

TECHNICAL EVALUATION REPORT

REVIEW OF COGEMA MINING, INC.'S, IRIGARAY MINE RESTORATION REPORT, PRODUCTION UNITS 1 THROUGH 9, SOURCE MATERIALS LICENSE SUA-1341

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LICENSE NO.: SUA-1341

LICENSEE: COGEMA Mining, Inc.

FACILITY: COGEMA Irigaray Mine

PROJECT MANAGER: Ron C. Linton

TECHNICAL REVIEWER: Ron C. Linton

SUMMARY AND CONCLUSIONS

COGEMA Mining, Inc. (COGEMA), has requested that the U.S. Nuclear Regulatory Commission (NRC) concur with the Wyoming Department of Environmental Quality's (WDEQ) determination that ground-water restoration at the Irigaray Mine production units 1 through 9 meets regulatory requirements so that decommissioning of the wellfield can commence (COGEMA, 2005). The WDEQ determined that the Irigaray Mine production units 1 through 9 have been restored to premining class of use and to Wyoming statutory and regulatory requirements. The WDEQ also determined that ground-water quality within the wellfield, based on the mean concentrations, will not endanger ground water outside the aquifer exemption boundary (WDEQ, 2005).

The restoration goal in License Condition (LC) 10.16 of NRC Source Materials License SUA-1341 is to return ground-water quality, on a production-unit average, to baseline concentrations on a parameter-by-parameter basis. If the primary goal cannot be achieved, the licensee will, at a minimum, return the ground water to the premining use category (NRC, 2006a). COGEMA has not restored ground water to primary, or background, standards. However, because of the restoration efforts made by COGEMA and the use of best practicable technology, the NRC considers the WDEQ secondary restoration standards and the NRC premining use category as the applicable restoration standards in lieu of the primary goal of restoration in LC 10.16. The WDEQ class-of-use standards (NRC premining use standards) have been met and approved by WDEQ, and the NRC concurs with this approval. Therefore, the NRC concludes that ground-water restoration to the premining use category in LC 10.16 is complete in COGEMA Irigaray Mine production units 1 through 9 and that wellfield decommissioning can commence.

Enclosure

BACKGROUND

By letter dated July 26, 2004, COGEMA submitted the Irigaray Wellfield Restoration Report for mine production units 1 through 9 to WDEQ for approval. During the course of its review and because the postrestoration ground-water conditions differ from background water quality, WDEQ required additional ground-water fate and transport modeling to ensure that ground-water quality will not degrade outside the aquifer exemption boundary. COGEMA performed additional modeling and submitted the results to WDEQ to demonstrate that restoration was complete (COGEMA, 2005). After further review, WDEQ determined that (1) ground water, as a whole, has returned to its premining class of use, and (2) although the ground water has not returned to baseline conditions, the ground-water quality within the wellfield, based on the mean concentrations, will not endanger the class of use and the U.S. Environmental Protection Agency (EPA) maximum contaminant limits (MCLs) for the ground water outside the aquifer exemption boundary (WDEQ, 2005).

COGEMA requested that the NRC concur with the WDEQ's decision that Irigaray Mine production units 1 through 9 have been restored and that COGEMA can abandon all wells and decommission the wellfield (COGEMA, 2005). The NRC reviewed the submission and responded with a request for additional information (RAI) (NRC, 2006c). COGEMA responded to the RAI with additional information and again requested concurrence with the WDEQ's determination (COGEMA, 2006a and 2006b).

REGULATORY FRAMEWORK

The State of Wyoming issues permits for mining at *in situ* leach (ISL) operations for compliance with the EPA underground injection control (UIC) program in Title 40, Part 144, "Underground Injection Control Program," of the *Code of Federal Regulations* (40 CFR Part 144). Injection wells associated with ISL mining are Class III wells under the EPA UIC program. The State of Wyoming has primacy over this program, as delegated by EPA. Before conducting ISL mining, an applicant for a UIC permit must demonstrate that the aquifer is expected to produce minerals and must obtain an aquifer exemption allowing injection of mining solutions in that portion of the aquifer that is exempt. Wyoming has permitted ISL fluid injection by COGEMA at the Irigaray Mine under Wyoming Permit No. 478, TFN 4 1/170. Under the EPA UIC program, exempt aquifers do not require restoration or cleanup. The applicant for a permit is required to demonstrate that water outside of the exempted boundary is not, or will not be, degraded beyond the MCLs set by EPA under the Safe Drinking Water Act. The Wyoming UIC program for Class III wells is more stringent than the EPA UIC program. Wyoming requires that "the operation will achieve the standard of returning all affected ground water to the pre-mining class of use or better using best practicable technology."

The NRC issues licenses authorizing a licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material (NRC, 2006a). The NRC considers ground water that has been chemically altered as a result of the injection of lixiviant during the ISL milling process to be byproduct material and regulates it under Appendix A, "Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content," to 10 CFR Part 40, "Domestic Licensing of Source Material." Ground-water restoration standards in Appendix A to 10 CFR Part 40 require that licensees restore ground

water to background standards or the standards in Table 5C of Appendix A and that, if this cannot be achieved, the Commission set an alternate concentration limit. The NRC established these standards primarily for conventional uranium mill sites. Subsequently, the NRC issued NUREG-1569, "Standard Review Plan for In Situ Leach Uranium Extraction License Applications," which contains three different restoration standards for ISL ground water restoration, specifically (1) background or primary standards, (2) class-of-use or secondary standards, and (3) an alternative standard requiring no degradation at the aquifer exemption boundary (NRC, 2003).

The Wyoming primary restoration (class-of-use) standards and the NRC primary restoration (background) standards differ. Both the NRC and the State require ground-water reporting by the ISL permittee or licensee in response to the dual regulatory requirements in 40 CFR Part 144 and 10 CFR Part 40. Because of the dual nature of ISL regulation under the EPA UIC program in 40 CFR Part 144, the NRC regulatory requirements in Appendix A to 10 CFR Part 40, and guidance in NUREG-1569, the Commission has directed, in Staff Requirements Memorandum (SRM) COMJSM-06-0001, "Regulation of Groundwater Protection at In Situ Leach Uranium Extraction Facilities," that the staff exercise enforcement discretion to allow current ISL uranium extraction facility licensees to meet State ground-water requirements in lieu of any alternative conditions in their NRC licenses (NRC, 2006b). This direction by the Commission requires the NRC staff to give substantial deference to ground-water restoration approvals by the State.

TECHNICAL EVALUATION

COGEMA has processed more than 840 million gallons of water over an 11.5-year period, displacing and treating a minimum of 9.5 pore volumes in each wellfield and displacing an average of 13.7 pore volumes over the entire wellfield as part of its ground-water restoration activities. COGEMA has shown that using the best practicable technologies of ground-water sweep, permeate injection with reductant addition, and aquifer recirculation has enabled the restoration results to become asymptotic, indicating no significant increasing trends for the wellfield restoration parameters. Although all of the ground-water parameters have not been returned to premining baseline conditions, the ground-water quality is consistent with the premining class of use (COGEMA, 2005).

The WDEQ concluded that COGEMA has used best practicable technology in its restoration work in the Irigaray Mine wellfield and that restoration results have reached baseline or become asymptotic. The WDEQ determined that COGEMA has restored the Irigaray wellfield to Wyoming statutory and regulatory requirements and that ground water, as a whole, has returned to its premining class of use. The WDEQ also concluded that although the ground water has not returned to baseline conditions, the ground-water quality within the wellfield, based on the mean concentrations, will not endanger the class of use and the EPA MCLs for ground water outside the aquifer exemption boundary (WDEQ, 2005).

The NRC staff reviewed the wellfield restoration report and requested additional information on the restoration and stabilization data and the ground-water modeling methodology (NRC, 2006c). In response to the NRC's RAI request in Comment No. A1, COGEMA determined that the individual restoration and stabilization data fall within the baseline ranges for all constituents except for calcium, magnesium, sodium, carbonate, chlorine, ammonium, total dissolved solids,

conductivity, alkalinity, lead, barium, manganese, and radium-226. These data show that, when comparing premining baseline ranges to postmining stabilization ranges, several constituents did not meet primary restoration targets. When comparing the postmining stabilization means for constituents in production units 1 through 9 in round 4 to premining baseline means in production units 1 through 9, nearly half of the constituents exceed the mean values (COGEMA, 2006a and 2006b).

The NRC concluded that the COGEMA response to NRC's RAI Comments B1 through B4 regarding ground-water modeling methodologies was satisfactory. The COGEMA ground-water modeling has shown that the ground water outside of the aquifer exemption boundary will be protected and that elevated contaminants within the wellfield will naturally attenuate with time. For its modeling evaluation, COGEMA developed an advective transport model that is independent of geochemical reactions. COGEMA sees this approach as extremely conservative, resulting in overprediction of constituent concentrations downgradient of the site (COGEMA, 2005). The NRC staff supports the premise that, in general, ground-water modeling that is independent of geochemical reactions is conservative for constituent concentration predictions.

COGEMA must conduct ground-water restoration as follows, as stipulated in NRC LC 10.16 of NRC Materials License SUA-1341:

The licensee shall conduct groundwater restoration and post-restoration monitoring as described in Section 6.1 of the approved license application. The primary goal of restoration shall be to return the ground water quality, on a production-unit average, to baseline concentrations on a parameter-by-parameter basis. If the primary goal cannot be achieved, the ground water will, at a minimum, be returned to the pre-mining use category.

The data supplied by COGEMA show that ground-water restoration to the primary, or background, goal has not been achieved for many constituents. However, as noted above, NRC LC 10.16 indicates that "ground water will, at a minimum, be returned to the premining use category."

Section 6.1.3(4)(b) of NUREG-1569 states the following:

Secondary Restoration Standards....The applicant may therefore propose returning the water quality to its pre-operational class of use (e.g., drinking water, livestock, agricultural, or limited use) as a secondary restoration standard. Applications should state the principal goal of the restoration program and that secondary standards will not be applied so long as restoration continues to result in significant improvement in ground-water quality. The applicant must first attempt to return ground-water quality to primary restoration standards before falling back on secondary restoration standards.

Paragraph 4 of Section 6.1.3(3) of NUREG-1569 notes the following:

Generally, the acceptance criteria for restoration success are based on the ability to meet the predetermined numerical standards of the restoration program and the absence of significant increasing trends of monitored indicator constituent concentration during the stability monitoring period.

As previously stated, WDEQ determined that the licensee has restored the Irigaray wellfield to Wyoming statutory and regulatory requirements; that ground water in wellfield production units 1 through 9, as a whole, has returned to its premining class of use; and that restoration results have reached baseline or become asymptotic. Based on the effort by COGEMA to restore ground water at the site and the restoration results that have become asymptotic and are not showing significant improvement, COGEMA has complied with the secondary restoration goal set forth in LC 10.16 and recognized in NUREG-1569.

In addition, COGEMA has shown through modeling that ground water would not likely be affected outside of the aquifer exemption boundary. The WDEQ required this modeling, which is equivalent to the restoration standard in Section 6.1.4(c) of NUREG-1569, which states the following:

If a constituent cannot technically or economically be restored to its secondary standard within the exploited production zone, an applicant must demonstrate that leaving the constituent at the higher concentration would not be a threat to public health and safety or the environment or produce an unacceptable degradation to the water use of adjacent ground-water resources...the applicant must show that leaving the individual constituent at a concentration higher than secondary standard would not be a threat to public health and safety nor the environment or produce an unacceptable degradation to the water use of adjacent ground-water resources.

Furthermore, NUREG-1569 and a recent Commission SRM direct that substantial deference should be given to the ground-water technical review and restoration approval of WDEQ and the permit required by the EPA UIC program and administered by WDEQ.

Paragraph 2 of Section 6.1 of NUREG-1569 states the following:

In conducting these evaluations, the reviewer should consider the technical evaluations conducted by a state or other federal agency with authorities overlapping those of the NRC.

Commission SRM COMJSM-06-0001 (NRC, 2006b) notes the obligation to “exercise enforcement discretion to allow current licensees to meet state ground-water requirements in lieu of alternative conditions that may exist in their licenses.”

The NRC concurs with the WDEQ’s conclusion that the licensee has restored the Irigaray wellfield, as a whole, to its premining class of use by the use of best practicable technology. With the information provided by COGEMA, including documentation of the WDEQ conclusion that Irigaray Mine has been restored, the NRC staff concludes that the Irigaray Mine has been restored and that ground water has returned to the premining use category as required by NRC

license SUA-1341, LC 10.16. This determination is consistent with the ground-water restoration and review approach outlined in NUREG-1569 and directed by SRM COMJSM-06-0001. Furthermore, COGEMA can begin decommissioning the wellfield.

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