Environmental Chemicals III

Principles of Environmental Toxicology
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Learning Objectives

- Explore the Montana Pole Superfund site.
- Examine methods for treatment of PCP contaminated soils and waters.
- Explore the history, science and risk issues surrounding the Hudson River, NY PCB contamination.

Montana Pole Site

- The Montana Pole and Treating site is an abandoned forty-acre wood treatment facility in Butte, Montana.
- From 1946 to 1983, the facility preserved utility poles, posts and bridge timbers with pentachlorophenol (PCP).
- Hazardous substances from the pole-treating operations were discharged into a ditch next to the plant that ran towards Silver Bow Creek.

EPA

Butte, MT

Receptors and Controls

- The site is in a residential and industrial area.
  - The nearest residence is 100 yards away.
  - The nearest private well is located one fifth mile down gradient from the site.
- Federal and state agencies are addressing soil and groundwater contamination, as well as waste products on site.
- Contaminated soil currently is being treated with bioremediation in an on-site land treatment unit.

EPA

Removal Actions

- About 16,000 gallons of PCP contaminated waste oil were sent to a licensed disposal facility in Utah for incineration in the 1980s.
  - In spring 1998, forty drums of PCP contaminated sludge were shipped to Utah.
- The State of Montana signed an agreement with a contractor in March 1999 to dispose of all remaining site debris.

EPA

Contamination

- The ground water and soils at the Montana Pole site are contaminated with PCPs, dioxins, furans (flammable liquids from wood oils), volatile organic compounds (VOCs) and metals.
- The sludge also is contaminated with PCPs, dioxins and furans.
- PCP has been detected in Silver Bow Creek.

EPA

Superfund Listing

- The site was proposed for addition to the Environmental Protection Agency's (EPA's) Superfund National Priorities List (NPL) in June 1986.
- The final date of its addition to the NPL was July 1987.
- Clean-up, $38M settlement from PRP.

EPA

Risks

- Accidentally swallowing or having direct contact with ground water, surface water, soil or sludge can be hazardous to human health.
- Contaminants may enter the air naturally or during cleanup operations, presenting another potential source of exposure.

EPA

Clean-up Remedy

- Bioremediation of the soil and ground water, including excavation of approximately 200,000 cubic yards of contaminated soil.
- Construction of a land treatment unit to biologically treat the soil.
- Construction of a carbon water treatment plant with extraction of the ground water, treatment of the ground water with nutrients.
- Re-injection of the treated ground water.

EPA

Case Presentation

- Randy Huffsmith, Supervising Engineer, Montana Pole Site.
- Jamie Veis, Field Engineer, Montana Pole Site.

Hudson River, NY

- Hudson River PCB Superfund Site.
- The Hudson River Site encompasses the Hudson River from Hudson Falls to the Battery in New York Harbor.
- Nearly 200 river miles.
- Different hydrologic regimes distinguish the upper region from the lower region.

Hudson River PCBs

- During the 30 year period ending in 1977, two GE facilities used PCBs in the manufacture of electrical capacitors.
  - GE Hudson Falls, mile 197.
  - GE Fort Edward, mile 195.
- 0.21 to 1.3 million pounds of PCBs estimated to have been discharged between 1957 and 1975.


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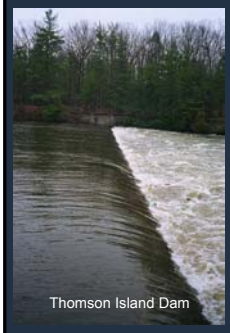
Hudson River, NY

Distribution


Thomson Island Dam

- Break point at Federal Dam.
- Investigations of the lower river are critical in the understanding of migration of PCBs, dissolved or suspended, from the upper river to the lower river.

Pathway

- PCBs discharged to the river tended to adhere to the sediments.
- Subsequently accumulated downstream with the sediments as they settled in an impounded pool behind the former Fort Edward Dam (river mile 194.5).
- The dam was removed in 1973 because of deterioration.
- During subsequent spring flooding PCB contaminated sediments were scoured and released downstream.

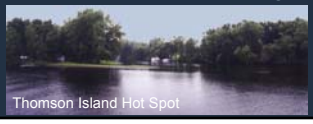
Sediment Deposits

- Exposed sediments from the former pool behind the dam called "remnant deposits" have been the subject of many clean-up efforts.
- "Remnant deposits" currently stretch from river mile 197 to 195.


EPA

Hot Spots

- In 1978 and 1984 NYSDEC collected river bottom sediment cores from the Ft. Edward Dam site to the next dam down river, the Thomson Island Dam.
  - Ft. Edward, river mile 194.5; Thomson Island, mile 188.5.
- Results indicated that bulk of the PCBs had been distributed into distinct zones or "hot spots".
  - These zones were generally distributed off the main navigational channel of the river and good correlation between hot spots and finer grained sediments.


Thomson Island Hot Spot

Human Health Risk

- December 1999 Human Health Risk Assessment.
  - Cancer risk and non-cancer hazard from consumption of game fish.

Remediation

- Dredging and product removal.
- Biodegradation.
  - The source for most information regarding anaerobic dechlorination.
- Natural attenuation *vs.* active dredging.
- Source control is complex.
- USEPA 2001: Dredge it.

Case Presentation

- The Hudson River PCB Story: A Toxic Heritage
  - Hudson River Sloop Clearwater.