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## **Diluted bitumen: a new oil spill hazard** ~ Patrick Brown

It's now two years after Enbridge's '6B' pipeline burst at Marshall, Michigan. The 30-inch pipeline was an integral part of a system that connected Hardisty, Alberta, to refineries at Sarnia, Toronto, Ottawa, Montreal, as well as Buffalo, New York.

The pipeline was built in 1969. On the day of the breach, July 25, 2010, it was carrying diluted bitumen, known as 'dilbit', from the Alberta tar sands. In fact, the accident at Marshall was the first known breach of a pipeline carrying this form of oil.

Enbridge were not to reveal this until late August, 2010, and this accounted for unprecedented delay and difficulty in the cleanup. For several weeks, the government agencies involved were under the impression that the pipeline contained 'normal' light crude.

Two years later, the 1,200,000-gallon spill is still being cleaned up; so far it has cost Enbridge \$765 million, eighteen times as much per litre as a light crude spill. And the longer term environmental damage and health effects have not been fully evaluated, let alone mitigated.

The most recent dilbit spill occurred on June 18, 2012, from Enbridge's Athabasca pipeline; it has been estimated at 230,000 litres.

Planned pipelines (Enbridge's Northern Gateway to Kitimat, Kinder Morgan's expansion of Trans Mountain to Burnaby, and TransCanada's Keystone XL to the US Gulf Coast) will be carrying dilbit from Alberta to offshore markets. And, of course, offshore tankers will be used. A dilbit spill in coastal waters from a tanker would be very difficult to handle.

### **What Is 'Dilbit'?**

The term is short for diluted bitumen. Bitumen is the form of oil that is extracted from Alberta's tar sands; it is described as having the consistency of peanut butter, and it must be diluted, usually with lighter crude oil or liquids derived from natural gas, before it can be pumped through a pipeline. The ratio is typically 70% bitumen and 30% 'diluent'. Even then, it may require increased pipeline pressures or heating to make pipeline transport possible.

This accounts for the 'twin pipeline' approach proposed,

for example, for the Northern Gateway pipeline between the tar sands and the port of Kitimat. One pipeline will carry imported diluent to the tar sands, where it will be mixed with bitumen; a second pipeline, of higher capacity, will carry the dilbit (bitumen plus diluent) back to Kitimat.

The chemical composition of the diluent has not officially been made public, and probably varies; however, it is thought to contain benzene (a known carcinogen), hydrogen sulphide (highly toxic) and naphtha. Enbridge's 'Material Safety Data Sheet' for the oil in Pipeline 6B warns of severe consequences from contact or ingestion, even central nervous system damage and death. However, it is described only as 'heavy crude', not as 'dilbit'.

A dilbit spill into a body of water results in separation of the bitumen and the diluent. The bitumen sinks to the bottom, where it has severe effects on animal and plant life; the diluent evaporates from the surface, where it is toxic to humans and animals. The result of this separation is that the conventional clean-up method, of capturing oil floating on the surface with booms and skimming it off, is ineffective.

### **The Kalamazoo Spill**

Marshall is on the Kalamazoo river, and Enbridge's Pipeline 6B runs close to the town; before the break, most of the local authorities did not know it was there. Pressures and flows in the pipeline are monitored in Enbridge's central control room, 1,500 miles away.

At 5:57 EDT on the morning of July 25, as 6B lost pressure, alarms sounded, but the line was in the middle of a batch changeover, and so pipeline operators did not take them seriously. Some four hours later, local residents dialed 911 to complain to local authorities of the smell; meanwhile, Enbridge's operators were making attempts to get the line restarted. An Enbridge technician reported from the Marshall pump station that he could see nothing wrong. It wasn't until 11:17am that a local natural gas company employee telephoned Enbridge in Edmonton to tell them that oil was pouring into the rain-swollen Talmadge Creek, which flowed into the Kalamazoo River, which, 115 miles downstream, empties into Lake Michigan. Enbridge immediately shut down the pipeline, but not before the dilbit

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had covered wetlands, overwhelmed Talmadge Creek, and was well on its way to Lake Michigan.

The evaporated diluent had already driven local residents from their homes; two days later, dilbit was still leaking from a six-and-a-half foot gash in the pipe.

### **The Cleanup**

By the end of the first week, full clean-up crews were at work, and by mid-August, the surface of the Kalamazoo was clearing. However, flakes of tar were surfacing, and crews realized that the tar was on the bottom of the river, with marble-sized balls being swept downriver by the current. It was not until late August that Enbridge's president, Patrick Daniel, was prepared to admit that it was bitumen. This left authorities with a new problem: how to clean up the bottom of the river without destroying it completely.

Enbridge, meanwhile, started to compensate local residents for their losses, although in some cases the company fought court cases on the basis that it had met all regulations, and its actions had been approved by federal, state, and local authorities, and that the damage was not foreseeable.

### **US Federal Action**

On July 2, 2012, the US Department of Transportation's Pipeline and Hazardous Materials Safety Administration proposed 24 actions against Enbridge for multiple violations of its hazardous liquid pipeline safety regulations related to integrity management, failure to follow operation and management procedures, and neglect of reporting and operator qualification requirements. A total civil penalty of \$3.7 million will be levied. Enbridge has 30 days to respond to these charges.

### **The Upgrading Alternative**

An alternative to pipelining dilbit would be the upgrading of tar sands bitumen—effectively, the first stage of refining to synthetic crude—before consigning it to a pipeline. Synthetic crude would be easier to handle, and less difficult to clean up in the case of a spill.

Until 2008, the upgrading was expected to take place in Alberta. This would have involved billion-dollar capital investments for upgrading plants, large amounts of energy to run them, and result in significant greenhouse gas production.

This strategy was supported by Prime Minister Harper, who suggested that certain countries could be denied bitumen shipments on environmental grounds. However, Enbridge's application in 2010 for twin Northern Gateway pipelines appeared to rule out any such policy.

Later, the construction of upgraders in Canada was halted, and decisions were made to carry out upgrading in the United States or overseas. This made the shipping of tar sands bitumen in the form of dilbit inevitable, and there was no suggestion of any Canadian or Alberta government regulation.

The eventual reason for this change was unclear; the upgrading facilities, wherever they were built, would probably have been financed by the same multinational corporations. It has been suggested, however, that the increasing value of the Canadian dollar after 2008, thus increasing costs, may have contributed to the change in approach. ☞