

TAR SANDS OIL:

Toxic and Corrosive, Hazardous to Workers, Emergency Responders and the Environment

Tar sands present health and environmental hazards at all stages, from mining through burning it as fuel. After mining, heavy, viscous oil called bitumen, must be extracted, processed and then diluted for transport.

Mining and processing have left the air and water around the tar sands mines and processing facilities in Canada contaminated with highly toxic chemicals, and increased local



Tar sands extraction in Canada.

levels of leukemia and other cancers. The U.S. imports around half a million barrels of diluted bitumen, or “dilbit,” per day from Canada’s tar sands, and that amount could increase. As dilbit enters the U.S. by rail and pipeline, it is important

to recognize its potential hazards to those who live nearby, work with it or respond to spills and derailments, as well as to the environment.

Dilbit contains higher concentrations of many **toxic** compounds than other crude oil, including:

- **Benzene**, used to dilute bitumen, can cause leukemia and other cancers.
- **Toluene**, also in the diluents (diluting agents), can damage the liver and kidneys, central nervous system, eyes and skin. Other hydrocarbons in the diluent affect mainly the lungs.
- **Sulfur**, which is emitted as sulfur dioxide when heated, is associated with reduced lung function, respiratory illness, and deterioration of the lung’s defense systems, as well as aggravation of existing heart disease.
- **Sulfur and nitrous oxides** emitted from refining contribute to smog and acid rain.
- **Heavy metals**, including copper, nickel, lead mercury, arsenic, chromium and others, associated with many short- and long-term health effects, including respiratory and heart problems, and cancer.

Transport by Pipeline and Rail: Spills, Leaks and Derailments

The transport of diluted bitumen can involve a multistage process: loading and unloading rail cars, pumping into and out of pipelines or loading and unloading barges. At each stage, dilbit must be heated and pumped at high pressure. In addition, it is more **corrosive** than other crude, partly because of its higher acidity.

These properties increase the likelihood and hazard potential of leaks and spills during all phases of transport, as well as refining. High pressure makes leaks more hazardous to emergency responders. In one case, the failure of a ¾-inch fitting resulted in a 60-foot geyser that spewed over 21,000 gallons of oil in a matter of minutes. Oil leak detection systems on pipelines miss 19 out of 20 spills, making large spills more likely. At any leak or spill site, the lighter (benzene containing) diluents evaporate quickly, becoming airborne, and putting workers and neighbors at particular risk.

Though its temperature will drop somewhat en route, dilbit is still warmer than other crude. For example, TransCanada's first Keystone pipeline was permitted to operate at 158°F, and is expected to operate at between 130°F and 150°F. A study of high temperature pipelines in California showed that pipelines operating above 129°F have nearly ten times the external corrosion failure rate when compared to ambient temperature pipelines. TransCanada's first pipeline spilled a dozen times in less than a year of operation.

Environmental and health problems result from spills and derailments into water. Heavy dilbit sinks to the bottom and is nearly impossible to clean up. A pipeline rupture in Michigan in 2010 spilled over a million gallons into the Kalamazoo River, leading to the most expensive oil pipeline cleanup in U.S. history. As of 2013, more than \$1 billion had been spent, but nearly 40 miles of the river were still contaminated. After that spill, the Michigan Department of Public Health determined that 320 people suffered adverse health effects, including cardiovascular, dermal, gastrointestinal, neurological, ocular, renal, and respiratory impacts. Whatever health effects are felt in surrounding communities are likely to be higher for workers and emergency responders, who suffer higher exposures to the same chemicals.

Refining

Refining tar sands crude requires greater use of heaters, boilers, hydro-treating, and cracking than lighter oil, all of which increase the likelihood of emissions of the same toxic pollutants mentioned above.

Corrosive ingredients of tar sands crude and the high temperatures commonly reached during refining can lead to leaks of toxic components and accidents, endangering workers: a serious concern given the advanced age and poor maintenance record of many U.S. refineries. In addition, foul smelling and highly volatile sulfur compounds, called mercaptans, may be released. They have been linked to central nervous system problems and can irritate the eyes, skin, and upper respiratory system.

At this time there are no refineries in NJ for tar



2013 Exxon tar sands spill, Mayflower, AR.

sands oil, but this may change, as oil companies and environmental groups continue to spar. Texas-based Buckeye Partners already has permits from the New Jersey Department of Environmental Protection to ship tar sands oil by rail from Albany to its storage and distribution terminal in Perth Amboy, and plans to pipe it from there to its Linden Hub for distribution to other states, and to the BORCO refinery in the Bahamas. Possibly in the future, refining will be done in Linden.

The Oil and the Coal within the Oil: Disaster for the Environment

Many environmentalists believe that tar sands oil will be disastrous for climate change in the long term. The production of the oil, including mining, processing to bitumen, and refining, emits three times the emissions of global warming gases as conventional oil production.

Often left out of environmental comments is the "coal within the oil," petroleum coke, or pet coke, a product of refining. Refiners sometimes use it as a fuel for their boilers, but more often sell it for use as fuel in other industries, including coal-burning utilities. According to the Environmental Protection Agency, pet coke emissions from burning, and dust blowing off piles of it, contain a high level of very fine particles that can cause heart and lung problems.

Best Overview of Tar Sands Hazards

Natural Resources Defense Council, *Tar Sands Crude Oil: Health Effects of a Dirty and Destructive Fuel*, Issue Brief, February 2014, available at: www.nrdc.org/energy/files/tar-sands-health-effects-IB.pdf