

Yukon River Dumping More Mercury Thanks to Climate Change

New research shows that the [Yukon River](#) delivers more than five tons of mercury per year to the Arctic environment, likely thanks to climate change

By Douglas Fischer and Daily Climate | Tuesday, October 25, 2011 | 26 comments

The Yukon River is delivering upwards of five tons of mercury a year to the Arctic environment, likely in response to a warming climate, scientists from the U.S. Geological Survey announced Tuesday.

The river is pumping three to 32 times more mercury into the environment than similarly sized river basins, based on limited data. And while scientists don't know the reason for the Yukon's big mercury load, they say evidence points strongly to two suspects: Melting permafrost, and the Yukon basin's unique placement as a catchment for pollution from Asia and Europe.

"What has been happening in that part of the world for the past 30 years has been unprecedented in terms of environmental pollution," said Paul Schuster, a USGS hydrologist who was the lead author of the study, published in the journal *Environmental Science and Technology*.

"What we might be seeing is a combination of the release of (mercury) reserves from thawing permafrost and the more recent anthropogenic contamination."

Mercury is a potent neurotoxin and takes several different forms in the environment. Methylated mercury – the type most easily absorbed and therefore harmful to food webs and humans – was found in the Yukon River but at very low levels.

The vast bulk of the Yukon's mercury load – upwards of 90 percent of what scientists measured – consists of less bio-available "particulate mercury:" mercury bound to an organic compound like carbon. Such mercury isn't as readily available to organisms, but it is important nonetheless, Schuster cautioned.

"No. 1, it's a vector by which you move mercury into the environment," he said. "And No. 2, it's an eventual source of mercury for methylation."

Mercury comes from various sources but today is released into the environment in large quantities by the burning of fossil fuels, primarily coal. Coal plants in Asia are one of the largest sources, accounting for 860 metric tons, according to the United Nations Environmental Program. Cement production, waste disposal and metal foundries are also major sources. The amount of mercury being ferried annually by the Yukon is one-twentieth the annual emissions from U.S. coal plants and roughly equal to emissions from U.S. iron and steel production, according to the UN.

The source of the Yukon's mercury puzzles scientists. Permafrost in the Yukon basin has been absorbing naturally occurring mercury – chiefly from volcanoes – since the end of the last ice age 10,000 years ago. Now those soils, as a result of changing climate conditions, are thawing at increased rates. That could be releasing a substantial reservoir of the metal into the marshes and streams feeding the Yukon River, the world's 19th largest river.

More recently, industrial pollution has coated the basin. Prevailing winds from Europe and Asia funnel industrial pollution, including mercury, directly to interior Alaska and the Yukon River drainage, Schuster said.

"If we had funding, we could prove this. We could determine whether this comes from coal or volcanoes. But that's very expensive," he said.

Much of what is known about mercury transport in rivers comes from studies of small streams and lakes. Data exist only on eight major river basins, Schuster said, and this was the first to look at total mercury load.

"What we can say, is that of those eight basins, the Yukon seems to be pumping out a lot more mercury," he said. "That's where we basically have to stop."

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