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FRACKING NEAR PEACE RIVER DAMS SCARES BC HYDRO

Senior BC Hydro executives have worried for years that earthquakes triggered by fracking operations in search of natural gas could damage its two big dams on the Peace River, putting thousands of people at risk if the dams fail. Yet the Crown corporation, which generates and distributes most of the province's electricity, has said nothing to the public about these concerns, choosing instead to negotiate behind the scenes with the provincial energy industry regulator, the BC Oil and Gas Commission. BC Hydro's concerns became public Tuesday after Ben Parfitt, a resource policy analyst with the Canadian Centre for Policy Alternatives, CCPA, issued a report based on information obtained through a Freedom of Information request filed with BC Hydro. In response to the FOI request, the Crown corporation disclosed its fears that fracking could trigger earthquakes more powerful than its dams are designed to withstand. Documents released by BC Hydro to the CCPA show that in December 2009 senior officials at BC Hydro

became alarmed at oil and gas industry operations on lands near its Peace Canyon Dam. The dam is 23 kilometres downstream from the W.A.C. Bennett Dam, a 49-year-old structure that impounds the world's seventh-largest hydro reservoir by water volume. At that time, writes Parfitt, Hudson's Hope Gas, a subsidiary of Canada Energy Partners and GeoMet Inc., had drilled at least eight coal bed methane wells near Hudson's Hope, a town of about 1,000 residents about nine kilometres (six miles) downstream from the Peace Canyon Dam. The company had plans to drill and frack up to 300 more wells, with at least three of them situated close to the Peace Canyon Dam. "The plans clearly alarmed BC Hydro's then chief safety, health and environment officer, Ray Stewart, who called them an 'immediate' threat to the region's hydro facilities," Parfitt writes. "The production of coal bed methane from these wells involves hydro-fracturing [fracking] to increase permeability of the coal seams, followed by extraction of groundwater to desaturate coal seams and allow methane gas to be released," Stewart wrote in a letter to the provincial Ministry of

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Environment's Glen Davidson, then British Columbia's comptroller of water rights. "BC Hydro believes that there are immediate and future potential risks to BC Hydro's reservoir, dam and power generation infrastructure as a result of this," wrote Stewart. Stewart went on to warn that the "potential effects" of such actions could be natural gas industry-induced earthquakes that were greater in magnitude "than the original design criteria for the dam." Stewart also warned that fracking could "reactivate" ancient faults in the region, which could potentially set the stage for earthquakes. He also warned of unspecified "hydrogeologic impacts" on hydro reservoirs from fracking and the potential for site-specific areas of land to subside or sink as a result of immense amounts of water being pumped out of the earth or in the event that de-watered coal seams somehow ignited. There are no further such letters from Stewart in the documents supplied by BC Hydro, Parfitt reports. Coal bed methane extraction was short-lived in British Columbia. No company in the province for that matter is currently drilling or fracking for coal bed

methane gas. The industry has now shifted to the extraction of shale gas. The Montney Basin, which underlies much of the Peace River region, is rich in shale gas, explains Parfitt. "But extracting shale gas, which is tightly bound up in rock formations, requires the use of even greater brute force fracking technology. More water must be pumped at even higher pressure to fracture the rock and extract the trapped gas than is the case with coal bed methane, which is typically found closer to the earth's surface," he writes. As fracking for shale gas became more common, senior officials at BC Hydro began to see a pattern, Parfitt found through studying the information released by BC Hydro. "Earthquakes started occurring in lockstep with fracking operations. One of the most pronounced examples occurred in the Farrell Creek fracking zone, near BC Hydro's Peace River dams. Between July 2010 and March 2013, a dozen earthquakes were recorded in the region, ranging from a low of 1.6 magnitude on the Richter scale to a high of 3.4," he writes. The cluster of earthquakes, all in the same region where one company, Talisman Energy, was fracking, caught the

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attention of Scott Gilliss, BC Hydro's dam safety engineer in the Peace River region. Gilliss made his concerns known to senior officials at BC Hydro's head office in Vancouver. He was instructed to document his concerns, Parfitt reports. Gilliss pointed out in a subsequent email released by BC Hydro that "oil and gas production may have contributed to a dam breach" at the Baldwin Hill Dam in Los Angeles in 1963. The Baldwin Hill breach, as described by award-winning investigative reporter and writer Andrew Nikiforuk in his most recent book "Slick Water: Fracking and One Insider's Stand Against the World's Most Powerful Industry," resulted in a "colossal rupture that sent 292 million gallons of water spilling into a residential community, destroying hundreds of homes and killing five people." A

subsequent review of the catastrophe by Richard Meehan, a leading expert on fluid migration at Stanford University, and Douglas Hamilton, a prominent civil engineer, concluded that "fluid injection" by the oil and gas industry, combined with sinking ground around the dam had led to the structure's sudden and ultimately deadly failure. "This is the case study that triggered my concern over hydraulic fracturing in the Peace," Gilliss explained in an email to BC Hydro executives on March 17, 2013. Gilliss wrote, "In my view, which I have already shared, the province should simply add buffer zones around any very Extreme and Very High Consequence Dams, where hydraulic fracturing cannot be undertaken without a prior full investigation into the risks, and an implemented risk management plan.

Why is this so difficult?" Gilliss's buffer zone idea was not new. Two years earlier, after conducting research for the Canadian Centre for Policy Alternatives, Parfitt authored a report calling for "no-go zones" where fracking was banned to protect other important resources such as water. By then, there were also de facto bans on fracking in Quebec and New York State. Since then, more earthquakes in northeast British Columbia have been triggered by fracking, including a magnitude 4.6 tremor that occurred to the north of Fort St. John last year, in an area then being fracked by Progress Energy, a subsidiary of Malaysian state-owned Petronas. "The strength of that induced earthquake was the largest to date anywhere in the world associated with fracking operations," writes Parfitt. Parfitt writes that to date, discussions between BC Hydro and the BC Oil and Gas Commission, OGC, "have resulted in only modest 'understandings' between the hydro provider and the OGC that would see a halt in the issuance of any new 'subsurface rights.' Companies already holding such rights would not be subject to the ban. But the 'understandings' would allow companies to drill and frack for natural gas within five kilometres of the Peace River's two existing dams or an approved third dam on the river, the controversial \$9-billion Site C project." The Site C dam would be built downstream from the existing W.A.C. Bennett and Peace Canyon dams. Designs call for an estimated peak capacity of approximately 1,100 MW, an average output of 680 MW, and an annual output of 5,100 GWh of electricity. This would be the first large dam built in BC since 1984 and BC's fourth largest producer of electricity. Treaty 8 First Nations, and local landowners have filed legal challenges to the dam. Also, more than 200 scientists, and the Royal Society of Canada, have expressed their concerns to the federal Liberal government, citing weaknesses in the regulatory review process and the project's environmental assessment. Nonprofit groups have also protested the Site C dam. In July, more than 1,000 people and hundreds of watercraft participated in the 11th annual Paddle for the Peace outside of Fort St. John, west of the Site C Dam construction site. First Nations leaders, politicians, residents, and activists issued a long list of things wrong with the Site C dam project, but it already has the green light from federal and provincial authorities. The federal government has declined to intervene to halt dam construction, and Premier Christy Clark supports

Site C dam construction despite the warnings. The idea of a buffer area around BC Hydro's Peace River dams has now been adopted. In response to written questions, the Oil and Gas Commission said that as a result of discussions with BC Hydro the province "has established a five kilometre buffer area around the WAC Bennett, Peace Canyon and Site C dams." Graham Currie, the OGC's executive director of corporate affairs, said that the Site C dam location is squarely within the Montney Basin, which contains large quantities of shale gas. Gas from dense shale rock formations can only be coaxed from the earth by extensive use of fracking. In an email response to questions, the OGC said that right now, the Ministry of Natural Gas Development "is not accepting any new requests for subsurface [natural gas] rights within 5 kilometres of the Site C construction area." The OGC said, "...there are no active hydraulic fracturing operations" within the five kilometres of BC Hydro's Peace River dams but that there are "a small amount of existing subsurface rights issued within the 5 km buffer zone around Site C. These were issued prior to the creation of the buffer." Any applications in that area, or elsewhere, must go through what the OGC called "a strict review process" before permits are issued. The Commission now is talking with BC Hydro about any additional permit conditions that would be required to protect public safety and the environment in the area, specifically, "before construction occurs on Site C," Currie wrote. As of 2014, 95 percent of the province's electricity was produced by hydroelectric generating stations, which consist mainly of large hydroelectric dams on the Columbia and Peace Rivers. On the Peace River, BC Hydro's two generating stations produce roughly 29 percent of BC Hydro's electricity requirements. Documents released in response to the FOI request show that in both Alberta and British Columbia hydropower providers have become increasingly alarmed at natural gas company incursions onto lands near their dams. The concerns have escalated as distinct clusters of earthquakes in confined areas over short periods of time have occurred in lockstep with fracking operations. Gail Atkinson is a professor in Earth Sciences who holds the Industrial Chair in Hazards from Induced Seismicity at the University of Western Ontario. The chair is funded, in part, by TransAlta, a privately owned hydro provider in Alberta. In response to written questions, Atkinson said the big concern with earthquakes triggered



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by fracking is that they occur much closer to the Earth's surface than do natural earthquakes – two kilometres from the surface as compared with 10 kilometres below the surface for a natural quake. The shaking caused by a fracking-induced earthquake may be of only short duration, but it is a stronger and different kind of shaking. The potentially "strong ground motions" generated by such shaking occur "closer to infrastructure on the surface," said Atkinson. "The concern is that the potential for induced earthquakes to generate strong motions makes it difficult to satisfy the high safety requirements for critical infrastructure, if earthquakes can be induced by

operations in very close proximity [to dams and reservoirs]," she said. Atkinson added that even earthquakes of a "moderate" strength could damage dams or other structures if they are induced "at close distances" to such structures. However, writes Parfitt, "Such risks are not something that BC Hydro talks about publicly." Instead, BC Hydro's Deputy CEO Chris O'Riley Tuesday issued a statement meant to reassure the public. "First, it is important to note that to BC Hydro's knowledge, there has never been any fracking activity around (within 5 kilometres of) BC Hydro's dams," said O'Riley. "That said, our dams are built to withstand

much larger ground motions associated with higher magnitude events that are much longer in duration than fracking. In fact, our dams can withstand events many times larger than those associated with fracking. Fracking by itself cannot generate large magnitude earthquakes," he said. O'Riley said, "Our highest responsibility is public safety. Our dam safety program meets the highest standards including 24/7 instrumentation monitoring, weekly inspections, bi-annual engineering reports and regular expert reviews of all our dams by international, independent experts." Over the next 10 years, he said, BC Hydro will invest an

estimated \$1.9 billion in dam safety across the province.



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