Groundwater Impacts

Affected Environment

Interbedded sandstones and siltstones; subhorizontal
Sandstone aquifers, siltstone aquitards; aquifers confined w/exception of F Sand at Hank
Current use – water supply generally for livestock
Water Quality – Variable, generally exceeds Class III standards
Depth to near surface aquifers variable, locally shallow

Construction Impacts to Groundwater

SMALL – Nichols and Hank based on the limited nature of construction activities and implementation of best management practices to protect shallow groundwater.

Operational Impacts to Groundwater

Shallow (near surface) Aquifers

MODERATE to LARGE – in GEIS based on 1) the groundwater in shallow aquifers is close to the ground surface, 2) the shallow aquifers are important sources for local domestic or agricultural water supplies, or 3) shallow aquifers are hydraulically connected to other locally or regionally important aquifers.

MODERATE - Nichols Ranch and Hank based on mitigating measures aggressive leak detection, spill cleanup program, and well mechanical integrity testing.

Production & Surrounding Aquifers

Water consumptive use

SMALL – Nichols Ranch based on available head (440+ feet), limited drawdown ($\leq$35 feet), no apparent leakage from under and overlying aquifers, actual consumption is a small fraction of water currently stored in basin-wide aquifer, and in-place mitigation measures (confidential surface use agreements) in the event of impact to free flowing wells.

SMALL – Hank based on limited drawdown, no apparent leakage from under and overlying aquifers, and actual consumption is a small fraction of water currently stored in basin-wide aquifer.

Excursions and Groundwater Quality

SMALL and temporary – Nichols Ranch based on its groundwater chemical composition that generally does not permit the use of the groundwater for drinking water, agriculture or livestock use; inward hydraulic control; monitoring, and geochemistry of formation.

SMALL – Hank based groundwater composition that generally constrains the use of the groundwater for drinking water, agriculture or livestock use; inward hydraulic control; and monitoring.

Deep Aquifers

SMALL – GEIS if water production from deep aquifers is not economically feasible, groundwater quality not suitable for domestic or agricultural uses (e.g., high salinity), and they sufficiently confined by low permeability layers.

SMALL – Nichols Ranch and Hank based on water quality in target formation, and UIC permit requirement (i.e., aquifer exemption).

Aquifer Restoration Impacts to Groundwater

MODERATE – Nichols Ranch during restoration due to increased drawdown, but ample available head (440+ feet), SMALL – Nichols Ranch long term based on actual consumption is a small fraction of water currently stored in basin-wide aquifer.

SMALL – Hank based on limited drawdown during restoration.

Decommissioning Impacts to Groundwater

SMALL – GEIS based on implementation of best management practices (BMPs)

A discussion and statement of what actions the applicant plans to take to mitigate the impact of large water level drawdowns from consumptive use in the "A sand" on water wells within a five mile radius of the Nichols Ranch unit. Uranerz pumping drawdown analysis, shown in Figure 7-1, indicates large water level drawdown created by planned consumptive use over a wide area surrounding Nichols Ranch.
Response:
Impacts to any wells that could be affected by consumptive use in the "A" Sand by Uranerz are addressed in surface use agreements between Uranerz and the surface owner of the land where the Nichols Ranch ISR Project is located. Although the details of the surface use agreement are confidential, Uranerz has agreed to work with the landowners if a well is affected by the "A" Sand drawdown. Potential actions could include installing pumps in artesian/flowing wells that stop flowing or drilling a new well for the landowner.
Section 7.2.3 of the Technical Report was revised to reflect this information.

Responses to NRC's RAIs 3-11-2009.ML090820538

The bleed rate from the'ISR operation at Nichols Ranch Unit will cause a steady stress on the A Sand aquifer. For production of 3,500 gpm and a 1% bleed rate. The bleed rate will average 35 gpm. This stress for a three year operation at Nichols Ranch Unit was simulated with the aquifer properties of 350 gal/day/ft for transmissivity and a storage coefficient of, 1.8E-4. Figure 7-1 (see map pocket) presents the results of these drawdowns. These drawdowns were calculated from three different stress locations. Pumping wells were placed in the southeastern portion of the wellfield, north central and southwestern portion; each for one-year pumping period. One pumping location in- the center of the wellfields would produce very similar drawdown. These predictions show that 30 ft of the drawdown w ill extend 7,000 ft outward from the center of the wellfields. The 5 ft contour is projected to extend out 22,500 ft or approximately 4 mi from the Nichols Ranch ISR Project area. Table 7A.1-1 in Addendum 7A presents the WELFLO model printout of the simulated drawdown.:

The flowing wells that are inside the 10 ft contours and produce the majority of its water from the A Sand are likely to cease flowing. Most of the flowing wells in the area only have a few PSI pressure when they are shut in. Brown 20-9 flowing well is completed in the A Sand and will very likely cease flowing during the ISR operation. Impacts to any wells that could be affected by consumptive use in the "A" Sand by Uranerz are addressed in surface use agreements between Uranerz and the surface owner of -the land. where the Nichols Ranch ISR Project is located. Although the details of the surface use agreement are confidential; Uranerz has agreed

to work with the landowners if a well is affected by the "A" Sand drawdown. Potential actions could include installing pumps in artesian/flowing wells that stop flowing or drilling a new well for the landowner.

The analysis of the potential predicted drawdowns in the F Sand from the Hank Unit ISR operation were calculated with average aquifer properties of transmissivity (400 gal/day/ft) and storage value of 0.05 and 3 years of operation. For a production rate of 2,500 gpm and a 3% bleed rate, the predicted drawdowns are presented in Figure 7-2 (see map pocket). Twelve stresses were used to simulate these drawdowns. Six stresses for a total of 75 gpm for 1.5 years Was located on the northern wellfield and asecond set of six stresses for the following 1.5 years was located in the southern wellfield. This figure shows that for the 10 ft contour extends only near the area of the southern wellfield while the **5-ft** unit contour extends out. approximately 900 ft from the edge of the wellfields. Table 7A.2-1 in Addendum 7A presents the output from the WELFLO program for the Hank simulation.

No flowing wells exist in the F Sand in this area and therefore the limited drawdowns are not likely to significantly affect any existing water users.