

**Water Quality at the Philadelphia Port:
Environmental Issues and Concerns**

A report by Clean Air Council

With comments from the Port Environmental Task Force

Final Draft – October 2007

Introduction

Historically, the Delaware River has been a remarkable economic and social resource for its bordering communities. Today, the river's resources are being stretched to meet the public's ever-expanding needs for goods. The Delaware River flows through one of the most highly populated areas of the United States bordering the States of: New York, New Jersey, Pennsylvania and Delaware. The Delaware River Bay is only a day's commute for 40% of the people living in the United States and is the main source of drinking water for over 17 million people.¹ According to US Census Bureau Figures, the population of the basin has increased approximately 3.7 percent between 1990 and 2000; due to growth primarily in the Philadelphia area suburbs and the Pennsylvania Pocono Mountain Region. Currently, it is estimated that the basin's population consists of over 7.31 million people.² Neighboring communities have relied on the river as a provider of jobs, revenue, and water.

The Delaware River Basin is home to the fifth largest port complex in the United States in terms of total waterborne commerce.³ Annually, over 70 million tons of cargo move through its waters heading for the ports of Pennsylvania,

¹ "2004 Delaware River and Bay Integrated List Water Quality Assessment Report", (Delaware River Basin Commission, September 2004), retrieved July 11,2006
<<http://www.state.nj.us/drbc/04IntegratedList/index.htm>> (p.11)

² DRBC, (2004, September) (p.10,11)

³ "The Athos I : Oil Spill on the Delaware River", (University of Delaware, 2004), retrieved July 11.2006
< <http://www.ocean.udel.edu/oilspill/shipping.html>>

New Jersey, and Delaware. It is also the second largest oil port in the United States, handling about 85% of the East Coast's oil imports. The port complex has created more than 30,000 jobs, provides more than \$1 billion in wages and generates \$3.5 billion in revenues a year.⁴ Ensuring the continued health of the River should be a priority considering its significance as the regions most important and heavily exploited water source.

Demands on ports world-wide has risen dramatically. The steady rise of global shipping is primarily driven by free trade and the transfer of manufacturing to destinations in Asia; for that reason, "...nearly 90% of global trade is by sea."⁵ The American Association of Port Authorities estimate that the volumes of cargo American ports currently handle—about 2 billion tons annually—will double over the next 15 years.⁶ In response to growth in the marine sector, environmental controls may be more and more insufficient as the environmental impacts of ports have gone up.⁷ Increased activity and new construction have an increased impact on water and air quality. Potential sources

⁴ U.Del, (2004)

⁵ Sharma, Dinesh C., "Ports in a Storm", Environmental Health Perspectives; Apr2006, Vol 114 Issue 4, pA222- A231, 10p

⁶ "America's Ports Today", (The American Association of Port Authorities, February, 2006) retrieved July 11, 2006. <http://www.aapa-ports.org/pdf/8-pg_Americas_Ports_Today.pdf>

⁷ Bailey, D. (2004, March). Harboring Pollution: The Dirty Truth about U.S. Ports. Natural Resources Defense Council. (1- 76). Retrieved July 5th, 2006, <<http://www.nrdc.org/air/pollution/ports/ports.pdf>>

of water pollution related to port activities include: ballast water, antifouling additives, stormwater runoff, oil spills, and dredging.

ANTIFOULING ADDITIVES:

By 2008, antifouling additives will not be allowed to be used in any paints and the EPA has stated that in compliance with the International Maritime Organization (IMO) Treaty there will be periodic paint testing of ship hulls. While this new rule will hopefully make antifouling additives a non-issue, additives continue to be added to paints that are used on ship's surfaces. In addition, paints containing antifouling additives that are purchased before the rule takes effect may remain in use well beyond 2008. Paint additives prevent barnacles and other marine organisms from attaching and growing on the surfaces of ships. Many additives contain tributyltin (TBT), a toxic chemical that can seep into water.⁸ Although the use of harmful additives has diminished, these toxic pollutants continue to persist and damage local ecosystems.⁹ The IMO is the United Nations' specialized agency responsible for improving maritime safety and preventing pollution from ships.¹⁰ The IMO has taken the lead in the fight to banish all use of TBT in antifouling additives. The IMO Treaty states that:

⁸ Bailey, 9

⁹ Bailey, 5.

¹⁰ "Actors in the Regional Seas Programme" (retrieved July 26, 2006)
< http://www.unep.org/regionalseas/Publications/parts_data/part_bal.doc>

- Sale and application of TBT antifoulings is to cease, under the International Maritime Organization (IMO) Antifouling System Convention agreed in October 2001
- The treaty calls for the ban on application from 1st of January 2003 and total prohibition on hulls by 1st of January 2008
- International is to cease all trading in TBT antifoulings after 31st December 2002

In the United States, the EPA is working towards the goals of the IMO treaty through the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The EPA, U.S. Coast Guard, and US Department of State have represented the US's position throughout the Treaty procedures; "...has maintained the position that it would pursue retroactive enforcement of the 1/1/2003 date through port state measures after the AFS Convention comes into force, on all vessels where TBT was applied to the hull after 1/1/2003."¹¹

BALLAST WATER:

Ballast water (also known as bilge water) is water that is stored in the hull of the ship to maintain stability of un-laden ships; it is then discharged into open waters before the ship is loaded with cargo. Contaminated with oil from the ship's machinery, the ballast water is then combined with other wastewater and sewage before it is pumped out.¹² In addition to the oil and toxins that are

¹¹ "IMO- Antifouling Ban" (retrieved July 17th, 2006)
< http://www.international-marine.com/environmental/documents/Interswift_IMO.PDF>

¹² Bailey, 5.

discharged, ballast water often contains foreign organisms, labeled as invasive species, which can pose a threat to local ecosystems.¹³

In response to national concern regarding the invasions of foreign aquatic organisms, the National Invasive Species Act of 1996 (NISA) was enacted which reauthorized and amended the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA). The Coast Guard has been required through NISA to establish a national mandatory Ballast Water Management Program (BWP). The program has led to regulations and guidelines for ballast water management and disposal.¹⁴ These guidelines include but are not limited to:

- “...- Avoiding or minimizing ballast intake
- Avoid ballast operations in or near marine sanctuaries, marine preserves, marine parks, or coral reefs.
- Clean ballast tanks to remove sediment regularly.
- Only discharge minimal amounts of ballast water in coastal and internal waters.
- Rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin.
- Remove fouling organisms from hull, piping, and tanks on a regular basis and dispose of any removed substances in accordance with local, state and federal regulations.
- Maintain a vessel specific ballast water management plan.
- Train vessel personnel in ballast water and sediment management and treatment procedures...”¹⁵

¹³ “Global Ballast Water Management Programme”, (International Maritime Organization, 2000- 2006). Retrieved July 12, 2006. < <http://globallast.imo.org/index.asp>>

¹⁴ “Ballast Water Management Program,” United States Coast Guard, (retrieved July 9th, 2006) < <http://www.uscg.mil/hq/g-m/mso/bwm.htm>>

¹⁵ “Ballast Water Management Program: Aquatic Nuisance Species” United States Coast Guard (retrieved July 9th, 2006) < <http://www.uscg.mil/hq/g-m/mso/ans.htm>>

Any vessel that enters US waters that has a ballast water tank is obligated to complete Ballast Water Forms in order to ensure that they follow the correct procedures. The maximum possible penalty for not complying with the requirements of the Ballast Water Program is \$27,500 per day.¹⁶ The ships submit their Ballast Water Forms to their Port of destination. However, the Coast Guard is responsible for checking up on ports to make sure that they comply with the BWP. In addition, they also perform surprise inspections of ships and review submitted ballast water forms.

In the Delaware River and Bay, 70 non-indigenous species have been evaluated and studied. These species are primarily from the Ponto-Caspian region. The most commonly found are zebra mussels, round gobies, and spiny water fleas for they have proven tolerant of mid-Atlantic estuary conditions. Many ships arriving at the ports of Wilmington, Camden, and Philadelphia come from European ports invaded by fresh and brackish-water species from the Black Sea-Caspian basin.¹⁷ According to Clean Air Council's observations, there is minimal water monitoring at port terminals and it is unclear who at the port was taking responsibility to identify invasive species which can enter the shipping canal unnoticed.

¹⁶ "Ballast Water Management Program: Aquatic Nuisance Species"

¹⁷ "Biological Impacts and Invasions in the Chesapeake and Delaware Bays: Patterns and Impacts", (retrieved July 26, 2006) <<http://sgnis.org/publicat/proceed/aide/foforuiz.htm> >

STORMWATER RUNOFF:

Storm water runoff is the water that runs off the land surface (and rooftops, piers, or other structures) during and immediately after it rains. Runoff can collect oil, toxins, pesticides, metals, sediments, debris, and air pollutants, as it runs across surfaces on its way towards a point of discharge into a receiving body of water.¹⁸ When excesses of nitrogen are found in the water it begins the harmful process of eutrophication. The National Research Council has determined eutrophication “...as the most serious problem facing estuaries in the United States.”¹⁹ The northern branch of the Delaware River has experienced progress in the past decade by significantly diminishing eutrophication by reducing discharges into the water.²⁰ However, Delaware Inland Bays are still plagued by the problem.²¹ Subsequently, urban runoff is the largest contributor of pollution to U.S coastal waters and the second largest polluter of U.S estuaries.²² The effects of urban runoff (which includes runoff from ports) have

¹⁸ Bailey, 9

¹⁹ Bailey, 5

²⁰ “Inland Bay’s Basin”, (retrieved August 23, 2006)

http://www.dnrec.state.de.us/water2000/sections/watershed/ws/map_ib.htm

²¹ DNREC, “Inland Bay’s Basin”

²² Bailey, 5

negatively affected human health and natural resources in a multitude of ways,

such as:

- “- fills in navigable waterways with contaminated sediment, leaving us with increased dredging and spoil disposal costs;
- closes or shrinks lucrative rockfish, shad, flounder, crab, oyster, and other commercial fisheries due to chemical contamination, oxygen starvation, and the resulting loss of habitat;
- fouls beaches and other recreational waters, causing losses in revenues from declines in boating, fishing, duck hunting and coastal tourism;
- pollutes drinking water sources, filling in reservoirs with clogging silt and oxygen-robbing nutrients and contributing to drinking water emergencies;”²³

Water pollution is regulated primarily by the National Pollutant Discharge Eliminations System (NPDES) Program. Enacted under the Clean Water Act Amendments of 1972, the NPDES program has resulted in substantial pollution discharge reductions. The NPDES Program requires that all facilities that discharge pollutants directly into a U.S water source obtain a NPDES permit.²⁴ The scope of the permit program is very broad and allows for the addition of new pollutants and discharge standards. In Pennsylvania, the Department of Environmental Protection (DEP) is the NPDES permitting authority for all municipal, industrial and private facilities in the state.

There appears to be some confusion over the ports are required to have NPDES permits. Port terminals have persistently been overlooked in terms of

²³ “The Problem of Stormwater Pollution”, July 10, 2006 <http://www.nrdc.org/water/pollution/fstorm.asp>

²⁴ “Water Permitting 101”, July 10, 2006 < <http://www.epa.gov/npdes/pubs/101pape.pdf> >

their impact on water quality and are therefore under-regulated. While stormwater runoff would be monitored under an NPDES permit, it would not necessarily be regulated or reduced.

But even having an NPDES permit is no guarantee of compliance with Clean Water Act requirements. According to the report "Troubled Waters: An Analysis Of Clean Water Act Compliance," by PennEnvironment (a local Environmental Advocacy Group), water monitoring practices that are enforced under NPDES permits are inadequate in preventing or minimizing pollution from stormwater runoff.. The Report finds a serious lack of urgency to comply with the Clean Water Act:

“...-More than fifty-seven percent of Pennsylvania’s industrial and municipal facilities exceeded their Clean Water Act permits at least once between July 1, 2003 and December 31, 2004.

- 383 facilities in Pennsylvania reported nearly 2,000 exceedances of their Clean Water Act permits during the 18-month period, ranking the state fourth in the country for the most exceedances.

- On average, Pennsylvania facilities exceeding their Clean Water Act permits did so by nearly 155%. ...”²⁵

OIL SPILLS:

Oil spills are the number one reported issue, in the media, in terms of water pollution. The media has focused on “catastrophic” spills, such as the

²⁵ Masur, David. “Polluter’s Foul Pennsylvania’s Waters” March 23rd, 2006. <<http://www.pennenvironment.org/PEwater.asp?id2=23024>>

Prestige Spill off the coast of Spain in 2002. The tanker was carrying 20 million gallons of fuel oil when it began to leak, causing one of the largest environmental disasters in Spain's history. There have been many significant local oil spills.

Listed below are some of the major oil spills in the Delaware River over the past few decades.

“... • November 2004 - A single-hulled Greek oil tanker, the Athos I, twice struck a rusting ship's anchor as it prepared to dock at the Citgo Asphalt Refinery near Paulsboro, N.J. The ship spilling 265,000 gallons of heavy crude oil into the water across the river from the Philadelphia International Airport.

- June 1989 - Uruguayan tanker Presidente Rivera prematurely dropped anchor. The out-of-control tanker grounded off Claymont, spilling 300,000 gallons of heating oil.

- September 1986 - The Viking Osprey, registered in Singapore, ran against a rocky underwater ledge near Marcus Hook. A ruptured holding tank released 295,000 gallons of crude oil.

- March 1986 - Liberian tanker Inter Mar Alliance rammed a pier at the BP Oil Co. refinery, near Marcus Hook, spilling 189,000 gallons of oil.

- September 1985 - The Panamanian tanker Grand Eagle spilled more than 435,000 gallons of crude oil, polluting a 12-mile stretch of the river. The 791-foot tanker hit a rocky shoal off Claymont.

- December 1976 - Liberian tanker Olympic Games ran aground near Marcus Hook, Pa., when a valve stuck as the tanker was trying to dock. The spill released 133,000 gallons of oil, contaminating 22 miles of the river.

- January 1975 - Two tankers collided near Marcus Hook, Pa., as one tried to turn around in the Delaware River. Twenty-nine workers died; an estimated 315,000 to 500,000 gallons of oil spilled...²⁶

While “catastrophic” oil spills can result in major and abrupt loss of bird and aquatic life, there is more oil quantity resulting from “chronic” spills or those

²⁶ “Three Decades of Oil Spills”, (retrieved July 26, 2006) , posted July 17, 2006, <<http://www.delawareonline.com/apps/pbcs.dll/article?AID=/20060716/NEWS/60716008> >

that occur regularly. Contributing to chronic spills are runoff, unloading and loading oil tankers and the discharging of ballast water. According to a report compiled by the NRDC, oil contamination as a result of “chronic spills” account for three times as much oil contamination as tanker accidents.²⁷

The EPA has been proactive in enacting regulations to regulate spill prevention and response. Many efforts have been made in oil spill prevention and response because of the disastrous effects that it has on marine ecosystems. Damage from oil spills vary depending on the type of oil spilled and the natural actions of the receiving water.²⁸ Petroleum based and non-petroleum based oils are equally detrimental to marine wildlife and both form emulsions and sludge. However, petroleum oil is more flammable and toxic posing a threat not only to animals but manmade infrastructures. Non-petroleum oils share many of the same characteristics of petroleum oils but may persist longer in the environment.

Oil spills are environmental tragedies for many reasons, such as:

- reducing the amount oxygen available which is needed by aquatic organisms;²⁹
- when birds are covered in oil they freeze, for the oil breaks down their feathers insulating properties, oil spills contribute to the drowning of birds;
- Spills are contaminating the marine food chain, reducing animals ability to eat and also damages their intestinal tracts;

²⁷ Bailey, 5.

²⁸ “Oil Program: Threats from Oil Spills”, (retrieved July 11, 2006) < <http://www.epa.gov/oilspill/effects.htm> >

²⁹ “Oil Program” < <http://www.epa.gov/oilspill/effects.htm> >

-Vapors from spills are damaging the marine animal's central nervous system, liver and lungs.³⁰

The Mid-Atlantic Oil Program, created by the EPA and the Pennsylvania Department of Environmental Protection, carries out the routine inspections of regional facilities. (It is not clear if this program includes inspection of port terminals in the Mid-Atlantic region.) Any facility not in compliance is subjected to penalties. In July 2002, the congress amended the Oil Pollution Act of 1990 and added the Spill Prevention, Control and Countermeasure Rule (SPCC). The SPCC extends the EPA's power to fund and regulate oil spill prevention and response. Earlier measures covered under the Oil Pollution Program addressed post spill clean up only, the SPCC focuses on helping to prevent spills from occurring. Methods to contain and prevent oil spills include: retention walls, use of sorbent materials, and employee training. After assessing a facility, various methods of spill prevention are then incorporated into the facility's SPCC Plans.³¹

The Council could not determine whether the ports are required to have an SPCC plan, nevertheless there are additional measures they can voluntarily undertake to reduce the potential for oil spills that can also prove to be economically beneficial. In the 2000 report *Green Ports: Environmental Management and Technology at U.S. Ports*, researchers at the University of

³⁰ "Oil Program: Impact on Species" (retrieved July 11, 2006) <<http://www.epa.gov/oilspill/impact.htm>>

³¹ "Oil Program: Spill Prevention, Control and Countermeasure", (retrieved on July 11, 2006) <<http://www.epa.gov/oilspill/spcc.htm>>

Massachusetts Boston Urban Harbors Institute concluded that the recycling of waste oil, oily bilge and oil-contaminated waste has become a feasible and cost effective option for ports; "...oil-dispensing facilities at ports can be encouraged to buy back used oil for recycling."³² Through the use of filtration devices, runoff from paved areas and other wastes can be effectively controlled and diverted to onsite recycling facilities. In addition to chronic spills, ships have been known to illegally mix waste oil into the ballast water to avoid port fees. (While this is an industry-wide problem, no specific incidences along the Delaware River were identified at the release of this report.) The treatment plants that the ballast water is then transferred to are unable to filter the oily residue.³³ The technology to contain and filter oil spills is available and when used correctly have been proven to be very effective. Clean Air Council suggests that local port terminal operators work proactively with ship lines to promote this type of technology.

DREDGING:

Dredging is the removal of sediments that have accumulated from erosion and silt disposition to deepen or create a channel.³⁴ Ports rely on dredging to ensure that larger ships can continue to pass through the channels to unload at the terminals.

³² Sharma, A 225.

³³ Sharma, A 225.

³⁴ Bailey, 6.

Pennsylvania government and port operators are currently advocating a dredging project to deepen the Delaware River by 45- 50 feet. Supporters of the dredging project believe that due to increase of global shipping deepening the channel is necessary in order to remain competitive with other ports along the east coast and to accommodate the larger draft vessels.. The projected cost of the proposed dredging the Delaware will cost approximately \$311 million dollars according to Environmental Network News. Opponents of the proposed dredging plan are concerned about the possible damages to ecosystems in the Delaware River in particularly the fish populations and what it will mean for fisheries. DRPA has stated that they have accounted for possible environmental implications and will attempt to dredge using technology that will minimize any harm to marine life.³⁵ An environmental Impact Statement (EIS) and a supplemental EIS were conducted as required by the National Environmental Policy Act (NEPA). Pennsylvania has agreed to accept 75% of the Pennsylvania-New Jersey portion of dredged material generated during the dredging project.³⁶ The Philadelphia Regional Port Authority believes that the resurgence of jobs due to the project and projected contracts as a result of a deeper channel compensate for the initial costs; "...there is potential for over \$1 billion in

³⁵ "Public Policy, Issues Index : Dredging Update," Greater Philadelphia Chamber of Commerce (retrieved July 19, 2006) <http://www.gpcc.com/currentissues_state.asp#7>

³⁶ Hajna, Lawrence. "Corzine Voices Dredging Doubts," Courier-Post [Camden] 26 Feb. 2006, <<http://www.courierpostonline.com/apps/pbcs.dll/article?AID=/20060225/NEWS01/602250329/1006/ARCHIVES>>.

revenue over the life of the project, with \$600 million in personal income over the next ten years...”³⁷ Currently, the dredging project’s environmental impact statement has been reviewed and the project has been approved at both the federal and state levels with the EPA and the U.S Fish and Wildlife Service. However, the project has been stalled due to a dispute between Pennsylvania and New Jersey.

Maintenance Dredging

Over time, sediments gradually accumulate in areas where dredging has taken place. This is a natural, unavoidable ecological process that counteracts the desired benefits of dredging a channel by decreasing the depth and width of the channel as silt is deposited along the bottom and sides of the dredged area.

During maintenance dredging, the channel is restored to the original depth and width as it was after the original dredging process was completed using various environmentally appropriate methods. These might include clam buckets, drag lines, and back hoes. Invasive hydraulic methods such as propeller washing and suction dredging are avoided due to the threat posed to aquatic life by the

³⁷ “Regional Competitiveness” (retrieved July 11,2006)
<http://www.dredgenow.org/index.php?section=learn_more>

increase in suspended sediments present in the water while dredging takes place³⁸.

Maintenance Dredging is an ongoing process. Since the Delaware River was last dredged to its present depth of 40 feet, in 1942, ongoing maintenance dredging results in the removal of 3 million cubic yards of sediments annually. When the depth of the Delaware River is increased to 45 feet with the current dredging project, maintenance dredging activities will likely need to continue to maintain the desired channel depth³⁹. In the case of the Delaware River, maintenance dredging will ensure the reliability of the waterway for ship navigation and result in increased efficiency of travel by ships.

POLLUTION IN THE DELAWARE RIVER

Water quality in the Delaware River is monitored in numerous ways. In Compliance with the Clean Water Act, the EPA requires that every two years states submit reports about the water quality in their state. Every two years the EPA also updates assessment and reporting protocols that the states must

³⁸ Fisheries and Oceans Canada. "Pacific Regional Operational Statement Routine Maintenance Dredging for Navigation." (retrieved June 11, 2007). <http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/pdfs/pacific_region_11_routine_maintenance_e.pdf>.

³⁹ American Society of Civil Engineers. "Navigable Waterways: 2006 Report Card for Pennsylvania's Infrastructure." (retrieved June 11, 2007). <<http://www.pareportcard.org/graphics/PANavigableWaterways2006.pdf>>.

follow.⁴⁰ At the State level, the Pennsylvania Department of Environmental Protection obtains water quality data through their statewide Citizen's Volunteer Monitoring Program. In addition, the PA DEP's Bureau of Water Standards and Facility Regulation can monitor water quality through the permit requirements of industrial and state water treatment facilities and facilities with point source discharge.⁴¹ Numerous non-governmental groups also monitor water quality in the Delaware River. The Delaware Riverkeeper has a volunteer monitoring program with sites along the entire river and many of its tributaries. The data obtained is then distributed to government agencies or interested parties to assist with assessments, protection, and enforcement of water quality standards in the Delaware.⁴² The Delaware River Basin Commission monitors the water quality of the Delaware River and works with government agencies, non-profit organizations, volunteers and staff to improve the water quality in the Delaware River estuaries.

Voluntary programs in the area- Partnership for the Delaware Estuary runs a voluntary, non-regulatory program called Clean Water Partners. The program is intended to train business owners and managers about how to

⁴⁰ "Mid-Atlantic States: Water Monitoring" (retrieved July 17)
<http://www.epa.gov/reg3wapd/monitor/state_monitoring.htm>

⁴¹ "PA Department of Environmental Protection" (retrieved July 17th, 2006)
<<http://www.depweb.state.pa.us/dep/cwp/view.asp?a=3&q=474428&pp=12&n=1>>

⁴² "Delaware Riverkeeper Network's Volunteer Monitoring Program" (retrieved July 17th, 2006)
<<http://www.delawareriverkeeper.org/monitoring/monitoring.htm>>

prevent stormwater runoff before it occurs through Best Management Practices. Clean Water Partners provides technical support and a handbook that enable program implementation for local businesses. Participating businesses sign a pledge which proclaims their dedication to the program and the environment. After completing the training they are then given decals that can be placed on windows and around the business which inform the public and employees about their environmental efforts.⁴³

A recent study by the federal Environmental Protection Agency concludes that the Delaware River and Bay have some of the highest concentrations of chemicals in the nation, although overall levels appear to be decreasing. Pollution levels are highest in the stretch of river from Chester, Pa., to the mouth of Rancocas Creek in Burlington County.

The incidence of fin erosion, ulcers and abnormal growths in fish are generally low...about 5 per 1,000 fish, EPA says. Still, this rate is nearly double other estuaries in the region, including Chesapeake Bay.

Some of the Delaware River's most common pollutants include:

⁴³ "Clean Water Partners"(retrieved July 17th 2006)
<<http://www.delawareestuary.org/educationandoutreach/communityinitiatives/cleanwaterpartners.asp>>

PCBs (Polychlorinated biphenyls)

This class of chemicals is suspected of causing cancer, liver damage, and respiratory distress. PCBs were once widely used in cooling electrical equipment, plasticizers, inks and dyes. They are slow to degrade in the environment and accumulate in the aquatic food chain. A 1994 study by Arthur D. Little Inc. of Cambridge, Mass., found PCBs in river sediments to be higher than previously thought. PCBs may still be getting into the river by way of leaking landfills, improper storage and illegal dumping. Locally, the Delaware River Basin Commission has completed a major basin-wide initiative on PCBs.

Metals

Toxic heavy metals including chromium, copper, lead, mercury and arsenic can have a wide range of health impacts, including causing neurological problems and cancer. These metals are found in river sediments from past industrial pollution. Industries continue to discharge metals into the river. Urban runoff and airborne pollutants also contribute to metals in the river.

Nutrients

Nitrogen, phosphorous and ammonia from the discharge of treated municipal and industrial wastes contribute to algae blooms that can result in reduced dissolved oxygen. The Delaware River has one of the nation's highest

concentrations of nutrients. But these nutrients haven't been a big problem, possibly because sediments suspended in the water may block out sunlight that algae need to grow.

Volatile Organic Compounds

Cancer-causing chemicals used by industry including 1,2-dichloroethane and tetrachloroethene have turned up in the river at levels exceeding federal drinking water criteria. Concerned about the risk of these chemicals ending up in drinking water supplies, officials are taking steps to set maximum industrial discharge limits. They are also tracking sources that discharge these chemicals into municipal wastewater treatment plants that discharge effluent into the river.”⁴⁴

NATIONWIDE EFFORTS – GREEN PORTS

Across the nation ports have recognized their environmental footprint and have started to address the issue. ALASKA - In 1991 the Port of Anchorage created the Port Area Petroleum Users Group (PUG). This group was organized with the intention of reducing pollution from petroleum-hydrocarbon contaminated soil and water. With the assistance of the Alaska Department of Environmental Conservation, PUG assessed the soils and water in the 300 acres surrounding the

⁴⁴ “Major Pollutants in the Delaware River”, Courier Post Online, August 11, 2005. (retrieved August 23, 2006) <<http://www.southjerseynews.com/river/toxin.html>>

Port of Alaska.⁴⁵ The port believed that forming a collaborative with area land owners and users would result in a single more expansive and cost effective plan for environmental clean up than if many smaller plans were developed for individual subdivisions of the same area.⁴⁶ State regulatory agencies supported PUG to the extent that it agreed to not issue compliance orders as long as PUG functioned.⁴⁷ Participating companies were interested in joining PUG because throughout the process no individual parties were assigned blame and no binding commitment was necessary to join. PUG maintained its focus solely on financing and administering an environmental assessment and clean up.

The formation of PUG was an innovative approach for environmental clean up that incorporated fundamental keys of success such as: encouraging dialogue, discussion of time-saving strategies, making cost effective strategies, shared labor, focus on solution not blame, and increased cooperation between shareholders. By combining technical and financial resources, the PUG members have developed a nontraditional approach to remediation that has resulted in considerable cost and time savings.⁴⁸ In this case, cost effectiveness is measured

⁴⁵“Land-Based Water Pollution” (retrieved July 21, 2006) < <http://www.aapa-ports.org/govrelations/resources/GreenPorts/14.Land-base.pol.37-43%20pp.pdf>>

⁴⁶ “Land-Based Water Pollution”, 3.

⁴⁷ “Land-Based Water Pollution” , 3.

⁴⁸ “Land-Based Water Pollution” , 3

as avoided costs. The success of groups like PUG depends on the active commitment of its members in terms of: time, raising funds, administrative responsibilities, management, capacity for change and follow up supervision.

TEXAS – The Port of Corpus Christi Authority (PCCA) has revised its Stormwater Collection System to account for an increase in contaminated stormwater discharge due to the reconfiguration and new construction of their dry bulk docks. The PCCA formulated a Stormwater Pollution Prevention Plan that surpasses the traditional stormwater pollution controls required under the NPDES permit and has supplemented them with innovative stormwater infrastructure improvements and technologies. Infrastructure improvements include the “...construction of concrete-lined storm drains and ditches, stilling basins for runoff water, and filtration before stormwater is released into the channel or before pumping into storage ponds.”⁴⁹ The filtration unit “...consists of three different beds - limestone, geo-synthetic fabric membranes and anthracite coal...these filters remove sediments, hydrocarbons, insoluble heavy metals and aeration improves the Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD).”⁵⁰ The accumulated sediments in the basins and filter traps need to be periodically removed and they can be reused as base materials for pet-coke pads. These supplemental pollution controls have proven

⁴⁹ “Land-Based Water Pollution”, 4.

⁵⁰ “Land-Based Water Pollution”, 4.

to be a success, "...the PCCA has improved the quality of discharge water, improved the aesthetics of the Bulk terminal, separated and reclaimed solid wastes, captured and reused filtered storm water, suppressed dust emissions and saved money."⁵¹

PCCA's diligent stormwater efforts proved to be more than just effective but also rewarding.

CALIFORNIA- The Port of Long Beach completed an effective and comprehensive Stormwater Pollution Prevention Program. The Port administers the program and oversees permit compliance for applicable facilities; "...the Port strives to minimize redundancy and waste, reduce pollutant loading, and lessen the burden on tenants."⁵²

What makes their stormwater program so successful is how different aspects of management are distributed throughout port departments.

- ***Planning Division*** – day-to-day administration; assists facilities with stormwater pollution issues
- ***Maintenance Division*** – maintains the storm drain system, conducts periodic cleaning, stencils inlets, and sweeps the streets
- ***Engineering Division*** – designs and constructs structures for tenants using Best Management Practices; obtains the necessary NPDES permits

⁵¹ "Land-Based Water Pollution", 4.

⁵² "Land-Based Water Pollution", 4.

- ***Security Division*** – reports on spills and tenant activities that may impact stormwater quality
- ***Information Management Division*** – manages a Geographic Information System database.⁵³

The Port of Long Beach’s Stormwater Management Program exceeds the EPA’s stormwater program template and guidelines. The Port began this program in 1991 by educating its tenants about the need to comply with the general permit and asked them to join the Port’s stormwater program. At the same time, the Port sought information, in the form of Stormwater Runoff questionnaires, probing each facility’s operations in regards to: “...activities, potential pollutants, and control measures.”⁵⁴ After the Port assessed the stormwater runoff information they created a state-of-the-art GIS database that could integrate “... information on the Port’s storm drain infrastructure with facility-specific information.”⁵⁵ This database allowed the port to evaluate drainage systems and isolate problem areas. This collaborative approach has been beneficial for improving communication between the Port and its’ tenants, in addition to cost savings and overall reductions in runoff.⁵⁶ Though the formation of Stormwater Pollution Prevention Plans for participating tenants has been successful, critics

⁵³ “Land-Based Water Pollution”, 4,5.

⁵⁴ “Land-Based Water Pollution”, 5.

⁵⁵ “Land-Based Water Pollution”, 5.

⁵⁶ “Land-Based Water Pollution”, 5.

have argued that the Port should have stormwater requirements for all the facilities not just the participants who volunteered.⁵⁷

SOUTH CAROLINA- When the Port of Charleston decided to expand one of its terminals, in 1991, they had to take into account how runoff would pollute the adjacent wetlands. The engineers designed an innovative drainage system and retention pond that collects, filters, and treats the runoff before discharging it into the surrounding ecosystem.

“...Stormwater is collected by an extensive underground network of concrete pipes and then directed through filter cloth into a 17- acre L-shaped detention pond. Sand filters in the pond naturally remove contaminants from the water. Drains installed in the sand filtration bed around the perimeter of the pond were made with geosynthetic materials designed to filter particulates from water and enhance soil reinforcement. During low tide conditions, hydraulic pressure pushes collected storm water through the filtration system and into the Wando River. A tide gate prevents salt water intrusion into the pond during high tides...”⁵⁸

The Port of Charleston’s environmental efforts have not only prevented wetland degradation but the surrounding wildlife have benefited from the new detention system, “...osprey nest on the terminal, ducks frequent the pond and alligators swim in the retention pond and sun bathe on the grassy embankment.”⁵⁹

⁵⁷ Bailey, 22.

⁵⁸ “Land-Based Water Pollution”, 7.

⁵⁹ “Land-Based Water Pollution”, 7.

NATIONWIDE – Environmental Management Systems (EMS) are becoming a popular solution for many ports across the United States when confronting environmental challenges. When these systems are integrated into port management they modernize port activities in terms of: health & safety, security, operational efficiency and community relations.⁶⁰ EMS's provide for ports the tools needed to find the roots of actual/potential environmental problems and to improve environmental performance, prevent pollution, and conserve energy and natural resources. These systems work because they integrate an innovative framework which incorporates strong operational controls and Best Management Practices into already existing jobs.⁶¹ The benefits of Environmental Management Systems are:

- “...- Demonstrate leadership in environmental protection**
- Enhance credibility and public image**
- Reduce cost and improve efficiency**
- Lower environmental liability and improve insurance coverage**
- Improve emergency response capability**
- Increase staff awareness, competency, involvement and morale...”⁶²**

Across the U.S, EMS's are being assimilated into ports' daily activities. The EPA in partnership with the American Association of Port Authorities (AAPA) and

⁶⁰ “Environmental Management Systems and Public Seaports”, (retrieved 7/26/06) <http://www.peercenter.net/about/EMSPortsIInitiative.pdf> (1-2), 1.

⁶¹ “Environmental Management Systems and Public Seaports”, 1.

⁶² “Environmental Management Systems and Public Seaports”, 1.

the Global Environment and Technology Foundation (GETF) have initiated a project to help ports receive EMS training, mentoring and technical assistance. Already eleven ports are included in the project and share the cost of EMS installation at \$45,000 over a two year period.⁶³ A case study example:

“...The Port of Houston Authority (PHA) adopted an EMS at its Barbour's Cut Container Terminal and its Central Maintenance Facility in order to improve its environmental performance, reduce costs and provide regulatory benefits. Through the establishment of an internal EMS team and with the involvement of all PHA departments, the EMS effort focused on environmental issues in the following areas: stormwater impacts, air emission reductions, and waste minimization. PHA staff received assistance in preparing its EMS by participating in the U.S. Environmental Protection Agency's EMS Initiative for Local Government Entities. In its first two years, the PHA's EMS minimized stormwater impacts, reduced absorbent disposal by 75% and nitrogen oxide emissions by three tons, and completely eliminated the disposal of oily rags. In addition, the PHA expects to see substantial benefits in its insurance coverage due to its comprehensive EMS documentation and demonstrated operational controls...”⁶⁴

EMS's are successful because they change the core methodology of the Port management, meaning that they become more aware and have established the methods necessary to continually promote improvement.⁶⁵

Worldwide Efforts – Green Ports

NEW ZEALAND – Port Nelson is the largest fishing port in New Zealand. It has enacted an innovative environmental program that promotes continual

⁶³ “Environmental Management Systems and Public Seaports”, 1.

⁶⁴ “Environmental Management Systems and Public Seaports”, 2.

⁶⁵ “Environmental Management Systems: Systematically Improving Your Performance” (retrieved July 26, 2006) < http://www.epa.gov/sectors/ports/ports_bizcase.pdf > , (1-12), 3.

improvements to minimize environmental impacts and seeks cooperation with port users. In 1994, Port Nelson Ltd (PNL) established an Environmental Consultative Committee (ECC) to begin the process of developing an Environmental Management Plan (PNEMP). Members of the committee represent port operators, members of the surrounding community, environmental advocates and other area stakeholders. In 1996, the PNEMP was initiated as a “living public document” and it outlines the Port’s environmental policies and goals. By making it a “living” document the ECC aspires to keep the PNEMP updated and modified as necessary. The ECC meets monthly in order to progress environmental issues and they have taken on a lobbying role for global issues that they cannot control. The PNEMP depends on the continual auditing, monitoring and reporting of independent consultants to pinpoint areas of priority.⁶⁶ The success of the PNEMP relies on excellent communication between the members of the ECC, port users, port employees and the community. Most importantly it is necessary that the port staff is updated on changes and new priorities of the PNEMP. To achieve that goal the PNEMP, “...ensures that there are mechanisms in place to make certain that PNL staff know about the environmental objectives and targets outlined in the various policies, codes of practice (used as forms of regulations), instructions for emergency actions and

⁶⁶ “Port Nelson Environmental Management Plan” (retrieved July 31, 2006) <http://www.portnelson.co.nz/files/environmental_full.pdf>, (1- 79), 2.

the procedures for reporting environmental incidents carried out during staff induction, and through the various internal communication networks.”⁶⁷ These various internal communications are carried out, “...through the rePort magazine, Incident reports, monthly newsletters and staff notice boards are used to convey environmental messages to the various staff.”⁶⁸ External communications include a monthly Environmental Update Newsletter, annual environmental reports, issues register and through ECC members. The structure of the PNEMP is categorized into 9 parts:

“...1) Introduction providing the background behind Port Nelson’s environmental approach towards sustainable management of natural and physical resources. It also outlines the history behind the Environmental Consultative Committee and two subcommittees.

2) Definitions of technical wording used throughout this Plan.

3) Port Nelson’s Structure and Responsibility outlines the dynamics of the port, Port Nelson Ltd’s management structure and where the Company has direct and indirect control as landowner through lease agreements.

4) Port Nelson’s Commitment to the Environment presents Port Nelson’s Environmental Policy Statement and also illustrates how the use of ISO 14001 can assist Port Nelson Ltd in reaching its environmental goals.

5) Legal and Other Requirements outlines the national regulations, legislation, statutory plans and policies, and codes of practice that the Port Company is obligated to follow when carrying out an activity that involves the environment.

6) Environmental Effects illustrates the environmental effects of Port Nelson’s activities and the priority given to each effect to address them.

7) Environmental Policies, which contain a general noise policy, air quality policy, a water quality policy and a sustainable management policy, and the associated targets and mechanisms to reach the identified goals.

8) Training, Awareness and Communication outlines the systems in place to increase staff awareness and training of procedures associated with reporting environmental incidents and following codes of practices. This section also explains the external and internal communication processes used to keep staff and the community informed.

⁶⁷ “Port Nelson Environmental Management Plan”, 3.

⁶⁸ “Port Nelson Environmental Management Plan”, 3.

9) **Environmental Reporting and Internal Auditing** Environmental reporting is part of an annual reporting process that is made public. Regular internal auditing is carried out through checking activity compliance with that of the codes of practice.”⁶⁹

Due to the thorough dissemination of responsibilities and a cohesive communications structure, the PNEMP is a far reaching and persistently self improving doctrine.

ECOPORTS- EcoPorts originated as research project funded by the European Commission, “...to harmonize the environmental management approach of ports in Europe and to exchange experiences and implement best practices on port-related environmental issues.”⁷⁰ In 1999, the EcoPorts Foundation, a non-profit, was founded to create a balance in Europe, concerning port related environmental issues by establishing a pan-European network of ports with a policy of voluntary, self-regulation on environmental issues.⁷¹ The specific goals are:

“...- Create a 'level playing field' in terms of the implementation of environmental legislation, and to remove the environmental component as a competitive factor between ports.

- Develop and implement cost effective and practicable solutions specifically targeted at environmental protection and sustainable development

- Provide a focus for business opportunities and port development

⁶⁹ “Port Nelson Environmental Management Plan”, 8.

⁷⁰ “Ports Sharing Environmental Experience”, (retrieved July 26, 2006)
<<http://www.ecoport.com/ports/index.asp>>

⁷¹ “Ports Sharing Environmental Experience”

- Demonstrate good performance and best practice of the European port sector in terms of environmental duties and responsibilities
- Contribute to continuous improvement of the port environment...⁷²

The foundation's unique approach depends on the ability of Port managers to identify environmental problem areas and to take effective action. The tools that the foundation provide so as to assist ports in their evaluations and actions are as follows:

“...- Self Diagnosis Methodology (SDM): a validated procedure that assists ports to establish their base-line performance in terms of comparison with best practice guidelines and to assess their environmental management status against the European benchmarks. The feed-back provides GAP and SWOT analysis which assists ports to identify priorities for action.

-Port Environmental Review System (PERS): another validated procedure that assists ports to implement the first stages of a credible Environmental Management System. It can be used as a preliminary step to a more comprehensive system such as ISO 14000 but allows phased development. Following PERS establishes the core elements of an EMS. PERS is identified as a standard for port environmental management by the ECOPORTS Foundation, and as such, it carries the voluntary option of independent review (currently carried out by Lloyd's Register, Rotterdam, on behalf of the Foundation) with a Certificate of Validation for ports that reach the standard. This is an important new development for ports in Europe as it demonstrates attainment of a benchmark standard...⁷³

The foundation also provides the following packages to make these processes easier:

⁷² “Ports Sharing Environmental Experience”

⁷³ “Ports Sharing Environmental Experience”

“...- Strategic Overview of Significant Environmental Aspects: a methodology for ports to assess the major impacts of their activities and to check that they have sufficient information by which to manage their liabilities and responsibilities.

- Decision Support System: a methodology to examine the range of factors involved in environmental issues, their interactions, and response options in decision-making.

- Database of best-practice solutions to key environmental challenges.

- Environmental Management Information System: a networked system that integrates all the components of ECOPORTS into an easily accessed system that can be interrogated by port professionals for purposes of practicable and cost-effective management options...”⁷⁴

Membership to the EcoPort Foundation is strictly voluntary but the benefits are worthwhile:

“...-Identification of business opportunities by applying smart solutions to environmental issues

- Saving of costs by applying best practices from other ports, and by avoiding duplication of effort

- Shared costs of developing new techniques and management tools

- Access to network of environmental experience and expertise

- Opportunity to influence policy development...”⁷⁵

The success of this project and the formation of the EcoPort Foundation is directly related to the emphasis on reformulating port management methodology and refocusing from the burdens associated with environmental challenges to the benefits of new practices.

⁷⁴ “Ports Sharing Environmental Experience”

⁷⁵ “Ports Sharing Environmental Experience”

CONCLUSION

The pressing environmental issues affecting the Philadelphia port terminals are consistent with those at port terminals across the country. There are signs that the port industry is beginning to address these environmental issues and develop proactive strategies to reduce their environmental footprint. Philadelphia port terminals need to do their part in the larger vision of a “greener”, healthier US port system. Clean Air Council is optimistic that Philadelphia port operators will participate in more voluntary measures to that end.