

## **SALT CAVERNS IN THE OIL SANDS**

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### **Abstract**

Cenovus Energy Inc. operates two salt caverns at its Foster Creek facility near Cold Lake, Alberta. These are the two most northerly storage caverns in North America. They are used to support the operations of the Steam Assisted Gravity Drainage (SAGD) plant, storing both diluent (natural gas condensate) to feed the plant and bitumen blend produced by the plant.

Both caverns are located in the Prairie Evaporite salt formation, a bedded deposit that is 180 m thick, with top of salt at a depth of 620 m. Cavern #1 washing started in 2001 and was put into storage service in 2005. Cavern #2 washing started in 2006 and was put into storage service in 2009. Washing was performed using water that was otherwise being disposed from the SAGD operations.

The operations of these caverns are unique in several respects: they are the only hydrocarbon storage caverns in Canada located at an upstream oil production facility; diluent and bitumen blend are stored simultaneously in both caverns; and water is used as the drive mechanism to push out the hydrocarbons.

There have been a number of learnings associated with this development. Among them were facility and controls design for multiple operating modes; determining procedures to handle bitumen blend; and assessing the impact of cavern growth due to water drive.

Overall, the caverns have provided strongly positive operational and financial benefits for the SAGD operations. It is expected that more caverns will be installed at other Cenovus facilities over the next decade.

**Key words:** Caverns for Liquid Storage, Cavern Operation, Bedded Salt, Rock Mechanics, Canada, Brine Chemistry