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What Do Floodwaters Mean for Alberta's 400,000 km of Pipelines?



In the weeks since torrential rains began pummeling Alberta, the focus has, understandably, been on the human victims—those who lost their homes and towns.

But while [Alberta Oil Magazine](#) [1] touts the flooding as an opportunity for oil companies to “start winning a few public relations battles,” what have been the effects of these extreme weather events on Alberta’s infrastructure and the multi-billion-dollar oil and gas industries that rely upon it?

With all the devastation in Calgary, it’s easy to forget that the story began with days of flooding around [Fort McMurray](#) [2], sparking fears that tailing ponds might overflow or embankments erode and spread toxic chemicals [throughout the Mackenzie River Basin](#) [2].

Two pipeline leaks have been directly linked to the heavy rains, which many [scientists have said](#) [3] are a sign of what is to come as climate change progresses.

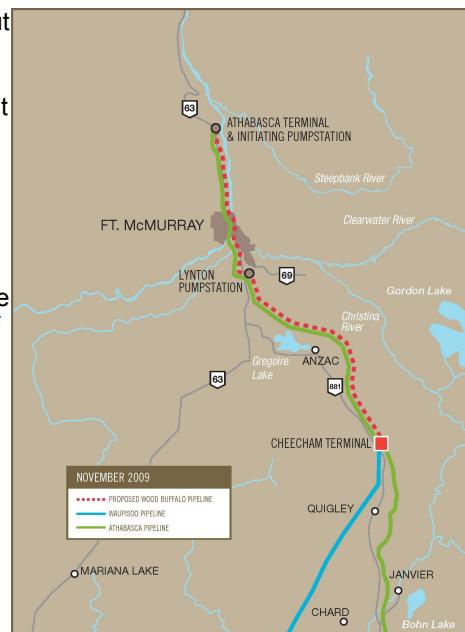
In the Turner Valley, a pipeline carrying [sour gas](#) [4] containing one per cent hydrogen sulfide was ruptured by floating debris, prompting the evacuation of 50 residences within a 100-mile radius. Although the operator Legacy Oil and Gas moved to shut the line off from the source, it was impossible to access the line itself due to deepening flood waters.

On Tuesday [Enbridge confirmed](#) [5] that heavy rainfall caused a leak of about 750 barrels of crude oil from the Wood Buffalo Pipeline (Line 37). The line between Fort McMurray and Cheecham was restarted at a reduced pressure “pending completion of further geotechnical analysis in the incident area.”

Fears of flooding damage also prompted Enbridge to shut down the 540 km Athabasca line between Cold Lake and Hardisty, 200 km southeast of Edmonton, and the Waupisoo line to Edmonton from Cheecham Terminal.

That, along with the closure of the iconic Trans-Canada Highway, leaves the cash-strapped Alberta government, where oil sands make up 29 per cent of the economy, [still calculating the loss in revenue](#) [6].

And then there was the case of the Lubicon Lake spill. On June 23 [Penwest Exploration](#) [7] was [hampered by flooding](#) [8] as they rushed to deal with a produced water leak near Red Earth, Alberta, approximately 170 km east of Peace River. But the issue didn’t come from flooding in the area, but rather flooding at Penwest’s Calgary-based head office, reminding us that a disaster plan is only as good as a company’s ability to follow through on it.



The Calgary office of the newly inaugurated Alberta Energy Regulator [9] (AER) was also closed due to flooding. It re-opened on June 28, but spokesperson Bob Curran said their inspectors have been run off their feet since the flood struck.

He says that the agency will continue to inspect pipelines based on reported incidences, but ultimately the onus is on the companies themselves to ensure the safety of their operations.

"We have staff across the province, but we've also got about 400,000 km of pipelines in Alberta, so what we will do is what we would always do, which is inspect pipelines where there may be more likelihood of a problem, or where we've had problems in the past."

Greenpeace's Mike Hudema says the environmental organization has been reticent to speak out thus far in respect for victims of the flood. But he does have misgivings about the AER's ability to handle this kind of catastrophe, particularly in light of the recent streamlining of the regulatory process [10].

"We had questions about the safety of Alberta's pipeline infrastructure before, and after the last week we have even more about how prepared pipelines are for extreme weather events like floods, that we know are going to increase in the coming years and decades because of climate change."

Other signs of damage have appeared all over the province. On June 27 already stressed emergency workers were given another challenge when Bonnybook Bridge collapsed [11], almost sending five rail cars filled with petroleum product that may have been tar sands diluent into the Bow River. Engineers [12] blamed the failure on gravel that had been scoured away by the fast-moving currents. Only divers could have detected the damage.

John Pomeroy, of the University of Saskatchewan, told the Canadian Press that the flooding has altered the landscape [13] of the Rocky Mountains irrevocably. He described an entire mountainside collapsing. "A side of it sloughed off and a large section created a debris flow 50 metres wide through a little creek you could have jumped across."

In Edmonton, which was spared the worst of the damage, heavy rains have nonetheless led to an outbreak of unusually large sinkholes [14]. The month of June saw more than 111 mm of rain, where the average is 87 mm, overwhelming drainage systems and flooding apartments.

Dr. John Clague who holds the chair in natural hazard research at Simon Fraser University says that the primary damage to the landscape from the extreme flooding will appear in the widening of river channels that must be taken to account in the recovery efforts.

With underwater pipelines, engineers must pay attention to the depths of scouring that can occur during flooding. Extreme caution is required when placing this kind of infrastructure in areas sensitive hydrological events such as torrential rain. "When you look at fixed infrastructure—pipelines and highways—you're looking at infrastructure that has to maybe not be bullet proof, but you have to have a plan B if you have one of these storms over a period of 50 years or 100 years."

This issue becomes much more serious when dealing with pipelines that run east to west, such as the proposed Enbridge Northern Gateway and Kinder Morgan pipelines. East-west pipelines—more than the north-south lines that have been typical in Alberta and Saskatchewan—cross an extraordinary number of watersheds. Each crossing is vulnerable to extreme changes in the movement of water.

Although he's reticent to comment on the specifics, University of Western Ontario professor of civil and environmental engineering Slobodan Simonovic says he doesn't think that operators and government are paying enough attention to these kinds of disasters when planning oil and gas pipelines. "They're talking about environmentally sensitive areas, but I don't think the impact of disasters has been taken into consideration at all."

Simonovic, author of *Systems Approach to Management of Disasters: Methods and Applications*, says colleagues in the Calgary area have been working around the clock to deal with the extraordinary amount of damage. "I don't think they've been sleeping."

He reiterates that the best way to deal with events like this is to recognize and move to mitigate the effects of climate change on infrastructure.

"One of the very serious problems that is becoming very obvious with Canada is much more frequent occurrences of these extreme events. I'm talking on both sides: floods and droughts," he says. "If we continue to ignore them, as our government is currently doing, and we don't include them in our planning of the design in the future infrastructure and in the maintenance of the existing infrastructure, if we don't take into consideration the change of the land use and do not implement regulations that prevent further development in these areas, we're just going to continue increasing the damage from event to event."

Hudema agrees that the floods present an opportunity for the Alberta government to change its stance on climate change. "The question is, is Alberta ready for the type of horrific incidents that we saw in the past few weeks in this province? A lot needs to be done and currently the question is whether the government is willing to put in the resources, not only to deal with the immediate impacts, but also to improve the system in the future."

Image Credit: Premier Alison Redford [15] via Flickr

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Links:

- [1] <http://www.albertaoilmagazine.com/2013/06/energy-companies-have-an-opportunity-to-help-in-the-southern-alberta-flood-devastation/>
- [2] <http://desmog.ca/2013/06/13/fort-mcmurray-flooding-emphasizes-tar-sands-threat-mackenzie-river-basin>
- [3] http://www.huffingtonpost.ca/david-suzuki/alberta-flood-climate-change_b_3480005.html
- [4] <http://desmog.ca/2013/06/21/extreme-flooding-southern-alberta-causes-deadly-sour-gas-leak>
- [5] <http://www.enbridge.com/MediaCentre/News.aspx?yearTab=en2013&id=1737093>
- [6] http://www.huffingtonpost.ca/2013/06/26/alberta-flooding-cost-economic-impact_n_3504604.html
- [7] <http://pennwest.mediaroom.com/index.php?s=27585&item=135193>
- [8] http://www.calgaryherald.com/business/energy-resources/Flooding+Calgary+hampers+response+pipeline/8567131/story.html?__lsa=d18e-c125
- [9] <http://www.aer.ca/>
- [10] <http://www.edmontonjournal.com/business/Environment+groups+warn+about+Alberta+single+regulator/8496431/story.html>
- [11] <http://desmog.ca/2013/06/27/Derailed-train-carrying-tar-sands-diluent-slumps-over-flooded-bow-river>
- [12] http://www.thestar.com/news/canada/2013/06/27/train_derails_on_calgary_bridge_over_swollen_bow_river.html
- [13] <http://www.ctvnews.ca/sci-tech/flooding-in-alberta-has-changed-the-rockies-forever-says-scientist-1.1339687#ixzz2Y0VQPctY>
- [14] <http://www.edmontonjournal.com/news/Heavy+rain+Edmonton+causes+flooding+Cloverdale+sinkholes+near+Bonnie+Doon/8576966/story.html>
- [15] <http://www.flickr.com/photos/premierofalberta/>
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