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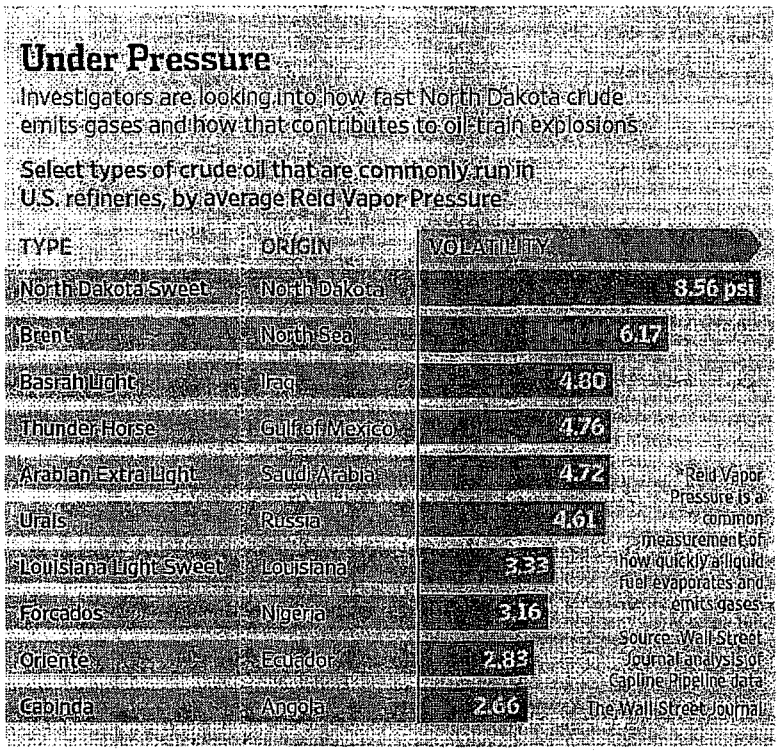
BUSINESS

Bakken Shale Oil Carries High Combustion Risk

Analysis of Crude From North Dakota Raises Further Questions About Rail Transportation



By RUSSELL GOLD
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Crude oil from North Dakota's Bakken Shale formation contains several times the combustible gases as oil from elsewhere, a Wall Street Journal analysis found, raising new questions about the safety of shipping such crude by rail across the U.S.

Federal investigators are trying to determine whether such vapors are responsible for recent extraordinary explosions of oil-filled railcars, including one that killed several dozen people in Canada last summer.

The rapid growth of North Dakota crude-oil production—most of it carried by rail—has been at the heart of the U.S. energy boom. The volatility of the crude, however, raises concerns that more dangerous cargo is moving through the U.S. than previously believed.

Neither regulators nor the industry fully has come to terms with what needs to be done to improve safety. There have been some steps, for example, slowing trains and promising to redirect around high-risk areas. But debate still rages over whether railcars need to be strengthened, something the energy industry has resisted.

"Given the recent derailments and subsequent reaction of the Bakken crude in those incidents, not enough is known about this crude," said Sarah Feinberg, chief of staff at the U.S. Transportation Department. "That is why it is imperative that the petroleum industry and other stakeholders work with DOT to share data so we can quickly and accurately assess the risks."

Potential fixes could create their own problems: Clamping down on rail transport could thwart the growth of oil output and slowing oil trains could affect the rail industry's ability to move freight around the country.

The Journal analyzed data that had been collected by the Capline Pipeline in Louisiana, which tested crude from 86 locations world-wide for what is known as vapor pressure. Light, sweet oil from the Bakken Shale had a far higher vapor pressure—making it much more likely to throw off combustible gases—than crude from dozens of other locations.

Neither federal law nor industry guidelines require that crude be tested for vapor pressure. Marathon Petroleum Corp. , which operates Capline, declined to elaborate on its operations except to say that crude quality is tested to make sure customers receive what they pay for.

According to the data, oil from North Dakota and the Eagle Ford Shale in Texas had vapor-pressure readings of over 8 pounds per square inch, although Bakken readings reached as high as 9.7 PSI. U.S. refiner Tesoro Corp. , a major transporter of Bakken crude to the West Coast, said it regularly has received oil from North Dakota with even more volatile pressure readings—up to 12 PSI.

By comparison, Louisiana Light Sweet from the Gulf of Mexico, had vapor pressure of 3.33 PSI, according to the Capline data.

Federal regulators, who have sought information about vapor pressure and other measures of the flammability and stability of Bakken crude, have said the energy industry hasn't provided the data despite pledges to do so.

The industry's chief lobbying group said it was committed to working with the government but that historically it hadn't collected the information. The energy industry has resisted the idea that Bakken Shale oil's high gas level is contributing to oil train explosions, but the American Petroleum Institute is revisiting the question, said President Jack Gerard. "Are we testing everything we should be testing?"

David Miller, head of the institute's standards program, said a panel of experts would develop guidelines for testing crude to ensure it is loaded into railcars with appropriate safety features. New tests could include measures of viscosity, corrosion and vapor pressure, he said.

The rapid growth in transporting oil by rail was rocked by several accidents last year. Last summer a train loaded with 72 cars of crude exploded, leveling downtown Lac-Mégantic, Quebec, and killing 47 people. Later in the year, derailed trains exploded in Alabama and North Dakota, sending giant fireballs into the sky. Derailments, typically caused by track problems or equipment failure, triggered the accidents. While crude oil is considered hazardous, it isn't usually explosive.

Most oil moving by rail comes from the Bakken Shale, where crude production has soared to nearly a million barrels daily at the end of last year from about 300,000 barrels a day in 2010.

The rapid growth in Bakken production has far outpaced the installation of pipelines, which traditionally had been relied on to move oil from wells to refineries. Most shale oil from Texas moves through pipelines, but about 70% of Bakken crude travels by train.

Bakken crude actually is a mixture of oil, ethane, propane and other gaseous liquids, which are commingled far more than in conventional crude. Unlike conventional oil, which sometimes looks like black syrup, Bakken crude tends to be very light.

"You can put it in your gas tank and run it," said Jason Nick, a product manager at testing-instruments company Ametek Inc. "It smells like gasoline."

Equipment to remove gases from crude before shipping it can be hard to find in the Bakken. Some Bakken wells are flowing so quickly that companies might not be able to separate the gas from the oil, said Lynn Helms, director of North Dakota's Department of Mineral Resources. "At a really high flow rate, it is just much more difficult to get complete gas separation," he said.

There also is a financial benefit to leaving gaseous liquids in the oil, because it gives companies more petroleum to sell, according to Harry Giles, the retired head of quality for the U.S. Energy Department's Strategic Petroleum Reserve and a former head of the Crude Oil Quality Association.

The federal government doesn't spell out who should test crude or how often. Federal regulations simply say that oil must be placed in appropriate railcars.

There are three "packaging groups" for oil, based on the temperatures at which it boils and ignites. But these tests don't look at how many volatile gases are in the oil, and that is the industry's challenge, according to Don Ross, senior investigator with the Transportation Safety Board of Canada. "There is no accepted industry method for testing for gassy crude," he said.

Without clear guidance, some oil producers simply test their crude once and generate a "material safety data sheet" that includes some broad parameters and characteristics.

After last summer's deadly Canadian incident, investigators said several data sheets that were supposed to describe oil quality were either incomplete or incorrect.

Much of the oil industry remains resistant to upgrading the 50,000 railcars that are used to carry crude oil, saying it would be too time consuming and expensive. The problem, they argue, isn't the cargo but a lack of railroad safety.

Some observers of the energy industry are starting to call for oil companies to ensure the crude being poured into railcars isn't too volatile.

"We need some standards," said Bill Lywood, an oil-industry consultant in Edmonton, Alberta, who measures crude characteristics for producers in Western Canada. "The industry should not be filling railcars with unstabilized crude."

—Laura Stevens and Tom McGinty contributed to this article.

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