Spills on the Delaware

Two major spills into the tidal and non-tidal Delaware River during 2004 and 2005 required intensive cleanup responses from numerous public and private stakeholders, including the DRBC.

Athos I Oil Spill

On the evening of November 26, 2004, the 750-foot Greek tanker *Athos I* struck a submerged object in the Delaware River, puncturing the vessel's bottom plating and releasing an estimated 264,000 gallons of heavy crude oil into the river. The ship was carrying 13 million gallons of the slightly buoyant, very sticky oil that can easily form into tar balls. The incident occurred as the *Athos I*, which had a single bottom and double-sided hull, approached the Citgo Asphalt Refining Facility in Paulsboro, N.J. near river mile 90 across the Delaware from Philadelphia. The U.S. Coast Guard later recovered the object – an 18,000 pound anchor – but investigators could not identify its owner nor establish how long it was submerged.

The spill prompted the Coast Guard to initially close the river for a 27-mile stretch downstream from the Tacony Palmyra Bridge (river mile 107). Restrictions were gradually relaxed and the river was open to all marine traffic by December 8. The intensive response effort at one point involved more than 1,800 federal, state, and local officials and contractors, 150+ vessels, and the deployment of over 20 miles of spill containment boom. By February 1, 2005, it was reported that 366 birds were cleaned and released, while another 178 birds could not be saved.

The active spill cleanup of nearly 57 miles of shoreline in Pennsylvania, New Jersey, and Delaware, of which about five miles was heavily impacted, concluded a year later and resulted in the removal of more than 18,000 tons of oily solids (cleanup materials and oil) at a total estimated cost of over $150 million.

While not a first responder agency, DRBC staff members used their knowledge of the river and technical expertise to provide assistance to the unified command response team headed by the Coast Guard. Modeling and Monitoring Branch staff members led by Dr. Thomas Fikslin worked with the response modeling team located in Seattle, Washington to help determine the extent of oil spread and locations of priority cleanup actions using commission models developed for the movement of toxic pollutants through the tidal river and bay. As the visible oil sheen reached within a few miles of the City of Philadelphia's drinking water intake, DRBC staff also worked with state environmental and city officials to ensure that sufficient sampling was being conducted. In addition, staff provided technical advice on the question of toxicity of possible cleaning agents under consideration for use on oil-contaminated vessels in order to minimize environmental impacts.

As a result of this incident, the Coast Guard-led unified command response team became more familiar with the DRBC's resources – including data collection, technical expertise, and overall agency knowledge of the estuary – that could be tapped into when responding to future spills. DRBC staff members now regularly attend and participate in training sessions and meetings of the Philadelphia Port Area Committee held throughout the year to prepare for such incidents.

A U.S. House of Representatives subcommittee, chaired by Congressman Frank LoBiondo (R-N.J.), held a field hearing on the oil spill in Philadelphia on January 18, 2005. In response to what was learned at the hearing, LoBiondo along with Representatives James Saxton (R-N.J.), Robert Andrews (D-N.J.), Michael Castle (R-Del.), and Allyson Schwartz (D-Pa.), introduced the Delaware River Protection Act, H.R. 1412, on March 17, 2005. Several important provisions contained in H.R. 1412 were later incorporated into another bill that was signed into law on July 12, 2006. They included:

- Requiring mandatory reporting of objects that are lost overboard to the Coast Guard for immediate recovery;
- Encouraging the use of double hull tankers by more than doubling the liability limits on single hull tankers under the federal Oil Pollution Act;
- Updating the oil spill contingency plan for the Delaware River and Bay to ensure the protection of environmentally sensitive habitats and locations;
- Creating a new committee to report to Congress on ways to improve oil spill response and prevention; and
- Establishing a pilot project on the Delaware River and Bay to test techniques to recover submerged oil.

Athos I the day after it struck a submerged object causing an oil spill in the Delaware River. (Photo courtesy of the U.S. Coast Guard)

PPL Fly Ash Release

A leak developed on the evening of August 23, 2005 in one of the fly ash settling basins on the property of PPL Corporation's Martins Creek power plant in Lower Mount Bethel Township, Northampton County, Pa. Wooden stop logs that hold back water and fly ash (a by-product of burning coal in the power generation units) in the 40-acre basin breached, allowing a discharge of fly ash slurry to move from the basin over land to Oughoughton Creek and then to the nearby Delaware River. Without a gate valve or built-in structure to stop the flow of the accidental release, PPL had a difficult time plugging the leaking ash storage pond. By the time the flow stopped on August 27, approximately 100 million gallons of contaminated water and fly ash was released into the Delaware River. The City of Easton, Pa., the closest downstream surface water user, temporarily shut down its drinking water intake and imposed water use restrictions as a precaution.

The Delaware Valley Early Warning System (EWS) was activated upon receiving notification of the incident on August 25. The EWS, which was developed by the Philadelphia Water Department with a grant awarded by Pennsylvania DEP, alerts partners about spills and shares important information. It is comprised of water suppliers and government agencies from both Pennsylvania and New Jersey, including the DRBC, and became operational in October 2003.

PPL used contractors to remove the fly ash from the river and other impacted areas, an activity that continued into 2006. A new stoplog assembly made of steel-reinforced concrete, a reinforced steel wall on the basin side of the discharge structure, and installation of two shutoff valves on the pipeline between the discharge structure and the river were in place by October 2005. The company also tested and continues quarterly testing of more than 230 residential wells in Pennsylvania and New Jersey at the request of property owners. PPL reported on November 1, 2005 that costs associated with the leak would exceed $30 million.

Post-release water quality sampling was conducted by PPL, Pennsylvania and New Jersey DEPs, New Jersey Water Supply Authority, DRBC, Philadelphia Water Department, and the U.S. Geological Survey. The DRBC hosted a meeting with agency and PPL representatives at its West Trenton offices on November 3, 2005 to review the data collected up to that point. Pennsylvania and New Jersey representatives requested that DRBC staff compile and assess the collected water column data. This assessment of over 1,800 samples can be viewed on the DRBC web site at http://www.nj.gov/drbc/FlyAshAssessment_061906.pdf. Although it appears that there were no immediate harmful effects caused by the release, biological and other studies continue in order to determine any possible longer term impacts to the river. The DRBC had been monitoring water quality in this stretch of the river for several years prior to the release, so the commission has good "baseline" data to help to determine the existence of possible environmental impacts. A feasibility study is planned to determine whether a real-time water quality monitor should be installed along the river in the vicinity of the PPL power plant. There are currently no public water supply intakes on the main stem Delaware River north of Easton.

As was the case in the *Athos I* oil spill, a Natural Resource Damage Assessment team comprised of federal and state agencies – often referred to as "trustees" – has been formed to identify the extent of resource injuries, the best methods for restoring those resources, and the type and amount of restoration required.

Automation of a Hydrodynamic Model for the Tidal Delaware for Rapid Assessment of Spill Impacts on Water Intakes

The tidal Delaware River provides drinking water for nearly two million people. This same portion of the river also is home to a dense concentration of chemical, petroleum, and manufacturing facilities. Because the tidal influence on the river results in upstream as well as downstream water movement approaching 12 miles every 12.5 hours, water intakes are at risk from both downstream and upstream spills. Over a dozen documented spills have occurred in the last 20 years.

Nationally available time-of-travel tools have been developed for non-tidal rivers, but they do not address the complex hydrodynamics of tidal systems like those found in the Delaware Estuary. During a contaminant release event, water utility managers need to know which intakes will be impacted, as well as the timing and likely duration of the impact, in order to determine how to use limited water reserves most efficiently while protecting drinking water and infrastructure. Up-to-date hydrodynamic conditions and realistic future hydrologic inputs are one of the key components to depict the dispersion of any spill event and to provide relatively accurate predictions for decision makers. *However, recent spill responses have demonstrated that the time required to populate, run, and process a hydrodynamic and subsequent mass transport and fate model probably exceeds the critical first tidal cycles after the spill.*

Following the *Athos I* spill, DRBC Water Resource Engineers/Modelers Dr. Namsoo Suk and John Yagecic developed an automated system to retrieve and process current hydrological and meteorological data, create a model input file, run an existing hydrodynamic model, and process the output. The hydrodynamic model was recently updated and calibrated by DRBC as part of the PCB total maximum daily load (TMDL) for the Delaware Estuary, which extends from the mouth of the bay where it meets the Atlantic Ocean to the head of tide at Trenton, N.J. This model is run overnight, every night, without user input. This system obtains both recent observations and forecasts of upstream freshwater flows via the Internet from the U.S. Geological Survey and the National Oceanic and Atmospheric Administration (NOAA) as well as tidal boundary elevations from NOAA. The model includes a forecast typically extending five days into the future. The automated flow and transport model has been operational since January 2006.

Upon notification that a spill has occurred, the most recent hydrodynamic prediction file can be coupled with a dispersion model to predict the relative concentration of the contaminant in the vicinity of water intakes. *By automating the hydrodynamic modeling, the time required to develop a contaminant transport prediction can be reduced dramatically.* Utilizing three- to five-day upstream inflow predictions from the National Weather Service, the model can generate near term estuary hydrodynamic forecasts. In addition, periodic confirmation runs ensure that the model is functioning properly in time of need. Since all the applications utilize widely available standard business software, this concept is easily transferable to other systems and other model platforms.