My name is Dan Sheer. I am a Water Resources Analyst, Citizen of the State of Maryland concerned with public policy. I have a Ph.D. in geography and environmental engineering from The Johns Hopkins University. I founded and directed HydroLogics, a small company which helped manage water in river basins and water supply systems that collectively include about 20% of the population of the United States, as well as abroad.

My testimony is in support of Senate Bill 168.

I support a moratorium on the use of CAD in Baltimore harbor because I believe that:

- **A CAD implementation, or even a large scale pilot, in the Harbor is likely to create an environmental disaster**, and
- **CAD will not provide an economic alternative for disposal of dredged material, if it provides any substantial additional capacity at all.**

Understanding the reasons for my objections to CAD requires a basic understanding of what CAD involves relative to current disposal methods. Current methods involve:

1) Dredging the harbor channels.
2) Placing the material in a Dredged Material Containment Facility (DMCF), where it is sealed off from the environment for a long time.

The crux of the problem with current methods is the potential for running out of DMCF capacity to accept dredged materials. Under State law, those materials cannot be removed from the Patapsco area, so space is limited. CAD is advertised to reduce dependence on DMCF and thus to extend the life of current and future DMCF projects. Under State law, the Maryland Port Authority is required to maintain a 20-year reserve of disposal capacity.

CAD is more complex than the current methods. It involves:

1) Dredging a very large hole in the bottom of the Patapsco River, most likely on the south side east of the Key Bridge, with a volume equal to the amount of dredged material to be place in the CAD.
2) Placing the material from the hole (CAD material, CADM) in a DMCF.
3) Dredging the harbor channels.
4) Placing the dredged material removed in the hole.
5) **Disposing of large portion of the CADM through sale or reuse. This is required if CAD is to provide additional disposal capacity. If the CADM is not sold or reused, then as much DMCF capacity is required to implement CAD as would be required with current disposal methods.**

CAD steps 1 and 4 are the primary causes of a potential environmental disaster, and step 5 is the reason it most likely will not achieve the goal of providing additional disposal capacity. Current plans for a CAD Pilot ignore step 5.

CAD is a Potential Environmental Disaster

The reasons CAD will likely be an environmental disaster are numerous. I will describe just two.

First, the sediment in the area likely to be used for CAD is heavily polluted. A 2011 Independent study found that it was so toxic that it does not qualify for even the lowest category of re-use. The area with the most sand, and thus the most likely to be used for a pilot, is just across the River from the EPA Superfund site located on the river bottom east of Sparrows Point. It is far from surprising that it is very polluted.

Dredging a CAD cell will release a significant amount of this polluted sediment into the water column. Carried by current, this sediment will likely disperse and settle across a large area of less polluted river bottom, degrading the environment. Adding insult to injury, when the hole is filled, the release of dredged sediment to fill the hole will once again infuse the water column with sediment. **While dredging the harbor channels releases some sediment even with current methods, CAD will effectively *triple* that impact due to the extra dredging involved in digging the hole and the release of dredged material into the hole.**

Second, digging a deep hole into the Patapsco River bottom will expose the sands of the Upper Patapsco Aquifer (UPA) directly to the polluted waters of the Patapsco River. The UPA is a major water source for Anne Arundel County among others. The Arnold wellfield is in the UPA, as well as many residential wells along the south shore of the Patapsco and in the northeast portion of Anne Arundel county.

When a CAD cell is dredged, salty and otherwise polluted Patapsco River water is very likely to seep into the aquifer at a much-accelerated rate due to the removal of the insulating layer of more impervious bottom sediment. This would be a potential threat to water supplies in the county, first to those closest to the CAD site, and then to the Arnold wellfield and other sources. Treatment at the wellfield does not remove salt. There has been no consideration of this impact in CAD planning that I have seen.

Even if the CAD cell is filled within a year or two, a slug of contaminated water will migrate through the aquifer. A full scale, 20 cell CAD implementation will expose the aquifer for 20 or more years. **A single CAD cell (or large pilot) will have an exposure area greater than thousands of unlined household wells of the same depth. Unlined wells are illegal because of the threat of aquifer contamination. CAD is a much bigger potential threat. Again, this threat has not been evaluated to my knowledge.**

CAD Will Not Provide an Economic Alternative for Disposal of Dredged Material

The primary reason I believe this to be true is the likely difficulty and expense involved in dredging and repurposing the material dredged to create the hole.

As a point of cost comparison, the cost per cubic yard for DMCF capacity at Masonville was about $4.50/cubic yard (cy), after adjustment for inflation from 2009 to present. Dredging, under the current USACE contracts for Baltimore harbor dredging, costs about $18/cy. CAD involves dredging twice as much material as the current method of direct DMCF disposal. Both CAD and current methods require dredging of the channels, but CAD also requires dredging an equivalent volume just to create the hole. There are other additional costs for CAD as well, but the dredging costs alone will increase by a factor of at least two, which is four times the cost of additional DMCF capacity.

More importantly, there is no established market for the material to be removed from the hole (CADM). Part of the material is mucky sediment. Despite many years of research and effort, there is no large-scale example of reuse of this type of material that I know of.

Part of the material may be sand. While there is a market for sand, the quality of the sand to be removed is not well established. Coring and other testing describes the material as "silty sand" for which there may or may not be a market. If the material can be cleaned and marketed or given away, costs are likely to increase.

Further, the amount of sand that might be generated from a single CAD cell is very large, on the order of the total annual production of sand in the State of Maryland. It seems that MPA envisions a full implementation to consist of about 20 cells. If this much material becomes available, it will certainly reduce prices and put a strain on existing sand producers in the State. The market for sand is often limited by transportation costs, which often exceed the value of the sand itself. In short, it is not at all clear that a substantial portion of the sand will be utilized. No market studies for the disposal of this large a quantity of sand have been conducted to my knowledge.

The less material can be repurposed, the more expensive CAD becomes, and the less additional disposal capacity will be created. Again, if none of the CADM, muck or sand, can be sold or re-purposed, it will consume about the same amount of DMCF capacity as current disposal methods. This would make CAD a complete waste of resources, accompanied by substantial environmental damage.

For the reasons above, I urge you to support SB168. A moratorium will provide time to confirm the analysis described above, and to prevent a potentially costly and environmentally disastrous mistake.

Thank you for the opportunity to testify.

Dan Sheer