

Piaçaguera Channel Cleanup Dredging Project

Carlos Consulim (carlos.consulim@cpeanet.com), Mariana Masutti,
and Gimel R. Zanin (CPEA, São Paulo, Brazil),
Guilherme Lotufo (U.S. Army Engineer Research and Development
Center, Vicksburg, MS, USA)
Patrícia F. Silvério (CPEA, São Paulo, Brazil)

Background/Objectives. The Piaçaguera Channel is an estuarine channel located on an industrial area, linking private terminals to Port of Santos, the most important port of South America. In the past, untreated industrial effluents were released directly into the estuarine system, contaminating the sediment. Since the 1980's strict control measures have resulted in sharp decrease in the input of contaminants into the estuary promoting the sedimentation of much cleaner sediment in the estuary. However, legacy contamination, mainly by some metals and PAHs, remains below the surface. Channel sediment was extensively characterized in the context of both dredging to maintain navigation and to remove legacy contamination as a cleanup effort.

Approach/Activities Extensive sediment sampling using vibracore were carried out to characterize the horizontal and vertical distribution of PAHs concentrations and other contaminants at 0.5-m depth strata between -12.0 m and -16 m throughout the project area. Concentrations measured in each stratum were evaluated for their suitability for unrestricted ocean disposal according to the evaluation criteria in Brazilian regulation CONAMA 454/12. When considering the vertical distribution of contamination, a conservative approach was used. When a given layer was considered unsuitable for ocean disposal, the whole segment was considered unsuitable and consequently was assigned for confinement. Segments of the channel considered suitable for ocean disposal in the entire depth were placed at the offshore disposal site (PDO). Placement of contaminated sediments in terrestrial confined disposal facilities (CDF) and in confined aquatic disposal cells (CAD) was evaluated taking into account costs, logistics, regulatory acceptance, environmental risk. Both alternatives have been widely and successfully used worldwide. A total in situ volume of 2.4 million m³ was placed in a near-shore CAD cell adjacent to the channel, the volume to PDO was around 589,000 m³ and the current project phase is the CDF volume detailing. The disposal process in CAD was conducted using several operation controls to minimize loss outside the placement area, including the use of a diffuser to direct the dredged material at the bottom of the CAD, and a silt curtain in the whole CAD perimeter to reduce plume dispersion during disposal. Following placement, a 1.5 m thick sand cap will provide adequate stability.

Results/Lessons Learned. The whole process of confining in CAD has been extensively monitored since the excavation phase and all information was gathered in a database. Past and ongoing monitoring activities include sampling water and sediment for quality evaluation, some of them in a daily basis (and semi-annual sampling of fisheries resources and toxicity testing). Monitoring results so far has shown full compliance with regulatory parameters. No apparent adverse effects of the dredging and disposal operations were observed in the environment, in accordance with the results of similar monitoring studies on contaminated sediment placement in CADs from past projects around the globe.