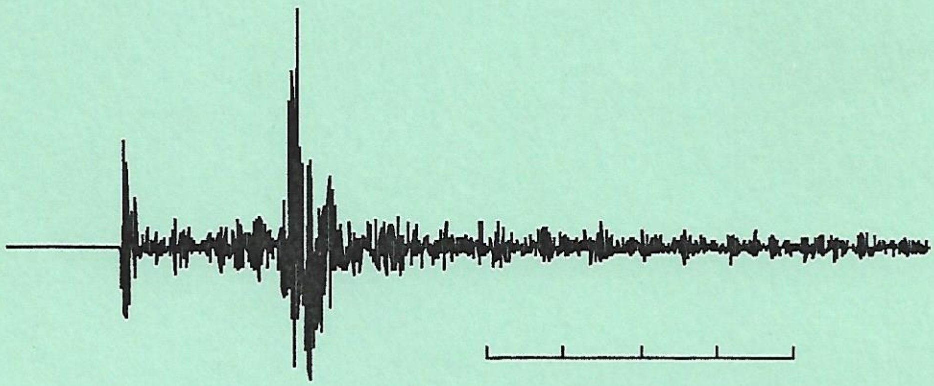
QUEENSLAND REGIONAL SEISMIC NETWORK
OPERATIONAL REPORT
JULY 1994 to AUGUST 1995



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Front Cover - Seismogram of magnitude 2.0 earthquake at Eidsvold on 26 December, 1995. Vertical component as recorded on EDV at a distance of 15 km. Scale is in seconds.

1 - INTRODUCTION

1.1 - CLIENTS

The Queensland University Advanced Centre for Earthquake Studies (QUAKES)[1] at the University of Queensland (UQ) is responsible for monitoring of earthquakes in Queensland for the State Government as well as for several clients. These include the Water Resources section of the Department of Primary Industries (DPI), the South East Queensland Water Board (SEQWB) and the Gladstone Area Water Board (GAWB). Monitoring of large cities in Queensland is conducted by QUAKES for the Australian Geological Survey Organisation (AGSO) via funding from the State Government.

1.2 - CONTENT

This report details the operational aspects of the seismographs operated by QUAKES for the above clients, for the period July 1994 to August 1995. This report is deliberately brief as detailed descriptions of network operations have been presented in previous reports (see Section 1.3).

The seismographs of each client together with those on loan to QUAKES combine to form a single regional network. Operating the seismographs as a single network provides more data than if they were operated separately thus benefiting each client. For simplicity, and to provide an overview of the entire network operations, it was decided to provide a combined report rather than present individual reports to each of the clients.

Some of the statistics relating to down-time and repair are not detailed as the records were not in an appropriate form. Changes and new innovations in record keeping will make more detailed statistics available in future reports.

1.3 - PREVIOUS REPORTS

Detailed descriptions of the instrumentation used at the various seismograph sites, the physical aspects of the installations, and the operating procedures, including the servicing of the network and the analysis of the data were presented in reports to DPI, SEQWB and GAWB in October, 1994.

A summary of analyses of the seismological data obtained from the QUAKES seismograph network was presented in April, 1995.

1.4 - OVERVIEW

19 seismographs have been operated continuously by QUAKES for the period of this report; an additional 11 have been installed during the period and 4 have been removed.

A total of 22 single-day field trips have been spent servicing existing sites, investigating possible future sites and installing sites. Extended field trips have totalled 32 days. Total person-days for field work was 87 days.

Processing and analysis of the data is ongoing and involves two full-time and two part-time staff, as well as the services of an electrical technician (for a total of approximately seven weeks).

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1 QUAKES is a joint centre of the Departments of Earth Sciences and Civil Engineering at the University of Queensland.

2 - INSTRUMENTS

Table 1 lists QUAKES stations that have operated during the report period. Codes, locations and operating periods are listed for each station. Also listed are the owners and the operators of the equipment at each site. Service frequency refers to the period between operator services (in weeks).

Figure 1 is a map showing the locations of stations listed in Table 1. Details of the operation of these stations for the period of this report are given in the following sections

2.1 - BURDEKIN NETWORK

BLO - Burdekin Lookout

This site has operated with a data recovery rate of 100% from the digital (Yerilla) recorder and 92% from the analog (MEQ-800) recorder.

DLB - Dalbeg

Battery failure, tape problems and problems with one of the component boards reduced recovery rate to 74%. The problems with the tapes stem from operator error and will be reduced with additional on-site training. A new battery was purchased and installed by the operators in August 1994.

DNG - Doongara

The cassettes from this site frequently exhibit poor signal level reducing recovery rate to 54%. The tape transport will be changed at the next maintenance visit.

MCP - Mt Cooper

The digital (Yerilla) recorder at this site has operated with a data recovery rate of 100%.

UKA - Ukalunda

This instrument has given persistent trouble with system failures despite repeated attempts to fix it; both by the operator and by UQ staff. The instrument will be swapped with a spare Yerilla held at UQ. No data was obtained for the report period.

2.2 - WIVENHOE DAM NETWORK

This network has operated with a high rate of data recovery. There have been a few breakdowns of some of the MEQ-800 recorders which in general have been fixed at UQ[2]. These have included IC's in the clock and also problems with high frequency noise in the amplifiers. The noise problem has proved difficult to diagnose and additional field testing is required.

The instrument from the Cricket Road site (WCR) has not been re-installed as is being used as a spare instrument.

Additional spares of the components of the MEQ-800 recorders that are susceptible to failure are being ordered by the SEQWB network operator, John Pix.

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[2] More detailed descriptions of equipment problems are now being kept and will be available for the next report.

2.3 - WIVENHOE DAM ACCELEROGRAPHS

The Telydyne-Geotech A700s accelerographs were purchased in 1985 for monitoring of structures associated with the Splityard Creek dam, the Wivenhoe dam and the Wivenhoe Power Station. These instruments, which have proven difficult to maintain, are relatively insensitive and have not yet provided any useful data. The susceptibility of the instruments to moisture dictates a regular routine of exchanging desiccant on a monthly basis.

Repairs to these instruments have included; replacing an LCD display with a spare, replacement of the main gel-cell batteries, replacement of a memory battery. An intermittent problem with communication between a Data Retrieval Unit and an A700 proved difficult to correct and may require additional work.

The Splityard Wall (SW) recorder has been removed on a semi-permanent basis due to problems with operation using a battery (rather than mains power) and is now used as a spare or to conduct tests in the office. Recorders have had to be swapped around when there have been equipment failures.

2.4 - SOUTHEAST QUEENSLAND NET (SEQNET)

A total of eight recorders have been installed in a dense network in the most active area of south-east Queensland with the goal of recording sufficient data from a small earthquake to enable the effect of a large earthquake to be estimated[3]. The instruments were obtained on loan from several sources; five from the Queensland Electricity Commission, two from the Research School of Earth Sciences (RSES) at the Australian National University and two from the Australian Seismological Centre at the Australian Geological Survey Organisation (AGSO) in Canberra.

One of the sites (LMD) has since been removed due to excessive local noise. Durong (DRG) was removed in August 1995 because the equipment needed to be returned to AGSO.

GPS time receivers were installed at four of the sites (EDV, MNT, MPR, BGD) in July 1995.

There were some problems with batteries at EDV, MNT, MPR and BGD. This was traced to incorrect configuration of the recorders when the external memory modules were installed.

The REFTEK recorders from RSES were installed at the CSIRO Pastoral Station at Narayen (NAR) and at a private property at Cooyar (CYR). These recorders require a visit by UQ personnel every 7 weeks.

2.5 - JOINT URBAN MONITORING PROJECT (JUMP)

Seven accelerographs and three combined seismograph/accelerograph systems are to be installed in Queensland. QUAKES will be responsible for nine installations; two accelerographs in Brisbane, an accelerograph in Toowoomba, and an accelerograph and a combined accelerograph/seismograph at each of the Gold Coast, Townsville and Cairns. The University of Central Queensland will be responsible for the installation and operation of an accelerograph in Rockhampton.

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[3] This project is designed at improving earthquake hazard assessment in southeast Queensland.

Councils in each of the cities to be monitored have been contacted with a view to having them assist with the installations. This will enable each council to become involved with basic earthquake hazard research. QUAKES personnel have visited each city and sites have been selected. The Councils are now being asked to provide the housings and services (power and telephone).

The Gold Coast City Council have installed a concrete bunker at Southport West and a Kelunji was installed in July 1995. Despite efforts to reduce interference from mains power there is still some 50 Hz noise evident at this site. Additional work relating to earthing is required to reduce this interference. A second site at the Gold Coast has been chosen but the installation is being delayed because bedrock cannot be found at a suitable position.

The possibility of using disused chemical sheds at Brisbane City Council reservoirs is being investigated. In the meantime the permanent seismograph vault at Mt Nebo 30 km west of Brisbane city is being used as a temporary monitoring and equipment testing site.

2.6 - INDIVIDUAL SITES

BDM - Boondooma Dam

This site has operated at a data recovery rate of 94%.

A solar panel and regulator system was installed in early August 1995. This should alleviate problems that occurred with power loss due to poor power connections to the batteries.

The records are now being posted weekly to Brisbane to aid in the analysis of the digital data from the south-east Queensland network (SEQNET).

AWG - Awoonga High Dam

This site has operated at a data recovery rate of 90%.

A solar panel and regulator have been purchased. A suitable frame for the solar panel will have to be made before the site can be converted to solar power.

GLD - Glenlyon Dam

The operator took sick-leave for several months in early 1995 during which time the instrument was not operational, thereby reducing the data recovery rate to 68%. UQ personnel visited the site in August 1995 to instruct additional operators for such a situation. A new battery was also installed as the old battery had collapsed.

PFD - Peter Faust dam

The site has not operated continuously due to the workload of the sole DPI staff member at the dam. Data recovery rate was only 27%.

CRC - Cracow

The site was removed in December 1994 when the SEQNET was installed. Data recovery rate up to that time was 91%.

TABLE 1 - SEISMOGRAPHS OPERATING DURING REPORT PERIOD

CODE	NAME	LONG. (°E)	LAT. (°S)	Z (km)	START (yy-mm-dd)	FINISH (yy-mm-dd)	REC.	CH.	OWNER	OPERATOR	SERVICED (weeks)
BURDEKIN FALLS DAM NETWORK											
BLO(R)	Burdekin - Lookout	147.1207	20.6247	0.234	91-10-29	-	MEQ	1	DPI	DPI	1
BLO(B)	Burdekin - Lookout	147.1207	20.6247	0.234	91-10-29	-	Yerilla	3	DPI	DPI	2
DLB	Dalbeg	147.264	20.151	0.070	84-04-09	-	Yerilla	3	DPI	DPI	2 - 4
DNG	Doongara	146.475	20.555	0.280	84-02-29	-	Yerilla	3	DPI	Private	3 - 6
MCP	Mt. Cooper	146.806	20.552	0.300	84-02-23	-	Yerilla	3	DPI	Private	3 - 4
UKA	Ukalunda	147.127	20.899	0.200	84-03-28	-	Yerilla	3	DPI	Private	2 - 3
WIVENHOE DAM NETWORK											
WPM	Pine Mt.	152.7355	27.5357	0.035	77-03-18	-	MEQ	1	SEQWB	SEQWB	0.3
WMB	Mt. Brisbane	152.5502	27.1155	0.160	77-03-18	-	MEQ	1	SEQWB	SEQWB	0.3
WTG	Toogoolawah	152.3333	27.1458	0.130	77-03-18	-	MEQ	1	SEQWB	SEQWB	0.3
WWH	Wivenhoe Hill (3)	152.5872	27.3702	0.19	84-07-12	-	MEQ	1	SEQWB	SEQWB	0.3
WRC	Reedy Ck. (5)	152.6631	27.1874	0.19	84-07-11	-	MEQ	1	SEQWB	SEQWB	0.3
WBA	Buaraba (3)	152.3082	27.3527	0.15	84-07-06	-	MEQ	1	SEQWB	SEQWB	0.3
WIVENHOE DAM ACCELEROGRAPHS											
WW	Wivenhoe Wall	152.602	27.394	0.080	85-09-17	-	A700	3	SEQWB	SEQWB	5
WB	Wivenhoe Base	152.603	27.395	0.030	85-09-17	-	A700	3	SEQWB	SEQWB	5
SW	Splityard Wall	152.641	27.379	0.170	85-09-17	-	A700	3	SEQWB	SEQWB	5
SB	Splityard Base	152.641	27.375	0.100	85-09-17	-	A700	3	SEQWB	SEQWB	5
PS	Power Station	152.631	27.347	0.078	85-09-17	-	A700	3	SEQWB	SEQWB	5
PP	Power Station Park	152.631	27.375	0.078	85-09-17	-	A700	3	SEQWB	SEQWB	5

Note :- Longitudes and latitudes are in degrees east and south, respectively. Start and finish dates are in year-month-day format. Service frequency is in weeks. Two recorders operated at the BLO site.

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TABLE 1 (continued) - SEISMOGRAPHS OPERATING DURING REPORT PERIOD

CODE	NAME	LONG. (°E)	LAT. (°S)	Z (km	START (yy-mm-dd)	FINISH (yy-mm-dd)	REC.	CH.	OWNER	OPERATOR	SERVICED (weeks)
SEQNET											
EDV	Eidsvold	150.9485	25.4385	0.22	94-12-18	-	Kelunji	3	QEC	Private	3
MNT	Monto	151.1412	24.8317	0.25	94-12-13	-	Kelunji	6	QEC	Private	3
LMD	Lake Monduran	151.8516	24.8768	0.08	94-12-16	95-04-11	Kelunji	3	QEC	DPI	3
MPR	Mount Perry	151.6188	25.2053	0.37	94-12-12	-	Kelunji	6	QEC	Private	3
BGD	Biggenden	152.1092	25.5282	0.18	94-12-11	-	Kelunji	3	QEC	Private	3
DRG	Durong	151.2545	26.3032	0.34	94-12-20	95-08-01	Kelunji	3	QEC	Private	3
NAR	Narayen	150.8901	25.7094	0.27	94-12-14	-	REFTEK	3	RSES	UQ	6
CYR	Cooyar	151.8097	26.9982	0.45	94-12-14	-	REFTEK	3	RSES	UQ	6
JOINT URBAN MONITORING PROGRAM											
GCA1	Gold Coast (temp)	153.4443	28.1025	0.08	94-07-01	95-04-21	Kelunji	3	AGSO	UQ	3
GC1	Gold Coast	153.36074	27.95035	0.060	95-07-26	-	Kelunji	6	AGSO	UQ	3
BRSA	Brisbane	152.7750	27.3917	0.525	93-11-17		Kelunji	3	AGSO	UQ	3
INDIVIDUAL SITES											
CTA	Charters Towers	146.2550	20.0883	0.357	62-00-00	-	-	6	UQ	UQ	0.2
BRS	Brisbane	152.7750	27.3917	0.525	63-02-00	-	-	6	UQ	UQ	0.2
AWD	Awoonga dam (#3)	151.3157	24.0780	0.11	87-07-01	-	MEQ	1	GAWB	GAWB	0.5
BDM	Boondooma dam	151.4444	26.1123	0.320	80-07-29	-	MEQ	1	DPI	DPI	0.5
PFD	Peter Faust dam	148.3746	20.3858	0.120	91-04-18	-	MEQ	1	DPI	DPI	0.5
CRC	Cracow	150.2799	25.2535	0.29	90-07-24	94-12-18	Yerilla	3	DPI	Company	2 - 4
GLD	Glenlyon dam	151.4797	28.9694	0.480	91-02-21	-	Yerilla	3	DPI	DPI	3 - 5

Note :- Longitudes and latitudes are in degrees east and south, respectively. Start and finish dates are in year-month-day format. Service frequency is in weeks.

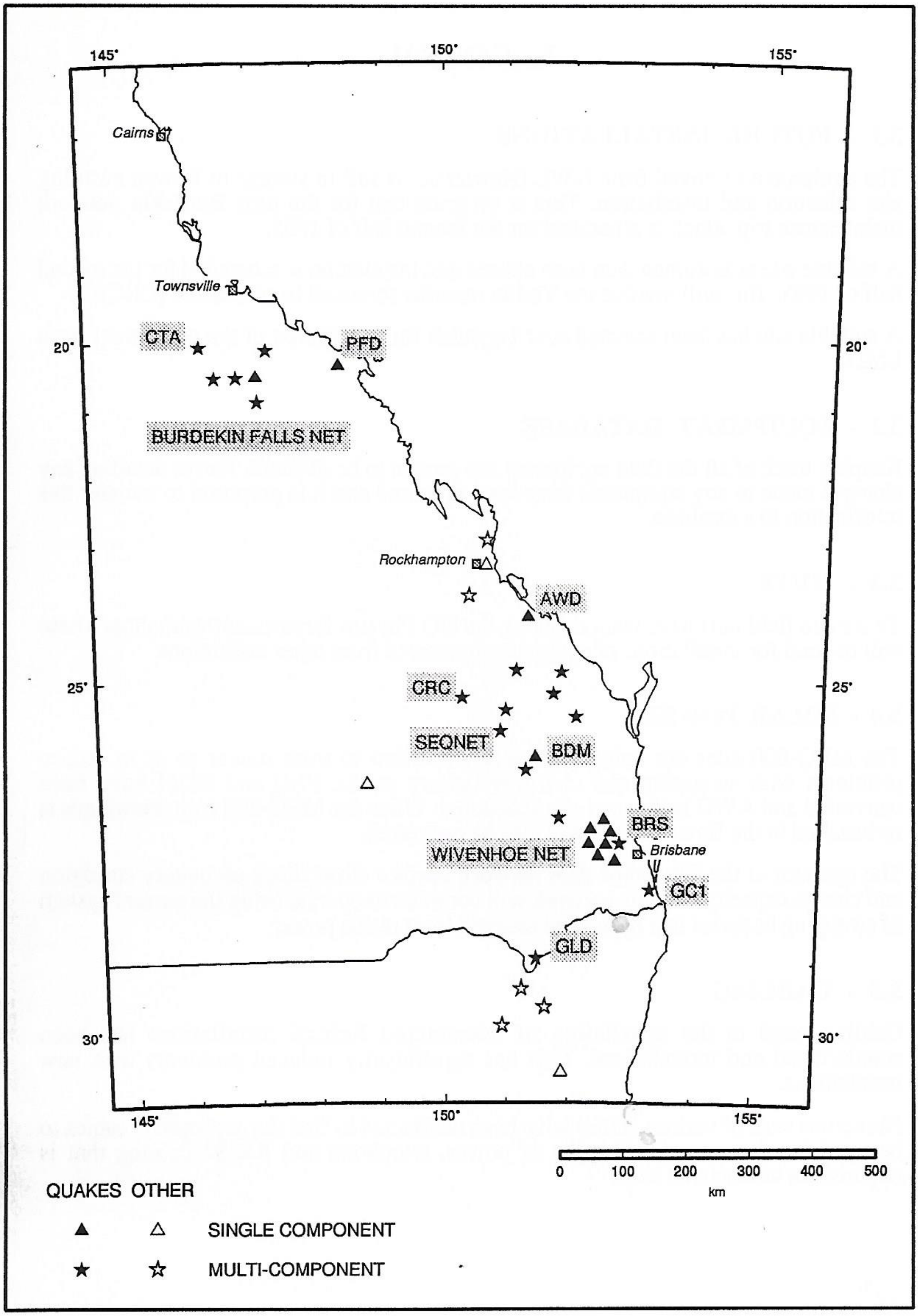

Figure 1 - Seismographs in eastern Queensland.
Operating during report period (July 1994 to August 1995)

3 - GENERAL

3.1 - FUTURE INSTALLATIONS

The equipment removed from NWL (Newlands) is still in storage in Bowen awaiting site selection and installation. This is programmed for the next Burdekin network maintenance trip which is scheduled for the second half of 1995.

A suitable site at Borumba dam been chosen and installation is scheduled for the second half of 1995. This will involve the Yerilla recorder removed from Cracow (CRC).

A suitable site has been selected near Gayndah for installation of the equipment from LMD.

3.2 - EQUIPMENT DATABASE

Keeping track of all the field equipment has proven to be difficult. Forms detailing any changes made to any equipment have been prepared and it is proposed to transfer this information to a database.

3.3 - HUTS

Two extra field huts have been made by the UQ Physics Department workshop. These will be used for installations of equipment borrowed from other institutions.

3.4 - SOLAR POWER

The MEQ-800 sites are being gradually converted to solar power so as to reduce problems with swapping and charging battery packs. PFD and BDM have been converted and AWG is the next site scheduled. When the MEQ-800 from Newlands is re-installed in the Bowen area it will also be converted.

The operator at the Wivenhoe dam network keeps a close check on battery condition and charge capacity and this network will continue to operate using the current system of swapping batteries that have been charged from mains power.

3.5 - CABLING

Cabling used in the installation of telemetered Kelunji installations has been standardised and modularised. This has significantly reduced problems with new installations.

Numerous tests of various cables have been conducted to find the appropriate cables to be used for the extended lengths of power, telephone and RS232 cabling that is required for telemetered sites.