



**Australian Government**  
**Bureau of Meteorology**

## **Severe Tropical Cyclone *Frank*** 6 – 13 December 1995

Perth Tropical Cyclone Warning Centre  
Bureau of Meteorology

### **A. Summary**

A tropical low that was first observed near 10°S 117°E on 6 December tracked southeast and intensified, reaching cyclone strength by the afternoon of 7 December. As further intensification progressed *Frank* changed direction towards the south southwest, maintaining that course until early on 12 December when located just to the west of Cape Cuvier. *Frank* was at maximum strength around 0100 UTC on 10 December when located at 19.3°S 114.9°E with maximum winds of 85 knots. *Frank* remained offshore throughout its lifetime passing closest to land during early evening on 11 December, when the centre was about 70 kilometres west of NW Cape.

A study of the foreshore on the western side of Exmouth Gulf showed that a storm surge had occurred, however there was no tide gauge to provide accurate measurements.

The cyclone weakened rapidly over colder water during 12 December to below cyclone strength by the evening. The low then recurved towards the south southeast passing close to Carnarvon around midnight, then moved inland and weakened further during 13 December.

*Frank* was the first tropical cyclone to form off the northwest coast of Australia during the 1995/96 season. At the time it was reported to be one of only three cyclones since 1876 that caused gales at NW Cape prior to Christmas.

### **B. Meteorological Description**

#### *Intensity*

A strong northeast monsoon flow developed on the South China Sea on 5 December which resulted in a surge in the northwest monsoon through the Java Sea and into the region south of Indonesia. *Frank* formed from a low first observed in the monsoon trough just south of Bali on 6 December. The low tracked southeast which placed it in a favourable development area under an upper ridge. It reached tropical cyclone intensity by 0700 UTC 7 December.

Initial movement appeared to be associated with the northwest monsoon surge; however, as it intensified it was steered to the southwest under the influence of a middle-level ridge. *Frank* continued on a southwest or south-southwest track and

slowly intensified. It reached the category three stage by 2100 UTC 8 December 1995 as it came closer to the strong upper northwesterly winds developing overland south of Northwest Cape. A trough in the mid-latitude westerlies associated with the development of these northwesterly winds passed to the south of the cyclone during the period from 8 to 10 December. It was not of sufficient amplitude to erode the dominant middle level ridge which continued to steer *Frank* to the south-southwest.

The cyclone reached maximum intensity at 0100 UTC 10 December. Around 0900 UTC 11 December it passed 70 km from Northwest Cape. Gale-force winds occurred in the Cape region for 24 hours commencing around 0000 UTC 11 December.

The deep, layered ridge poleward of *Frank* then began to weaken and on 12 December 1995 the cyclone turned southwards and then towards the south-southeast. As *Frank* turned south around 1900 UTC 11 December it weakened to a category two cyclone becoming subjected to increasing westerly wind shear. The cyclone continued to weaken and by 1300 UTC 12 December the system was no longer of tropical cyclone intensity. The remnants of *Frank* then moved into Shark Bay and made landfall as a tropical low at 0000 UTC 13 December.

#### *Motion and Structure*

The southeast movement of the low in the early stages of development was most likely due to the shallow circulation being embedded in the northwest monsoonal surge. As intensification proceeded the circulation associated with *Frank* deepened and came under the influence of the middle level (500hPa) steering flow. At this level a ridge axis extending westward from a high over central Australia was the controlling influence. As development continued a secondary arm of the ridge extended northward towards the WA/NT border. This may have been a downward reflection of the high level anticyclonic gyre associated with the intensifying cyclone. The secondary arm of the ridge resulted in a more north to northeast steering flow in the region of the cyclone.

A trough in the mid latitude westerlies passed to the south of the cyclone during the period 8-10 December, but was not of sufficient amplitude to erode the dominant east-west ridge axis located through central WA. *Frank* eventually passed around the middle level ridge axis early on the 12th. Although increasing shear appeared to contribute to the weakening of *Frank*, the strength of the shear was not sufficient to fracture the cyclonic circulation. Consequently the cyclone continued to be steered around the axis of the middle level ridge, rather than be influenced by the more easterly flow in the lower levels. The position of the 500 hPa ridge indicated by upper wind observations during the period of re-curvature appeared to shift erratically, being near Geraldton at 0000 UTC on 12 December then appearing near Port Hedland by 0000 UTC the following day. The 400 hPa ridge axis positions were more stable during this period, being located near or just to the north of the latitude of re-curvature

### **C. Impact**

Gale force winds occurred in the NW Cape region for a period of just over 24 hours commencing on the morning of 11 December. Some minor damage to property occurred at Exmouth. A storm surge of approximately one metre was reported at Exmouth Gulf.

Heavy rain in the Carnarvon area caused damage to plantations.

#### **D. Observations**

##### *Wind*

Learmonth: Gust to 111 kilometres per hour at 0822 UTC 11 December.

##### *Pressure*

Learmonth: 995 hPa at 0800 UTC 11 December.

##### *Rainfall*

Learmonth: 133 mm in 24 hours to 0900 WST 12 December.

Ningaloo: 158 mm in 24 hours to 0900 WST 12 December.

Table 1. Best track summary for *Frank*, 6 – 13 December 1995

Note: Add 8 hours to convert to WST. Refer to best track database for complete track details.

Year	Month	Day	Hour (UTC)	Position Latitude S	Position Longitude E	Max wind 10min knots	Central Pressure hPa	Rad. of Gales nm
1995	12	6	0400	10.4	116.8	20	1005	
1995	12	6	0700	10.5	117.0	20	1003	
1995	12	6	1000	10.7	117.3	25	1002	
1995	12	6	1300	10.9	117.6	25	1002	
1995	12	6	1600	11.1	117.9	25	1000	
1995	12	6	1900	11.3	118.1	30	998	
1995	12	6	2200	11.5	118.5	35	996	
1995	12	7	0100	11.8	118.7	35	996	
1995	12	7	0400	12.3	118.8	35	995	
1995	12	7	0700	12.6	118.8	35	995	55
1995	12	7	1000	12.9	118.7	35	995	55
1995	12	7	1300	13.1	118.6	40	990	55
1995	12	7	1600	13.4	118.4	40	990	65
1995	12	7	1900	13.6	118.2	40	990	65
1995	12	7	2200	13.8	117.9	45	985	80
1995	12	8	0100	14.1	117.7	45	985	80
1995	12	8	0400	14.3	117.5	45	985	80
1995	12	8	0700	14.7	117.3	55	980	110
1995	12	8	1000	15.1	117.0	55	980	110
1995	12	8	1300	15.4	116.8	60	975	110
1995	12	8	1600	15.6	116.6	60	975	110
1995	12	8	1900	15.9	116.4	65	970	110
1995	12	8	2200	16.2	116.2	70	965	110
1995	12	9	0100	16.5	116.0	70	965	110
1995	12	9	0400	17.0	115.7	70	965	110
1995	12	9	0700	17.3	115.7	75	960	110
1995	12	9	1000	17.7	115.6	80	955	110
1995	12	9	1300	18.1	115.4	80	955	110
1995	12	9	1600	18.4	115.3	80	955	110
1995	12	9	1900	18.6	115.2	80	955	110
1995	12	9	2200	18.9	115.1	85	950	110
1995	12	10	0100	19.3	114.9	85	950	90
1995	12	10	0400	19.6	114.7	85	950	90
1995	12	10	0700	19.8	114.6	85	950	90
1995	12	10	1000	20.0	114.5	80	955	90
1995	12	10	1300	20.1	114.3	75	960	90
1995	12	10	1600	20.2	114.2	70	965	90
1995	12	10	1900	20.4	114.2	70	965	90
1995	12	10	2200	20.7	114.1	70	965	90
1995	12	11	0100	20.9	113.9	70	965	90
1995	12	11	0400	21.1	113.7	70	965	90
1995	12	11	0700	21.4	113.4	70	965	85
1995	12	11	1000	21.7	113.2	70	965	85

1995	12	11	1300	21.9	113.0	65	970	85
1995	12	11	1600	22.1	112.9	65	970	85
1995	12	11	1900	22.4	112.8	60	975	85
1995	12	11	2200	22.7	112.8	55	980	85
1995	12	12	0100	22.9	112.8	45	985	85
1995	12	12	0400	23.2	112.8	45	985	85
1995	12	12	0700	23.6	112.9	40	990	80
1995	12	12	1000	24.0	113.1	40	990	65
1995	12	12	1300	24.5	113.3	35	995	55
1995	12	12	1600	24.9	113.6	35	995	
1995	12	12	1900	25.4	113.8	30	998	
1995	12	12	2200	25.8	114.1	30	998	
1995	12	13	0100	26.2	114.4	25	1000	
1995	12	13	0700	27.2	115.5	25	1000	

Figure 1. Track of Tropical Cyclone Frank 7 – 13 December 1995  
*All times in WST.*



