



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION IV
 URANIUM RECOVERY FIELD OFFICE
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Return to URFO 467-SS
 Docket 40-8728
 PDR

URFO:FWR
 Docket No. 40-8728
 04008728080E

FEB 28 1983

MEMORANDUM FOR: Docket File No. 40-8728
 FROM: Frederick W. Ross
 Licensing Branch I
 Uranium Recovery Field Office
 Region IV
 SUBJECT: TETON R&D N ORE ZONE FINAL RESTORATION REVIEW

BACKGROUND

The ore at the Teton Leuenberger site lies within two separate sand units designated as the N and the M ore zones. The N sand lies above the M sand at a depth of from 220 to 270 feet beneath the surface. The ore-bearing portion of the unit ranges in thickness from 5 to 20 feet within the 50 foot thick N sand. The N sand contains about 26% of the mineable uranium ore.

One 5 spot test pattern consisting of one recovery well surrounded by four injection wells placed 50 feet apart was used to mine the N ore zone. Injection of sodium bicarbonate lixiviant began on January 22, 1980 and terminated on June 1, 1980. About 47 pore volumes (6.2×10^6 gal) were circulated through the N zone during the four month mining cycle.

Restoration of the N ore zone began on June 1, 1980 and terminated on November 1, 1980. The principle means of groundwater restoration was a simple groundwater sweep consisting of alternately pumping individual injection and recovery wells. No special physical or chemical treatment of contaminated groundwater was employed. At the conclusion of restoration 24.12 pore volumes (3.14×10^6 gal) of water were discharged directly to the solar evaporation ponds.

DESIGNATED ORIGINAL

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Certified By B. Fisher

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DISCUSSION

To evaluate the adequacy of Teton's N ore zone restoration, the NRC staff compared restored peak and average concentrations of each indicator to peak and average baseline concentrations as well as to WDEQ Class I standards (pre-mining quality of use as determined by WDEQ-WQD). To ensure that the wellfield has remained stable after restoration, data from eight (8) post-restoration sampling rounds taken over a fourteen (14) month period were each compared to the initial restoration verification round. Wells sampled during restoration and post-restoration included the five pattern interior wells NR-1, NI-1, NI-2, NI-3, NI-4 and two additional N ore zone observation wells 317 and 574.

The restoration verification sampling data show that the average restored concentrations of major ionic constituents (those contributing most greatly to the total dissolved solids concentration) exceeding baseline average concentrations are bicarbonate, sodium, sulfate, and magnesium. In the worst case of sodium, the average restored concentration exceeds the baseline average by less than 30%. Because the ore body was mined with a sodium carbonate/bicarbonate lixiviant, sodium and bicarbonate concentrations were severely elevated during the mining process and have not been restored to baseline. However, there are no standards for these parameters, and their contribution to restored TDS concentrations is not enough to raise TDS levels significantly beyond the baseline range; the baseline average TDS concentration (530 ppm) is above the Wyoming DEQ Class I (domestic) standard. Although the average restored sulfate concentration marginally exceeds the Class I (domestic) standard (266 ppm vs 250 ppm), it is restored to within the baseline range of values, as is magnesium for which there is no standard. Of the trace elements, only restored concentrations of radium-226 and iron (252 pCi/l and 0.62 ppm) exceed the Class I standard, however, the baseline average for radium-226 (185 pCi/L) is well over the 5 pCi/L Class I standard. Restored iron concentrations were reduced dramatically (well below baseline and the Class I standard) after Teton initiated the practice of filtering samples.

Fourteen months of post-restoration data show only minor changes in water quality compared to the restoration verification sampling. Average sodium and calcium concentrations show slight increases with sodium increasing to 47 percent over baseline at a concentration of 50 ppm. Calcium, initially restored to baseline, increased to an average concentration of 103 ppm which is 11 percent over baseline; there is no

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standard for calcium. The average sulfate concentration decreased very slightly (7 ppm) and remains only 3.6 percent above the drinking water standard.

CONCLUSIONS

It is the opinion of the staff that Teton Exploration Drilling has met the NRC's objectives for restoration. The groundwater quality of the N ore zone wellfield has been returned to its highest potential pre-mining use, and with the exception of radium-226, all constituents that exceeded an applicable standard prior to mining have been returned to baseline. Average sulfate concentrations which did not exceed drinking water standards prior to mining, now exceed the standard by only 3.6 percent.

FOLLOW-UP ACTIONS

The staff recommends that Teton be notified by letter of the results of the NRC's N ore zone restoration evaluation, and that N ore zone production, injection and observation wells may be abandoned in accordance with WDEQ regulations for well abandonment. The WDEQ has approved restoration of the N ore zone and granted permission for N ore zone well abandonment in their May 19, 1982 letter to Teton.

Frederick W. Ross

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Region IV

Approved *JJ [Signature]*

Case Closed: 04008728080E

CC: Teton Exploration Drilling Co.