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The CENTER for SCIENCE in PUBLIC PARTICIPATION

"Technical Support for Grassroots Public Interest Groups"

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MERCURY AIR EMISSIONS FROM MINES



Exploration at the Donlin Creek mine, on the Kuskokwim River, near Crooked Creek, Alaska. Because of thermal processing of the ore the mine could emit more mercury than all of the present sources in the state.

Quicksilver

Mercury, although a naturally occurring element, is not content to remain a stable citizen of rocks and earth. It is a restless traveler moving freely between solid, liquid and gas forms – earning it the ancient name of "Quicksilver". On hot days it can vaporize out of rocks into the air, then drop back to earth with rain, snow, and fog. It comes north to the Arctic from lower latitudes through this process of vaporization and deposition. It moves east from Asia into Alaska on wind currents. Old mercury mines (Red Devil, Sleetmute, Salt Chuck, and others) have left legacy mercury in sediments. And now a proposed gold mine will be the first in Alaska to process ore in a manner that releases mercury.

Once mercury enters soil, bacteria can turn it into methylmercury, which can bioaccumulate in a single animal and biomagnify in the food chain.

Methylating bacteria prefer environments such as wetlands, coastal estuaries, and forests – which Alaska has in abundance. The National Park Service found low concentrations of mercury in snow and vegetation in Alaska parks, but relatively high concentrations of mercury in fish. In part this was due to the age of the fish sampled, but additionally they hypothesized that there was not a direct correlation between the mercury in sediment, soil, and vegetation and fish mercury, but rather that the ability of the local environment to methylate the mercury contributed to the concentrations.

Regulating Gold Mine Mercury

Mercury has long been recognized as hazardous. It can cause madness if inhaled and impacts the nervous system and childhood learning when a small child or pregnant woman regularly ingests mercury-contaminated food (usually fish). Only one year after

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the Clean Air Act was passed in 1970, mercury was added to the list of hazardous pollutants. Yet it was not until 1998 when mining companies began reporting to the Toxic Release Inventory (TRI) that people realized gold mining might be a significant source of mercury emissions to air. Gold mines produce "byproduct mercury" when gold is located in host rock naturally high in mercury, and the mercury is released during processing.

Based on the TRI reports, Nevada – one of the largest gold-producing regions in the world – began the "Voluntary Mercury Reduction Program" (VMRP) in 2001. Four mining facilities (Barrick Goldstrike, Placer Dome Cortez Hills – now owned by Barrick, Queenstake Jerritt Canyon, and Newmont Twin Creeks) agreed to participate in this initiative to reduce mercury air emissions from gold mines by 50% in three years.

The VMRP showed some success – the Cortez mine reduced emissions by 58% and Goldstrike, while it actually increased emissions as reported to TRI, made significant progress in installing and testing mercury control equipment. However, there were also problems. What was reported to the TRI was not always consistent with what was reported to the VMRP, and actual measurements of mercury emissions at specific equipment was spotty – with some annual estimates based on actual measurements that were more than 2 years old.

In 2006, Nevada became the first, and only, state to regulate mercury emissions from gold mines. It was only after this that the EPA found the Jerritt Canyon operation circumvented emission controls to achieve "apparent" emission reduction from 7980 lbs per year (2001) to 293 lbs per year (reported in

2006); 1966 lbs was actually measured in 2007.

After years of lawsuits by public interest groups, the EPA is in the process of issuing federal regulations that would apply to all gold mining operations nationwide.

Donlin Mine

The proposed Donlin mine, a 50/50 partnership between Barrick Gold and NovaGold, is located in South-west Alaska on the Kuskokwim River, an area where villages are heavily dependent on subsistence fishing. The Kuskokwim area has naturally high mercury in the rocks, and was mined for mercury from the 1930's until 1971. According to hair-sampling information from the Alaska Department of Health and Human Services, the only women with elevated (greater than 5 ppm) mercury have all been from the Yukon-Kuskokwim region, indicating that the population is already at some risk, and additional release of mercury should be tightly controlled.

The mine and road property is owned by the Calista Regional Corporation and the Kuskokwim Corporation, and both are receiving royalties. Donlin LLC has also performed extensive outreach and hired local people from throughout the region during exploration. Therefore the mine already has provided, and is likely to continue to provide, financial benefit in this economically depressed region.

Barrick's experience in designing, installing, and operating mercury capture equipment in Nevada will be particularly important. However, there are differences between Barrick's Goldstrike mine and the Donlin mine. Donlin is expected to process nearly twice as much ore per year as Goldstrike (22 million tons per year versus 12 million tons). Donlin lies directly on a creek that feeds into the Kuskokwim River, while Goldstrike is not located near surface water. There is no infrastructure (power, roads) to support a mining operation in Donlin. And transporting mercury out of the region to commercial buyers will be expensive.

Based on expected annual throughput and reported concentrations of mercury in ore, approximately 30-60 tons of mercury could be released annually during processing. Potential issues include:

- Worker health – mercury may be found in some process fluids
- Efficiency of capture equipment to keep mercury from being released to air
- Protective storage of liquid mercury. Mercury captured from operations will come out in liquid form

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and will need to be stored on site until it can be transported out.

- Safe transport. The Kuskokwim River is only ice-free for about 3 months out of the year. During this period, local people conduct subsistence and commercial fishing. Donlin will need to bring barges of goods in and transport ore out. Mercury will have to be moved out by either barge or airplane, and it is critical that there be no release of mercury from barge transport.
- Sale and repository. Nevada mines sell mercury to three commercial buyers, located in Pennsylvania, Illinois, and Minnesota. Gold production (and byproduct mercury capture) is increasing in Nevada, and production at Donlin is expected to significantly increase the byproduct mercury on the market. It is not clear whether there is enough of a market to absorb all the byproduct mercury. There is a ban on exporting mercury, and there is currently no civilian repository for waste mercury. The only repository under consideration is a military facility for military mercury at Hawthorne, NV.

CSP2's involvement

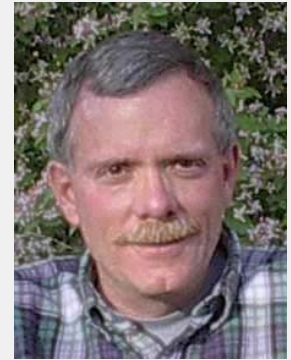
CSP2 presented information to the Alaska Village Council President's in Bethel in 2008 and 2009 and met with the Alaska Inter-tribal Council in Anchorage to discuss risks and possible options related to Donlin. CSP2 has also been active in the Donlin Working Group, a coalition of citizens and tribes that formed to determine what expertise might be available for addressing an EIS, if Donlin should reach that stage.

The State of Alaska, with other agency and non-agency partners, has formed the "Alaska Contaminants Monitoring Strategy Group" (ACMS), which is developing a strategy for monitoring mercury. Recently DNR has joined in order to better understand regulations and risk associated with Donlin. CSP2 has been active in the ACMS for over a year, contributing information on both the bacterial/environmental processes associated with methylation and information on mercury emissions from gold mining.

Upcoming federal mercury regulations, the potential development of Alaska's first gold mine in a mercury belt, and ACMS "Quicksilver Summit" are all expected to occur within the upcoming year.

FROM THE EXECUTIVE DIRECTOR

CSP2 has been supporting a joint effort by a number of NGOs to comment on Draft Mercury Air Emission regulations for gold mines, being issued by the EPA under a court order.



*Dave Chambers is the Executive Director of **CSP2***

Although the Obama administration is far more receptive to reasonable regulatory reform than the Bush administration, this has not meant that EPA has been moving swiftly to revise obvious regulatory deficiencies. We can see this: (1) in the Gulf oil spill; (2) in little movement on reversing the potentially disastrous Bush-era rule that allows lakes and streams to be used for mine waste disposal (see last summer's issue on the Kensington decision); (3) in the continuing controversy over mountain top removal in Appalachia; and, (4) in the need for a court order to force EPA move forward on regulating mercury air emissions from mines, which has been obvious for a decade.

EPA has been meeting with technical experts from the mining industry and the Nevada Department of Environmental Protection, the agency that regulates mining in Nevada, since at least March, 2009. NGO technical experts had their first meeting the EPA in May, 2010. EPA is under court order to publish a final rule on by December, 2010, and will not be revisited for at least 8 years.

Contrary to tea party rhetoric, federal regulatory agencies, including the EPA, move slowly and carefully before establishing new regulations—which can be very frustrating to those who are suffering damage from “environmental externalities.”

We hope, and have made a number of clear suggestions, that the new regulations will lead to significant reductions in mercury air emissions from gold, and other, mines that can emit mercury. What we expect to see is a set of regulations that, while requiring mercury abatement, will stick close to the status quo in terms of monitoring and collection technologies—which will mean ongoing diligence from NGOs to determine whether the public is being protected. After all, it was NGOs that pointed out this problem to begin with. And so it goes.



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