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Too Much Propane Could Be a Factor in Exploding Oil Trains

Mar 5, 2014

By Marcus Stern and Sebastian Jones

Producers are supposed to strip out volatile gases before transporting oil. But experts say some may have been 'cheating' and leaving in large amounts.

By Marcus Stern and Sebastian Jones

As federal regulators continue investigating why tank cars on three trains carrying North Dakota crude oil have exploded in the past eight months, energy experts say part of the problem might be that some producers are deliberately leaving too much propane in their product, making the oil riskier to transport by rail.

Sweet light crude from the Bakken Shale formation straddling North Dakota and Montana has long been known to be especially rich in volatile natural gas liquids like propane. Much of the oil is being shipped in railcars designed in the 1960s and identified in 1991 by the <u>National</u> <u>Transportation Safety Board</u> [2] as having a dangerous penchant to rupture during derailments or other accidents.

While there's no way to completely eliminate natural gas liquids from crude, well operators are supposed to use separators at the wellhead to strip out methane, ethane, propane and butane before shipping the oil. A simple adjustment of the pressure setting on the separator allows operators to calibrate how much of these volatile gases are removed. The worry, according to a half-dozen industry experts who spoke with InsideClimate News, is that some producers are adjusting the pressure settings to leave in substantial amounts of natural gas liquids.

"There is a strong suspicion that a number of producers are cheating. They generally want to simply fill up the barrel and sell it—and there are some who are not overly worried about quality," said Alan J. Troner, president of Houston-based <u>Asia Pacific Energy Consulting</u> [3], which provides research and analysis for oil and gas companies. "I suspect that some are cheating and this is a suspicion that at least some refiners share."

Harry Giles, a now-retired, 30-year veteran of the Department of Energy whose duties included managing the crude oil quality program for the Strategic Petroleum Reserve, said there's "a distinct possibility" that propane has been intentionally left in Bakken oil.

"I think there is such a large focus on what's happening in the Bakken...that no one really cares to talk about these issues," Giles said.

Producers might be tempted to leave in some of the natural gas liquids because there aren't enough gas-processing facilities or pipelines in the Bakken to handle all the methane, ethane, propane and butane that is suspended in the crude when it comes out of the ground. Without sufficient infrastructure, operators are left with few options. They can flare or vent the volatile gases into the North Dakota sky, although they risk being penalized for violating emission limits. Or they can leave some of the gases, especially propane, suspended as liquid in the crude oil they send to refineries, where gas-processing facilities already exist.

Some drillers might also be purposefully selling their crude "fluffed up" with propane and small amounts of butane to boost the volume of oil in the railcar and maximize their profits, according to the experts, some of whom spoke on the condition they not be identified because of pending lawsuits triggered by recent accidents.

The Bakken, a vast crude reservoir lying about two miles beneath the Earth's surface, has been tapped since 1953. It was only in recent years that new fracking technologies allowed the volume of crude taken from the ground to explode, jumping from a negligible amount in 2007 to 1 million barrels a day currently.

Energy companies have been scrambling to install the infrastructure they need to support the boom. But they face awkward economics. Constructing gas plants and pipelines is expensive and involves a lengthy permitting process. By the time the facilities are in place, production at many Bakken wells might be in decline. Shale gas production <u>can drop off sharply</u> [4] in the first few years.

Lynn Helms, head of the North Dakota Department of Mineral Resources ^[5] and the state's chief oil-well regulator, said in a statement emailed by his spokesperson on Feb. 26 that "at this time we are investigating what, if any, issues there may be surrounding separation of Bakken streams."

At the federal level, the movement of crude oil by rail is regulated by the Federal Railroad Administration and the <u>Pipeline and Hazardous Materials Safety Administration</u> [6] (PHMSA), both housed within the Department of Transportation.

PHMSA officials did not respond to questions about whether the agency is investigating Bakken oil companies for deliberately leaving too much propane in their crude. The American Petroleum Institute, which has been assisting PHMSA in its effort to determine what new rules or testing methods are needed, declined to comment.

PHMSA began testing Bakken crude to see what was making it so volatile after an oil train from North Dakota derailed and exploded in Canada in July, killing 47 people and generating up to \$2 (billion in liabilities. In response to questions from InsideClimate News about what is making the

Bakken crude explosive, PHMSA spokesman Gordon "Joe" Delcambre said in a Feb. 14 email that the agency is "still awaiting the final report of the test results on the crude oil samples submitted to the lab. Keep checking back periodically." As of Wednesday, PHMSA had provided no update.

On Nov. 8, a train carrying Bakken oil derailed and burned near Aliceville, Ala., en route to a refinery in Mobile. On Dec. 30, another train hauling Bakken oil train collided with a derailed grain train outside Casselton, N.D., setting off a series of explosions that sent large, mushroom-shaped fireballs into the sky.

In response to the accidents, PHMSA issued a safety alert on Jan. 2 saying "recent derailments and resulting fires indicate that the type of crude oil being transported from the Bakken region may be more flammable than traditional heavy crude oil." On Feb. 4, the agency proposed fining three Bakken producers for shipping oil that was more hazardous than shipping documents indicated.

On Feb. 25, the Department of Transportation ordered Bakken operators to begin testing their rail shipments "with sufficient frequency and quality" to ensure the shipping papers properly reflect the oil's flamability.

At a congressional hearing two days later, PHMSA administrator Cynthia Quarterman said oil companies would have wide discretion in determining what constituted "sufficient frequency and a quality" when it came to testing.

"We specifically left those terms to be determined by the shippers based on their operations," Quarterman said. "We did not want to say each and every instance before a shipment occurs that testing needed to occur. It may be that a shipper, if they are a producer, are producing from one play and that play is consistent and over time the test results would be the same."

Giles, the retired Department of Energy official, expressed doubts about the testing program.

"The number of railcars they're loading each day, the number of tank trucks that are going into each of these, the wide range of [oil] quality across the Bakken area are creating challenges for a sampling and analysis program," he said. "It's not like some of the established fields in Oklahoma or Louisiana or Texas where the quality is fairly constant across the producing area. Here [in the Bakken] it ranges from a light crude to a fairly heavy crude. The amount of light constituents that are being produced are creating real challenges. I have reservations about what is being done and how it's being done."

However, Giles believes the fiery explosions have already led producers to be more careful with their shipments.

"There are numerous operators there and I am confident that they are going to do whatever is needed and prudent to minimize any increase in the volatility of the crude oil," he said.

All the industry experts interviewed by InsideClimate News say a key step in preventing future rail explosions is to properly strip out propane and other natural gas liquids from the crude.

When oil comes out of the ground it is mixed with natural gas, natural gas liquids and water. The first step is to put this mixture through a series of separators that reduces the pressure of the fluid, separating the ingredients into distinct streams.

Raising the final separator's pressure setting leaves more propane dissolved within the crude. As an oil train shakes, rattles and rolls toward the refinery, which in the case of Bakken oil can be thousands of miles away, the propane begins separating from the liquid and turning into gas.

A typical tank car carries about 30,000 gallons of flammable liquid at the start of its journey. Some oil trains pull more than 100 cars for a total of more than 3 million gallons of propane-rich crude. In 2008, 9,500 carloads of Bakken oil were shipped. By 2013, the number had climbed above 400,000, with trains winding their way through Philadelphia, New York, Chicago, the Pacific Northwest and the Gulf Coast.

If one of those cars ruptures, the propane gas inside will likely make contact with outside air. If the gas is ignited—perhaps by a spark thrown off when the car rips open or maybe a spark thrown up from steel wheels scraping over steel tracks—the car can explode. Then the burning car can act like a blowtorch on the tanker next to it, even if that car is upright and intact. Eventually, the metal shell of the second tanker would fail from the heat and explode like the first one. Engineers have a clunky technical term for such a disaster. They call it a Boiling Liquid Expanding Vapor Explosion or BLEVE (rhymes with levee). At that point, railcars can explode in domino fashion.

Experts say the explosiveness of the Bakken oil lies in its chemistry.

"It's typical of this type of oil. So it's not surprising. There's no mystery to it... especially if it were (in a tanker not meant to carry that type of fluid," said Ramanan Krishnamoorti, a professor of petroleum engineering at the University of Houston.

Krishnamoorti was referring to the much-criticized DOT-111, a black, torpedo-shaped railcar designed in the 1960s that has become the workhorse of the crude-rail industry during the nation's drilling boom.

The NTSB ratcheted its long-standing push for sturdier railcars after a 2009 accident in which a DOT-111 ethanol train derailed and exploded at a railroad crossing in Cherry Valley, III., killing one motorist and injuring others. The NTSB's investigation of that accident prompted the Association of American Railroads (AAR), an industry trade group, to petition PHMSA to expedite tougher standards for future railcars. Expressing doubts that PHMSA would act in a timely way, the AAR adopted its own voluntary standards for newly built railcars in July 2011.

The issue of the railcar standards remains a point of contention between PHMSA and the NTSB. In May 2012, Quarterman told NTSB Chair Deborah Hersman that implementing the NTSB's recommendations would have financial consequences for industry.

"Requiring all new and existing DOT-111 rail tank cars to comply with enhanced design standards will no doubt be a very costly endeavor," she said in a letter to Hersman, adding, "We invite and encourage NTSB to comment as we proceed through the regulatory process."

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When Quarterman wrote that letter, it had been 21 years since the NTSB had first warned of the dangers of using the DOT-111 to carry hazardous materials.

PHMSA's defenders note that the NTSB doesn't have to worry about pushback from industry stakeholders or the rough and tumble of regulatory rulemaking.

"NTSB has a very broad mandate: Investigate causes and potential remedies," said former PHMSA administrator Brigham McCown. "But unlike all the other executive branch agencies, they're not constrained by cost-benefit analysis or any of the other regulatory restrictions that are typically placed on other executive branch agencies."

Eric Weiss, an NTSB spokesperson, agreed with McCown's interpretation of the NTSB's mission.

"Our focus is on safety, on representing the American people when it comes to safety," Weiss said. "The Cherry Valley accident happened in 2009. We issued our strong recommendations in March 2012. And it's now 2014."

PHMSA's consideration of upgraded railcar requirements will continue at least through early next year, according to its timetable. It will take even longer to get the new or retrofitted railcars onto the tracks, since manufacturers are stuck in a holding pattern until new standards are determined.

In the meantime, PHMSA's Delcambre said the agency will have inspectors in North Dakota "performing unannounced inspections and taking crude oil samples at crude oil loading and handling facilities."

On Thursday, the U.S. Senate Committee on Commerce, Science and Transportation has scheduled a hearing on rail safety, including the transportation of Bakken crude oil. PHMSA's Quarterman is set to appear as a witness, along with representatives from industry groups and the other federal agencies involved.

The hearing comes just days after two trains carrying oil from North Dakota derailed in New York state. None of the oil spilled, and nobody was hurt. But the accidents prompted New York Gov. Andrew Cuomo to urge federal officials to do more to tighten safety regulations.

"I am not convinced that federal regulations and oversight sufficiently protect New York's communities and natural resources from safety hazards in transporting this material," Cuomo said in a letter to U.S. Transportation Secretary Anthony Foxx and Homeland Security Secretary Jeh Johnson.

This article is part of a project supported by the Alicia Patterson Foundation, the George Polk Award program at Long Island University, the Fund for Investigative Journalism and the Society of Environmental Journalists' Fund for Environmental Journalism.

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Oil Train Explosions: The Importance of Removing Volatile Gases - INFOGRAPHIC

Mar 7, 2014

By Marcus Stern and Paul Horn

Oil producers may be failing to properly separate fiery gases like propane from the crude. Graphic explains how separation works and why it matters.

By Marcus Stern and Paul Horn

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About 70 percent of Bakken crude is shipped by rail to refineries in other regions of the country, passing through the heart of urban centers and environmentally sensitive wetlands. Three of those oil trains have exploded in the past year raising questions about the volatility of the Bakken crude and the safety of shipping it by rail.

After eight months of searching, regulators and industry still have not come up with an answer. Some oil and gas experts suspect producers might be failing to properly separate flammable "wet" gases like propane from the crude before shipping it. They cite three possible reasons: a shortage of gas-processing plants in the area; added profitability for producers if they "fluff up" their crude shipments with natural gas liquids, which are worth less per-barrel than crude; and/or carelessness.

MORE: Too Much Propane Could Be a Factor in Exploding Oil Trains [2]

Click to enlarge [3]



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40pt. 29,2014

Updated: Propane explosions rock Jackson Hole, eyewitnesses recount event

Leave a comment (http://wyomingbusinessreport.com/updated-propane-explosions-rock-jackson-hole-eyewitnesses-recount-event/#respond)

UPDATE 4:30 p.m.: Added eyewitness accounts and updated information along with new photos.

JACKSON – Multiple explosions at the AmeriCas facility in southwest Jackson were reported early this afternoon by Teton County Emergency Management. The facility, located off High School Road, as well as businesses within a one-block radius are under a mandatory evacuation order. So far, no injuries have been reported.

The Jackson Hole News&Guide reported that the AmeriGas building exploded at around 12:45 p.m. and that one of the businesses adjacent to it, Bell Fitness, was on fire. Vehicles in the parking lot were also burning, according to reports.

A man who works in a nearby office who didn't want to be named said he was worried for the people in Bell Fitness who would have been there during lunch hour to work out.

"They were there," he said. "They were a piece of tin and a little bit of insulation away from it all."

Jackson Hole High School, Middle School, Colter Elementary and Summit High School a little farther away were asked to shelter in place, while the Jackson Hole Community School was asked to evacuate. Police cordoned off the roads and nearby parking lots and even a bike path that runs through the area, all while warning bystanders of toxic furnes.

Other businesses impacted by the evacuation order are Smith's Food Plaza and the Flat Creek Business Center. Sweet Peas day care and the Teton Literacy Center are both located inside the Flat Creek Business Center, and students from both have been evacuated to the Colter school gym.

Paul Perry, ironically the owner of AmeriGas's former building where he runs Canvas Unlimited, a party tent rental company, said his building is just across from AmeriGas's newest facility in a phone interview. The explosion rained ash down on his parking lot and sent his insurance agent scrambling proactively to say she would check out the damage when the area was secured.

"One big explosion rocked it pretty hard" and two more came soon after, he said. "We thought it was, say, an earthquake. We went outside and there was a massive column of flames. I knew the propane company was having some bad times over there."



By MJ Clark and Mark Wilcox

http://wyomingbusinessreport.com/updated-propane-explosions-rock-jackson-hole-eyewitnesses-recount-event/

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	100 feet away and it was raging," Perry said. sion came about 10 minutes later, prompting him to move even farther from the AmeriGas facility.
There was nothing get to the lot bec	the fire department could do as each of the tanks exploded until it burnt out," Perry said. "They were spraying water quite a ways ause they didn't want to get too close either."
later soon arced th fire fighter up in th	nrough the air as fire fighters fought the blaze from a distance. One fire truck parked by the Smith's near the AmeriGas facility sent as scoop to rain down on the flames after the gas had burned out.
he worker, who ha rther away.	d been evacuated and was hoping for the all clear to get back to work, also gave an account of what happened from a little
ove me," he said.	desk working away and all the sudden I hear the windows shaking like 10 bodies upstairs had jumped up and down on the floor "It happened the second time and I saw the flames just flying through the air."
	he was it wasn't that loud.
	igs booming – like, kind of boom!" he said. "And those were probably the smaller propane tanks. What was loud, though, was e door and you could hear the gas being pushed out of the bigger tanks and it was like a wind rushing through a canyon. Really
in range of the fire	e by the News&Guide quoted law enforcement officials at the scene as saying that one 10,000 gallon propane tank at AmeriGas e, and if it explodes it could take much of a nearby Smith's grocery store with it.
When it was boom hink that big tank	ing that was probably when the most danger was," the man said. "Now that they're up there spraying the water down, I don't . is gonna go."
y 2:17 p.m. the fire	was "diminished but not out" Incident Commander Kathy Clay told the News&Guide.
t made for an inter	esting afternoon, I'll tell you that," Perry said.
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It turned out Fuchs had left the propane on too long, allowing it to build up inside the grill and ignite. Home surveillance cameras rolled as he ran to his swimming pool to put himself out. Moments later, paramedics arrived and rushed him to the ER.

Fuchs got second-degree burns on his arms as well as other burns on his legs, "and of

course my face, my hair caught on fire," he said. And he isn't alone: Other dangerous explosions are posted all over YouTube.

To find out just/how powerful a blast can be, NBC News set up a demonstration. With Minnesota firefighters standing by, Jeff Rossen's investigative team opened the gas valve on a propane grill to simulate a leak.

After just a few minutes, a giant ball of fire erupted from the grill, blowing the doors open. Flames shot out of the top and poured out of the bottom.



With firefighters standing by, NBC News set up an exploding gas grill demonstration.

According to James Novak, a fire investigator for the St. Paul, Minnesota, fire department, the most common mistake people make when grilling is: "They turn on the gas, they leave the cover down, they hit the igniter and they get an explosion from a buildup of gas."

The solution, Novak said, is to keep the lid open before you light the grill: "Turn it and light it right away. Don't wait and let it build up gas. And then you don't want to lean over the top so you singe your face off or worse."

Another tip is the soapy water test: Spray all your hoses and connections with soapy water. If you see the soapy water bubbling, that means you have a gas leak there, "and you either need to tighten that up or you need to replace it if it can't be tightened up," Novak said.

The industry says grills are safe if used properly. And experts say there is even more you can do.

- If you keep hitting the igniter switch and your barbecue doesn't light right away, don't keep hitting it: Shut off the gas completely, and wait three to five minutes before trying to light it again. If gas has built up, that'll give it time to dissipate.
 - Also, keep your grill at least three feet away from your house: That way, if there is a fire, it doesn't spread.
 - And, of course, follow the instructions on your grill or propane tank they're always printed right on the side.

Have an idea for a future edition of Rossen Reports? Email us,

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Two Years After Exxon's Mayflower Spill, Will Tougher Pipeline Rules Go Beyond Talk?

If a new rule takes effect, about 95 percent of all pipelines would be subject to stricter safety testing because of their age, location and other factors.

By Elizabeth Douglass, InsideClimate News





It's been two years since a broken 1940s ExxonMobil pipeline flooded an Arkansas neighborhood with Canada's heaviest oil, and the ripple effects of the spill have made it to Washington D.C.,



3/31/15 9:21 AM

- were constructed before November 1970, when testing and safety regulations kicked in.
- have not been previously pressure tested or lack records proving that they are operating at safe pressures.
- are located in areas where an incident could have catastrophic impact, such as near populated or environmentally significant areas or in highway rights of way.
- are carrying propane or other highly volatile liquids.

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• are operating above a certain pressure benchmark.

About half of the nation's hazardous liquid pipelines—or nearly 100,000 miles of pipe—were installed before 1970, according to PHMSA. When you add in newer pipelines that meet the location and other criteria, the number jumps as high as 182,000 miles, or about 95 percent of all the hazardous liquid pipe.

The current rules, collectively known the Integrity Management Program, "basically say companies need to assess their pipelines, know what's in the ground and then figure out what the risks are and mitigate the risks," said Weimer.

They apply only to pipelines in populated areas and other "high consequence" places, such as near drinking water sources, commercial waterways or unusually sensitive environments.

If the new rules become final, they would require companies to prove that they know what kinds of pipe they have, that the lines have been pressure-tested, and that they don't contain repairs made using substandard techniques.

API and the Association of Oil Pipe Lines called the proposed rules "onerous," and questioned whether the sweeping new proposal is "technically feasible, reasonable, cost-effective and practicable."

Before PHMSA puts its new plan on the formal path toward new

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