

**BUREAU OF METEOROLOGY  
QUEENSLAND REGIONAL OFFICE**

**FLOODS IN LOGAN RIVER CATCHMENT AND WARRILL CREEK**

**FEBRUARY 1991**

**INTRODUCTION**

On the night of Thursday 7th February 1991 very heavy rain occurred in the Logan River and Warrill Creek catchments to the south of Brisbane. Three people drowned at flooded road crossings during the flash flooding that followed. Extensive damage occurred to rural properties, fencing and crops in the Boonah, Rathdowney and Kalbar areas and to a school at Kooralbyn. The subsequent Logan River flooding resulted in record flood levels at several locations and led to flooding of houses, properties and roads. Several houses in the suburbs of Logan City in the Waterford area were flooded during the weekend of 9th and 10th February. Flooding in these areas was the highest since the February 1976 flood.

**METEOROLOGICAL SITUATION**

A monsoon depression over Central Australia directed an airstream into South East Queensland which contained more water vapour than would be expected in this region. Temperatures in the atmosphere above were cold enough for the development of heavy shower or thunderstorm type clouds. More importantly, a small scale trough system was located in the area. This trough had a ground level wind flow pattern which ensured most of these rain clouds would either develop above the catchment areas under discussion or else develop in an area where the prevailing upper winds would carry them over the catchment area. Therefore weather systems of several different scales combined with the mountainous nature of the catchment area to focus extremely heavy rain over a small portion of South East Queensland.

**RAINFALL**

Listed below are the highest reported rainfalls for the 24 hour period ending 9am on Friday 8th February:

Moogerah Dam	243mm
Foxley	221mm
Tarome	213mm
Maroon Dam	203mm
Rathdowney	195mm
Boonah	170mm
Palen Creek	148mm
Kalbar	137mm
Kooralbyn	131mm

Figure 1 shows a catchment map of the affected area with rainfall isohyets for the 24 hour period ending 0900 on 8th February 1991. Rainfall intensities were very high in the immediate foothills area of the Macpherson Range, but reduced markedly 25 kilometres to the north of the ranges.

Figures 2 and 3 are diagrams showing rainfall intensities at several pluviograph stations in the affected catchments. The period of most intense rainfall was between 6pm and midnight

on the 7th.

Intensity-Frequency-Duration (IFD) analyses were undertaken for rainfall stations at Kooralbyn, Maroon Dam and Moogerah Dam. Listed below is the maximum rainfall intensity for several durations for this event compared to the 1:100 year intensities given by the IFD analysis.

Measured intensities at Maroon Dam and Moogerah Dam for durations of about 1 to 12 hours exceeded the 100 year (average recurrence interval) intensities.

Kooralbyn: Duration	Intensity (mm/hr) Feb 91	Intensity (mm/hr) 1:100yr
15min	56	191
30min	43.2	133
1hr	31.6	88.9
3hr	21.7	40.4
6hr	17.4	23.6
12hr	10.9	14.2
24hr	5.5	9.1

Maroon Dam: Duration	Intensity (mm/hr) Feb 91	Intensity (mm/hr) 1:100yr
15min	136	185.5
30min	118	128
1hr	112	86
3hr	48.3	41.4
6hr	30.2	25.4
12hr	16.7	15.9
24hr	8.3	10.2

Moogerah Dam:	Duration	Intensity (mm/hr) Feb 91	Intensity (mm/hr) 1:100yr
	15min	108	182
	30min	94	124
	1hr	90	83.2
	3hr	50.3	39.2
	6hr	36.4	23.7
	12hr	16.0	14.8
	24hr	10.1	9.8

Design Rainfall Intensity curves for the three stations are shown in Figures 4 to 6. Rainfall intensity for this event has also been plotted on these diagrams.

### **LOGAN RIVER FLOODING**

The main flash flooding occurred in the Boonah and Rathdowney districts and record flood peaks were recorded at several locations in the Logan River and Teviot Brook. Listed below are the peak flood heights at current Bureau of Meteorology flood warning stations for this event compared to the previous highest recorded peak.

	Feb 91 Peak			Previous Highest	
Logan River:					
Rathdowney TM	8/2/91	0100	14.01m	Feb 76	13.11m
Dulbolla	8/2/91		14.40m	Feb 76	12.00m
Round Mountain TM	8/2/91		16.85m	Feb 76	16.12m
Beaudesert	8/2/91	0830	13.90m	Feb 76	13.80m
Yarrahappini TM	8/2/91	2200	18.66m	Jan 74	20.75m
Macleans Bridge	9/2/91	0530	18.50m	Jan 74	21.67m
Waterford	9/2/91	1930	9.06m	Jan 74	12.90m*
Eagleby	9/2/91	2400	4.85m	Jan 74	7.25m*
Christmas Creek:					
Rudds Lane TM	9/2/91	0300	6.24m	Apr 89	6.95m
Teviot Brook:					
	8/2/91		8.50m	Feb 76	8.16m*
The Overflow TM	8/2/91	0625	13.42m	Jan 74	12.90m

NB. Levels marked with an asterisk have been estimated from flood marks and other information.

The flood hydrographs for this event are shown plotted in Figure 7.

#### **WARRILL CREEK FLOODING**

The flood peak in the Kalbar area is the highest recorded since records commenced in 1950. Downstream at Harrisville and Amberley, the peaks were below the levels reached in 1974 and 1976. Only minor to moderate flooding occurred along the Bremer River above the Warrill Creek junction. As can be seen from the rainfall isohyets in Figure 1, this section of the Bremer catchment narrowly missed the heavy rainfall further to the south. The subsequent peak of 7.20m in the Bremer River at Ipswich resulted in minor flooding only. Listed below are the Warrill Creek peaks for this event compared to the previous highest recorded peak.

	Feb 91 Peak			Previous Highest	
Warrill Creek:					
Kalbar	8/2/91	0330	10.95m	Feb 76	10.73m
Harrisville TM	8/2/91	1100	5.64m	Jan 74	6.18m
Amberley BVRT	8/2/91	2100	7.55m	Jan 74	10.18m

The flood hydrographs for Warrill Creek for this event are shown in Figure 8.

#### **FLOOD WARNING SERVICES**

As a result of rains in the previous 24 hours flood warnings were current for the Logan River and Warrill Creek before the onset of flash flooding on the night of the 7th. Priority warnings were issued from 2330 hours Thursday 7th for the Logan and Albert Rivers, and from 0030 hours on Friday 8th for Warrill Creek and Bremer River. No advance warning was given for the flash floods in the upper reaches.

In relation to the downstream flooding in the Macleans Bridge to Waterford areas of the Logan River, qualitative warnings were provided from 0200 hours Friday onwards which

provided at least 12 to 18 hours lead time to the commencement of any significant flooding. Quantitative predictions for Waterford were provided in the warning of 1615 hours Friday, which provided 24 hours advance warning of the peak. The prediction was for a flood peak similar to the 1976 flood of 10.4 metres, but also provided predictions for timing of the Waterford Bridge inundation. The warning of 0715 hours Saturday predicted that the peak would be about 9.5 metres, and the 1000 hours Saturday warning lowered the prediction to about 9 metres, but less than 9.5 metres.

The peak at Waterford was 9.06 metres at 2000 hours on Saturday. At the time of the flood, the accuracy of the February 1976 peak of 10.40 metres, which was used for comparison purposes, was in doubt. It has been subsequently re-surveyed and found to be 10.00 metres at the existing Waterford gauge.

There were 15 flood warnings issued for the Logan River from 2330 on the 7th to 0830 on the 11th.

For Warrill Creek, the warning of 0030 hours on Friday 8th warned of severe flash flooding in low-lying areas and rapid stream rises and serious major flooding in headwater areas extending to the Harrisville area. Warning was also provided for major flooding in the Rosewood, Walloon and Amberley areas. The warning of 1115 on Friday predicted only minor to moderate flooding at Rosewood with a flood peak at Ipswich below minor flood level that night.

There were 9 flood warnings issued for Warrill Creek from 0030 on the 8th to 1045 on the 10th.

A summary table of warnings issued is attached.

## **LOGAN RIVER FEBRUARY 1991 - SUMMARY OF WARNINGS ISSUED**

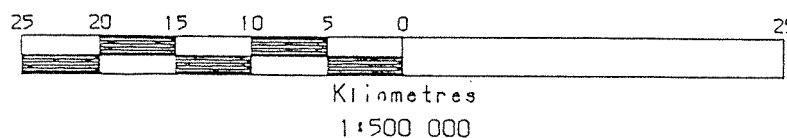
<b>Date/Time</b>	<b>Summary of Warning</b>
7/2/91 2330	Very fast rises and major flooding expected in Teviot Brook and in the Logan River downstream to the Beaudesert area.
8/2/91 0200	Very fast rises and severe major flooding. Record levels at Rathdowney. Serious major flooding Teviot Brook below Boonah and the Logan River downstream to Beaudesert.
8/2/91 0515	Severe major flooding Beaudesert area. Above 1976 in Teviot Brook and at Macleans Bridge. Rises at Waterford and major flood overnight.
8/2/91 1100	Very fast rises to Macleans Bridge with peak less than 1976. Fast rises at Waterford to bridge level and peak Saturday below 1976.
8/2/91 1615	Macleans Bridge to peak 0600 9th similar or slightly higher than 1976. Waterford at bridge deck tonight and peak on 9th at 1976 level.
8/2/91 2230	Macleans Bridge to peak at 18.5-19.0m by 0600. Waterford to peak at 1976 level (10.4m) on 10th.
9/2/91 0030	Macleans Bridge near peak of 18.5m similar but slightly higher than 1976. Waterford to peak very close to 1976 level (10.4m) in afternoon.
9/2/91 0715	Macleans Bridge peaked at 18.5m. Waterford peak late afternoon at 9.5m (less than 1976 level).
9/2/91 1000	Waterford to peak at about 9.0m but less than 9.5m late afternoon.
9/2/91 1300	Waterford to rise next 3-6 hours and peak at 1800. Peak about 9.0m level but less than 9.5m. Level to hold steady for 6 hours after peak.
9/2/91 1600	Waterford near peak. Peak of 9.0m about 1.4m below 1976 level. River level to hold steady for about 6 hours after peak.
9/2/91 2130	Waterford peaked at 9.06m at 2000 hours. Rises downstream for several hours.
10/2/91 1000	Levels lower Logan peaked and to fall slowly.
10/2/91 1245	Flooding to ease quickly overnight.
11/2/91 0830	Final warning issued.

## **WARRILL CREEK FEBRUARY 1991 - SUMMARY OF WARNINGS ISSUED**

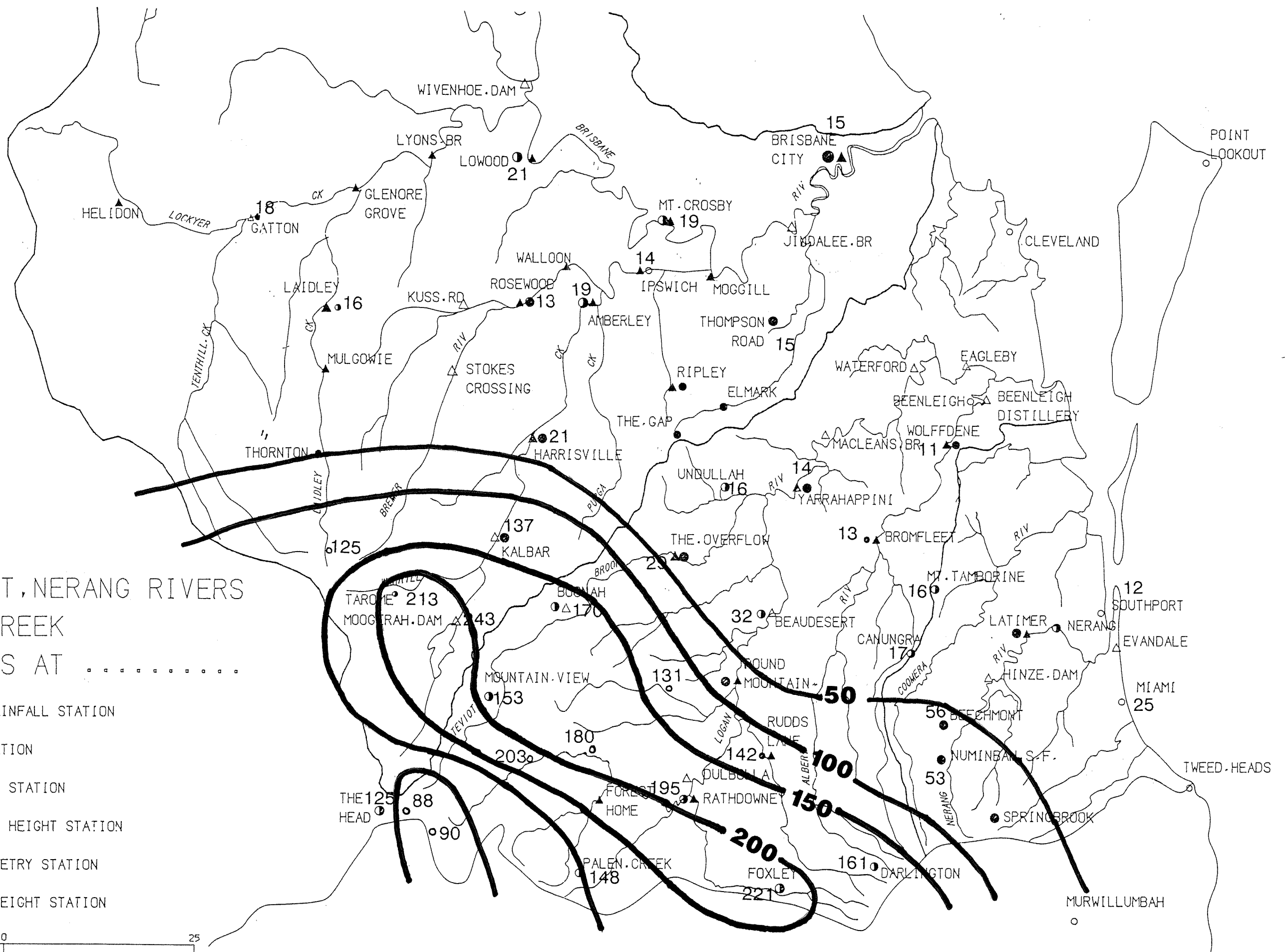
<b>Date/Time</b>	<b>Summary of Warning</b>
8/2/91 0030	Serious major flooding around Tarome, Kalbar and Aratula. Major flooding to extend to Harrisville, Amberley and Walloon areas.
8/2/91 0315	Floodwaters to extend downstream of Kalbar to Harrisville. Harrisville to rise to about 6m at 0600. Major flooding expected at Rosewood, Walloon and Amberley.
8/2/91 0700	Harrisville to peak at 6.2m at 0900-1200. Major flooding at Rosewood, Walloon and Amberley. Moderate flooding expected in Ipswich tonight.
8/2/91 1115	Major flood levels near peak at Harrisville and moderate flooding at Amberley. Minor to moderate flooding at Rosewood. Flood peak for Ipswich to be at or below minor flood level.
8/2/91 1630	Amberley near peak with major flooding. Minor to moderate at Rosewood. Ipswich to peak at or below minor flood level tonight.
9/2/91 0745	Major flooding easing in Warrill Creek. Levels falling in Bremer River.
9/2/91 1200	Renewed rises downstream of Kalbar to maintain moderate to major flooding in Warrill Creek.
9/2/91 1700	Moderate to major flood levels falling in Warrill Creek.
10/2/91 1045	Final warning issued.

# LOGAN, ALBERT, NERANG RIVERS & WARRILL CREEK SITUATION AS AT .....

- DAILY REPORTING RAINFALL STATION
- HEAVY RAINFALL STATION
- RAINFALL TELEMETRY STATION
- △ FLOODWARNING RIVER HEIGHT STATION
- ▲ RIVER HEIGHT TELEMETRY STATION
- UNOFFICIAL RIVER HEIGHT STATION



RAINFALL ISOHYETS FOR 24 HOUR PERIOD ENDING 0900 8/2/91



LOGAN RIVER RAINFALL MASS CURVES  
FROM 1200 7/2/91 TO 0600 8/2/91

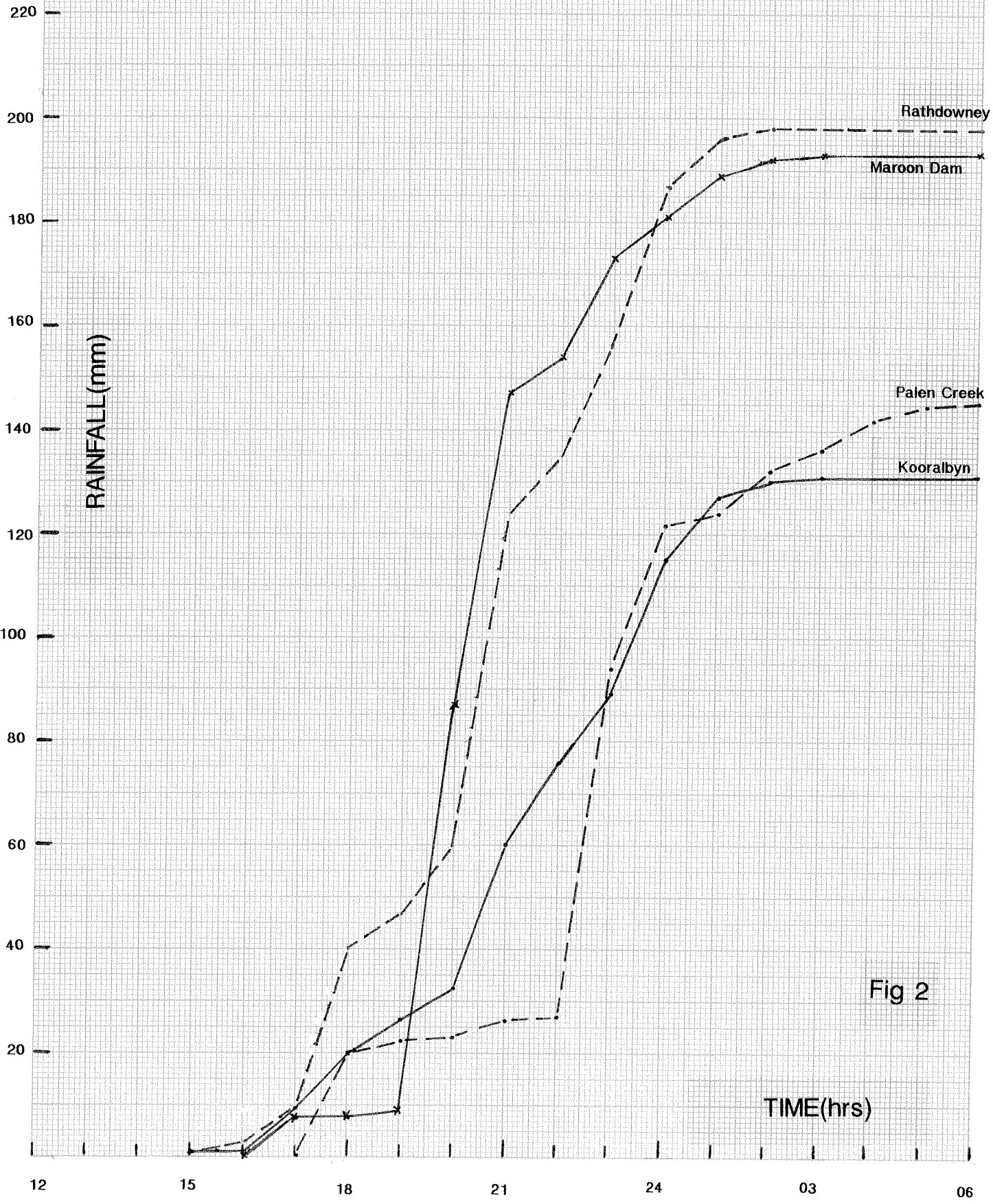


Fig 2



# WARRILL CREEK RAINFALL MASS CURVES

FROM 1200 7/2/91 TO 0600 8/2/91

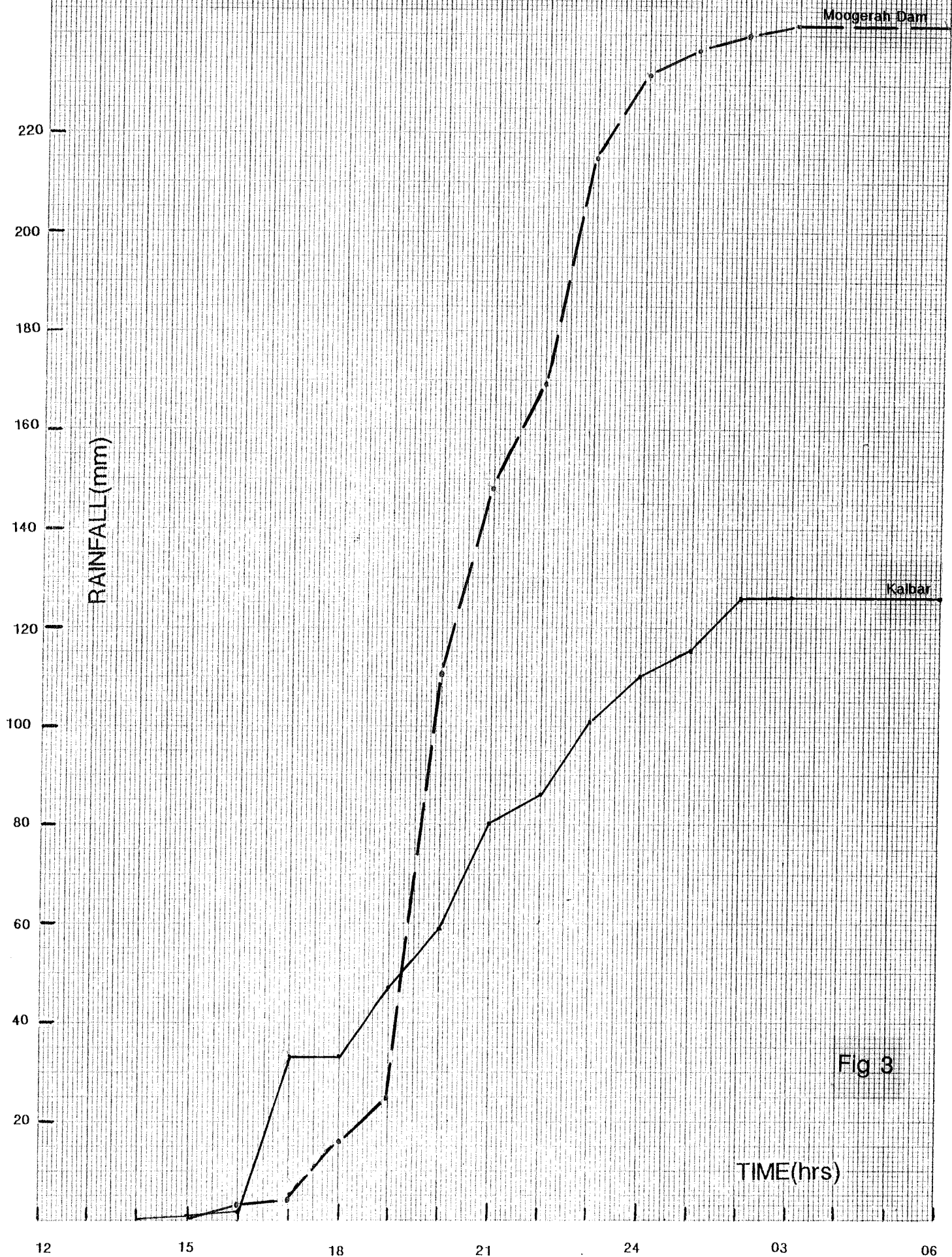


Fig 3

# DESIGN RAINFALL INTENSITY DIAGRAM

LOCATION 28.075 S 152.825 E \* NEAR.. KOORALBYN

\* ENSURE THE COORDINATES ARE THOSE REQUIRED.  
SINCE DATA IS BASED ON THESE AND NOT THE LOCATION NAME.

ISSUED 28<sup>TH</sup> FEBRUARY 1991 REF. -FN3447

(RAW DATA 43.62, 6.54, 1.89, 78.60, 12.15, 3.72, 0.200, 2HD)

PREPARED BY --- HYDROMETEOROLOGICAL ADVISORY SERVICE --- MELBOURNE

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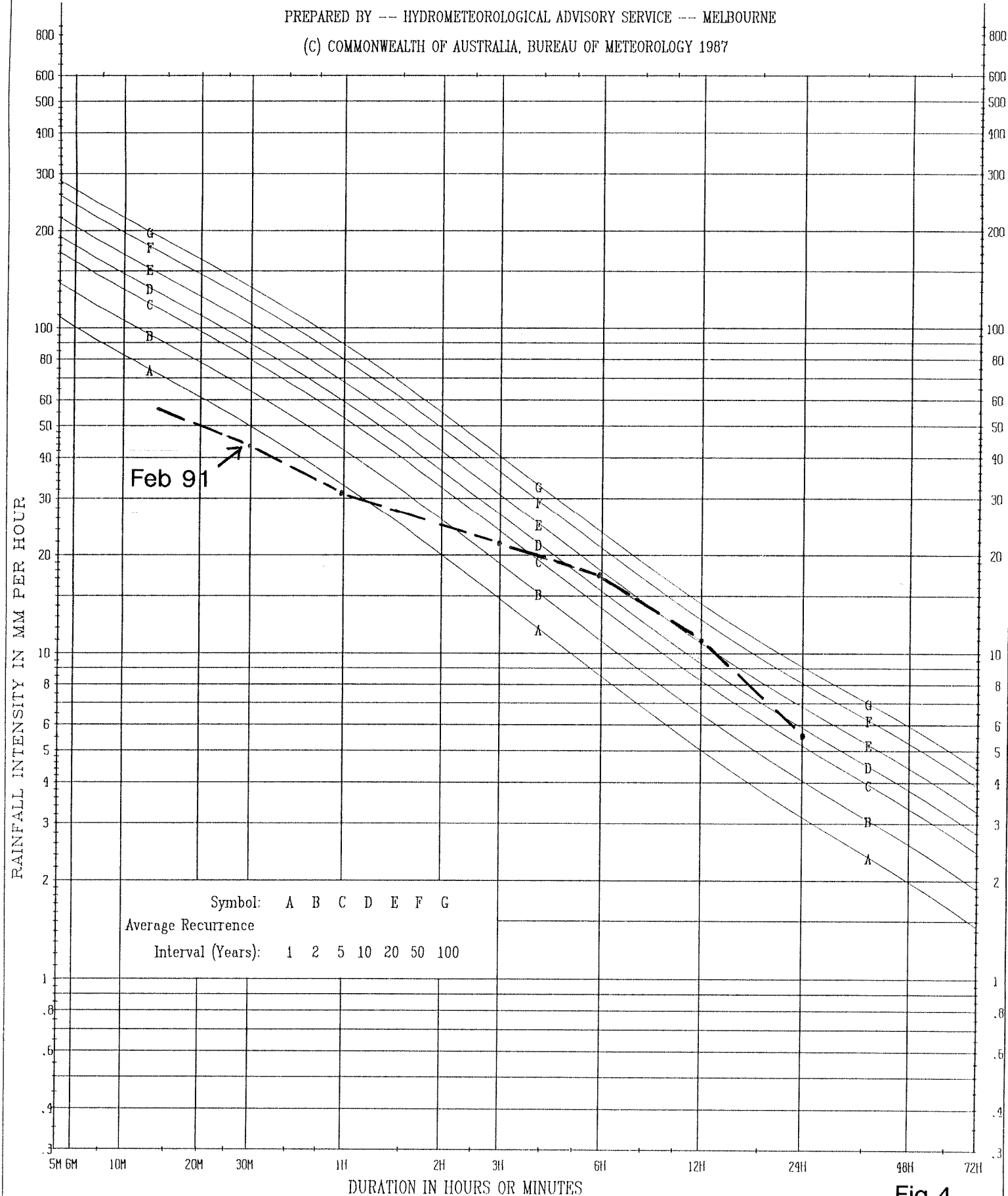


Fig 4

# DESIGN RAINFALL INTENSITY DIAGRAM

LOCATION 28.175 S 152.650 E \* NEAR. MAROON DAM

\* ENSURE THE COORDINATES ARE THOSE REQUIRED.  
SINCE DATA IS BASED ON THESE AND NOT THE LOCATION NAME.

ISSUED 28<sup>TH</sup> FEBRUARY 1991 REF. -FN3447

(RAIN DATA 42.61, 6.88, 2.07, 75.01, 13.34, 4.06, 0.240, 218)

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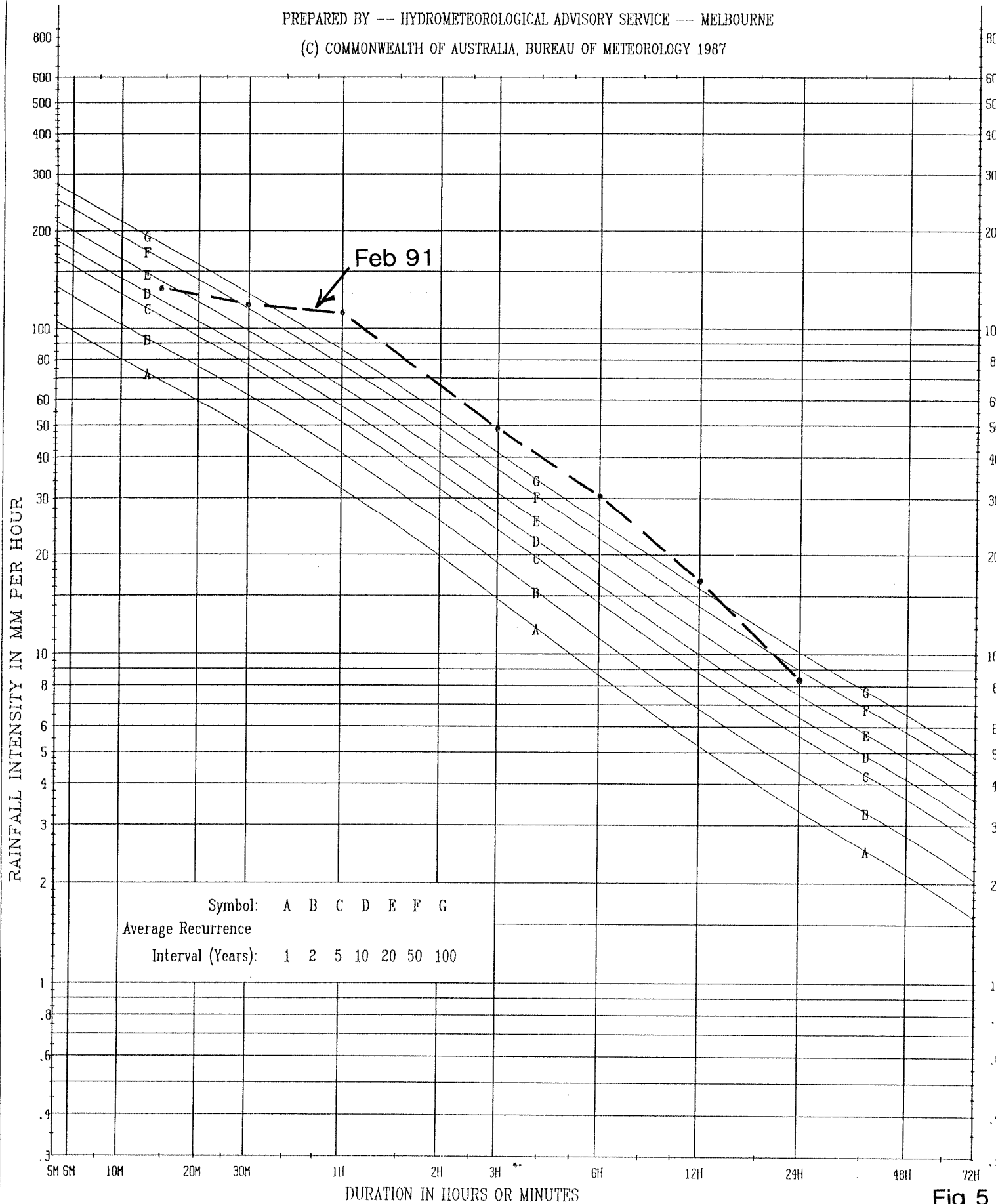


Fig 5

# DESIGN RAINFALL INTENSITY DIAGRAM

LOCATION 28.025 S 152.550 E \* NEAR.. MOOGERAH DAM

↓ ENSURE THE COORDINATES ARE THOSE REQUIRED.  
SINCE DATA IS BASED ON THESE AND NOT THE LOCATION NAME.

ISSUED 6<sup>TH</sup> MARCH 1991 REF.-FN3452

(RAW DATA 42.33, 7.08, 2.02, 12.51, 12.55, 4.17, 0.260, 210)

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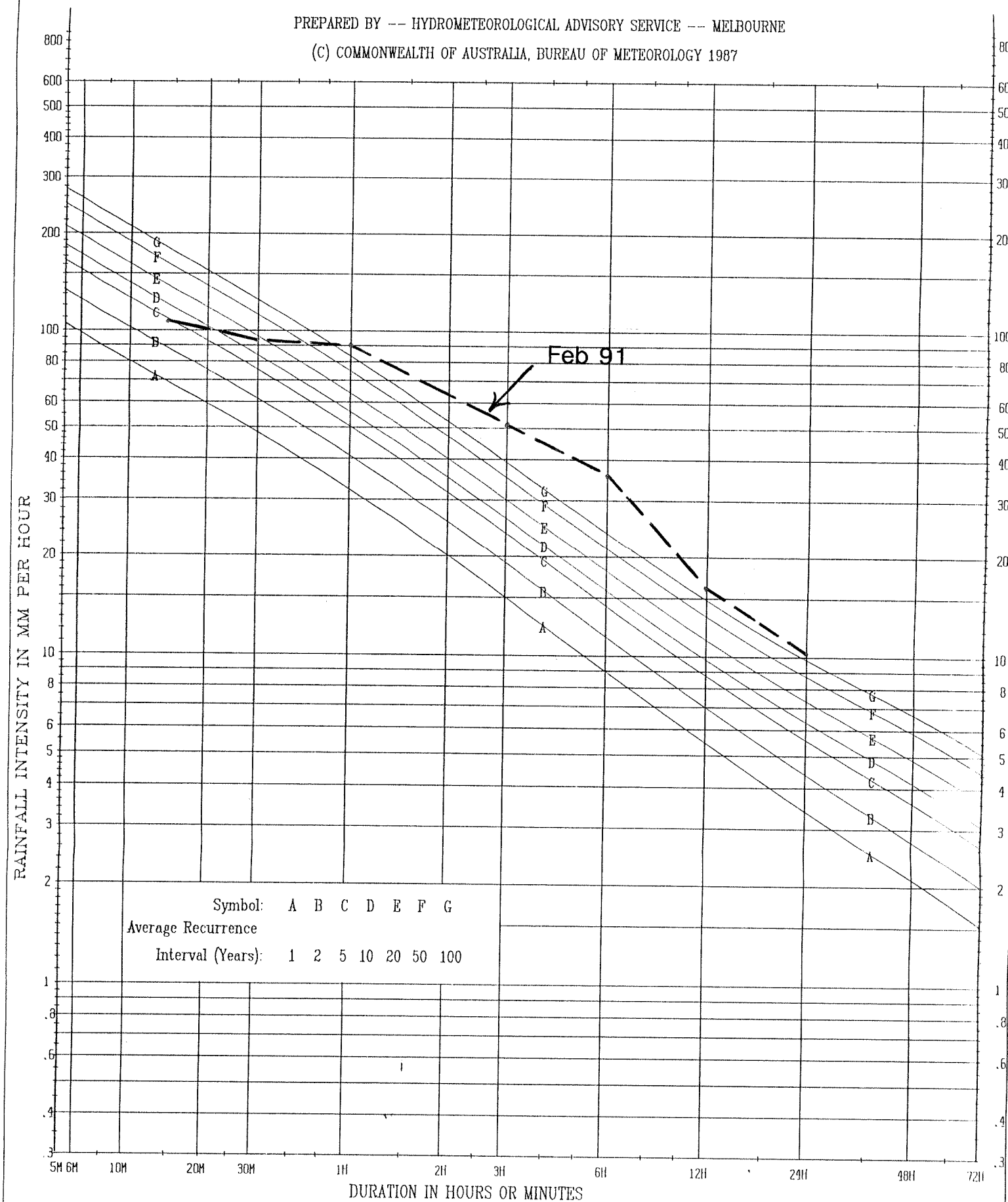


Fig 6

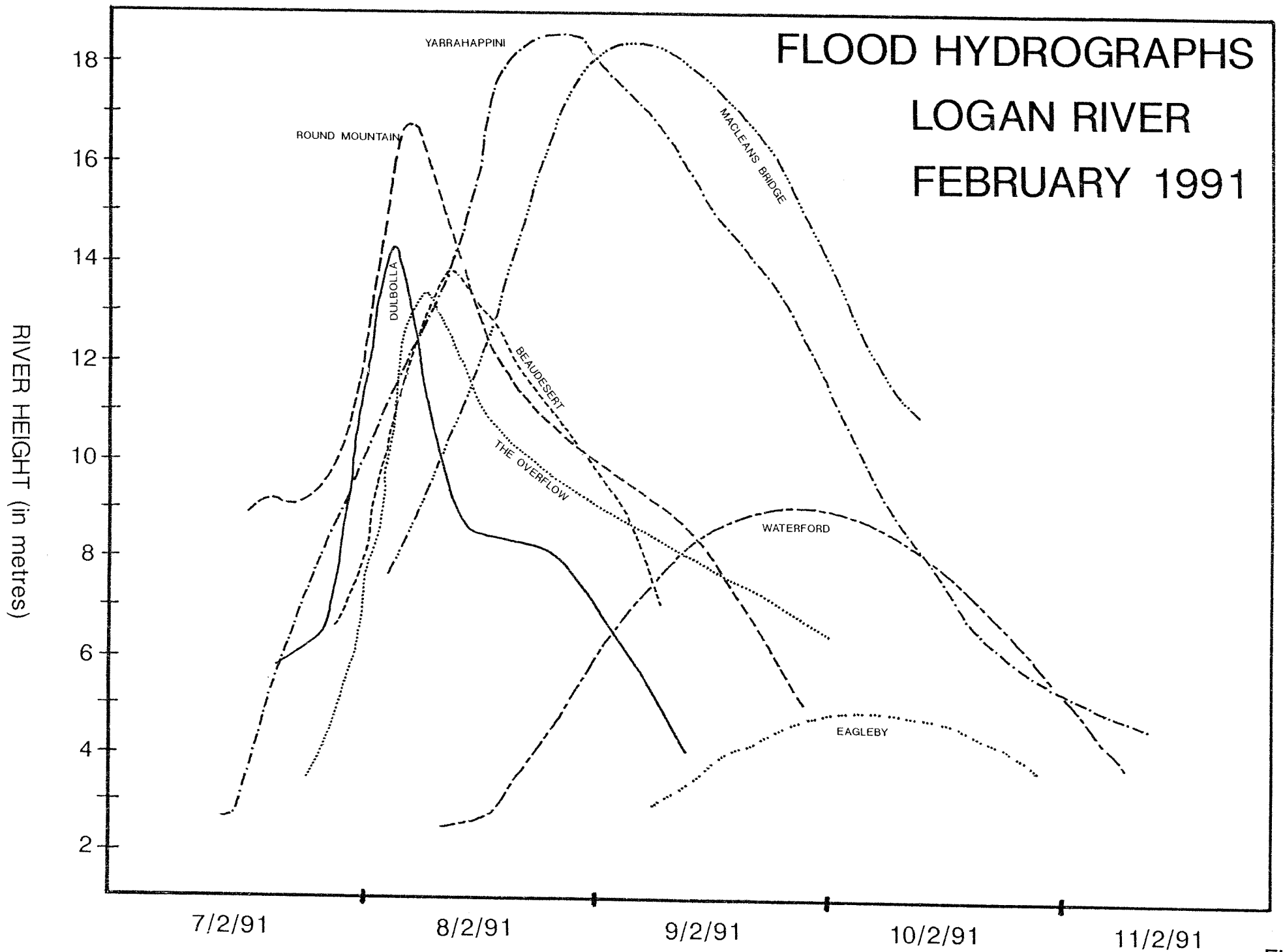


Fig 7

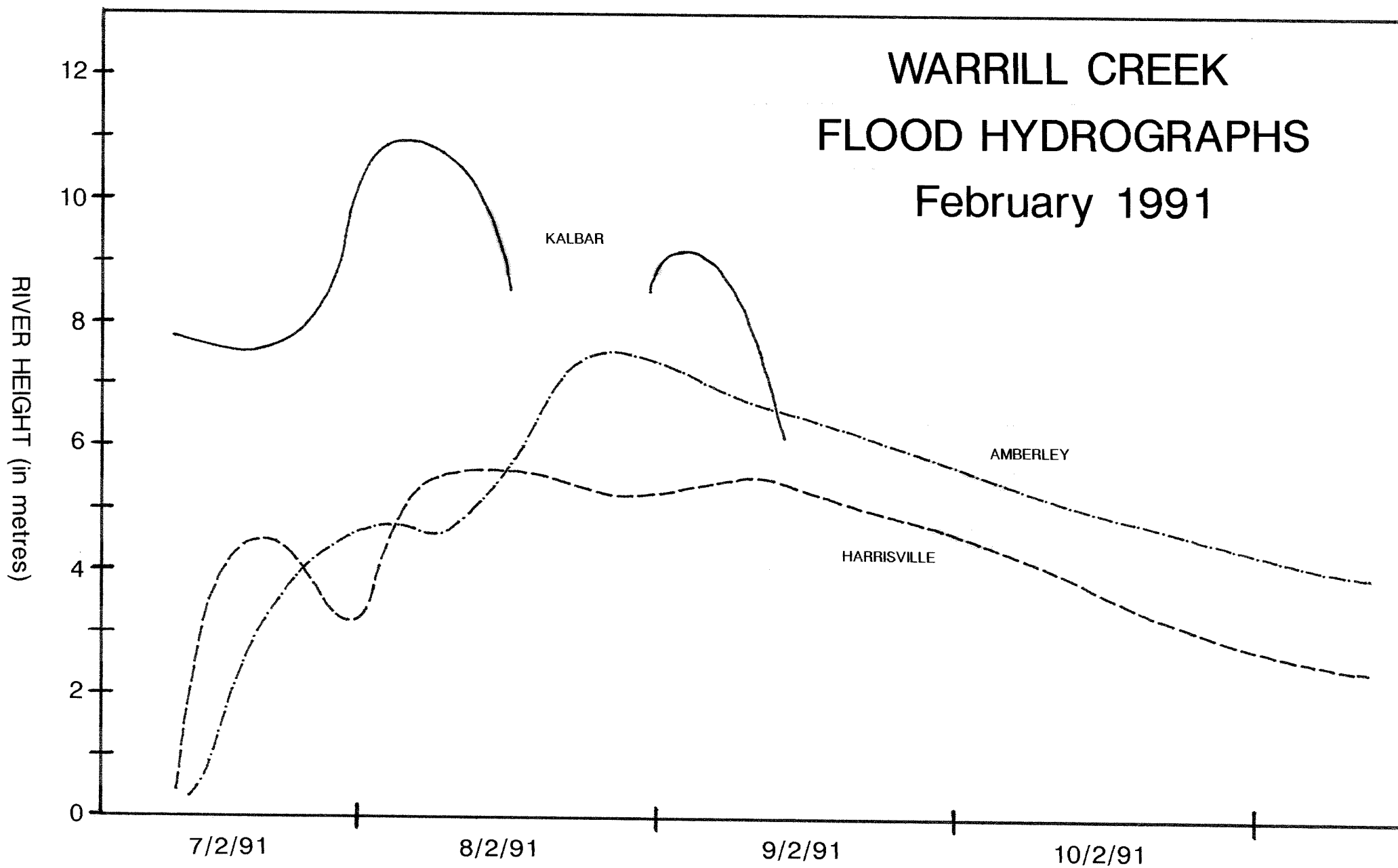


Fig 8