

**TURBIDITY MEASUREMENTS
"SIR THOMAS HILEY"
DREDGING OF MAIN CHANNEL**

Prepared for: Port of Brisbane Corporation

Prepared by: WBM Oceanics Australia
99 Leichhardt St.,
SPRING HILL QLD 4004
Telephone (07) 831 6744
Fax (07) 832 3627

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| <p>WBM OCEANICS AUSTRALIA 99 LEICHHARDT STREET PO BOX 203 SPRING HILL QLD 4004 AUSTRALIA</p> <p>TELEPHONE: 07 831 6744 International: + 617 831 6744 FAX: 07 832 3627 International: + 617 832 3627</p> | <p><i>Document No:</i> 8908.1.0</p> <p><i>Archive Document No:</i> 00015737</p> <p><i>Original Date of Issue:</i> 22/5/95</p> <p><i>Project Manager:</i> C Witt</p> |
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| <i>Title:</i> | Turbidity Measurements, "Sir Thomas Hiley", Dredging of Main Channel |
| <i>Author:</i> | A Charteris |
| <i>Client:</i> | Port of Brisbane Corporation |
| <i>Client Contact:</i> | Mr John Dobson |
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| <i>Synopsis:</i> | Turbidity associated with maintenance dredging of Main Channel was measured. This report documents results of the measurement exercises. |

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1.0 INTRODUCTION

WBM Oceanics Australia were commissioned by the Port of Brisbane Corporation to undertake turbidity measurements associated with dredging activities in Main Channel, Moreton Bay.

The vessel "Sir Thomas Hiley" was undertaking the maintenance dredging exercise in Main Channel between channel markers M8 and M9 (see Figure 1). On 28/02/95 WBM Oceanics Australia performed the following measurement activities:

- turbidity profiling of background conditions
- drogue tracking of plume movement and turbidity profiling of plume dispersion
- water sample collection

This report documents the results of these measurement activities and subsequent sample analyses.

2.0 EQUIPMENT AND METHODOLOGY

Turbidity profiling was performed using a Hydrolab H20 water quality instrument. Drogues were used to track the plume generated by dredge activity for subsequent turbidity profiling of dispersion with time and distance. Communication with the dredge confirmed that its hoppers were about 90% full when the drogues were deployed and the first turbidity profile of the plume was carried out. This occurred approximately 150 m behind the dredge in the centre of the surface visible plane (time 12:13) on a dredging pass towards port (M9 to M8).

The tide was ebbing from a high of 2.47m LAT at 08:49 am to a low of 0.36m LAT at 15.23pm (predicted at Brisbane bar). Wind conditions were slight.

Turbidity profiles were recorded and water samples collected at regular intervals in the plume as tracked by drogues. Water samples were dispatched for laboratory analysis of suspended sediment content and turbidity.

3.0 RESULTS

3.1 PROFILES

Table 3.1 presents results from profiling of turbidity in the plume generated by the dredge activity.

TABLE 3.1
Turbidity Profiles
 All units recorded as NTU

| Time | 11:40 | 12:13 | 12:30 | 12:50 | 13:10 | 13:30 | 13:55 |
|----------|------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------|
| Location | Background | 27 10 47 S 153 18 33 E | 27 10 27 S 153 18 48 E | 27 10 07 S 153 19 03 E | 27 09 39 S 153 19 18 E | 27 09 06 S 153 19 30 E | Background |
| Depth | | | | | | | |
| -2.0 | 9.5 | 25.9 | 19.7 | 16.4 | 14.4 | 12.9 | 9.3 |
| -4.0 | 9.5 | 36.8 | 19.5 | 17.4 | 13.8 | 13.5 | 9.7 |
| -6.0 | 9.2 | 20.3 | 21.7 | 16.4 | 13.5 | 15.2 | 10.3 |
| -8.0 | 9.8 | 42.8 | 19.9 | 15.5 | 14.3 | 16.9 | 12.1 |
| -10.0 | 9.9 | 33.3 | 14.2 | 15.2 | 14.4 | | 11.6 |
| -12.0 | 10.2 | 33.6 | 13.8 | 14.3 | 13.4 | | 10.3 |
| -14.0 | 10.1 | 32.8 | 13.4 | 13.1 | 13.4 | | 12.3 |
| -16.0 | 9.8 | 45.2 | 12.4 | 14.6 | 14.1 | | |
| -18.0 | | | 14.7 | 15.0 | 13.8 | | |

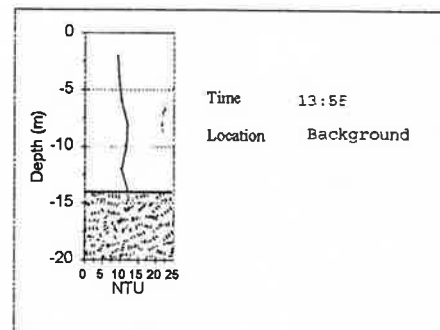
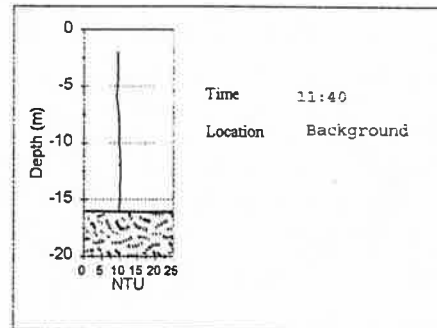
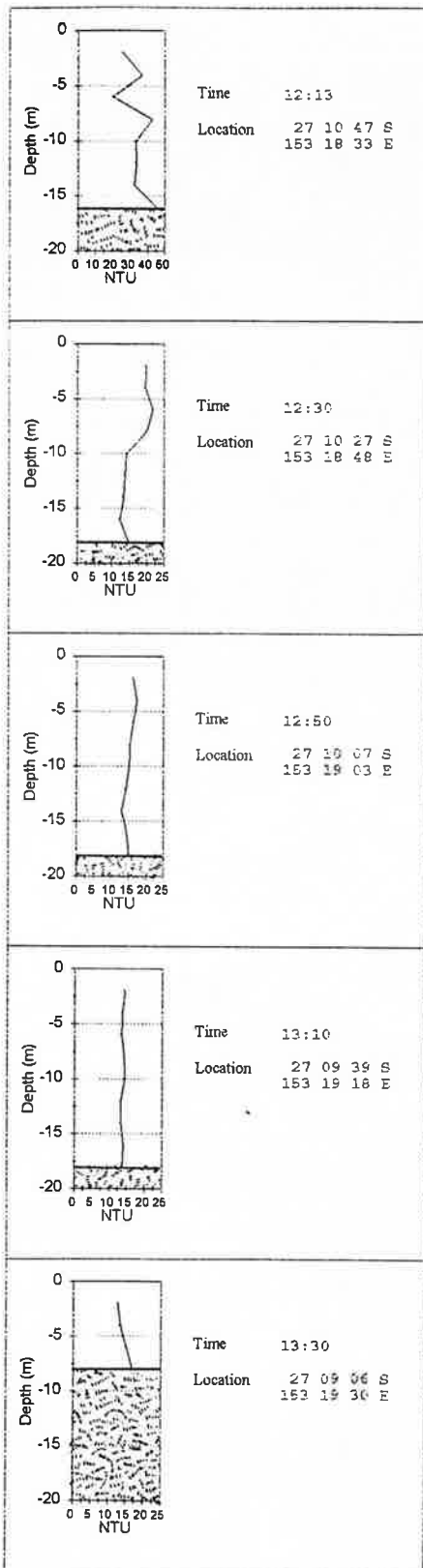
This is illustrated diagrammatically in Figure 2. The drogues deployed in the plume travelled approximately 3.5 km to the northeast during the 1.25 hours they were tracked.

3.2 WATER SAMPLES

Water samples were collected from three depths at the following locations:

TABLE 3.2
Water Samples Locations

| Site | Time | Location | |
|------|-------|------------|-------------|
| S1 | 11:40 | Background | |
| S2 | 12:13 | 27 10 47 S | 153 18 33 E |
| S3 | 12:50 | 27 10 07 S | 153 19 03 E |
| S4 | 13:30 | 27 09 06 S | 153 19 30 E |



TURBIDITY PROFILES

FIGURE

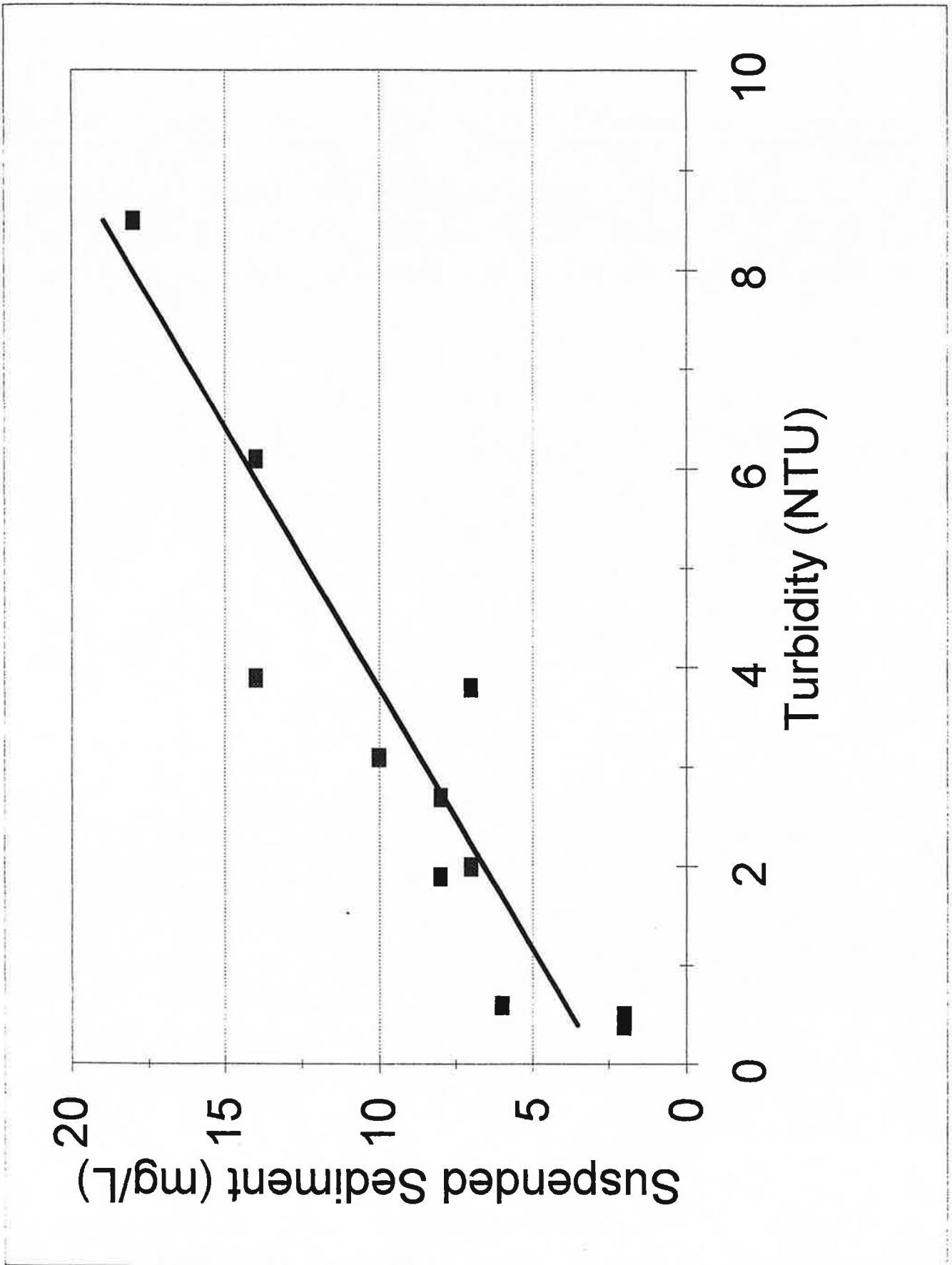
Table 3.3 below presents the water sample results for both turbidity and suspended sediment concentration.

TABLE 3.3
Water Sample Analysis Results

| Site | S1 | | S2 | | S3 | | S4 | |
|-------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|
| Depth | Turb (NTU) | SS (mg/L) | Turb (NTU) | SS (mg/L) | Turb (NTU) | SS (mg/L) | Turb (NTU) | SS (mg/L) |
| 3.0 | 0.5 | 2 | 6.1 | 14 | 2.7 | 8 | 1.9 | 8 |
| 6.0 | 0.4 | 2 | 2.0 | 7 | 0.6 | 6 | 3.1 | 10 |
| 9.0 | 0.5 | 2 | 3.8 | 7 | 3.9 | 14 | 8.5 | 18* |

* possibly contaminated due to shallow depth of water and interaction with seabed.

Figure 3 illustrates the suspended sediment/turbidity relationship for sediments in this area of the bay.



RELATIONSHIP BETWEEN
TURBIDITY & SUSPENDED SEDIMENT CONCENTRATION

FIGURE

4.0 SUMMARY

Monitoring of turbidity created by the dredge "Sir Thomas Hiley" during dredge activities in Main Channel showed peak suspended sediment concentrations of 14 mg/L on background concentrations of 2 mg/L. In-situ turbidity profiling showed peak levels behind the dredge of 20 to 45 NTU on background levels of 9 to 10 NTU. Peak levels decayed back to near background concentrations quickly. The drogues deployed in the plume travelled approximately 3.5 km to the northeast during the 1.25 hours they were tracked.