ENVIRONMENTAL ASSESSMENT
RELATED TO ISSUANCE OF A LICENSE AMENDMENT
FOR HOMESTAKE MINING COMPANY OF CALIFORNIA
GRANTS, NEW MEXICO PROJECT

SOURCE MATERIALS LICENSE SUA-1471
DOCKET NO. 40-8903

PREPARED BY

THE U.S. NUCLEAR REGULATORY COMMISSION
DIVISION OF FUEL CYCLE SAFETY AND SAFEGUARDS
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

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Enclosure

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1.0 INTRODUCTION

In accordance with 10 CFR Part 40, Appendix A, Criterion 5B(1) and 5B(5), the U. S. Nuclear Regulatory Commission (NRC) may establish ground water protection standards (GWPSs) at the point of compliance by reference to the background concentrations, the appropriate value found in the table in Criterion 5C, or using alternative concentration limits. The current GWPSs at the Homestake Mining Company of California (HMC) Grants, New Mexico facility (the Site), which were established in 1989, are background concentrations based on a very limited set of ground water quality data from one upgradient well. HMC is proposing a revision to the Site's GWPSs based on a much larger data set of upgradient ground water quality.

The NRC has reviewed HMC's amendment request and has developed this Environmental Assessment (EA) in support of this action. The EA was developed by the NRC in accordance with the requirements of 10 CFR Part 51 and by using the guidance provided in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (NRC 2003). Based on the EA, the NRC has determined that a Finding of No Significant Impact (FONSI) is appropriate.

1.1 Background

The Site is located in Cibola County, New Mexico, approximately 5.5 miles north of the Village of Milan. It is bordered on the east by State Highway 605. County Road 63 runs adjacent to the northern boundary of the Large Tailing Pile (LTP), the most prominent feature on the Site. The nearest residential area (Murray Acres) is approximately 3,000 feet from the Site. Four other residential subdivisions (Broadview Acres, Felice-Acres, Pleasant Valley Estates, and Valle Verde) are located to the south or southwest, within 2 miles of the Site. Figure 1 is a map of the Site and nearby areas.

Uranium milling began at the Site in 1958 and continued through 1990 under NRC License SUA-1471. A total of 22 million tons of ore were milled at the Site using a conventional alkaline leach process. From 1993 to 1995, the mill was decommissioned and demolished (US EPA 2001). The demolition debris was placed in several repository trenches adjacent to the Site, and the material was covered by clean soil and rock for stability. The Site has two solid tailings piles (LTP and Small Tailings Pile (STP)), a collection pond, and two synthetic lined evaporation ponds. An EA was prepared for the Site in 1993 to document NRC staff's evaluation of alternatives for tailings reclamation and mill decommissioning (NRC 1993). The staff concluded that reclamation of the tailings and decommissioning of the mill as proposed by the licensee would not have a significant impact on the environment.

Implementation of the original ground water protection program began in 1977 through the installation and operation of a number of injection and recovery wells located between the southern portion of the Site and the residential subdivisions located immediately south/southwest of the tailings impoundments and evaporation ponds (EPA 2001). This original system has since been supplemented several times (see Section 4.3.1). Final reclamation activities and ground water restoration are ongoing.

In 1989, the NRC established GWPSs for the Site as background concentrations from a single San Mateo alluvium (alluvial aquifer) monitor well, well P (NRC 1989). These ground water protection standards were derived from a statistical analysis of three sets of split samples (i.e., samples were divided into two equal parts and sent to two different laboratories for analysis) collected from well P between December 13, 1988 and February 15, 1989 (HMC 1989). Table 1 contains the current GWPSs for the Site.

TABLE 1
HMC's CURRENT GROUND WATER PROTECTION STANDARDS

Constituents	
Selenium (mg/L)	0.10
Uranium (mg/L)	0.04
Molybdenum (mg/L)	0.03
Vanadium (mg/L)	0.02
Thorium-230 (pCi/L)	0.30
Ra-226 + Ra-228 (pCi/L)	5

Ground water protection standards are applied at point of compliance wells D1, X, and S4.

Under License Condition 35B of NRC License SUA-1471, Point of Compliance (POC) wells (i.e., wells where the GWPSs apply) are located near the downgradient side of the tailings piles. Current POC wells include alluvial wells D1 and X (SUA-1471, Amendment 8, NRC 1990), and alluvial well S4 (SUA-1471, Amendment 10, NRC 1991). POC wells are shown on Figure 1. It should be noted that the New Mexico Environment Department (NMED) requires that the entire ground water system meet approved GWPSs.

1.2 Review Scope

In accordance with 10 CFR Part 51, this EA serves to: (1) present information and analysis for determining whether to issue a FONSI or to prepare an Environmental Impact Statement (EIS); (2) fulfill the NRC's compliance with the National Environmental Policy Act when no EIS is necessary; and (3) facilitate preparation of an EIS when one is necessary. Should the NRC

issue a FONSI, no EIS would be prepared. Since this action relates to ground water protection standards, most of the focus is on potential environmental impacts related to ground water.

2.0 THE PROPOSED ACTION

HMC has proposed to amend License Condition 35 of License SUA-1471 to:

1) Establish revised GWPSs for selenium, uranium and molybdenum for the alluvial aquifer; no change is proposed in the GWPSs for vanadium, radium-226, plus radium-228 and thorium-230 for the alluvial aquifer;

2) Add GWPSs for nitrate, TDS, sulfate and chloride for the alluvial aquifer; and,

3) Establish GWPSs for the Chinle mixing and non-mixing zones.

The proposed GWPSs for the Site are listed in Table 2.

TABLE 2
HMC's PROPOSED SITE GROUND WATER PROTECTION STANDARDS

Constituents	Alluvial$_1$	Chinle Mixing Zone	Upper Chinle Non-Mixing Zone	Middle Chinle Non-Mixing Zone	Lower Chinle Non-Mixing Zone
Selenium (mg/L)	0.32	0.14	0.06	0.07	0.32
Uranium (mg/L)	0.16	0.18	0.09	0.07	0.03
Molybdenum (mg/L)	0.10	0.10	0.10	0.10	0.10
Sulfate (mg/L)	1,500	1,750	914	857	2000
Chloride (mg/L)	250	250	412	250	634
TDS (mg/L)	2734	3140	2010	1560	4140
Nitrate (mg/L)	12	15	*	*	*
Vanadium (mg/L)	0.02	0.01	0.01	*	*
Thorium-230 (pCi/L)	0.30	*	*	*	*
Ra-226 + Ra-228 (pCi/L)	5	*	*	*	*

* - site standards not necessary for the constituents in the indicated aquifer
1 - selenium, uranium, sulfate, TDS, and nitrate standards are 95th percentile upgradient concentrations; molybdenum standard taken from 40 CFR 192, subpart A, Table 1; chloride standard taken from secondary drinking water standards; and vanadium, radium-226 & -228, and thorium standards remain unchanged.

HMC's initial license amendment request for changes in the GWPSs for the alluvial aquifer at the Site was submitted in December 2001 (HMC 2001). This initial request involved a

reevaluation of the background concentrations for molybdenum, selenium, and uranium based on 23 years of data from 1976 through 1998. The staff requested additional information with respect to the amendment and HMC provided responses dated July 7, 2003 (HMC 2003a). As a result of some of the staff's questions, HMC submitted a proposal and request for setting Chinle background water quality standards in October 2003 (Environmental Restoration Group 2003, HMC 2003b, and HMC and Hydro-Engineering 2003). The staff requested additional information with respect to these site standards and the report was revised in June 2004 (HMC 2004a and 2004b).

In response to NMED comments, HMC recalculated alluvial aquifer background concentrations using data from 1995 through 2004 (i.e., 10-year period) (HMC 2005a). A letter received from HMC dated December 5, 2005 (HMC 2005b) and revised January 19, 2006 (HMC 2006) requested that the NRC amend the Site license (SUA-1471) to incorporate HMC'c revised GWPSs.

3.0 NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to modify the existing GWPSs and to establish additional GWPSs for the Site. In accordance with Part 40, Appendix A, Criterion 5D the licensee must continue corrective action measures to the extent necessary to achieve and maintain compliance with GWPSs. However, the GPWS added to the license in 1989 were derived based on the average of a small number of samples taken from one upgradient well and were based on drinking water regulatory standards at the time. The licensee believes that several of the GWPSs established in 1989 are not representative of actual site background water quality. In contrast, the proposed revised GWPSs for the alluvial aquifer are based on ten years of data from nine wells located upgradient of the Site. In addition, the proposed GWPSs include background concentrations for the three Chinle non-mixing zones (Lower, Middle, and Upper) and the Chinle Mixing Zone.

4.0 SITE DESCRIPTION

4.1 Hydrogeology

Tailings at the Site, which are contained in the LTP and STP, are underlain by the San Mateo alluvium. In the immediate vicinity of the Site, the saturated thickness of the San Mateo alluvium varies between 10 to 60 feet. The Chinle Formation, which is comprised mainly of a massive shale interspersed with some sandstone (approximately 800 feet thick), exists below the alluvium. Complicating matters are two structural faults in the Chinle Formation. These faults are identified in site-related documents as the East Fault and West Fault. The northeast/southwest trending East Fault extends under the eastern portions of the LTP and STP and continues under the Broadview Acres and Felice Acres subdivisions. The West Fault, which also trends northeast/southwest, passes just west of the LTP and extends underneath the Murray Acres subdivision. Hydro-Engineering (2001) contains maps and a discussion of geological structural features at the Site.

With respect to ground water, the Site and associated tailings are situated directly above the alluvial aquifer. The alluvial aquifer, in general, flows from north of the site, into the site area, and then shifts in the southwest direction. However, HMC's ground water restoration program

has substantially altered ground water flow in the area immediately downgradient of the site. The program, which includes significant ground water withdraw and injection, has created a large hydraulic cell which appears to impede the migration of site related contaminants (see Section 4.2.1). Southwest of the Site, the alluvial aquifer eventually flows into the Rio San Jose Alluvial aquifer.

Three saturated zones within the Chinle Formation have been defined in the Site area (Upper, Middle and Lower). Complicating matters is the fact that all three Chinle zones subcrop (i.e., intersect) with the alluvial aquifer at different locations in the vicinity of the Site. Hydrogeochemically, all of the Chinle subcrops have been defined together as the Chinle mixing zone. Saturated Chinle units downgradient of the Chinle mixing zone are referred to individually as the Upper, Middle, or Lower Chinle non-mixing zones.

Further complicating matters in the Chinle are two structural faults. These faults are identified in site-related documents as the East Fault and West Fault. The northeast/southwest trending East Fault extends under the eastern portions of the Large Tailings Pile and Small Tailings Pile and continues under the Broadview Acres and Felice Acres subdivisions. The West Fault, which also trends northeast/southwest, passes just west of the Large Tailings Pile and extends underneath the Murray Acres subdivision.

The deepest producible aquifer in the area is the San Andres which underlies the Chinle formation. Depth to the San Andreas is approximately 800 to 955 feet bgs in the immediate vicinity of the Site (HMC and Hydro-Engineering 2005). This aquifer appears to be unaffected by the Site (HMC and Hydro-Engineering 2003).

4.2 Water Resource Uses

4.2.1 Ground Water Restoration

Virtually all the water withdrawn from the alluvial aquifer in the vicinity of the Site is associated with HMC's ground water restoration program. HMC and Hydro-Engineering (2005) presents 2004 data on ground water restoration related to injections and withdraws. The current program consists of the following components: pumping contaminated ground water from areas downgradient of the tailings into lined evaporation ponds or treating ground water with a reverse osmosis unit and re-injecting the product of the reverse osmosis treatment; pumping tailings fluid from the tailings into the evaporation ponds; injecting fresh water into the tailings to aid the collection of the tailings water; and injecting fresh water into the aquifer downgradient of the site to prevent downgradient plume movement and assist movement of the plume to collection wells. A review of historical water quality data indicates that the operation of the ground water restoration program has resulted in a significant improvement in ground water quality in the alluvial aquifer. The program, as defined by NRC License SUA-1471 and NMED Permit DP-200 (NMED 2006), was initiated in 1977. HMC estimates program completion by 2011; however, termination of the program will be based on a number of factors including compliance with approved GWPS. Locations of injection and production wells are shown in Figure 1.

4.2.2 Residential Use

Historically, residences in the subdivisions used ground water for domestic purposes. In

November 1983, Homestake and the U.S. Environmental Protection Agency (US EPA) signed a consent decree for an alternate water supply for the nearby residences. Nearby residences were subsequently connected to the Village of Milan water supply. Alternate water supply hookups were completed in April 1985.

In late 2005 and early 2006, HMC undertook a survey to determine whether current occupied dwellings downgradient of the Site were utilizing water service from the Village of Milan system for potable water consumption (HMC and Hydro-Engineering 2006). The survey included review of records and customer database from the Village of Milan water district and a lot-by-lot reconnaissance of the five subdivisions downgradient of the Site. The survey identified 12 residences downgradient of the Site where domestic wells appeared to be utilized for potable water supplies. In addition, based on anecdotal information, it appears that sporadic use of ground water for gardening and livestock watering occurs in residences currently connected to the Village of Milan water supply.

4.3 Ground Water Quality

A significant amount of data has been compiled to characterize ground water quality upgradient of the Site. Upgradient ground water, which has not been influenced by mill activities, is defined as "background water." HMC's statistical evaluation of upgradient alluvial ground water quality for chloride, nitrate, sulfate, total dissolved solids (TDS), molybdenum, selenium, and uranium was presented in Environmental Restoration, Inc.(2001). The statistical analysis of these data are the basis for several of HMC's proposed revised GWPSs. In general, the upgradient quality of the alluvial aquifer is poor. The 95th percentile concentrations for selenium, uranium, and nitrate (0.32 mg/L, 0.16 mg/L, and 12 mg/L, respectively) are all above their Federal maximum contaminant levels (MCL) (0.05 mg/L, 0.03 mg/L, and 10 mg/L, respectively). With respect to secondary Federal drinking water standards (i.e., aesthetic effects such as taste, odor, or color), virtually all the upgradient alluvial samples contained TDS and sulfate at levels above their respective limits.

HMC's statistical evaluation of the upgradient Chinle mixing and non-mixing ground water quality was presented in Environmental Restoration Group, Inc. (2003) for molybdenum, selenium, uranium, vanadium, chloride, nitrate, sulfate, total dissolved solids, thorium-230, and radium-226 and -228. Like the alluvial aquifer, the background water quality of the Chinle Formation in the vicinity of the Site is poor. The 95th percentile concentrations for selenium in the three Chinle non-mixing zones and the Chinle mixing zone range from 0.06 to 0.14 mg/L, which are all above the Federal MCL for selenium. Uranium shows a similar trend, with only the 95th percentile concentration for the Middle Chinle below the current uranium Federal MCL. Nitrate is above the Federal MCL in the Chinle Mixing Zone. Although there is no Federal MCL for molybdenum, its 95th percentile concentrations in the Upper and Middle Chinle zones and the mixing zone are over the Life-time Health Advisory concentration of 0.04 mg/L (US EPA 2004). In terms of secondary Federal drinking water standards, the arithmetic mean concentrations for TDS and sulfate are both above their respective limits in all three Chinle non-mixing zones and the Chinle mixing zone. The 95th percentile Chloride concentration is also above its secondary Federal limit in both the Upper and Lower Chinle non-mixing zones.

5.0 ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

5.1 Impact to Ground Water Quality

HMC's proposed license amendment involves the use of an extensive set of background ground water quality data for the alluvial, Upper, Middle, and Lower Chinle mixing and non-mixing zones (see Section 4.3). The proposed GWPSs will have virtually no impact on ground water quality downgradient of the mill because they represent the ambient chemical quality of ground water flowing into (and eventually downgradient of) the Site from upgradient areas.

5.2 Other Potential Impacts

NRC staff have concluded that since the proposed action (i.e., the revision of GWPSs) is the quantification of background ground water quality based on data collected from a number of upgradient monitoring wells, there would be no effect to the following resources: visual resources, vegetation and soils, ambient air quality, surface water or transportation. Because the proposed GWPSs are higher than the existing GWPSs (both of which are above Federal MCLs for some of the constituents of interest), the cost of post-restoration treatment to meet these Federal limits may be higher.

5.3 Potential Cumulative Impacts

A proposed action may have limited effects when considered individually and significant effects when considered cumulatively in space or time. NRC staff has concluded that the cumulative impacts to the proposed action are small.

5.4 Cultural, Ecological, and Historical Resources

NRC staff has determined that the proposed action will not affect listed species or critical habitat. Therefore, staff has determined no further consultation is required under Section 7 of the Endangered Species Act. Furthermore, since the proposed action does not involve any land disturbance, no potential or identified cultural or historical resource areas would be affected by the proposed action. Therefore, staff has determined that no further consultation is required under Section 106 of the National Historic Preservation Act.

6.0 ALTERNATIVES TO THE PROPOSED ACTION

No Action Alternative

The current GWPSs at the Site are background water quality concentrations based on the average values of three sets of split samples collected over a two-month period between mid-December 1988 and mid-February 1989, from a single alluvial aquifer well located upgradient (i.e., outside the chemical or hydraulic influence) of the Site. In the no action alternative, the current background GWPSs would remain in force. Based on HMC's extensive study of upgradient ground water quality, the current GWPSs do not accurately represent "background water quality" at the Site. Nevertheless, of these current background GWPSs, uranium at 0.04 mg/L and selenium at 0.1 mg/L are both greater than their respective Federal MCLs for drinking water (uranium, 0.03 mg/L; and selenium, 0.05 mg/L). As a result, even if the current uranium

and selenium standards are met at the Site (i.e., the point in time when HMC will be permitted to terminate ground water restoration efforts), treatment of ground water prior to domestic use will be necessary to meet Federal primary drinking water standards.

Proposed Action

The proposed action involves a revision of the GWPSs based on the 95th percentile concentrations from a larger set of upgradient spatial and temporal ground water quality data (10-year period from 1995 through 2004 (HMC 2005a)). The use of a broader and more representative set of data along with selecting the 95th percentile concentration as the representative background concentration yields revised ground water standards that are higher than the present standards. Similar to the present standards, several of the proposed revised alluvial; Chinle mixing zone; and Upper, Middle, and Lower Chinle non-mixing zones background values for uranium and selenium exceed their respective Federal MCLs for drinking water. Just as in the no action alternative, because the selected background concentrations of uranium, selenium, and nitrate are above Federal MCLs, further ground water treatment prior to domestic consumption will be required to meet Federal primary drinking water standards.

Conclusion

Even though the proposed action results in higher GWPSs for several designated constituents, these concentrations represent background water quality conditions upgradient of the Site and are based on detailed analytical and statistical studies. Moreover, selection of the no action alternative results only in a small impact to the potability of ground water (i.e., quality of ground water for consumption) downgradient of the Site since both alternatives will require additional post-restoration treatment to meet Federal MCLs.

7.0 CONSULTATION AND SOURCE INFORMATION

The information used in preparation of this document was obtained primarily from HMC reports and correspondence and NRC documents (see Section 8.0). The draft EA was sent to U.S. EPA, Region 6 and the NMED to solicit comments. The U.S. EPA responded that they have no comments (US EPA 2006). NMED responded and their comments have been incorporated into the final EA (NMED 2006).

8.0 CONCLUSION

The NRC staff has prepared this EA in support of HMC's proposed action to amend License Condition 35 of License SUA-1471 by revising and proposing additional GWPSs for the alluvial aquifer; Chinle mixing zone; and Upper, Middle, and Lower Chinle non-mixing zones. On the basis of this EA, NRC has concluded that there are no significant environmental impacts and the license amendment does not warrant the preparation of an Environmental Impact Statement. Accordingly, it has been determined that a Finding of No Significant Impact is appropriate and will be published in the *Federal Register*.

9.0 SOURCES USED

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U.S. EPA (2001) First Five-year Review Report for Homestake Mining company superfund Site, Cibola County, New Mexico. September 2001. [Adams Accession Nos. ML013230044 and ML013230074]

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