



Mercury from Coal



Effects on Alaska

Alaska produces relatively little mercury, but a significant amount arrives from outside, reaching the state via atmospheric transport.

EFFECTS OF MERCURY EXPOSURE

Exposure to mercury can have a variety of effects on animals and people. Exposure to mercury in food can lead to reduced immune function, weight loss, and reduced reproduction rate. Well-documented effects on human health also include mental defects and other neurological problems. Fetal exposure presents the greatest risk because mercury particularly targets developing nerve cells.

HUMAN-PRODUCED MERCURY

Human-produced (anthropogenic) mercury is emitted into the air from coal combustion, incinerators, industrial boilers and gold mining operations. This anthropogenic mercury represents 70% of the mercury added to the global atmosphere in the past 100 years. Coal combustion is the single highest contributor in the US, responsible for almost 50% of atmospheric mercury emissions. 75 tons of mercury are present in the coal used by US coal-fired power plants every year. More than 50 tons of this are released into the atmosphere. Mercury in the gaseous form is transported to Alaska year-round from all over the Northern Hemisphere. This mercury, along with that produced by coal combustion in the state, accumulates over the pole in winter and falls to earth in spring.

MERCURY IN THE FOOD CHAIN

At snowmelt, mercury sitting on snow and ice drains into watersheds, rivers, and lakes and settles into sediment. At this point it is brought into contact with bacteria who can convert elemental mercury into methylmercury.

Methylmercury is readily taken up by plants and animals

where it can subsequently reveal its toxic effects. An older animal will accumulate more mercury over its lifetime than a younger animal - this is called bioaccumulation. Also, animals that eat higher on the food chain accumulate more mercury. Because many food chains are long, marine mammals, predatory fish, and scavengers acquire more mercury than herbivores like caribou and moose.

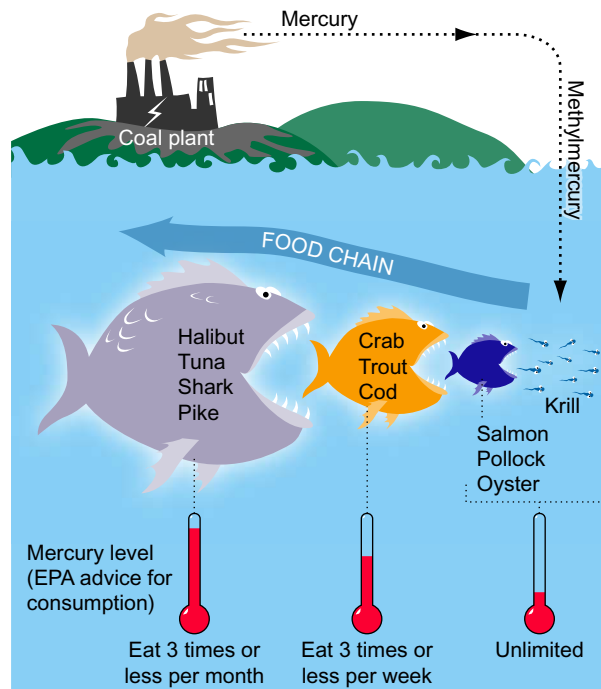


Figure 1. Mercury emitted from power plants ends up in the food chain, and gets most concentrated in large, old fish at the top of the food chain. The EPA recommends that children and pregnant women limit how much of certain fish they consume because of how much mercury they contain. Other adults are considered much less at risk, and should limit their fish consumption to five times the limit for children and pregnant women. Fish from highly industrialized coasts like the Gulf of Mexico have much more mercury than those from Alaska, but mercury levels in Alaska fish are problematically high in some species, such as large halibut and pike.

MERCURY IN FISH

Alaska issued a state fish consumption advisory based on mercury contamination for the first time in 2007. So far, only a few fish (such as large halibut) have been listed. However, there are suggestions that some freshwater fish in specific river systems should have advisories. For example, a study of pike in the Yukon found an average mercury concentration of 1500 nanograms(ng)/g. Similarly,

over half the pike in a survey of Nowitna National Wildlife Refuge contained 1000-2900 ng/g. These exceed both the FDA and State of Alaska recommended maximum of 1000 ng/g and the EPA recommended maximum of 300 ng/g.

While recreational or commercial fishermen can avoid mercury contaminated areas and species, subsistence users are limited to resources in their immediate area, therefore they are more at risk of mercury contamination.

MERCURY AND MARKETS

Even the image of potential contamination can disrupt seafood markets. The market for Alaskan salmon decreased sharply when the Exxon Valdez Oil Spill occurred, resulting in wholesalers and retailers turning to farmed fish. This event permanently changed the market share for all commercially-caught Alaska salmon. Mercury contamination is already a major concern of consumers seeking the health benefits of fish, and major Alaskan exports such as pollock and salmon currently have some of the lowest mercury levels of any commonly-eaten fish. Increasing mercury pollution in the state could damage these lucrative markets.

SUMMARY

Future coal mines in Alaska depend on exporting coal to Asia for combustion that will release mercury into the atmosphere. Over half of all atmospheric mercury in the world, and about 20% of the mercury in Alaska, is attributed to Asian coal plants and industry. The remaining coal would be burned in the state and also contribute to local mercury emissions.

The atmospheric mercury released by the combustion of coal directly impacts Alaska. Alaska has already issued its first fish advisories for marine fish, and should consider issuing site-specific advisories for freshwater fish. To date, marketing of wild Alaska fish has resulted in a lucrative market for commercially-caught fish, and marketing the pristine nature of Alaska has brought in millions of dollars from tourists and recreational fishermen. Mercury contamination can directly impact subsistence users, and even the image of potential contamination can disrupt markets based on pristine ecosystems. The long term health of a variety of well-established industries needs to be weighed when considering the potential export of coal and the expansion of existing coal-based operations in Alaska.

This fact sheet was prepared in collaboration between the Center for Science in Public Participation, Ground Truth Trekking, and Cook Inletkeeper. Find this and other fact sheets at:

<http://www.groundtruthtrekking.org/factSheets/FactSheelIndex.html>

FURTHER READING

Alaskan Department of Health and Social Services. 2007. Fish Consumption Advice for Alaskans: A Risk Management Strategy to Optimize the Public's Health.

http://www.epi.hss.state.ak.us/bulletins/docs/rr2007_04.pdf

Environmental Protection Agency (EPA). 1997. Mercury Study Report to Congress.

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Electric Power Research Institute (EPRI). 2006. Sources of Mercury Depositing in the US: issue brief. September. <http://www.epri.com>

Jewett, SC and Duffy, LK. 2003. Mercury in fishes of Alaska, with emphasis on subsistence species. *Chemosphere* 50 (3): 383-392