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U.S. Environmental Protection Agency (EPA) GE/Housatonic River Site Community Update

EPA Community Involvement

August 2009

This community update provides you with information on the GE/Housatonic River Site "Rest of River Risk Assessments"

Introduction

EPA is issuing this fact sheet to provide a review of the risks from the PCB contamination in the Housatonic River and its floodplain.

EPA conducted a Human Health Risk Assessment (HHRA) to quantify risks to adults and children exposed to PCBs originating from the GE Facility in Pittsfield, Massachusetts. Exposure could occur while living or working near the Housatonic River and its floodplain, or using the river and floodplain for recreation or agriculture. In addition, an Ecological Risk Assessment (ERA) was conducted to quantify risks from PCBs to the animals living and/or feeding in the river and floodplain.

The HHRA and the ERA identified and quantified serious risks to humans and the environment from the PCBs in the river and its floodplain and biota. Currently, fish consumption advisories are in place in both Massachusetts and Connecticut due to the PCBs, and in Massachusetts there are advisories on consuming waterfowl, frogs and turtles as well.

Background

The risk assessments were conducted by teams of experts working with EPA using state-of-the-art techniques. The risk assessments were based on an extensive site-specific database derived from thousands of samples collected over several years, as well as site-specific laboratory and field studies.

Both risk assessments were subjected to a public external Peer Review process and formal public comment period. The Peer Review Panels were comprised of teams of internationally recognized experts in risk assessment. Comments from the Panels were incorporated into the final risk assessments, which were issued in November 2004 (ERA) and February 2005 (HHRA). Both documents are available at: www.epa.gov/region1/ge/thesite/restofriver-reports.html.

Human Health Risk Assessment

The HHRA began with a screening of all environmental media to determine the most serious routes of exposure to PCBs in the Housatonic River and floodplain.

These routes of exposure are:

- direct contact with contaminated soil and sediment;
- consumption of contaminated fish and waterfowl; and
- consumption of contaminated agricultural products produced in the floodplain.

The HHRA evaluated each of these pathways separately and provided some insight into how these risks could be combined for individuals exposed to multiple pathways. Risks from exposure to PCBs in river water and air were found to be below levels EPA considers unacceptable.

What are PCBs?

A class of chemicals consisting of 209 individual compounds known as congeners. PCBs are classified by EPA as probable human carcinogens. EPA recognizes that PCBs also cause neurological and developmental effects and considers all PCB mixtures to be toxic.

How Are People Exposed to Contaminants?

Direct Contact Exposure



Fish and Waterfowl Consumption



Agricultural Product Consumption



Risk from Direct Contact with Floodplain Soil

More than 240 individual exposure areas along the Housatonic River, most of them between the confluence and Rising Pond, were evaluated for risk due to exposure to PCBs in floodplain soil and sediment. The amount of exposure depended upon the accessibility of a particular area. Direct contact with soil and sediment was assumed to occur randomly across an exposure area. If people spend more time in a more contaminated part of an exposure area, the risks will be higher. The risks from direct contact are summarized below:

- Cancer risks from exposure to PCBs in soil are within the EPA risk range, except for one recreational exposure (adult angler) in one exposure area.
- Non-cancer Hazard Indices (HIs) from exposure to PCBs in soil exceeded the EPA benchmark of 1.0 in some exposure areas for almost all exposure scenarios.
- Cancer risks from exposure to PCBs in sediment were within the EPA risk range in all of the exposure areas.
- Non-cancer HIs exceeded 1.0 at two of the sediment exposure areas.

Risk from Consumption of Fish and Waterfowl

The Housatonic River in Massachusetts and Connecticut is currently under various restrictions regarding the consumption of fish and other animals from the river due to the PCB contamination. Although current advisories are assumed to reduce the amount of fish and other biota that people eat, the fish and waterfowl consumption portion of the HHRA evaluated cancer and non-cancer risks to individuals consuming quantities of these foods that would be anticipated in the absence of restrictions, as required by EPA guidance. The risks are summarized below:

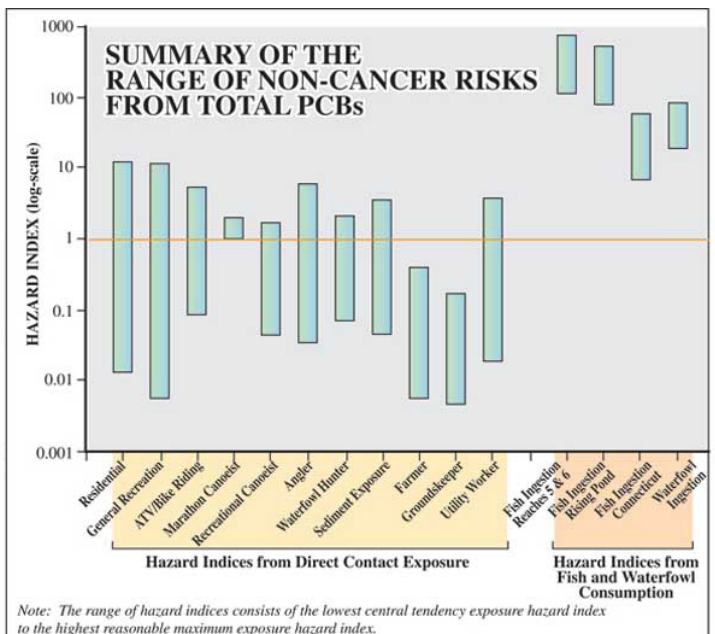
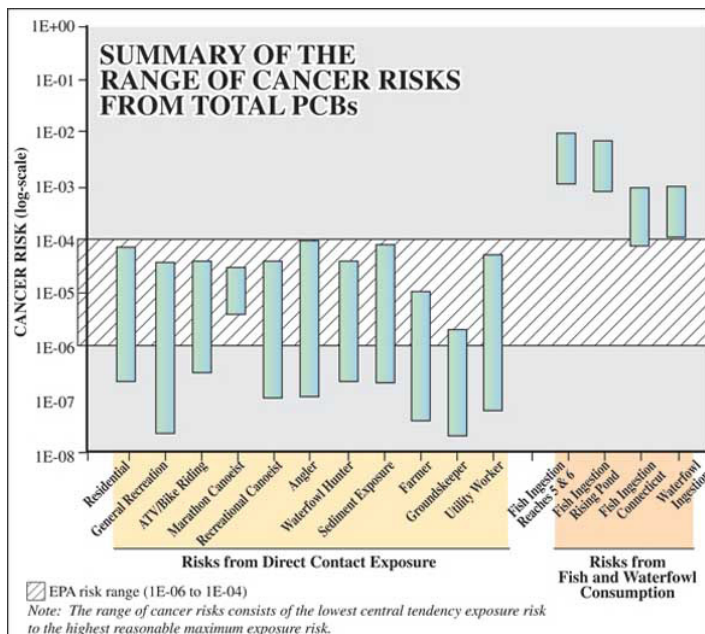
- Cancer risks from consuming fish and waterfowl greatly exceed EPA's risk range in Massachusetts and in Connecticut. The risks in Massachusetts are greater than those in Connecticut.
- Non-cancer risks from consuming fish and waterfowl greatly exceed EPA's benchmark of a HI of 1.0. The HIs in Massachusetts are greater than those in Connecticut.
- Although the amount of frogs and turtles consumed was assumed to be much less than fish and waterfowl, concentrations of PCBs in these species would also result in risk if consumed in large quantities.

Risk from Consumption of Agricultural Products

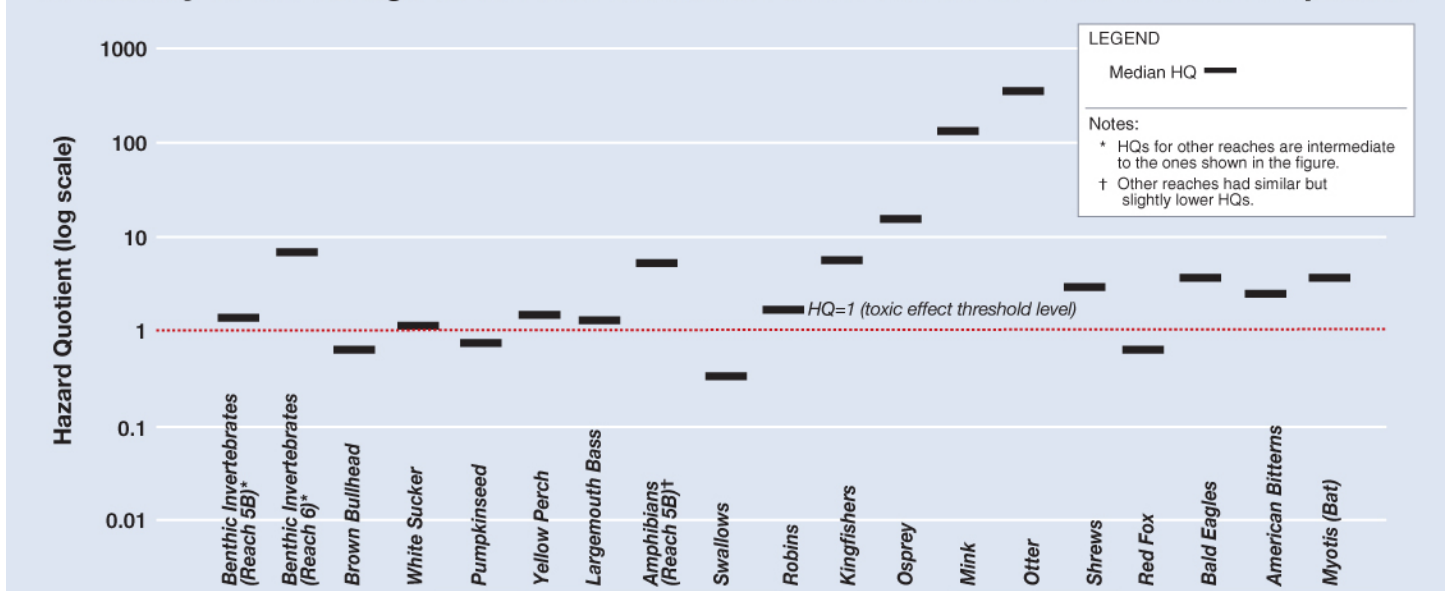
The agricultural portion of the HHRA evaluated risks from consuming commercial and backyard (home grown) meat, dairy, and produce as well as risks associated with home gardens. It also provided an estimate of the risk associated with consuming other food sources such as deer and wild edible plants. Because of limited data on PCBs in site-specific agricultural products, the assessment used an innovative modeling approach to evaluate risks. The results were presented in a way that allowed the risks to be scaled to different average PCB concentrations in floodplain soil for different acres used. The risks are summarized below:

Commercial Farms

For commercial farm families who consume their products or crops (assuming that all feed and crops are grown in soil with average PCB soil concentrations of 2 mg/kg or less), cancer risks from PCBs are within EPA's Risk Range, and non-cancer HIs are below EPA's benchmark. However, if average soil concentrations in the areas used by the animals or upon which feed or crops are grown are higher, both cancer and non-cancer risks are likely.



Summary of the Range of Hazard Quotients from Total PCBs for Selected Species



Source: EPA

Backyard Farms

- For families consuming backyard-raised dairy, beef, and poultry products, cancer risks from PCBs are within, but at the high end of EPA's Risk Range for PCB soil concentrations of 2 mg/kg or less. However, where the average soil concentrations exceed 2 mg/kg, there may be unacceptable risks.
- Non-cancer risks exceed EPA's benchmark.

Home Gardens and Wild Plants

- Consumption of home garden produce (at a soil concentration of 2 mg/kg or less) is not a health risk, even in combination with soil exposure during gardening activities.
- Risk from consumption of wild plants is unlikely because consumption rates are assumed to be lower than for home garden produce.

Ecological Risk Assessment

In the ERA, risk to eight different groups of animals, consisting of species that are related or share other characteristics such as dietary preferences, were evaluated. The eight groups are:

- Benthic invertebrates
- Amphibians
- Fish
- Insectivorous (insect-eating) Birds
- Piscivorous (fish-eating) Birds

- Piscivorous Mammals
- Omnivorous/Carnivorous (plant and animal/animal-eating) Mammals
- Threatened & Endangered Species

These groups of animals are all important components of the Housatonic River ecosystem. For each of these groups, concentrations of PCBs in the environment that each group comes into contact with (generally water, sediment, soil, and food) were compared to data on the toxicity of PCBs for the species in question. In addition, site-specific field surveys and toxicity studies using soil, sediment, water and animals from the site were conducted for many species by scientists from across the country.

The figure above provides one way of visualizing the extent of risks to these ecological receptors from PCBs in the river and floodplain. In this presentation, hazard quotients (HQs) were calculated for the various representative species by dividing their range of individual PCB exposure concentrations by a concentration corresponding to low or no effects. An HQ exceeding 1.0 indicates that the species is at risk, with the magnitude of the risk generally proportional to the magnitude of the HQ.

As shown in the figure, many of the species have HQs exceeding 1.0, and in some cases the HQs exceed 10 or even 100, indicating that the PCB concentrations in the river and/or floodplain are 10 or as much as 100 times greater than a concentration considered to not pose risk to that species.

In addition, the site-specific field and toxicity studies evaluated adverse effects to benthic invertebrates, frogs, fish, tree swallows, robins, belted kingfisher, mink, and short-tail shrews. In these studies, the effects from exposure to PCBs through water, soil, sediment or diet from the Housatonic River were evaluated in the river or floodplain directly, and/or in the laboratory. In these site-specific studies, with the exception of the bird species, survival or reproductive or developmental impairments attributable to the PCBs were measured and are described in detail in each of the scientists' reports as well as summarized in the ERA. The vast majority of the effects have also been documented in other studies of PCBs or related chemicals. Some of the effects that were observed included:

- Benthic invertebrate mortality (death) and impaired development;
- Reduced survival of larval fish, and various deformities including swim bladders that were malformed or formed outside of the body cavity;
- Frogs with abnormal egg masses, malformations, impacts to metamorphosis (development from tadpoles to frogs), and sex changes;
- Mortality in 50% of mink young within six weeks of birth from mothers that were fed a diet containing very low concentrations of PCBs in fish harvested from the Housatonic River. Jaw lesions were observed in the developing young that did survive, which results

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in eventual loss of teeth, leading to anorexia and finally death.

- While not measured directly, there is expected impairment of reproduction in osprey and bald eagles.

The findings of the Risk Characterization demonstrated conclusively that the many species of aquatic life and wildlife in the Housatonic River ecosystem are experiencing intermediate to high risk as a result of exposure to PCBs in both the river and floodplain. In addition, these results also demonstrated that similar risks extend to species beyond those specifically evaluated.

RISKS ARE PRESENTED AS NUMBERS

Cancer Risk is the increased probability, or chance, of getting cancer as a result of exposure to chemicals at a site. In the reports for this site, a 1 in 1,000,000 chance is written as 1E-06.

Noncancer Risk is a comparison of an allowable exposure to the amount of exposure estimated at a site. The comparison is called the Hazard Index (HI).

$$HI = \frac{\text{site exposure}}{\text{allowable exposure}}$$

An HI greater than 1 indicates that the site exposure exceeds the allowable exposure.

Acceptable Risks for cancer are considered by EPA to be less than 1 in 1,000,000. Between a 1 in 1,000,000 and a 1 in 10,000 chance, EPA looks at the site-specific factors affecting risk and the uncertainties with the estimate. For noncancer health effects, an HI less than 1 means people are unlikely to be harmed.

PCBs in the Housatonic River and Floodplain

- The Housatonic River and its floodplain are heavily contaminated with PCBs originating from the GE Facility in Pittsfield, MA.
- Most of the PCB contamination is found between the confluence of the East and West branches in Pittsfield and Woods Pond Dam in Lenox and further into Rising Pond in Great Barrington, MA; however, the contamination has also spread downstream from Pittsfield into Connecticut, a distance of approximately 140 miles.
- The PCBs found at this site are persistent in the environment and resistant to biodegradation; as a result, the concentrations of PCBs in river sediment, floodplain soil, and fish show little decrease over time.
- Fish, other aquatic animals, and wildlife in the river and floodplain contain concentrations of PCBs that are among the highest ever measured.
- Natural recovery from this contamination in the absence of cleanup in the river and floodplain is a very slow process that will take decades if not hundreds of years before PCB concentrations in fish decrease to a level that will permit unlimited consumption.
- Clean up of contaminated sediment, bank and floodplain soil in the first two miles of the East Branch of the Housatonic River downstream from the GE facility was performed by GE and EPA from 1999 to 2007.

For more information :

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More Information:

Berkshire Athenaeum Public Library
Reference Department
Pittsfield, MA 01201
(413) 499-9480

Cornwall Public Library
Cornwall, CT 06796
(860) 672-6874

Kent Memorial Library
(Kent Library Association)
Kent, CT 06757
(860) 927-3761

Housatonic Valley Association
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