

## Key Messages

Bradford Island Community Involvement Program  
U.S. Army Corps of Engineers

## Introduction

- The Army Corps of Engineers (Corps) is working with the Oregon Department of Environmental Quality (ODEQ) to remove polychlorinated biphenyl (PCB) contaminated sediments from the Bonneville Dam forebay, near Bradford Island.
- These contaminated sediments are the result of the disposal of electrical equipment on Bradford Island and in the Columbia River during the 1970's.
- The Corps has been investigating and doing cleanup work at Bradford Island since 1997. Electrical debris and some sediments were removed from the forebay in 2002. Contaminated sediments remain in the river adjacent to Bradford Island.
- The Corps has made the removal of 0.83 acres of highly contaminated PCB sediments (called "hot spots") a high priority. Removal of these contaminated sediments is scheduled to occur in October 2007.
- The Corps is conducting a Remedial Investigation and Feasibility Study for the Bradford Island area to determine a final remedy for the island and river contamination. The remedial investigation is scheduled to be completed in 2008.

## What are PCBs?

- Polychlorinated biphenyls (PCBs) are colorless, odorless, and tasteless chemicals that were widely used in electrical equipment such as transformers and capacitors before their production was banned in 1976. The same properties that made PCBs so useful in industrial applications, such as their stability and non-flammability, enable PCBs to persist in the environment for long periods of time.
- Because PCBs become attached to particles in the water, they eventually settle out and are buried in bottom sediments. Bottom-dwelling organisms ingest these PCB-contaminated sediments and pass them up into the food chain. The smallest aquatic organisms are eaten by successively larger predator fish which are then consumed by fish-eating mammals. PCBs have been detected in both fresh and saltwater fish in varying amounts depending on size, feeding grounds, position in the food chain, exposure, and fat content. PCBs build up primarily in fatty tissue in fish and to a lesser extent in edible muscle tissue. Larger, fatter fish tend to accumulate PCBs to a greater extent than younger, leaner fish. Some fish may contain high enough levels that they are considered unsafe for human consumption, or with concentration levels where consumption should be restricted.

- Medical authorities suspect prolonged exposure to small doses of PCBs can contribute to a variety of human health problems, including developmental problems in children, liver damage, and various forms of cancer. For humans, food is by far the most significant source of PCB exposure. Foods most likely to contain PCBs include milk, eggs, chicken, turkey, beef, and fish. Since 1977, when manufacturing of PCBs was banned, levels in most foods have declined.
- PCBs are stored in the body's fatty tissue where they can accumulate. Women of childbearing age, especially those pregnant or nursing, are advised to minimize risk of exposure by avoiding eating fish from waters known to contain PCB contaminants.
- Two federal agencies have responsibility in protecting humans from exposure to harmful levels of PCBs. The U.S. Food and Drug Administration (FDA) is responsible for setting standards for tolerable levels of PCBs in fish sold via interstate commerce. In 1984, the FDA lowered the allowable level of PCBs from 5.0 ppm (5 parts PCB per million parts edible fish) for fish and shellfish to 2.0 ppm. The FDA periodically tests fish typically sold in markets to determine the levels of PCBs and other contaminants, and when necessary, confiscates contaminated products. The U.S. Environmental Protection Agency (EPA) sets standards for PCBs based exclusively on protection of public health, whereas the FDA has to consider many factors including economics. Currently, the EPA's Office of Water health screening level for all PCBs in fish tissue is 0.01 ppm. This level of PCBs in fish tissue could result in one additional cancer due to PCBs in a population of 100,000, assuming an average adult eats one meal of contaminated fish per month over a lifetime.
- For more information on PCBs, see <http://oregon.gov/DHS/ph/envtox/pcbs.shtml>.

## Contamination Levels at Bradford Island

- The “in-river” contamination is concentrated on the north side of Bradford Island and has been spread, by currents above the dam, throughout the Bonneville Dam forebay. PCB concentrations drop quickly away from the source area. Upland areas of contamination are localized and do not appear to pose a threat to adjacent areas. The Remedial Investigation will determine the nature and extent of the contamination and what will require cleanup.
- The Corps has only been able to acquire a relatively low number of co-located sediment, clam, and crayfish tissue samples. The data from these samples are not conclusive. The limited data showed little relationship between sediment and tissue PCB concentrations.
- The Corps agreed to collect sturgeon, bass, and walleye in the Bonneville Dam pool to inform a potential fish advisory for waters around the dam. After a significant effort, only a few bass were caught and no walleye or sturgeon were caught (the bass that were caught were well upstream of Bradford Island). The Corps is not planning any additional fish collection efforts at the present time; however, additional fish collections will be necessary to inform the broader Remedial Investigation study.

## Shellfish and Fish Advisories

- The Oregon Department of Human Services (DHS) has issued a shellfish advisory related to elevated levels of PCBs in crayfish and freshwater clams living in the Columbia River immediately above Bonneville Dam. All commercial crayfish harvesters, sport fishermen, and food collectors are advised to avoid catching or eating clams, crayfish, or other bottom-dwelling organisms from the Columbia River between Bonneville Dam and the mouth of Ruckel Creek at mile-post 147, which is about one mile upstream of the dam. The advisory is to continue until further notice. <http://www.oregon.gov/DHS/ph/envtox/0301esc.shtml>
- More information on the Oregon DHS advisories may be obtained by calling (971) 673-0444.
- Washington has prohibited the harvesting of all freshwater clams and mussels. <http://apps.leg.wa.gov/WAC/default.aspx?cite=220-56-129>

## Exposure/Risk

- The purpose of the Bradford Island Remedial Investigation is to determine whether risks to the environment and/or human health are present at the site. A determination of risk is not possible at this time. However, risk factors affecting human health can be discussed.
- To affect human health, a person must be exposed to a contaminant. There are three potential contamination exposure routes associated with Bradford Island:
  - Direct contact (touching contaminated material)
  - Inhalation (breathing dust that is contaminated)
  - Ingestion (consuming contaminated soils, sediments, or tissue)
- **Direct contact:** The upland sites at Bradford Island are off-limits to workers and the general public. The in-river contamination area is located within the dam's Boat Restricted Zone (BRZ). Only authorized personnel are allowed in these areas. Exposure by direct contact, associated with activities such as swimming, fishing, and other shoreline recreation activities, is unlikely.
- **Inhalation:** The Corps has done some modeling for windblown dust at the site and plans to do more modeling for solvents in the groundwater. These models will determine whether contaminants have the potential for inhalation by workers or members of the public. The results to date are negative.
- **Ingestion (direct):** Human exposure resulting from ingestion of contaminated soils or sediments is unlikely.
- **Ingestion (indirect):** Human exposure resulting from ingestion of clams, crayfish, or fish that have been contaminated has the greatest potential for risk. This type of exposure is influenced by many different factors:
  - **Availability of the organism as a food source:** Clams and crayfish have a small home range. Access to the area is restricted and the Corps is not aware of anyone collecting

clams or crayfish in the area. Higher trophic level organisms (for example, bass and walleye) seem to be relatively scarce in the Bradford Island area. The Corps has attempted to catch sturgeon at the site but have been unsuccessful.

- **Residence Time:** Anadromous fish such as salmon that pass through the vicinity of the Bonneville Dam on their journey downstream or upstream would have little to no exposure, as opposed to resident fish that stay in a localized area all year long.
- **Home Range of Resident Fish:** Sturgeon and bass in the vicinity are predators of local crayfish and clams. A sturgeon may have a home range of 50 miles or more. A bass may have a home range of 30 to 50 acres.
- **Percent of Diet:** The most “at risk” people will be those who regularly eat fish caught in the vicinity of the site. A person who eats fifty meals of local fish each year would be at greater risk than a person who eats one meal of local fish per year.
- **The amount of contamination that is biologically available in the sediments:** Bioavailability of PCBs is dependent on the amount of organic carbon in sediments. This factor will be used in the modeling proposed for the Bradford Island food web model.

## Fish Consumption Guidelines

- The Oregon DHS recommends following these guidelines for consuming fish from areas with potential contamination:
  - Reduce the frequency of eating fish.
  - Do not eat raw fish.
  - Eat smaller, younger fish.
  - Eat smaller portions of fish.
  - Reduce or avoid eating fatty parts of fish.
  - Remove the skin and all fat, eggs, and internal organs.
- For a diagram of how to properly clean fish, see <http://oregon.gov/DHS/ph/envtox/images/cleanfish.jpg>

## Project Timeline

- Dredging of the most contaminated sediments in the river around Bradford Island is planned for October 2007. The dredging work involves permitting and contracting (including Endangered Species Act review) that require advance planning. Other contaminated sites on or around Bradford Island could also be addressed in 2007, although no additional cleanup actions are planned at this time.

- The Remedial Investigation study will be complete in 2008. The Feasibility Study will require additional public outreach. Final cleanup of Bradford Island would likely take place over the following 2-3 years (2009-1011).

## Project Cost

- It is impossible to estimate the total project costs at this time since the scope of cleanup actions is unknown. The total cost of the project to this point is approximately \$7,000,000.