

How Produced Water and Source Water Qualities Influence the Operation and Environmental Footprint of SAGD Surface Facilities

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This paper examines how the qualities of produced water and source water influence not only the operation of SAGD facilities, but also their environmental footprint. SAGD requires anywhere from two to four barrels of water to produce one barrel of bitumen, but does so by recycling 90% or more of the water used to produce the bitumen. Traditionally, SAGD has relied on de-oiling and softening to re-process the aqueous portion of the produced fluids from SAGD production. The softening process most commonly in use today is hot or warm lime softening, followed by ion exchange, using combinations of weak acid and strong acid cation exchange resins to remove hardness. The lime softening process also is used to remove silica, through the addition of magnesium hydroxide in the lime softener. In general, the higher the salinity of both the produced water and the source water used to replace water losses, the higher the silica and hardness of the water as well. This paper will provide a brief overview of SAGD surface facilities, and then show how poorer subsurface water quality (higher loads of undesirable chemical species) leads to higher operating costs due to chemical consumption, and larger environmental footprint due to increased air emissions (GHGs, SO_x, NO_x) and waste disposal volumes. Means of controlling deep well disposal volumes will be examined briefly, along with the implications of higher contaminant concentrations on disposal.