

On July 16, 2010, just nine days before the Marshall accident, the U.S. Environmental Protection Agency (EPA) warned that the proprietary nature of the diluents found in DilBit could complicate cleanup efforts.

How does DilBit affect pipeline safety?

Some watchdog groups contend that DilBit is more corrosive than conventional oil and causes more pipeline leaks. The industry disputes that theory, and there are no independent studies to support either side. In late 2011, the U.S. Congress passed a bill that ordered the Pipeline and Hazardous Materials Safety Administration (PHMSA) to study if DilBit increases the risk of spills. Results are expected in 2013.

The industry says that Canadian tar sands oil is very similar to conventional heavy crudes from places such as Venezuela, Mexico and Bakersfield, California. Those crude oils, however, aren't transported through pipelines. The Bakersfield oil is processed at on-site refineries, while the Venezuelan and Mexican imports are shipped via tankers to refineries on the U.S. Gulf Coast.



The pipeline spill on March 29, 2013 in Mayflower, Arkansas was an estimated 1 million litres of DilBit.

The same watchdogs that criticize DilBit say, however, that synthetic crude—which is partially upgraded from bitumen—poses no additional threats to pipeline safety. The U.S. currently imports more than 1.2 million barrels of Canadian DilBit and synthetic crude per day, and that figure is expected to grow ten-fold in next decade. Most of the increased production will come from DilBit—because Canada's synthetic crude upgraders have reached capacity, and because it's more profitable for oil companies to export DilBit themselves.

Does the government regulate DilBit differently from conventional crude oil?

Some say the oil from Canada's tar sands is so different based on its chemistry, behaviour, and how it's produced, that it should not be considered crude oil at all.

In Canada, DilBit is not subject to any additional safety regulations. This is one of the reasons why it's hard to compare DilBit's safety record with that of conventional crude. In public statements, Enbridge constantly hides information about DilBit in "heavy crude" statistics.

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What Is DilBit?



DilBit stands for Diluted Bitumen.

Bitumen is a kind of crude oil found in natural oil sands deposits—it's the heaviest crude oil used today. The oil sands, also known as tar sands, contain a mixture of sand, water and oily bitumen. The tar sands region of Alberta, Canada is the third largest petroleum reserve in the world.

What makes bitumen different from regular or conventional oil?

Conventional crude oil is a liquid that can be pumped from underground deposits. It is then shipped by pipeline to refineries where it's processed into gasoline, diesel and other fuels.

Bitumen is too thick to be pumped from the ground or through pipelines. Instead, the heavy tar-like substance must be dug from the ground or extracted by injecting steam into the ground (fracking). The extracted

bitumen has the consistency of peanut butter and requires extra processing (upgrading) before it can be delivered to a refinery.

There are two ways to process the bitumen.

Some tar sands producers use on-site upgrading facilities to turn the bitumen into synthetic crude, which is similar to conventional crude oil. (This process extracts the solids as Pet Coke which, when burned, is more polluting than coal.) Most Alberta producers dilute the bitumen using either conventional light crude, or a cocktail of toxic and corrosive liquids.

The resulting diluted bitumen, or DilBit, has the consistency of heavy crude mixed with sand, and when heated can be pumped through pipelines under high pressure.

What chemicals are added to dilute the bitumen?

The exact composition of these chemicals, collectively called diluents, is considered a trade secret. The diluents vary depending on the particular type of DilBit being produced. The mixture often includes benzene, a known human carcinogen.

If DilBit has the consistency of regular crude, why doesn't it float?

The DilBit that spilled in Marshall, Michigan (Kalamazoo) in 2010 was composed of 70 percent bitumen and 30 percent diluents. Although the DilBit initially floated on water after pipeline 6B split open, it soon began separating into its different components. Most of the diluents evaporated into the atmosphere, leaving behind the heavy bitumen, which sank under water.

Can conventional crude oil also sink in water?

Every type of crude oil is made up of hundreds of different chemicals, ranging from light,



The 2010 pipeline spill in Marshall, Michigan (Kalamazoo) has cost almost \$1 billion to clean up and is still not finished.

volatile compounds that easily evaporate, to heavy compounds that will sink.

The vast majority of the chemicals found in conventional oil are in the middle of the pack—light enough to float but too heavy to gas off into the atmosphere.

DilBit has very few of these mid-range compounds: instead, the chemicals tend to be either very light (the diluents) or very heavy (the bitumen).

Because bitumen makes up 50 to 70 percent of the composition of DilBit, at least 50 percent of the compounds in DilBit are likely to sink in water, compared with less than 10 percent for most conventional crude oils.

How do you know whether a particular type of crude oil will sink or float?

The industry classifies different crude oils as light, medium or heavy, based on their densities. There is debate over the cutoffs for these categories, but bitumen falls into the

“extra heavy” category because it is more dense than water. The diluted bitumen that spilled from 6B was lighter than water and considered heavy crude oil.

But density alone doesn't determine whether a particular type of crude oil will sink or float. Weather and other conditions can change the buoyancy of crude oils: for example, crudes that are lighter than water can sink if they mix with sediment.

That's exactly what happened with the bitumen from 6B. In general, the density of bitumen ranges from slightly heavier than water to barely lighter than water. The bitumen that spilled in Marshall was at the lighter end of the scale. Marc Huot, a technical and policy analyst at the Pembina Institute's Oilsands Program, said the bitumen's density was so close to that of water that it was in “a gray area. It may or may not float depending on [conditions]...think of a log—it floats, but not very well.”

But as the bitumen mixed with grains of sand and other particles in the river, the weight of the sediment pulled the bitumen underwater.

Why has it been so hard to clean up submerged oil?

Existing cleanup procedures and equipment are designed to capture floating oil. Because the 2010 Marshall, Michigan accident was the first major spill of DilBit in U.S. waters, cleanup experts at the scene were unprepared for the challenge of submerged oil.

Once cleanup crews locate submerged oil, it's hard to remove it without destroying the riverbed. Cleanup workers in Marshall were forced to improvise less invasive procedures that balanced oil cleanup with protecting the ecosystem.