

Important Questions to Keep in Mind Regarding Mercury and the Donlin Creek Project

Given the occurrence of mercury in the ore body at the Donlin Creek site, and the fact that there are not yet regulations addressing fugitive emissions or monitoring, there are some important issues to keep in mind when looking at the Donlin Creek Project, including:

- (1) How effective will the control technologies to be used at Donlin be at capturing mercury from every point source?
- (2) How will the mercury emissions from both point and fugitive sources be monitored, including after mine closure?
- (3) While the Donlin Creek LLC has said that it will use emission control technologies to reduce emissions from point sources, how will the company reduce emissions from fugitive sources, both during operations and after closure?
- (4) For the mercury that is captured from point sources, where and how will that mercury be stored on the site, how will it be transferred off of the site, and where will it be stored permanently? It is important that any captured mercury be stored and transported safely and securely, to reduce any potential impacts and harm.
- (5) How will workers be protected from mercury exposure at the mine?
- (6) How will subsistence resources be monitored for impacts from mercury emissions and what protections and controls will be put in place if there is an impact? ☺

References: Anna Breithaupt, Alaskans for Responsible Mining (ARM), A Case for the Development of Mercury Regulations for Alaska's Existing and Proposed Gold Mines (February 2009); Center for Science in Public Participation, Ground Truth Trekking and Cook Inletkeeper, Mercury from Coal: Effects on Alaska, available at: <http://www.groundtruthtrekking.org/factSheets/MercuryFactSheet.pdf>; Donlin Creek LLC, <http://www.donlincreek.com/> (last visited April 12, 2010); Kirk Hanson P.E. et al., NovaGold Resources, Inc., Donlin Creek Gold Project, Alaska, USA, NI 43-101 Technical Report (April 1, 2009); US Environmental Protection Agency. Process descriptions and material flows for gold ore processing facilities, draft, REPA2-0920-002 (2001).

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With Special Thanks to
Hig at Ground Truth Trekking.

Mercury, the Donlin Creek Mine Project and What it Means for the Kuskokwim River

Mercury—What It Is and Where It Comes From



Mercury (Hg) is a naturally occurring metal, often found in a rock called “cinnabar” that is a mix of mercury and sulfide. This is the rock that was mined along the Kuskokwim for mercury, and is in waste material at old mines.

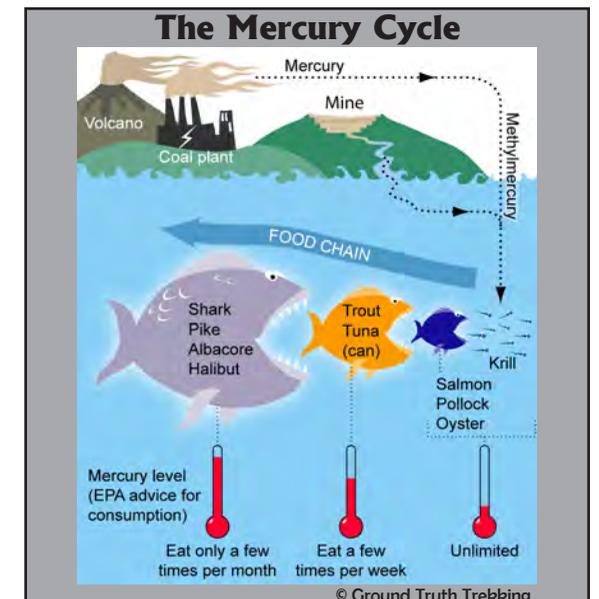
There are no longer mercury mines anywhere in the United States, including Alaska.

Mercury is sometimes found with gold deposits. Although mercury is not attached to the gold, processing the gold can release it; this “by-product” mercury from these areas is sold to commercial companies. Current uses of the metal include munitions manufacturing, antimicrobial agents, fluorescent lights, and electrical industries.

Mercury is released into the environment by both natural and human processes. Natural sources of mercury pollution include volcanic and oceanic emissions, wildfires, and erosion of rocks and soils containing mercury. Human sources of mercury pollution include coal-fired power plants, industrial processes, gold mines, and solid waste and biomass burning. ☺

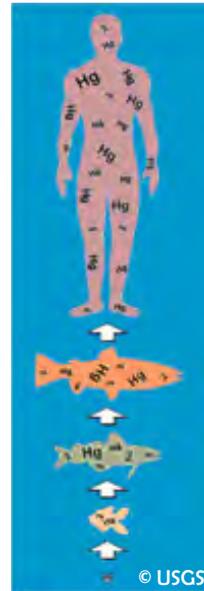
Mercury in the Environment

We know mercury as the shiny silver metal in thermometers. This is one form of “elemental” mercury. When mercury is released into the air from either human or natural sources, it can take three more forms: (1) the mercury can attach to a particle—particulate mercury, (2) it can be reactive and attach to other molecules in the air—reactive mercury, or (3) it can change to a gas—gaseous elemental mercury. Gaseous elemental mercury will stay in the air longest and travel greater distances before falling to the Earth; reactive mercury and particle mercury will often be deposited on the earth closer to the source. Mercury emissions from gold mines can be in all three forms, meaning that the mercury emitted from gold mines can have both ...cont'd next page



...cont'd from front page local and broader impacts. Mercury in the air will eventually fall back down to Earth, depositing either on land or in the water. It can then be absorbed by bacteria, which convert it into methylmercury, a form of mercury that is easily absorbed by fish, plants, animals, and people.

Methylmercury that is absorbed in fish and animals can build up in older and larger animals in a process called **bioaccumulation**. Mercury can also become concentrated up the food chain when larger predators eat small fish or vegetation that contains mercury; this process is called **biomagnification**. It is very difficult to predict how mercury will move through the environment and where the greatest concentrations will occur. However, studies have shown that big plant-eating animals like moose and some whales do not have high mercury levels while some fish do. This is because animals that eat plants have only two steps in the food chain (soil to plant, plant to moose) while there are many steps in the aquatic food chains. ☼



The Health Affects of Mercury Exposure



Mercury exposure can occur in various ways—mine workers are usually exposed through inhalation or absorption through the skin, while people who do not work at mines are commonly exposed through fish and marine mammal consumption.

Mercury exposure can cause adverse health impacts to people of all ages, but children and fetuses are particularly susceptible because mercury targets developing nerve cells. Mercury exposure can impair neurological, cardiac and kidney functioning, and cause damage to the lungs and pulmonary system and the immune system. Impacts specific to children include impaired memory and motor skills, language and attention deficits (which can result in learning disabilities), and high blood pressure. ☼

IMAGE © http://en.wikipedia.org/wiki/Minamata_disease

Mercury and the Kuskokwim River

Historically, mercury mining occurred within the Kuskokwim River watershed. Because of the time period when these old mercury mines were operating, there were no restrictions on how they handled their waste products, and thus, significant amounts of mercury were introduced into the Kuskokwim River watershed and ecosystems. Mercury continues to be released from some old sites as a result of erosion of rocks and soils containing mercury.

Because of past mercury emissions, pike in the Kuskokwim River have been found to contain high levels of mercury, making them unsafe to eat. And studies of mercury accumulation in women across Alaska indicate that people living in the Kuskokwim River watershed have elevated levels of mercury in their bodies. Thus, the Kuskokwim River, some fish, and the people living and relying on the river have already been impacted by mercury emissions from mining. ☼



IMAGE © http://aquanauts_dc.homestead.com/files/northern_pike1.jpg

Mercury and the Donlin Creek Project

The Donlin Creek Project is located in the “mercury belt” of Alaska, a geologic zone of Alaska where mercury is found in many rock formations. As a result, mining and milling activities at the Donlin Creek Project will produce both point source and fugitive source mercury emissions. In fact, calculations based on information provided by Donlin Creek LLC predict that the mine could release 21-42 tons of mercury per year without mercury controls in place. Even if the company used the technology to capture 98% of the mercury emissions, 850 - 1700 pounds of mercury could be emitted every year from processing.

Where would this mercury go?

- When gold is heated during processing, mercury vaporizes. The Donlin Creek Project will likely include two autoclaves that use heat.
- Cyanide extraction will remove some mercury, which is likely to go to the tailings pond where mill waste is sent.
- “Carbon stripping” and “electrowinning” are final steps in gold processing that also release mercury as a gas.

Any mercury recovered from these processes because of emission control devices would be in a liquid form and would have to be stored on-site and later shipped to another facility. Unrecovered mercury would be released into the atmosphere or end up in the tailings pond, where it can vaporize and has the potential to leak.

The 21-42 tons of mercury are based on the amount of rock that would be processed through the mill. In addition, rock that does not contain high enough levels of gold will be placed in waste rock piles, where rocks containing mercury will be susceptible to erosion, releasing mercury into the environment. ☼

Regulating Mercury Emissions

Under the federal Clean Air Act, mercury is considered a hazardous air pollutant, meaning that the federal Environmental Protection Agency (EPA) found that it has the potential to harm humans and the environment. Mercury emissions from coal-fired power plants and electric steam generating plants have been regulated by the EPA for years, and in December, 2010, the agency started regulating mercury emissions from mines. Although the rule is strong, it will only address the mercury emissions from smoke stacks or other vents at mines, or “point sources.” The regulations will not cover emissions or require monitoring of emissions from other sources at gold mines, including the tailings ponds and waste rock piles, or so-called “fugitive emission sources.” Although the EPA rule is a step in the right direction, fugitive sources at Donlin could account for as much as 20 times times more mercury pollution than do the point sources, leaving the majority of the problem yet to be dealt with. ☼

