MELBOURNE CHANNEL DEEPENING PROJECT

Precis: Verification Report No.1 for Department of Sustainability and the Environment, Victoria, Australia

Ripper Draghead Compliance Verification

1. Objective

Verification that the design of the ripper dragheads being used by the Alliance to dredge rock at the Entrance of Port Phillip Bay is in accordance with the findings and recommendations of the Delft Hydraulics Report Z4117, dated October 2006, and that the dragheads have been constructed according to the design.

2. Information available

The following information is currently available:

- Notes made by RNB during the Delft trials and reported to the IEG, dated 24/5/06 and 6/6/06;
- Physical Model Experiments with Ripper Dragheads in Rock. Delft Report No Z4117, dated October 2006;
- Verification Report "Ripper Dragheads Modifications" Evers Consult, dated 26/3/08.
- Photographic Record of Ripper Draghead Modifications, PoMC/Boskalis Alliance dated 1 April 2008
- Data obtained during the site inspection on 3rd June, 2008

3. Site inspection

On the 3rd June, 2008, the author, accompanied by DSE, DEWHA and PoMC/Boskalis Alliance personnel, visited the quay in Melbourne where the TSHD "Queen of the Netherlands" was docked. The starboard suction pipe and draghead were, at that time, suspended over the quay during a period of maintenance and repair (see Figure 1). From inspection at close quarters it was clear where the water jets were situated, where additional shielding had been added and what other modifications had been made in accordance with the Delft recommendations.

Figure 1: TSHD “Queen of the Netherlands” starboard suction pipe and draghead ready for inspection on 3/6/08

4. Discussion

The Delft Report concluded that model draghead type RDH-2 was the optimum design and that:

1. The spill in front of the draghead is mainly governed by the configuration of the flow of the water jets;
2. Further spill reduction is achieved if the jet flow and suction flow is balanced;
3. Obstructions in the suction mouth can lead to momentary blockage and increased spill;
4. The capability of the draghead to pick up material is influenced by the distance between the suction mouth and the top of the seabed; and
5. Additional shielding of the upper parts of the draghead significantly improves the suction characteristics and reduces spill.

Point 1 was derived from the results of varying the water jet positions in the Delft tests. The photographs of the modified dragheads shown in the Evers Consult Report and the inspection of the draghead during the site visit on the 3rd June, 2008, (see section 3) demonstrated that the principles found during the Delft tests have been retained in the modified design.

Point 2 in the above list relates to an operational aspect of the dredging on the site. The suction flow will be a function of the pump design and operation, the suction pipe diameter and the characteristics of the draghead and other hydraulic resistances in the suction line. It would normally be variable during the dredging process, but oscillating

around a reasonably constant average. The dredgemaster then has to vary the water jet flow until the optimum balance is achieved. It is apparent from the results of the dredging and cleaning carried out on the Nepean Bank that the cleaning process is being effective and that approximately 3% of the dredged volume is being recovered as spill. So far, a quantification of the spill remaining on the seabed has not been made, but would appear to be well below 2% as predicted in the Supplementary Environmental Effects Statement.

The obstructions noted in Point 3 may be partially eliminated by increasing the size of the apertures leading to the suction pipe. It was unclear from the photographs whether this point had been taken into account in the modified design. However, during the site visit on 3rd June, 2008, these apertures were examined and found to be increased in size. Moreover, it was pointed out by Boskalis personnel that an additional anti-blockage plate had been added.

Point 4 is another operational aspect. When the draghead is being used in the cleaning mode, the cutting teeth are replaced by skids. It is very difficult to tell how much of the time the draghead is actually touching the seabed during the cleaning runs. However, the evidence of spill recovery points towards an effective use of the equipment for this purpose.

Point 5 is an important finding of the Delft trials, leading to significant improvements in spill reduction, and it is clear from the photographs that serious attempts have been made to shield the sides and upper part of the dragheads to reduce inflow from these directions. These shields were examined during the site visit and found to be fully functional.

5. Discussion

In the light of the above discussion, and the verifications carried out by Evers Consult and myself on site, I am of the opinion that the design of the modified dragheads is in line with the findings of the Delft 2006 report, and the dragheads have been constructed and used accordingly.

R N BRAY
Member of the Independent Expert Group
25th June, 2008