CASE STUDY

Disposal Technologies Used in the Chesapeake Bay

Wayne Young, *Maryland Environmental Service*

I will talk principally about two projects in the state of Maryland, the Hart-Miller Island facility and the CSX/Cox Creek facility. The Port of Baltimore is way up the Chesapeake Bay and definitely needs to dredge. It has to dredge 5 million yd^3/year (3.8 million m^3/year), of which 4 million yd^3 (3 million m^3) are in Maryland. Of that, 500,000 yd^3 (382500 m^3) are from the harbor area and, although considered under Maryland law to be contaminated, may or may not actually be contaminated. The outer parts of the harbor tend to be very lightly contaminated, whereas some of the inner areas tend to be more contaminated with zinc, chromium, and arsenic.

To show you where this fits into the overall context, I will talk briefly about the governor's strategic plan for dredged material management. This is an outgrowth of more than 25 years of searching for suitable placement sites for both contaminated and uncontaminated dredged material dating back to 1970, before Hart-Miller Island opened. There have been a number of activities since Hart-Miller Island, including the 1986–1990 master plan, which looked at more than 300 sites and fell on hard times because of a political process. Several options—one in particular, a deep trough or hole in the Chesapeake Bay—became an environmental "cause célèbre," and then-Governor Schaefer formed a task force. The master plan never was produced in its full final form. The task force shifted the emphasis to beneficial uses of dredged material, which formed the basis for the Maryland Port Administration (MPA) Dredging Needs and Placement Options Program and continues to form the basis for the governor's strategic plan and the U.S. Army Corps of Engineers' (USACE's) Dredged Material Management Plan.

The range of alternatives covers everything from traditional open-water placement to upland sites, beneficial-use options, innovative concepts, artificial islands, and ocean disposal. The extensive involvement of the community, interagency efforts at the federal and state levels, municipalities, Baltimore County, and other counties on the Eastern Shore resulted a balanced, multiphase plan that includes two sites for contaminated dredged material, Hart-Miller Island and CSX/Cox Creek. It also includes the restoration of Poplar Island; open-water placement at Pooles Island (continuing the practice there) on a small scale for the next three or four years; large-scale open-water placement; and, ultimately, an Upper Bay island for clean dredged material. Some of these are very-high-cost options, making open-water placement necessary as a low-cost option to balance the cost of some of the more expensive alternatives.

The beneficial use of dredged material has been attempted with only one success in the upper portion of the Chesapeake Bay. The reasons for the limited success are the following. First, we have covered a tremendous range of options, including habitat development and so forth, all for clean material. Only one, Poplar Island,

currently is moving forward. Aberdeen Proving Ground has a lot of contamination, both in the water and on land. Under the sponsorship of the MPA, we had 16 different island sites, restoration sites, shoreline sites, and so forth, all of which are no longer being considered.

Although we potentially could get these projects covered by the Comprehensive Environmental Response, Cleanup, and Liability Act (Superfund) under protocols for the installation of restoration programs, there is another type of contamination here, unexploded ordnance (UXO), and there are no protocols for UXO. Thus, if the port or USACE were to go in and build a project and then it was decided that the UXO had to be removed, we would have to go back in and dig out the habitat project, and they would have to pay for it. That killed the project.

Another project that has not worked and is still on the drawing boards is in Baltimore Harbor, in the area of Sparrows Point. It involved taking some degraded bottom area and putting clean material on top of the contaminated sediment to form a habitat. The citizens in the area do not approve of this project, in part because a lot of this harbor area was filled in before by Bethlehem Steel, and the citizens opposed it. There is also a rule established by the Maryland State Legislature that prohibits any containment facility within 5 mi (8 km) of Hart-Miller Island. This rule, which was put in after Hart-Miller was built, offers another example of the political process and how it can affect planning. Because this project would require a containment facility, it is also on hold.

At Poplar Island, portions of the island have been lost because of erosion. For the past seven years, planning has been under way to bring it back as an island containment site, hence providing a beneficial use for clean material. That project was fast-tracked. It took about seven years to go from concept to full-scale construction. There was a dedication ceremony at the USACE, presided over by the government, a week ago. The project is under construction. It will hold 38 million yd^3 (29 million m^3) of clean dredged material.

A number of lessons were learned from the beneficial-use efforts. First, we have broad support for beneficial-use concepts. However, beneficial use tends to be loosely defined. When we tie the beneficial use to a specific location, we usually have opposition. The only place we did not have opposition of some form was Poplar Island. It was a popular fishing area, and some clamming areas were affected. With the assistance of the Maryland Department of Natural Resources (DNR), a new area was found and opened up for clamming. Now there is total support for the Poplar Island project.

One of the big problems, of course, is funding. These projects are very expensive, much more so than open-water placement. This project will cost on the order of $75 million or more just for construction, and then it has to be maintained. Therefore, we have had great difficulty bringing these beneficial-use projects on line. Why am I talking about that at a symposium on contaminated sediments? If we are having a problem with clean stuff, then you can imagine the problems you will have with contaminated material.

Hart-Miller Island has been in operation since 1984. It is a multiple-use site. It is probably a beneficial-use site, although most people do not consider it as such. It was a beneficial-use site before that term became popular, because there is an active park there. Hart-Miller Island is the disposal site for contaminated dredged material. Everything west of a certain line in the harbor is, by state law, defined as or considered contaminated regardless of its content, and it must be contained.

Hart-Miller Island is located outside of Baltimore Harbor, at the mouth of the Back River. It consists of more than 1,000 acres. The north cell is the active containment cell. The south cell, once used actively, has not been used since 1990 and is under development for passive recreation and habitat. It has a park. When the facility was constructed it reconnected Hart and Miller islands, which at one point were the same island. A beach also was constructed. It has an observation tower and draws up to 70,000 visitors in a good year.

Regarding Hart-Miller Island's economic contributions, obviously it is a disposal site for dredged material and has allowed the port to maintain operations uninterrupted. It is cost-effective placement. It has been built. The dikes have been raised, so we did not have to build a new facility. Raising the dikes was less expensive than building a new facility. There is also local acquisition of goods and services, so the local economy has benefited. In addition, the location of the approximately 1-by-2 mi (1.6-by-3.2 km) island provides a shelter against winter ice and storms, so it has benefited local property owners.

The recreational assets include the constructed beach, observation tower, and park facilities. There are 22 primitive campsites, which are used extensively during the summer. There are test plots out there now testing vegetation. This is a USACE project; the local sponsor is the Maryland DNR, with support from the MPA and technical support from the Maryland Environmental Service.

The environmental benefit of Hart-Miller Island is that it provides an environmentally sound containment area for Inner Harbor dredged sediments. The operation is monitored extensively, both on the facility and by the Maryland Department of the Environment (MDE) externally, to check on what is happening in the benthic region and so forth. There have been no benthic problems. There has been some increase in zinc levels in the area of the spillways. We occasionally have

test results indicating some toxicity, but when the materials have been retested, the toxicity has gone away. The area alongside the dike is used extensively by crabbers when the crabs are migrating. In fact, one waterman told me he liked it better with the island there because now he knows where the crabs are going and he catches more of them.

We have avoided water quality impacts in the form of total suspended solids (TSS). We have strict monitoring criteria. The facility is operated under a state discharge permit, and we operate to those parameters for TSS and pH. For metals, we have extensive testing, which I will not go into in great detail.

The islands of Hart and Miller have been preserved. Before, they were eroding; now, the beach has been reconstructed. There is now more shallow-water habitat than there would have been otherwise. There is extensive use by migratory waterfowl. More than 267 species of birds have been observed at Hart-Miller Island, and when the dredged material comes in, perhaps because of the organisms and other things in the dredged material, tremendous numbers of birds use it, coinciding with their winter migration. In the development of the south cell, one of the concerns was that, when the north cell no longer is used as a dredged material containment facility, the shorebird habitat that is now provided on an interim basis will be lost. That has figured into the planning for the south cell to help rebuild shorebird habitat.

Then there are environmental study opportunities. The Hart-Miller Island project was started in 1969. The project was authorized, and the site was selected. Then there was a lawsuit, which was won by the port. The facility was constructed from 1981 through 1984, and the first inflow was in 1984. The port got a 50-ft (15.25-m) channel deepening project through, and all the money came in two years. This put tremendous demand on the facility, resulting in what then was to be a temporary raising of the dikes from 18 to 28 ft (5.5 to 8.5 m).

This gets to one of the lessons learned. We believe that, because Hart-Miller Island was there, it took the pressure off of finding a solution for the dredged material management problem. The facility was filled up to the 28-ft (8.5-m) dike. Now the dikes on the north cell have been raised to 44 ft (13 m), with extensive public involvement and a lot of controversy. Because of the demand for placement capacity, the facility is operated on a one-year dredged material management cycle to get optimal, or nearly optimal, consolidation of the material.

The port has funded a very aggressive crust management program. When the material comes in, the water is decanted and discharged in accordance with criteria overseen by the MDE. As soon as the material starts forming a bit of crust, we put exterior trenches in. We also run a pontoon excavator out into the cell to put depressions in. They are only 6 or 8 in. (15 or 20 cm), but they provide pathways for the water to get to the exterior trenches that run down to the spillways. When the crust can support it, trenching equipment is sent out; then we get a full crust and we are back to inflow. The trenching pattern is over the entire facility. It takes a fair amount of time to put that in place, but it helps keep the water off and the facilities rapidly drying.

When the material from the 50-ft (15-m) deepening project came in, crust management was not possible because the port had to get that material in or else lose the money. Once the crust management started, we gained the capacity back and inflow started again. Dave Bibo was instrumental in getting a two-year hiatus, which gains additional capacity for the facility. With aggressive management, we might get as much as 50 percent consolidation. During a drought year we got 60 percent consolidation.

The follow-up to Hart-Miller Island will be the CSX/Cox Creek facility, an existing dredged material containment facility that has not been used for some time, although it has been maintained for that purpose. An old refinery discharged water there. We are in the process of rerouting the stormwater discharge through a wetland. We have gone through all of the permitting for that. We have to get an additional permit for some nontidal wetland impacts, and we are coordinating with the MDE on that.

This facility will be dewatered, and the cross dike will be removed. A tow berm will be placed about 60 ft (18 m) outside because the bottom conditions are not particularly good; there are clay areas. For stability reasons, to get an adequate engineering factor of safety, the tow berm needs to be placed here. We are working with the regulators now on the water quality certification requirements for this facility. The regulatory field is changing. This is an impaired water body, so there is a lot of discussion as to what the appropriate criteria are, and this will be going on for some time.

This facility is a wetland. However, these wetlands are incidental to dredged material placement. The facility originally was constructed by the USACE. Then it was acquired by private companies, CSX Corporation and the refinery company, and it was used privately for material from the CSX and Cox Creek access points to their facilities. The facility was converted and the USACE determined that it was nonjurisdictional, which allows its reactivation. It will be used for maintenance-dredging material.

Once the traditional technologies allow the material to settle out and we decant the water, manage the crust, and fill the facility, then we will need another facility. It is getting more difficult to find these places, so the port is looking at recycling to see if contaminated material can be turned into an environmentally sound, unregulated product. Because it needs to dredge 500,000 yd^3

(382,500 m^3) of contaminated material every year, the port is using this number as a target. One problem, however, is finding a technology that is cost-effective and will produce an environmentally sound, unregulated product, whether landfill caps, topsoil with amendments, or whatever. It is a major effort to get rid of 500,000 yd^3.

A confined disposal facility (CDF) can provide interim habitat. However, you have to use it in a way that prevents you from losing it. If an endangered species moves in, then one potentially could lose the use of those facilities. If it turns into wetlands and you go back to reuse it, then you potentially could lose it. Perhaps this problem should be resolved from a regulatory perspective, so that those who build these facilities and operate them effectively do not lose their availability while providing habitat that is widely used by various species, perhaps displaced from elsewhere.

The regulatory field is changing. The total maximum daily load issue may have profound effects on all facilities that are impaired water bodies. We are not sure how that issue will relate to this facility, and we are working with the MDE on that. We believe the Clean Water Act, Section 401, is the appropriate regulatory authority. Hart-Miller Island is operating under a discharge permit because this approach was more effective back when the facility was started, and there was an agreement with the citizens that it would be controlled very tightly.

I mentioned that the availability of a CDF can relieve the pressure to find a long-term solution, and to some extent, that has happened. When you have something as large as Hart-Miller Island, it may appear that it will go on operating forever. But it will fill up. Thus, even when you are able to get a large facility built, you cannot stop looking for other alternatives—and looking hard—with extensive public involvement. Finding new locations in harbor areas is very difficult because these areas have been developed. Perhaps we could put sediment in brownfields. Strong public involvement is needed at all stages because this is a sociopolitical issue as well as an environmental, engineering, and cost issue.

With Hart-Miller Island, we have to deal with the rule that says we cannot have a containment facility within 5 mi (8 km). Yet to get a long-term solution, most of the island sites that are being considered are either all or partly within 5 mi of Hart-Miller Island. Strong public involvement and legislative involvement will be required if any of those sites go forward. This is a NIMBY ("not in my back yard") meets NIMBY situation. The bay community says, "Put that material upland." The upland folks say, "Don't put it here." Where do we put it? We have to put it somewhere. We have controversy over the sites no matter where we put it. Poplar Island was an exception; it got broad-based support because of a number of factors, but sites like that are few and far between.

Down in Houston they had good luck with one beneficial-use project, so there are opportunities. But these are for clean material. We need innovative alternatives and technologies for contaminated sediments. The port is looking into this. The cost seems to be high, although one company says that for \$10/yd^3 (\$13/m^3) it can make an environmentally safe, unregulated product. The port is interested in putting out requests for expressions of interest. The documentation is finished, but the request is on hold because the site they plan to use for recycling is the CSX/Cox Creek facility, and the upland site would be the staging area. There is an initiative to put a racetrack there, in Anne Arundel County. Until that is resolved, the request for expression of interest is on hold.

Even if we ultimately find a technology that is cost-effective and can make a product that is environmentally safe and unregulated, the technology is useless unless we can get rid of 500,000 yd^3 (382 500 m^3)of material a year. We still have to find a market for it. After we have used up the space available in the facility, then we are back to square one. We have to find someplace to put it. Getting into the product stream and marketing can be very difficult because we are going up against existing topsoil and gravel markets and so forth.

With all these technologies, information sharing is critical. This is a very expensive area. The ports and others need to work together so that information about successes and failures is shared. That way, resources are conserved, and people do not invest in someone else's mistake but rather in someone else's success, adapting it for their local area. Finally, funding for high-cost dredged material management options is very difficult to obtain, particularly when you have traditional options available, but at the same time you need the traditional options to balance those high costs.