

# THE WORLD'S BIGGEST EXPERIMENTAL FRACK JOB!! (FRACKING 24/7 ... FRACKING ALL NIGHT LONG) A DUBIOUS HONOUR FOR BRITISH COLUMBIA AND, WATER *IN-FRACK-TIONS* AT 2 ISLAND LAKE?

By Will Koop, June 17, 2010



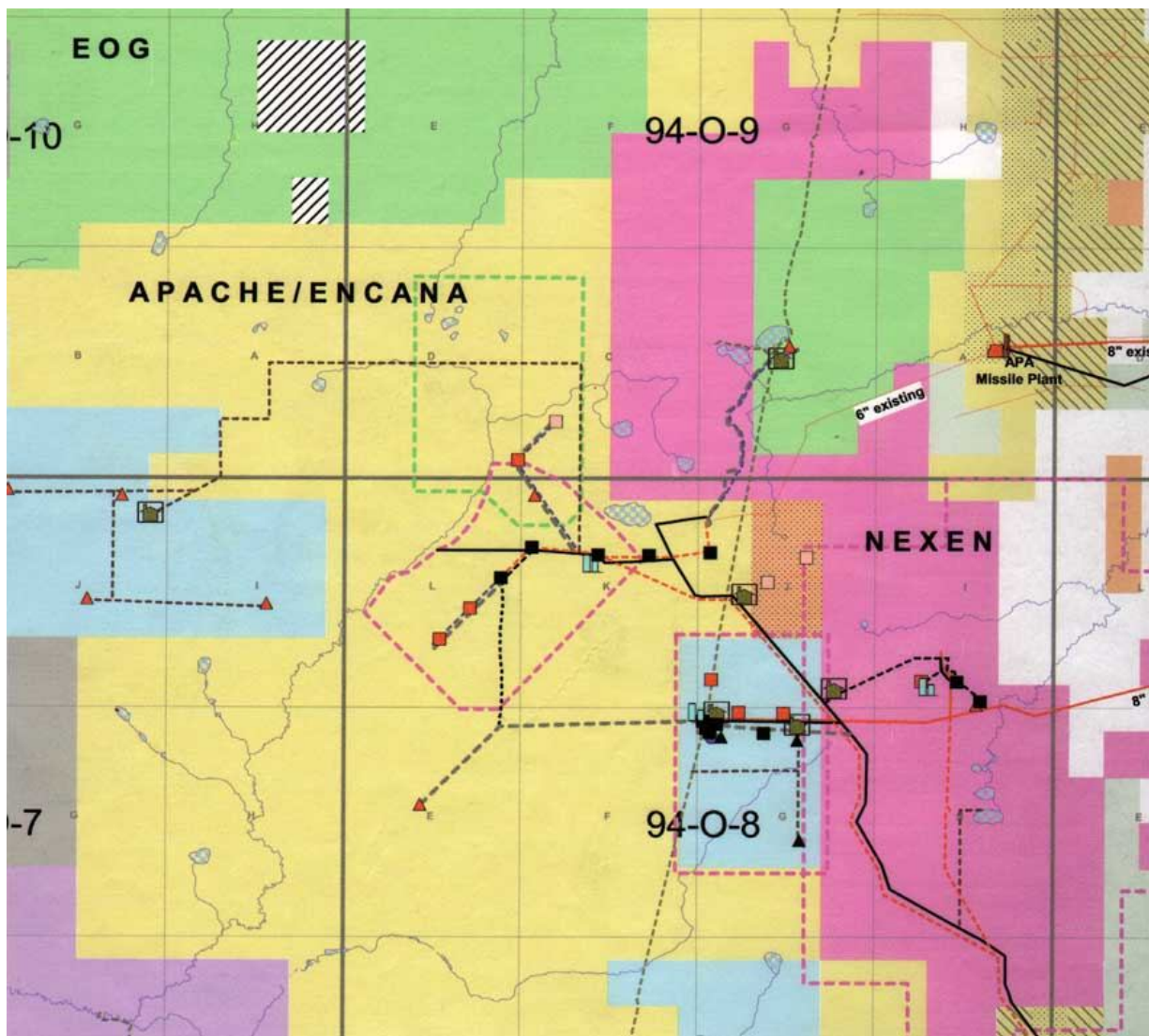
Apache Corp., an oil and gas energy company based in Houston, Texas, with gas tenure rights in British Columbia, boasted at its May 6, 2010 Annual meeting of Shareholders that it had just completed the **“World’s Largest Frac Job”**. This biggest frack (hydraulic fracturing) took place in the isolated, far corner muskeg wilderness of northeastern B.C., about 80 kilometers (as the raven flies) north of the small town of Fort Nelson, in the middle of a large identified geological formation (1.3 million hectares) dubbed the Horn River Basin.

For three and a half months, over a 111 day period, from sometime in January to April 27, 2010, Apache fracked continuously, day and night, **an apparently unprecedented total of 274 fracks**, averaging 2 and a half (2.5) fracks per day. The machines never stopped running, the din of the giant diesel engines kept blasting their high-pitched frequencies, far more annoying than the resonating vuvuselas at the 2010 World Cup in South Africa that the world’s audience kept complaining about.

The fracks occurred on Apache’s remote groomed clearcut (called a “pad”), identified as **APA 70-K Pad**. The pad is located at its **Two Island Lake Operations** area, which it partner shares with energy giant Encana. Nearby to the 70-K Pad, are more similar multi-well pad sites, with many more to come, along with a number of Apache and Encana newly constructed facilities, including a new water treatment plant.



John Crum, Apache’s Co-Chief Operating Officer and President of North America, reported on the World’s Largest Frack Job.



A close-up from a larger map showing natural gas company fracking tenures (as different colors and shading) in the middle zone of the Horn River Basin geological formation. In the exact center of the map is 2 Island Lake, with Apache (Houston, Texas) and Encana's (Calgary, Alberta) gas well clearcut pads in dark black squares in the yellow shaded area. The yellow area is Apache and Encana's shared tenures; the light blue areas is Devon; the pink is Nexen; the green is EOG Resources; the light brown is 100% Encana tenure; the grey is Conoco Phillips; the purple is Imperial Oil/Exxon; the diagonal black lines is Stone Mountain; the yellow with black diagonal lines is 100% Apache. This is just the beginning phase of these companies' operations. This map area is 46 km. wide by 41 km. high, or 1,886 sq. km, or 188,600 hectares, and represents one seventh of the total area of the Horn River Basin formation of 1.3 million hectares.

Apache's marathon event was continuously monitored by a team of rotating engineers and managers from its Calgary-based operations center via live video feed and data links, in what company and service industry people have nicknamed **the "war room"**. With its chief aims of integrating cost and resource efficiencies, Apache's experiment will set the world stage as a new standard or method: intensive copy-cat fracking for the future.

Not far away to the southeast of the pad operation is a \$20 million, 500 plus room camp (the "Horn River Lodge"), with all, or more, the luxuries you can imagine, fuelled by generators 24/7, in what was once a quiet wilderness only a few years ago. Apache not only equally shares the expenses of



this camp with gas giant Encana, but also shares (51%) with Encana a rather large land gas exploration and production tenure in northeast BC's Horn River Basin. Not far away is the construction site of Encana's Cabin gas plant, what will be North America's largest gas plant, on a one square kilometer clearcut pad. Next door to the Horn River Lodge is EOG Resource's big camp, called "Eagle Point Lodge", for its nearby operations at Trail Lake, just north of 2 Island Lake. Most of the fracking labour force is not from BC, many from Alberta.

## The 274 Fracks Operation: 890,300 Cubic Meters of Water

The deep and lengthy horizontal patterned network of gas well fracking that is now beginning to erupt and escalate throughout the five or so deep shale formations in northeast BC - underground horizontal well distances that are getting increasingly longer for company experimental operations - requires enormous quantities of fresh water, along with toxics (never explicitly identified as such in company statements to British Columbians) and frack sand. Water source availability is the key concern and strategic hurdle of all the fracking gas companies.

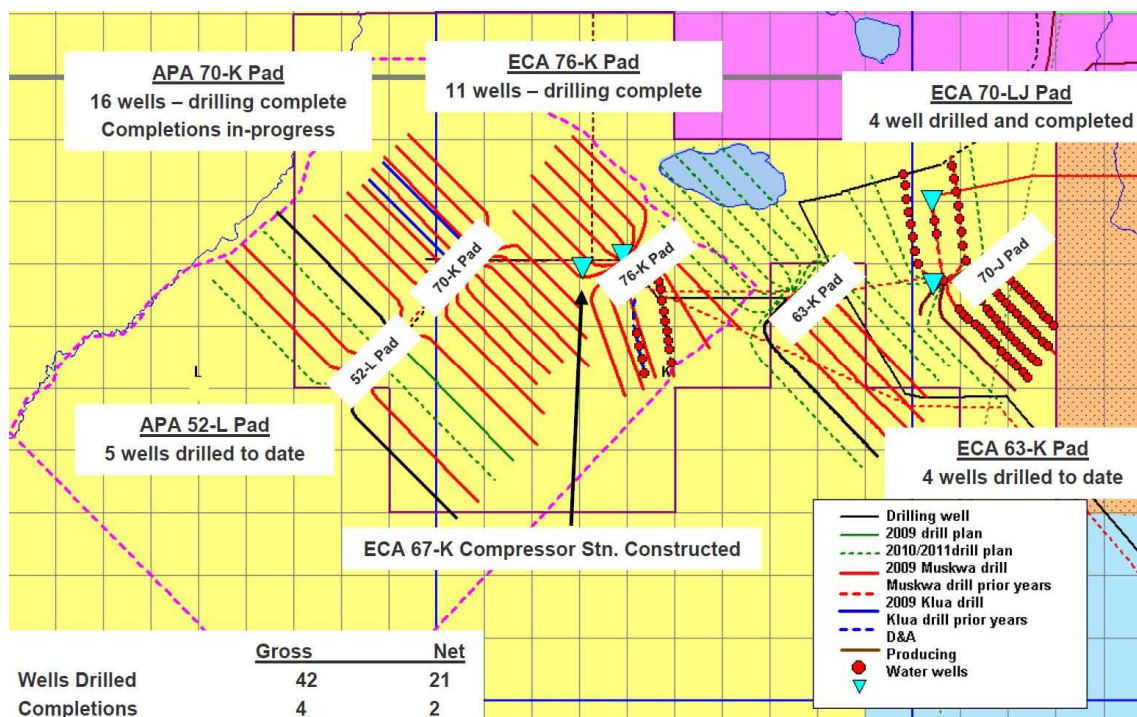


Diagram from Apache's power point presentation about its biggest frack on APA (Apache) 70-K Pad. In this diagram are also Encana (ECA) gas well pads, providing information on the identification number and underground horizontal location of the wells. 2 Island Lake is shown as blue in the upper yellow grid lines.

On pad 70-K, Apache drilled a total of 16 deep horizontal natural gas wells. Based on Apache's information of 274 total fracks, each of the 16 wells received an average of just over 17 fracks during its 111-day long operation.

Partner Encana stated in its March 2010 Investor Day, 100-page transcript that it will conduct even more fracks - up to 21 fracks per well in 2010 - on even longer horizontal well sections, requiring even more fresh water.

For its grand global efficiency experiment in the Horn River Basin on pad 70-K, Apache claims to have used **5.6 million barrels of water** and 111 million pounds of frack sand (no information was provided on the amount of toxics [stimulation fluids] used).

Based on the standard conversion rate of one cubic meter equals 6.2898 barrels of oil (one barrel of oil equals 35 imperial gallons of water, or about 42 U.S. gallons of water), **Apache obtained and used a total of about 890,303 cubic meters, or 195,866,000 imperial gallons of fresh water.** (Apache did not define what “barrel” measurement it was using, and it is assumed here that it used the “barrels of oil” conversion figure.) That’s almost the equivalent of a football field’s entire length of water - cubed: 300 feet by 300 feet wide, by 300 feet high.

Earlier this year, in January 2010, gas industry service company Schlumberger’s chief hydrogeologist Ken Campbell predicted in a power point presentation at an industry in-house conference in Banff that fracking operations in the Horn River Basin may need on average between 2,000 to 4,000 cubic meters of fresh water per frack:

- 2,000 cubic meters is roughly the equivalent of a standing cube of water measuring 42 feet by 42 feet wide, and 42 feet high;
- 4,000 cubic meters is roughly the equivalent of a standing cube of water measuring 52 feet by 52 feet wide by 52 feet high.

According to Apache’s information for 274 fracks, using a total of 890,303 cubic meters of water, **each frack averaged 3,249 cubic meters of water**, a figure that falls well within Campbell’s predicted estimate of water use. However, as experimental fracking operations continue, it now seems that some companies are poised to require even more water than Campbell predicted for lengthier horizontal well operations.

According to numerous U.S. gas industry documents, on average an additional 10% from the total water figure must also account for the volume use of both frack sand and toxics. About 9.5% of this 10% volume is made up of frack sand, and about 0.5% is toxics, both of which are proportionately mixed into the water fracking operation.

Under enormous pressure from giant integrated diesel generator engines, the frack sand’s initial task is to fill in the cracks that are formed through explosive fracking forces in the tightly compacted shale geologies deep underground, in order to keep the fracked cracks ajar and supported. The frack sand has a second role, to allow the “trapped” gas molecules to escape to ‘freedom’ by migrating through the tiny sand grain pores or gaps and then through the perforated well casing, then up the well under natural pressure, a pressure that also returns with it almost all the injected toxic water over time.

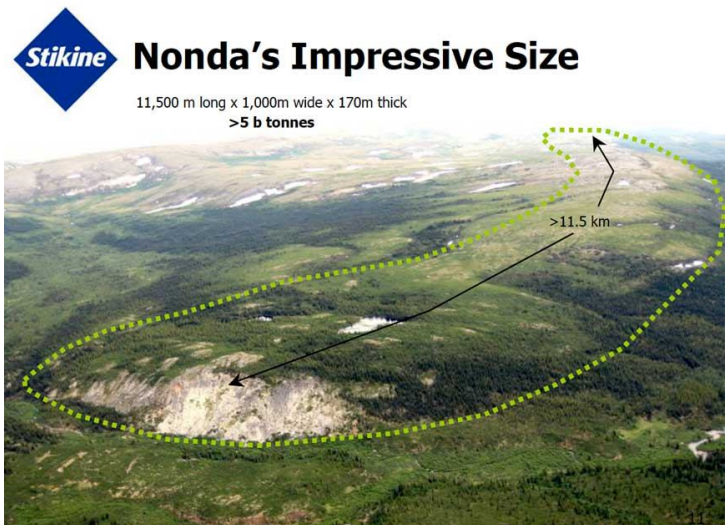


Here, frack sand containers at the 2 Island Operation are hauled to the fracking site and erected into standing towers to allow the frack sand to empty freely by gravity.

Based on its total water use figure, **Apache may have used at least 4,452 cubic meters of toxics for the total fracks (979,440 imperial gallons), and about 84,579 cubic meters of frack sand.** The toxics alone would fill up about 70 standard metal rental water fracking containers, each containing a maximum of 64 cubic meters. Both the frack toxics and the specially mined frack sand are trucked to the operational site.

Currently, frack sand is shipped by rail cars to Ft. Nelson from either Saskatchewan, Nebraska or Texas, then trucked north to the remote operational sites. As a strategic concern, many companies must store large volumes of frack sand in advance of their fracking operations. For instance, EOG Resources, operating just north of Encana and Apache's 2 Island Lake operations, is building a large frack sand silo. **To fill this silo enough for EOG's 2010 planned frack jobs requires 14 trucks to run back and forth from Fort Nelson continuously, 24/7, for about 14 days.**

In the interest of capturing (profiting by) a new lower-cost site demand market, Canadian Stikine Gold Corp. has been flogging interested investors and B.C.'s energy companies elaborate schemes to open-pit mine and deliver frack sand to all BC's northeast fracking operations over the next 35 to 40 years. **One of the company's proposals involves excavating an 11 (eleven) kilometer long open pit mine along a mountain ridge northwest of Fort Nelson near the Yukon border.** All of the proposed frack sand, from a small number of other proposed open pit mine sites, will then be continuously hauled by trucks, posing yet another enormous source of greenhouse gas emissions in BC's northeast gas exploration and production areas.



## Apache's Water Source for the World's Biggest Frack Job Experiment

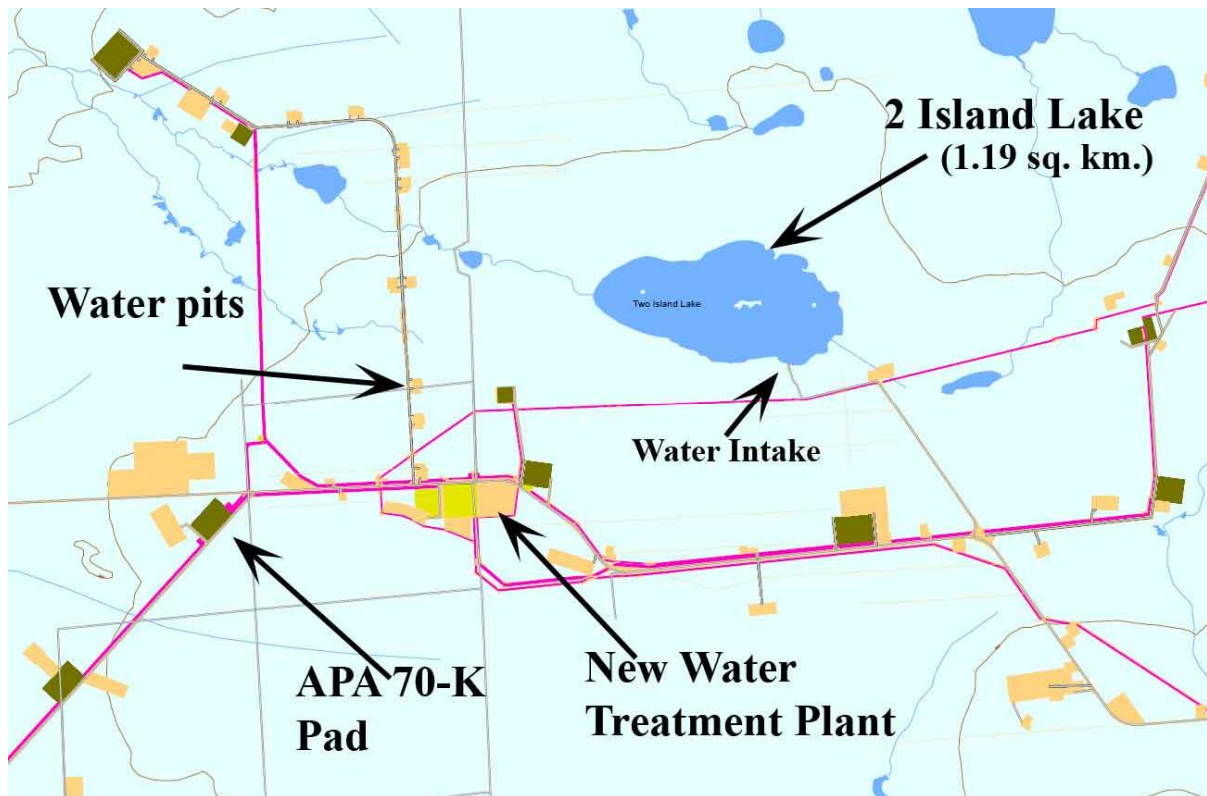
Both Apache and Encana obtained separate temporary water licenses from the BC Ministry of Environment to withdraw fresh surface water from the same source, **2 Island Lake**. Both companies were then issued water permits from the OGC (BC Oil & Gas Commission). According to comments made by government officials visiting the 2 Island Lake area on June 2, 2010, Apache's initial water permit clock began ticking in January 2009.



The 2 Island oval-shaped shallow muskeg lake, **home to nesting trumpeter swans**, is 1.8 kilometers at its longest point, and 1.0 kilometers at its widest. The lake has a total area of 119 hectares (1.19 square kilometers), with a maximum depth of 1.5 meters (source:



comments from government visitors on June 2, 2010 citing company bathymetry data). Since at least January 2009, Apache methodically piped the water until March 2010 to slowly fill extremely large volume borrow pits that hold the water as fracking operations source reservoirs.



According to the Encana operator, there are at least 10 such pits in the area that were excavated by both Encana and Apache. The holding capacity of these borrow pits, some of which were excavated to great depths, may store between 100,000 to 200,000 cubic meters or more of fresh water. In turn, the excavated soils are used for other purposes, i.e. road building, building pads, or are simply left heaped up to the sides of the pits.



This photo taken in June, 2010, shows what a typical borrow pit looks like.

Apache's and Encana's hydrology consultants provided water drainage and holding water volume capacity information for 2 Island Lake. Depending on the time of year, and level of rainfall and snow melt, technicians advise the companies of seasonal withdrawal estimates, information which is shared with the OGC. These estimates would be coordinated with steady monitoring of the lake's water level during withdrawal periods.

According to information presented to First Nations and government representatives on or about June 2, 2010 by an Encana operator,

**Apache and/or Encana had removed 15 centimeters from the lake level sometime between March and May, 2010.**

That is 5 centimeters beyond the lake's regulated or permitted removal ceiling limit of 10 centimeters. (In mid March, 2010, Apache's water permit was revised by the OGC to allow a withdrawal of 15 centimeters, 5 centimeters beyond its initial permit allowance, but Encana's permit withdrawal remained at 10 centimeters.) A 15 centimeter withdrawal represents at least 10 percent of the lake's total water volume (this percentage would be higher when accurate bathymetric data is assessed).



According to the statement made by the Encana manager that day, 2 Island Lake had only recovered 5 centimeters of the 15 that had been withdrawn, meaning that recovery would be quite slow given the fact that the Spring freshet was already over.

“I believe 15 cm were drawn out of the lake. We're back, just under 5 cm.” (Encana operator quote)

In mid March to April 2010, the month during and after Apache withdrew its water withdrawal pipes from 2 Island Lake, the BC Oil and Gas Commission (OGC) provided two amendments to Apache's water permit, allowing it to withdraw water down to 15 centimeters below lake level, but still disallowing Encana to withdraw water below 10 centimeters. With no informational access to the date, withdrawal and lake level data, it is difficult to understand the facts at this time. **The question is, was an OGC official on site in the early months of 2010 who may have possibly noted a water permit violation?**



Apache's water intake is temporarily left anchored offshore, ready for re-use.

## Is Apache's total water use figure for the world's biggest frack job trustworthy?

To service Apache's 70-K pad, 16 well, 274 fracks, the water pumped from 2 Island Lake alone would require total water volumes of almost 900,000 cubic meters. If Two Island Lake was Apache's only source of fresh water, and if Apache had slowly begun pumping water in January 2009 to fill artificial water storage pits over time in preparation for its 111-day fracking operations in 2010, let's hypothesize that it steadily pumped water over a 15 month period to do so (January 2009 to March 2010). That's an average of 60,000 cubic meters of water withdrawal per month from a very shallow lake.





Encana's two eight inch pipes at 2 Island Lake, described as "Water Source 508".  
(June 2, 2010)

Given the estimated area of 2 Island Lake at 1.19 square kilometers, each 10 centimeter withdrawal represents about 119,000 cubic meters of water. This also means that this removal rate, to comply with withdrawal limits, would have been repeated almost another seven times (to obtain the 900,000 cubic meter total) in the space of 15 months.

According to discussions by the visitors on June 2, 2010, Apache's initial water permit from the BC government restricted water withdrawals beyond a 10 centimeter drop in the lake level. That would mean that every time Apache reached the 10 centimeter drop zone level, it had to patiently wait for the lake to naturally rebound or recharge its water volume from external water sources entering the Lake.

However, this natural recharge process, outside of the freeze-up months where very little water runoff flows into this particular lake, could have taken a long time over the course of the late Spring, Summer, and early Fall months primarily because the Lake is located at the very edge or beginning of a headwaters system, in very flat terrain. There is no steady or fixed rate of source water into the lake, being an ephemeral dependent runoff reliant system. And, according to the Encana operator, Apache had also been withdrawing water over the winter period when the Lake was frozen over with a thick layer of ice.



Government, First Nations, and Encana representatives at 2 Island Lake, discussing issues of water withdrawal. Encana's water meter shack to the right.

During the June 2, 2010 visit to 2 Island Lake, Encana operators provided an on-site tour of the company's water meter shack (station) facilities located on the Lake's southern perimeter. Two eight-inch pipes emerge onshore connected to the submerged off-shore intake, and run directly into a nearby shack where two meters are safely housed from the elements. All of the water that is



withdrawn from 2 Island Lake is supposed to be metered, and withdrawal data is then provided to the OGC, the regulatory agency for permit compliance and evaluation.

Government and First Nations visitors inspecting the Encana meter house noted something of interest. **A single pipe within the meter house was engineered with a convenient option to actually allow 2 Island Lake water to bypass the two water meters. This bypass pipe had no meter installed inside or attached to it.** Some government representatives quickly voiced their concerns about this bypass to the Encana company operator at the site, wondering why such a bypass would have been installed without a meter. The questions on the visitors' minds was: How often was the bypass pipe used?; How trustworthy were the meters in providing accurate figures for total water volumes removed from 2 Island Lake? (Quotes: **“Why is there a bypass here?”**; **“Why is it un-metered?”**)



Government officials staring at the bypass pipe. One of the two meters in the meter shack is seen to the left of the photo with its pipe protruding upward out of a water pipe. You can see the handles on top of the pipes that allow anyone to turn on, turn off, and redirect water flow.



Photo to left shows one of two ends of the bypass piping arrangement connected to both of Encana's pipes from and to 2 Island Lake. Anyone's hand can redirect water from the two meters.

Questions automatically arose as to whether Apache had a similar pipe engineering bypass arrangement in its metered pump shack, which it had removed from the area in March 2010, at the end of its water withdrawal period. An OGC official stated that he had noted the same bypass configuration by Apache in its meter shack during his visit in March 2010, and had specifically asked Apache to provide him with a schematic to explain the bypass concern. (Quote: **“The question was posed before. It’s exactly the same set up as Apache had.”**)

According to a statement by the Encana operator, Apache had still been pumping water into burrow pit #1 during the beginning of Spring breakup (March, 2010) before it disconnected its meter shack at the end of its program.

Based on this information, if, for some reason, an unknown volume of water had actually bypassed the two meters, then total water volumes stated by Apache in its May 6, 2010 Shareholders’ presentation may be unreliable, which then may lead to other serious questions. According to information stated on the June 2, 2010 tour, Apache submitted total water volumes used from its fracking completions at pad APA 70-K to the OGC, and that those volumes had to agree with or match its water withdrawals recorded at the 2 Island Lake meter shack.

The Encana operator stated to the visitors that Encana was about to withdraw one cubic meter of water per minute, or 1,440 cubic meters per day, from 2 Island Lake. It was preparing for its summer frack jobs, and mentioned that borrow pits 1, 2, 4 and 10 were to be filled and used for Encana’s summer operations. As Encana was about to start up its new water treatment plant to source treat highly saline water from the Debolt Aquifer located 1,000 meters below ground, the 2 Island Lake was to soon act as a backup source of fresh water over the remaining months of 2010.

Given the fact that 2 Island Lake was not fully recovered, hopefully Encana decided against pumping water after the visitors left the site on June 2, 2010, in order to comply with its permit from the OGC stipulating that it could not withdraw water beyond the 10 centimeter lake level drop.

“It’s all about trust”, was a repeated comment from one of the OGC officials.

## **2 Island Lake Fracking Operations - 2009**

The estimates accounting for fresh water fracking usage in this document from 2 Island Lake only account for water used in the opening four months of 2010. The estimates do not address the amount of water drawn from 2 Island Lake that may have been used for fracking operations by either Encana or Apache during the 12 months of 2009. According to page 41 of Encana’s March 2010 Investor Day transcript, a number of wells were completed in the area in 2009 with its partner Apache.