Annex I

PORT OF TYNE CONTAMINATED DREDGE MATERAIL

SUMMARY OF CAPPING PROJECT

Application

The Port of Tyne (PoT) originally applied for the disposal of about 500 000 tonnes of dredged material to sea from 9 sites. The applicants undertook contaminant analysis of the material and showed that up to approximately 22 4000 tonnes (160 000 m^3) of it was grossly contaminated with the anti fouling Tributyltin oxide (TBT) and heavy metals. Management options for the material were proposed. Following consultation and taking into account socio economic needs for the area, a trial of capped offshore placement for the contaminated dredge material (COM) was agreed with the Minister Elliot Morley. The quantity of COM was further discussed and refined to approximately 96 000 tonnes (60 000 m^3"for the project.

Capital applications under FEPA may require an EIA, but this is not always the case and depends on a variety of factors including the scale of the activity. Although no formal 'EIA' was undertaken for this project considerably more information gathering, environmental assessment, monitoring and communication was involved than on any other dredging project undertaken in recent years.

Neptune Yard was last dredged in 1988 and the East Fitting Out Quay in 2000, therefore the material was a mixture of Capital and Maintenance material (Posford report February 2003).

The aim of the capping trial was to test a means of safely disposing of contaminated dredged material from within the Port of Tyne to allow the business of the port to continue and thus avoiding harming the socio-economic well being of the area.

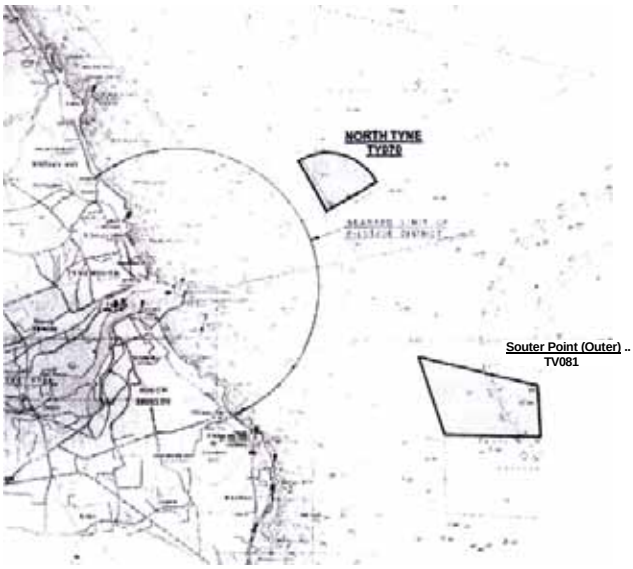
The licence was issued to permit approximately 96 000 tonnes (60 000 m^3) of contaminated dredge material to be placed at the Souter Point disposal site. To ensure the contaminated dredge material was contained, the disposal licence required a 1.5 m 'cap' of clean silt and sand.

Port of Tyne South Souter Disposal Site (TY081)

Port of Tyne dispose of about 250 000 tonnes of maintenance dredged material annually offshore. There are two disposal sites available, North Tyne (TY070) and Souter Point (Outer TY081).

Port of Tyne have their own powers to undertake dredging as do many Harbour Authorities. They would still however be controlled under different environmental regulations, and may regarding water quality and navigation restraints under the coast protection act (CPA) have conditions imposed on them. Therefore although Defra does not control dredging per se, whether the material concerned is capital or maintenance, they do require a licence under FEPA to dispose at either of the two disposal sites offshore.

Figure 1. The location of the Souter Point Outer Disposal Ground



Souter Point disposal site is about 4 miles from the coast in approximately 48m of water and is affected by relatively weak tides, which ebb and flow predominantly in a north - south direction with a residual flow to the south. It is a relatively large disposal site the terrain of which slopes away from the land. Dredged material is generally placed to the North western corner of the Souter Point site as it is closer and thus more cost effective.

Souter Point is less dispersive than North Tyne and is indeed probably the least dispersive dredged material disposal site in England and Wales.

The Souter Point (Inner) disposal site (TY080), where the mine tailings and colliery waste were placed, is in shallower water, where the bed shear stress will be comparatively greater, than at the capping site. The colliery waste material consisted of relatively soft friable rock that breaks down into sandy material over a long time when subjected to abrasion such as can occur at the seabed. It is this material that can disperse. In fact most of the colliery waste material is probably still in or close to the disposal site as evidenced by the mound that exists in that part of the site. Much of the material disposed of to Souter recently has been silty maintenance dredged material and will be more inclined to disperse under the prevailing conditions than sandy material.

The assessment of dredged material for disposal to sea is based on a weight of evidence approach. The contaminant levels within the proposed dredge material are assessed as part of this 'weight of evidence' approach to determine its suitability for disposal to sea. These values may be used in conjunction with a range of other assessment methods e.g. bioassays, as well as historical data and knowledge regarding the dredging site, the material's physical characteristics, the disposal site characteristics and other relevant data, to make management decisions regarding the fate of dredged material. This integrated approach is in line with recent discussions regarding weight of evidence approaches to environmental management of sediments. It considers balancing multiple lines of evidence concerning ecological assessment as an aid to decision making. There is no difference in the contaminant concentration levels used for the assessment of dredge material with regard to its' suitability for disposal offshore for either Capital or Maintenance dredge material.

Dredge and Disposal

To minimise the release of suspended sediments from the dredging activity, the best technique is the use of an enclosed backhoe. Any dredging technique is likely to lose some material from the exterior surfaces of the device used as it is hauled to the surface and over to a barge or other receptacle. Large pieces of sediment that may fall off the dredging bucket are of little concern as they will fall straight to the seabed and thus remain within the dredging area. The greater concern is with the loss of fine material that can be carried away from the dredging site by currents. However, in this case the suspended sediment monitoring carried out by the EA clearly showed that elevated levels were confined to very close to the dredging site so that dispersion of fine contaminated sediment away from the site was minimised. Port of Tyne chose to use split-hopper barges with rubber seals to minimise any loses from the barges during transport of the COM to the disposal site.

158 loads, some 82,160 tonnes of COM, were excavated by backhoe dredger and placed using a split hopper barge. Each load was to be placed in the centre of the trial site to limit spreading of the material. Load 16 fell outside target zone 20 m south of Southern edge of COM box but inside the original designated capping zone.

Dredging of silt for the cap commenced 3 April 2005 using a trailer suction dredger loaded on average 9 loads per day, some 67 loads in total finishing on 12th April 05. The material was placed using the dredger's twin-pipes and spread using the port side pipe with pumps reversed. 100, 000 cubic meters (140,000 tonnes) of silt was placed over the COM.

A bathymetric monitoring survey following placement of the COM and another followed the silt cap placement of the later was undertaken. The survey illustrated that the silt cap had failed to act as predicted, and only 20 - 30% of the silt cap material could be accounted for.

Silt capping was halted and immediate placement of sand was started. The quantity of sand required to cover the COM effectively was then calculated by the applicants, and coastal process experts at Cefas; only following considerable communication were the additional quantities required to effectively form the cap with sand instead agreed. The cap (sand) needed to be placed over the contaminated dredge material as soon as possible to limit the exposure of the contaminated material.

Due to the velocity of sand through the fall pipe and a perceived risk to the CDM mound, the operators decided to spread the sand over the site by trickling the material over the area through the dredgers doors. The cargo was disposed of against the tide. The 29 loads, approximately 90 000 cubic meters (144 000 tonnes) of sand was placed and the cap was completed on 15th April 2005.

State of the art acoustic techniques and Sediment Profile Imaging SPI, which was fundamental in evaluating CDM layers of less than 20cm thick were used for monitoring the project.

PoT's determination of a significant boundary lay around the 8-1 Ocm thickness of CDM in some places. Cefas opinion was that 2cm apron was significant (as per USA Army Corps Engineers).

There were no licence conditions containing timing restrictions with regard to dredging imposed on the Port of Tyne.

Threshold levels were set by the EA who did the monitoring, for suspended solid concentrations during the dredging if these had been exceeded dredging would have ceased. The Port liaised directly with the EA regarding turbidity and dissolved oxygen concentration. The results of water sampling for suspended particulate matter prior to, during and post-sediment disposal and capping were given in the monitoring reports. Results showed no significant impact on SPM concentrations within the disposal area.

Objectives of the dredging were to ensure:

a) *'No loss of contaminated material during transport to the capping site.'* We have no evidence to support your statement that this objective has not been met. Port of Tyne chose to use split-hopper barges with rubber seals to minimise any loses from the barges during transport of the COM to the disposal site.
b) *'Minimal contaminated material loss to the water column during the placement and capping operations'.* We have no evidence to support your statement that this objective has not been met. The monitoring data showed that elevated levels of suspended sediments in the water column were confined to the disposal site.
c) *'Minimal disturbance of contaminated material during the placement of the cap material?'.* We have no evidence to support your statement that this objective has not been met.
d) *'Placement of adequate thickness of capping material over the whole volume of the deposited contaminated material'.* Using all the latest state of the art techniques for monitoring the cap thickness show that the cap is on average 0.85 m, which has now been agreed to be an acceptable thickness based on the different material constituting the cap and experience since the capping. The original licence stated 1.5m-cap thickness, but this was prior to consolidation of both the placed contaminated material and cap. (Usace website)
e) long *term maintenance of the integrity and efficacy of the cap assured by monitoring and cap maintenance.'* The applicants are subject to stringent and costly monitoring, and agreed maintenance when required, to ensure the
cap continues to be effective.

If you can provide evidence that any of these objectives have not been met then we will gladly consider it.

Choice of Disposal Site for the COM

Souter Point (Outer) was chosen as the site for the trial, because it was slightly less dispersive than North Tyne due to being in deeper water and thus less influenced by waves and tide. Souter Point site is not a very dispersive site and what will disperse depends on the characteristics of the material concerned and the forces applied. Thus, while dispersed fine silts may be transported out of the site, the consolidated contaminated dredged material will not be dispersed due to its cohesive nature. The contaminated material dredged for the capping trial dredged by backhoe to maintain it's cohesive nature. The cohesive nature of this material makes it harder to disperse.

The transport of sand on the seabed at the Souter Point disposal site will depend on its particle size and the strength of the currents. Assessment of the evidence suggested that only storm events were likely to significantly move the sand placed as the cap.

Maintenance of Cap

Initial modelling of the bathymetry data produced indicated that the 0.65 m cap could be impacted by 3 moderate storms. Therefore Cefas requested further material to be added to improve the cap in December 2005. PoT were concerned that this would muddy monitoring results and wished to complete their monitoring before undertaking further placement. PoT in consultation with their contractors did undertake further placement of material without notification to Defra. Although it was without consultation, they used maintenance-dredged material, which they are licensed to dispose of on a daily basis (a large quantity of material) at the Souter Point disposal site. On completion of placement they un§fertook further monitoring to show how the silt and sand had behaved. On the initiifgifp placement little silt had remained over the contaminated dredge material, therefore an alternative placement method, using barge bottom doors just opening, was tried to see if the silt behaved better. This placement was undertaken over the disposal site and, although it may have jeopardised the science (i.e. implications for monitoring) it will have added to the isolation of the COM and the overall success of the project. Further material will only cover the COM with a thicker cap.

Following a meeting recently with the applicants and their consultants, monitoring following additional material placement and a years consolidation of both the COM and the capping material, indicated the cap now to be a mean of 0.85m. Agreement was reached following consultation regarding acoustic survey results, that future maintenance material (only available resource) will be used to 'top up' the cap when required as informed by the monitoring results.