MINUTE

To: Director Water Resources

From: C.H. Henkel
    Through Principal Chemist

Subject: INVESTIGATION OF ORE CONCENTRATE SPILL DURING THE LOADING OF
        WOODCUTTERS CONCENTRATES, 24/1/1990

Please find attached report on investigations of an ore spill during the
loading of Woodcutters concentrates on the 24/1/1990

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20/3/40
SYNOPSIS

During the loading of mineral concentrates on the 24/1/1990 some material was spilled and fell off the Old Iron Ore Wharf into the water.

Staff of the Water Resources Division Laboratory were requested to investigate the incident and a team of the laboratory staff were sent to take water and sediment samples at and near the spillage site.

This report is a record of results obtained for the samples taken.
1. INTRODUCTION

The Old Iron Ore Wharf, Darwin Harbour, has been used for the loading of bulk minerals for many years on an intermittent basis.

Since mining of iron ore at Francis Creek ceased in the seventies, barytes from Dorisvale were loaded until the mid-eighties.

The wharf is now used for the loading of bulk concentrates from Woodcutters mine, which is producing and exporting two distinct types of concentrates, namely, zinc concentrate and lead concentrate.

A spill occurred during loading of concentrates on the 24/1/1990.

Initial investigations on the same day showed that lead concentrate was spilled.
2. CONCLUSIONS

2.1 Water Samples

As expected, all results for heavy metals analyzed were below detection levels, indicating that the spilled material did not dissolve to any appreciable extent.

2.2 Sediment Samples

Results obtained for the sediment samples indicate that the sea bed around the wharf is contaminated with heavy metals of the type found in Woodcutters concentrates, but also indicate, that this contamination is not solely due to the spillage of the concentrate on the 24/1/1990, as too much zinc was present in all three sediment samples.

The contaminants found are most likely an accumulation of materials spilled over the period of the past four years of loading Woodcutters concentrates, plus of iron ore and barytes since start of operation of the Old Iron Ore Wharf.

The results obtained for barium and iron show that material which dropped into the water have remained for some time on the bottom in the vicinity of where they have settled, and may have been partially removed by tidal flows.

Damage caused to the environment by the spill of the lead concentrate is likely to be minor when compared to the lead laden particles generated by the combustion of leaded fuel, which find their way into the harbour during heavy rain storms in Darwin.
3. SAMPLING

3.1 Sampling Locations

Three sampling points were decided on. These were named Point 1, 2 and 3. Point 1 was the westerly end of the wharf, Point 2, the centre of the wharf facing the shore and 3 metres away from where the spill occurred, and Point 3, the easterly end of the wharf.

From each sampling point one sediment sample and two water samples were taken. The water samples for each location consisted of samples taken from one metre above the sea bed and one sample from half way between the surface and the sea bed.

3.2 Sampling Time

The samples were taken on the 25/1/1990 between 1130 and 1200 h. The time of sampling was chosen to coincide with a low tide on the change, so as to ensure that the movement in the water due to tidal run was minimal and to find evidence of dissolution of heavy metals, should such dissolution have taken place.

3.3 Sampling Equipment

Sediment samples were taken using a grab suitable for this purpose. These samples were transferred into a clean plastic bag and on arrival in the laboratory stored in a refrigerator until sent for analysis.

Water samples were obtained using a 2 litre Niskin Sampler. The samples were transferred into clean acid washed bottles and stored in a refrigerator until sent for analysis.

3.4 Sample Identification

Point 1

<table>
<thead>
<tr>
<th>Water Sample No.</th>
<th>AWN1</th>
<th>1 metre from bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Sample No.</td>
<td>AWN2</td>
<td>6 metres from surface</td>
</tr>
<tr>
<td>Sediment Sample No.</td>
<td>491</td>
<td>12 metres from surface</td>
</tr>
</tbody>
</table>
Point 2
Water Sample No. AWN3 1 metre from bottom
Water Sample No. AWN4 6 metres from surface
Sediment Sample No. 492 12 metres from surface

Point 3
Water Sample No. AWN5 1 metre from bottom
Water Sample No. AWN6 7 metres from surface
Sediment Sample No. 493 14 metres from surface

4. ANALYSIS

As the PAWA laboratory does not have the appropriate NATA registration, all samples were sent to Classic Laboratories Ltd, Adelaide, for analysis.

A NATA certificate was issued with all results. The results for the water samples are shown in Table 4.1 and the results for the sediment samples are listed in Tables 4.2 and 4.3, as issued by Classical Laboratories.

The samples were analyzed using NATA approved ICP methods.

5. DISCUSSION OF RESULTS

The results obtained for the six water samples showed that all metals analyzed for were below the detection limit of the method used.

The method chosen was, for the given circumstances, the most effective and sensitive method available. The results show that no gross water contamination problem had developed at the time of sampling.

The results for the sediment samples show that the bottom of the harbour around the Old Iron Ore Wharf has been contaminated over the years not only by Woodcutters concentrate, but also by iron ore from Francis Creek and barytes from Dorisvale.