Produced Water Disposal Wells & Injection Wells Webinar - Questions and Answers

1. How does the Commission manage seismicity from disposal/injection?

An application by a permit holder for disposal use of a well must include an assessment of the potential for induced seismicity. Commission geology and reservoir engineering staff review this information, and any other data available, to determine risk of induced seismicity. If a risk is identified, it may result in refusal of the application, or it may be approved with conditions to monitor for and reduce the potential for induced seismicity.

If a disposal/injection well causes induced seismicity, section 21.1 of the Drilling and Production Regulation is followed.

Induced Seismicity:

21.1 (1) During fracturing, injection or disposal operations on a well, the well permit holder must immediately report to the Commission any seismic event within a 3 km radius of the drilling pad that is recorded by the well permit holder or reported to the well permit holder by any source available if,

(a) the seismic event has a magnitude of 4.0 or greater, or

b) a ground motion is felt on the surface by any individual within the 3 km radius.

(2) If a well is identified by the well permit holder or the Commission as being responsible for a seismic event that has a magnitude of 4.0 or greater, the well permit holder must suspend fracturing, injection and disposal operations on the well immediately.

(3) Fracturing, injection and disposal operations suspended under subjection (2) may continue once the well perfmit holder has implemented operational changes satisfactory to the Commission to reduce or eliminate the initation of additional induced seismic events.

Seismicity from a disposal/injection well below magnitude 4.0 results in a Commission review with the permit holder. Monitoring and reporting requirements are added, and operations may be adjusted to reduce the frequency and magnitude of events. If the location and depth of events show a potential loss of caprock integrity, for migration of fluids out of the approved disposal formation, the approval for injection/disposal is cancelled and operations stop.

If you'd like more information on induced seismicity, please watch our Induced Seismicity Webinar.

Produced Water Disposal Wells & Injection Wells Webinar - Questions and Answers

2. What is the management process when an injection/disposal well is deactivated?

At the time of well decommissioning, permit holders are expected to follow the Commission's Well Decommissioning Guidelines (Guidelines).

Wells used for injection/disposal are generally expected to meet the Guideline's definition of "high pressure intervals", which triggers a need for enhanced wellbore decommissioning. This includes a more robust plugging program.

3. What does the Commission do when packer tests or monitoring falls outside of acceptable limits?

Any sign of a loss of isolation, including failure of a packer isolation test or abnormal casing pressure at any time, means the permit holder must stop injection/disposal operation and immediately report the issue to the Commission. The permit holder must submit to the Commission information and testing confirming the well and packer integrity. Only following the Commission's review and approval of this information can injection/disposal continue.

4. What are the pros/cons of water flooding?

Waterflooding has proven to approximately double the recovery of oil from a pool. This reduces the "waste" of hard-to-get resources, while increasing production without the surface disturbance from drilling new wells.

Waterflooding may use fresh water for initial injection, but as water is produced from the oil wells, that water is re-cycled back as injection water, reducing the need for more fresh water.

Waterflooding will extend the operating life of an oil pool, keeping surface well pads, pipelines, facilities and roads in place for a longer period than without waterflooding.

Glossery terms not explained in the webinar

Induced Seismicity - an event resulting from human activity and can be caused by industries such as mining and natural gas development. Induced seismicity is seldom felt at the surface and in British Columbia events have been recorded at low magnitudes.

High pressure intervals – for the purpose of the Guidelines, high pressure intervals are those that:

- Have an original pressure gradient in excess of 14 kPa/m, measured from surface.
- Have been used for injection or disposal and where the pool pressure at time of abandonment exceeds the pool discovery pressure.