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Demonstration Projects

Pennsylvania Mines Demonstration

Between 1998 and 2001, the New Jersey Department of Transportation's Office of Maritime Resources (NJDOT/OMR), assessed the technical and economic feasibility (pdf 53k) of processing and shipping dredged materials to abandoned mines in Pennsylvania for use in remediation efforts.

Abandoned mine reclamation is a priority environmental issue for Pennsylvania and New Jersey Department of Environmental Protection has offered cooperation in the evaluation of the use of amended dredged materials for fill and capping material.

Capping the mines serves to restore the natural topography and eliminate exposure of sulfur-bearing rock to the elements, which has been shown to cause acid runoff.

A pilot project was sponsored by NJDOT/OMR in 1998 involving the dredging, processing and shipment of 19,500 cubic yards from the public marina at Perth Amboy. This material was successfully placed at the Bark Camp Abandoned Mine Reclamation Laboratory in Clearfield County, PA.

An additional 400,000 cubic yards of material from various locations in the NY/NJ Harbor were subsequently dredged, processed, shipped and placed successfully. To date, the State has invested over $11,000,000 in the project. Funding was provided from the Port Authority of NY and NJ and the 1996 Dredging and Harbor Revitalization Bond Act. A full report (pdf 465k) on the Bark Camp demonstration project is now available.

Additional information on this project, including water quality data, is available at the PADEP Bureau of Abandoned Mines web site.

You will need Adobe Acrobat Reader to view the PDF files which is available at our state Adobe Acrobat Access page.

Air Guard Demonstration

NJDOT/OMR sponsored a demonstration of a sedimentation reduction technology sold under the name Air Guard. Air Guard is a pneumatic barrier system designed to reduce sedimentation by reducing the ability of suspended sediments to settle in the protected area.

A specially engineered pattern of pipes is installed in the berthing area and air is forced through the pipes to create "bubble curtains."

NJDOT/OMR evaluated the ability of this technology to reduce or eliminate the need to dredge in "finger pier" style facilities.

The pilot project was conducted at the IMTT facility in Bayonne, and the report completed in May of 2000.

Sedimentation was significantly reduced compared to reference areas. No negative environmental impacts to water quality or fish populations were noted. For more information:

- Sedimentation Reduction Technology (pdf 1.5m)
- Assessment of Alternate Dredging Technologies Pneumatic Sediment Suspension System for IMTT-Bayone (pdf 4.6m)
- Evaluation of a Berth Sedimentation Control Technology in the Kill Van Kull: The Airguard Pneumatic Barrier System (pdf 698k)

Berm Project

NJDOT/OMR, in conjunction with Rutgers Center for Advanced Infrastructure and Transportation (CAIT), OENJ-Cherokee, and the NJDOT Dredging Task Force have completed a field demonstration of the utilization of navigational dredged material from the Port of NY and NJ in the construction of highway embankments.

The project involved the design, construction and evaluation of two model embankments built entirely from 80,000 cubic yards of sediment dredged from the Union Dry Dock in Hoboken. The dredged material was stabilized to form a soil-like matrix utilizing 8-12 percent Portland Cement.

Data was collected on slope stability, strength, constructability and durability as well as environmental data for worker exposure, runoff and leaching potential. While it appears that amended dredged material is potentially suitable and safe for the construction of highway embankments, there are considerable questions regarding durability, especially freeze/thaw and costs.

- Use of Dredged Materials for the Construction of Roadway Embankments - Volume I (pdf 1.1m)
- Use of Dredged Materials for the Construction of Roadway Embankments - Volume II (pdf 2.8m)
- Use of Dredged Materials for the Construction of Roadway Embankments - Volume III (pdf 5.6m)
- Use of Dredged Materials for the Construction of Roadway Embankments - Volume IV (pdf 1.8m)
- Use of Dredged Materials for the Construction of Roadway Embankments - Volume V (pdf 233k)

At a minimum, a cost escalation of $8 per cubic yard is expected for the engineering, placement and monitoring of the material.

A formal field trial on an actual roadway would be necessary to further define the parameters for use of amended dredged material in highway construction.

However, NJDOT/OMR does not recommend further exploration of this technology due to the logistical issues associated with dredged material from the port.

Dredging schedules are difficult to predict, making coordination with construction projects difficult, if not impossible. The fact that the material was shown to respond negatively to rehandling contraindicates stockpiling as a potential solution.

However, this does not preclude the use of previously dewatered dredged material from confined disposal facilities along the Delaware River and Intercoastal waterways. NJDOT/OMR will continue to explore this potential beneficial use.

Claremont Channel Dredging

As the agency responsible for safe navigation in state waters of the NY/NJ Harbor, the NJDOT/OMR took the lead on the maintenance dredging of the state-owned Claremont Channel in Jersey City.

In 1999, the Claremont Channel was only safely navigable at a depth of 25 feet, even though it is authorized to be dredged to 32 feet. Working closely with the main facility on the Channel, Hugo Neu Schnitzer East, NJDOT/OMR provided funding for dredging and dredged materials management while also funding research into innovative technologies for the beneficial use of dredged materials.

Approximately 150,000 cyd of sediment was used in the Pennsylvania Mines Reclamation Demonstration, another 280,000 cyd of sediment was used to cap a brownfield site in Jersey City and prepare it for the construction of a golf course, and another 40,000 cyd for the capping of Linden Landfill.

Approximately 70,000 cyd was used as a brownfield cap on the Hugo Neu Schnitzer East property. Approximately 5,000 cyd of sediment was used to evaluate the use of Propat (shredded auto interiors) as an agent to stabilize dredged material for use as fill.

- Bench Scale Testing Results for Propat as a Dredged Material Stabilizing Agent (pdf 5m)
- Pilot Program Testing Results for Propat as a Dredged Material Stabilizing Agent (pdf 5m)
- Field Demonstration Environmental Monitoring Report for Propat as a Dredged Material Stabilizing Agent (pdf 2.4m)
- Final Report: Propat as a Dredged Material Stabilizing Agent (pdf 1.8m)

The State also provided capacity for 150,000 cyd of material to be placed in the Newark Bay Confined Disposal Facility.

The remainder of the material (400,000 cubic yards) has not yet found a home, but will likely be placed at either the Encap Golf site in Rutherford or at another brownfield site in the region.

Evaluation of Potential for Pollutants to Volatilize from Amended Dredged Material

NJDOT/OMR commissioned a lengthy study to evaluate the potential for contaminants in dredged material to volatilize (move from the sediment to the air) when the sediment is mixed with stabilizing agents prior to placement at an upland location. This study was motivated by literature that suggests that semi-volatile organic compounds like those found in industrial oils and metals like mercury can become airborne when dredged materials are placed on land. The potential problem could easily be exacerbated by the standard practice of adding stabilizing substances like Portland cement because of the exothermic reaction that occurs when cement cures. This increased heat might increase the rate or extent of release of pollutants.

NJDOT/OMR entered into an agreement with the NJ Marine Sciences Consortium (NJMSC) to provide technical assistance in this endeavor. NJMSC provided a grant to Rutgers and Stevens Institute of Technology to perform a thorough study comprised of both field and laboratory studies. Field efforts included monitoring of background air concentrations of both polychlorinated biphenyls (PCBs) and total gaseous mercury (Hg). Extensive monitoring was also conducted during and after placement of amended dredged material using state-of-the-art monitoring tools. The site chosen for this effort was the former Bayonne City landfill and a former Proctor and Gamble plant that was being remediated using amended dredged material by the OENJ-Cherokee Corporation.

Results indicate that although there is evidence to suggest that contaminents do volatilize from amended dredged materials, the observed concentrations decline rapidly after placement are always well below the concentrations that are of environmental or human health concern. A full report on the field study (pdf 2.8m) is available. Laboratory evaluation of volatilization of Polychlorinated Biphenyls (PCBs) (pdf 1.3m) and of Mercury(pdf 1.1m) was conducted to further understand the nature and extent of this phenomenon. The mercury report also includes an atmospheric model that demonstrates that sources of contamination in the region result in contamination that is considerably higher than any observed from dredged material. In an overall project summary (pdf 250k), investigators believe that the threat of air contamination from upland placement of dredged material is temporary and does not exceed the benefits both from an economic and environmental standpoint. This conclusion, however, is specific to the NY/NJ metropolitan area.

Additional raw data for field study:

- Appendix 1 - PCB Background and perimeter analysis (pdf 172k)
- Appendix 2 - PCB Analysis from landfill (pdf 40k)
- Appendix 3 - PCB flux calculations (pdf 24k)
- Appendix 4 - Hourly background Hg readings (pdf 351k)
- Appendix 5 - Hg above sediment (pdf 17k)
- Appendix 6 - Hg Flux (pdf 34k)
- Appendix 7 - Micrometeorology data (pdf 260k)
- Appendix 8 - PCB congener profiles (pdf 104k)
- Appendix 9 - Bergen Pt. Weather station (pdf 202k)