

# How SAGD Works

## Steam-Assisted Gravity Drainage (SAGD)

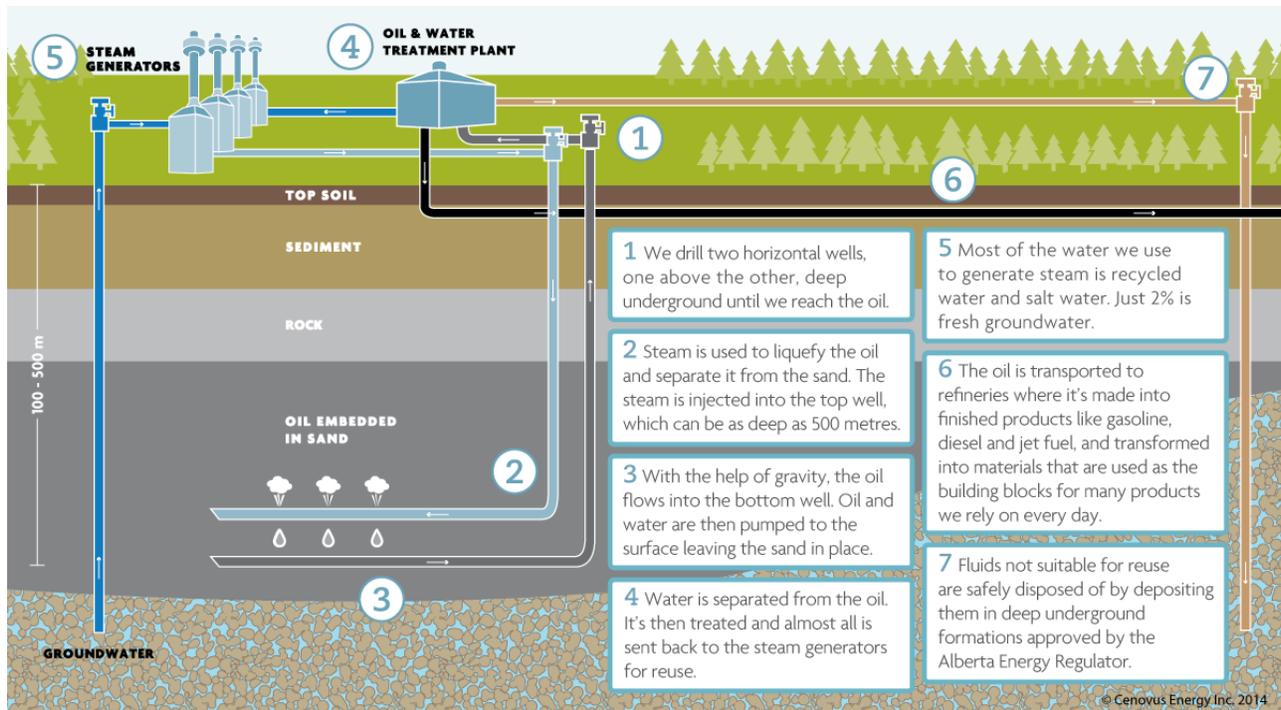


Figure 1. Overview of how SAGD works. Photo courtesy of Cenovus

SAGD stands for steam-assisted gravity drainage. For oil sands formations that are well below the surface (300m – 500m deep), the SAGD process is a means by which the oil can be extracted from the formation. Most of the oil in the Canadian Oil Sands is only accessible by an in-situ (in-place) extraction process, such as SAGD. See figure 1 for a simplified overview of the process.

### THE PROBLEM:

In Fort McMurray, Alberta, Canada, SAGD Production Emulsion Switching Valves, located at the well pads, experience the challenge of cycling multiple times per week and providing reliable shut off while being exposed to an emulsion of bitumen, oil, water, gas, and sand slurries. Operating temperatures are up to 250°C (Design production temperatures up to 298°C) and within ANSI 600 class pressure ratings. If for example there are nine well pairs (one well for steam, the other for production) at a SAGD well pad, regulations require that one of the nine wells be placed in test mode, while the other eight are in production mode. Each well is switched into and out of test mode by the switching valves several times per week to test/monitor production quality.

**THE SOLUTION:**

Since being installed in this application in 2015, the Val-Matic QuadroSphere® Ball Valve has proven to be robust and reliable. Not only does the unique QuadroSphere® ball design (See figure 2) allow flushing of sand and bitumen that may accumulate between the ball and the body cavity, it also reduces rubbing/friction between the ball and seats, which decreases operating torque requirements. This reduces actuator sizes and provides a more compact automated valve assembly envelope which is very desirable for maximizing cost savings and minimizing space requirements.

Canadian energy companies using Quadrosphere® Ball Valves include Suncor Firebag SAGD facility (figures 3-4), Devon Jackfish, MEG Energy, Encana, Pembina and engineering firms Wood and Worley Parsons.

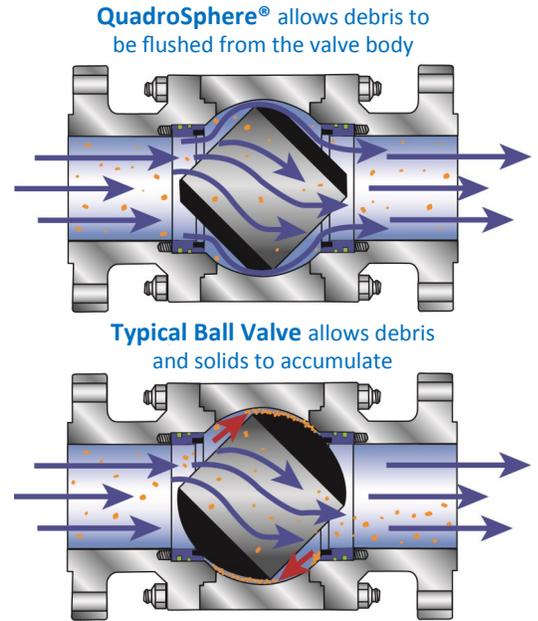


Figure 2. QuadroSphere® Ball Valve

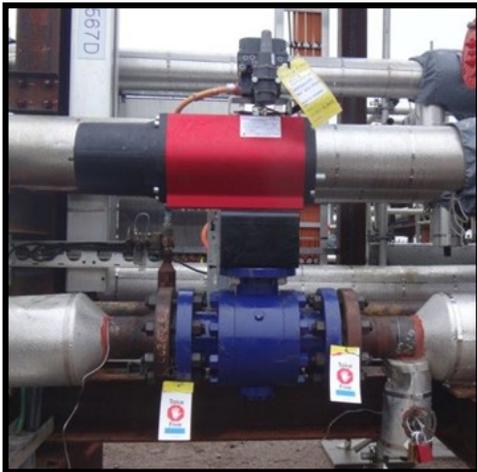


Figure 3. 4" ANSI 600 QuadroSphere® Ball Valve with Rotork scotch yoke actuator



Figure 4. New well pad module with 4" ANSI 600 QuadroSphere® Ball Valves at Suncor Firebag SAGD Facility



Figure 5. 2" and 3" ANSI 600 QuadroSphere® Ball Valves with Rotork Actuators and Fisher DVC position transmitters at Suncor Firebag SAGD facility.

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