

The Tip of BC's Fracking Iceberg: Frac-Focus Toxic Chemical Data, Water Volumes, Fracking Locations, and Operators in the Altares Gas Field, North of Hudson's Hope, BC, Near and Within the Farrell Creek Watershed Area

By Will Koop,
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<http://www.bctwa.org/FrackingBC.html>

Giant Alberta-based Talisman Energy, registered as one among scores of energy company operators in northeast BC, recently built five large and lined storage pits for its fracking flowback toxic fluids, located alongside a newly built access corridor called the Altares Core Road. One of these pits reportedly began leaking in January 2013. The photo to the right, taken by a film crew on March 28, 2013 from a fixed wing aircraft, shows the location (far right) of Talisman's leaking "Pond A," a 12 meter-deep pit that holds a maximum capacity of 30,000 cubic meters of toxic waste fluids. Note the large pump-house station for the four flow-back pits, and that each pit is filled to capacity.



On November 18, 2013, the Common Sense Canadian website published an investigative article, [Talisman Frackwater Pit Leaked for Months, Kept from Public](#), on the groundwater contamination incident north of Hudson's Hope, BC:

The company has been unclear about the nature of contaminants in the frackwater, only acknowledging the presence of chlorides, sodium and dissolved solids. In his email to the Hudson's Hope mayor, Mr. Glover pointed to the province's "[FracFocus](#)" tool, a database where companies operating in BC are now mandated to file chemicals used in their fracks. However, companies are allowed to keep trade secrets and use other tricks to avoid full disclosure.

For instance, we examined the FracFocus list of ingredients used in [Well 93-i of the Altares field](#), directly across the road from the frack fluid storage pits, as an example of the toxics potentially contained in Pond A. While contractor Schlumberger lists most of the chemicals it used in the well, it leaves out some critical details and product information (known as [CAS Registry Numbers](#)). And since the FracFocus tool has only been in place since November 2011 in BC, there is data missing for a number of older wells.

For example, Talisman only reports chemicals used in 73 out of 111 of its wells in the Altares field. The company's total data for the 73 Altares wells indicates it used 993,832 cubic metres (almost a billion litres) of water for fracking purposes – and about 10,000 cubic metres (10 million litres) of toxic additives.

Moreover, the FracFocus tool does not include drilling additives, which, as revealed in a recent [peer-reviewed, published paper](#), can be just as dangerous as fracking fluids.

In any event, here are just a few of the chemicals disclosed by contractor Schlumberger at Talisman's well (view the full list [here](#)):

- *Hydrochloric Acid*
- *Distillates (petroleum)*
- *Sodium hydroxide (impurity)*
- *2-Methyl-4-isothiazolin-3-one*
- *Trisodium nitrilotriacetate (impurity)*

Neither the OGC [BC Oil and Gas Commission, the regulator] nor Talisman have yet to reveal to the public the naturally occurring toxics released within the fracked flow back water – such as mercury, arsenic, barium, strontium, chromium, BTEX (benzene, toluene, ethylbenzene, xylenes), radium, uranium, and whatever other dangerous underground substances are being dredged up by fracking (read our recent story about [dead cows and radiation connected to fracking](#) near a farm in Alberta).

Troubling related questions were being raised by the article's authors as to how many such lined storage pits for fracking flow-back fluids have been built in northeast BC, and how many other contamination incidents had occurred (whether officially reported or not), as the BC Oil and Gas Commission (OGC) does not register this information in simple or meaningful ways on its website or in reports. If Talisman has five such pits in a small section of the Altares Gas Field (an area of about 600 square kilometres), wherein other energy fracking operators also have other storage pits, there obviously are dozens or hundreds of such pits in other oil and gas fields in northeast BC.

Other deeply troubling questions relate to the untold millions of cubic metres of contaminated frack water/fluids, as they are all, more or less, routinely dumped or disposed of in cavities far underground the earth's surface in specially created waste "water disposal sites:" a majority of these sources are fresh waters now contaminated and removed from the earth's hydrologic cycle.

1. New Interactive Tool

With these daunting questions in mind, this report sets out to reveal the toxic fluid ingredients used in fracking operations in BC's Altares and Farrell Gas Fields, largely representative of all fracking operations in BC. As of January 1, 2012, energy fracking operators are now mandated to post the composition and volumes of fracking fluid data on the Frac-Focus website, not all fluid or additive data of which is reported due to "trade secrets" - all of the current data for the two Gas Fields has been compiled in this report. This data is provided on a specially made map (offsite, downloadable) showing the fracking operations, where the interested reader can find the location of the energy operators' gas wells, and find the location of which wells were reported to Frac-Focus. This is perhaps the first such tool created for information about specific fracking operations in BC.

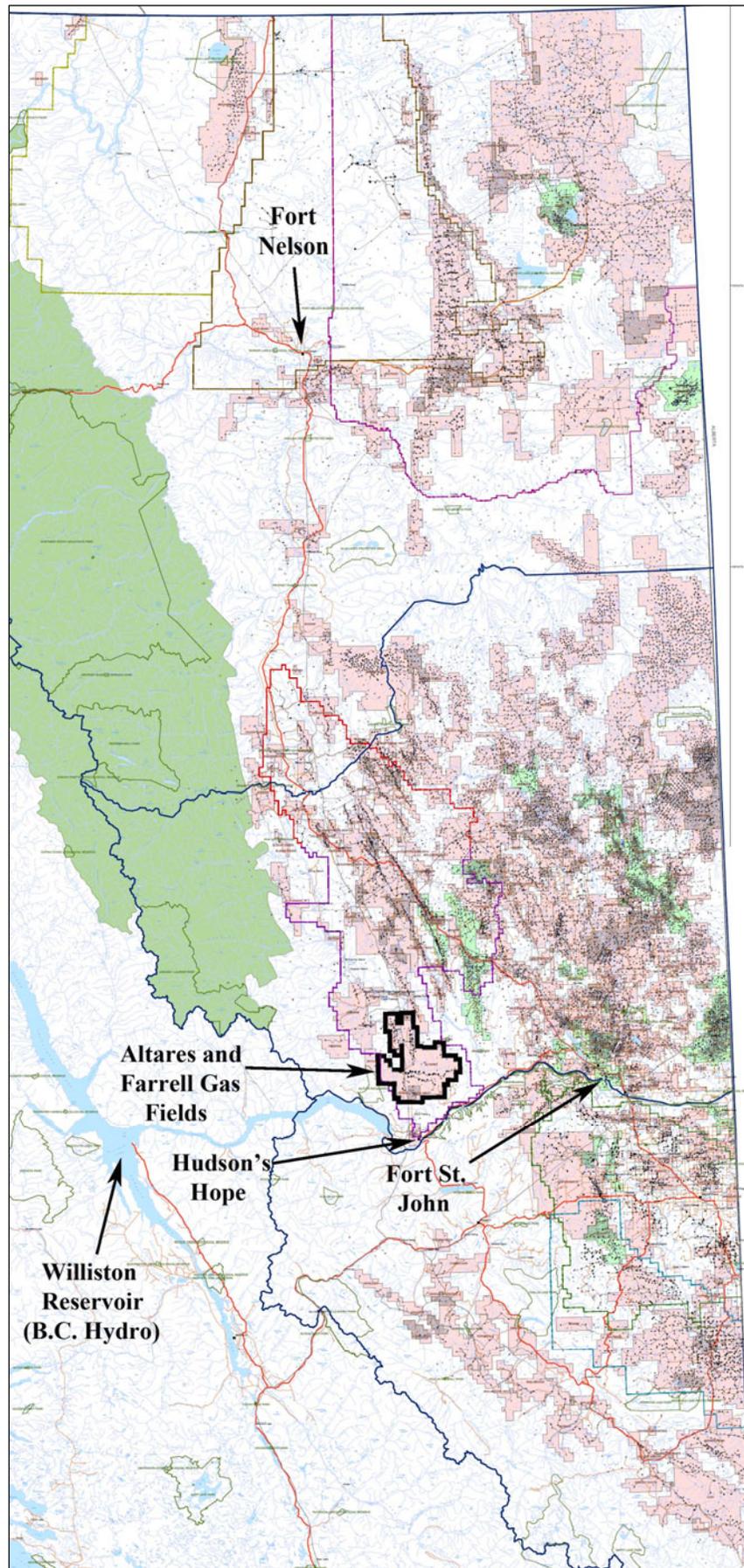
2. Location Maps

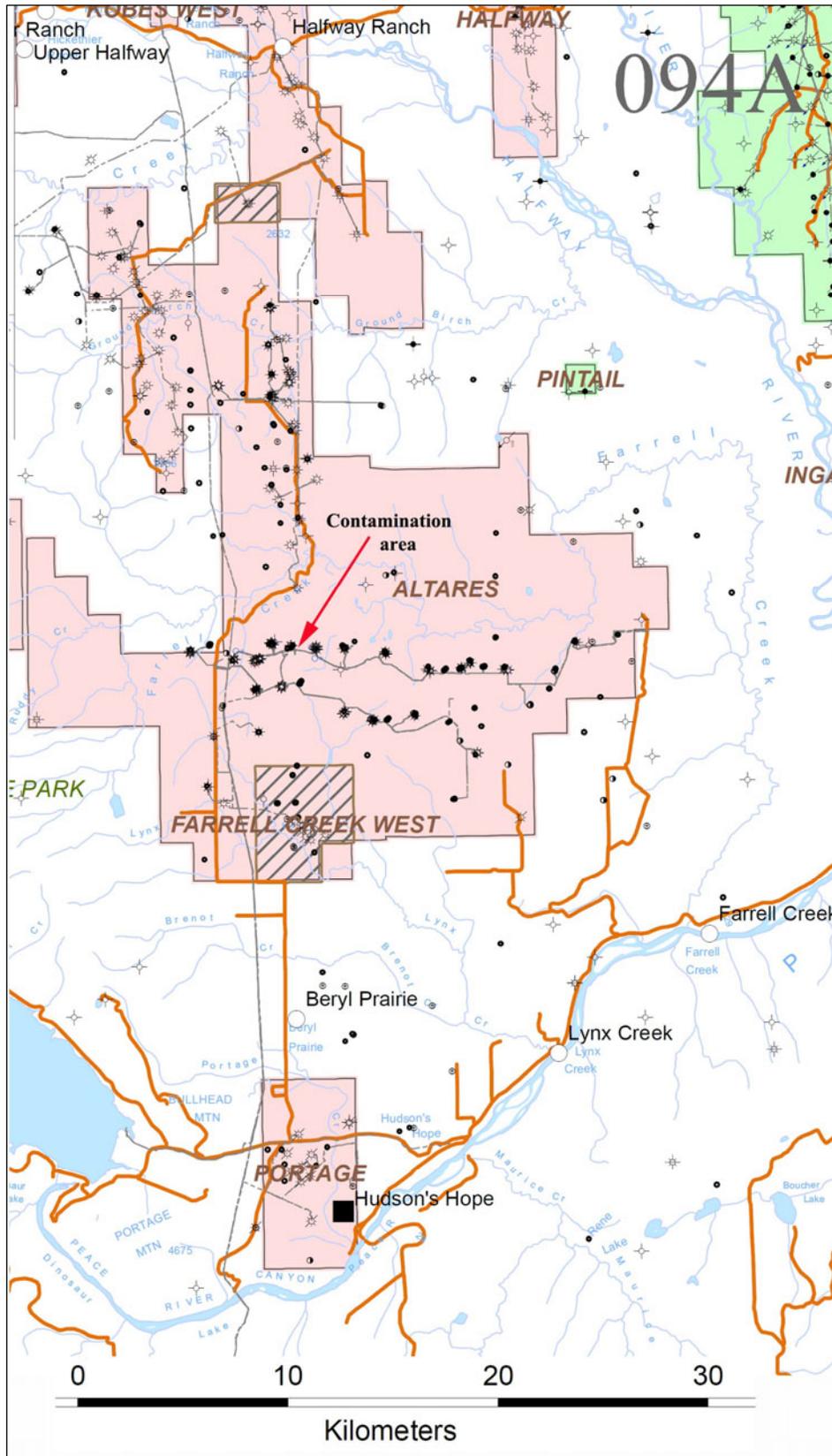
The Map on this page shows the perspective location and outline of the Altares and Farrell Gas Fields (bold black), located in northeast British Columbia, and directly north of the Town of Hudson's Hope. The approximate total area of the two inter-connected Gas Fields is 600 square kilometres.

For scale, on the map the straight horizontal distance between the Town of Fort Nelson and the Town of Fort St. John is exactly 300 kilometres.

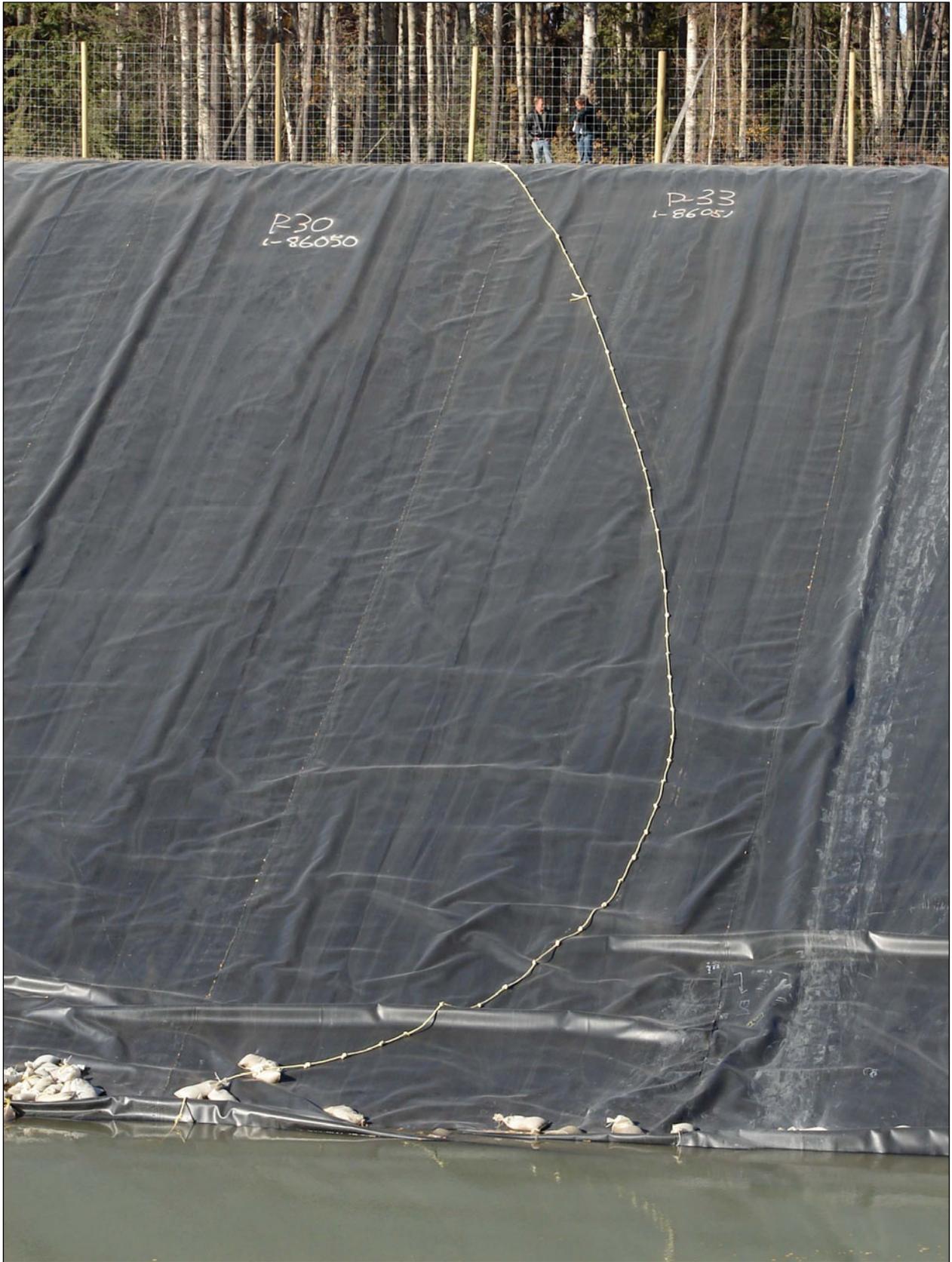
The pinkish-colored areas on the map are the other named or identified Gas and Oil Fields distributed throughout the Western Sedimentary Zone, now part of the fracking fields. Not shown are the geologic "play" zones for fracking, the Montney, Cordova Bay, Horn River, Liard, etc., within the pinkish and white areas. The Western Sedimentary zone area, from the bottom right corner of the map, and diagonally to the top left, represents about 15 percent of BC's total land base.

All the tiny black dots are the locations of oil and gas wells, some 30,000 or more drilled since 1957. About 16,500 wells were registered/and or drilled since the year 2000. About 8,600 wells were registered/and or drilled since the year 2006 when the practice of horizontal fracking became predominant in BC.





Location of the Altares and Farrell Gas Fields. The red arrow on the map pin-points the location of the groundwater contamination site. Bottom area shows the location of the Town of Hudson's Hope, with the eastern portion of the Williston Reservoir to bottom left (in blue), and the course of the Peace River.



Talisman's "Pond A" lined pit for storing fracking flow-back fluids, 12 metres deep, with a capacity of 30,000 cubic metres. For scale, note the two people at the top. Photo by the author, September 30, 2010.

3. Methodology

The “Surface Hole” (SH) government GIS data used to compile gas and/or oil data for well names, operator names, and well locations in this report for the Altares and Farrell Gas Fields was retrieved from the BC Oil and Gas Commission website in mid-November, 2013. That spreadsheet summary data was then carefully assessed using GIS software, and then identity and numeric data was transferred onto the main reference map - which is approximately 35 kilometres by 35 kilometres in representational area. The main reference map was stitched together from an long series of images downloaded from IMAP BC, with geographic fields showing contours, OGC data, roads, etc. at high definition. (Click link here to retrieve Main Reference Map)

The complete collection of the OGC summary data registered on the main reference map is replicated and available in Appendix A, where OGC well data is combined with Frac-Focus well data in a table with numerous categories.

Appendix A includes total volumes of “water” reported on by the three energy operators for each respective well group that was fracked, with a total figure for all volumes of water used by each energy operator. These registered water volumes used for fracking operations do not include the volumes of toxic and non-toxic additives used for fracking purposes which are separately indexed in the respective Frac-Focus data sheets in Appendix B.

Appendix B includes a navigable, hypertext index of all the 93 Frac-Focus website documents submitted by three energy operators in the Altares and Farrell Gas Fields - Talisman Energy (73 gas well documents), Canbriam Energy (14 gas well documents), and Progress Energy (6 gas well documents) - are incorporated as a complete unit, all 186 pages, where the interested or curious reader can analyze and scrutinize all of the fracking chemical additive ingredients (minus those “trade secrets”) to his/her heart’s content. In aid of such interest, all of the text in these documents is pdf word-searchable, and can be digitally copied and transferred to other working documents.



Toxic fracking flow-back fluids into two temporary lined containers alongside an active fracking operation on Talisman’s multi-well pad, 095-I/094-B-01. Note the two fake owls mounted on top of a branch poles, meant to frighten away unsuspecting birds and ducks from an unhappy, toxic fate. Photo by author, September 30, 2010.

4. Summary Analysis of the Table Data in Appendix A (Altares & Farrell Gas Fields)

4.a. Talisman Energy

Talisman currently has a total of **123** active gas wells, with a remaining **133** classified as inactive and or pending.

Since November 30, 2011 onward, Talisman has submitted **73** gas well data sheets to Frac-Focus from **19** pad locations (well name groups). It appears that Talisman has yet to submit three gas well data sheets to Frac-Focus, with one other entry as “suspect”.

Talisman has used a total **984,542.99** cubic metres of “water” to frack **73** wells, which is an average of **13,487** cubic metres of water per well. The Frac-Focus data sheets show that Talisman’s top five figures for cubic metres of water per well are as follows:

- **18,366** cu. m. (well # D-A, 090-L/094-A-04)
- **18,415** cu. m. (well # 04, 033-083-25)
- **18,420** cu. m. (well # B-A, 093-I/094-B-010)
- **18,824.2** cu. m. (well # A12, 036-083-25)
- **19,681.3** cu. m. (well # A-F, 092-I/094-B-01)

Talisman has not made public similar water use data on its **50** remaining active wells, prior to the Frac-Focus mandate of January 1, 2012.

4.b. Canbriam Energy

Canbriam currently has a total of **26** active gas wells, with a remaining **31** classified as inactive and or pending.

Since February 3, 2012 onward, Canbriam has submitted **14** gas well data sheets to Frac-Focus from **6** pad locations (well name groups). It appears that Canbriam has yet to submit six gas well data sheets to Frac-Focus.

Canbriam has used a total **171,098.82** cubic metres of “water” to frack **14** wells, which is an average of **12,221** cubic metres of water per well. The Frac-Focus data sheets show that Canbriam’s top five figures for cubic metres of water per well are as follows:

- **14,313.44** cu. m. (well # B-B, 034-H/094-B-08)
- **15,806.9** cu. m. (well # C-C, 027-H/094-B-08)
- **16,061.85** cu. m. (well # C-B, 027-H/094-B-08)
- **19,048.11** cu. m. (well # C-A, 044-H/094-B-08)
- **19,687.54** cu. m. (well # C-A, 027-H/094-B-08)

Canbriam has not made public similar water use data on its **12** remaining active wells, prior to the Frac-Focus mandate of January 1, 2012.

4.c. Progress Energy

Progress currently has a total of **22** active gas wells, with a remaining **19** classified as inactive and or pending.

Since August 16, 2012 onward, Progress has submitted **6** gas well data sheets to Frac-Focus from **3** pad locations (well name groups).

Progress has used a total **71,334.6** cubic metres of “water” to frack **6** wells, which is an average of **11,889** cubic metres of water per well. The Frac-Focus data sheets show that Progress’s six figures for cubic metres of water per well are as follows:

- **9,913.1** cu. m.
- **10,177.9** cu. m.
- **11,634.2** cu. m.
- **11,745.6** cu. m.
- **13,500.2** cu. m.
- **14,363.6** cu. m.

Progress has not made public similar water use data on its **13** remaining active wells, prior to the Frac-Focus mandate of January 1, 2012.

4.d. Natural Resources Limited

NRL currently has a total of **20** active gas wells, with a remaining **4** classified as inactive and or pending.

NRL has not submitted gas well data sheets to Frac-Focus, as it has not yet conducted fracking operations since January 1, 2012.

NRL has not made public water use fracking data on its **20** active wells, prior to the Frac-Focus mandate of January 1, 2012.

4.e. Crew Energy

Crew currently has a total of **4** wells classified as inactive and or pending.

4.f. Canadian Natural Resources Limited

CNRL currently has a total of **2** active gas wells, with a remaining **2** classified as inactive and or pending.

The OGC data shows that CNRL has an active gas well as of 2013. CNRL has yet to submit the single gas well data sheet to Frac-Focus.

4.g. Canadian Spirit Resources Inc. (CSRI)

CSRI currently has a total of **6** wells classified as inactive and or pending.

4.h. ARC Resources

ARC currently has a total of **2** wells classified as inactive and or pending.

4.i. Suncor

Suncor currently has a total of **4** wells classified as inactive and or pending. Though categorized as inactive, it appears that Suncor has yet to submit a single gas well data sheet to Frac-Focus.

4.j. Terra

Terra currently has a total of **1** well classified as inactive and or pending.

5. Summary Analysis Discussion - Water Volumes for Fracking Operations in the Montney and Horn River Basins

The three current and main operators - Talisman, Canbriam, and Progress - have **171** active wells in the Altares and Farrell Gas Fields, **93** active wells of which have been registered with Frac-Focus since November 30, 2011, with possibly ten, or more, wells unreported.

The data shows that the three operators used a combined total of **1,226,976.4** cubic metres of water to frack **93** wells, which is an average of **13,193** cubic metres per well. The precise volume of toxic and non-toxic additives are not known, and may be assumed to be about one percent of the total water volume, which totals about **12,270** cubic metres of additives. The total tonnage of frack sand that was used for fracking operations is not reported for any of the 93 wells.

The data shows that the current record for the highest registered volume use of water for fracking of a single well in the two Gas Fields (which are located in the upper northwest Montney Play formation) since November 2011 stands at **19,687.54** cubic metres by operator Canbriam.

However, even though these water volume use figures in the Altares Field may seem somewhat daunting, they pale in comparison to unbelievable figures released in a table on page 11 of an August, 2012 BC Oil and Gas Commission (OGC) report.

The report, [*Investigation of Observed Seismicity in the Horn River Basin*](#), makes reference to what appears to be the most outlandish and largest usage, per volume, of water used in any fracking operation in British Columbia, or perhaps in the entire world, to date. What is also interesting, the OGC report avoids naming the energy operators whose unprecedented fracking operations induced a series of numerous earthquake events.

According to well location data in the August 2012 OGC report, Encana Corporation's fracking operations on **seven** wells in the Horn River Basin in 2011 on pad **001-D/094-O-09** near and west of Two Island Lake (some 80 kilometres north of Fort Nelson) used an unprecedented total of **966,035** cubic metres of "fluid" (water combined with toxic and non-toxic additives), which is an average of **138,005** cubic metres of "fluid" per well (no data was included that registered the correct volume totals for each well). The horizontal wells far below ground extended as much as **2.727** kilometres away from the well pad.

Table 1. Identity and activities of Fracking Operators from Etsho Area data in *Investigation of Observed Seismicity in the Horn River Basin* and causal relationship of earthquakes

Operator	Well Pad/Group Identity	Fracking Period (month/year)	Number of Earthquakes	Total Fracking “Fluids” used (Cubic Metres)	Total Frack Sand Used (Tonnes)
Apache	052-L / 094-O-08	09-2009 to 04-2010	(suspect)		
Apache	070-K / 094-O-08	01-2010 to 04-2010	(suspect)		
Apache	034-L / 094-O-08	04-2011 to 05-2011	9	567,000 (9 wells)	28,800
Devon	087-G / 094-O-08	09-2010 to 10-2010	7		
Devon	100-G / 094-O-08		---	57,525 (5 wells)	3,550
EnCana	001-D / 094-O-09	05-2011 to 07-2011	9	966,035 (7 wells)	38,388
EnCana	070-J / 094-O-08	02-2009 to 06-2009	3	376,600 (7 wells)	18,844
EnCana	063-K / 094-O-08	05-2010 to 10-2010	13	1,508,332 (14 wells)	63,070
EnCana	076-K / 094-O-08	01-2011 to 03-2011	1	759,018 (13 wells)	31,902
EOG Resources	055-B / 094-O-09	10-2010 to 12-2010	(suspect)		
Nexen	018-I / 094-O-08	06-2010 to 07-2010	1		
Nexen	001-J / 094-O-08	07-2011 to 08-2011	3	471,861 (9 wells)	27,648
Spoke Resources	068-B / 094-O-15	12-2011	7		
Totals			39 shared earthquake / seismic events	4,706,371 (64 wells) Average of 73,537 cu.m. per well!	212,202 (64 wells) Average of 3,316 tonnes per well!

That average for EnCana’s 7 wells in the Horn Basin is just over **10 times greater** than Talisman Energy’s average use of 13,487 cubic metres per well of its 73 wells in the Altares Gas Field.

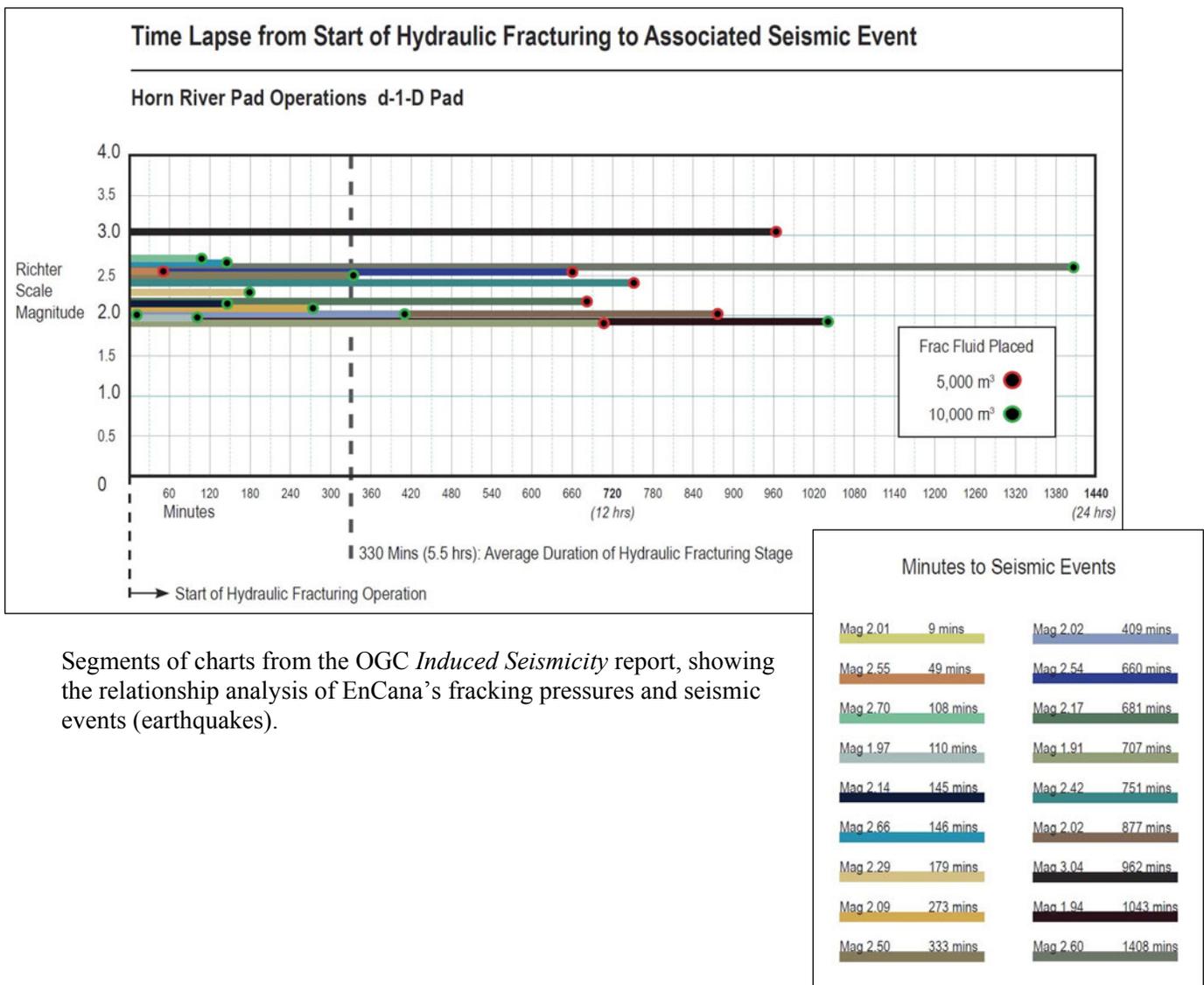
So fierce was the fracking pressure underground, the OGC reported that Encana’s fracking operations on pad **001-D/094-O-09** also stimulated **6 seismic events** (earthquakes), ranging from 2.5 to 3.1 on the Richter Scale (two events were at 3.1).

Accompanying its dubious Canadian record, the OGC reported that EnCana’s fracking operations for the seven wells on pad **001-D/094-O-09** used a total of **38,388 tonnes** of frack sand (proppant) specially transported from a mining area outside of BC. (There are about 92.3 cubic metres of frack sand per 100 tons: 38,388 tonnes is equal to about 35,400 cubic metres of frack sand. With each 42 foot-long railway car carrying 100 tons of frack sand to the Fort Nelson railway terminal, that’s 384 railway cars, stretching 16,128 delivery railway feet, or 5 kilometres in line-up distance!)

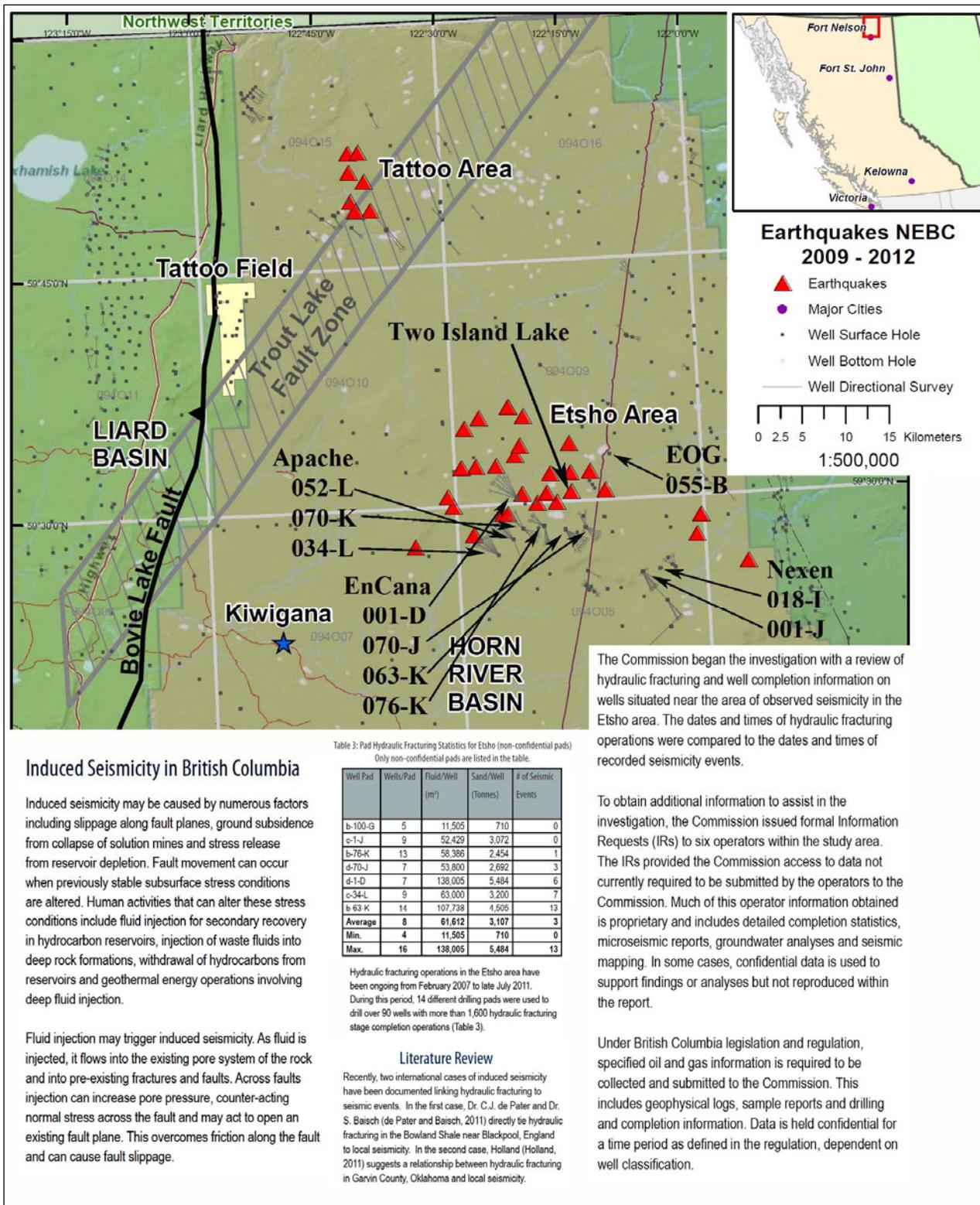
The author of this report wrote two reports in 2010, one on June 17 heralding the largest fracking operation on the planet by Apache Corp., [The World's Biggest Experimental Frack Job!! \(Fracking 24/7 ... Fracking All Night Long\) A Dubious Honour for British Columbia and, Water In-Fracking at 2 Island Lake?](#) Apache's operations are located in the Etsho area (see map, below) where the recent earthquake incidents occurred. Apache reportedly used **890,300** cubic metres of water to frack **16** wells on pad **70-K** in 2010, which is an average of **55,643** cubic meters of water per well.

In the second November 9, 2010 report, [EnCana's Cabin Not So Homey: Cumulative Environmental Effects, an Unfolding and Emerging Crisis in Northeastern British Columbia's Shale Gas Plays](#), it features how EnCana had conducted the largest and longest fracking operation in the world on pad **063-K/094-O-08**, breaking its fracking partner Apache's recent record. Though never admitted by EnCana, the 2010 report assumed that EnCana used about 1.86 million cubic metres of water to frack 14 wells by way of 400 separate fracks, over a period of about 174 days.

The August 2012 OGC report provides the correct figure, finally, for pad 063-K, where EnCana used **1,508,332** cubic metres of fracking "fluids," which is an average of **107,738** cubic metres of "fluids" for the 14 wells. That figure, enormous on its own, is **30,267** cubic metres shy of the per/well average record that Encana made in 2011, the following year, on pad **001-D/094-O-09**.



Segments of charts from the OGC *Induced Seismicity* report, showing the relationship analysis of EnCana's fracking pressures and seismic events (earthquakes).



Induced Seismicity in British Columbia

Induced seismicity may be caused by numerous factors including slippage along fault planes, ground subsidence from collapse of solution mines and stress release from reservoir depletion. Fault movement can occur when previously stable subsurface stress conditions are altered. Human activities that can alter these stress conditions include fluid injection for secondary recovery in hydrocarbon reservoirs, injection of waste fluids into deep rock formations, withdrawal of hydrocarbons from reservoirs and geothermal energy operations involving deep fluid injection.

Fluid injection may trigger induced seismicity. As fluid is injected, it flows into the existing pore system of the rock and into pre-existing fractures and faults. Across faults injection can increase pore pressure, counter-acting normal stress across the fault and may act to open an existing fault plane. This overcomes friction along the fault and can cause fault slippage.

Table 3: Pad Hydraulic Fracturing Statistics for Etsho (non-confidential pads)
Only non-confidential pads are listed in the table.

Well Pad	Wells/Pad	Fluid/Well (m ³)	Sand/Well (Tonnes)	# of Seismic Events
b-100-G	5	11,505	710	0
c-1-J	9	52,429	3,072	0
b-76-K	13	58,386	2,454	1
d-70-J	7	53,800	2,692	3
d-1-D	7	138,005	5,484	6
c-34-L	9	63,000	3,200	7
b-63-K	14	107,738	4,505	13
Average	8	61,612	3,107	3
Min.	4	11,505	710	0
Max.	16	138,005	5,484	13

Hydraulic fracturing operations in the Etsho area have been ongoing from February 2007 to late July 2011. During this period, 14 different drilling pads were used to drill over 90 wells with more than 1,600 hydraulic fracturing stage completion operations (Table 3).

Literature Review

Recently, two international cases of induced seismicity have been documented linking hydraulic fracturing to seismic events. In the first case, Dr. C.J. de Pater and Dr. S. Baisch (de Pater and Baisch, 2011) directly tie hydraulic fracturing in the Bowland Shale near Blackpool, England to local seismicity. In the second case, Holland (Holland, 2011) suggests a relationship between hydraulic fracturing in Garvin County, Oklahoma and local seismicity.

The Commission began the investigation with a review of hydraulic fracturing and well completion information on wells situated near the area of observed seismicity in the Etsho area. The dates and times of hydraulic fracturing operations were compared to the dates and times of recorded seismicity events.

To obtain additional information to assist in the investigation, the Commission issued formal Information Requests (IRs) to six operators within the study area. The IRs provided the Commission access to data not currently required to be submitted by the operators to the Commission. Much of this operator information obtained is proprietary and includes detailed completion statistics, microseismic reports, groundwater analyses and seismic mapping. In some cases, confidential data is used to support findings or analyses but not reproduced within the report.

Under British Columbia legislation and regulation, specified oil and gas information is required to be collected and submitted to the Commission. This includes geophysical logs, sample reports and drilling and completion information. Data is held confidential for a time period as defined in the regulation, dependent on well classification.

Segments from the OGC's *Induced Seismicity* report pasted together on one page. The identity of each energy operator is included on the map above, providing the names of fracking pads and arrows pointing to the fracking locations in the Etsho area, in the Horn River Basin, in the vicinity of Two Island Lake.

6. BC Frac-Focus

With mounting public pressure largely emanating from the United States for energy companies to disclose the toxic chemicals and ingredients used in fracking operations, industry was forced to create the Frac-Focus initiative, and the website where the public can review the limited data, as some additives are withheld under the proviso of “trade secrets.”

Keith Hall’s 2013 legal review article, [*Hydraulic Fracturing: Trade Secrets and the Mandatory Disclosure of Fracturing Water Composition*](#), published in the Idaho Law Review (49, 399), opened with the following summary:

Historically, the companies that perform hydraulic fracturing kept the composition of their fracturing fluids confidential, treating the compositions as trade secrets. But in recent years, many people expressed fears that hydraulic fracturing might be harmful to the environment, and they began pushing for regulations that would require companies to publicly disclose the composition of fracturing fluids. The push has been effective. Since mid-2010, about seventeen states have enacted mandatory disclosure regulations, and this count includes most of the states that have a significant amount of hydraulic fracturing activity. In addition, other states seem poised to adopt similar rules.

On August 1, 2011, the Tye’s Laura Dennis published an article, [*Unlike BC, Wyoming Won’t Allow Fracking Secrets*](#):

The chemicals used to extract shale gas continue to be a closely guarded corporate secret in British Columbia. But in Wyoming, disclosure of those chemicals is the rule. And that’s a practice environmentalists want to import to this province.



OUR VISION
To be the leading oil and gas regulator in Canada

MISSION
We regulate oil and gas activities for the benefit of British Columbians. We achieve this by:

- Protecting public safety,
- Respecting those affected by oil and gas activities,
- Conserving the environment, and
- Supporting resource development.

Through the active engagement of our stakeholders and partners, we provide fair and timely decisions within our regulatory framework.

We support opportunities for employee growth, recognize individual and group contributions, demonstrate accountability at all levels, and instill pride and confidence in our organization.

We serve with a passion for excellence.

Concerns and Considerations in Developing Laws and Regulations

- Safe drinking water
- Protection of aquifers and surface water
- Amount of water used/taken
- Fluid components
- Likelihood of interaction between the “frac” and water sources
- Seismic events

The chemicals -- which vary from company to company but are known in the United States to sometimes include carcinogens and explosives -- are mixed with sand and high-pressurized water and then injected into rock formations that contain shale gas.

In an email interview with The Tyee, the head of Wyoming's oil and gas conservation commission Tom Doll explained the governor in office at the time wanted to toughen up the rules around shale gas development.

As a result, explained Doll, oil and gas companies must now "submit a plan detailing the chemical additives and receive approval prior to doing well stimulation" -- another term for fracking.

But, he said, "more importantly, post-stimulation, the operator must disclose what chemical compounds, types, and concentrations or rates were actually injected into the well."

For example, Encana Corp. -- which also operates shale gas wells in northeastern British Columbia -- has revealed the chemicals they're using at one Wyoming drilling site include: boric acid, an insecticide; tettrakis (hydroxymethyl) phosphonium sulfate, another insecticide; and heavy aromatic naphtha, which is similar to gasoline.

However, the state's new regulations are far from perfect.

"The owner, operator or service company may request well data confidentiality," revealed Doll.

"(They) may also provide a written request to hold 'trade secret' chemistry confidential. However, the rules still require disclosure of the chemistry to the Supervisor."

States such as Arkansas, Michigan and Pennsylvania have followed in Wyoming's footsteps, approving their own disclosure rules. Other jurisdictions have gone even further, including Quebec where fracking has been banned outright.

As a result of growing public awareness and concerns, in British Columbia the BC Oil and Gas Commission (OGC) eventually made mandatory reporting of fracking operations data to Frac-Focus on January 1, 2012. That initiative was announced in a December 19, 2011 OGC Industry Bulletin (2011-13), [Submission Information for Disclosure of Hydraulic Fracturing Fluids](#):

The BC Oil and Gas Commission (Commission) will be implementing mandatory disclosure of hydraulic fracturing fluids beginning Jan. 1, 2012, as announced by the province earlier this year.

The Commission has made changes to its online submission portal (KERMIT) to facilitate the new requirements. Fracture fluid reports will only be accepted electronically and submissions can be made on a voluntary basis immediately. Submitted reports will be made available to the public through the disclosure website, which is anticipated to be launched in January 2012.

Each company has designated one or more individuals as company administrators within the KERMIT application. The company administrator must assign the “Frac Fluid Reporting” role to all staff who will be entering the disclosure information.

On January 12, 2012, the OGC published the [Fracture Fluid Report Upload Manual](#) (Version 1.1) for BC’s energy operators: “The Province of British Columbia has committed to the disclosure of hydraulic fracture fluid ingredients and this intuitive manual will take you through the step-by-step process to successfully upload your data:”

*Each company must designate one or more individuals as company administrators within the KERMIT application. The company administrator is required to assign the “Frac Fluid Reporting” role to all staff responsible for entering the disclosure information on their company’s behalf. For instructions on how to assign roles within the KERMIT application, please refer to the following document:
<http://bcogc.ca/documents/guidelines/Company%20Admin.pdf>.*



Talisman Energy’s fracking operations on pad 092-I/094-B-01, with the rig tower reflecting in a toxic pool of flow-back fluids. Note the large pad, recently cleared of standing Crown land forest. Photo by author, September 30, 2010.

6.a. BC Energy Operators: Frac-Focus

As of late November, 2013, the Frac-Focus website lists the following 41 energy company / corporation operators in northeast British Columbia as current fracking operations data submitters, seven of which are operators in the Altares and Farrell Gas Fields (highlighted in bold red):

- **ARC Resources Ltd.**
- Apache Canada Ltd.
- Artek Exploration Ltd.
- Baytex Energy Ltd.
- Black Swan Energy Ltd.
- Bonavista Energy Corporation
- **Canadian Natural Resources Limited**
- **Canbriam Energy Inc.**
- Carmel Bay Exploration Ltd.
- Carnaby Energy Ltd.
- ConocoPhillips Canada Operations Ltd.
- ConocoPhillips Canada Resources Corp.
- **Crew Energy Inc.**
- Crocotta Energy Inc.
- Dejour Energy (Alberta) Ltd.
- Devon Canada Corporation
- Devon NEC Corporation
- EnCana Corporation
- Enerplus Corporation
- Imperial Oil Resources Limited
- Murphy Oil Company Ltd.
- Nexen Energy ULC
- Painted Pony Petroleum Ltd.
- Paramount Resources Ltd.
- Pengrowth
- PennWest
- Procyon Energy Corp.
- **Progress Energy Canada Ltd.**
- Quicksilver Resources Canada Inc.
- Ramshorn Canada Investments Ltd.
- Secure Energy Services Inc.
- Shell Canada Limited
- Sinopec Daylight Energy Ltd.
- Storm Resources Ltd.
- **Suncor Energy Inc.**
- TAQA North Ltd.
- **Talisman Energy Inc.**
- Tervita Corporation
- Tourmaline Oil Corp.
- UGR Blair Creek Ltd.
- Yoho Resources Inc.

7. Disclosure Recommendation to BC Government

As energy operators have only been required by the OGC to report fracking data from January 1, 2012 onward, the BC government must make mandatory the missing information, whereby all BC operators must file with the OGC all of their fracking data prior to January 1, 2012 (whether confidential, or otherwise).



Talisman Energy's fracking operations on pad 074-I/094-B-01, with the rig towers reflecting in a large water storage pit. Note the large pad, recently cleared of standing Crown land forest. Photo by author, September 30, 2010. For more, refer to the author's October 13, 2010 report, [*24/7 Less Peace in the Peace - Recent Photos and Commentary of Talisman Energy Inc.'s Fracking Operations North of Hudson's Hope, British Columbia, September 30 - October 3, 2010.*](#)

APPENDIX A: List of Active and Non-Active Energy Wells in the Altares and Farrell Gas Fields (Data from Mid-November, 2013), with Frac-Focus Document Data by Energy Operators (with active links)

1. Talisman Energy

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	31-083-24	---	0	---	14, A-14, B-14 C-14, D-14,	5	About-to-be Fracked
17-084-24	04	Same	Same	1	0	---	1	15,528
---	---	08-083-25	---	0	---	02, A02, B02, C02	4	---
16-083-25	11, A11, B11	Same	Same	3	0	06	4	38,054
19-083-25	11, A11, B11, C11	Same	Same	4	0	10, A10, B10, C10, D10, E10, F10, G10	12	46,291
---	---	20-083-25	---	0	---	06, 07	2	---
---	---	21-083-25	---	0	---	06, 13, A13, 14, A14	5	---
---	---	22-083-25	A16 (2013)	1	1	16, B16,	3	Unreported to Frac-Focus
26-083-25	15, A15, B15, C15	Same	Same	4	0	D15, E15, F15, G15, 06, A06, B06, C06	12	35,057.4
27-083-25	13, A13, B13, C13	Same	Same	2	---	---	4	37,747
---	---	29-083-25	---	0	---	14, 16, A16	3	---
30-083-25	A16, B16, C16	Same	Same	3	0	16	4	41,423.8
31-083-25	01, A01, B01, C01, D01	Same	Does not report D01 as Active	5	0	---	5	59,181.31
32-083-25	01, A01, B01, E01	Same	Same	4	0	03, C01, D01	7	58,069.7

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
33-083-25	04, A02, A04, B02, B04, C02, C04	Same	Same	7	0	02, D02, D04, E02, E04, F02, F04, G02, G04, 16, A16, B16, C16	20	85,415.73
---	---	34-083-25	---	0	---	04, A04, B04, C04	4	---
36-083-25	12, A12,13	Same	12, A12, B12 , 13, A13 , B13	6	3	A10 (2007) C13, D13	9	50,367.7 (Suspect)
---	---	24-083-26	---	0	---	09, A09, 10, A10, B10, C10, D10, E10	8	---
36-083-26	07, A07, 10, A10	Same	Same	4	0	B07, C07, B10, C10	8	64,773.37
---	---	10-085-25	---	0	---	A06	1	---
---	---	065-I / 094-B-01	C, C-A, C-B, C-C, C-D, C-E	6	---	C-F, C-G, C-H C-I, C-J, C-K C-L, C-M	15	Unreported - Pre Frac-Focus
073-I / 094-B-01	A-A, A-B, A-C	Same	Same	3	0	A, A-D, A-E, A-F, A-G, A-H	9	40,120
---	---	074-I / 094-B-01	A, A-A, A-B, A-C, A-D, A-E, A-F (2011)	7	---	---	7	Unreported - Pre Frac-Focus
---	---	082-I / 094-B-01	D, D-A (2011)	2	---	D-B, D-C	4	Unreported - Pre Frac-Focus
085-I / 094-B-01	B-B, B-C, B-D, B-E, B-F, B-G	Same	C (2010), C-A (2009), C-B (2009), C-C (2009), C-D (2011), B (2011), B-A (2011)	13	0	---	13	76,428.2 Unreported - Pre Frac-Focus
---	---	087-I / 094-B-01	A, D, A-B, D-B, D-C (2011)	4	---	C, D, A-A,	7	Unreported - Pre Frac-Focus
---	---	089-I / 094-B-01	C, C-A, C-D, C-E, C-F, C-G (2010-2011)	6	---	C-B, C-C,	8	Unreported - Pre Frac-Focus

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
092-I / 094-B-01	A-C, A-D, A-E, A-F	Same	A-A (2010), A-B (2011), A-G (2012)	7	0	A	8	68,984.45 Unreported - Pre Frac-Focus
093-I / 094-B-01	B, B-A, B-B	Same	Same	3	0	B-C, B-D, B-E B-F, B-G, B-H B-J, B-K	11	47,450 (Suspect)
094-I / 094-B-01	B-J, B-K, B-L	Same	B (2011), B-A (2011), B-C (2011), B-D (2011), B-E (2010), B-F (2010), B-G (2010)	10	0	B-B, B-H, B-I	13	42,449.8 Unreported - Pre Frac-Focus
---	---	095-I / 094-B-01	---	0	---	A, A-A, A-B, A-C	4	---
---	---	098-I / 094-B-01	---	0	---	B, B-A, B-B, B-C, B-D, B-E B-F, B-G, B-H	9	---
058-L / 094-A-04	B, B-A, B-B, B-C, B-E, B-F, B-H, B-I	Same	Same	8	0	B-D, B-G	10	108,864.02
---	---	060-L/094-A-04	D, D-B, D-C, C-A, C-B (2011) C (2012)	6	---	D-A	7	Unreported - Pre Frac-Focus & Unreported to Frac-Focus
090-L / 094-A-04	D, D-A, D-B	Same	Same	3	0	---	3	51,935.51
100-L / 094-A-04	A	Same	Same	1	0	A-A, A-B, A-C, A-D, B, B-A	7	16,402
TOTAL	73			123	4		256	984,542.99

2. Canbriam Energy

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	05-083-24	---	0	---	05	1	Unreported - Pre Frac-Focus
07-083-24	12	Same	Same	1	---	---	1	1,169.5
---	---	31-083-24	---	0	---	01, 14, A14, C14, D14	5	Unreported - Pre Frac-Focus - Drilling Activity (2013) - Unreported to Frac-Focus
---	---	24-083-25	---	0	---	03 (2013)	1	- Unreported to Frac-Focus
---	---	25-083-25	---	0	--	01	1	---
---	---	01-085-26	---	0	---	15, A15, B15, C15	4	Unreported to Frac-Focus - Drilling Activity (2013)
---	---	017-I / 094-B-01	B (2011)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	018-I / 094-B-01	C, C-B (2011)	2	---	C-A, C-C	4	Unreported - Pre Frac-Focus
---	---	045-I / 094-B-01	---	0	---	C	1	---
---	---	048-I / 094-B-01	C-A (2011)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	053-A / 094-B-08	D (2009)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	054-A / 094-B-08	---	0	---	A	1	---
---	---	064-A / 094-B-08	A (Sept. 30, 2013)	1	---	---	---	Unreported to Frac-Focus
---	---	074-A / 094-B-08	---	0	---	B-A (2013 - Drilling) B-B, B-C	3	---
---	---	004-H / 094-B-08	---	0	---	C, CA, CB	3	---
---	---	006-H / 094-B-08	---	0	---	B	1	---

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	014-H / 094-B-08	C-B (December, 2011), C-C (2009)	2	---	---		C-B Unreported to Frac-Focus - Unreported - Pre Frac-Focus
--	---	017-H / 094-B-08	---		---	C	1	
023-H / 094-B-08	C, C-A, C-B	Same	Same	3	---	---	3	27,739.53
024-H / 094-B-08	B-B	Same	Same	1	---	B-C, B-D, B-E, B-F	5	10,260.6
027-H / 094-B-08	C, C-A, C-B, C-C	Same	Same	4	---	---	4	62,578.32
---	---	033-H / 094-B-08	---	0	---	C	1	
034-H / 094-B-08	B, B-A, B-B	Same	Same	3	---	B-C	4	36,917.31
044-H / 094-B-08	C, C-A	Same	Same	2	---	C-B	3	32,433.556
---	---	064-H / 094-B-08	C (2009), C-A (2011) C-B (January 2012) C-C (March 2012)	4	---	C-D, C-E, C-F	7	C-B, C-C Unreported to Frac-Focus - Unreported - Pre Frac-Focus
Total	14			26			57	171,098.82

3. Progress Energy

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	067-I / 094-B-01	---	0	---	B-A	1	---
---	---	080-A / 094-B-08	---	0	---	A	1	---
---	---	083-A / 094-B-08	A (1994)	1	---	---	1	---
---	---	094-A / 094-B-08	---	0	---	D	1	---
---	---	100-A / 094-B-08	B (2007)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	081-B / 094-B-08	D (2007)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	093-B / 094-B-08	---	0	---	D	1	---
---	---	022-G / 094-B-08	---	0	---	B	1	---
---	---	041-G / 094-B-08	B (2005)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	042-G / 094-B-08	B (2006)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	062-G / 094-B-08	D (2003)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	063-G / 094-B-08	A (2006)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	064-G / 094-B-08	---	0	---	D	1	---
---	---	066-G / 094-B-08	---	0	---	A	1	---
---	---	071-G / 094-B-08	B (2006)	1	---	---	1	Unreported - Pre Frac-Focus
075-G / 094-B-08	A, A-A	Same	Same	2	---	A-B, A-C	4	21,658.7
---	---	082-G / 094-B-08	B (1994)	1	---	---	1	---
---	---	084-G / 094-B-08	D (2006)	1	---	---	1	Unreported - Pre Frac-Focus
093-G / 094-B-08	B-A, B-B	Same	B (2004)	3	---	B-C, B-D	5	27,863.8
---	---	095-G / 094-B-08	A (2006)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	010-H / 094-B-08	A (2006)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	020-H / 094-B-08	C (2006)	1	---	---	1	Unreported - Pre Frac-Focus

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	030-H / 094-B-08	C (2006)	1	---	---	1	Unreported - Pre Frac-Focus
---	---	077-H / 094-B-08	---	0	---	D	1	---
---	---	004-J / 094-B-08	D (2006)	1	---	---	1	Unreported - Pre Frac-Focus
007-J / 094-B-08	C, C-A	Same	Same	2	---	C-B, C-C, C-D, C-E	6	21,812.1 About-to-be Fracked
---	---	012-J / 094-B-08	---	0	---	B, B-A, B-B	3	---
Total	6			22			41	71,334.6

4. Natural Resources Limited

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	023-A / 094-B-08	A (2010)	1			1	Unreported - Pre Frac-Focus
---	---	043-A / 094-B-08	A (2010), B (2006)	2			2	Unreported - Pre Frac-Focus
---	---	055-A / 094-B-08		0		D	1	About-to-be Fracked
---	---	064-A / 094-B-08	D (2010)	1		A	2	Unreported to Frac-Focus & Unreported - Pre Frac-Focus
---	---	071-A / 094-B-08	C (2006)	1			1	Unreported - Pre Frac-Focus
---	---	074-A / 094-B-08	B (2011)	1			1	Unreported - Pre Frac-Focus

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	082-A / 094-B-08	C, C-A (2008)	2			2	Unreported - Pre Frac-Focus
---	---	003-H / 094-B-08	A-A (2006), D (2007)	2			2	Unreported - Pre Frac-Focus
---	---	013-H / 094-B-08	C (2007)	1			1	Unreported - Pre Frac-Focus
---	---	014-H / 094-B-08	C-A (2007), C-B (2011)	2			2	Unreported - Pre Frac-Focus
---	---	033-H / 094-B-08	A (2006), B (2007), B-A (2007), B-B (2008) B-C (2010)	5			5	Unreported - Pre Frac-Focus
---	---	044-H / 094-B-08	D-A (2010)	1		D	2	Unreported - Pre Frac-Focus
---	---	053-H / 094-B-08	B (2008)	1			1	Unreported - Pre Frac-Focus
---	---	079-H / 094-B-08				B	1	---
Total				20			24	---

5. Crew Energy

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	10-084-24	---	0	---	01	1	---
---	---	13-084-25	---	0	---	12	1	---
---	---	22-084-25	---	0	---	09, 10	2	---
Total				0			4	---

6. Canadian Natural Resources Limited

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	016-G / 094-B-08	---	0	---	C	1	---
---	---	024-G / 094-B-08	---	0	---	B	1	---
---	---	046-G / 094-B-08	D (2013)	1	---		1	Unreported to Frac-Focus
---	---	061-G / 094-B-08	A (2006)	1	---		1	---
Total				2			4	

7. Canadian Spirit Resources Inc. (CSRI)

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	12-083-25	---	0	---	01, A01	2	---
---	---	15-083-25	---	0	---	04,	1	---
---	---	083-H / 094-B-01	---	0	---	C, CA	2	---
---	---	004-I / 94-B-01	---	0	---	A	1	---
Total				0			6	

8. ARC Resources

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	16-084-24		0	---	16	1	---
---	---	20-084-24		0	---	04	1	---
Total				0			2	

9. Suncor

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	12-084-26	---	0	---	15, 16, A16	3	---
---	---	029-I / 094-B-08	---	0	---	C (2013)	1	Unreported to Frac-Focus
Total				0			4	

10. Terra

FRAC-FOCUS ENTRY - Well Name Group Location	FRAC-FOCUS ENTRY - Active Well Names	OGC DATA - Well Name Group Location	OGC DATA - Active Well Names (Pre- and Post-Frac Focus)	Total Active Wells	FRAC FOCUS - Active Wells Missing	OGC DATA - Non-Active Well Names	Total Wells - Active and non-Active	FRAC FOCUS Water Volumes - Wells Reported (cubic metres)
---	---	061-H / 094-B-08	---	0	---	C	1	---
Total				0			1	

APPENDIX B: Frac-Focus Documents - Talisman Energy, Canbriam Energy, Progress Energy - Altares Gas Field Operators, and External Link to Main Reference Map

The long list of Frac-Focus documents following these first two pages of gas well lists for each energy operator appear in the identical, numerical order as presented in Appendix A.

The gas well bullets listed on these first two pages of individual wells is where the reader can hyper-text link directly to the Frac-Focus well documents below. There are return hyperlinks created on the top left corner of each separate Frac-Focus document - found on the Operator and Well names in the green-shaded table - which will direct the reader back to these first two index pages. The well group location numbers or identities on this page (bold numbers) are the well pad groups featured in red rectangular boxes on the main reference map. Due to the large size format of the main reference map, it is separated from this report, found at this link.

Talisman Energy

17-084-24	26-083-25	31-083-25	33-083-25	073-I/094-B-01	093-I/094-B-01	090-L/094-A-04
• 04	• 15	• 01	• 04	• A-A	• B	• D
	• A15	• A01	• A02	• A-B	• B-A	• D-A
	• B15	• B01	• A04	• A-C	• B-B	• D-B
16-083-25	• C15	• C01	• B02	085-I/094-B-01	094-I/094-B-01	
• 11		• D01	• B04	• B-B	• B-J	100-L/094-A-04
• A11	27-083-25		• C02	• B-C	• B-K	• A
• B11	• 13	32-083-25	• C04	• B-D	• B-L	
	• A13	• 01	36-083-25	• B-E		
19-083-25	• B13	• A01	• 12	• B-F	058-L/094-A-04	
• 11	• C13	• B01	• A12	• B-G	• B	
• A11		• E01	• 13		• B-A	
• B11	30-083-25		36-083-26	092-I/094-B-01	• B-B	
• C11	• A16		• 07	• A-C	• B-C	
	• B16		• A07	• A-D	• B-E	
	• C16		• 10	• A-E	• B-F	
			• A10	• A-F	• B-H	
					• B-I	

Canbriam Energy

07-083-24

- 12

023-H/094-B-08

- C
- C-A
- C-B

024-H/094-B-08

- B-B

027-H/094-B-08

- C
- C-A
- C-B
- C-C

034-H/094-B-08

- B
- B-A
- B-B

044-H/094-B-08

- C
- C-A

Progress Energy

075-G/094-B-08

- A
- A-A

093-G/094-B-08

- B-A
- B-B

007-J/094-B-08

- C
- C-A

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	01/06/2012
Province:	BC
Region:	Altares
Well Number:	27532
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 04-17-084-24
Longitude:	-121.455732
Latitude:	56.163642
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	15,528

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FR-9	Trican	Friction Reducer	petroleum distillate	64742-47-8	0.28%	0.00025%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
Busan 94	Trican	Biocide	2,2-dibromo-3-nitripropionamide	10222-01-2	0.30%	0.00004%	
			Sodium bromide	7647-15-6	0.04%	0.00000%	
			Polyethylene glycol	25322-68-3	0.60%	0.00007%	
			Dibromoacetoneitrile	3252-43-5	0.03%	0.00000%	
SI-2	Trican	Scale Inhibitor	Methanol	67-56-1	0.20%	0.00006%	
			Organic phosphonate 1		0.30%	0.00009%	
			Organic phosphonate 2		0.10%	0.00003%	
			Ammonium chloride	12125-02-9	0.10%	0.00003%	
			Amine salt		0.05%	0.00001%	
			Oxyalkylated polyamine		0.05%	0.00001%	
HCL 15%	Trican	Acid	hydrochloric acid	7647-01-0	0.15%	0.00072%	
			water	7732-18-5	0.85%	0.00410%	
S-8	Trican	Acid add. for gas wells	Methanol	67-56-1	0.60%	0.00000%	
			Oxyalkylated alkylphenolic resin	30704-64-4	0.30%	0.00000%	
			Polyglycol diepoxide	68036-95-3	0.05%	0.00000%	
			Polyglycol diepoxide	68036-92-0	0.05%	0.00000%	
			Xylene	1330-20-7	0.05%	0.00000%	
			Light aromatic naphtha	64742-95-6	0.05%	0.00000%	
			1,2,4-Trimethylbenzene	95-63-6	0.01%	0.00000%	
			Ethylbenzene	100-41-4	0.01%	0.00000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			1,3,5-Trimethylbenzene	108-67-8	0.01%	0.00000%	
IC-3	Trican	Acid add. for gas wells	Sodium nitrilo-triacetate, monohydrate	18662-53-8	0.99%	0.00004%	
AI-9	Trican	Acid add. for gas wells	Methanol	67-56-1	0.60%	0.00000%	
			Polyoxyalkylenes	68951-67-7	0.30%	0.00000%	
			Modified thiourea polymer	68527-49-1	0.30%	0.00000%	
			Propargyl alcohol	107-19-7	0.10%	0.00000%	
			Olefin	64743-02-8	0.05%	0.00000%	
DF-1	Trican	Acid add. for gas wells	Undisclosed		1.00%	0.00000%	
Proppant	Trican	Proppoant	crystalline silica	14808-60-7	1.00%	0.11550%	
Water	Trican	water	water	7732-18-5	1.00%	0.87829%	
WG-3L	Trican	Gell	Undisclosed		1.00%	0.00002%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/06/2012
Province:	BC
Region:	Altares
Well Number:	27774
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 11-16-083-25
Longitude:	-121.533723
Latitude:	56.114561
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,863.8

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	86.89457%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.07109%	
			water	7732-18-5	85.00%	0.40474%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00047%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00023%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00004%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00004%	
			xylene	1330-20-7	5.00%	0.00004%	
			light aromatic naphtha	64742-95-6	5.00%	0.00004%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00001%	
			ethylbenzene	100-41-4	1.00%	0.00001%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00220%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00028%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00028%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00028%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00001%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00005%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.03094%	
			ammonium chloride	12125-02-9	1.50%	0.00166%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02033%	
			Water	7732-18-5	50.00%	0.01695%	
			Methanol	67-56-1	0.50%	0.00017%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01026%	
			non-hazardous ingredients		60.00%	0.01026%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00062%	
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00256%	
			isopropanol	67-63-0	40.00%	0.00171%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00021%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00021%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00097%	HMIRC #7947
			water	7732-18-5	65.00%	0.00157%	HMIRC #7947
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	12.45649%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/06/2012
Province:	BC
Region:	Altares
Well Number:	28088
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A11-16-083-25
Longitude:	-121.533668
Latitude:	56.114618
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	12,236.7

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	86.94364%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.10783%	
			water	7732-18-5	85.00%	0.61390%	
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	12.00274%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00213%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00106%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00018%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00018%	
			xylene	1330-20-7	5.00%	0.00018%	
			light aromatic naphtha	64742-95-6	5.00%	0.00018%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00004%	
			ethylbenzene	100-41-4	1.00%	0.00004%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00004%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00199%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00043%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00043%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00043%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00001%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00707%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02132%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Water	7732-18-5	50.00%	0.01777%	
			Methanol	67-56-1	0.50%	0.00018%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01090%	
			non-hazardous ingredients		60.00%	0.01090%	
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00516%	
			isopropanol	67-63-0	40.00%	0.00344%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00043%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00043%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00153%	HMIRC #7947
			water	7732-18-5	65.00%	0.00248%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00079%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02255%	
			ammonium chloride	12125-02-9	1.50%	0.00121%	
Breaker SR	Trican	Breaker	potassium persulfate	7727-21-1	90.00%	0.00638%	
			crystalline silica	14808-60-7	30.00%	0.00213%	
CC-55	Trican	Clay Control	1,3-propanediaminium-2-substitued, -hexaalkyl-, di halide		60.00%	0.01753%	HMIRC #7744
			formic acid	64-18-6	5.00%	0.00146%	HMIRC #7744
GBE-1:5	Trican	Enzyme Breaker	propylene glycol	57-55-6	70.00%	0.00028%	
GNE-1	Trican	Non-emulsifier	propylene glycol	57-55-6	60.00%	0.00735%	
WG-111L	Trican	Polymer	middle hydrotreated petroleum distillate	64742-46-7	60.00%	0.04519%	
			polysaccharide blend		60.00%	0.04519%	
WXB-10	Trican	Crosslinker	light hydrotreated petroleum distillate	64742-47-8	60.00%	0.02737%	
			borate salts	1319-33-1	60.00%	0.02737%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/06/2012
Province:	BC
Region:	Altares
Well Number:	28090
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B11-16-083-25
Longitude:	-121.533641
Latitude:	56.114647
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	11,953.5

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	87.13689%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.08268%	
			water	7732-18-5	85.00%	0.47073%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00054%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00027%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00005%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00005%	
			xylene	1330-20-7	5.00%	0.00005%	
			light aromatic naphtha	64742-95-6	5.00%	0.00005%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00001%	
			ethylbenzene	100-41-4	1.00%	0.00001%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00256%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00033%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00033%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00033%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00001%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00005%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02979%	
			ammonium chloride	12125-02-9	1.50%	0.00160%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02062%	
			Water	7732-18-5	50.00%	0.01718%	
			Methanol	67-56-1	0.50%	0.00017%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01024%	
			non-hazardous ingredients		60.00%	0.01024%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00122%	
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00282%	
			isopropanol	67-63-0	40.00%	0.00188%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00024%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00024%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00118%	HMIRC #7947
			water	7732-18-5	65.00%	0.00192%	HMIRC #7947
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	12.13801%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/22/2013
Province:	BC
Region:	Altares
Well Number:	27393
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 11-19-083-25
Longitude:	-121.562825
Latitude:	56.124402
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	15,624

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.86352%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00001%	
			2-ethylhexanol	104-76-7	0.10%	0.00000%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00000%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00003%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00001%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00039%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00057%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%	0.00001%	HMIRC #7948
			quaternary ammonium compound		0.30%	0.00001%	HMIRC #7948
			non-hazardous ingredients		0.10%	0.00000%	HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%	0.00000%	HMIRC #7947
			water	7732-18-5	0.65%	0.00000%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%	0.00000%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13491%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00011%	
			non-hazardous ingredients		0.60%	0.00011%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/23/2013
Province:	BC
Region:	Altares
Well Number:	27394
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A11-19-083-25
Longitude:	-121.562775
Latitude:	56.124418
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	18,054

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.89337%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00001%	
			2-ethylhexanol	104-76-7	0.10%	0.00000%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00000%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00003%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00001%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00047%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00069%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%	0.00005%	HMIRC #7948
			quaternary ammonium compound		0.30%	0.00003%	HMIRC #7948
			non-hazardous ingredients		0.10%	0.00001%	HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%	0.00002%	HMIRC #7947
			water	7732-18-5	0.65%	0.00003%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%	0.00000%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.10473%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00022%	
			water	7732-18-5	0.50%	0.00018%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00011%	
			non-hazardous ingredients		0.60%	0.00011%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/24/2013
Province:	BC
Region:	Altares
Well Number:	28457
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B11-19-083-25
Longitude:	-121.563163
Latitude:	56.124853
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	12,613

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.90249%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00001%	
			2-ethylhexanol	104-76-7	0.10%	0.00000%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00000%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00005%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00031%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00045%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%	0.00007%	HMIRC #7948
			quaternary ammonium compound		0.30%	0.00003%	HMIRC #7948
			non-hazardous ingredients		0.10%	0.00001%	HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%	0.00002%	HMIRC #7947
			water	7732-18-5	0.65%	0.00004%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%	0.00001%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.09238%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00015%	
			water	7732-18-5	0.50%	0.00013%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00011%	
			non-hazardous ingredients		0.60%	0.00011%	
WG-33L	Trican	Water Gellant	non-hazardous ingredients		1.00%	0.00214%	
CC-7	Trican	Clay Control	1,6-hexanediamine, dihydrochloride	6055-52-3	0.40%	0.00023%	
			water	7732-18-5	0.85%	0.00050%	
WXZ-2	Trican	Crosslinker	methanol	67-56-1	1.00%	0.00041%	
			n-propanol	71-23-8	0.05%	0.00002%	
			alkanolamine chelate of zirconium alkoxide	197980-53-3	0.07%	0.00003%	
WBO-2	Trican	Breaker	sodium persulfate	7775-27-1	1.00%	0.00006%	
PH-2	Trican	pH Modifier	acetic acid	64-19-7	0.60%	0.00028%	
			water	7732-18-5	0.40%	0.00019%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/22/2013
Province:	BC
Region:	Altares
Well Number:	28458
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES C11-19-083-25
Longitude:	-121.563113
Latitude:	56.124870
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	9,288

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.93622%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00005%	
			2-ethylhexanol	104-76-7	0.10%	0.00001%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00001%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00002%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00039%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00057%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%	0.00010%	HMIRC #7948
			quaternary ammonium compound		0.30%	0.00005%	HMIRC #7948
			non-hazardous ingredients		0.10%	0.00002%	HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%	0.00003%	HMIRC #7947
			water	7732-18-5	0.65%	0.00005%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%	0.00001%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.06055%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00023%	
			water	7732-18-5	0.50%	0.00019%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00012%	
			non-hazardous ingredients		0.60%	0.00012%	
WG-33L	Trican	Water Gellant	non-hazardous ingredients		1.00%	0.00075%	
CC-7	Trican	Clay Control	1,6-hexanediamine, dihydrochloride	6055-52-3	0.40%	0.00009%	
			water	7732-18-5	0.85%	0.00018%	
WXZ-2	Trican	Crosslinker	methanol	67-56-1	1.00%	0.00014%	
			n-propanol	71-23-8	0.05%	0.00001%	
			alkanolamine chelate of zirconium alkoxide	197980-53-3	0.07%	0.00001%	
WBO-2	Trican	Breaker	sodium persulfate	7775-27-1	1.00%	0.00002%	
PH-2	Trican	pH Modifier	acetic acid	64-19-7	0.60%	0.00013%	
			water	7732-18-5	0.40%	0.00008%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/22/2013
Province:	BC
Region:	Altares
Well Number:	27690
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 15-26-083-25
Longitude:	-121.500093
Latitude:	56.134961
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	10,475.1

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.85864%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00001%	
			2-ethylhexanol	104-76-7	0.10%	0.00000%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00000%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00005%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00037%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00054%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13984%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00016%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/22/2013
Province:	BC
Region:	Altares
Well Number:	27691
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A15-26-083-25
Longitude:	-121.500051
Latitude:	56.134983
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	9,852.3

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.86253%	
S-8	Trican	Surfactant	methanol	67-56-1	0.60%	0.00002%	
			oxyalkylated alkylphenolic resin	30704-64-4	0.30%	0.00001%	
			polyglycol diepoxide	68036-95-3	0.05%	0.00000%	
			polyglycol diepoxide	68036-92-0	0.05%	0.00000%	
			xylene	1330-20-7	0.05%	0.00000%	
			solvent naphtha (petroleum), light aromatic	64742-95-6	0.05%	0.00000%	
			1,2,4-trimethylbenzene	95-63-6	0.01%	0.00000%	
			ethylbenzene	100-41-4	0.01%	0.00000%	
			1,3,5-trimethylbenzene	108-67-8	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00004%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00006%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00041%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00059%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13578%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/22/2013
Province:	BC
Region:	Alatres
Well Number:	27692
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALATRES B15-26-083-25
Longitude:	-121.500009
Latitude:	56.135006
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	7,575.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.86612%	
S-8	Trican	Surfactant	methanol	67-56-1	0.60%	0.00001%	
			oxyalkylated alkylphenolic resin	30704-64-4	0.30%	0.00001%	
			polyglycol diepoxide	68036-95-3	0.05%	0.00000%	
			polyglycol diepoxide	68036-92-0	0.05%	0.00000%	
			xylene	1330-20-7	0.05%	0.00000%	
			solvent naphtha (petroleum), light aromatic	64742-95-6	0.05%	0.00000%	
			1,2,4-trimethylbenzene	95-63-6	0.01%	0.00000%	
			ethylbenzene	100-41-4	0.01%	0.00000%	
			1,3,5-trimethylbenzene	108-67-8	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00005%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00040%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00059%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13227%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/22/2013
Province:	BC
Region:	Altares
Well Number:	27693
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES C15-26-083-25
Longitude:	-121.495967
Latitude:	56.135028
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	7,154.1

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.86240%	
S-8	Trican	Surfactant	methanol	67-56-1	0.60%	0.00004%	
			oxyalkylated alkylphenolic resin	30704-64-4	0.30%	0.00002%	
			polyglycol diepoxide	68036-95-3	0.05%	0.00000%	
			polyglycol diepoxide	68036-92-0	0.05%	0.00000%	
			xylene	1330-20-7	0.05%	0.00000%	
			solvent naphtha (petroleum), light aromatic	64742-95-6	0.05%	0.00000%	
			1,2,4-trimethylbenzene	95-63-6	0.01%	0.00000%	
			ethylbenzene	100-41-4	0.01%	0.00000%	
			1,3,5-trimethylbenzene	108-67-8	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00002%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00016%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00039%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00057%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13586%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/06/2013
Province:	BC
Region:	Altares
Well Number:	27564
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 13-27-083-25
Longitude:	-121.520879
Latitude:	56.135295
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	12,823

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.89065%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00001%	
			2-ethylhexanol	104-76-7	0.10%	0.00000%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00000%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00005%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00046%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00067%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%	0.00001%	HMIRC #7948
			quaternary ammonium compound		0.30%	0.00001%	HMIRC #7948
			non-hazardous ingredients		0.10%	0.00000%	HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%	0.00000%	HMIRC #7947
			water	7732-18-5	0.65%	0.00001%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%	0.00000%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.10755%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00021%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00011%	
			non-hazardous ingredients		0.60%	0.00011%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/05/2013
Province:	BC
Region:	Altares
Well Number:	27723
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A13-27-083-25
Longitude:	-121.522046
Latitude:	56.135369
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	7,450.1

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.85927%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00003%	
			2-ethylhexanol	104-76-7	0.10%	0.00000%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00000%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00005%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00007%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00042%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00061%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%		HMIRC #7948
			quaternary ammonium compound		0.30%		HMIRC #7948
			non-hazardous ingredients		0.10%		HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%		HMIRC #7947
			water	7732-18-5	0.65%		HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%		
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13875%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00035%	
			water	7732-18-5	0.50%	0.00029%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/06/2013
Province:	BC
Region:	Altares
Well Number:	27724
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B13-27-083-25
Longitude:	-121.521004
Latitude:	56.135228
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	8,918.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.84773%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00001%	
			2-ethylhexanol	104-76-7	0.10%	0.00000%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00000%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00004%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00001%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00042%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00061%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%		HMIRC #7948
			quaternary ammonium compound		0.30%		HMIRC #7948
			non-hazardous ingredients		0.10%		HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%		HMIRC #7947
			water	7732-18-5	0.65%		HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%		
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.15065%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/05/2013
Province:	BC
Region:	Altares
Well Number:	27725
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES C13-27-083-25
Longitude:	-121.521963
Latitude:	56.135414
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	8,555

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.85910%	
S-2	Trican	Surfactant	isopropanol	67-63-0	0.80%	0.00007%	
			2-ethylhexanol	104-76-7	0.10%	0.00001%	
			solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.10%	0.00001%	
			oxydiethylenebis(alkyldimethyl ammonium chloride)	68607-28-3	0.05%	0.00000%	
			methanol	67-56-1	0.01%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00002%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00019%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00044%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00064%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%		HMIRC #7948
			quaternary ammonium compound		0.30%		HMIRC #7948
			non-hazardous ingredients		0.10%		HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%		HMIRC #7947
			water	7732-18-5	0.65%		HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%		
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13898%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00016%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00011%	
			non-hazardous ingredients		0.60%	0.00011%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/23/2012
Province:	BC
Region:	Altares
Well Number:	27338
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A16-30-083-25
Longitude:	-121.554477
Latitude:	56.135296
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,991.8

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Produced Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			86.82077%	
HCL; Slickwater; ClearFRAC XT; Proppant	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Rheology Modifier; Sand; Surfactant	Crystalline silica	14808-60-7	97.93%	12.84460%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Rheology Modifier; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.38%	0.04952%	
			Sodium salt of aliphatic amine acid		0.03%	0.00375%	
			Methanol	67-56-1	0.01%	0.00115%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00069%	
			Aliphatic acids		0.01%	0.00069%	
			Fatty acid amidoalkyl betaine		0.00%	0.00057%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00031%	
			Propan-2-ol	67-63-0	0.00%	0.00029%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00023%	
			Ethoxylated alcohols		0.00%	0.00017%	
			Ethoxylated alcohols #2		0.00%	0.00017%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00006%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02735%	
			Water	7732-18-5	50.00%	0.02279%	
			Methanol	67-56-1	0.50%	0.00023%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01054%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Non-Hazardous Ingredients		60.00%	0.01054%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/23/2012
Province:	BC
Region:	Altares
Well Number:	27339
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B16-30-083-25
Longitude:	-121.554443
Latitude:	56.135322
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	14,062.1

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Produced Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			87.46209%	
HCL; Slickwater; ClearFRAC XT; Proppant	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Rheology Modifier; Sand; Surfactant	Crystalline silica	14808-60-7	97.97%	12.22172%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Rheology Modifier; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.35%	0.04367%	
			Sodium salt of aliphatic amine acid		0.03%	0.00331%	
			Methanol	67-56-1	0.01%	0.00101%	
			Fatty acid amidoalkyl betaine		0.01%	0.00099%	
			Aliphatic alcohols, ethoxylated #1		0.00%	0.00061%	
			Aliphatic acids		0.00%	0.00061%	
			Propan-2-ol	67-63-0	0.00%	0.00050%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00028%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00020%	
			Ethoxylated alcohols		0.00%	0.00015%	
			Ethoxylated alcohols #2		0.00%	0.00015%	
Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00006%				
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02739%	
			Water	7732-18-5	50.00%	0.02283%	
			Methanol	67-56-1	0.50%	0.00023%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01019%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Non-Hazardous Ingredients		60.00%	0.01019%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/22/2012
Province:	BC
Region:	Altares
Well Number:	27340
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES C16-30-083-25
Longitude:	-121.554409
Latitude:	56.135348
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,369.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Produced Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			87.66103%	
HCL; Slickwater; ClearFRAC XT; Proppant	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Rheology Modifier; Sand; Surfactant	Crystalline silica	14808-60-7	97.49%	11.96578%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Rheology Modifier; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.46%	0.05650%	
			Sodium salt of aliphatic amine acid		0.03%	0.00428%	
			Methanol	67-56-1	0.01%	0.00131%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00079%	
			Aliphatic acids		0.01%	0.00079%	
			Fatty acid amidoalkyl betaine		0.00%	0.00060%	
			Sodium hydroxide (impurity)	67-63-0	0.00%	0.00036%	
			Propan-2-ol	1310-73-2	0.00%	0.00031%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00026%	
			Ethoxylated alcohols		0.00%	0.00019%	
			Ethoxylated alcohols #2		0.00%	0.00019%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00007%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02833%	
			Water	7732-18-5	50.00%	0.02361%	
			Methanol	67-56-1	0.50%	0.00024%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01073%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Non-Hazardous Ingredients		60.00%	0.01073%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/15/2012
Province:	BC
Region:	Altares
Well Number:	27333
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 01-31-083-25
Longitude:	-121.555216
Latitude:	56.135554
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	10,649.47

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Produced Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			86.65591%	
HCL; Slickwater; ClearFRAC XT, Proppant	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand; Surfactant	Crystalline silica	14808-60-7	97.46%	12.94587%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.49%	0.06497%	
			Aliphatic amine polymer		0.21%	0.02740%	
			Aromatic hydrocarbon		0.21%	0.02740%	
			Sodium salt of aliphatic amine acid		0.04%	0.00492%	
			Ethoxylated alcohol		0.03%	0.00457%	
			Methanol	67-56-1	0.01%	0.00151%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00091%	
			Aliphatic acids		0.01%	0.00091%	
			Fatty acid amidoalkyl betaine		0.01%	0.00078%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00041%	
			Propan-2-ol	67-63-0	0.00%	0.00039%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00030%	
			Ethoxylated alcohols #2		0.00%	0.00022%	
Ethoxylated alcohols		0.00%	0.00022%				
Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00008%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02617%	
			Water	7732-18-5	50.00%	0.02181%	
			Methanol	67-56-1	0.50%	0.00022%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01027%	
			Non-Hazardous Ingredients		60.00%	0.01027%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/16/2012
Province:	BC
Region:	Altares
Well Number:	27334
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A01-31-083-25
Longitude:	-121.555182
Latitude:	56.135580
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,666.96

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Produced Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			86.35214%	
HCL; Slickwater; Proppant	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Crystalline silica	14808-60-7	97.58%	13.21839%	
HCL; Slickwater	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.48%	0.06460%	
			Aliphatic amine polymer		0.19%	0.02517%	
			Aromatic hydrocarbon		0.19%	0.02517%	
			Sodium salt of aliphatic amine acid		0.04%	0.00489%	
			Ethoxylated alcohol		0.03%	0.00420%	
			Methanol	67-56-1	0.01%	0.00150%	
			Aliphatic acids		0.01%	0.00090%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00090%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00041%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00030%	
			Ethoxylated alcohols #2		0.00%	0.00022%	
			Ethoxylated alcohols		0.00%	0.00022%	
Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00008%				
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.04951%	
			Water	7732-18-5	50.00%	0.04126%	
			Methanol	67-56-1	0.50%	0.00041%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01176%	
			Non-Hazardous Ingredients		60.00%	0.01176%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/03/2013
Province:	BC
Region:	Altares
Well Number:	27335
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B01-31-083-25
Longitude:	-121.555148
Latitude:	56.135607
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	8,858.92

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water	7732-18-5	100.00%	84.60631%	
HCl (28%)	Trican	Carrier	water	7732-18-5	72.00%	0.40035%	
			hydrochloric acid	7647-01-0	28.00%	0.15569%	
Sand (40/70)	Trican	Proppant	silica crystalline	14808-60-7	100.00%	9.98812%	
Sand (30/50)	Trican	Proppant	silica crystalline	14808-60-7	100.00%	4.74024%	
FR-8	Trican	Friction Reducer	non-hazardous ingredients		58.50%	0.05227%	
			distillates (petroleum), hydrotreated light	64742-47-8	40.00%	0.03574%	
			ammonium chloride	12125-02-9	1.50%	0.00134%	
S-4W	Trican	Surfactant	fatty acid alkanolamide	68603-42-9	50.00%	0.00473%	
			methanol	67-56-1	30.00%	0.00284%	
			diethanolamine	111-42-2	15.00%	0.00142%	
			fatty acids, coco compounds with diethanamine		10.00%	0.00095%	Trade Secret
IC-1	Trican	Iron Control	citric acid	77-92-9	100.00%	0.00487%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	60.00%	0.00148%	
			quaternary ammonium compound		30.00%	0.00074%	HMIRC#7948
			non-hazardous ingredients		10.00%	0.00025%	
AI-7NR	Trican	Corrosion Inhibitor	modified propargyl alcohol		100.00%	0.00195%	Trade Secret
			propargyl alcohol	107-19-7	0.90%	0.00002%	
FC-2	Trican	Surfactant	water	7732-18-5	65.00%	0.00065%	
			organic salt		40.00%	0.00040%	HMIRC#7947
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00011%	Trade Secret

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/03/2013
Province:	BC
Region:	Altares
Well Number:	27336
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES C01-31-083-25
Longitude:	-121.555114
Latitude:	56.135633
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	14,639.11

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water	7732-18-5	100.00%	87.46289%	
HCl (28%)	Trican	Carrier	water	7732-18-5	72.00%	0.47291%	
			hydrochloric acid	7647-01-0	28.00%	0.18391%	
Sand (40/70)	Trican	Proppant	silica crystalline	14808-60-7	100.00%	8.00645%	
Sand (30/50)	Trican	Proppant	silica crystalline	14808-60-7	100.00%	3.76129%	
FR-8	Trican	Friction Reducer	non-hazardous ingredients		58.50%	0.05401%	
			distillates (petroleum), hydrotreated light	64742-47-8	40.00%	0.03693%	
			ammonium chloride	12125-02-9	1.50%	0.00139%	
S-4W	Trican	Surfactant	fatty acid alkanolamide	68603-42-9	50.00%	0.00559%	
			methanol	67-56-1	30.00%	0.00335%	
			diethanolamine	111-42-2	15.00%	0.00168%	
			fatty acids, coco compounds with diethanamine		10.00%	0.00112%	Trade Secret
IC-1	Trican	Iron Control	citric acid	77-92-9	100.00%	0.00576%	
AI-7NR	Trican	Corrosion Inhibitor	modified propargyl alcohol		100.00%	0.00230%	Trade Secret
			propargyl alcohol	107-19-7	0.90%	0.00002%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	60.00%	0.00036%	
			quaternary ammonium compound		30.00%	0.00018%	HMIRC#7948
			non-hazardous ingredients		10.00%	0.00006%	
FC-2	Trican	Surfactant	water	7732-18-5	65.00%	0.00016%	
			organic salt		40.00%	0.00010%	HMIRC#7947
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00012%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00003%	Trade Secret

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/03/2013
Province:	BC
Region:	Altares
Well Number:	29021
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES D01-31-083-25
Longitude:	-121.554774
Latitude:	56.135895
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	11,366.85

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water	7732-18-5	100.00%	86.34938%	
HCl (28%)	Trican	Carrier	water	7732-18-5	72.00%	0.48080%	
			hydrochloric acid	7647-01-0	28.00%	0.18698%	
Sand (40/70)	Trican	Proppant	silica crystalline	14808-60-7	100.00%	8.92675%	
Sand (30/50)	Trican	Proppant	silica crystalline	14808-60-7	100.00%	3.92509%	
FR-8	Trican	Friction Reducer	non-hazardous ingredients		58.50%	0.05285%	
			distillates (petroleum), hydrotreated light	64742-47-8	40.00%	0.03614%	
			ammonium chloride	12125-02-9	1.50%	0.00136%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	60.00%	0.00869%	
			quaternary ammonium compound		30.00%	0.00434%	HMIRC#7948
			non-hazardous ingredients		10.00%	0.00145%	
S-4W	Trican	Surfactant	fatty acid alkanolamide	68603-42-9	50.00%	0.00568%	
			methanol	67-56-1	30.00%	0.00341%	
			diethanolamine	111-42-2	15.00%	0.00170%	
			fatty acids, coco compounds with diethanamine		10.00%	0.00114%	Trade Secret
FC-2	Trican	Surfactant	water	7732-18-5	65.00%	0.00383%	
			organic salt		40.00%	0.00235%	HMIRC#7947
IC-1	Trican	Iron Control	citric acid	77-92-9	100.00%	0.00585%	
AI-7NR	Trican	Corrosion Inhibitor	modified propargyl alcohol		100.00%	0.00234%	Trade Secret
			propargyl alcohol	107-19-7	0.90%	0.00002%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00062%	Trade Secret

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00012%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/27/2012
Province:	BC
Region:	Altares
Well Number:	27399
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 01-32-083-25
Longitude:	-121.541718
Latitude:	56.135667
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	15,002

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	86.91342%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.07682%	
			water	7732-18-5	85.00%	0.43734%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00050%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00025%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00004%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00004%	
			xylene	1330-20-7	5.00%	0.00004%	
			light aromatic naphtha	64742-95-6	5.00%	0.00004%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00001%	
			ethylbenzene	100-41-4	1.00%	0.00001%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00238%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00030%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00030%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00030%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00001%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00005%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02700%	
			ammonium chloride	12125-02-9	1.50%	0.00145%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00233%	
			isopropanol	67-63-0	40.00%	0.00155%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00019%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00019%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00089%	HMIRC #7947
			water	7732-18-5	65.00%	0.00144%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00083%	
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	12.41190%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02095%	
			Water	7732-18-5	50.00%	0.01746%	
			Methanol	67-56-1	0.50%	0.00017%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01055%	
			non-hazardous ingredients		60.00%	0.01055%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/27/2012
Province:	BC
Region:	Altares
Well Number:	27400
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A01-32-083-25
Longitude:	-121.541677
Latitude:	56.135690
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	16,155.8

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	86.88193%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.07136%	
			water	7732-18-5	85.00%	0.40625%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00132%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00066%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00011%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00011%	
			xylene	1330-20-7	5.00%	0.00011%	
			light aromatic naphtha	64742-95-6	5.00%	0.00011%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00002%	
			ethylbenzene	100-41-4	1.00%	0.00002%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00002%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00141%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00028%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00028%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00028%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00001%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00422%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02870%	
			ammonium chloride	12125-02-9	1.50%	0.00154%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00400%	
			isopropanol	67-63-0	40.00%	0.00267%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00033%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00033%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00148%	HMIRC #7947
			water	7732-18-5	65.00%	0.00240%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00130%	
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	12.46510%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02083%	
			Water	7732-18-5	50.00%	0.01736%	
			Methanol	67-56-1	0.50%	0.00017%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01042%	
			non-hazardous ingredients		60.00%	0.01042%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/27/2012
Province:	BC
Region:	Altares
Well Number:	27401
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B01-32-083-25
Longitude:	-121.541635
Latitude:	56.135712
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,875.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	87.10394%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.06097%	
			water	7732-18-5	85.00%	0.34712%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00040%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00020%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00003%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00003%	
			xylene	1330-20-7	5.00%	0.00003%	
			light aromatic naphtha	64742-95-6	5.00%	0.00003%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00001%	
			ethylbenzene	100-41-4	1.00%	0.00001%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00189%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00024%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00024%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00024%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00000%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00004%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02816%	
			ammonium chloride	12125-02-9	1.50%	0.00151%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00484%	
			isopropanol	67-63-0	40.00%	0.00323%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00040%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00040%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00205%	HMIRC #7947
			water	7732-18-5	65.00%	0.00333%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00124%	
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	12.31742%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02075%	
			Water	7732-18-5	50.00%	0.01729%	
			Methanol	67-56-1	0.50%	0.00017%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01035%	
			non-hazardous ingredients		60.00%	0.01035%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/28/2012
Province:	BC
Region:	Altares
Well Number:	27404
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES E01-32-083-25
Longitude:	-121.541593
Latitude:	56.135735
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,036

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	86.90577%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.05538%	
			water	7732-18-5	85.00%	0.31528%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00145%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00072%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00012%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00012%	
			xylene	1330-20-7	5.00%	0.00012%	
			light aromatic naphtha	64742-95-6	5.00%	0.00012%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00002%	
			ethylbenzene	100-41-4	1.00%	0.00002%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00002%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00069%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00022%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00022%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00022%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00000%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00537%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02751%	
			ammonium chloride	12125-02-9	1.50%	0.00147%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00320%	
			isopropanol	67-63-0	40.00%	0.00213%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00027%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00027%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00101%	HMIRC #7947
			water	7732-18-5	65.00%	0.00164%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00057%	
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	12.55415%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02138%	
			Water	7732-18-5	50.00%	0.01781%	
			Methanol	67-56-1	0.50%	0.00018%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01058%	
			non-hazardous ingredients		60.00%	0.01058%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/09/2011
Province:	BC
Region:	Altares
Well Number:	25587
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 04-33-083-25
Longitude:	-121.535217
Latitude:	56.140453
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	18,415

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FR-9	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.01991%	
			ammonium chloride	12125-02-9	1.50%	0.00107%	
Busan 94	Trican	Biocide	2,2-dibromo-3-nitripropionamide	10222-01-2	30.00%	0.00286%	
			Sodium bromide	7647-15-6	4.00%	0.00038%	
			Polyethylene glycol	25322-68-3	60.00%	0.00573%	
			Dibromoacetoneitrile	3252-43-5	3.00%	0.00029%	
SI-2	Trican	Scale Inhibitor	Methanol	67-56-1	20.00%	0.00342%	
			Organic phosphonate 1		30.00%	0.00512%	
			Organic phosphonate 2		10.00%	0.00171%	
			Ammonium chloride	12125-02-9	10.00%	0.00171%	
			Amine salt		5.00%	0.00085%	
			Oxyalkylated polyamine		5.00%	0.00085%	
HCL 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.12093%	
			water	7732-18-5	85.00%	0.68851%	
S-8	Trican	Acid add. for gas wells	Methanol	67-56-1	60.00%	0.00053%	
			Oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00026%	
			Polyglycol diepoxide	68036-95-3	5.00%	0.00004%	
			Polyglycol diepoxide	68036-92-0	5.00%	0.00004%	
			Xylene	1330-20-7	5.00%	0.00004%	
			Light aromatic naphtha	64742-95-6	5.00%	0.00004%	
			1,2,4-Trimethylbenzene	95-63-6	1.00%	0.00001%	
			Ethylbenzene	100-41-4	1.00%	0.00001%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			1,3,5-Trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Acid add. for gas wells	Sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00443%	
AI-9	Trican	Acid add. for gas wells	Methanol	67-56-1	60.00%	0.00054%	
			Polyoxyalkylenes	68951-67-7	30.00%	0.00027%	
			Modified thiourea polymer	68527-49-1	30.00%	0.00027%	
			Propargyl alcohol	107-19-7	10.00%	0.00009%	
			Olefin	64743-02-8	5.00%	0.00004%	
DF-1	Trican	Acid add. for gas wells	Undisclosed		100.00%	0.00005%	
Proppant	Trican	Proppoant	crystalline silica	14808-60-7	100.00%	13.65399%	
Water	Trican	water	water	7732-18-5	100.00%	85.00619%	
WG-3L	Trican	Gell	Undisclosed		100.00%	0.02010%	
WXZ-2	Trican	X-Link	Methanol	67-56-1	100.00%	0.00470%	
			n-propanol	71-23-8	5.00%	0.00023%	
WBO-2	Trican	Breaker	sodium persulfate	7775-27-1	100.00%	0.00076%	
Ph-2	Trican	Buffer	acetic acid	64-19-7	60.00%	0.00282%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/08/2013
Province:	BC
Region:	Altares
Well Number:	28002
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A02-33-083-25
Longitude:	-121.531628
Latitude:	56.135798
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	18,352.73

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water	7732-18-5	100.00%	85.46814%	
HCl (28%)	Trican	Carrier	water	7732-18-5	72.00%	0.24054%	
			hydrochloric acid	7647-01-0	28.00%	0.09354%	
Sand (40/70)	Trican	Proppant	silica crystalline	14808-60-7	100.00%	8.54806%	
Sand (30/50)	Trican	Proppant	silica crystalline	14808-60-7	100.00%	5.50741%	
FR-8	Trican	Friction Reducer	non-hazardous ingredients		58.50%	0.05217%	
			distillates (petroleum), hydrotreated light	64742-47-8	40.00%	0.03567%	
			ammonium chloride	12125-02-9	1.50%	0.00134%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	60.00%	0.01792%	
			quaternary ammonium compound		30.00%	0.00896%	HMIRC#7948
			non-hazardous ingredients		10.00%	0.00299%	
FC-2	Trican	Surfactant	water	7732-18-5	65.00%	0.00789%	
			organic salt		40.00%	0.00486%	HMIRC#7947
S-4W	Trican	Surfactant	fatty acid alkanolamide	68603-42-9	50.00%	0.00284%	
			methanol	67-56-1	30.00%	0.00170%	
			diethanolamine	111-42-2	15.00%	0.00085%	
			fatty acids, coco compounds with diethanamine		10.00%	0.00057%	Trade Secret
IC-1	Trican	Iron Control	citric acid	77-92-9	100.00%	0.00293%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00128%	Trade Secret
AI-7NR	Trican	Corrosion Inhibitor	modified propargyl alcohol		100.00%	0.00117%	Trade Secret
			propargyl alcohol	107-19-7	0.90%	0.00001%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00006%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/06/2011
Province:	BC
Region:	Altares
Well Number:	26948
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A04-33-083-25
Longitude:	-121.535275
Latitude:	56.140458
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,300
Total Water Volume (m3)*:	12,437

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FR-9	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02390%	
			ammonium chloride	12125-02-9	1.50%	0.00128%	
Busan 94	Trican	Biocide	2,2-dibromo-3-nitripropionamide	10222-01-2	30.00%	0.00334%	
			Sodium bromide	7647-15-6	4.00%	0.00045%	
			Polyethylene glycol	25322-68-3	60.00%	0.00668%	
			Dibromoacetoneitrile	3252-43-5	3.00%	0.00033%	
SI-2	Trican	Scale Inhibitor	Methanol	67-56-1	20.00%	0.00379%	
			Organic phosphonate 1		30.00%	0.00569%	
			Organic phosphonate 2		10.00%	0.00190%	
			Ammonium chloride	12125-02-9	10.00%	0.00190%	
			Amine salt		5.00%	0.00095%	
			Oxyalkylated polyamine		5.00%	0.00095%	
HCL 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.15036%	
			water	7732-18-5	85.00%	0.85601%	
S-8	Trican	Acid add. for gas wells	Methanol	67-56-1	60.00%	0.00044%	
			Oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00022%	
			Polyglycol diepoxide	68036-95-3	5.00%	0.00004%	
			Polyglycol diepoxide	68036-92-0	5.00%	0.00004%	
			Xylene	1330-20-7	5.00%	0.00004%	
			Light aromatic naphtha	64742-95-6	5.00%	0.00004%	
			1,2,4-Trimethylbenzene	95-63-6	1.00%	0.00001%	
			Ethylbenzene	100-41-4	1.00%	0.00001%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			1,3,5-Trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Acid add. for gas wells	Sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00372%	
AI-9	Trican	Acid add. for gas wells	Methanol	67-56-1	60.00%	0.00045%	
			Polyoxyalkylenes	68951-67-7	30.00%	0.00023%	
			Modified thiourea polymer	68527-49-1	30.00%	0.00023%	
			Propargyl alcohol	107-19-7	10.00%	0.00008%	
			Olefin	64743-02-8	5.00%	0.00004%	
DF-1	Trican	Acid add. for gas wells	Undisclosed		100.00%	0.00004%	
Proppant	Trican	Proppoant	crystalline silica	14808-60-7	100.00%	16.23244%	
Water	Trican	water	water	7732-18-5	100.00%	82.13613%	
WG-3L	Trican	Gell	Undisclosed		100.00%	0.02726%	
WXZ-2	Trican	X-Link	Methanol	67-56-1	100.00%	0.00663%	
			n-propanol	71-23-8	5.00%	0.00033%	
WBO-2	Trican	Breaker	sodium persulfate	7775-27-1	100.00%	0.00103%	
Ph-2	Trican	Buffer	acetic acid	64-19-7	60.00%	0.00385%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/17/2013
Province:	BC
Region:	Altares
Well Number:	28003
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B02-33-083-25
Longitude:	-121.531586
Latitude:	56.135821
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	11,425

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.85144%	
S-4W	Trican	Surfactant	methanol	67-56-1	0.30%	0.00003%	
			fatty acid alkanolamide	68603-42-9	0.50%	0.00005%	
			diethanolamine	111-42-2	0.15%	0.00002%	
			fatty acids, coco compounds with diethanamine		0.10%	0.00001%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00005%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00004%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00042%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00061%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%		HMIRC #7948
			quaternary ammonium compound		0.30%		HMIRC #7948
			non-hazardous ingredients		0.10%		HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%		HMIRC #7947
			water	7732-18-5	0.65%		HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%		
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.14681%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00019%	
			water	7732-18-5	0.50%	0.00016%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	methanol	67-56-1	0.01%	0.00000%	
			ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/14/2011
Province:	BC
Region:	Altares
Well Number:	26949
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B04-33-083-25
Longitude:	-121.535332
Latitude:	56.140463
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	14,118

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FR-9	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02000%	
			ammonium chloride	12125-02-9	1.50%	0.00000%	
Busan 94	Trican	Biocide	2,2-dibromo-3-nitripropionamide	10222-01-2	30.00%	0.00000%	
			Sodium bromide	7647-15-6	4.00%	0.00000%	
			Polyethylene glycol	25322-68-3	60.00%	0.01000%	
			Dibromoacetoneitrile	3252-43-5	3.00%	0.00000%	
SI-2	Trican	Scale Inhibitor	Methanol	67-56-1	20.00%	0.00000%	
			Organic phosphonate 1		30.00%	0.01000%	
			Organic phosphonate 2		10.00%	0.00000%	
			Ammonium chloride	12125-02-9	10.00%	0.00000%	
			Amine salt		5.00%	0.00000%	
			Oxyalkylated polyamine		5.00%	0.00000%	
HCL 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.06000%	
			water	7732-18-5	85.00%	0.31000%	
S-8	Trican	Acid add. for gas wells	Methanol	67-56-1	60.00%	0.00000%	
			Oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00000%	
			Polyglycol diepoxide	68036-95-3	5.00%	0.00000%	
			Polyglycol diepoxide	68036-92-0	5.00%	0.00000%	
			Xylene	1330-20-7	5.00%	0.00000%	
			Light aromatic naphtha	64742-95-6	5.00%	0.00000%	
			1,2,4-Trimethylbenzene	95-63-6	1.00%	0.00000%	
			Ethylbenzene	100-41-4	1.00%	0.00000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			1,3,5-Trimethylbenzene	108-67-8	1.00%	0.00000%	
IC-3	Trican	Acid add. for gas wells	Sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00000%	
AI-9	Trican	Acid add. for gas wells	Methanol	67-56-1	60.00%	0.00000%	
			Polyoxyalkylenes	68951-67-7	30.00%	0.00000%	
			Modified thiourea polymer	68527-49-1	30.00%	0.00000%	
			Propargyl alcohol	107-19-7	10.00%	0.00000%	
			Olefin	64743-02-8	5.00%	0.00000%	
DF-1	Trican	Acid add. for gas wells	Undisclosed		100.00%	0.00000%	
Proppant	Trican	Proppoant	crystalline silica	14808-60-7	100.00%	15.54000%	
Water	Trican	water	water	7732-18-5	100.00%	82.76000%	
WG-3L	Trican	Gell	Undisclosed		100.00%	0.03000%	
WXZ-2	Trican	X-Link	Methanol	67-56-1	100.00%	0.01000%	
			n-propanol	71-23-8	5.00%	0.00000%	
WBO-2	Trican	Breaker	sodium persulfate	7775-27-1	100.00%	0.00000%	
Ph-2	Trican	Buffer	acetic acid	64-19-7	60.00%	0.00000%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/16/2013
Province:	BC
Region:	Altares
Well Number:	28004
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES C02-33-083-25
Longitude:	-121.531545
Latitude:	56.135843
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	9,744

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.85125%	
S-4W	Trican	Surfactant	methanol	67-56-1	0.30%	0.00003%	
			fatty acid alkanolamide	68603-42-9	0.50%	0.00005%	
			diethanolamine	111-42-2	0.15%	0.00002%	
			fatty acids, coco compounds with diethanamine		0.10%	0.00001%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00005%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00042%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00062%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%		HMIRC #7948
			quaternary ammonium compound		0.30%		HMIRC #7948
			non-hazardous ingredients		0.10%		HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%		HMIRC #7947
			water	7732-18-5	0.65%		HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%		
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.14703%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00019%	
			water	7732-18-5	0.50%	0.00016%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	methanol	67-56-1	0.01%	0.00000%	
			ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/20/2011
Province:	BC
Region:	Altares
Well Number:	26950
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES C04-33-083-25
Longitude:	-121.535389
Latitude:	56.140468
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,310
Total Water Volume (m3)*:	924

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FR-9	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.02764%	
			ammonium chloride	12125-02-9	1.50%	0.00148%	
Busan 94	Trican	Biocide	2,2-dibromo-3-nitripropionamide	10222-01-2	30.00%	0.00273%	
			Sodium bromide	7647-15-6	4.00%	0.00036%	
			Polyethylene glycol	25322-68-3	60.00%	0.00546%	
			Dibromoacetoneitrile	3252-43-5	3.00%	0.00027%	
SI-2	Trican	Scale Inhibitor	Methanol	67-56-1	20.00%	0.00492%	
			Organic phosphonate 1		30.00%	0.00737%	
			Organic phosphonate 2		10.00%	0.00246%	
			Ammonium chloride	12125-02-9	10.00%	0.00246%	
			Amine salt		5.00%	0.00123%	
			Oxyalkylated polyamine		5.00%	0.00123%	
HCL 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.13641%	
			water	7732-18-5	85.00%	0.77661%	
S-8	Trican	Acid add. for gas wells	Methanol	67-56-1	60.00%	0.00129%	
			Oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00065%	
			Polyglycol diepoxide	68036-95-3	5.00%	0.00011%	
			Polyglycol diepoxide	68036-92-0	5.00%	0.00011%	
			Xylene	1330-20-7	5.00%	0.00011%	
			Light aromatic naphtha	64742-95-6	5.00%	0.00011%	
			1,2,4-Trimethylbenzene	95-63-6	1.00%	0.00002%	
			Ethylbenzene	100-41-4	1.00%	0.00002%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			1,3,5-Trimethylbenzene	108-67-8	1.00%	0.00002%	
IC-3	Trican	Acid add. for gas wells	Sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.01088%	
AI-9	Trican	Acid add. for gas wells	Methanol	67-56-1	60.00%	0.00132%	
			Polyoxyalkylenes	68951-67-7	30.00%	0.00066%	
			Modified thiourea polymer	68527-49-1	30.00%	0.00066%	
			Propargyl alcohol	107-19-7	10.00%	0.00022%	
			Olefin	64743-02-8	5.00%	0.00011%	
DF-1	Trican	Acid add. for gas wells	Undisclosed		100.00%	0.00012%	
Proppant	Trican	Proppoant	crystalline silica	14808-60-7	100.00%	12.33397%	
Water	Trican	water	water	7732-18-5	100.00%	86.73814%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/15/2012
Province:	BC
Region:	Altares
Well Number:	27477
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 12-36-083-25
Longitude:	-121.485954
Latitude:	56.143229
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	17,122.6

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	99.40429%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.06121%	
			water	7732-18-5	85.00%	0.34848%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00040%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00020%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00003%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00003%	
			xylene	1330-20-7	5.00%	0.00003%	
			light aromatic naphtha	64742-95-6	5.00%	0.00003%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00001%	
			ethylbenzene	100-41-4	1.00%	0.00001%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00190%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00024%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00024%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00024%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00000%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00004%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.00657%	
			ammonium chloride	12125-02-9	1.50%	0.00035%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FR-9	Trican	Friction Reducer	petroleum distillate, light hydrotreated	64742-47-8	25.00%	0.02438%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02379%	
			Water	7732-18-5	50.00%	0.01983%	
			Methanol	67-56-1	0.50%	0.00020%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01215%	
			non-hazardous ingredients		60.00%	0.01215%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00010%	
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00055%	
			isopropanol	67-63-0	40.00%	0.00037%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00005%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00005%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00016%	HMIRC #7947
			water	7732-18-5	65.00%	0.00026%	HMIRC #7947
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	0.00000%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/15/2012
Province:	BC
Region:	Altares
Well Number:	28091
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A12-36-083-25
Longitude:	-121.485783
Latitude:	56.143359
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	18,824.2

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water			100.00000%	99.342771
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0		14.93000%	0.069132
			water	7732-18-5		85.00000%	0.393583
S-8	Trican	Non-emulsifier	methanol	67-56-1		60.00000%	0.001377
			oxyalkylated alkylphenolic resin	30704-64-4		30.00000%	0.000689
			polyglycol diepoxide	68036-95-3		5.00000%	0.000115
			polyglycol diepoxide	68036-92-0		5.00000%	0.000115
			xylene	1330-20-7		5.00000%	0.000115
			light aromatic naphtha	64742-95-6		5.00000%	0.000115
			1,2,4-trimethylbenzene	95-63-6		1.00000%	0.000023
			ethylbenzene	100-41-4		1.00000%	0.000023
			1,3,5-trimethylbenzene	108-67-8		1.00000%	0.000023
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8		99.00000%	0.001264
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6		30.00000%	0.000273
			polyoxyalkylenes	68951-67-7		30.00000%	0.000273
			Acetone	67-64-1		30.00000%	0.000273
			Fatty Acids			0.00000%	0
			Modified Thiourea Polymer			0.00000%	0
			Methanol	67-56-1		0.50000%	0.000005
DF-1	Trican	Defoamer	non-hazardous ingredients			100.00000%	0.004595
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8		28.00000%	0.005632
			ammonium chloride	12125-02-9		1.50000%	0.000302

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
FR-9	Trican	Friction Reducer	petroleum distillate, light hydrotreated	64742-47-8		25.00000%	0.024789
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8		60.00000%	0.025382
			Water	7732-18-5		50.00000%	0.021152
			Methanol	67-56-1		0.50000%	0.000212
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1		60.00000%	0.012796
			non-hazardous ingredients			60.00000%	0.012796
FCB-1	Trican	Breaker	severely refined mineral oil			100.00000%	0.000264
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8		60.00000%	0.000863
			isopropanol	67-63-0		40.00000%	0.000575
			N,N,N-dimethyl-1-octadecanamine	124-28-7		5.00000%	0.000072
			N,N,N-dimethyl-1-octadecanamine-HCL			5.00000%	0.000072
FC-2	Trican	Surfactant	organic salt *			40.00000%	0.000205
			water	7732-18-5		65.00000%	0.000333
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7		100.00000%	0

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	10/15/2012
Province:	BC
Region:	Altares
Well Number:	28097
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 13-36-083-25
Longitude:	-121.485759
Latitude:	56.143378
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	14,420.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	99.37283%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.06605%	
			water	7732-18-5	85.00%	0.37604%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00043%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00022%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00004%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00004%	
			xylene	1330-20-7	5.00%	0.00004%	
			light aromatic naphtha	64742-95-6	5.00%	0.00004%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00001%	
			ethylbenzene	100-41-4	1.00%	0.00001%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00205%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00026%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00026%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00026%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00000%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00004%	
FR-9	Trican	Friction Reducer	petroleum distillate, light hydrotreated	64742-47-8	25.00%	0.02650%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02361%	
			Water	7732-18-5	50.00%	0.01967%	
			Methanol	67-56-1	0.50%	0.00020%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01190%	
			non-hazardous ingredients		60.00%	0.01190%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00031%	
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00057%	
			isopropanol	67-63-0	40.00%	0.00038%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00005%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00005%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00022%	HMIRC #7947
			water	7732-18-5	65.00%	0.00035%	HMIRC #7947
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	0.01411%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	02/12/2012
Province:	BC
Region:	Altares
Well Number:	27322
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 07-36-083-26
Longitude:	-121.574539
Latitude:	56.142022
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	16,987.38

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater; ClearFRAC XT	Talisman	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Water (Includes Mix Water Supplied by Client)			89.18574%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Crystalline silica	14808-60-7	96.78%	10.40697%	
			Hydrochloric Acid	7647-01-0	0.59%	0.06372%	
			Distillates (petroleum); hydrotreated light	64742-47-8	0.39%	0.04167%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.05%	0.00521%	
			Sodium salt of aliphatic amine acid		0.04%	0.00483%	
			Methanol	67-56-1	0.01%	0.00148%	
			Aliphatic acids		0.01%	0.00089%	
			Aliphatic alcohols; ethoxylated #1		0.01%	0.00089%	
			Fatty acid amidoalkyl betaine		0.01%	0.00071%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00040%	
			Propan-2-ol	67-63-0	0.00%	0.00036%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00030%	
			Ethoxylated alcohols #2		0.00%	0.00022%	
			Ethoxylated alcohols		0.00%	0.00022%	
Aliphatic amine polymer		0.00%	0.00021%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Aromatic hydrocarbon		0.00%	0.00021%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00008%	
			Ethoxylated alcohol		0.00%	0.00004%	
			Sulfonated polystyrene		0.00%	0.00002%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02677%	
			Water	7732-18-5	50.00%	0.02231%	
			Methanol	67-56-1	0.50%	0.00022%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.00988%	
			Non-Hazardous Ingredients		60.00%	0.00988%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	03/20/2012
Province:	BC
Region:	Altares
Well Number:	27323
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A07-36-083-26
Longitude:	-121.574505
Latitude:	56.142048
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,807.62

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Produced Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)	-		87.16863%	
Proppant	Schlumberger	Resin Coated Prop	Crystalline silica	14808-60-7	97.52%	12.47359%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.46%	0.05847%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.30%	0.03871%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.04%	0.00484%	
			Sodium salt of aliphatic amine acid		0.03%	0.00443%	
			Methanol	67-56-1	0.01%	0.00135%	
			Aliphatic acids		0.01%	0.00082%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00082%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00037%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00027%	
			Ethoxylated alcohols #2		0.00%	0.00020%	
			Ethoxylated alcohols		0.00%	0.00020%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00007%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.01748%	
			Water	7732-18-5	50.00%	0.01456%	
			Methanol	67-56-1	0.50%	0.00015%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.00695%	
			Non-Hazardous Ingredients		60.00%	0.00695%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	02/11/2012
Province:	BC
Region:	Altares
Well Number:	27317
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES 10-36-083-26
Longitude:	-121.574621
Latitude:	56.142373
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	16,446.15

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater	Talisman	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Water (Including Mix Water Supplied by Client)			87.87183%	
HCL; Slickwater	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Crystalline silica	14808-60-7	97.96%	11.82068%	
			Hydrochloric Acid	7647-01-0	0.33%	0.03925%	
			Distillates (petroleum); hydrotreated light	64742-47-8	0.32%	0.03915%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.04%	0.00490%	
			Sodium salt of aliphatic amine acid		0.02%	0.00298%	
			Methanol	67-56-1	0.01%	0.00091%	
			Aliphatic acids		0.00%	0.00055%	
			Aliphatic alcohols; ethoxylated #1		0.00%	0.00055%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00025%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00018%	
			Ethoxylated alcohols #2		0.00%	0.00013%	
			Ethoxylated alcohols		0.00%	0.00013%	
MC B-8650	Multi-Chem	Biocide	Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00005%	
			Glutaraldehyde	111-30-8	60.00%	0.27058%	
			Water	7732-18-5	50.00%	0.22548%	
			Methanol	67-56-1	0.50%	0.00225%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.09989%	
			Non-Hazardous Ingredients		60.00%	0.09989%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	02/03/2012
Province:	BC
Region:	Altares
Well Number:	27318
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A10-36-083-26
Longitude:	-121.574655
Latitude:	56.142346
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	17,532.22

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater	Talisman	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Water (Including Mix Water Supplied by Client)		100.00%	89.44457%	
HCL; Slickwater	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Crystalline silica	14808-60-7	97.57%	10.12478%	
			Distillates (petroleum); hydrotreated light	64742-47-8	0.39%	0.04055%	
			Hydrochloric Acid	7647-01-0	0.39%	0.04013%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.05%	0.00507%	
			Sodium salt of aliphatic amine acid		0.03%	0.00305%	
			Methanol	67-56-1	0.01%	0.00093%	
			Aliphatic acids		0.01%	0.00056%	
			Aliphatic alcohols; ethoxylated #1		0.01%	0.00056%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00025%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00019%	
			Ethoxylated alcohols #2		0.00%	0.00014%	
			Ethoxylated alcohols		0.00%	0.00014%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00005%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.08742%	
			Water	7732-18-5	50.00%	0.00729%	
			Methanol	67-56-1	0.50%	0.00073%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.03261%	
			Non-Hazardous Ingredients		60.00%	0.03261%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/06/2013
Province:	BC
Region:	Altares
Well Number:	27536
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A-A073-I/094-B-01
Longitude:	-122.014420
Latitude:	56.133626
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,158

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.41829%	
S-4W	Trican	Surfactant	methanol	67-56-1	0.30%	0.00001%	
			fatty acid alkanolamide	68603-42-9	0.50%	0.00001%	
			diethanolamine	111-42-2	0.15%	0.00000%	
			fatty acids, coco compounds with diethanamine		0.10%	0.00000%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00001%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00001%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00020%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00029%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%	0.00004%	HMIRC #7948
			quaternary ammonium compound		0.30%	0.00002%	HMIRC #7948
			non-hazardous ingredients		0.10%	0.00001%	HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%	0.00001%	HMIRC #7947
			water	7732-18-5	0.65%	0.00002%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%	0.00000%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.58082%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00010%	
			water	7732-18-5	0.50%	0.00008%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	methanol	67-56-1	0.01%	0.00000%	
			ethylene glycol	107-21-1	0.60%	0.00005%	
			non-hazardous ingredients		0.60%	0.00005%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/09/2013
Province:	BC
Region:	Altares
Well Number:	27537
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A-B073-I/094-B-01
Longitude:	-122.014380
Latitude:	56.136350
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,442

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.87412%	
S-4W	Trican	Surfactant	methanol	67-56-1	0.30%	0.00002%	
			fatty acid alkanolamide	68603-42-9	0.50%	0.00003%	
			diethanolamine	111-42-2	0.15%	0.00001%	
			fatty acids, coco compounds with diethanamine		0.10%	0.00001%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00003%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00001%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00042%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00062%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%	0.00007%	HMIRC #7948
			quaternary ammonium compound		0.30%	0.00004%	HMIRC #7948
			non-hazardous ingredients		0.10%	0.00001%	HMIRC #7948
FC-2	Trican	Surfactant	organic salt		0.40%	0.00003%	HMIRC #7947
			water	7732-18-5	0.65%	0.00005%	HMIRC #7947
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%	0.00001%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.12401%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00017%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/06/2013
Province:	BC
Region:	Altares
Well Number:	27538
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A-C073-I/094-B-01
Longitude:	-122.014341
Latitude:	56.133674
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,520

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.87104%	
S-4W	Trican	Surfactant	methanol	67-56-1	0.30%	0.00002%	
			fatty acid alkanolamide	68603-42-9	0.50%	0.00003%	
			diethanolamine	111-42-2	0.15%	0.00001%	
			fatty acids, coco compounds with diethanamine		0.10%	0.00001%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00003%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00001%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00042%	
			ammonium chloride	12125-02-9	0.02%	0.00002%	
			non-hazardous ingredients		0.59%	0.00062%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.12731%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00020%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/07/2012
Province:	BC
Region:	Altares
Well Number:	26300
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-B085-I/094-B-01
Longitude:	-122.034937
Latitude:	56.141215
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,317
Total Water Volume (m3)*:	12,817.2

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			85.50733%	
Proppant	Schlumberger	Proppant	Crystalline silica	14808-60-7	97.78%	14.12589%	
HCL; Slickwater	Schlumberger	Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.40%	0.05597%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.28%	0.02703%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.04%	0.00785%	
			Sodium salt of aliphatic amine acid		0.03%	0.00785%	
			Methanol	67-56-1	0.01%	0.00424%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00338%	
			Aliphatic acids		0.01%	0.00131%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00130%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00078%	
			Ethoxylated alcohols		0.00%	0.00078%	
			Ethoxylated alcohols #2		0.00%	0.00035%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00026%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.00019%	
			Water	7732-18-5	50.00%	0.00019%	
			Methanol	67-56-1	0.50%	0.00007%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01046%	
			Non-Hazardous Ingredients		60.00%	0.01046%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/08/2012
Province:	BC
Region:	Altares
Well Number:	26304
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-C085-I/094-B-01
Longitude:	-122.034672
Latitude:	56.140937
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,506
Total Water Volume (m3)*:	13,656.1

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			85.50000%	
Proppant	Schlumberger	Proppant	Crystalline silica	14808-60-7	97.89%	14.12468%	
HCL; Slickwater	Schlumberger	Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.39%	0.05596%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.19%	0.02703%	
			Aromatic hydrocarbon		0.05%	0.00784%	
			Aliphatic amine polymer		0.05%	0.00784%	
			Sodium salt of aliphatic amine acid		0.03%	0.00424%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.02%	0.00338%	
			Ethoxylated alcohol		0.01%	0.00131%	
			Methanol	67-56-1	0.01%	0.00130%	
			Aliphatic acids		0.01%	0.00078%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00078%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00035%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00026%	
			Ethoxylated alcohols #2		0.00%	0.00019%	
			Ethoxylated alcohols		0.00%	0.00019%	
Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00007%				
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.03082%	
			Water	7732-18-5	50.00%	0.02569%	
			Methanol	67-56-1	0.50%	0.00026%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01163%	
			Non-Hazardous Ingredients		60.00%	0.01163%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/04/2012
Province:	BC
Region:	Altares
Well Number:	26305
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-D085-I/094-B-01
Longitude:	-122.035040
Latitude:	56.141185
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,754
Total Water Volume (m3)*:	6,324

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			86.62821%	
Proppant	Schlumberger	Proppant	Crystalline silica	14808-60-7	97.66%	13.01341%	
HCL; Slickwater	Schlumberger	Base Fluid; Antifoam Agent; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Prop; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.43%	0.05684%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.29%	0.03913%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.04%	0.00489%	
			Sodium salt of aliphatic amine acid		0.03%	0.00431%	
			Methanol	67-56-1	0.01%	0.00132%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00080%	
			Aliphatic acids		0.01%	0.00080%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00036%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00027%	
			Ethoxylated alcohols		0.00%	0.00019%	
			Ethoxylated alcohols #2		0.00%	0.00019%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00007%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.01953%	
			Water	7732-18-5	50.00%	0.01628%	
			Methanol	67-56-1	0.50%	0.00016%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.00829%	
			Non-Hazardous Ingredients		60.00%	0.00829%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/04/2012
Province:	BC
Region:	Altares
Well Number:	26306
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-E085-I/094-B-01
Longitude:	-122.034396
Latitude:	56.141377
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,917.5

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater; ClearFRAC XT 1.5%	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand; Surfactant	Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/04/2012
Province:	BC
Region:	Altares
Well Number:	27468
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-F085-I/094-B-01
Longitude:	-122.034448
Latitude:	56.141362
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	14,470.5

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater; ClearFRAC XT 1.5%	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand; Surfactant	Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00009%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	04/09/2012
Province:	BC
Region:	Altares
Well Number:	27469
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-G085-I/094-B-01
Longitude:	-122.034499
Latitude:	56.141348
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	15,242.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			86.69435%	
Proppant	Schlumberger	Proppant	Crystalline silica	14808-60-7	97.37%	12.89361%	
HCL; Slickwater; ClearFRAC XT 2%	Schlumberger	Base Fluid; Antifoam Agent; Calcium carbonate; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Prop Transport Additive; Resin Coated Prop; Rheology Modifier; Sand; Surfactant	Hydrochloric Acid	7647-01-0	0.49%	0.06445%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.24%	0.03141%	
			Aromatic hydrocarbon		0.05%	0.00664%	
			Aliphatic amine polymer		0.05%	0.00664%	
			Sodium salt of aliphatic amine acid		0.04%	0.00489%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.03%	0.00393%	
			Fatty acid amidoalkyl betaine		0.02%	0.00245%	
			Methanol	67-56-1	0.01%	0.00149%	
			Propan-2-ol	67-63-0	0.01%	0.00124%	
			Ethoxylated alcohol		0.01%	0.00111%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00090%	
			Aliphatic acids		0.01%	0.00090%	
			Synthetic organic polymer		0.00%	0.00050%	
			Calcium carbonate	471-34-1	0.00%	0.00050%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00041%	
Prop-2-yn-1-ol	107-19-7	0.00%	0.00030%				
Ethoxylated alcohols #2		0.00%	0.00022%				
Ethoxylated alcohols		0.00%	0.00022%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Sodium hydroxide	1310-73-2	0.00%	0.00009%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00008%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02735%	
			Water	7732-18-5	50.00%	0.02279%	
			Methanol	67-56-1	0.50%	0.00023%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01054%	
			Non-Hazardous Ingredients		60.00%	0.01054%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	02/19/2012
Province:	BC
Region:	Altares
Well Number:	26636
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A-C092-I/094-B-01
Longitude:	-122.005884
Latitude:	56.143226
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,200
Total Water Volume (m3)*:	14,343.68

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater; ClearFRAC XT	Talisman	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Water (Including Mix Water Supplied by Client)			86.50523%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Crystalline silica	14808-60-7	97.80%	13.14372%	
			Hydrochloric Acid	7647-01-0	0.40%	0.05393%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.28%	0.03715%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.03%	0.00465%	
			Sodium salt of aliphatic amine acid		0.03%	0.00409%	
			Methanol	67-56-1	0.01%	0.00125%	
			Aliphatic acids		0.01%	0.00075%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00075%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00034%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00025%	
			Ethoxylated alcohols		0.00%	0.00018%	
			Ethoxylated alcohols #2		0.00%	0.00018%	
MC B-8650	Multi-Chem	Biocide	Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00007%	
			Glutaraldehyde	111-30-8	60.00%	0.02706%	
			Water	7732-18-5	50.00%	0.02255%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Methanol	67-56-1	0.50%	0.00023%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.00999%	
			Non-Hazardous Ingredients		60.00%	0.00999%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	01/09/2012
Province:	BC
Region:	Altares
Well Number:	27192
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A-D092-I/094-B-01
Longitude:	-122.005734
Latitude:	56.143349
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	16,548.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			89.72049%	
Proppant	Schlumberger	Proppant	Crystalline silica	14808-60-7	92.93%	9.55321%	
HCL; Slickwater; YF130LGM	Schlumberger	Base Fluid; Antifoam Agent; Bactericide; Breaker; Caustic Soda; Chelating Agent; Corrosion Inhibitor; Crosslinker; Friction Reducer; Gelling Agent; Hydrochloric Acid; Prop Transport Additive; Resin Coated Prop; Sand; Scale Inhibitor; Surfactant	Distillates (petroleum), hydrotreated light	64742-47-8	1.06%	0.10869%	
			Hydrochloric Acid	7647-01-0	0.86%	0.08827%	
			Synthetic organic polymer		0.41%	0.04228%	
			Hydrocarbon hydrocarbon		0.40%	0.04121%	
			Guar gum	9000-30-0	0.40%	0.04121%	
			Sodium bromate	7789-38-0	0.15%	0.01554%	
			Diammonium peroxodisulphate	7727-54-0	0.13%	0.01298%	
			Methanol	67-56-1	0.11%	0.01094%	
			Sodium hydroxide	1310-73-2	0.07%	0.00699%	
			Ethoxylated alcohols		0.07%	0.00697%	
			Ethoxylated alcohols #2		0.07%	0.00697%	
			Sodium salt of aliphatic amine acid		0.07%	0.00669%	
			Boric acid	10043-35-3	0.06%	0.00626%	
			Ethane-1,2-diol	107-21-1	0.04%	0.00459%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.03%	0.00278%	
Diatomaceous earth, calcined	91053-39-3	0.02%	0.00215%				
Aliphatic acids		0.01%	0.00123%				
Aliphatic alcohols, ethoxylated #1		0.01%	0.00123%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Sodium chloride	7647-14-5	0.01%	0.00076%	
			Calcium chloride	10043-52-4	0.01%	0.00076%	
			Sodium hydroxide (impurity)	1310-73-2	0.01%	0.00056%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00041%	
			Magnesium nitrate	10377-60-3	0.00%	0.00036%	
			5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	0.00%	0.00036%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00018%	
			Magnesium chloride	7786-30-3	0.00%	0.00018%	
			Hemicellulase enzyme	9012-54-8	0.00%	0.00012%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00011%	
			Crystalline silica: Quartz (SiO ₂)	14808-60-7	0.00%	0.00004%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00000%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	02/22/2012
Province:	BC
Region:	Altares
Well Number:	27193
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A-E092-I/094-B-01
Longitude:	-122.005771
Latitude:	56.143323
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	18,410.57

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater; ClearFRAC XT	Talisman	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Water (Including Mix Water Supplied by Client)			87.64908%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Crystalline silica	14808-60-7	97.58%	12.05227%	
			Hydrochloric Acid	14808-60-7	0.42%	0.05170%	
			Distillates (petroleum), hydrotreated light	7647-01-0	0.33%	0.04069%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	64742-47-8	0.04%	0.00509%	
			Sodium salt of aliphatic amine acid	68002-97-1	0.03%	0.00392%	
			Fatty acid amidoalkyl betaine		0.01%	0.00125%	
			Methanol		0.01%	0.00120%	
			Aliphatic alcohols, ethoxylated #1	67-56-1	0.01%	0.00072%	
			Aliphatic acids		0.01%	0.00072%	
			Propan-2-ol		0.01%	0.00064%	
			Sodium hydroxide (impurity)	67-63-0	0.00%	0.00033%	
			Prop-2-yn-1-ol	1310-73-2	0.00%	0.00024%	
			Ethoxylated alcohols	107-19-7	0.00%	0.00017%	
			Ethoxylated alcohols #2		0.00%	0.00017%	
Trisodium nitrilotriacetate (impurity)		0.00%	0.00007%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC B-8650	Multi-Chem	Biocide	Sulfonated polystyrene	5064-31-3	0.00%	0.00001%	
			Glutaraldehyde	111-30-8	60.00%	0.02706%	
			Water	7732-18-5	50.00%	0.02255%	
			Methanol	67-56-1	0.50%	0.00023%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.00999%	
			Non-Hazardous Ingredients		60.00%	0.00999%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	01/12/2012
Province:	BC
Region:	Altares
Well Number:	27194
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A-F092-I/094-B-01
Longitude:	-122.010075
Latitude:	56.143002
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	19,681.3

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Talisman	Base Fluid	Water (Including Mix Water Supplied by Client)			89.39050%	
Proppant	Schlumberger	Proppant	Crystalline silica	14808-60-7	91.71%	9.72958%	
HCL; Slickwater; YF130LGM	Schlumberger	Base Fluid; Antifoam Agent; Bactericide; Breaker; Caustic Soda; Chelating Agent; Corrosion Inhibitor; Crosslinker; Friction Reducer; Gelling Agent; Hydrochloric Acid; Prop Transport Additive; Resin Coated Prop; Sand; Scale Inhibitor; Surfactant	Distillates (petroleum), hydrotreated light	64742-47-8	1.37%	0.14532%	
			Hydrochloric Acid	7647-01-0	1.18%	0.12469%	
			Synthetic organic polymer		0.43%	0.04606%	
			Sodium bromate	7789-38-0	0.15%	0.01544%	
			Diammonium peroxodisulphate	7727-54-0	0.14%	0.01492%	
			Methanol	67-56-1	0.11%	0.01202%	
			Hydrocarbon hydrocarbon		0.09%	0.00972%	
			Guar gum	9000-30-0	0.09%	0.00972%	
			Sodium salt of aliphatic amine acid		0.09%	0.00945%	
			Sodium hydroxide	1310-73-2	0.07%	0.00745%	
			Ethoxylated alcohols		0.07%	0.00727%	
			Ethoxylated alcohols #2		0.07%	0.00727%	
			Boric acid	10043-35-3	0.06%	0.00667%	
			Ethane-1,2-diol	107-21-1	0.04%	0.00430%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.03%	0.00303%	
Diatomaceous earth, calcined	91053-39-3	0.02%	0.00216%				
Aliphatic acids		0.02%	0.00174%				
Aliphatic alcohols, ethoxylated #1		0.02%	0.00174%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Sodium hydroxide (impurity)	1310-73-2	0.01%	0.00079%	
			Sodium chloride	7647-14-5	0.01%	0.00072%	
			Calcium chloride	10043-52-4	0.01%	0.00072%	
			Prop-2-yn-1-ol	107-19-7	0.01%	0.00058%	
			Magnesium nitrate	10377-60-3	0.00%	0.00036%	
			5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	0.00%	0.00036%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00018%	
			Magnesium chloride	7786-30-3	0.00%	0.00018%	
			Hemicellulase enzyme	9012-54-8	0.00%	0.00018%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00016%	
			Crystalline silica: Quartz (SiO ₂)	14808-60-7	0.00%	0.00004%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00004%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	11/30/2011
Province:	BC
Region:	Altares
Well Number:	26296
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B- 093-I/094-B-01
Longitude:	-122.020740
Latitude:	56.143492
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,800
Total Water Volume (m3)*:	12,553

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCl Acid; Slickwater	Talisman	Base Fluid; Antifoam Agent; Bactericide; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Proppant; Rheology Modifier; Sand, Scale Inhibitor; Surfactant	Water (Includes Mix Water Supplied by Client)		100.00%	91.49068%	
HCl Acid; Slickwater	Schlumberger	Base Fluid; Antifoam Agent; Bactericide; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Proppant; Rheology Modifier; Sand, Scale Inhibitor; Surfactant	Crystalline silica		92.08%	7.83573%	
			Crystalline silica	14808-60-7	3.44%	0.29238%	
			Hydrochloric Acid	7647-01-0	0.82%	0.06980%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.41%	0.03513%	
			Fatty acid amidoalkyl betaine		0.08%	0.00667%	
			Sodium salt of aliphatic amine acid		0.06%	0.00529%	
			Ethane-1,2-diol	107-21-1	0.05%	0.00459%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.05%	0.00439%	
			Propan-2-ol	67-63-0	0.04%	0.00339%	
			Diatomaceous earth, calcined	91053-39-3	0.03%	0.00219%	
			Methanol	67-56-1	0.02%	0.00162%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00098%	
			Aliphatic acids		0.01%	0.00098%	
			Sodium chloride	7647-14-5	0.01%	0.00077%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Calcium chloride	10043-52-4	0.01%	0.00077%	
			Sodium hydroxide (impurity)	1310-73-2	0.01%	0.00044%	
			Magnesium nitrate	10377-60-3	0.00%	0.00037%	
			5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	0.00%	0.00037%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00033%	
			Ethoxylated alcohols #2		0.00%	0.00024%	
			Ethoxylated alcohols		0.00%	0.00024%	
			Sulfonated polystyrene		0.00%	0.00023%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00018%	
			Magnesium chloride	7786-30-3	0.00%	0.00018%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00009%	
			Crystalline silica: Quartz (SiO ₂)	14808-60-7	0.00%	0.00004%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00004%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/02/2011
Province:	BC
Region:	Altares
Well Number:	26297
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-A093-I/094-B-01
Longitude:	-122.020777
Latitude:	56.143466
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	18,420

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCl Acid; Slickwater; ClearFRAC	Talisman	Base Fluid; Antifoam Agent; Bactericide; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Proppant; Rheology Modifier; Sand; Scale Inhibitor; Surfactant	Water (Includes Mix Water Supplied by Client)	-	100.00%	88.12590%	
HCl Acid; Slickwater; ClearFRAC	Schlumberger	Base Fluid; Antifoam Agent; Bactericide; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Proppant; Rheology Modifier; Sand; Scale Inhibitor; Surfactant	Crystalline silica	-	93.42%	11.09320%	
			Crystalline silica	14808-60-7	3.66%	0.43432%	
			Hydrochloric Acid	7647-01-0	0.57%	0.06720%	
			Distillates (petroleum); hydrotreated light	64742-47-8	0.24%	0.02866%	
			Sodium salt of aliphatic amine acid		0.04%	0.00509%	
			Ethane-1,2-diol	107-21-1	0.04%	0.00504%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.03%	0.00358%	
			Diatomaceous earth; calcined	91053-39-3	0.02%	0.00194%	
			Methanol	67-56-1	0.01%	0.00156%	
			Fatty acid amidoalkyl betaine		0.01%	0.00100%	
			Aliphatic acids		0.01%	0.00094%	
			Aliphatic alcohols; ethoxylated #1		0.01%	0.00094%	
			Calcium chloride	10043-52-4	0.01%	0.00084%	
Sodium chloride	7647-14-5	0.01%	0.00084%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Propan-2-ol	67-63-0	0.00%	0.00051%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00042%	
			5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	0.00%	0.00032%	
			Magnesium nitrate	10377-60-3	0.00%	0.00032%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00031%	
			Ethoxylated alcohols		0.00%	0.00023%	
			Ethoxylated alcohols #2		0.00%	0.00023%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00016%	
			Magnesium chloride	7786-30-3	0.00%	0.00016%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00008%	
			Crystalline silica: Quartz (SiO ₂)	14808-60-7	0.00%	0.00003%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00003%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/02/2011
Province:	BC
Region:	Altares
Well Number:	27247
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-B093-I/094-B-01
Longitude:	-122.020811
Latitude:	56.143441
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	16,477

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCl Acid; Slickwater; ClearFRAC XT 1.5%	Talisman	Base Fluid; Antifoam Agent; Bactericide; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Proppant; Sand, Scale Inhibitor; Surfactant	Water (Including Mix Water Supplied by Client)	-	100.00%	88.30199%	
HCl Acid; Slickwater; ClearFRAC XT 1.5%	Schlumberger	Base Fluid; Antifoam Agent; Bactericide; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Hydrochloric Acid; Resin Coated Proppant; Sand, Scale Inhibitor; Surfactant	Crystalline silica	14808-60-7	96.98%	11.34509%	
			Hydrochloric Acid	7647-01-0	0.58%	0.06842%	
			Distillates (petroleum); hydrotreated light	64742-47-8	0.25%	0.02963%	
			Ethane-1;2-diol	107-21-1	0.05%	0.00530%	
			Sodium salt of aliphatic amine acid		0.04%	0.00518%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.03%	0.00370%	
			Diatomaceous earth; calcined	91053-39-3	0.02%	0.00201%	
			Methanol	67-56-1	0.01%	0.00158%	
			Aliphatic acids		0.01%	0.00096%	
			Aliphatic alcohols; ethoxylated #1		0.01%	0.00096%	
			Sodium chloride	7647-14-5	0.01%	0.00088%	
			Calcium chloride	10043-52-4	0.01%	0.00088%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00043%	
			Magnesium nitrate	10377-60-3	0.00%	0.00034%	
5-chloro-2-methyl-4-isothiazolin-	26172-55-4	0.00%	0.00034%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			3-one				
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00032%	
			Ethoxylated alcohols #2		0.00%	0.00023%	
			Ethoxylated alcohols		0.00%	0.00023%	
			Magnesium chloride	7786-30-3	0.00%	0.00017%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00017%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00009%	
			Crystalline silica: Quartz (SiO ₂)	14808-60-7	0.00%	0.00003%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00003%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/17/2012
Province:	BC
Region:	Altares
Well Number:	27715
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-J094-I/094-B-01
Longitude:	-122.030013
Latitude:	56.143944
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,391

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	87.12512%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.10477%	
			water	7732-18-5	85.00%	0.59648%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00069%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00034%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00006%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00006%	
			xylene	1330-20-7	5.00%	0.00006%	
			light aromatic naphtha	64742-95-6	5.00%	0.00006%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00001%	
			ethylbenzene	100-41-4	1.00%	0.00001%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00325%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00041%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00041%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00041%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00001%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00007%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.03253%	
			ammonium chloride	12125-02-9	1.50%	0.00174%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	11.97539%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02127%	
			Water	7732-18-5	50.00%	0.01772%	
			Methanol	67-56-1	0.50%	0.00018%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.00909%	
			non-hazardous ingredients		60.00%	0.00909%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00285%	
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00882%	
			isopropanol	67-63-0	40.00%	0.00588%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00074%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00074%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00303%	HMIRC #7947
			water	7732-18-5	65.00%	0.00492%	HMIRC #7947

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/18/2012
Province:	BC
Region:	Altares
Well Number:	27716
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-K094-I/094-B-01
Longitude:	-122.025977
Latitude:	56.143970
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	15,399.7

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	88.94552%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.08360%	
			water	7732-18-5	85.00%	0.47593%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00172%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00086%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00014%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00014%	
			xylene	1330-20-7	5.00%	0.00014%	
			light aromatic naphtha	64742-95-6	5.00%	0.00014%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00003%	
			ethylbenzene	100-41-4	1.00%	0.00003%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00003%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00148%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00033%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00033%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00033%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00001%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00582%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.03226%	
			ammonium chloride	12125-02-9	1.50%	0.00173%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	10.30402%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.01968%	
			Water	7732-18-5	50.00%	0.01640%	
			Methanol	67-56-1	0.50%	0.00016%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.00900%	
			non-hazardous ingredients		60.00%	0.00900%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00191%	
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00559%	
			isopropanol	67-63-0	40.00%	0.00373%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00047%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00047%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00202%	HMIRC #7947
			water	7732-18-5	65.00%	0.00328%	HMIRC #7947

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/19/2012
Province:	BC
Region:	Altares
Well Number:	27717
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-L094-I/094-B-01
Longitude:	-122.025940
Latitude:	56.143994
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	13,659.7

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	water		100.00%	87.98349%	
HCl 15%	Trican	Acid	hydrochloric acid	7647-01-0	14.93%	0.08849%	
			water	7732-18-5	85.00%	0.50380%	
S-8	Trican	Non-emulsifier	methanol	67-56-1	60.00%	0.00058%	
			oxyalkylated alkylphenolic resin	30704-64-4	30.00%	0.00029%	
			polyglycol diepoxide	68036-95-3	5.00%	0.00005%	
			polyglycol diepoxide	68036-92-0	5.00%	0.00005%	
			xylene	1330-20-7	5.00%	0.00005%	
			light aromatic naphtha	64742-95-6	5.00%	0.00005%	
			1,2,4-trimethylbenzene	95-63-6	1.00%	0.00001%	
			ethylbenzene	100-41-4	1.00%	0.00001%	
			1,3,5-trimethylbenzene	108-67-8	1.00%	0.00001%	
IC-3	Trican	Iron Control	sodium nitrilo-triacetate, monohydrate	18662-53-8	99.00%	0.00274%	
AI-10	Trican	Acid Inhibitor	formic acid	64-18-6	30.00%	0.00035%	HMIRC#7939
			polyoxyalkylenes	68951-67-7	30.00%	0.00035%	HMIRC#7939
			Acetone	67-64-1	30.00%	0.00035%	HMIRC#7939
			Fatty Acids		0.00%	0.00000%	HMIRC#7939
			Modified Thiourea Polymer		0.00%	0.00000%	HMIRC#7939
			Methanol	67-56-1	0.50%	0.00001%	HMIRC#7939
DF-1	Trican	Defoamer	non-hazardous ingredients		100.00%	0.00006%	
FR-8	Trican	Friction Reducer	petroleum distillate	64742-47-8	28.00%	0.03091%	
			ammonium chloride	12125-02-9	1.50%	0.00166%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Frac Sand - regular	Trican	Proppant	crystalline silica	14808-60-7	100.00%	11.24616%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02124%	
			Water	7732-18-5	50.00%	0.01770%	
			Methanol	67-56-1	0.50%	0.00018%	
MC S-2510T	Multi -Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.00884%	
			non-hazardous ingredients		60.00%	0.00884%	
FCB-1	Trican	Breaker	severely refined mineral oil		100.00%	0.00151%	
FC-1	Trican	Surfactant	N,N,N-trimethyl-1-octadecaminium chloride	112-03-8	60.00%	0.00397%	
			isopropanol	67-63-0	40.00%	0.00265%	
			N,N,N-dimethyl-1-octadecanamine	124-28-7	5.00%	0.00033%	
			N,N,N-dimethyl-1-octadecanamine-HCL		5.00%	0.00033%	
FC-2	Trican	Surfactant	organic salt *		40.00%	0.00161%	HMIRC #7947
			water	7732-18-5	65.00%	0.00262%	HMIRC #7947

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	05/18/2012
Province:	BC
Region:	Altares
Well Number:	27160
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B- 058-L/094-A-04
Longitude:	-121.582553
Latitude:	56.123690
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,700
Total Water Volume (m3)*:	14,381.7

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL;Slickwater;ClearFR AC XT	Talisman	Base Fluid	Water		100.00%	89.69196%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Corrosion Inhibitor; Surfactant; Acid; Breaker; Rheology Modifier; Gelling Agent; Water Friction-Reducing Agent J618; AntiFoam Agent; Chelating Agent; Propping Agent; Fluid Loss Additive	Crystalline silica	14808-60-7	98.63%	10.10301%	
			Hydrochloric acid	7647-01-0	0.88%	0.08973%	
			Hydrocarbon hydrocarbon		0.23%	0.02309%	
			Phenolic resin	9003-35-4	0.15%	0.01559%	
			Sodium salt of aliphatic amine acid		0.07%	0.00679%	
			Methanol	67-56-1	0.02%	0.00208%	
			Erucic amidopropyl dimethyl betaine	149879-98-1	0.02%	0.00194%	
			Aliphatic alcohols, ethoxylated #2		0.01%	0.00125%	
			Aliphatic acids		0.01%	0.00125%	
			Propan-2-ol	67-63-0	0.01%	0.00098%	
			Sodium hydroxide (impurity)	1310-73-2	0.01%	0.00057%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00042%	
			Oxyalkylated Alkanols		0.00%	0.00030%	
			Alcohol, C11 linear, ethoxylated	34398-01-1	0.00%	0.00030%	
Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00011%				
Sulfonated polystyrene		0.00%	0.00004%				
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02806%	
			Water	7732-18-5	50.00%	0.02338%	
			Methanol	67-56-1	0.50%	0.00023%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01046%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Non-Hazardous Ingredients		60.00%	0.01046%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	05/18/2012
Province:	BC
Region:	Altares
Well Number:	27415
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-A058-L/094-A-04
Longitude:	-121.582508
Latitude:	56.123711
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,800
Total Water Volume (m3)*:	15,423.3

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL;Slickwater;ClearFR AC XT	Talisman	Base Fluid	Water		100.00%	87.97380%	
HCL;Slickwater;ClearFR AC XT	Schlumberger	Corrosion Inhibitor; Surfactant; Acid;Friction Reducing Agent; AntiFoam Agent; Chelating Agent; Fluid Loss Additive; Propping Agent	Crystalline silica	14808-60-7	99.18%	11.86420%	
			Hydrochloric Acid	7647-01-0	0.49%	0.05840%	
			Hydrochloric Acid	9003-35-4	0.17%	0.02000%	
			Phenolic Resin		0.16%	0.01920%	
			Sodium Salt of Aliphatic Amine Acid		0.04%	0.00440%	
			Methanol	67-56-1	0.01%	0.00140%	
			Erucic amidopropyl dimethyl betaine		0.01%	0.00080%	
			Aliphatic alcohols, ethoxylated #2		0.01%	0.00080%	
			Aliphatic acids	1310-73-2	0.00%	0.00040%	
			Propan-2-ol	107-19-7	0.00%	0.00030%	
			Sodium hydroxide (impurity)	34398-01-1	0.00%	0.00020%	
			Prop-2-yn-1-ol		0.00%	0.00020%	
			Oxyalkylated Alkanols	5064-31-3	0.00%	0.00010%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02770%	
			Water	7732-18-5	50.00%	0.02310%	
			Methanol	67-56-1	0.50%	0.00020%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01060%	
			Non-Hazardous Ingredients		60.00%	0.01060%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	05/20/2012
Province:	BC
Region:	Altares
Well Number:	27416
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-B058-L/094-A-04
Longitude:	-121.582463
Latitude:	56.123731
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,700
Total Water Volume (m3)*:	15,291.07

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater; ClearFRAC XT	Talisman	Base Fluid	Water		100.00%	87.61463%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Corrosion Inhibitor; Viscosifier and Fluid Loss Additive; Surfactant; Acid; Additive; Rheology Modifier; Gelling Agent; Water Friction-Reducing Agent J618; AntiFoam Agent; Activator; Chelating Agent; Propping Agent; Fluid Loss Additive	Crystalline silica	14808-60-7	99.05%	12.20410%	
			Hydrochloric acid	7647-01-0	0.57%	0.06962%	
			Phenolic resin	9003-35-4	0.19%	0.02292%	
			Hydrocarbon hydrocarbon		0.16%	0.01976%	
			Sodium salt of aliphatic amine acid		0.04%	0.00527%	
			Erucic amidopropyl dimethyl betaine	149879-98-1	0.04%	0.00432%	
			Propan-2-ol	67-63-0	0.02%	0.00218%	
			Methanol	67-56-1	0.01%	0.00161%	
			Synthetic organic polymer		0.01%	0.00132%	
			Calcium carbonate	471-34-1	0.01%	0.00100%	
			Aliphatic alcohols, ethoxylated #2		0.01%	0.00097%	
			Aliphatic acids		0.01%	0.00097%	
			Sodium hydroxide	1310-73-2	0.00%	0.00060%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00032%	
			Alcohol, C11 linear, ethoxylated	34398-01-1	0.00%	0.00024%	
			Oxyalkylated Alkanols		0.00%	0.00024%	
Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00009%				
Polyethylene glycol sorbitan monolaurate	9005-64-5	0.00%	0.00001%				
Cetyethylmorpholinium ethyl		0.00%	0.00001%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			sulfate				
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02823%	
			Water	7732-18-5	50.00%	0.02352%	
			Methanol	67-56-1	0.50%	0.00024%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01044%	
			Non-Hazardous Ingredients		60.00%	0.01044%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/17/2013
Province:	BC
Region:	Altares
Well Number:	27417
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-C058-L/094-A-04
Longitude:	-121.582418
Latitude:	56.123752
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,800
Total Water Volume (m3)*:	11,106

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.86201%	
S-4W	Trican	Surfactant	methanol	67-56-1	0.30%	0.00003%	
			fatty acid alkanolamide	68603-42-9	0.50%	0.00006%	
			diethanolamine	111-42-2	0.15%	0.00002%	
			fatty acids, coco compounds with diethanamine		0.10%	0.00001%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00006%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00027%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00039%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13661%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00021%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	05/11/2012
Province:	BC
Region:	Altares
Well Number:	27419
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-E058-L/094-A-04
Longitude:	-121.582058
Latitude:	56.123915
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,900
Total Water Volume (m3)*:	14,381.69

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater-Friction Reducer; ClearFRAC XT	Talisman	Base Fluid	Water		100.00%	89.69171%	
HCL; Slickwater-Friction Reducer; ClearFRAC XT	Schlumberger	Corrosion Inhibitor; Surfactant; Acid; Breaker; Rheology Modifier; Gelling Agent; Water Friction-Reducing Agent J618; AntiFoam Agent; Chelating Agent; Propping Agent; Fluid Loss Additive	Crystalline silica	14808-60-7	98.63%	10.10299%	
			Hydrochloric acid	7647-01-0	0.88%	0.08973%	
			Hydrocarbon hydrocarbon		0.23%	0.02309%	
			Phenolic resin	9003-35-4	0.15%	0.01559%	
			Sodium salt of aliphatic amine acid		0.07%	0.00674%	
			Methanol	67-56-1	0.02%	0.00208%	
			Erucic amidopropyl dimethyl betaine	149879-98-1	0.02%	0.00194%	
			Aliphatic alcohols, ethoxylated #2		0.01%	0.00125%	
			Aliphatic acids		0.01%	0.00125%	
			Propan-2-ol	67-63-0	0.01%	0.00098%	
			Sodium hydroxide (impurity)	1310-73-2	0.01%	0.00056%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00042%	
			Oxyalkylated Alkanols		0.00%	0.00030%	
			Alcohol, C11 linear, ethoxylated	34398-01-1	0.00%	0.00030%	
Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00011%				
Sulfonated polystyrene		0.00%	0.00004%				
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02803%	
			Water	7732-18-5	50.00%	0.02336%	
			Methanol	67-56-1	0.50%	0.00023%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01067%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Non-Hazardous Ingredients		60.00%	0.01067%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	05/09/2012
Province:	BC
Region:	Altares
Well Number:	27420
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-F058-L/094-A-04
Longitude:	-121.582013
Latitude:	56.123935
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,900
Total Water Volume (m3)*:	14,277.26

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater-Friction Reducer; ClearFRAC XT	Talisman	Base Fluid	Water		100.00%	87.65423%	
HCL; Slickwater-Friction Reducer; ClearFRAC XT	Schlumberger	Corrosion Inhibitor; Surfactant; Acid; Rheology Modifier; Gelling Agent; Water Friction-Reducing Agent J618; AntiFoam Agent; Chelating Agent; Propping Agent	Crystalline silica	14808-60-7	99.17%	12.18053%	
			Hydrochloric acid	7647-01-0	0.50%	0.06086%	
			Phenolic resin	9003-35-4	0.17%	0.02149%	
			Hydrocarbon hydrocarbon		0.16%	0.01942%	
			Sodium salt of aliphatic amine acid		0.04%	0.00457%	
			Methanol	67-56-1	0.01%	0.00141%	
			Aliphatic acids		0.01%	0.00085%	
			Aliphatic alcohols, ethoxylated #2		0.01%	0.00085%	
			Erucic amidopropyl dimethyl betaine	149879-98-1	0.00%	0.00057%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00038%	
			Propan-2-ol	67-63-0	0.00%	0.00029%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00028%	
			Alcohol, C11 linear, ethoxylated	34398-01-1	0.00%	0.00021%	
			Oxyalkylated Alkanols		0.00%	0.00021%	
Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00008%				
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02779%	
			Water	7732-18-5	50.00%	0.02316%	
			Methanol	67-56-1	0.50%	0.00023%	
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01042%	
			Non-Hazardous Ingredients		60.00%	0.01042%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/17/2013
Province:	BC
Region:	Altares
Well Number:	28697
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-H058-L/094-A-04
Longitude:	-121.583034
Latitude:	56.124097
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	11,856

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.86335%	
S-4W	Trican	Surfactant	methanol	67-56-1	0.30%	0.00003%	
			fatty acid alkanolamide	68603-42-9	0.50%	0.00006%	
			diethanolamine	111-42-2	0.15%	0.00002%	
			fatty acids, coco compounds with diethanamine		0.10%	0.00001%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00006%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00029%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00042%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.13522%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00021%	
			water	7732-18-5	0.50%	0.00017%	
			methanol	67-56-1	0.01%	0.00000%	
MC S-2510T	Multi-Chem	Scale Inhibitor	ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/17/2013
Province:	BC
Region:	Altares
Well Number:	28700
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES B-I058-L/094-A-04
Longitude:	-121.582967
Latitude:	56.124128
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	12,147

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Operator	Carrier	Water		1.00%	0.87013%	
S-4W	Trican	Surfactant	methanol	67-56-1	0.30%	0.00003%	
			fatty acid alkanolamide	68603-42-9	0.50%	0.00005%	
			diethanolamine	111-42-2	0.15%	0.00002%	
			fatty acids, coco compounds with diethanamine		0.10%	0.00001%	
IC-1	Trican	Iron Control	citric acid	77-92-9	1.00%	0.00005%	
AI-7NR	Trican	Acid Inhibitor	propargyl alcohol	107-19-7	0.01%	0.00000%	
			non-hazardous ingredients		0.99%	0.00002%	
DF-1	Trican	Defoamer	non-hazardous ingredients		1.00%	0.00000%	
FR-8	Trican	Friction Reducer	distillates (petroleum), hydrotreated light	64742-47-8	0.40%	0.00030%	
			ammonium chloride	12125-02-9	0.02%	0.00001%	
			non-hazardous ingredients		0.59%	0.00044%	
FC-1S	Trican	Surfactant	isopropanol	67-63-0	0.60%	0.00002%	
			quaternary ammonium compound		0.30%	0.00001%	
			non-hazardous ingredients		0.10%	0.00000%	
FC-2	Trican	Surfactant	organic salt		0.40%	0.00001%	
			water	7732-18-5	0.65%	0.00001%	
FCB-1	Trican	Breaker	severely refined mineral oil		1.00%	0.00000%	
Frac Sand - regular	Trican	Proppant	silica crystalline	14808-60-7	1.00%	0.12836%	
MC B-8650	Multi-Chem	Biocide	glutaraldehyde	111-30-8	0.60%	0.00021%	
			water	7732-18-5	0.50%	0.00017%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	methanol	67-56-1	0.01%	0.00000%	
			ethylene glycol	107-21-1	0.60%	0.00010%	
			non-hazardous ingredients		0.60%	0.00010%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	05/01/2012
Province:	BC
Region:	Altares
Well Number:	27161
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES D- 090-L/094-A-04
Longitude:	-121.594016
Latitude:	56.142905
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	17,022.85

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater; ClearFRAC XT	Talisman	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Water (Including Mix Water Supplied by Client)			88.01130%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Crystalline silica	14808-60-7	97.61%	11.64020%	
			Hydrochloric Acid	7647-01-0	0.46%	0.05450%	
			Sodium salt of aliphatic amine acid		0.03%	0.00413%	
			Fatty acid amidoalkyl betaine		0.02%	0.00246%	
			Methanol	67-56-1	0.01%	0.00126%	
			Propan-2-ol	67-63-0	0.01%	0.00125%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00076%	
			Aliphatic acids		0.01%	0.00076%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00034%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00025%	
			Ethoxylated alcohols		0.00%	0.00018%	
			Ethoxylated alcohols #2		0.00%	0.00018%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00007%	
			Sulfonated polystyrene		0.00%	0.00001%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02787%	
			Water	7732-18-5	50.00%	0.02322%	
			Methanol	67-56-1	0.50%	0.00023%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01039%	
			Non-Hazardous Ingredients		60.00%	0.01039%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/19/2011
Province:	BC
Region:	Altares
Well Number:	27162
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES D-A090-L/094-A-04
Longitude:	-121.593982
Latitude:	56.142931
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	18,366

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
water	Talisman	Base / Carrier Fluid					water
			Water (Including Mix Water Supplied by Client)		100.00%	88.66000%	
			Water (Including Mix Water Supplied by Client)		100.00%	88.66000%	
HCl, Slickwater, ClearFRAC	Schlumberger	sand/propant	Crystalline silica	14808-60-7	97.56%	11.06000%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00000%	
			Crystalline silica: Quartz (SiO2)	14808-60-7	0.00%	0.00000%	
			Crystalline silica	14808-60-7	97.56%	11.06000%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00000%	
			Crystalline silica: Quartz (SiO2)	14808-60-7	0.00%	0.00000%	
HCl, Slickwater, ClearFRAC	Schlumberger	acid	Hydrochloric Acid	7647-01-0	0.39%	0.04000%	
			Hydrochloric Acid	7647-01-0	0.39%	0.04000%	
HCl, Slickwater, ClearFRAC	Schlumberger	Antifoam Agent, Bactericide, Chelating Agent, Corrosion Inhibitor, Friction Reducer, Gelling Agent, Resin Coated Prop, Rheology Modifier, Scale Inhibitor, Surfactant	Distillates (petroleum), hydrotreated light	64742-47-8	0.30%	0.03000%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.04%	0.00000%	
			Ethane-1,2-diol	107-21-1	0.04%	0.00000%	
			Sodium salt of aliphatic amine acid		0.03%	0.00000%	
			Fatty acid amidoalkyl betaine		0.02%	0.00000%	
			Diatomaceous earth, calcined	91053-39-3	0.02%	0.00000%	
			Propan-2-ol	67-63-0	0.01%	0.00000%	
			Methanol	67-56-1	0.01%	0.00000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Calcium chloride	10043-52-4	0.01%	0.00000%	
			Sodium chloride	7647-14-5	0.01%	0.00000%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00000%	
			Aliphatic acids		0.01%	0.00000%	
			5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	0.00%	0.00000%	
			Magnesium nitrate	10377-60-3	0.00%	0.00000%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00000%	
			Sulfonated polystyrene		0.00%	0.00000%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00000%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00000%	
			Magnesium chloride	7786-30-3	0.00%	0.00000%	
			Ethoxylated alcohols		0.00%	0.00000%	
			Ethoxylated alcohols #2		0.00%	0.00000%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00000%	
			Aliphatic amine polymer		0.00%	0.00000%	
			Aromatic hydrocarbon		0.00%	0.00000%	
			Ethoxylated alcohol		0.00%	0.00000%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.30%	0.03000%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.04%	0.00000%	
			Ethane-1,2-diol	107-21-1	0.04%	0.00000%	
			Sodium salt of aliphatic amine acid		0.03%	0.00000%	
			Fatty acid amidoalkyl betaine		0.02%	0.00000%	
			Diatomaceous earth, calcined	91053-39-3	0.02%	0.00000%	
			Propan-2-ol	67-63-0	0.01%	0.00000%	
			Methanol	67-56-1	0.01%	0.00000%	
			Calcium chloride	10043-52-4	0.01%	0.00000%	
			Sodium chloride	7647-14-5	0.01%	0.00000%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00000%	
			Aliphatic acids		0.01%	0.00000%	
			5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	0.00%	0.00000%	
			Magnesium nitrate	10377-60-3	0.00%	0.00000%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00000%	
			Sulfonated polystyrene		0.00%	0.00000%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00000%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00000%	
			Magnesium chloride	7786-30-3	0.00%	0.00000%	
			Ethoxylated alcohols		0.00%	0.00000%	
			Ethoxylated alcohols #2		0.00%	0.00000%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Aliphatic amine polymer		0.00%	0.00000%	
			Aromatic hydrocarbon		0.00%	0.00000%	
			Ethoxylated alcohol		0.00%	0.00000%	

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	05/01/2012
Province:	BC
Region:	Altares
Well Number:	27163
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES D-B090-L/094-A-04
Longitude:	-121.593948
Latitude:	56.142958
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	5,200
Total Water Volume (m3)*:	16,546.66

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL; Slickwater; ClearFRAC XT	Talisman	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Water (Including Mix Water Supplied by Client)			87.70108%	
HCL; Slickwater; ClearFRAC XT	Schlumberger	Base Fluid; Antifoam Agent; Breaker; Chelating Agent; Corrosion Inhibitor; Friction Reducer; Gelling Agent; Hydrochloric Acid; Resin Coated Prop; Rheology Modifier; Sand, Surfactant	Crystalline silica	14808-60-7	97.54%	11.93349%	
			Hydrochloric Acid	7647-01-0	0.48%	0.05925%	
			Sodium salt of aliphatic amine acid		0.04%	0.00449%	
			Fatty acid amidoalkyl betaine		0.01%	0.00171%	
			Methanol	67-56-1	0.01%	0.00137%	
			Propan-2-ol	67-63-0	0.01%	0.00087%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00083%	
			Aliphatic acids		0.01%	0.00083%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00037%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00028%	
			Ethoxylated alcohols		0.00%	0.00020%	
			Ethoxylated alcohols #2		0.00%	0.00020%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00007%	
			Sulfonated polystyrene		0.00%	0.00003%	
MC B-8650	Multi-Chem	Biocide	Glutaraldehyde	111-30-8	60.00%	0.02823%	
			Water	7732-18-5	50.00%	0.02352%	
			Methanol	67-56-1	0.50%	0.00024%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
MC S-2510T	Multi-Chem	Scale Inhibitor	Ethylene Glycol	107-21-1	60.00%	0.01042%	
			Non-Hazardous Ingredients		60.00%	0.01042%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/19/2011
Province:	BC
Region:	Altares
Well Number:	26660
Operator Name:	Talisman Energy Inc.
Well Name:	TALISMAN HZ ALTARES A- 100-L/094-A-04
Longitude:	-121.593914
Latitude:	56.142984
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	16,402

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
water	Talisman	Base / Carrier Fluid					water
			water		100.00%	86.30000%	
HCl, Slickwater, ClearFRAC	Schlumberger	sand/propanat	Crystalline silica	14808-60-7	97.34%	13.34000%	
			Crystalline silica: Quartz (SiO2)	14808-60-7	0.00%	0.00000%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00000%	
			Crystalline silica	14808-60-7	97.34%	13.34000%	
			Crystalline silica: Quartz (SiO2)	14808-60-7	0.00%	0.00000%	
			Crystalline silica: cristobalite	14464-46-1	0.00%	0.00000%	
HCl, Slickwater, ClearFRAC	Schlumberger	acid	Hydrochloric Acid	7647-01-0	0.48%	0.07000%	
			Hydrochloric Acid	7647-01-0	0.48%	0.07000%	
HCl, Slickwater, ClearFRAC	Schlumberger	Antifoam Agent, Bactericide, Chelating Agent, Corrosion Inhibitor, Friction Reducer, Gelling Agent, Resin Coated Prop, Rheology Modifier, Scale Inhibitor, Surfactant	Distillates (petroleum), hydrotreated light	64742-47-8	0.27%	0.04000%	
			Sodium salt of aliphatic amine acid		0.04%	0.01000%	
			Ethane-1,2-diol	107-21-1	0.03%	0.00000%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.03%	0.00000%	
			Diatomaceous earth, calcined	91053-39-3	0.01%	0.00000%	
			Methanol	67-56-1	0.01%	0.00000%	
			Aliphatic acids		0.01%	0.00000%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00000%	
			Aromatic hydrocarbon		0.01%	0.00000%	
Aliphatic amine polymer		0.01%	0.00000%				

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
			Calcium chloride	10043-52-4	0.01%	0.00000%	
			Sodium chloride	7647-14-5	0.01%	0.00000%	
			Fatty acid amidoalkyl betaine		0.01%	0.00000%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00000%	
			Propan-2-ol	67-63-0	0.00%	0.00000%	
			5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	0.00%	0.00000%	
			Magnesium nitrate	10377-60-3	0.00%	0.00000%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00000%	
			Ethoxylated alcohols		0.00%	0.00000%	
			Ethoxylated alcohols #2		0.00%	0.00000%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00000%	
			Magnesium chloride	7786-30-3	0.00%	0.00000%	
			Ethoxylated alcohol		0.00%	0.00000%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00000%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.27%	0.04000%	
			Sodium salt of aliphatic amine acid		0.04%	0.01000%	
			Ethane-1,2-diol	107-21-1	0.03%	0.00000%	
			Alcohol ethoxylate C-10/16 with 6.5 EO	68002-97-1	0.03%	0.00000%	
			Diatomaceous earth, calcined	91053-39-3	0.01%	0.00000%	
			Methanol	67-56-1	0.01%	0.00000%	
			Aliphatic acids		0.01%	0.00000%	
			Aliphatic alcohols, ethoxylated #1		0.01%	0.00000%	
			Aromatic hydrocarbon		0.01%	0.00000%	
			Aliphatic amine polymer		0.01%	0.00000%	
			Calcium chloride	10043-52-4	0.01%	0.00000%	
			Sodium chloride	7647-14-5	0.01%	0.00000%	
			Fatty acid amidoalkyl betaine		0.01%	0.00000%	
			Sodium hydroxide (impurity)	1310-73-2	0.00%	0.00000%	
			Propan-2-ol	67-63-0	0.00%	0.00000%	
			5-chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	0.00%	0.00000%	
			Magnesium nitrate	10377-60-3	0.00%	0.00000%	
			Prop-2-yn-1-ol	107-19-7	0.00%	0.00000%	
			Ethoxylated alcohols		0.00%	0.00000%	
			Ethoxylated alcohols #2		0.00%	0.00000%	
			2-Methyl-4-isothiazolin-3-one	2682-20-4	0.00%	0.00000%	
			Magnesium chloride	7786-30-3	0.00%	0.00000%	
			Ethoxylated alcohol		0.00%	0.00000%	
			Trisodium nitrilotriacetate (impurity)	5064-31-3	0.00%	0.00000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	09/14/2012
Province:	BC
Region:	Altares
Well Number:	27435
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM ALTARES 12-07-083-24
Longitude:	-121.472542
Latitude:	56.110340
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	2,253
Total Water Volume (m3)*:	1,169.5

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
AcResin Activator W	Canyon Technical Services Ltd.	LT Consolidation Aid	Polyethylene Glycol	25322-68-3	5.00%	0.00090%	
			Methanol	67-56-1	50.00%	0.00899%	
			Alcohols, C12-14 Secondary, Ethoxylated	84133-50-6	70.00%	0.01258%	
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Acid Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.00204%	
			Cupric Chloride	7447-39-4	10.00%	0.00023%	
			Monoethanolamine	141-43-5	30.00%	0.00068%	
CAN-1201 Non-Emulsifier	Canyon Technical Services Ltd.	Acid Wetting Agent	Ethylene Glycol Monobutyl Ether	111-76-2			HMIRC Registry # 8252
CAN-1203 Anti-Sludge Agent / Non-Emulsifier	Canyon Technical Services Ltd.	Acid Antisludge	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.00560%	
CAN-1911 Clay Stabilizer	Canyon Technical Services Ltd.	Clay Control	1,6-Hexandiamine, dihydrochloride	6055-52-3	40.00%	0.07112%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Hydrotreated Kerosene	64742-47-8	30.00%	0.02685%	
			Ammonium Chloride	12125-02-9	1.50%	0.00134%	
CAN-2410 Demulsifier	Canyon Technical	Non-emulsifier	Methanol	67-56-1	60.00%	0.04691%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Services Ltd.							
HCL 15%	Canyon Technical Services Ltd.	Acid Stimulation	Hydrogen Chloride	7647-01-0	15.00%	0.15927%	
Nitrogen Gas	Canyon Technical Services Ltd.	N2	Nitrogen Gas		100.00%	6.66899%	
Prime Plus (30/50)	Canyon Technical Services Ltd.	Proppant (Resin Coated, Curable)	Prime Plus (30/50)		100.00%	1.97565%	
Sand (40/70)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (40/70)		100.00%	11.85387%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (50/140)		100.00%	0.98782%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.01236%	
Water	Third Party	Carrier Fluid	Water		100.00%	77.01725%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/25/2012
Province:	BC
Region:	Altares
Well Number:	27196
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES C- 023-H/094-B-08
Longitude:	-122.020295
Latitude:	56.212078
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	9,983.57

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Acid Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.00151%	
			Cupric Chloride	7447-39-4	10.00%	0.00017%	
			Monoethanolamine	141-43-5	30.00%	0.00050%	
			Ethylene Glycol Monobutyl Ether	111-76-2			HMIRC Registry # 8252
CAN-1201 Non-Emulsifier	Canyon Technical Services Ltd.	Acid Wetting Agent	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
			Phenolic Resin				HMIRC Registry # 8253
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.00543%	
CAN-1911 Clay Stabilizer	Canyon Technical Services Ltd.	Clay Control	1,6-Hexandiamine, dihydrochloride	6055-52-3	40.00%	0.06306%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Hydrotreated Kerosene	64742-47-8	30.00%	0.02792%	
			Ammonium Chloride	12125-02-9	1.50%	0.00140%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Non-emulsifier	Methanol	67-56-1	60.00%	0.05003%	
HCL 15%	Canyon Technical Services Ltd.	Acid Stimulation	Hydrogen Chloride	7647-01-0	15.00%	0.11747%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (30/50)		100.00%	7.58213%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (40/70)		100.00%	6.22667%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (50/140)		100.00%	0.42358%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.01804%	
Water	Third Party	Carrier Fluid	Water		100.00%	84.57738%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/30/2012
Province:	BC
Region:	Altares
Well Number:	27242
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES C-A023-H/094-B-08
Longitude:	-122.020238
Latitude:	56.212115
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	8,975.95

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Acid Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.00174%	
			Cupric Chloride	7447-39-4	10.00%	0.00019%	
			Monoethanolamine	141-43-5	30.00%	0.00058%	
			Ethylene Glycol Monobutyl Ether	111-76-2			
CAN-1201 Non-Emulsifier	Canyon Technical Services Ltd.	Acid Wetting Agent	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
			Phenolic Resin				HMIRC Registry # 8253
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.00579%	
CAN-1911 Clay Stabilizer	Canyon Technical Services Ltd.	Clay Control	1,6-Hexandiamine, dihydrochloride	6055-52-3	40.00%	0.07628%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Hydrotreated Kerosene	64742-47-8	30.00%	0.02887%	
			Ammonium Chloride	12125-02-9	1.50%	0.00144%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Non-emulsifier	Methanol	67-56-1	60.00%	0.04999%	
HCL 15%	Canyon Technical Services Ltd.	Acid Stimulation	Hydrogen Chloride	7647-01-0	15.00%	0.13594%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (30/50)		100.00%	8.61838%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (40/70)		100.00%	5.52700%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (50/140)		100.00%	0.42155%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.01368%	
Water	Third Party	Carrier Fluid	Water		100.00%	84.08492%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/31/2012
Province:	BC
Region:	Altares
Well Number:	27243
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES C-B023-H/094-B-08
Longitude:	-122.020181
Latitude:	56.212152
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,500
Total Water Volume (m3)*:	8,780.01

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Acid Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.00131%	
			Cupric Chloride	7447-39-4	10.00%	0.00015%	
			Monoethanolamine	141-43-5	30.00%	0.00044%	
			Ethylene Glycol Monobutyl Ether	111-76-2			HMIRC Registry # 8252
CAN-1201 Non-Emulsifier	Canyon Technical Services Ltd.	Acid Wetting Agent	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
			Phenolic Resin				HMIRC Registry # 8253
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.00554%	
CAN-1911 Clay Stabilizer	Canyon Technical Services Ltd.	Clay Control	1,6-Hexandiamine, dihydrochloride	6055-52-3	40.00%	0.07066%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Hydrotreated Kerosene	64742-47-8	30.00%	0.02735%	
			Ammonium Chloride	12125-02-9	1.50%	0.00137%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Non-emulsifier	Methanol	67-56-1	60.00%	0.04728%	
HCL 15%	Canyon Technical Services Ltd.	Acid Stimulation	Hydrogen Chloride	7647-01-0	15.00%	0.10205%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (30/50)		100.00%	9.14881%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (40/70)		100.00%	5.17857%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (50/140)		100.00%	0.38360%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.01070%	
Water	Third Party	Carrier Fluid	Water		100.00%	84.19980%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	02/03/2012
Province:	BC
Region:	Altares
Well Number:	27596
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES B-B024-H/094-B-08
Longitude:	-122.025406
Latitude:	56.210267
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,329
Total Water Volume (m3)*:	10,260.6

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Acid Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.00134%	
			Cupric Chloride	7447-39-4	10.00%	0.00015%	
			Monoethanolamine	141-43-5	30.00%	0.00045%	
			Ethylene Glycol Monobutyl Ether	111-76-2			HMIRC Registry # 8252
CAN-1201 Non-Emulsifier	Canyon Technical Services Ltd.	Acid Wetting Agent	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
			Phenolic Resin				HMIRC Registry # 8253
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.00587%	
CAN-1911 Clay Stabilizer	Canyon Technical Services Ltd.	Clay Control	1,6-Hexandiamine, dihydrochloride	6055-52-3	40.00%	0.03687%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Hydrotreated Kerosene	64742-47-8	30.00%	0.02681%	
			Ammonium Chloride	12125-02-9	1.50%	0.00134%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Non-emulsifier	Methanol	67-56-1	60.00%	0.04876%	
HCL 15%	Canyon Technical Services Ltd.	Acid Stimulation	Hydrogen Chloride	7647-01-0	15.00%	0.10455%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (30/50)	-	100.00%	9.56456%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (40/70)	-	100.00%	5.83600%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (50/140)	-	100.00%	0.40528%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.01200%	
Water	Third Party	Base	Water	-	100.00%	83.16786%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/08/2012
Province:	BC
Region:	Altares
Well Number:	27530
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES C- 027-H/094-B-08
Longitude:	-122.051985
Latitude:	56.211795
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,470
Total Water Volume (m3)*:	11,022.03

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Acid Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.00016%	
			Cupric Chloride	7447-39-4	10.00%	0.00002%	
			Monoethanolamine	141-43-5	30.00%	0.00005%	
			Ethylene Glycol Monobutyl Ether	111-76-2			HMIRC Registry # 8252
CAN-1201 Non-Emulsifier	Canyon Technical Services Ltd.	Acid Wetting Agent	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
			Phenolic Resin				HMIRC Registry # 8253
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.00541%	
CAN-1911 Clay Stabilizer	Canyon Technical Services Ltd.	Clay Control	1,6-Hexandiamine, dihydrochloride	6055-52-3	40.00%	0.03992%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Hydrotreated Kerosene	64742-47-8	30.00%	0.02680%	
			Ammonium Chloride	12125-02-9	1.50%	0.00134%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Non-emulsifier	Methanol	67-56-1	60.00%	0.04709%	
HCL 15%	Canyon Technical Services Ltd.	Acid Stimulation	Hydrogen Chloride	7647-01-0	15.00%	0.12278%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (30/50)		100.00%	9.32810%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (40/70)		100.00%	5.21612%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (50/140)		100.00%	0.38074%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.01592%	
Water	Third Party	Carrier Fluid	Water		100.00%	83.93026%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/25/2013
Province:	BC
Region:	Altares
Well Number:	27956
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES C-A027-H/094-B-08
Longitude:	-122.051905
Latitude:	56.211815
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,614
Total Water Volume (m3)*:	19,687.54

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Corrosion Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1203 Anti-Sludge Agent / Non-Emulsifier	Canyon Technical Services Ltd.	Anti-Sludge/Non-Emulsifier	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
HCL 15%	Canyon Technical Services Ltd.	Acid	Hydrogen Chloride	7647-01-0	15.00%	0.83348%	
			Water	7732-18-5	85.00%	4.72306%	
Water	Third Party	Carrier Fluid	Water		100.00%	44.08876%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Demulsifier	Methyl Alcohol	67-56-1	60.00%	0.40040%	
			Water	7732-18-5	70.00%	0.46713%	
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.04549%	
			Water	7732-18-5	85.00%	0.25778%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	0.55436%	
			Aluminum Oxide	1344-28-1	5.00%	0.02949%	
			Iron Oxide	1309-37-1	1.00%	0.00590%	
			Titanium Oxide	13463-67-7	0.09%	0.00053%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	26.79399%	
			Aluminum Oxide	1344-28-1	5.00%	1.42521%	
			Iron Oxide	1309-37-1	1.00%	0.28504%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant	Titanium Oxide	13463-67-7	0.09%	0.02565%	
			Crystalline silica, quartz	14808-60-7	94.00%	18.13984%	
			Aluminum Oxide	1344-28-1	5.00%	0.96489%	
			Iron Oxide	1309-37-1	1.00%	0.19298%	
			Titanium Oxide	13463-67-7	0.09%	0.01737%	
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.04006%	
			Cupric Chloride	7447-39-4	10.00%	0.00445%	
			Monoethanolamine	141-43-5	30.00%	0.01335%	
			Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.07894%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Water	7732-18-5	25.00%	0.02631%	
			1-Methoxy-2-Propanol	107-98-2	30.00%	0.00626%	
CAN-1202 Acid Wetting Agent	Canyon Technical Services Ltd.	Acid Wetting	Water	7732-18-5	90.00%	0.01879%	
			Undisclosed		100.00%	0.76289%	
CAN-2057 Friction Reducer	Canyon Technical Services Ltd.	Friction Reducer	Undisclosed		100.00%	0.76289%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/22/2013
Province:	BC
Region:	Altares
Well Number:	27957
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES C-B027-H/094-B-08
Longitude:	-122.051825
Latitude:	56.211835
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,557
Total Water Volume (m3)*:	16,061.85

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Corrosion Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1203 Anti-Sludge Agent / Non-Emulsifier	Canyon Technical Services Ltd.	Anti-Sludge/Non-Emulsifier	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
HCL 15%	Canyon Technical Services Ltd.	Acid	Hydrogen Chloride	7647-01-0	15.00%	0.80128%	
			Water	7732-18-5	85.00%	4.54058%	
Water	Third Party	Carrier Fluid	Water		100.00%	24.87848%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Demulsifier	Methyl Alcohol	67-56-1	60.00%	0.27840%	
			Water	7732-18-5	70.00%	0.32480%	
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.03176%	
			Water	7732-18-5	85.00%	0.17999%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	2.42118%	
			Aluminum Oxide	1344-28-1	5.00%	0.12879%	
			Iron Oxide	1309-37-1	1.00%	0.02576%	
			Titanium Oxide	13463-67-7	0.09%	0.00232%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	40.81829%	
			Aluminum Oxide	1344-28-1	5.00%	2.17119%	
			Iron Oxide	1309-37-1	1.00%	0.43424%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant	Titanium Oxide	13463-67-7	0.09%	0.03908%	
			Crystalline silica, quartz	14808-60-7	94.00%	21.10701%	
			Aluminum Oxide	1344-28-1	5.00%	1.12271%	
			Iron Oxide	1309-37-1	1.00%	0.22454%	
			Titanium Oxide	13463-67-7	0.09%	0.02021%	
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.03851%	
			Cupric Chloride	7447-39-4	10.00%	0.00428%	
			Monoethanolamine	141-43-5	30.00%	0.01284%	
			Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.05260%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Water	7732-18-5	25.00%	0.01753%	
			1-Methoxy-2-Propanol	107-98-2	30.00%	0.00602%	
CAN-1202 Acid Wetting Agent	Canyon Technical Services Ltd.	Acid Wetting	Water	7732-18-5	90.00%	0.01806%	
			Undisclosed		100.00%	0.46061%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/27/2013
Province:	BC
Region:	Altares
Well Number:	28656
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES C-C027-H/094-B-08
Longitude:	-122.051666
Latitude:	56.211875
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,450
Total Water Volume (m3)*:	15,806.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Corrosion Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1203 Anti-Sludge Agent / Non-Emulsifier	Canyon Technical Services Ltd.	Anti-Sludge/Non-Emulsifier	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
HCL 15%	Canyon Technical Services Ltd.	Acid	Hydrogen Chloride	7647-01-0	15.00%	0.95880%	
			Water	7732-18-5	85.00%	5.43321%	
Water	Third Party	Carrier Fluid	Water		100.00%	43.94443%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Demulsifier	Methyl Alcohol	67-56-1	60.00%	0.45140%	
			Water	7732-18-5	70.00%	0.52663%	
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.05109%	
			Water	7732-18-5	85.00%	0.28952%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	3.78970%	
			Aluminum Oxide	1344-28-1	5.00%	0.20158%	
			Iron Oxide	1309-37-1	1.00%	0.04032%	
			Titanium Oxide	13463-67-7	0.09%	0.00363%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	14.54299%	
			Aluminum Oxide	1344-28-1	5.00%	0.77356%	
			Iron Oxide	1309-37-1	1.00%	0.15471%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant	Titanium Oxide	13463-67-7	0.09%	0.01392%	
			Crystalline silica, quartz	14808-60-7	94.00%	26.07790%	
			Aluminum Oxide	1344-28-1	5.00%	1.38712%	
			Iron Oxide	1309-37-1	1.00%	0.27742%	
			Titanium Oxide	13463-67-7	0.09%	0.02497%	
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.04608%	
			Cupric Chloride	7447-39-4	10.00%	0.00512%	
			Monoethanolamine	141-43-5	30.00%	0.01536%	
			Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.09147%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Water	7732-18-5	25.00%	0.03049%	
			Hydrotreated Kerosene	64742-47-8	30.00%	0.21907%	
			Ammonium Chloride	12125-02-9	1.50%	0.01095%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Water	7732-18-5	89.50%	0.65355%	
			1-Methoxy-2-Propanol	107-98-2	30.00%	0.00720%	
CAN-1202 Acid Wetting Agent	Canyon Technical Services Ltd.	Acid Wetting	Water	7732-18-5	90.00%	0.02161%	
			Undisclosed		100.00%	0.33018%	
CAN-2057 Friction Reducer	Canyon Technical Services Ltd.	Friction Reducer	Undisclosed		100.00%	0.33018%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	01/09/2013
Province:	BC
Region:	Altares
Well Number:	28290
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES B- 034-H/094-B-08
Longitude:	-122.025086
Latitude:	56.213338
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	3,909
Total Water Volume (m3)*:	10,658.8

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Acid Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.00575%	
			Cupric Chloride	7447-39-4	10.00%	0.00064%	
			Monoethanolamine	141-43-5	30.00%	0.00192%	
			Ethylene Glycol Monobutyl Ether	111-76-2			HMIRC Registry # 8252
CAN-1201 Non-Emulsifier	Canyon Technical Services Ltd.	Acid Wetting Agent	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
			Phenolic Resin				HMIRC Registry # 8253
CAN-1401 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Methyl Alcohol	67-56-1	40.00%	0.01632%	
CAN-1911 Clay Stabilizer	Canyon Technical Services Ltd.	Clay Control	1,6-Hexandiamine, dihydrochloride	6055-52-3	40.00%	0.03672%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Hydrotreated Kerosene	64742-47-8	30.00%	0.02765%	
			Ammonium Chloride	12125-02-9	1.50%	0.00138%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Non-emulsifier	Methanol	67-56-1	60.00%	0.04758%	
HCL 15%	Canyon Technical Services Ltd.	Acid Stimulation	Hydrogen Chloride	7647-01-0	15.00%	0.16673%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (30/50)		100.00%	8.57501%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (40/70)		100.00%	4.58978%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (50/140)		100.00%	0.59659%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.01024%	
Water	Third Party	Carrier Fluid	Water		100.00%	84.78598%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	01/12/2013
Province:	BC
Region:	Altares
Well Number:	28291
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES B-A034-H/094-B-08
Longitude:	-122.025033
Latitude:	56.213352
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,088
Total Water Volume (m3)*:	11,945.07

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Acid Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.00387%	
			Cupric Chloride	7447-39-4	10.00%	0.00043%	
			Monoethanolamine	141-43-5	30.00%	0.00129%	
			Ethylene Glycol Monobutyl Ether	111-76-2			HMIRC Registry # 8252
CAN-1201 Non-Emulsifier	Canyon Technical Services Ltd.	Acid Wetting Agent	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
			Phenolic Resin				HMIRC Registry # 8253
CAN-1401 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Methyl Alcohol	67-56-1	40.00%	0.01767%	
CAN-1911 Clay Stabilizer	Canyon Technical Services Ltd.	Clay Control	1,6-Hexandiamine, dihydrochloride	6055-52-3	40.00%	0.03943%	
CAN-2056 Gellant (G50 Microtox EC50)	Canyon Technical Services Ltd.	Viscosifier	Hydrotreated Kerosene	64742-47-8	30.00%	0.02984%	
			Ammonium Chloride	12125-02-9	1.50%	0.00149%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Non-emulsifier	Methanol	67-56-1	60.00%	0.05103%	
HCL 15%	Canyon Technical Services Ltd.	Acid Stimulation	Hydrogen Chloride	7647-01-0	15.00%	0.12084%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (30/50)		100.00%	5.62907%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (40/70)		100.00%	4.12571%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant (Sand)	Sand (50/140)		100.00%	0.44522%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.01118%	
Water	Third Party	Carrier Fluid	Water		100.00%	88.63652%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/17/2013
Province:	BC
Region:	Altares
Well Number:	28292
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES B-B034-H/094-B-08
Longitude:	-122.024980
Latitude:	56.213365
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,176
Total Water Volume (m3)*:	14,313.44

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.04797%	
			Water	7732-18-5	85.00%	0.27185%	
CAN-2057 Friction Reducer	Canyon Technical Services Ltd.	Friction Reducer	Undisclosed		100.00%	0.65546%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Demulsifier	Methyl Alcohol	67-56-1	60.00%	0.38222%	
			Water	7732-18-5	70.00%	0.44593%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.64186%	
			Water	7732-18-5	25.00%	0.21395%	
Water	Third Party	Carrier Fluid	Water		100.00%	12.86773%	
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Corrosion Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.04065%	
			Cupric Chloride	7447-39-4	10.00%	0.00452%	
			Monoethanolamine	141-43-5	30.00%	0.01355%	
CAN-1202 Acid Wetting Agent	Canyon Technical Services Ltd.	Acid Wetting	1-Methoxy-2-Propanol	107-98-2	30.00%	0.00636%	
			Water	7732-18-5	90.00%	0.01907%	
CAN-1203 Anti-Sludge Agent / Non-Emulsifier	Canyon Technical Services Ltd.	Anti-Sludge/Non-Emulsifier	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
			Phenolic Resin				HMIRC Registry # 8253

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
HCL 15%	Canyon Technical Services Ltd.	Acid	Hydrogen Chloride	7647-01-0	15.00%	0.84178%	
			Water	7732-18-5	85.00%	4.77006%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	44.50474%	
			Aluminum Oxide	1344-28-1	5.00%	2.36727%	
			Iron Oxide	1309-37-1	1.00%	0.47345%	
			Titanium Oxide	13463-67-7	0.09%	0.04261%	
Sand (40/70)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	28.86794%	
			Aluminum Oxide	1344-28-1	5.00%	1.53553%	
			Iron Oxide	1309-37-1	1.00%	0.30711%	
			Titanium Oxide	13463-67-7	0.09%	0.02764%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	0.81792%	
			Aluminum Oxide	1344-28-1	5.00%	0.04351%	
			Iron Oxide	1309-37-1	1.00%	0.00870%	
			Titanium Oxide	13463-67-7	0.09%	0.00078%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/10/2013
Province:	BC
Region:	Altares
Well Number:	28341
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTARES C- 044-H/094-B-08
Longitude:	-122.025895
Latitude:	56.221891
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	3,841
Total Water Volume (m3)*:	13,385.45

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Corrosion Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1203 Anti-Sludge Agent / Non-Emulsifier	Canyon Technical Services Ltd.	Anti-Sludge/Non-Emulsifier	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
HCL 15%	Canyon Technical Services Ltd.	Acid	Hydrogen Chloride	7647-01-0	15.00%	0.64588%	
			Water	7732-18-5	85.00%	3.66000%	
Water	Third Party	Carrier Fluid	Water		100.00%	34.04358%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Demulsifier	Methyl Alcohol	67-56-1	60.00%	0.22795%	
			Water	7732-18-5	70.00%	0.26594%	
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.03923%	
			Water	7732-18-5	85.00%	0.22229%	
CAN-1202 Acid Wetting Agent	Canyon Technical Services Ltd.	Acid Wetting	1-Methoxy-2-Propanol	107-98-2	30.00%	0.00485%	
			Water	7732-18-5	90.00%	0.01456%	
CAN-2057 Friction Reducer	Canyon Technical Services Ltd.	Friction Reducer	Undisclosed		100.00%	0.34571%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	1.99685%	
			Aluminum Oxide	1344-28-1	5.00%	0.10622%	
			Iron Oxide	1309-37-1	1.00%	0.02124%	
			Titanium Oxide	13463-67-7	0.09%	0.00191%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (30/50)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	28.24118%	
			Aluminum Oxide	1344-28-1	5.00%	1.50219%	
			Iron Oxide	1309-37-1	1.00%	0.30044%	
			Titanium Oxide	13463-67-7	0.09%	0.02704%	
Sand (40/70)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	18.82745%	
			Aluminum Oxide	1344-28-1	5.00%	1.00146%	
			Iron Oxide	1309-37-1	1.00%	0.20029%	
			Titanium Oxide	13463-67-7	0.09%	0.01803%	
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.03104%	
			Cupric Chloride	7447-39-4	10.00%	0.00345%	
			Monoethanolamine	141-43-5	30.00%	0.01035%	
SB Excel (20/40)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	100.00%	7.89029%	
			Phenol formaldehyde resin	9003-35-4	5.00%	0.39451%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.35962%	
			Water	7732-18-5	25.00%	0.11987%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/11/2013
Province:	BC
Region:	C-A44-H/94-B-8
Well Number:	28517
Operator Name:	Canbriam Energy Inc.
Well Name:	CANBRIAM HZ ALTRES C-A44-H/94-B-8 C-A044-H/094-B-08
Longitude:	-122.025819
Latitude:	56.221914
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	3,853
Total Water Volume (m3)*:	19,048.11

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
CAN-1000 Corrosion Inhibitor	Canyon Technical Services Ltd.	Corrosion Inhibitor	Alcohol Solvent 2				HMIRC Registry # 8141
			Methyl Alcohol	67-56-1			HMIRC Registry # 8141
CAN-1203 Anti-Sludge Agent / Non-Emulsifier	Canyon Technical Services Ltd.	Anti-Sludge/Non-Emulsifier	Aromatic Solvent 1				HMIRC Registry # 8253
			Methyl Alcohol	67-56-1			HMIRC Registry # 8253
			Organic Acid				HMIRC Registry # 8253
			Mineral Acid				HMIRC Registry # 8253
			Sulfonated Aromatic Derivative				HMIRC Registry # 8253
HCL 15%	Canyon Technical Services Ltd.	Acid	Hydrogen Chloride	7647-01-0	15.00%	0.96615%	
			Water	7732-18-5	85.00%	5.47484%	
Water	Third Party	Carrier Fluid	Water		100.00%	23.75662%	
CAN-2410 Demulsifier	Canyon Technical Services Ltd.	Demulsifier	Methyl Alcohol	67-56-1	60.00%	0.49729%	
			Water	7732-18-5	70.00%	0.58017%	
CAN-1400 Scale Inhibitor	Canyon Technical Services Ltd.	Scale Inhibitor	Potassium Chloride	7447-40-7	15.00%	0.08057%	
			Water	7732-18-5	85.00%	0.45658%	
Sand (50/140)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	1.09411%	
			Aluminum Oxide	1344-28-1	5.00%	0.05820%	
			Iron Oxide	1309-37-1	1.00%	0.01164%	
			Titanium Oxide	13463-67-7	0.09%	0.00105%	
Sand (30/50)	Canyon Technical Services Ltd.	Proppant	Crystalline silica, quartz	14808-60-7	94.00%	34.64687%	
			Aluminum Oxide	1344-28-1	5.00%	1.84292%	
			Iron Oxide	1309-37-1	1.00%	0.36858%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Sand (40/70)	Canyon Technical Services Ltd.	Proppant	Titanium Oxide	13463-67-7	0.09%	0.03317%	
			Crystalline silica, quartz	14808-60-7	94.00%	26.94756%	
			Aluminum Oxide	1344-28-1	5.00%	1.43338%	
			Iron Oxide	1309-37-1	1.00%	0.28668%	
			Titanium Oxide	13463-67-7	0.09%	0.02580%	
CAN-1101 Iron Control Reduction	Canyon Technical Services Ltd.	Iron Control	2-Mercaptoethanol	60-24-2	90.00%	0.04510%	
			Cupric Chloride	7447-39-4	10.00%	0.00501%	
			Monoethanolamine	141-43-5	30.00%	0.01503%	
			Tetrakis (Hydroxymethyl) Phosphonium Sulfate	55566-30-8	75.00%	0.55934%	
Tolcide PS75LT	Canyon Technical Services Ltd.	Biocide	Water	7732-18-5	25.00%	0.18645%	
			1-Methoxy-2-Propanol	107-98-2	30.00%	0.00783%	
CAN-1202 Acid Wetting Agent	Canyon Technical Services Ltd.	Acid Wetting	Water	7732-18-5	90.00%	0.02350%	
			Undisclosed		100.00%	0.86045%	
CAN-2057 Friction Reducer	Canyon Technical Services Ltd.	Friction Reducer	Undisclosed		100.00%	0.86045%	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/21/2013
Province:	BC
Region:	Altares
Well Number:	28453
Operator Name:	Progress Energy Canada Ltd.
Well Name:	PROGRESS HZ ALTARES A- 075-G/094-B-08
Longitude:	-122.105437
Latitude:	56.233773
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,213
Total Water Volume (m3)*:	11,745.6

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
DWP-621	Calfrac Well Services	Oilfield Additive	No hazardous ingredients		100.00%	0.10000%	No hazardous ingredients
DWP-913	Calfrac Well Services	KCl Substitute	No hazardous ingredients		100.00%	0.09000%	No hazardous ingredients
DWP-949	Calfrac Well Services	Non-Emulsifier / Surfactant	Ethoxylated Alcohols		40.00%	0.03000%	HMIRC # 8300
			Ethoxylated phenolic resin		10.00%	0.01000%	HMIRC # 8300
			Isobutyl Ketone		30.00%	0.03000%	HMIRC # 8300
			Organic Acid Salts		10.00%	0.01000%	HMIRC # 8300
			Organic Acid Salts		13.00%	0.01000%	HMIRC # 8300
			Organic Acid Salts		40.00%	0.03000%	HMIRC # 8300
Hydrochloric Acid	Calfrac Well Services	Spearhead, Gas Well	Hydrochloric acid	7647-01-0	30.00%	0.42000%	Acid
Sand (Proppant)	Calfrac Well Services	Propping Agent	Crystalline silica (Quartz)	14808-60-7	99.90%	8.79000%	Propping Agent
SB Prime (Proppant)	Calfrac Well Services	Propping Agent	Hexamethylenetetramine	100-97-0	1.00%	0.01000%	
			Quartz	14808-60-7	99.90%	1.10000%	
Tolcide PS75LT	Calfrac Well Services	Biocide	Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) (THPS)	55566-30-8	75.00%	0.01000%	Oilfield Treatment Product
Water	Progress	Carrier / Base Fluid	Water	-	100.00%	90.55000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	07/20/2013
Province:	BC
Region:	Altares
Well Number:	28616
Operator Name:	Progress Energy Canada Ltd.
Well Name:	PROGRESS HZ ALTARES A-A075-G/094-B-08
Longitude:	-122.105392
Latitude:	56.233794
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	3,897.4
Total Water Volume (m3)*:	9,913.1

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
DWP-621	Calfrac Well Services	Oilfield Additive	No hazardous ingredients		100.00%	0.10000%	No hazardous ingredients
DWP-913	Calfrac Well Services	KCl Substitute	No hazardous ingredients		100.00%	0.08000%	No hazardous ingredients
DWP-949	Calfrac Well Services	Non-Emulsifier / Surfactant					Proprietary
			Ethoxylated Alcohols		40.00%	0.02000%	HMIRC # 8300
			Isobutyl Ketone		30.00%	0.01000%	HMIRC # 8300
			Organic Acid Salts		13.00%	0.01000%	HMIRC # 8300
Hydrochloric Acid	Calfrac Well Services	Spearhead, Gas Well					Acid
			Hydrochloric acid	7647-01-0	30.00%	0.23000%	
Sand (Proppant)	Calfrac Well Services	Propping Agent					Propping Agent
			Crystalline silica (Quartz)	14808-60-7	99.90%	9.47000%	
SB Prime (Proppant)	Calfrac Well Services	Propping Agent					Propping Agent
			Hexamethylenetetramine	100-97-0	1.00%	0.01000%	
			Quartz	14808-60-7	99.90%	1.18000%	
Tolcide PS75LT	Calfrac Well Services	Biocide					Oilfield Treatment Product
			Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) (THPS)	55566-30-8	75.00%	0.01000%	
Water	Progress	Carrier / Base Fluid	Water	-	100.00%	88.67000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	12/04/2012
Province:	BC
Region:	Altares
Well Number:	28228
Operator Name:	Progress Energy Canada Ltd.
Well Name:	PROGRESS HZ ALTARES B-A093-G/094-B-08
Longitude:	-122.094371
Latitude:	56.243877
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,016
Total Water Volume (m3)*:	14,363.6

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
DWP-913	Calfrac Well Services	KCl Substitute	No hazardous ingredients		100.00%	0.09000%	No hazardous ingredients
DWP-949	Calfrac Well Services	Non-Emulsifier / Surfactant	Organic Acid Salts		40.00%	0.02000%	Proprietary
			Ethoxylated Alcohols		40.00%	0.02000%	HMIRC # 8300
			Isobutyl Ketone		30.00%	0.01000%	HMIRC # 8300
			Ethoxylated phenolic resin		10.00%	0.00000%	HMIRC # 8300
DWP-621	Calfrac Well Services	Oilfield Additive	No hazardous ingredients		100.00%	0.11000%	No hazardous ingredients
Tolcide PS75LT	Calfrac Well Services	Biocide	Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) (THPS)	55566-30-8	75.00%	0.01000%	Oilfield Treatment Product
Water	Progress	Carrier / Base Fluid	Water	7732-18-5	100.00%	96.88000%	
Hydrochloric Acid	Calfrac Well Services	Spearhead, Gas Well	Hydrochloric acid	7647-01-0	30.00%	0.47000%	Acid
Sand (Proppant)	Calfrac Well Services	Propping Agent	Crystalline silica (Quartz)	14808-60-7	99.90%	4.68000%	Propping Agent
SB Prime (Proppant)	Calfrac Well Services	Propping Agent	Hexamethylenetetramine	100-97-0	1.00%	0.01000%	Propping Agent
			Quartz	14808-60-7	99.90%	0.80000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	11/17/2012
Province:	BC
Region:	Altares
Well Number:	28413
Operator Name:	Progress Energy Canada Ltd.
Well Name:	PROGRESS HZ ALTARES B-B093-G/094-B-08
Longitude:	-122.094425
Latitude:	56.243865
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	4,030
Total Water Volume (m3)*:	13,500.2

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Progress	Carrier / Base Fluid	Water		100.00%	92.43000%	
DWP-913	Calfrac Well Services	KCl Substitute	No hazardous ingredients		100.00%	0.08000%	No hazardous ingredients
DWP-949	Calfrac Well Services	Non-Emulsifier / Surfactant	Organic Acid Salts		40.00%	0.02000%	HMIRC # 8300
			Ethoxylated Alcohols		40.00%	0.02000%	HMIRC # 8300
			Isobutyl Ketone		30.00%	0.02000%	HMIRC # 8300
			Ethoxylated phenolic resin		10.00%	0.01000%	HMIRC # 8300
PS75LT	Calfrac Well Services	Biocide	Phosphonium, tetrakis(hydroxymethyl)-, sulfate (2:1) (THPS)	55566-30-8	75.00%	0.01000%	Oilfield Treatment Product
SB Prime (Proppant)	Calfrac Well Services	Propping Agent	Hexamethylenetetramine	100-97-0	1.00%	0.01000%	Propping Agent
			Quartz	14808-60-7	99.90%	1.04000%	
Hydrochloric Acid	Calfrac Well Services	Spearhead, Gas Well	Hydrochloric acid	7647-01-0	30.00%	0.36000%	Acid
Sand (Proppant)	Calfrac Well Services	Propping Agent	Crystalline silica (Quartz)	14808-60-7	99.90%	6.08000%	Propping Agent
DWP-621	Calfrac Well Services	Oilfield Additive	No hazardous ingredients		100.00%	0.11000%	No hazardous ingredients

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/16/2012
Province:	BC
Region:	Altares
Well Number:	27684
Operator Name:	Progress Energy Canada Ltd.
Well Name:	PROGRESS HZ ALTARES C- 007-J/094-B-08
Longitude:	-122.124202
Latitude:	56.252087
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	3,913
Total Water Volume (m3)*:	11,634.2

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
DWP-913	Calfrac Well Services	KCl Substitute	No hazardous ingredients		100.00%	0.08000%	No hazardous ingredients
DWP-949	Calfrac Well Services	Non-Emulsifier / Surfactant	Organic Acid Salts		40.00%	0.02000%	Proprietary
			Ethoxylated Alcohols		40.00%	0.02000%	HMIRC # 8300
			Isobutyl Ketone		30.00%	0.01000%	HMIRC # 8300
			Ethoxylated phenolic resin		10.00%	0.00000%	HMIRC # 8300
SB Prime (Proppant)	Calfrac Well Services	Propping Agent	Hexamethylenetetramine	100-97-0	1.00%	0.01000%	Propping Agent
			Quartz	14808-60-7	99.90%	1.23000%	
Water	Progress	Carrier / Base Fluid	Water		100.00%	92.54000%	
DWP-621	Calfrac Well Services	Oilfield Additive	No hazardous ingredients		100.00%	0.12000%	No hazardous ingredients
DWP-966	Calfrac Well Services	Biocide	Bronopol		100.00%	0.06000%	Proprietary
Hydrochloric Acid	Calfrac Well Services	Spearhead, Gas Well	Hydrochloric acid	7647-01-0	30.00%	0.44000%	Acid
Sand (Proppant)	Calfrac Well Services	Propping Agent	Crystalline silica (Quartz)	14808-60-7	99.90%	6.53000%	Propping Agent

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Fracture Date:	08/16/2012
Province:	BC
Region:	Altares
Well Number:	27889
Operator Name:	Progress Energy Canada Ltd.
Well Name:	PROGRESS HZ ALTARES C-A007-J/094-B-08
Longitude:	-122.124244
Latitude:	56.252065
Long/Lat Projection:	NAD83
Production Type:	Undefined
True Vertical Depth (TVD):	3,988
Total Water Volume (m3)*:	10,177.9

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Hydrochloric Acid	Calfrac Well Services	Spearhead, Gas Well					Acid
			Hydrochloric acid	7647-01-0	30.00%	0.29000%	
DWP-913	Calfrac Well Services	KCl Substitute					No hazardous ingredients
			No hazardous ingredients		100.00%	0.08000%	
DWP-949	Calfrac Well Services	Non-Emulsifier / Surfactant					Proprietary
			Organic Acid Salts		40.00%	0.02000%	HMIRC # 8300
			Ethoxylated Alcohols		40.00%	0.02000%	HMIRC # 8300
			Isobutyl Ketone		30.00%	0.01000%	HMIRC # 8300
DWP-966	Calfrac Well Services	Biocide					Oilfield Treatment Product
			Methanol	67-56-1	60.00%	0.03000%	
			Bronopol		100.00%	0.04000%	HMIRC # 8461
SB Prime (Proppant)	Calfrac Well Services	Propping Agent					Propping Agent
			Hexamethylenetetramine	100-97-0	1.00%	0.01000%	
			Quartz	14808-60-7	99.90%	1.24000%	
Water	Progress	Carrier / Base Fluid	Water		100.00%	88.12000%	
Sand (Proppant)	Calfrac Well Services	Propping Agent					Propping Agent
			Crystalline silica (Quartz)	14808-60-7	99.90%	6.54000%	
DWP-621	Calfrac Well Services	Oilfield Additive					No hazardous ingredients
			No hazardous ingredients		100.00%	0.11000%	

Hydraulic Fracturing Fluid Product Component Information Disclosure

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
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* Total Water Volume sources may include fresh water, produced water, and/or recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

Information provided in this form with respect to ingredients in the fracturing fluid is consistent with the Material Safety Data Sheet (MSDS) information. The operator has completed this form with the information provided by the supplier. The operator cannot provide any of the supplier's proprietary information, trade secrets or confidential business information.