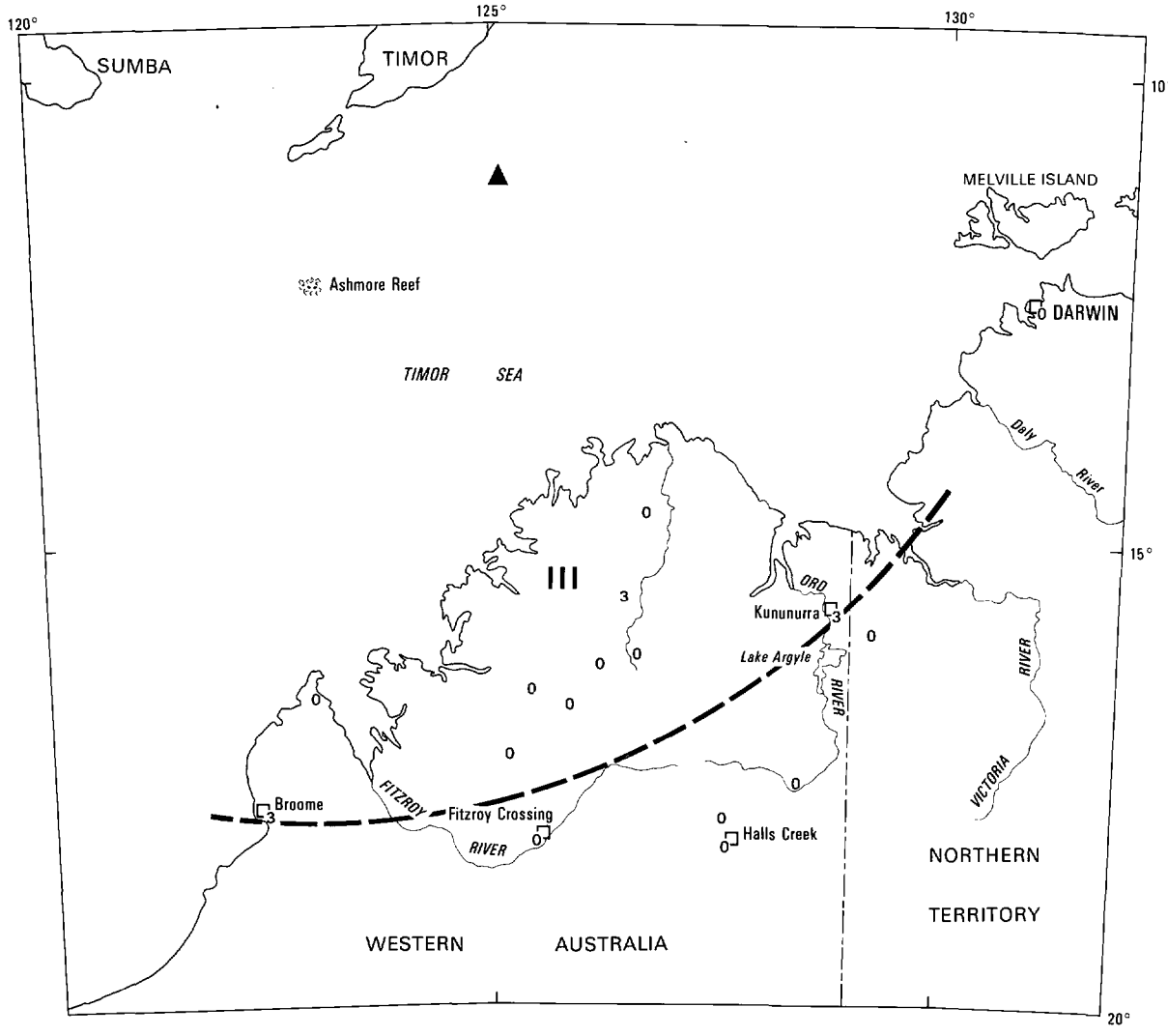
DATE : 10 OCTOBER 1985
TIME : 13:34:30.5 UT
MAGNITUDE : 4.3 ML (MUN)
EPICENTRE : 30.75°S 117.11°E
DEPTH :

▲ EPICENTRE
IV ZONE INTENSITY DESIGNATION
4 EARTHQUAKE FELT (MM)
0 EARTHQUAKE NOT FELT



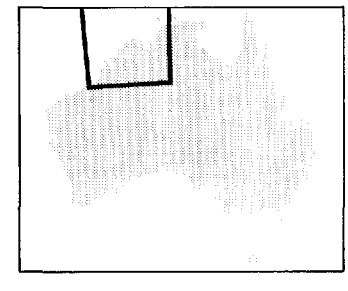
24/WA/72

ISOSEISMAL MAP OF THE TIMOR SEA EARTHQUAKE, 23 OCTOBER 1985



DATE : 23 OCTOBER 1985
TIME : 00:49:16.0 UT
MAGNITUDE : 6.0 MB (GS)
EPICENTRE : 11.04°S 125.04°E
DEPTH : 46 km

▲ EPICENTRE
IV ZONE INTENSITY DESIGNATION
4 EARTHQUAKE FELT (MM)
0 EARTHQUAKE NOT FELT



24/OA/4

in 1982. Generally people would be more active at midday and the earthquake effects may have gone unnoticed.

October 23 (Figure 6). This earthquake (MB = 6.0) located approximately 700 km north-west of Kununurra occurred at 0049 UT and was felt in the extreme north-west of Western Australia. The maximum intensity of MM 3+ on-shore was experienced at Kununurra with intensities of 3 felt at Broome and Drysdale River Station. This indicated a 3 isoseismal radius of about 700 km. Populated centres are very scattered in the area with questionnaires returned from only 13 other centres; none of which felt the earthquake.

The earthquake was most strongly felt by workers on Ashmore Reef, 300 km offshore and approximately 350 km south-west of the epicentre (Gregson and Others, 1986).

November 27 (Figure 7). A magnitude ML = 4.5 earthquake occurred at 2318 UT on 27 November (7.18 a.m. - 28 November local time). The epicentre was 5 km south west of the Cadoux townsite in the South West of Western Australia. This earthquake was slightly larger than the one which occurred in the same area seven weeks earlier.

The isoseismal was prepared from 150 returned questionnaires. The maximum intensity experienced was MM VI near the epicentre with the MM IV radius being 60 km. The earthquake was felt over an area of 100,000 sq km, up to 260 km from the epicentre (Gregson and Others, 1986).

Several thousand tremors have been recorded in the Cadoux area since the magnitude ML = 6.2 earthquake on 2 June 1979. Over 600 of these have had magnitudes 2.0 or greater and isoseismal maps have been prepared for nine of them.

Earthquake risk and prediction

Since October 24, Brian Gaull has been stationed at Mundaring to carry out research on earthquake risk in W.A. as well as set up a pilot scheme for earthquake prediction. This has chiefly involved operational aspects associated with the accelerograph network, as well as providing advice to other public departments (and private enterprise) on strong motion and earthquake risk.

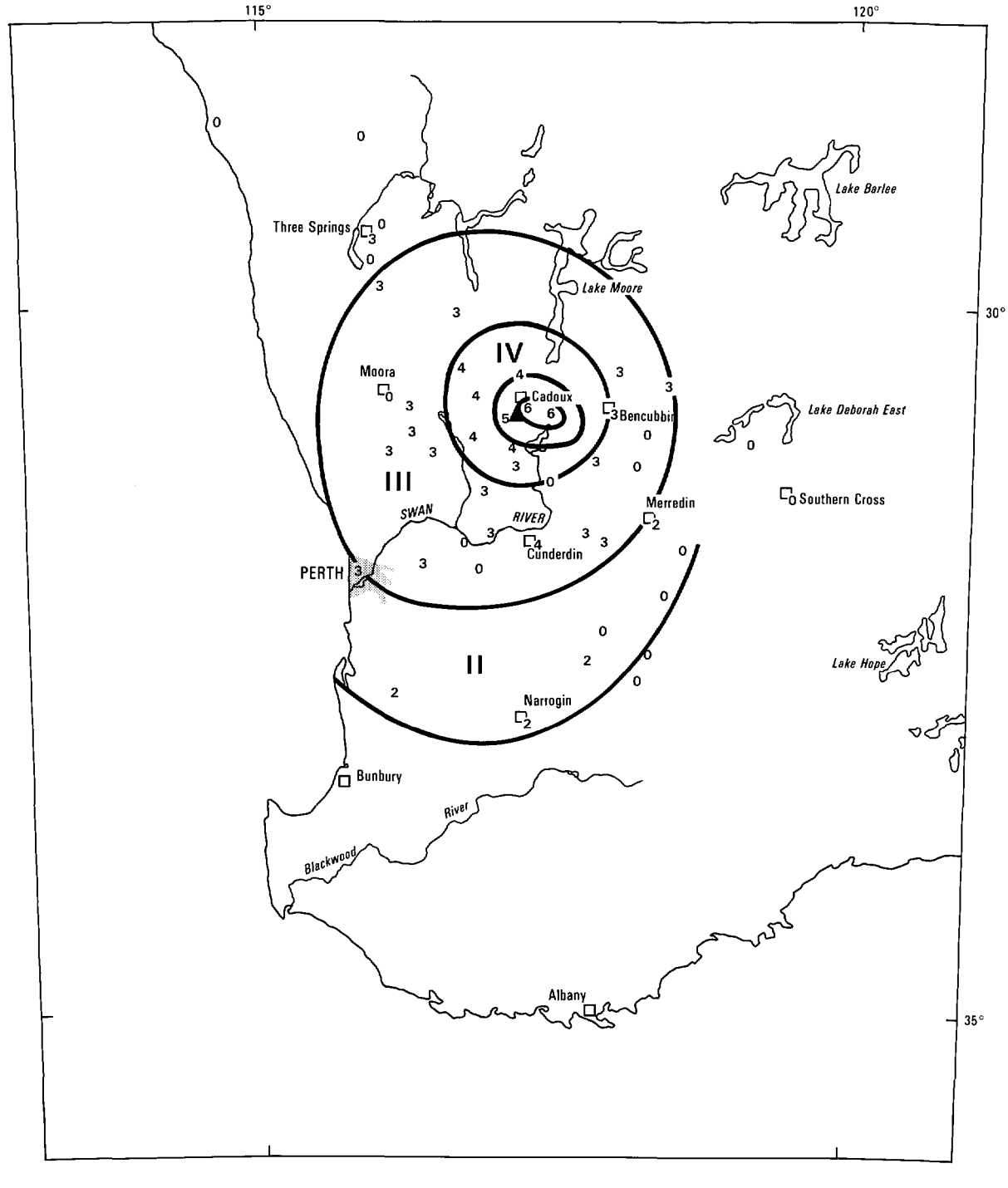
Some of the achievements realised in the 2 months since late October in these areas are:

(1) Accelerograph operations as outlined under that heading.
(2) Initiated research into the determination of a new local magnitude scale for Western Australia.
(3) Sent out questionnaires to senior citizens in the Southwest Seismic Zone to assist research into historical earthquakes.
(4) Liason with the Public Works Department (PWD) with regard to upgrading their accelerograph network on their dams.
(5) Miscellaneous earthquake risk requests from government and non-government bodies (see Table 16).
(6) Planned a combined earthquake risk - earthquake prediction study in the Cadoux region for 1986 using both seismograph and accelerograph arrays.
(7) Possible radon sampling from an abandoned bore on A. Robb's farm near Cadoux is being investigated.

Data distribution, publication and requests

Preliminary monthly lists of Western Australian earthquakes were distributed to 16 recipients.

ISOSEISMAL MAP OF THE CADOUX EARTHQUAKE, WESTERN AUSTRALIA
27 NOVEMBER 1985



0 200 km

DATE : 27 NOVEMBER 1985
TIME : 23:18:20.7 UT
MAGNITUDE : 4.5 ML (MUN)
EPICENTRE : 30.77°S 117.08°E
DEPTH :10 KM

▲ EPICENTRE
IV ZONE INTENSITY DESIGNATION
4 EARTHQUAKE FELT (MM)
0 EARTHQUAKE NOT FELT

24/WA/73

Requests for seismological data attended to during the year are listed in Table 16. Narrogin tapes were sent to ASL vis the US Consulate (Perth). Mundaring WWSS seismograms were sent to the WDC-A for copying.

6. GENERAL OPERATIONS

Computing

The Observatory has two facilities; an HP2645A terminal and a DEC350D personal computer, the latter being installed in October.

HP2645A Terminal. This terminal has two mini cartridge tape drives which use mini cartridge storage tapes. It is coupled to a STC Model 43 printer producing draft quality printouts. The terminal can be linked to the CSIRONET at Perth using a dial up modem. A link between the CSIRO and the BMR (Canberra) HP1000 computer was established in late 1983. This enabled access from Mundaring to both the CSIRO Cyber 76 and BMR HP computers.

The modem was upgraded during the year from 300 to 1200 baud rate which sped up the rate of data transmission.

DEC350D personal computer. This computer has a 10 megabyte Winchester hard disc and a floppy disc drive facility. Currently it is dedicated purely for storage and analysis of accelerogram data recorded on Geotech A700 accelerographs, and normal file storage of data and texts. It is linked to a digital LA50 printer which produces good quality printouts.

Routine seismic data. Preliminary seismic phase data is stored several times a week on HP files. Software was prepared and the phase data is automatically telexed using automatic telexing equipment installed by the Nuclear Monitoring Group. This procedure commenced routinely in February and eliminated the need to double handle the bulk of the routine seismic phase data.

Additional software was written which is used to convert the stored phase data into a format ready for use by headquarters to produce preliminary seismic bulletins.

Programs were written to allow more comprehensive checking of preliminary data. Because of the closer checking of preliminary data, final checking before distribution of data to the International Seismological Centre was discontinued.

Determination of earthquake epicentres. Development of routine procedures to locate Western Australian earthquakes using the hypoelipse program were in progress by the end of the year.

Routine files. Computer facilities are now being used for the routine storage of data and the transmission of reports. Naming conventions for routinely used files are listed in Appendix 2.

Conversion to Cyber 845 Numerous programs had been written for the Cyber 76 which was to be decommissioned in May 1985 (eventually November 1985). These programs were rewritten for use on the new Cyber 845. In addition programs written in Fortran IV were re-written in FTN77, because of the greater flexibility of the updated language.

Works program

The following works program was completed during the year.

New works.

(a) Removal of wall in the office building between "recording room" and "store" to make one larger room, "Operations". This effectively increases the recording room from 25m2 to 39m2 allowing additional space for increased recording equipment. The contents of the store have been absorbed elsewhere.

(b) Erection of a partition to divide the "library" into two rooms to cater for a smaller "library" and a "computer room".

(c) Erection of a partition in the passage return to create a small "power room" for the Seismic Research Observatory Charger/inverter console. Previously this was housed in the "store".

(d) Erection of security fencing for vehicle enclosure. This allows garaging of up to six BMR field vehicles when they are not in use in in the field.

(e) Installation of an intruder alarm in the office and workshop.

Repairs and maintenance.

(a) Partial internal painting of the office building.

(b) Internal and external painting of the residence.

(c) Replacement of two airconditioners in the workshop.

(d) Replacement of all soda acid fire extinguishers (12) which had been condemned by the fire brigade.

(e) Office cleaning is done by contract which allows six hours per week for cleaning. This is sufficient time to allow the job to be done satisfactorily.

(f) Ground maintenance is done by contract which allows six hours per week for lawn mowing, gardening etc. This is insufficient time and the standard of upkeep of the observatory grounds has deteriorated over the last five years.

Office telephone system

Details of phone numbers etc are given in Appendix 3.

Phone system. A Telecom Commander S416 intercom system is installed in the office with ten extensions. Two of these extensions, in the OIC's office and the operations room, have conference facilities.

There are four exchange lines into the commander system. The first three lines are on a exchange rotary system which automatically switches any incoming call to the first available line. The forth line is switched and is used to provide a line for a dial up link between the computer terminal and CSIRONET. It is also a guaranteed free phone in the event of emergencies when all other lines are in constant use (e.g. following an earthquake).

Outstation phones. Phones are located at the Gnangara Magnetic site, the Narrogin Seismic Research Observatory site and the Mundaring Weir Ionospheric site with an extension to the seismic vault.

Private lines. Telecom lines are used for both analog and digital telemetry for the transmission of seismic and magnetic data.

Telex. A telex machine is installed at the Mundaring Office.

7. ACKNOWLEDGEMENTS

The assistance of the daily attendants listed in Table 2 and the co-operation of Telecom for housing the seismograph at Marble Bar is hereby acknowledged. Remote seismometers and telemetry equipment were located on the properties of K. Quartermaine (Narrogin), V. Wright

8. REFERENCES

GREGSON, P.J., PAULL, E.P., DENT, V.F., WOAD, G. and PAGE, B.J., (1985) - Mundaring Geophysical Observatory, Annual Report, 1984 *Bureau of Mineral Resources Record*, 1985/

GREGSON, P.J., PAULL, E.P., GAULL, B.A., 1979 - The effects in Western Australia of a major earthquake in Indonesia on 19 August 1977. *BMR Journal of Australian Geology & Geophysics*, 4, 1979, 135-140.

EVERINGHAM, I.B., McEWIN, A.J., and DENHAM, D., 1982 - Atlas of isoseismal maps of Australian earthquakes.*Bureau of Mineral Resources, Australia, Bulletin* 214.

HEARN, S.J., and WEBB, J.P., 1984 - Continental-scale felt effects of the large Banda Sea earthquake of 4 November 1963.*Bulletin of the Seismological Society of America*, 74(1), 349-351.

APPENDIX
PRINCIPAL EVENTS
MUNDARING GEOPHYSICAL OBSERVATORY 1957-1985

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 magetograph replaced La Cour at Gnangara
1960 May 01	Cossor ionosonde replace Type 2
1960 Jun 22	Absolute magnetic observations commenced in new absolute house
1962 Jun	WWSS system commenced recording at MUN
1963 Apr19-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 Nov 16-1971 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 zone 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, Dec 18, 1981 Jul 20	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 SP-Z 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

APPENDIX 1 (Contd)

1980 Jun 19	NAU SP-Z recording commenced
1981 Aug 07-1982 Mar 27	BAL SP-Z recording
1981 Sep 23	KLB SP-Z recording commenced
1981 Nov 19-1982 Jun 27	Walpole SP-Z field recording
1982 Aug 26	BAL SP-Z recording commenced
1983 Aug 03	RKG SP-Z recording commenced
1984 Jun 21	MRWA SP-Z recording commenced

APPENDIX 2
STANDARD HP FILE NAMES

1. PRELIMINARY SEISMIC DATA

WAMMNN:109:53
MM = Month JA, FE, MA, AP, MY, JN, JY, etc
NN = Consecutive Number

2. LOCAL EARTHQUAKES

WAEQMM:109:53
MM = Month as above

3. EARTHQUAKE DATA FILE

WAEQYA:109:53
Y = Year, e.g. 1985 = 5
A or B = first or second six months

4. WEEKLY REPORT

MGOWRN:150:9
N = Consecutive number 1-9

5. EXPENDITURE STATEMENT

MGOXMM:150:9
MM = Month as for 1 above

MGOXYY:150:9
YY = Year, e.g. 1985/86 = 85
Details of expenditure

6. ANNUAL REPORTS

MGOYYA:150:53
YY = Year, e.g. 84, 85 etc

A = TEXT
B = TABLES
C = CONTENTS

MGYYAL:150:53
is file formatted for laser 2 printer

7. AUSTRALIAN SEISMOLOGICAL REPORTS

SEIYYA:150:53

YY = YEAR
A = TEXT
B = TABLES
C = CONTENTS

SEYYAL:150:53
is file formatted for laser 2 printer

APPENDIX 3

MUNDARING GEOPHYSICAL OBSERVATORY

PHONE NUMBERS

1. Mundaring Office

Line 1	(09) 2951030
Line 2	(09) 2951979
Line 3	(09) 2951555
Line 4	(09) Silent number

2. Outstations

Gnangara magnetic site	(09) 2964175
Ionospheric house weir site	(09) 2951590
Narrogin SRO site	(098) 811379

3. Private lines

Narrogin to Mundaring office	N9100281
Kellerberrin to Mundaring office	(N91111901
Ballidu to Mundaring office	(N91111902
	(N91111903
Marble Bar Airport to townsite	N9500400
Gnangara to Mundaring office	N9100355
Weir site to Mundaring office	N9100229
Weir site to Mundaring office	N9304597D
Kalgoorlie NTS to Kalgoorlie Airport	N9600613

4. Telex

Answer back code BUMIN	AA93876

5. SEC Account Numbers

Mundaring office	410M55162
Mundaring residence	410M55163
Mundaring Weir site	)10M2792
	)10M3228
Narrogin SRO site	10M119568A
Gnangara	sub/account from Forest Dept

TABLE 1

OBSERVATORY STAFF 1985

Officer	Designation
P.J. Gregson	Geophysicist Class 3
E.P. Paull	Geophysicist Class 2
V.F. Dent	Geophysicist Class 2
B.A. Gaull	Geophysicist Class 3 (from 24 Oct)
G. Woad	Senior Technical Officer Gr. 1
B.J. Page	Technical Officer Grade 2
M.A. Bousfield (Mrs)	Clerical Assistant Grade 3 (to 18 Jan)
Y.M. Moiler	Clerical Assistant Grade 3 (18 3/4 hrs part-time from 14 Jan)
H.L. Masters (Mrs)	Technical Assistant Grade 2 (18 hrs part time 29 Jan-19 Jul)
S.R. Field	Technical Assistant Grade 2 (18 hrs part-time from 22 Jul)
L.A. Van Reeken	Technical Assistant Grade 2 (18 3/4 hrs part-time 22 Jul-24 Dec)
R.W. Berkavicius	Technical Assistant Grade 2 (18 hrs part-time 22 Jul-16 Aug)
C.L. Ashman	Technical Assistant Grade 2 (18 hrs part-time 28 Aug-24 Dec)

TABLE 2

ASSOCIATED PERSONNEL 1985

Name	Nature of Duties
B. Carling	Daily attendant, Gnangara
G. McLauchlan	Daily attendant, Kalgoorlie (to 3 Aug)
P. East	Daily attendant, Kalgoorlie (from 4 Aug)
A. Mead	Daily attendant, Marble Bar
A. Riach	Daily attendant, Meekatharra (to 20 Feb)
D. Maley	Daily attendant, Meekatharra (from 21 Feb)
L. Makin	Daily attendant, Kununurra (to 31 Mar)
H. Horne	Daily attendant, Kununurra (1 Apr-30 Nov)
C. McKaay	Daily attendant, Kununurra (from 1 Dec)
D. Hosking	Daily attendant, Nanutarra
D. Hart	Daily attendant, Morawa
J. Capps	Daily attendant, Warburton
S. Cameron	Daily attendant, Rocky Gully
B. Bussau	Ground maintenance (to 30 April)
W. Briggs	Ground maintenance (from 1 May)
L. Page	Cleaning
A. Spice	Work experience Oct 14-25 (Eastern Hills Senior High School)

TABLE 3

OBSERVATORY STAFF ABSENCES 1985

Nature of absences	No. of man-days
Sick leave	32
Special leave	2
Furlough	11
Military leave	22
Attendance at outstations and field operations	39
Conferences and training	30
Total	142

TABLE 4

CONFERENCES, ADDRESSES AND TRAINING, 1985

Officer	Date	Conference
P.J. Gregson	Apr 17	"Understanding earthquakes" GSWA Seminar, Perth
	May 8-17	Geomagnetic workshop, Canberra
	Jun 27, Sep 18	Archives course & workshop, Perth
	Sep 02-06	Rheology of lithosphere & earthquake symposium, Canberra
E.P. Paull	Apr 17	"Understanding Earthquakes" GSWA Seminar, Perth
	Jul 01	Ionospheric Prediction Service Users conference, Perth
V.F. Dent	Apr 17	"Understanding Earthquakes" GSWA Seminar, Perth
	Sep 02-05	Rheology of lithosphere & earthquake symposium, Canberra
		Addresses
P.J. Gregson	Apr 17	GSWA Seminar, Perth "What are Earthquakes"
	Jul 29	Mosman Park Rotary Club, "Earthquakes"
	Sep 05	Earthquake symposium, Canberra "Historical Overview of Southwest Seismic Zone"
E.P. Paull	Feb 14	State Emergency Service "Earthquake hazards"
		Committees
P.J. Gregson		Geophysics Advisory Committee, Western Australian Institute of Technology
P.J. Gregson		Seismological data base sub-committee of the Accreditation Technical Natural Disasters (ATEND)
		Training
V.F. Dent	Feb 11-22	Computer course, Canberra
G. Woad	Jun 16-21	Headquarters, Canberra

TABLE 5

VISITORS 1985

Visitor	Institution
B. Myers	WA Water Authority
R. Stone	WA Water Authority
J. Denny	WA Water Authority
D. Goldstraw	WA Water Authority
T. Jones	BMR
G. Young	BMR
G. Feasey	BMR
M. McElhinny	BMR
B. Slater	Dept Local Goverment & Administrative
P. Veryard	" Services
A. Palmer	"
I. Everingham	Dept of Mines, Fiji
B. Hearn	Macquarie Island operator
J. Hamilton	Teledyne Geotech, USA
W. Strong	Teledyne Geotech, USA
J. Smith	Teledyne Geotech, USA
J. Rickards	Teledyne Geotech, Melbourne
30 students	Lesmurdie High School
20 students	Balcatta Senior High School
15 students	PEAC group Maddington
60 students	Swan View Senior High School
40 persons	"Livingtime", Floreat
15 students	PEAC, Bunbury

TABLE 6

PRELIMINARY MONTHLY MEAN GEOMAGNETIC VALUES AND K-INDICES, 1985

Month	D(West)	H,nT	Z,nT	F,nT	K
	o '				
January	3 19.1	23268	53767	58585	2.38
February	18.5	261	763	580	2.15
March	18.7	262	761	578	1.80
April	18.4	264	769	586	2.29
May	18.0	261	770	586	1.50
June	17.8	258	772	586	1.75
July	17.5	247	771	581	2.04
August	17.9	257	772	586	1.91
September	17.5	254	778	590	1.92
October	17.3	250	779	590	2.10
November	17.4	258	777	591	2.22
December	16.6	257	788	600	2.15
Mean	3 17.9	23258	53772	58587	2.02

TABLE 7

GEOMAGNETIC ANNUAL MEAN VALUES (AND SECULAR CHANGE) 1975-1985

Year	D	I	H,nT	X,nT	Y,nT	Z,nT	F,nT	Notes
	o '	o '						
1975	3 11.5	66 11.3	608	571	-1314	496	474	C
	(-0.9)	(-2.9)	(-48)	(-41)	(- 4)	(-32)	(+12)	
1976	12.4	14.2	567	530	-1318	528	486	C
	(-0.8)	(-2.8)	(-49)	(-39)	(- 6)	(-29)	(+11)	
1977	13.6	17.0	528	491	-1324	557	497	C
	(-1.5)	(-2.5)	(-47)	(-48)	(- 8)	(-39)	(+17)	
1978	15.1	20.5	481	443	-1332	596	514	C
	(-0.6)	(-2.6)	(-37)	(-38)	(- 7)	(-28)	(+11)	
1979	16.5	23.1	444	405	-1339	624	525	C
	(-1.3)	(-2.6)	(-33)	(-35)	(- 7)	(-28)	(+11)	
1980	17.8	25.7	409	370	-1346	652	536	C
	(-2.1)	(-3.2)	(-45)	(-45)	(-12)	(-33)	(+14)	
1981	19.9	28.9	364	325	-1358	685	550	D
	(+0.4)	(-3.0)	(-43)	(-43)	(+5)	(-29)	(+ 8)	
1982	19.5	31.9	321	282	-1353	714	558	D
	(+0.2)	(-1.8)	(-27)	(-27)	(+ 3)	(-16)	(+ 4)	
1983	19.3	33.7	294	255	-1350	730	562	D
	(+0.3)	(-1.6)	(-21)	(-21)	(+ 4)	(-22)	(+14)	
1984	19.0	35.3	273	234	-1346	752	574	D
	(+1.1)	(-1.7)	(-15)	(-15)	(+ 8)	(-36)	(+26)	
1985	17.9	37.0	258	219	-1338	788	600	D

Notes: C Preliminary values = Mean daily values, 10 days
D Preliminary values = Mean daily values, 5 days

TABLE 8

ADOPTED SCALE VALUES, GNANGARA MAGNETOGRAPH 1985

Date from	UT h	UT m	Scale Value	Explanation
HORIZONTAL INTENSITY			So (nT/mm)	
Jan 01	00	00	2.42	
Mar 16	00	00	2.43	
Aug 01	00	00	2.44	
DECLINATION			SD (min/mm)	
Jan 01	00	00	1.09	
VERTICAL INTENSITY			SZ nT/mm)	
Jan 01	00	00	6.10	
Jan 11	00	00	6.08	
Jan 21	00	00	6.06	
Feb 01	00	00	6.04	
Feb 11	00	00	6.02	
Feb 21	00	00	6.00	
Mar 01	00	00	5.98	
Mar 11	00	00	5.96	
Mar 20	00	00	5.94	
Mar 23	00	00	5.92	
Mar 26	00	00	5.90	
Mar 29	00	00	5.88	
Apr 01	00	00	5.86	
Apr 21	00	00	5.90	
Apr 26	00	00	5.92	
May 09	00	00	5.94	Drift due to temperature through to Jul 05
May 11	00	00	5.96	
May 13	00	00	5.98	
May 15	00	00	6.00	
May 17	00	00	6.02	
May 19	00	00	6.04	
May 21	00	00	6.06	
May 23	00	00	6.08	
May 25	00	00	6.10	
May 27	00	00	6.12	
May 29	00	00	6.14	
May 31	00	00	6.16	
Jun 02	00	00	6.18	
Jun 04	00	00	6.20	
Jun 06	00	00	6.22	
Jun 08	00	00	6.24	
Jun 10	00	00	6.26	
Jun 19	00	00	6.28	
Jun 22	00	00	6.30	
Jun 25	00	00	6.32	
Jun 28	00	00	6.34	
Jul 01	00	00	6.36	
Jul 04	00	00	6.38	

TABLE 8 (Contd)

Jul 07	00	00	6.40	
Sep 01	00	00	6.38	Drift due to temperature through to Nov 15
Sep 06	00	00	6.36	
Sep 11	00	00	6.34	
Sep 16	00	00	6.32	
Sep 21	00	00	6.30	
Sep 26	00	00	6.28	
Oct 01	00	00	6.26	
Oct 06	00	00	6.24	
Oct 11	00	00	6.22	
Oct 16	00	00	6.20	
Oct 21	00	00	6.18	
Oct 26	00	00	6.16	
Oct 29	00	00	6.14	
Nov 01	00	00	6.12	
Nov 04	00	00	6.10	
Nov 07	00	00	6.08	
Nov 10	00	00	6.06	
Nov 13	00	00	6.04	
Dec 01	00	00	6.02	

TABLE 9

ADOPTED BASELINE VALUES (UNCORRECTED) AT 20 ^{o}C

GNANGARA MAGNETOGRAPH 1985

Date 1983	UT h	m	Baseline Value	Explanation
HORIZONTAL INTENSITY			BHs (nT)	
Jan 01	00	00	23232	
Feb 01	00	00	23233	
Feb 06	00	00	23234	
Feb 11	00	00	23235	
Feb 26	00	00	23234	
Mar 01	00	00	23233	
Mar 06	00	00	23232	
Apr 01	00	00	23231	
Apr 11	00	00	23230	
Apr 21	00	00	23229	
May 01	00	00	23228	
Jun 01	00	00	23229	
Jun 06	00	00	23230	
Jun 11	00	00	23231	
Sep 01	00	00	23230	
Oct 01	00	00	23229	
Nov 16	00	00	23228	
Dec 16	00	00	23227	

TABLE 9 (Cont)

DECLINATION			BD (W)	
Jan 01	00	00	3 03.8	
Jan 16	00	00	3 03.7	
Feb 01	00	00	3 03.6	
Apr 01	00	00	3 03.7	
May 16	00	00	3 03.6	
May 21	00	00	3 03.5	
May 26	00	00	3 03.4	
Jun 01	00	00	3 03.3	
Aug 01	00	00	3 03.4	
Aug 06	00	00	3 03.5	
Aug 11	00	00	3 03.6	
Sep 05	00	00	3 03.5	
Sep 09	00	00	3 03.4	
Sep 13	00	00	3 03.3	
Sep 17	00	00	3 03.2	
Sep 21	00	00	3 03.1	
Sep 25	00	00	3 03.0	
Sep 29	00	00	3 02.9	
Oct 03	00	00	3 02.8	
Nov 01	00	00	3 02.9	
Nov 11	00	00	3 03.0	
Nov 21	00	00	3 03.1	
Dec 01	00	00	3 03.2	

VERTICAL INTENSITY			BZs (nT)	
Jan 01	00	00	53410	
Feb 11	00	00	53409	
Feb 21	00	00	53408	
Mar 25	06	00	53415	Unknown
Mar 26	03	00	53422	Unknown
Mar 30	03	00	53431	Unknown
Apr 09	10	00	53428	Unknown
Apr 24	01	00	53437	Unknown
May 06	00	00	53436	
May 08	00	00	53435	
May 10	00	00	53434	
May 12	00	00	53433	
May 14	00	00	53432	
May 16	00	00	53431	
May 18	00	00	53430	
May 20	00	00	53429	
Jun 06	00	00	53428	
Jun 11	00	00	53427	
Jun 16	00	00	53426	
Jun 21	00	00	53425	
Jul 01	00	00	53424	
Aug 01	00	00	53425	
Oct 01	00	00	53426	
Nov 01	00	00	53427	
Dec 01	00	00	53426	

TABLE 10

ORIENTATION TESTS 1985

Component	Reference	Magnet	Orientation	N Pole
9 July				
H	23247 nT	East	0.2°	S
D	3° 17.5'	North	0.2°	W
Z	53771 nT	North	0.5°	Up

TABLE 11

AZIMUTHS OF REFERENCE MARKS

	E	SE	SW	N
	Datum*	Temporary	Permanent	Permanent
Distance from NE pier	70m	30m	85m	130m
Resolution 1mm	0.05'	0.09'	0.04'	0.25'
Date	Azimuth from NE pier			
	° '	° '	° '	° '
1982 Aug 11	77 23.6	150 28.4	198 59.0	03 10.4
1982 Sep 20	77 23.6	150 28.4	198 59.4	03 10.6
1982 Oct 07	77 23.6	150 28.4	198 59.4	03 10.4
Adopted	77 23.6	150 28.4	198 58.4	03 10.4
1983 Aug 24	77 23.6	150 28.4	198 59.3	03 10.3
1985 Aug 21	77 23.6	150 28.4	198 59.2	03 10.3

*Azimuth determined by Australian Survey Office during 1982.
All other azimuths are relative to this value.

TABLE 12

SEISMOGRAPH RECORD LOSS, 1985 - HOURS

REASONS

A	Late or no change	F	Recorder failure	K	Maintenance
B	Pen/drum translation	G	Clock failure	L	Other
C	Pen pressure or heat	H	DC Power	T	Total
D	Pen broken/Globe blown	I	AC Power		
E	Amplifier failure	J	Line outage		

STATION	A	B	C	D	E	F	G	H	I	J	K	L	T	%	
VISUAL															
BAL Z				21					10		2	361	417	4.7	
KLB Z		19		2		6		72	11	23	4		137	1.6	
KLG Z	65			7		16			46		5		139	1.6	
KNA Z)		145	29	46			36	40	48	60	50		454	5.2)	
KNA N)		120					36	40	48	21	50		315	3.6)	6.3
KNA E)				24			36	40	48	21	50	672	891	10.1)	
MBL Z	63		25	25	23			306	37			13	467	5.3	
MEK Z		38	32	1					10		10		91	1.0	
MGO Z				3					19				22	0.3	
MRWA Z		8			294				34		5		345	3.9	
NAU Z	328								20		1		349	4.0	
NWAO SPZ)			16					2	13	13			44	0.5)	
NWAO LPZ)								2	13	13			28	0.3)	0.4
NWAO LPN)								2	13	13			28	0.3)	
NWAO LPE)								2	13	13			28	0.3)	
RKG Z	50		40			11	63		37		2		203	2.3	
WBN Z	2		255						2			883	1140	13.0	
PHOTOGRAPHIC															
MUN SP Z)						40					33		73	0.8)	
N)						40					33		73	0.8)	
E)						40					33		73	0.8)	
														)	0.6
MUN LP Z)											33		33	0.4)	
N)											33		33	0.4)	
E)											33	1	34	0.4)	
HG Z											14		14	0.2)	
WA N											14		14	0.2)	0.3
WA E				21							14		35	0.4)	
	508	324	397	152	317	153	171	506	422	177	414	1929			

TABLE 13

SEISMOGRAPH CALIBRATION DATA 1985

MAGNIFICATION (x1000)

SHORT PERIOD

PERIOD (Second) STATION	0.1	.15	0.2	.25	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
BAL Z to 01 May	273	381	334	270	233	172	127	95	75	56	44	34
BAL Z fm 02 May	175	235	259	236	213	145	91	58	37	24	16	10
KLB Z to 24 Nov	200	260	240	194	160	120	89	69	52	41	31	26
KLB Z fm 25 Nov	200	426	475	438	376	262	183	130	92	66	43	37
KLG Z		10	174	270	238	184	144	112	87	66	54	43
KNA Z to 25 Mar	80	145	165	155	130	90	70	47	35	27	21	18
KNA Z fm 26 Mar	135	187	200	187	164	118	86	65	49	37	28	21
KNA N,E to 25 Mar	25	32	34	34	32	27	22	18	15	12	10	7.8
KNA N,E fm 26 Mar	36	54	61	62	58	48	39	32	27	22	19	16
MBL Z to 31 Mar	1260	940	800	605	460	240	130	88	54	40	26	24
MBL Z fm 01 Apr	480	800	863	827	733	510	352	247	173	130	92	68
MEK Z	449	452	402	348	305	236	192	156	126	98	75	60
MRWA Z to 20 Feb	662	730	731	655	570	434	349	274	216	177	130	103
MRWA Z fm 21 Feb	56	112	136	144	140	120	96	80	68	52	44	36
MRWA Z fm 20 Mar	650	878	974	926	808	556	364	240	156	105	72	47
MGO	2.60	3.03	2.98	2.97	2.97	2.87	2.59	2.25	1.89	1.70	1.40	1.11
MUN**Z,N,E	3	6	10	14.5	20	31	39	41	40	36	31	25
MUN HGZ	406	380	338	324	326	318	207	101	55	31	21	14
MUN WA	2.05		2.05		1.98	1.83	1.68	1.50	1.35	1.21	1.06	0.95
NAU Z		27	340		432	318	222	150	92	57	38	28
NWAO*Z	30	110	193	238	260	242	190	150	120	90	70	50
RKG Z to 12 Mar	272	316	308	270	204	123	80	52	34	24	16	11
RKG Z fm 13 Mar	544	632	616	540	408	246	160	104	68	48	32	22
WBN Z	670	788	750	670	595	436	319	230	173	127	95	72
WA (STANDARD)	2.77		2.75		2.65	2.43	2.25	2.03	1.82	1.61	1.43	1.27

LONG PERIOD

PERIOD (Second) STATION	8	9	10	15	20	25	30	40	50	60	80	100
MUN**Z,N,E	.31	.34	.36	.375	.34	.28	.25	.18	.14	.11	.08	.06
NWAO*Z,N,E	.32	.50	.82	2.3	4.1	5.0	5.0	4.0	3.3	2.0	1.0	.50

* Seimic Research Observatory
** World Standard Seismograph

TABLE 14

EARTHQUAKES IN THE REGION OF WESTERN AUSTRALIA 1985

DATE	ORIGIN UT	LAT S (°)	LONG E (°)	DEP KM	MAG	LOCALITY	N	A
JAN 08	102715	16.37	121.07	37R	4.0 ML	210km NW Broome	9	C
14	192736.5	22.18	114.73	10G	2.5 ML	65km ESE Exmouth	3	C
14	211620.2	16.49	128.48	10G	2.0 ML	90km SSW Kununurra	2	C
25	105129.5	33.45	117.17	5	2.3 ML	17km SE Arthur River	5	B
FEB 03	093708.2	30.70	117.16	10G	2.1 ML	7 km NNE Cadoux	3	A
06	070138.3	30.71	117.12	10G	2.0 ML	Cadoux	4	A
09	170526.5	30.73	117.16	10G	3.0 ML	5 km NNE Cadoux	7	A
10	155903	25.23	129.97	10G	3.4 ML	70 km E Mt Olga (NT)	6	B
10	193315.6	32.35	117.13	10G	2.0 ML	12 km E Brookton	3	B
13	212121.4	20.04	130.89	10G	3.2 ML	80 km NE The GranitesNT	6	C
17	214959.3	30.66	117.16	10G	2.2 ML	12 km NNE Cadoux	4	A
23	195603.1	32.02	117.38	15	2.0 ML	1 km W Quairading	4	A
25	170045.4	34.07	117.66	10G	2.0 ML	4 km SE Tambellup	4	B
25	204009	18.87	117.42	37R	3.2 ML	190 km NNE Pt Hedland	3	D
28	091107.3	30.70	117.16	10G	2.5 ML	7 km N Cadoux	4	A
MAR 02	110433.6	13.93	127.95	10G	2.7 ML	220 km NNW Kununurra	3	C
03	002825.2	33.40	117.73	6	2.5 ML	8 km S Dumbleyung	5	B
03	110411	18.27	126.59	10G	3.5 ML	90 km NE Christmas Ck	6	C
10	011918.2	33.40	117.73	6	2.2 ML	8 km S Dumbleyung	4	B
10	012004.2	33.40	117.73	6	2.4 ML	8 km S Dumbleyung	4	B
12	234529.1	30.69	117.16	10G	2.5 ML	9 km NNE Cadoux	5	A
13	061317.8	36.61	121.54	19	3.7 ML	305 km S Esperance	8	C
13	215228	15.22	121.78	37R	5.3 ML	300 km NNE Broome	11	B
17	040330	31.69	110.85	37	3.5 ML	470 km W Perth	8	C
20	083314.4	26.95	111.58	10G	3.2 ML	270 km WNW Kalbarri	3	D
20	134742.8	30.81	117.06	10G	3.0 ML	8 km SW Cadoux	7	A
22	002344.1	22.84	125.57	10G	4.0 ML	120 km S Tobin Lake	6	C
28	224022	24.15	112.96	37R	3.1 ML	100 km NW Carnarvon	4	D
APR 01	044855	24.50	113.96	10G	3.0 ML	50 km NE Carnarvon	4	C
01	205824	22.10	126.45	10G	3.0 ML	40 km ESE Tobin Lake	6	C
06	034302.0	32.22	117.41	10G	2.4 ML	20 km NE Aldersyde	6	B
08	045847.6	30.80	117.17	10G	2.0 ML	5 km SE Cadoux	3	B
09	071804.8	20.49	120.52	10G	3.0 ML	100 km NE Marble Bar	3	C
09	115259	21.57	119.86	10G	3.0 ML	50km SSE Marble Bar	4	B
12	031827.8	14.75	130.14	10G	4.0 ML	185 km NW Kununurra NT	4	C
15	050027.6	30.78	117.09	10G	2.2 ML	5 km SW Cadoux	4	A
21	093912.7	32.03	116.70	10G	2.2 ML	18 km SSW York	6	A
21	145708	19.66	121.54	10G	3.8 ML	200 km SSW Broome	9	C
24	153843.1	21.73	114 06	10G	3.4 ML	20 km NW Exmouth	5	C
24	230437.7	31.99	116.69	10G	2.5 ML	14 km SW York	6	A
28	155148.6	22.05	113.77	10G	2.5 ML	40 km SW Exmouth	4	C
MAY 05	165025.5	25.96	116.63	10G	4.0 ML	200 km WNW Meekatharra	11	B
07	100448	18.95	118.88	10G	4.2 ML	150 km NNE Pt Hedland	10	C
07	165757	16.24	121.39	37R	3.8 ML	210 km NNW Broome	6	C
20	225859	18.41	120.86	10G	3.8 ML	150 km WSW Broome	5	C
24	192845.0	32.04	116.68	10G	2.0 ML	20 km SSW York	6	A
26	124311.3	20.35	118.58	10G	3.0 ML	Close to Port Hedland	4	C
JUN 01	235319	27.02	130.53	10G	3.0 ML	Gt Victoria Desert SA	3	D
03	123406.9	11.94	134.98	33	4.6 ML	Arafura Sea		A

TABLE 14 (Contd)

DATE	ORIGIN UT	LAT S (°)	LONG E (°)	DEP km	MAG	LOCALITY	N	A
JUN	05 034129.3	32.51	122.22	10G	3.2 ML	50 km SE Norseman	10	C
	10 150039	22.38	113.60	37R	4.1 ML	50 km WSW Learmonth	10	C
	19 014946.5	29.15	115.36	10G	2.0 ML	9 km NW Mingenew	4	C
	26 232415.5	32.43	116.97	10G	2.2 ML	7 km SSW Brookton	6	A
	30 232145	25.56	131.90	10G	3.2 ML	30km SSE Curtin Spr NT	4	C
JUL	02 234510	27.70	125.30	10G	3.5 ML	210 km SW Warburton	7	C
	03 090529.5	25.53	115.31	10G	2.5 ML	170 km ESE Carnarvon	3	C
	16 040658	33.53	118.23	10G	2.0 ML	8 km E Nyabing	4	C
	23 094758.5	19.14	126.77	10G	5.0 ML	90 km WSW Christmas Ck	13	B
	28 073947.3	32.51	122.22	10G	5.6 ML	50 km SE Norseman	13	B
	28 080735.7	32.51	122.22	10G	3.2 ML	50 km SE Norseman	4	C
	28 090121.2	32.51	122.22	10G	3.2 ML	50 km SE Norseman	4	C
	28 092222	32.51	122.22	10G	3.6 ML	50 km SE Norseman	7	C
	28 103929.7	32.51	122.22	10G	4.5 ML	50 km SE Norseman	10	B
	28 144719.6	32.51	122.22	10G	3.9 ML	50 km SE Norseman	7	C
	29 071335	28.10	124.26	10G	3.5 ML	190 km WNW Laverton	7	C
	29 073510.6	32.51	122.22	10G	4.0 ML	50 km SE Norseman	6	C
	30 134808	32.51	122.22	10G	3.1 ML	50 km SE Norseman	5	C
	30 145242	32.51	122.22	10G	3.2 ML	50 km SE Norseman	5	C
	31 101454.1	30.71	117.07	10G	2.0 ML	12 km SE Meckering	5	A
	31 150444	32.51	122.22	10G	3.0 ML	50 km SE Norseman	3	C
AUG	02 192823.0	31.71	117.09	10G	2.4 ML	12 km SE Meckering	6	A
	03 163910	32.51	122.22	10G	3.1 ML	50 km SE Norseman	5	C
	06 095222	32.51	122.22	10G	3.2 ML	50 km SE Norseman	7	C
	06 110752.6	31.60	117.03	10G	2.7 ML	3 km NE Meckering	5	A
	06 184245	-	-	-	3.8 ML	Simpson Desert? NT	-	-
	07 034640	32.51	122.22	10G	3.0 ML	50 km SE Norseman	6	C
	07 093505	32.51	122.22	10G	3.1 ML	50 km SE Norseman	7	C
	09 083225	37.37	107.07	10G	3.6 ML	800 km WSW Augusta	4	D
	10 072455.0	30.70	121.43	0	3.3 ML	Near Kalgoorlie	7	B
	13 123415.8	18.93	117.92	37R	4.0 ML	165 km NNW Pt Hedland	6	C
	14 040044	32.51	122.22	10G	4.6 ML	50 km SE Norseman	10	B
	18 010930	22.96	113.96	10G	3.7 ML	80 km S Learmonth	6	B
	19 072202	32.51	122.22	10G	3.6 ML	50 km SE Norseman	9	C
	21 101138.3	33.56	118.19	10G	2.0 ML	5 km E Nyabing	4	B
	24 163426	32.51	122.22	10G	3.3 ML	50 km SE Norseman	8	C
	24 174958.5	30.68	117.16	10G	2.4 ML	9 km NNE Cadoux	4	A
	25 140707	25.49	115.93	10G	2.4 ML	90 km SE Gascoyne Jn	3	C
	29 095043.2	30.70	117.16	10G	3.2 ML	8 km NNE Cadoux	10	A
	30 054824.0	30.70	117.16	10G	2.2 ML	8 km NNE Cadoux	5	A
	31 075020	30.73	121.47	0	2.7 ML	Pillar blast Kalgoorlie	7	A
SEP	02 000152.6	30.68	117.17	10G	2.2 ML	11km NNE Cadoux	4	A
	02 003840	32.51	122.22	10G	3.1 ML	50km SE Norseman	5	C
	02 094955	16.97	121.14	37R	3.7 ML	160km NW Broome	6	C
	03 174123.9	30.69	117.18	10G	2.0 ML	9km NE Cadoux	3	A
	05 183334.9	30.69	117.17	10G	3.4 ML	9km NNE Cadoux	6	A
	05 193049.2	33.42	117.81	10G	1.8 ML	38km NE Katanning	4	B
	05 232735.9	30.71	117.15	10G	2.7 ML	7km N Cadoux	4	A
	06 164027.2	30.84	117.16	10G	2.0 ML	8km SSE Cadoux	6	A
	09 170736	32.51	122.22	10G	3.1 ML	50km SE Norseman	7	C

TABLE 14 (Contd)

DATE	ORIGIN UT	LAT S (°)	LONG E (°)	DEP km	MAG	LOCALITY	N	A
SEP 10	033627.7	29.29	115.85	10G	2.1 ML	15km WSW Morawa	4	B
10	075421.0	32.02	117.40	10G	2.0 ML	1km S Quairading	4	A
13	211646.0	17.75	127.97	10G	2.9 ML	Near Alice Downs Stn	2	C
14	140404.5	30.82	117.19	10G	2.0 ML	7km SE Cadoux	4	A
17	031440.2	30.68	117.17	10G	2.0 ML	10km NNE Cadoux	4	A
18	111418	31.39	111.68	10G	3.7 ML	400km W Perth	7	C
20	200840	32.51	122.22	10G	3.1 ML	50km SE Norseman	5	C
22	055743.3	16.44	129.23	10G	2.4 ML	25km N Lissadell Stn	2	C
23	154502.4	32.51	122.22	10G	4.0 ML	50km SE Norseman	8	B
OCT 04	022515.9	30.72	117.13	10G	2.0 ML	5km N Cadoux	4	A
05	170759.3	30.76	117.09	10G	3.2 ML	4km W Cadoux	8	A
06	001602	32.51	122.22	10G	4.0 ML	50km SE Norseman	9	B
06	030324.7	32.51	122.22	10G	3.5 ML	50km SE Norseman	5	C
07	142802.4	30.74	117.10	10G	2.0 ML	4km NW Cadoux	5	A
10	000325.8	30.72	117.13	10G	2.0 ML	5km N Cadoux	4	A
10	133430.5	30.75	117.11	10G	4.3 ML	3km NW Cadoux	9	A
13	124010.1	33.15	116.63	10G	2.0 ML	50km ENE Collie	4	B
16	172056.5	31.42	117.97	5	2.0 ML	29km W Merredin	5	A
16	091547.4	15.76	128.63	5G	1.2 ML	13km W Kununurra	1	B
16	095235.8	36.04	122.00	10G	3.3 ML	240km S Esperance	4	D
23	004917	11.15	125.12	33N	5.9 ML	390km NNW Kalamburu	172	-
23	173028	32.51	122.22	10G	3.0 ML	50km SE Norseman	4	C
25	061836	32.51	122.22	10G	3.1 ML	50km SE Norseman	5	C
25	235944.5	33.40	117.72	10G	2.0 ML	7km S Dumbleyung	4	A
26	084500.2	33.40	117.72	10G	2.0 ML	7km S Dumbleyung	4	A
28	111215	32.51	122.22	10G	3.8 ML	50km SE Norseman	8	C
29	110329	32.51	122.22	10G	3.0 ML	50km SE Norseman	5	C
30	141018	32.48	122.25	10G	4.3 ML	50km SE Norseman	10	B
NOV 01	122459.6	30.75	117.13	10G	2.0 ML	1km N Cadoux	4	A
03	043704.9	30.72	117.14	10G	2.1 ML	5km N Cadoux	5	A
04	225050.6	30.73	117.14	10G	2.9 ML	4km N Cadoux	6	A
05	000024.8	30.70	117.15	10G	2.1 ML	8km NNE Cadoux	4	A
05	220544	21.78	113.70	37R	3.1 ML	35 km W Learmonth	3	C
08	124119.6	30.71	117.14	10G	2.7 ML	6km N Cadoux	8	A
10	171104	26.47	111.10	10G	3.0 ML	245km WSW Denham	4	C
12	155410.8	30.68	117.16	10G	2.1 ML	11km NNE Cadoux	4	A
13	174827.3	16.73	120.44	10G	4.0 ML	220km NW Broome	6	C
15	083503	23.74	113.53	10G	3.9 ML	120km N Carnarvon	8	C
16	233624.3	37.28	115.94	10G	2.6 ML	300km SSW Albany	2	D
19	215527.8	30.85	117.01	10G	2.4 ML	1km W Cadoux	5	A
24	124136.3	30.77	117.10	10G	2.1 ML	1km SW Cadoux	4	A
27	231820.7	30.77	117.08	10G	4.5 ML	4km W Cadoux	13	A
28	002414.7	30.78	117.08	10G	3.0 ML	2km SW Cadoux	8	A
28	011141.3	30.76	117.10	10G	2.0 ML	1km W Cadoux	4	A
28	131028.1	30.79	117.09	10G	2.1 ML	2km SW Cadoux	6	A
28	162745.3	30.75	117.14	10G	2.2 ML	3km NW Cadoux	6	A
29	033450.9	31.61	117.10	10G	2.7 ML	8km E Meckering	6	A
29	193249	25.93	114.36	10G	3.3 ML	80km E Denham	3	C
30	103933.3	30.77	117.11	10G	2.3 ML	2km SW Cadoux	5	A

TABLE 14 (Contd)

DATE	ORIGIN UT	LAT S (°)	LONG E (°)	DEP km	MAG	LOCALITY	N	A
DEC 01	064848	32.51	122.22	10G	3.4 ML	50km SE Norseman	7	C
01	212156.9	30.72	117.22	10G	2.0 ML	10MK NE Cadoux	4	B
02	080733.3	30.78	117.09	10G	2.1 ML	5km WSW Cadoux	5	A
02	165242.1	30.77	117.11	10G	2.7 ML	2km WSW Cadoux	6	A
03	115042.7	30.69	117.17	10G	2.2 ML	9km NE Cadoux	4	A
03	204135.8	31.65	117.06	10G	2.0 ML	5km SE Meckering	3	A
04	041554.0	31.66	117.05	10G	2.2 ML	6km SE Meckering	6	A
05	212525.2	32.02	117.36	10G	2.1 ML	3km WSW Quairading	6	A
06	030219.5	32.01	117.36	10G	3.6 ML	4km W Quairading	8	A
10	113353	25.32	117.01	10G	2.5 ML	25km SE Landor	3	C
11	163526.3	30.76	117.13	10G	2.3 ML	1km NW Cadoux	5	A
14	223910.6	32.51	122.22	10G	3.6 ML	50km SE Norseman	9	C
15	083319.3	36.68	117.59	10G	2.5 ML	160km S Albany	4	D
16	101403.5	27.32	113.23	10G	3.3 ML	60km NW Kalbarri	5	C
18	190246.8	16.26	128.52	10G	2.4 ML	108 km S Kununurra	2	C
22	105921.2	30.75	117.12	10G	2.6 ML	2km NW Cadoux	5	A
24	030502.9	31.65	117.05	10G	2.3 ML	5km SE Meckering	7	A

FOOTNOTES:

DEP = Depth of earthquake in kilometers.
G = Nominal depth.
R = Restrained depth.
MAG = Magnitude
ML = Richter magnitude
N = Number of stations that recorded the earthquake.
A = Accuracy of location.
A = +/- 0.05 degree
B = +/- 0.10 "
C = +/- 0.20 "
D = +/- 0.50 "
UT = Universal Time. Western Standard Time = UT + 8 hours.
Western Standard Summer Time = UT + 9 hours.

TABLE 15
MINOR EARTHQUAKES IN THE SOUTHWEST SEISMIC ZONE 1985

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 01 01	1110	1.5	Cadoux	
85 01 06	1521	1.4	Meckering	
85 01 09	1011	1.0	50km from Ballidu	
85 01 10	0212	1.7	Quairading	
85 01 19	1240	1.7	E of Quairading	
85 01 20	1745	1.0	Cadoux	
85 01 22	0341	1.2	Cadoux	
85 01 25	1051	1.6	?	
85 01 26	0400	1.4	Cadoux	
85 01 26	2206	0.9	Cadoux	
85 01 26	2351	1.1	Cadoux	
85 01 27	0142	1.3	Cadoux	
85 01 27	0218	0.7	Cadoux	
85 01 27	0250	1.1	Cadoux	
85 01 27	0343	1.3	Cadoux	
85 01 29	0255	0.9	Cadoux	
85 01 29	1312	1.6	Cadoux	
85 01 29	1432	1.3	Cadoux	
85 01 31	0424	1.4	Cadoux	
85 01 31	1238	1.1	Cadoux	
85 01 31	1325	1.8	Cadoux	
85 01 31	1637	1.6	Cadoux	
85 02 03	0930	1.7	Cadoux	
85 02 03	0932	1.3	Cadoux	
85 02 03	0937	2.1	Cadoux	
85 02 03	1257	1.5	Cadoux	
85 02 04	1106	1.1	Cadoux	
85 02 05	0447	1.0	Cadoux	
85 02 06	0701	2.0	Cadoux	
85 02 07	0838	0.2	Kellerberrin	
85 02 07	0919	1.4	180km fm KLB	
85 02 08	0910	1.2	Cadoux	
85 02 08	1243	1.0	Cadoux	
85 02 08	1723	1.0	Cadoux	
85 02 09	0029	0.8	Cadoux	
85 02 09	0053	1.5	Cadoux	
85 02 09	0445	1.5	Cadoux	
85 02 09	1705	3.0	Cadoux	
85 02 10	1933	2.0	Brookton	
85 02 11	1223	0.6	Cadoux	
85 02 11	2236	1.0	Cadoux	
85 02 13	0604	0.6	Cadoux	
85 02 14	0859	1.4	160km fm KLB	
85 02 16	1119	1.8	Cadoux	
85 02 16	1126	1.4	Cadoux	
85 02 16	1128	1.4	Cadoux	
85 02 17	1146	1.0	110km fm BAL	
85 02 17	2150	2.2	Cadoux	
85 02 18	0309	1.1	Cadoux	
85 02 18	0543	1.1	Cadoux	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 02 18	0914	0.9	Cadoux	
85 02 18	1334	1.1	Cadoux	
85 02 18	1515	1.0	Cadoux	
85 02 18	1519	0.8	Cadoux	
85 02 18	1521	0.8	Cadoux	
85 02 18	1716	1.0	Cadoux	
85 02 19	0334	1.3	Cadoux	
85 02 20	0847	1.0	Cadoux	
85 02 20	1525	1.1	Cadoux	
85 02 21	1008	1.3	?	
85 02 21	1156	0.7	Cadoux	
85 02 21	1421	1.2	95km NE of BAL	
85 02 23	1956	2.0	Quairading	
85 02 25	1700	2.0	Tambellup	
85 02 28	0429	0.7	Cadoux	
85 02 28	0911	2.5	Cadoux	
85 02 28	1039	1.3	Cadoux	
85 03 02	0053	1.1	Cadoux	
85 03 02	0200	1.3	Cadoux	
85 03 02	0647	1.0	Cadoux	
85 03 02	1951	1.2	Cadoux	
85 03 02	2130	1.3	Cadoux	
85 03 03	0028	2.5	8km S of Dumbleyung	
85 03 03	0320	1.0	Cadoux	
85 03 03	0711	0.7	Cadoux	
85 03 03	0715	0.7	Cadoux	
85 03 03	0741	0.6	Cadoux	
85 03 03	1541	0.9	Cadoux	
85 03 04	0236	1.2	BAL	
85 03 04	1704	1.0	Cadoux	
85 03 04	2259	0.9	Cadoux	
85 03 06	1052	1.8	Cadoux	
85 03 06	2051	1.7	Cadoux	
85 03 08	0408	1.5	Quairading	
85 03 09	2018	1.0	Cadoux	
85 03 10	0119	2.2	8km S of Dumbleyung	
85 03 10	0120	2.4	8km S of Dumbleyung	
85 03 10	0733	1.7	Cadoux	
85 03 11	0411	1.2	Cadoux	
85 03 11	1025	1.2	Cadoux	
85 03 11	1033	1.4	Cadoux	
85 03 11	1126	0.9	Cadoux	
85 03 11	1139	1.2	90km fm BAL	
85 03 11	1716	1.4	Dowerin	
85 03 12	2345	2.5	Cadoux	
85 03 12	2347	1.6	Cadoux	
85 03 13	0028	1.1	Cadoux	
85 03 13	0858	1.1	Cadoux	
85 03 13	1012	1.0	Cadoux	
85 03 13	1506	1.3	Cadoux	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 03 14	0131	1.1	Cadoux	
85 03 14	1014	1.1	Cadoux	
85 03 14	2019	1.1	Cadoux	
85 03 18	0230	1.4	Cadoux	
85 03 18	0233	0.7	Cadoux	
85 03 18	0241	1.1	Cadoux	
85 03 18	0347	1.5	Meckering	
85 03 20	1347	3.0	Cadoux	
85 03 20	1454	1.9	Cadoux	
85 03 21	0215	1.7	Cadoux	
85 03 21	2000	1.8	Cadoux	
85 03 23	2302	1.8	Cadoux	
85 03 24	1738	1.8	90km fm RKG	
85 03 26	2235	1.7	Cadoux	
85 04 02	2248	1.6	Cadoux	
85 04 06	0107	1.8	Cadoux	
85 04 06	0335	1.5	Meckering	
85 04 06	0343	2.4	20km NE Aldersyde	
85 04 06	0734	1.6	Cadoux	
85 04 07	1458	1.2	Meckering	
85 04 08	0459	2.0	Cadoux	
85 04 08	1615	1.7	Cadoux	
85 04 09	0224	1.3	Narrogin	
85 04 11	1125	1.7	Cadoux	
85 04 11	1526	1.7	Cadoux	
85 04 12	1005	1.4	Narrogin	
85 04 15	0151	1.5	Cadoux	
85 04 15	0500	2.2	Cadoux	
85 04 15	0503	1.7	Cadoux	
85 04 21	0939	2.2	18 km SSW York	
85 04 22	1404	0.7	Narrogin	
85 04 24	0605	1.1	Narrogin	
85 04 24	0734	1.0	Narrogin	
85 04 24	1341	1.4	Narrogin	
85 04 24	1535	0.5	York	
85 04 24	2146	0.5	York	
85 04 24	2304	2.5	14km SW York	
85 04 25	0103	0.9	York	
85 04 25	1429	0.8	York	
85 04 26	0241	1.4	Quairading	
85 04 26	1334	1.6	Brookton	
85 04 28	1451	1.1	Cadoux	
85 04 30	1724	1.0	Quairading	
85 05 01	1533	1.1	Cadoux	
85 05 01	1928	1.7	Cadoux	
85 05 04	0516	0.9	Cadoux	
85 05 04	1704	0.6	Cadoux	
85 05 04	1948	1.6	Cadoux	
85 05 04	2312	0.9	Cadoux	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 05 06	1132	1.1	Cadoux	
85 05 06	1222	1.2	Cadoux	
85 05 07	0859	1.4	160km fm KLB	
85 05 07	1601	2.0	170km fm MRWA	
85 05 13	0904	1.6	170km fm KLB	
85 05 15	0857	1.5	170km fm KLB	
85 05 19	0806	1.1	Cadoux	
85 05 24	1742	0.7	York	
85 05 24	1928	2.0	20km S York	
85 05 24	1928	1.5	York	
85 05 25	0030	1.4	Cadoux	
85 05 25	0121	0.7	Cadoux	
85 05 25	2350	1.0	Ballidu	
85 05 25	2351	0.2	Ballidu	
85 05 27	1308	1.1	Cadoux	
85 05 27	1653	1.2	Cadoux	
85 05 27	1713	0.9	Cadoux	
85 05 27	2102	1.0	Cadoux	
85 06 02	0354	1.5	Cadoux	
85 06 02	0459	0.8	Meckering	
85 06 02	1405	1.0	Cadoux	
85 06 02	1535	1.3	Cadoux	
85 06 03	1059	0.8	Cadoux	
85 06 08	0627	1.2	Cadoux	
85 06 09	1232	0.2	RKG	
85 06 09	1957	0.2	RKG	
85 06 10	1056	1.4	Quairading	
85 06 12	0154	0.7	Cadoux	
85 06 12	0743	1.4	Cadoux	
85 06 12	0852	0.7	Cadoux	
85 06 12	0959	1.0	Cadoux	
85 06 12	1029	1.1	Cadoux	
85 06 12	1036	1.3	Cadoux	
85 06 12	1039	0.9	Cadoux	
85 06 13	2144	1.0	Cadoux	
85 06 13	2147	1.3	Cadoux	
85 06 16	0604	2.0	225km fm MRWA	
85 06 17	0711	1.8	190km fm MRWA	
85 06 17	1431	1.0	Quairading	
85 06 17	1948	1.0	Quairading	
85 06 17	2150	1.5	Quairading	
85 06 17	2150	0.9	Quairading	
85 06 18	0057	1.8	230km fm MRWA	
85 06 18	1601	0.6	Quairading	
85 06 18	1659	0.9	Cadoux	
85 06 19	0149	2.0	9km NW Mingenew	
85 06 21	1210	1.3	Cadoux	
85 06 23	0833	1.0	Cadoux	
85 06 24	0706	1.3	Quairading	
85 06 24	0901	1.8	70 NE BAL	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 06 24	2334	1.0	Quairading	
85 06 25	0333	0.9	Quairading	
85 06 25	1855	1.2	Quairading	
85 06 26	1334	1.2	Quairading	
85 06 26	1334	1.2	Quairading	
85 06 26	1336	0.9	Quairading	
85 06 26	2034	1.5	Quairading	
85 06 26	2324	2.2	Brookton	
85 06 27	1941	1.3	Cadoux	
85 06 30	1835	1.3	Congelin	
85 07 02	1050	0.9	Quairading	
85 07 03	0822	1.3	Quairading	
85 07 03	0900	0.9	Quairading	
85 07 03	1645	1.2	Quairading	
85 07 03	2318	0.9	Quairading	
85 07 03	2320	0.8	Quairading	
85 07 05	0835	1.8	210km fm BAL	
85 07 05	0900	1.6	Meckering	
85 07 06	1914	1.2	York	
85 07 07	0507	0.8	Quairading	
85 07 08	1712	1.1	Meckering	
85 07 09	2218	2.1	240km fm MRWA	
85 07 15	0613	0.7	Cadoux	
85 07 17	1034	0.7	Cadoux	
85 07 18	2127	1.1	Beacon	
85 07 28	0157	1.3	Cadoux	
85 07 31	1015	1.8	Meckering	
85 08 01	0849	1.6	Cadoux	
85 08 01	1224	1.6	Cadoux	
85 08 02	1928	2.4	Meckering	
85 08 05	1528	0.4	15km fm KLB	
85 08 05	1627	0.7	Cadoux	
85 08 05	1645	1.0	Cadoux	
85 08 06	1108	2.5	Meckering	
85 08 06	1646	0.5	11km fm KLB	
85 08 07	1521	1.2	Meckering	
85 08 08	1150	1.4	Cadoux	
85 08 08	1737	1.6	Beacon	
85 08 09	0722	1.5	50km N Koorda	
85 08 10	0443	0.7	50km fm RKG	
85 08 11	1337	1.6	Cadoux	
85 08 12	0152	0.6	27km fm KLB	
85 08 12	1558	0.9	Cadoux	
85 08 16	1047	1.0	Meckering	
85 08 18	1040	1.4	Meckering	
85 08 21	0444	1.4	Cadoux	
85 08 22	1013	1.4	Cadoux	
85 08 22	1251	1.4	Cadoux	
85 08 24	0943	0.7	Cadoux	
85 08 24	1750	1.4	Cadoux	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 08 27	0230	1.4	Meckering	
85 08 27	0722	0.7	Cadoux	
85 08 27	1555	0.7	Cadoux	
85 08 29	0950	1.4	Cadoux	
85 08 29	1010	1.4	Cadoux	
85 08 29	1206	1.4	Cadoux	
85 08 29	2255	1.5	Cadoux	
85 08 30	0548	2.2	Cadoux	
85 08 30	0933	1.5	Beacon	
85 08 31	0302	1.0	Cadoux	
85 08 31	1014	1.0	Cadoux	
85 08 31	1043	1.5	Cadoux	
85 08 31	1207	1.0	Cadoux	
85 09 01	1058	1.3	Cadoux	
85 09 01	2232	1.3	Dumbleyung	
85 09 02	0002	2.2	Cadoux	
85 09 02	0004	1.8	Cadoux	
85 09 02	1428	1.0	Cadoux	
85 09 02	0651	1.2	Cadoux	
85 09 02	1131	1.2	80km fm RKG	
85 09 02	1151	1.9	Cadoux	
85 09 02	1218	1.3	Cadoux	
85 09 02	1406	1.2	Cadoux	
85 09 02	1427	1.8	Cadoux	
85 09 02	1551	1.0	Cadoux	
85 09 03	0414	1.2	Cadoux	
85 09 03	0620	1.0	Cadoux	
85 09 03	0627	1.3	Cadoux	
85 09 03	1553	1.2	Cadoux	
85 09 03	1555	1.3	Cadoux	
85 09 03	1613	0.9	Cadoux	
85 09 03	1652	1.7	Cadoux	
85 09 03	1741	2.1	Cadoux	
85 09 03	1800	1.8	Cadoux	
85 09 04	0046	1.0	Cadoux	
85 09 04	0231	1.0	Cadoux	
85 09 04	0234	0.7	Cadoux	
85 09 04	0401	1.6	50km fm MRWA	
85 09 04	0542	1.0	Cadoux	
85 09 04	0557	1.5	Cadoux	
85 09 04	1430	1.1	50km fm MUN	
85 09 04	1518	1.3	Cadoux	
85 09 05	1833	3.4	Cadoux	
85 09 05	2327	2.7	Cadoux	
85 09 05	2359	0.5	28km fm KLB	
85 09 06	0601	0.2	Ballidu	
85 09 06	1034	1.2	Cadoux	
85 09 06	1310	0.9	Cadoux	
85 09 06	1503	1.0	Cadoux	
85 09 06	1640	1.8	Cadoux	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 09 06	1751	1.2	Cadoux	
85 09 06	1943	0.9	Cadoux	
85 09 06	2122	0.9	Cadoux	
85 09 07	0629	0.0	10km fm RKG	
85 09 07	0716	1.1	Cadoux	
85 09 07	2157	1.2	Cadoux	
85 09 09	1658	1.7	Cadoux	
85 09 10	0336	1.9	North of Merredin	
85 09 10	0406	1.4	45km fm MRWA	
85 09 10	0754	1.6	Quairading	
85 09 10	0830	1.1	Quairading	
85 09 10	0922	0.8	Quairading	
85 09 11	0319	0.5	Cadoux	
85 09 14	1214	1.3	Cadoux	
85 09 15	0817	1.8	15km fm RKG	
85 09 15	1059	1.1	Cadoux	
85 09 16	0223	1.2	Cadoux	
85 09 16	0647	1.4	Congelin	
85 09 18	0140	0.9	60km NE Cadoux	
85 09 18	1327	1.0	Cadoux	
85 09 18	1538	0.7	30km fm MRWA	
85 09 19	0401	0.4	30km fm MRWA	
85 09 19	1456	0.7	Cadoux	
85 09 22	0317	0.6	25km fm MRWA	
85 09 23	0640	1.0	Cadoux	
85 09 24	0243	1.1	50km fm RKG	
85 09 24	0940	0.9	Cadoux	
85 09 25	0040	0.5	6km fm MRWA	
85 09 25	0905	1.8	90km NE Hyden	
85 09 26	0511	1.1	Cadoux	
85 09 26	0529	1.1	Cadoux	
85 09 27	0925	1.7	Cadoux	
85 09 27	1109	1.7	Meckering	
85 09 28	0644	0.9	Dowerin	
85 09 29	0103	0.0	25km fm RKG	
85 09 29	0502	0.0	24km fm MUN	
85 09 29	1558	1.3	Quairading	
85 09 29	1918	1.5	Cadoux	
85 09 29	1919	1.6	Cadoux	
85 09 30	0221	1.0	Cadoux	
85 10 01	0628	0.5	36km fm MUN	
85 10 01	2043	0.9	Cadoux	
85 10 02	0351	0.7	Cadoux	
85 10 02	0706	1.3	Cadoux	
85 10 02	1307	1.0	Cadoux	
85 10 02	2301	1.2	Cadoux	
85 10 04	0738	1.2	Cadoux	
85 10 05	1715	0.7	Cadoux	
85 10 05	1718	0.9	Cadoux	
85 10 06	0226	0.9	Cadoux	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 10 06	0420	0.9	Congelin	
85 10 06	1134	1.4	Meckering	
85 10 06	1507	0.8	Congelin	
85 10 06	2113	1.0	Cadoux	
85 10 07	1428	1.8	Cadoux	
85 10 08	0411	1.0	Cadoux	
85 10 08	0419	1.6	Cadoux	
85 10 08	0652	1.4	Cadoux	
85 10 09	0541	1.7	Cadoux	
85 10 09	0713	1.6	Cadoux	
85 10 10	0003	1.7	Cadoux	
85 10 10	1631	0.9	Cadoux	
85 10 11	1309	1.2	Cadoux	
85 10 11	2036	0.7	Cadoux	
85 10 12	1145	1.1	Cadoux	
85 10 13	1240	2.0	50km ENE Collie	
85 10 14	1419	0.9	Cadoux	
85 10 14	1754	1.5	Cadoux	
85 10 15	0149	0.7	Cadoux	
85 10 16	1721	1.8	Nungarin	
85 10 17	0752	1.0	Meckering	
85 10 17	1359	1.2	Cadoux	
85 10 18	0649	1.1	Meckering	
85 10 18	0802	1.6	Brookton West	
85 10 19	2009	1.8	Cadoux	
85 10 19	2112	0.9	Cadoux	
85 10 21	1550	1.4	Cadoux	
85 10 21	1648	1.0	Cadoux	
85 10 21	1721	1.0	Cadoux	
85 10 21	1834	1.2	Cadoux	
85 10 21	1938	1.1	Cadoux	
85 10 23	1319	0.9	Cadoux	
85 10 23	1637	1.1	Cadoux	
85 10 24	1108	1.5	Cadoux	
85 10 24	1111	0.9	Cadoux	
85 10 24	1215	0.9	Cadoux	
85 10 24	1517	1.7	Cadoux	
85 10 25	1540	1.1	Cadoux	
85 10 25	2017	1.4	Cadoux	
85 10 27	0152	1.4	Cadoux	
85 10 27	2202	0.9	Cadoux	
85 10 29	1009	1.2	Cadoux	
85 10 31	1728	1.3	Cadoux	
85 11 01	0849	1.5	Nyabing	
85 11 01	1225	1.6	Cadoux	
85 11 03	1141	1.4	Cadoux	
85 11 03	1955	1.4	Cadoux	
85 11 04	2256	1.0	Cadoux	
85 11 05	0000	1.8	Cadoux	
85 11 05	0020	1.5	Cadoux	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML	LOCALITY	REMARKS
85 11 05	0229	1.3	Cadoux	
85 11 05	0843	1.2	Cadoux	
85 11 06	0939	0.9	Cadoux	
85 11 07	0435	0.7	Cadoux	
85 11 08	0600	0.9	Cadoux	
85 11 08	1252	1.0	Cadoux	
85 11 09	0759	0.9	Meckering	
85 11 09	1705	0.7	Cadoux	
85 11 10	1642	0.9	Cadoux	
85 11 10	1825	0.7	Cadoux	
85 11 10	2115	1.2	Cadoux	
85 11 10	2240	1.1	Meckering	
85 11 11	0350	0.9	Cadoux	
85 11 12	0449	1.5	Cadoux	
85 11 12	1420	1.7	Cadoux	
85 11 12	1522	1.2	Cadoux	
85 11 14	1309	0.4	Cadoux	
85 11 15	0637	1.0	Cadoux	
85 11 15	1255	1.0	Cadoux	
85 11 15	1256	0.9	Cadoux	
85 11 15	1257	1.1	Cadoux	
85 11 15	1258	0.9	Cadoux	
85 11 17	1730	1.0	Cadoux	
85 11 17	2054	1.4	Cadoux	
85 11 17	2207	1.2	Meckering	
85 11 18	0353	0.9	Meckering	
85 11 18	1444	1.2	Cadoux	
85 11 19	1534	1.1	Cadoux	
85 11 19	1624	0.7	Cadoux	
85 11 20	0232	1.3	Merredin Nth	
85 11 21	2356	0.8	Cadoux	
85 11 23	1354	0.7	Cadoux	
85 11 24	1226	1.8	Cadoux	
85 11 25	0846	0.9	Cadoux	
85 11 25	1530	0.7	Cadoux	
85 11 25	1539	0.7	Cadoux	
85 11 25	1919	1.0	Cadoux	
85 11 25	2026	1.4	Cadoux	
85 11 26	0323	1.2	Cadoux	
85 11 27	0100	1.1	Cadoux	
85 11 27	2245	1.1	Cadoux	
85 11 28	0047	1.2	Cadoux	
85 11 28	0101	1.5	Cadoux	
85 11 28	0111	1.7	Cadoux	
85 11 28	0707	1.5	Cadoux	
85 11 28	0755	1.5	Cadoux	
85 11 28	1924	1.3	Cadoux	
85 11 30	1302	1.0	Cadoux	
85 11 30	1818	1.2	Cadoux	
85 12 01	0338	1.2	Cadoux	

TABLE 15 (Contd)

DATE yr mn dy	TIME UT	MAG ML6	LOCALITY Cadoux	REMARKS
85 12 03	1628	1.2	Cadoux	
85 12 04	0336	1.1	Cadoux	
85 12 05	2125	1.9	Quairading	
85 12 06	2301	0.9	Cadoux	
85 12 07	1631	0.4	Cadoux	
85 12 07	1825	0.7	Cadoux	
85 12 07	1830	0.7	Cadoux	
85 12 10	1146	0.4	Cadoux	
85 12 10	2013	0.9	Cadoux	
85 12 11	0013	1.3	Cadoux	
85 12 12	0457	0.9	Cadoux	
85 12 12	1545	0.9	Cadoux	
85 12 12	1643	0.7	Cadoux	
85 12 12	1801	1.6	Cadoux	
85 12 16	1831	0.8	Meckering	
85 12 16	1943	1.1	Cadoux	
85 12 18	1203	1.1	Cadoux	
85 12 20	0813	1.7	Kukerin	
85 12 20	2141	1.7	Kukerin	
85 12 21	2025	0.7	Cadoux	
85 12 22	1154	1.1	Cadoux	
85 12 23	1603	1.6	Quairading	
85 12 24	0305	2.4	Meckering	
85 12 24	0615	1.7	Cadoux	
85 12 25	2223	0.7	Cadoux	
85 12 26	0441	1.2	Cadoux	
85 12 26	0450	1.7	Cadoux	
85 12 29	0542	1.6	Cadoux	
85 12 29	0549	1.2	Cadoux	
85 12 29	0643	1.0	Cadoux	
85 12 29	0946	1.6	15km N Darkan	
85 12 31	0313	0.4	Cadoux	

TABLE 16

REQUESTS FOR DATA 1985

INSTITUTION	TYPE OF DATA	NO.
Seismic Data		
University of California	Seismogram copies	16
World Data Centre A	Seismogram copies	6
National Geophysical Research Institute, Hyderabad	Seismogram copies	10
University of Michigan	Seismogram copies	12
DSIR, New Zealand	Seismogram copies	6
Rabaul Volcanological Observatory	Seismogram copies	16
K. McCue, BMR	Seismogram copies	58
University of British Columbia, Canada	Seismogram copies	1
University of Illinois	Seismogram copies	6
Victoria University, Wellington	Seismogram copies	6
Massachusetts Institute of Technology	Seismogram copies	6
Toyama University, Japan	Seismogram copies	2
Institute of Earth Sciences, Taiwan	Seismogram copies	1
University of Uppsala, Sweden	Seismogram copies	12
Pacific Geophysics, Pasadena	Seismogram copies (16mm)	90
Northwestern University, Illinois	Seismogram copies	1
Dept Geological Sciences, Illinois	Seismogram copies	1
Washington University, Missouri	Seismogram copies	5
British Geological Survey	Seismogram copies	6
Dept of Industrial Development	Earthquake risk map	1
Dept of Health	Earthquake risk map	1
Building Advisory Committee	Earthquake risk map	1
Tremby Homes	Earthquake risk map	1
Cottage & Engineering Survey	Earthquake risk map	2
D. Finlayson, BMR	Earthquake data	1
Kenhill Stern Pty Ltd	Earthquake data	1
British Geological Survey	Earthquake data	1
Western Colleries	Earthquake data	1
Aitken & Co insurance assessors	Earthquake data	1
Koorda Shire	Earthquake data	3
T. Jones, BMR	Earthquake data	several
General public & insurance co's	Earthquake data	numerous (phone)
Dept Conservation & Environment	Earthquake risk data	2
Consulting engineers, Koorda	Earthquake risk data	2
McSweeny & Partners	Earthquake risk data	1
Magnetic data		
BMR Survey Party	Magnetogram copies	4
Western Australian Institute of Technology	K-indices (2 weeks)	1
Dept Lands & Surveys	Declination map	1

TABLE 17

ACCELEROGRAPH DATA - 1985

LOCATIONS

LOCALITY	CODE	LAT S	LONG E	ELEV	FOUNDATION	OP.
				m		
CADOUX						
Kalajzic's C	CA-K	30.719	117.143	300	Granite	BMR
Shankland's	CA-S	30.810	117.133	300	Alluvium/Granite	BMR
MECKERING						
Kelly's	ME-K	31.695	116.982	200	Alluvium/Granite	BMR
Morrell's	ME-M	31.659	117.089	220	Alluvium/Granite	BMR
MUNDARING						
Weir	MU-W	31.967	116.169	250	Concrete wall 42m	PWD
PERTH						
Telecom)	PT-B	31.953	115.850	10	Basement	TEL
Exchange)	PT-M	31.953	115.850	40	Middle floor	TEL
Building)	PT-T	31.953	115.850	70	Top floor	TEL

OPERATORS

BMRR Bureau of Mineral Resources, Mundaring Geophysical Observatory
PWD Public Works Department (WA)
TEL Telecom

CALIBRATION DATA

CODE	DATE OF OPERATION	INSTR. NO.	BLOCK NO.	CALIBRATION DATA g/cm and azimuth 1a	1b	1c
CA-K	Fm Dec 18	MO2	1166A	0.582	0.548	0.348
	To Dec 31	289		090	000	Up
CA-S	Fm Dec 18	MO2	1462	0.609	0.597	0.417
	To Dec 31	296		090	000	Up
ME-K	Fm Jan 01	MO2	1166A	0.582	0.548	0.348
	To Nov 13	289		090	000	Up
ME-M	Fm Jan 01	MO2	1462A	0.609	0.597	0.417
	To Nov 13	296		090	000	Up
MU-W	Fm Jan 01	SMA-1		0.510	0.526	0.568
	To Dec 31			000	Up	090
PT-B	See text	SMA-1		0.148	0.138	0.135
		4271		300	Up	210
PT-M	See text	SMA-1		0.138	0.144	0.135
		4272		300	Up	210
PT-T	See text	SMA-1		0.151	0.136	0.136
		4273		300	Up	210

TABLE 18

ACCELEROGRAM DATA - 1985

YR	MN	DY	UT	LAT	LONG	ML	LOC	H/E	COM	T(S)	ACC	R	DUR
85	12	22	1059	30.75	117.12	2.6	CA-S	(7)/(6)	PZ	0.04	4.9		
									N	0.04	0.6	5.8	
									E	0.04	3.0		
									SZ	0.03	4.1		
									N	0.07	3.0	7.9	1.8
									E	0.06	6.0		

KEY TO ACCELEROGRAM DATA

YR = Year
MN = Month
DY = Day
UT = Universal Time
LAT = Latitude (Degrees South)
LONG = Longitude (Degrees East)
ML = Richter Magnitude
LOC = Accelerograph Location
H/E = Hypocentral distance/Epicentral distance
COM = Component
T(S) = Ground period in seconds
ACC = Ground acceleration in centimetres per second squared, at time of R
R = Resultant peak acceleration in centimetres per second squared
DUR = Duration in seconds while ground acceleration remained above 0.5 centimetres per second squared