# TOXIC TRADE: The Coal-to-Mercury Cycle between Alaska and Asia

Imported coal is burned to produce electricity, which releases pollution into the air.

#### **Coal in Alaska**

Alaska has large coal reserves, but coal strip mines destroy importan fish and game habitat.

Alaska has roughly half of the total coal in the US, and with high energy prices and demand from Asian markets, there is a push to develop coal resources for export. However, coal strip mining is a inherently destructive land use that will destroy wildlife habitat, cause water pollution and negatively impact commercial, subsistence, and sport hunting and fishing economies.<sup>1</sup>

The Usibelli coal mine is the only mine currently operating in the state. It supplies coal to six coal-fired power plants in Alaska and exports coal to Korea and Chile. Several coal mines are currently being proposed such as the Chuitna Strip Mine, located on the west side of Cook Inlet, which would destroy up to 30 square miles of fish and game habitat in an area vital to the subsistence lifestyles of the that increasingly affects the state of Alaska. Tyonek and Beluga communities.<sup>2</sup>



#### Coal Powers Asia

China opened one coal-fired power plant each week in 2008.

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In 2008, China surpassed the U.S. as the world's largest emitter of greenhouse gases largely due to the combustion of coal. The dirty black rock is burned everywhere, from industrial boilers to home stoves.<sup>3</sup> But the Chinese

reliance on coal is most visible in the air. Smog cloaks cities, making them of coal, forms what is called a brown cloud, visible from space, that takes that builds up in fish, shellfish, and animals that eat fish in a process called practically invisible from the sky. Much of China's air pollution is from coal-"bioaccumulation."<sup>8</sup> It is through this process that nearly all human exposure about a week to cross the Pacific Ocean to the western U.S. - including fired power plants, producing about 75 percent of its electricity.<sup>4</sup> Alaska - where it accounts for as much as 15 percent of total air pollution.<sup>6</sup> to methylmercury in the U.S. occurs through eating fish and shellfish.<sup>9</sup>

Of major concern is that coal combustion releases mercury into the China consumes 2.5 billion tons of coal a year— more than double that of In 2007, the state determined that certain fish contained mercury levels that met or exceeded limits for unlimited consumption and issued state the U.S.—and imports are rising. On average, in 2008 China opened one atmosphere and this dangerous neurotoxin is one of the pollutants carried to Alaska by the brown cloud. At least 20% of the mercury in the coal-fired plant every week to serve its 1.3 billion people and the industries fish consumption advisories.<sup>10</sup> Health risks of exposure at high levels include harm to the developing nervous system of unborn babies and that manufacture cheap goods, largely for the U.S. and Europe.5 And now state is attributed to Asian coal plants and industry, and it is deposited Prepared for Cook Inletkeeper by Damion Design. Copyright 2009, All Rights Reserved. onto coastal waters and inland where it ends up in the local food chain, China's air pollution goes far beyond its cities; it is a global problem, one young children.<sup>11</sup> Mercury "exported" to Alaska from China therefore has 1.2.13 The True Cost of Coal K. Zamzow, Ph.D. Center for Science in Public Participation, Anchorage, Alaska, 3.5. Clean Cities and Dirty Coal Power---China's Energy Paradox, David Biello, Scientific America threatening the health of the state's wildlife, ecosystems, and human serious consequences for the health of the state's marine ecosystems, December, 2008. 4, 6. Can Coal and Clean Air Coexist in China?, David Biello, Scientific America, August 4, 2008. 7, 12. Coal and Mercury, K. Zamzow, Ph.D., Center for Science in Public Participation, Anchorage, Alaska. 8, 11. www.epa.gov/hg/about.htm 9. epa.gov/hg/exposure.htm#1 10. Fact Sheet: Fish consumption guidelines for Alaskans, http://hss.alaska.gov/press/2007/pr101507fish-consumption.htm. fishing economy, subsistence lifestyles, and human communities. communities.<sup>7</sup> Background map and brown cloud are used for illustration purposes only; the brown cloud illustration is based roughly on imagery showing transboundary pollution from China in May, 2003

### The Brown Cloud: Mercury emissions

from coal burned in China are carried across the Pacific Ocean.

BROM

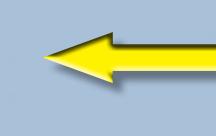
The best way to approach a solution to global transboundary air pollution would be to zero in on regulating mercury, a pollutant most everyone agrees is a hazard to human and environmental health.

> - Klaus Toepfer, Executive Director U.N. Environment Program

**NORGANIC MERCL** 

Watershed → Stream

Alaska coal is exported to China for combustion.



#### The Brown Cloud

The brown cloud can cross the Pacific Ocean in a week.

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n 2008, Asia (China, Korea, Japan) became the largest source of manmade atmospheric emissions on the planet, contributing over 50% of the total. Part of this pollution, caused largely by the increasing combustion

#### Mercury in Alaska's Fish

Alaska issued its first fish consumption advisories in 2007.

In Alaska, mercury transported by the brown cloud eventually deposits in early spring and drains into rivers and lakes during snowmelt. It settles into sediment where microorganisms change it into methylmercury, a highly toxic form

#### Mercury contamination in Alaska fish required Governor Palin to issue fish consumption advisories in 2007.

Sediment → Bacteria → Methylmercury

Conversion to Organic Mercury

Humans and other animals that eat larger, older fish are

OMAGNIFICATION Mercury levels increase as it moves up the food chain

IOACCUMULATION Mercury enters the food chair

in Alaska.

# Coal is strip mined

Elevated mercury levels threaten Alaska's:

### A Dangerous Cycle

The harmful effects of the coal-to-mercury cycle must be considered in all decisions surrounding Alaska coal exports to Asian countries.

The cycle shown here reveals a scenario where the mining and export of Alaska coal contributes to mercury contamination of the state's land, water, and fish. Fish are uniquely susceptible to coal development, not only from the direct habitat and water quality impacts from coal strip mining, but also from the bioaccumulation of methylmercury that is traced to humancaused mercury in the atmosphere, half of which comes from Asian coal combustion and industry.<sup>12</sup> This mercury, deposited by a persistent brown cloud from Asia, threatens the marketability of 'Wild Alaskan Seafood,' as well as the health of Alaskans who consume these fish.<sup>13</sup> There is a push to develop Alaska's coal to profit from China's exploding demand for energy, but this market, and its dangerous mercury cycle, would put the long-term health of Alaska's ecosystems and communities at risk.

# COAL TO ASIA MEANS MERCURY IN ALASKA'S FISH