

## **Injection Returns and Evolution of Non-Condensable Gases at the NCPA Geysers Wellfield, California**

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### **ABSTRACT**

NCPA is the developer and operator of the second-largest power installation at The Geysers steam field in California, generating some 120 MW at the southern end of the reservoir using 68 production wells and 8 injection wells. The current total monthly steam production is about 1.451 million lbs, and about 90% of this is replaced annually by a re-injection stream that comprises about 2,000 gpm of combined (treated) sewage and lake water and about 1,600 gpm of combined condensate and rain runoff. Routine monitoring of the stable isotopes and steam chemistry of production is carried out to evaluate injection returns (injection-derived steam), and the first comprehensive evaluation of the returns and evolution of non-condensable gases in the reservoir and production since 2001 has now been completed. In contrast to experience further north in the reservoir, the weighted average total gas / steam concentration of the NCPA wellfield has remained stable since about 1991, at about 3,000 ppm-wt. H<sub>2</sub>S has also remained stable at 100~150 ppm-wt. The dome-shaped reservoir has a well-defined halo of gas / steam that increases towards the top and sides, and the general character of this halo has not been changed by injection. NCPA gases are different in composition from a previously defined Southeast Geysers type, with high levels of total C and N, and high CH<sub>4</sub> / CO<sub>2</sub> (molar value up to 3) found especially in the far south. These gases are either released by local sedimentary rocks, or they are a remnant of the early Geysers reservoir, before it was once flushed by meteoric water.

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