

# Frequently Asked Questions

## Subsurface Order No. 2

February 2015

**Q1. Are operators still allowed to operate in the Fox Creek area?**

A1. Yes, operators are still allowed to operate in the Fox Creek area, including hydraulic fracturing; however, operators in the Fox Creek area of the Duvernay Zone must comply with Subsurface Order No. 2, which imposes new seismic monitoring and reporting requirements in the zone.

The subsurface order specifies that operators conducting hydraulic fracturing operations in the zone must monitor seismic activity within 5 kilometres of their wells.

- Before conducting hydraulic fracturing operations, operators must assess the potential for induced seismicity caused by, or resulting from, hydraulic fracturing operations and be immediately prepared to implement a response plan to address potential events.
- Operators will be required to monitor for seismic activity and follow a “traffic light” process with staged action thresholds. If there are no seismic events observed, operations can proceed as part of the AER’s usual requirements. Operators must immediately report any seismic events of 2.0 local magnitude ( $M_L$ ) or greater in the vicinity of their operations and invoke their response plans.
- If operators observe a seismic event of 4.0  $M_L$  or greater, they must immediately cease operations and report it to the AER. They will not be allowed to resume operations without AER approval.

**Q2. What happens if hydraulic fracturing causes another seismic event?**

A2. The bulletin and new requirements are designed to ensure that any seismic events beyond 2.0  $M_L$  are immediately addressed and reported to the AER. Beyond 4.0  $M_L$ , operations are ceased. This is to reduce any impact. We feel the “traffic light” protocol will address the concerns in the area.

We will continue to monitor seismicity. If we see activity similar to that of Fox Creek, we will extend the order to include other areas of the province.

**Q3. Will the AER look at hydraulic fracturing operations across the province and put the same restrictions in place?**

A3. Presently, the order is in place for the Fox Creek area of the Duvernay Zone because of the cluster of recent seismic events. The AER has been monitoring seismicity around the province. If the AER becomes aware of similar seismic events in other areas of the province, we may extend the order to other areas.

**Q4. How can the public be assured that hydraulic fracturing is safe?**

A4. Hydraulic fracturing has been used in Alberta since the 1950s and is one of several well-established methods to enhance the recovery of oil and natural gas and extend the life of older wells in mature oil and gas fields.

The AER has a number of directives in place to protect the subsurface and ensure wellbore integrity from the drilling and completion stage through to operations and abandonment. The AER has reviewed the subsurface well integrity challenges and opportunities with unconventional oil and gas development. *Directive 083: Hydraulic Fracturing – Subsurface Integrity* was developed to address the hydraulic fracturing risk to subsurface well integrity.

*Directive 083* provides clarity on

- preventing interwellbore communication impacts,
- ensuring well integrity, and
- requirements for wells completed in shallow zones, which applies to any depths shallower than 100 metres below the base of groundwater protection.

**Q5. How long will these new requirements be in place for the Fox Creek area?**

A5. As long as the AER feels they are necessary for the safe, efficient, orderly, and environmentally responsible development of energy resources in that area.

**Q6. Will these events be posted online?**

A6. Magnitudes are posted by Earthquakes Canada. If the AER receives reports of a 4.0 M<sub>L</sub> seismic event, which requires an operator to cease operations, it will be posted on the incident reporting tool.

**Q7. Why are these events happening in the Fox Creek region?**

A7. The AER is investigating and examining why the cluster of seismic events are happening in the area.

**Q8. Do residents feel these events?**

A8. To date, there have been no reported impacts to infrastructure from the seismic events in the Fox Creek area. Residents have reported feeling some of the seismic activity.

Current research suggests that a magnitude less than 3–4  $M_L$  could feel like vibrations of a passing truck and may pass unnoticed by most, whereas a magnitude of 4–5  $M_L$  could have more noticeable effects in terms of sound, felt vibrations, and overturning of unstable objects. The actual effect depends on ground conditions.

The AER requires operators to monitor seismic activity within 5 kilometres of their development.

**Q9. What happens if an operator doesn't comply with the order?**

A9. If an operator doesn't comply with any of the AER's requirements, they face enforcement action, which includes a range of possibilities, including shutting down the operations.

**Q10. How does the AER monitor seismicity?**

A10. The AER monitors seismic activity across Alberta using the Regional Alberta Observatory for Earthquake Studies Network (RAVEN) stations in conjunction with networks operated by other research organizations, including Natural Resources Canada (NRCan), the University of Alberta, the Montana Bureau of Mines and Geology, the University of Western Ontario, and the University of Calgary

We monitor seismicity using a network of seismic stations spread across the province and outside our borders. At the heart of each seismic station is the seismometer, a device that measures ground vibrations. These vibrations are recorded digitally and sent back to us in real time through various telemetry systems. Incoming waveform data is processed by software at the Alberta Geological Survey to determine the location of the event; the results are then verified by an in-house team to ensure accuracy. Next, earthquake locations and trends are analyzed using state-of-the-art techniques to better discern the nature of these quakes.

Data obtained provide us with the locations of earthquakes, motion on a fault, the strength of the event, faulting regime, statistical correlation to industrial activities, and insights to the wave field properties of the province. All of this information allows us to effectively detect and monitor earthquakes in Alberta.