October 10, 1995

Mr. Fred Craft, Resident Manager
Homestake Mining Company
Post Office Box 98
Grants, NM 87020

SUBJECT: REVISION TO RADON BARRIER THICKNESS

Dear Mr. Craft:

The U. S. Nuclear Regulatory Commission staff has completed its review of the amendment request submitted in your letter dated June 16, 1995. The review found the proposed revisions to the Grants Mill radon barrier for the large tailings pile generally acceptable, and the amendment is approved. Therefore, pursuant to Title 10 of the Code of Federal Regulations, Part 40, Source Material License SUA-1471 is hereby amended by revising License Conditions No. 36A(3) and 37A.

All other conditions of this license shall remain the same. A copy of the staff's Technical Evaluation Report for the license amendment is Enclosure 1. The license is being revised to incorporate the revised radon barrier design (Enclosure 2). An environmental report is not required from Homestake Mining Company because the amendment does not meet the criteria of 10 CFR Part 51.60 (b)(2). An environmental assessment for this action is not required since the license revisions are categorically excluded under 10 CFR 51.22(c)(11).

If you have questions concerning this letter, please contact Ken Hooks, the NRC Project Manager for the Homestake site, at (301) 415-7777.

Sincerely,
Original Signed By
Joseph J. Holonich, Chief
High-Level Waste and Uranium Recovery
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosures:
As stated
License SUA-1471, Amendment No. 22
Docket No. 40-8903

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TECHNICAL EVALUATION REPORT
HOMESTAKE MINING COMPANY
AMENDMENT REQUEST TO REVISE THE RADON BARRIER THICKNESS
OF THE LARGE TAILINGS PILE

DATE: October 2, 1995

DOCKET NO: 40-8903 LICENSE NO.: SUA-1471

LICENSEE; Homestake Mining Company

FACILITY: Grants Uranium Mill Site

PROJECT MANAGER: Kenneth Hooks

TECHNICAL REVIEWERS: Timothy Harris, Elaine Brummett

SUMMARY AND CONCLUSIONS:

License Condition 37A requires an 8-foot-thick radon barrier for the large tailings pile. The licensee proposes to reduce the radon barrier thickness as discussed in the *Final Radon Barrier Design for the Large Tailings Pile, Homestake Mining Company*, transmitted to NRC by letter dated June 16, 1995. The staff has reviewed this document and concludes that the proposed cover meets the radon flux standard set forth in Criterion 6(1) of 10 CFR Part 40, Appendix A. The other requirements of Criterion 6 have been considered in the review of the Reclamation Plan or will be considered in the staff's review of the Completion Rreport.

AMENDMENT REQUEST:

Homestake Mining Company initially submitted an amendment request by letter dated January 17, 1994, to reduce the cover thicknesses for the large and small tailings piles. Pursuant to meetings and discussion with NRC, the licensee revised the amendment request and submitted the June 16, 1995, document which addresses only the large tailings pile. Based on testing of tailings materials and proposed barrier soils from a new borrow site, the licensee requested that the radon barrier thickness be reduced from 96 inches to a variable thickness of 24 to 56 inches.

BACKGROUND:

The Homestake Mining Company uranium mill site is located near Milan, New Mexico. The uranium ore was processed using an alkaline leach process. There are two tailings piles on site designated as "large tailings pile" and "small tailings pile." The large tailings pile was used from 1958 to 1990 and contains 20.5 million tons of tailings. The large pile covers approximately 190 acres to a height of 85 to 100 feet. The small tailings pile was operated from 1958 to 1962 and contains 1.5 million tons of tailings. It covers approximately 40 acres to a height of 20 to 25 feet.

The licensee's Reclamation Plan was approved in July of 1993. Some reclamation activities, including mill decommissioning and soil cleanup, have been completed. Also, the radon cover has been placed on much of the large impoundment. The cover on the top will be placed after primary consolidation has occurred. Portions of the small impoundment are covered, but the top is being used as an evaporation pond for the ground water corrective action program, so completion of barrier construction for that impoundment is several years off.

TECHNICAL EVALUATION:

This review focuses on the proposed radon barrier design for the large tailings pile. The following design review has been conducted in accordance with the NRC *Final Standard Review Plan for the Review of Remedial Action of Inactive Mill Tailings Sites* (December 1993) and consisted of comprehensive assessments of the licensee's amendment request and supporting documentation.

To meet Criterion 6(1) of 10 CFR Part 40, Appendix A, a soil radon barrier is typically placed over tailings impoundments to limit long-term radon flux to less than 20 pCi/m^2s. The radon flux from the cell cover is dependent on the physical and radiological characteristics of the contaminated materials and the cover soils. These characteristics include radium content, dry density, specific gravity, porosity, long-term moisture, thickness, emanation coefficient, and diffusion coefficient. In addition, external influences, such as freeze-thaw degradation, biointrusion, erosional stability, and slope stability, may also affect the radon attenuation and stability of covers. Using measured values or estimates of the above parameters and factors, computer codes are used to model the radon flux through the cover. The moisture content and diffusion coefficient are considered to be the critical parameters. Because radon has a relatively short half-life and decays to a solid particle, evaluations are typically performed on the upper 15 feet of material. Each of the licensee's input values to the radon flux computer code for the contaminated materials and cover materials are discussed below.

Contaminated Material Parameters

The licensee has performed extensive sampling and testing to characterize the radium content, density, and moisture content of the tailings. Core logs were presented in sufficient detail to model the pile in several layers. The core samples indicated that there are predominately sand tailings with some interlayering of slimes in the upper 10 feet. The licensee noted that, as a result of recontouring the tailings prior to placement of interim cover, the upper 15 feet is predominately sand tailings. To account for the higher radium content of the interlayered slimes, the licensee averaged the radium content values in 2.5-feet-depth increments. The licensee modeled a total of 20 feet of contaminated material, assuming a radium content for the lower 10 feet equal to the last measured value. In considering the effect of concentrated areas of slimes in the 10 to 20 foot increment, the staff compared the modeled radium and moisture content with slime radium contents

characterized in the 1991 Reclamation Plan and concluded the current model was conservative.

The licensee used a tailings dry density of 1.49 gm/cm^3 in the model. Reviewing the laboratory data submitted, the staff calculated the average tailings dry density to be 1.45 g/cm^3. The difference in dry density was run in each of the barrier models and does not affect the required barrier thickness. Porosity is calculated based on the dry density and the estimated specific gravity. Slime tailings have significantly higher long-term moisture contents than sand tailings. The long-term moisture for the tailings was estimated to be 8 percent. This value conservatively neglects the influence of the interlayered slime material on the long-term moisture content.

Laboratory tests were performed to determine the emanation and diffusion coefficients of the tailings. The emanation coefficient value for the model (0.34) is based on an average of five tests and compares well with the NRC default value for tailings. The diffusion coefficient is a function of soil type, moisture content, and density. Lower diffusion coefficients result from wetter and denser soils. The licensee performed three diffusion tests on the tailings at approximately 6 percent moisture. The tests results ranged from 0.026 to 0.030 cm^2/sec in the model.

Windblown tailings, mill-yard soils, and other miscellaneous contaminated soils were placed on the east slope and on the aprons. The radium content of these materials was analyzed daily, and the placement volumes were recorded. These data were used to determine the radium content variation with depth. These materials were compacted to 90 percent of the maximum dry density as specified in the reclamation plan. The average of the field test dry density data was used. The long-term moisture content was assumed to be 8 percent, the same as the tailings. This value is considered conservative because the off-pile soils have a much higher clay content. The emanation coefficient was assumed to be 0.34, and the diffusion coefficient was calculated to be 0.0236 cm^2/sec.

Staff considers that contaminated material parameters are conservative or justified based on the site-specific measurements.

Existing Barrier and Interim Cover

The north, south, and west side slopes have an existing barrier (3.8 feet thick) in place, and there is 1 foot of interim cover on the top of the pile.

The measured radium content of the existing barrier and interim cover approximate background levels and may be ignored in calculating the barrier radon emanation. The dry density, porosity, and specific gravity parameters were based on field and laboratory test results of the in-place materials.

The long-term moisture content was determined using the Rawls and Brakensiek equation. This equation uses the clay and organic contents to estimate long-term moisture. Based on 40 tests, the long-term moisture for the existing barrier was calculated to be 10.0 percent. The long-term moisture of the

interim cover material was based on 29 tests and was calculated to be 8.6 percent. The licensee used long-term moisture values of 10 and 8 percent, respectively, for these materials, which is considered to be conservative.

The diffusion coefficient for the existing cover was based on 10 tests performed on samples at approximately the long-term moisture and dry density values noted above. Test results ranged from 0.012 to 0.016 cm^2/sec. A diffusion coefficient value of 0.0134 cm^2/sec was used in the model for the existing cover. A value of 0.0129 cm^2/sec was used in the model for the interim cover. These values compare well with the empirically calculated values and are considered acceptable.

Staff considers that existing barrier parameters are conservative or justified based on the site-specific measurements.

Proposed Barrier (North Borrow Area)

The radon barrier material from the north borrow is proposed for completion of the barrier. This borrow source has been well characterized and is known to have a higher clay content than the existing barrier. The licensee used this material on the east side slope and proposes to use it on the top of the pile (when sufficient settlement has occurred).

The measured radium content of the north borrow soils approximates background levels and may be ignored in calculating the barrier radon emanation. The dry density, porosity, and specific gravity parameters were based on laboratory test results of the in-place materials. The long-term moisture content was determined using the Rawls and Brakensiek equation. Based on 20 tests, the long-term moisture for the north borrow soil was calculated to be 15.5 percent, which is considered to be acceptable.

Numerous diffusion coefficient tests were performed at various moisture contents and dry densities. The licensee used a diffusion coefficient of 0.006 cm^2/sec for material at 100 percent compaction, 0.010 cm^2/sec for material at 95 percent compaction, and 0.0138 cm^2/sec for material presumed to be degraded by freeze-thaw cycles. These values compare well with the empirically calculated values, and are therefore considered acceptable.

Staff considers that parameters are conservative or justified based on the site-specific measurements.

Cover Stability

Changes to cover thickness discussed in the amendment request are insignificant to the overall height of the pile and will not change erosion or stability characteristics previously analyzed.

In evaluating the freeze-thaw effects on the cover, the licensee references: 1) studies performed by the U. S. Department of Energy (DOE); and 2) the DOE predicted long-term frost penetration of 22 inches at the nearby Ambrosia Lake

mill tailings pile. The staff reviewed the final DOE Ambrosia Lake Remedial Action Plan and determined the freeze-thaw depth was 24 inches. Accounting for the rock protection layer, the licensee modeled 24 inches of frost penetration which is considered acceptable. The degradation was conservatively modeled as an 8 percent increase in porosity and the corresponding decrease in density and increase in the diffusion coefficient. The licensee, however, only modeled freeze-thaw effects for the area covered with north borrow soils which constitutes approximately 60 percent of the pile area. The licensee cites an increased sand content in the previously placed radon barrier soils resulting in a reduced freeze-thaw potential. The staff concludes that this approach is not justified. The staff's evaluation of the effect of freeze-thaw degradation on the radon attenuation is discussed below.

The licensee concludes that biointrusion will not signficiantly impact the radon attentuation of the proposed cover. To support this conclusion, the licensee indicated that biointrusion will be restricted by the unfavorable environment of the surface rock layer. The native plants and animals were identified and are not considered to pose a significiant impact on the radon barrier.

Radon Attenuation Model

The licensee used the RAECOM computer code to calculate the long-term radon flux. The RAECOM code was developed for DOE in 1984 and is presented in NUREG.CR-3533, *Radon Attenuation Handbook for Uranium Tailing Cover Design.* In 1989, the RAECOM code was modified by NRC to eliminate cost-benefit optimizing and that code was named RADON. Both programs model radon flux using one dimensional, steady-state gas diffusion theory and are acceptable.

The attached table (Attachment A) summarizes the input soil parameters used by the licensee. Various regions of the pile (north side slope, south and west side slope, north and south aprons, east side slope, and top of pile) were modeled. On the north, south, and west slopes of the impoundment, 3.8 feet of radon barrier have been placed. The licensee calculated a radon flux of 25.45 pCi/m^2s for the north slope and 23.17 pCi/m^2s for the south and west slopes. Two feet of north borrow soils were placed on the east slope and the north and south aprons. Six inches of this layer was compacted to 100 percent compaction. The remaining thickness was compacted to 95 percent compaction. The licensee calculated radon fluxes of 2.03 pCi/m^2s, 1.97 pCi/m^2s and 1.97 pCi/m^2s, respectively. The cover on the top slope will consist of 12 inches of interim cover, 24 inches of north borrow soil at 100 percent compaction and 21 inches of north borrow soil at 95 percent compaction. The licensee calculated a radon flux of 27.32 pCi/m^2s for this area. The area-average radon flux was calculated by summing the product of the area and flux for each region and dividing by the total area. The area-averaged long-term radon flux over the entire pile was calculated by the licensee to be 19.4 pCi/m^2s.

To verify that the computer code results reflected measured flux values, the licensee performed an extensive testing program consisting of three test pads. The test pads were constructed over the tailings with differing thicknesses (1, 2, and 3 feet). All input parameters associated with the code were

measured at the test pads. The radon flux was measured at numerous locations on the surface of the test pads and averaged. The code calculated radon flux was compared to the average measured radon flux. The licensee concluded that the laboratory measured diffusion coefficients compared well with the empirically calculated values. Furthermore, the measured flux for the three cover thicknesses compared well with the RAECOM code calculated flux values. The licensee noted "that the harsh sun and low humidity conditions during the time of the measurements changed conditions during the course of the measurements which may have created the small differences that were observed."

As noted above, the licensee's evaluation of freeze-thaw effects is considered unacceptable. To evaluate the robustness of the proposed cover design, the staff modeled the freeze-thaw effects over the entire pile using the RADON code. The staff calculated an area-averaged radon flux of 19.7 pCi/m^2s and concluded that the proposed cover thickness is adequate to mitigate the effects of freeze-thaw.

Conclusions

The staff has reviewed the amendment request and determined that the proposed radon barrier design meets the The U. S. Environmental Protection Agency long-term radon flux standard. Our analysis of the barrier thickness indicates that the estimated radon flux from the side slopes, averaged with the flux from the top of the pile, meets the requirements in Criterion 6(1) of 10 CFR Part 40, Appendix A.

RECOMMENDED LICENSE CHANGE:

The staff recommends that a change be made to Source Material License SUA-1471, License Condition 37A, to reflect the change in radon barrier thickness required for the Large Tailings Pile. We recommend the following language for the revised license condition:

> The radon barrier for the large tailings pile shall be in accordance with material types, thicknesses and placement criteria described in Homestake Mining Company's *Final Radon Barrier Design for the Large Tailings Pile*, submitted June 16, 1995.

In addition, License Condition 36A.(3) should be revised to reflect the wording in 10 CFR Part 40, Appendix A, Criterion 6. This can be done by deleting the words "above background" in the first sentence.

ENVIRONMENTAL IMPACT EVALUATION

In accordance with the categorical exclusion contained in paragraph (c)(11) of 10 CFR Part 51.22, an environmental assessment is not required for this licensing action. That paragraph states that the categorical exclusion applies to the issuance of amendments to licenses for uranium mills provided that: (1) there is no significant change in the types or significant increase in the amounts of any effluent that may be released off site; (2) there is no significant increase in individual or cumulative occupational radiation

exposure; (3) there is no significant construction impact; and (4) there is no significant increase in the potential for or consequences from radiological accidents.

The licensing action discussed in this memorandum modifies the radon barrier design in accordance with Criterion 6 of 10 CFR Part 40, Appendix A. An environmental report is not required from the licensee because the amendment does not meet the criteria of 10 CFR Part 51.60 (b)(2).

RADON INPUT PARAMETERS

Layer	Diff. Coeff. (cm^2/sec)	Eman. Coeff.	Density (g/cc)	Porosity	Moisture Content (%)	Specific Gravity
Tailings	0.030	0.34	1.49	0.44	8	2.65
Wind-blown	0.0236	0.34	1.60	0.40	8	2.65
Interim Cover	0.0129	-	1.80	0.32	8	2.65
Existing Cover	0.0134	-	1.70	0.36	10	2.67
North Borrow *(95)	0.010	-	1.51	0.44	15.5	2.70
North Borrow (100)	0.006	-	1.59	0.41	15.5	2.70
North Borrow **(F/T)	0.0138	-	1.42	0.46	17.2	2.70

* percent compaction
** freeze/thaw damaged

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Homestake Mining Company	3. License number: SUA-1471, Amendment No. 22
2. P.O. Box 98 Grants, New Mexico 87020	4. Expiration date: Until NRC determines site reclamation is adequate. [Applicable Amendment: 12]
	Docket or Reference No: 40-8903

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
Uranium	Any	Unlimited

9. Authorized Place of Use: The licensee's uranium mill located in Cibola County, New Mexico, and the licensee's auxiliary ion exchange facility located in McKinley County, New Mexico. [Applicable Amendment: 12]

10. This license authorizes only the possession of residual uranium and byproduct material in the form of uranium waste tailings and other byproduct waste generated by the licensee's past milling operations in accordance with Tables 1 and 3 and the procedures submitted by letter dated September 2, 1993.

Anywhere the word "will" is used, it shall denote a requirement.

[Applicable Amendments: 2, 6, 12, 16]

11. DELETED by Amendment 21.

12. The licensee shall implement an embankment inspection program as specified in the submittal dated September 21, 1987, with the exception that quarterly dam evaluations need no longer be performed. The annual training of site personnel responsible for dam inspections shall be conducted by a registered professional engineer.

An annual technical evaluation report of the large and small tailings impoundments shall be prepared under the direction of a registered professional engineer experienced in dam design and construction. The evaluation should include an inspection of the large and small tailings impoundments, a review and assessment

of all associated monitoring data and inspection reports, and an overall judgement of the effectiveness of the inspection program. A copy of the report shall be submitted to the NRC, within 1 month of completion of the report.

[Applicable Amendments: 2, 12, 14]

13. The licensee is hereby authorized to possess byproduct material in the form of uranium waste tailings and other byproduct wastes generated by the licensee's milling operations.

14. Any equipment, supplies or manpower that come in contact with tailing sand and/or slimes will be determined to be free of radioactive material by a personal scan and equipment decontamination. [Applicable Amendment: 21]

15. The results of all effluent and environmental monitoring required by this license shall be reported in accordance with 10 CFR 40, Section 40.65, with copies of the report sent to the NRC. Monitoring data shall be reported in the format shown in the attachment to SUA-1471 entitled, "Sample Format for Reporting Monitoring Data." All ground-water monitoring data shall be reported as described in License Condition No. 35. [Applicable Amendments: 5]

16. Before engaging in any activity not previously assessed by the NRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC in the form of a license amendment.

17. Prior to termination of this license, the licensee shall provide for transfer of title to byproduct material and land, including any interests therein (other than land owned by the United States or the State of New Mexico), which is used for the disposal of such byproduct material or is essential to ensure the long-term stability of such disposal site, to the United States or the State of New Mexico, at the State's option.

18. The licensee shall not make any changes to the approved tailings retention system without specific prior approval of the NRC, in the form of a license amendment.

19. DELETED by Amendment No. 17.

20. DELETED by Amendment No. 21.

21. The mill Radiation Protection Administrator (RPA), who is responsible for conducting the mill radiation safety program, shall possess the minimum qualifications as specified in Section 2.4.1 of Regulatory Guide 8.31, "Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Mills will be As Low As is Reasonably Achievable."

22. The results of sampling, analyses, surveys and monitoring; the results of

calibration of equipment, reports on audits and inspections; all meetings and training courses required by this license and any subsequent reviews, investigations, and corrective actions, shall be documented. Unless otherwise specified in the NRC regulations, all such documentation shall be maintained for a period of at least 5 years.

23. Standard operating procedures (SOPs) shall be established for all operational process activities involving radioactive materials that are handled, processed, or stored. Standard operating procedures for operational activities shall enumerate pertinent radiation safety practices to be followed. Additionally, written procedures shall be established for nonoperational activities to include in-plant and environmental monitoring, bioassay analyses, and instrument calibrations. An up-to-date copy of each written procedure shall be kept in the mill area to which it applies.

    All written procedures for both operational and nonoperational activities shall be reviewed and approved in writing by the RPA before implementation and whenever a change in procedure is proposed to ensure that proper radiation protection principles are being applied. In addition, the RPA shall perform a documented review of all existing operating procedures at least annually.

24. The licensee shall be required to use a Radiation Work Permit (RWP) for all work or nonroutine maintenance jobs where the potential for significant exposure to radioactive material exists and for which no standard written procedure already exists. The RWP shall be approved by the RPA or his designee, qualified by way of specialized radiation protection training, and shall at least describe the following:

    A. The scope of work to be performed.

    B. Any precautions necessary to reduce exposure to uranium and its daughters.

    C. The supplemental radiological monitoring and sampling necessary prior to, during, and following completion of the work.

25. DELETED by Amendment No. 21.

26. Mill tailings, other than small samples for purposes such as research or analysis, shall not be transferred from the site without specific prior approval of the NRC in the form of a license amendment. The licensee shall maintain a permanent record of all transfers made under the provisions of this condition.

27. DELETED by Amendment No. 21.

28. The licensee shall maintain an NRC-approved financial surety arrangement consistent with 10 CFR 40, Criteria 9 and 10, adequate to cover the estimated costs, if accomplished by a third party, for decommissioning and decontamination of the mill and mill site, reclamation of tailings or waste disposal areas, ground-water restoration, and the long-term surveillance fee. Within 3 months of NRC approval of a revised reclamation plan, the licensee shall submit for NRC

review and approval a proposed revision to the financial surety arrangement if estimated costs for the newly approved plan exceed the amount covered in the existing financial surety. The revised surety arrangement shall then be in effect within 3 months of written NRC approval. Along with each proposed revision or annual update, the licensee shall submit supporting documentation showing a breakdown of costs and the basis for the cost estimate. The attachment to the license entitled, "Recommended Outline for Site Specific Reclamation and Stabilization Cost Estimates," outlines the minimum considerations used by the NRC in the review of site closure cost estimates.

The licensee's currently approved surety, a Parent Company Guarantee issued by Homestake Mining Company, shall be continuously maintained in an amount no less than $20,000,000 for the purpose of complying with 10 CFR 40, Criteria 9 and 10, until a replacement is authorized by the NRC. The use of a parent company guarantee necessitates an evaluation of the corporate parent as part of the annual surety update. In addition to the cost information required above, the annual submittal must include updated documentation of the (1) letter from the chief financial officer of the parent company, (2) auditor's special report confirmation of chief financial officer's letter, (3) schedule reconciling amounts in chief financial officer's letter to amounts in financial statements, and (4) parent company guarantee if any changes are appropriate.

[Applicable Amendments: 9, 12]

29. The licensee shall decommission the Homestake Uranium Mill in accordance with Section 2 of the reclamation plan dated January 1991; the licensee's August 28, 1991, response to comments 1-10 of the NRC's August 2, 1991, letter; and Technical Specifications B1 and B2 of the reclamation plan as revised on April 3, 1992. In addition, the licensee shall perform a soil cleanup verification gamma survey and soil sampling program as specified in the submittal of September 15, 1994, and as modified by the submittal of December 13, 1994. [Applicable Amendment: 20]

A. Deleted by Amendment No. 20.

B. Deleted by Amendment No. 20.

C. Deleted by Amendment No. 20.

D. The licensee shall use only soils obtained from borrow areas outside the restricted area which have not been impacted by site operations to cover the mill disposal area. The location of these borrow areas shall be documented.

E. The licensee shall implement a quality control (QC) program for the soil cleanup verification program which consists of recounting using offsite gamma spectroscopy equipment or chemical analysis by a vendor laboratory of at least 15 percent of all soil samples collected. In addition, a minimum of 5 percent of the QC samples shall be chemically analyzed. Results of the QC program shall be evaluated by the Radiation Protection Administrator and the evaluation documented at least monthly during the verification sampling program.

F. All decommissioning activities shall be documented. Within 90 days following the completion of mill demolition and disposal activities, the licensee shall submit to the NRC a report documenting the activities and providing summaries of all data generated as part of the radiation safety program for mill decommissioning. In addition, within 90 days following the completion of the soil cleanup and verification program, the licensee shall submit to the NRC a report documenting the cleanup activities and providing the results of all soil sampling and gamma surveys conducted to verify the adequacy of cleanup.

[Applicable Amendment: 15]

30. DELETED by Amendment No. 21.

31. The licensee is authorized to construct and operate a lined brine evaporation pond in accordance with plans, conditions, revisions, and commitments made in conjunction with Ground Water Discharge Plan DP-339, approved by the Ground Water/Hazardous Bureau of the State of New Mexico by a letter dated January 17, 1986, signed by Ernest Rebuck. Such plans, conditions, revisions, and commitments are contained in submittals and correspondence from Homestake Mining Company dated March 22, 1984, April 9, 1984, and April 17, 1986; and includes a commitment by letter dated April 11, 1986, to reclaim the pond area in accordance with applicable reclamation standards after the cessation of operations. [Applicable Amendments: 5, 8]

32. The licensee shall comply with the following:

A. The quantity of air sampled and the method of analysis shall result in a lower limit of detection (LLD) for all in-plant air sampling of at least 10 percent of the respective maximum permissible concentration for restricted areas.

B. Analysis of urine samples shall utilize an LLD of at least 5 ug/l uranium.

C. A copy of the report documenting the annual ALARA audit shall be submitted to the NRC, review within 30 days of completion of the audit.

[Applicable Amendment: 2]

33. DELETED by Amendment No. 21.

34. DELETED by Amendment No. 4.

35. The licensee shall implement a compliance monitoring program containing the following:

A. Implement the monitoring program shown in Table 2 of the licensee's September 2, 1993 submittal and Table 3 of the licensee's January 9, 1995, submittal.

B. Comply with the following ground-water protection standards at brine evaporation pond point-of-compliance Wells D1 and BP, at the inactive tailings impoundment point-of-compliance Wells Y and X, and at the active tailings impoundment point-of-compliance Wells S4, S3, M5, and DQ with background being recognized in Well P:

chromium = 0.06 mg/l, molybdenum = 0.03 mg/l, selenium = 0.10 mg/l, vanadium = 0.02 mg/l, uranium = 0.04 mg/l, radium-226 and -228 = 5.0 pCi/l, and thorium-230 = 0.30 pCi/l.

C. Implement the corrective action program described in the September 15, 1989, submittal due to exceeding ground-water protection standards, with the objective of returning the concentrations of chromium, molybdenum, selenium, thorium-230, uranium, and vanadium to the concentration limits specified in 35(B) above.

D. Operate the lined evaporation pond and enhanced evaporation system as described in the June 8 and 28, 1990, submittals.

E. Submit a semiannual ground-water monitoring report in accordance with the reporting requirements of 10 CFR 40.65. Also, submit, by February 28 of each year, a performance review of the corrective action program that details the progress towards attaining ground-water protection standards.

[Applicable Amendments: 3, 4, 5, 7, 8, 10, 11, 16, 21]

36. The licensee shall complete site reclamation in accordance with an approved reclamation plan. The ground-water corrective action plan shall be conducted as authorized by License Condition No. 35. All activities shall be completed in accordance with the following schedules.

A. To ensure timely compliance with target completion dates established in the Memorandum of Understanding with the Environmental Protection Agency (56 FR 55432, October 25, 1991), the licensee shall complete reclamation to control radon emissions as expeditiously as practicable, considering technological feasibility, in accordance with the following schedule:

(1) Windblown tailings retrieval and placement on the pile:

For the Large Impoundment - December 31, 1996.

For the Small Impoundment - May 31, 1997.

(2) Placement of the interim cover to decrease the potential for tailings dispersal and erosion:

For the Large Impoundment - December 31, 1996.

For the Small Impoundment - May 31, 1997.

(3) Placement of final radon barrier designed and constructed to limit radon emissions to an average flux of no more than 20 $pCi/m^2/s$.

For the Large Impoundment which has no evaporation ponds - December 31, 1996.

For the Small Impoundment, tailings pile surface areas are essentially covered by evaporation ponds constructed as part of the ground-water corrective action program. Prior to December 31, 2001, the areas not covered by the evaporation ponds shall have final radon barrier in place. Final radon barrier placement over the entire pile shall be completed within 2 years of completion of ground-water corrective actions.

B. Reclamation, to ensure required longevity of the covered tailings and ground-water protection, shall be complete as expeditiously as is reasonably achievable, in accordance with the following target dates for completion:

(1) Placement of erosion protection as part of reclamation to comply with Criterion 6 of Appendix A of 10 CFR Part 40:

For the Large Impoundment - September 30, 1999.

For the Small Impoundment - July 1, 2014.

(2) Projected completion of ground-water corrective actions to meet performance objectives specified in the ground-water corrective action plan - May 1, 2010.

C. Any license amendment request to revise the completion dates specified in Section A must demonstrate that compliance was not technologically feasible (including inclement weather, litigation which compels delay to reclamation, or other factors beyond the control of the licensee).

D. Any license amendment request to change the target dates in Section B above, must address added risk to the public health and safety and the environment, with due consideration to the economic costs involved and other factors justifying the request such as delays caused by inclement weather, regulatory delays, litigation, and other factor beyond the control of the licensee.

[Applicable Amendment: 13, 22]

37. The licensee shall reclaim the large and small tailings impoundments as stated in their October 29, 1993, submittal, including the following requirements.

A. The radon barrier for the large tailings pile shall be in accordance with material types, thicknesses and placement criteria described in Homestake Mining Company's *Final Radon Barrier Design for the Large Tailings Pile,* submitted June 16, 1995.

B. The radon barrier for the small impoundment shall be 14 feet thick and shall consist of minus 3/4-inch material, containing at least 25 percent passing the No. 200 sieve, Atterberg limits plotting above the "A" line; and shall be compacted in 6-inch lifts to at least 95 percent of Standard Proctor density within minus 2 to plus 2 percent of the optimum moisture content.

C. The licensee shall submit a construction quality control program for NRC review and approval prior to placing any portion of the radon barrier that will ensure that the specification which limits the activity of the radon barrier material to 5 pCi/g above background is not exceeded.

D. The construction quality assurance and control program shall be as defined in the Staff Technical Position On Testing and Inspection (NRC, 1989). The acceptable correlation between ASTM D 2922 and ASTM D 1556 shall be as defined in the licensee's April 30, 1992, submittal.

F. The radon barrier shall not be placed on the top surface of the large tailings impoundment until the settlement has been demonstrated to be at least 90 percent of expected settlement, and the results of this determination have been reviewed and accepted by the NRC. The radon barrier may be placed on the large impoundment side slopes following final grading of the impoundment. Care shall be taken to preclude the possibility of ponding. Before the erosion protection is placed, it shall be verified that the radon barrier material meets the specifications.

G. The adequacy of the erosion protection proposed for the side slopes of both the large and small impoundments shall be reevaluated considering any increases in impoundment heights due to the revised radon attenuation cover design.

H. DELETED by Amendment No. 21.

I. A completion report shall be provided within 6 months of the completion of construction. This report, including as-built drawings, shall verify that reclamation of the site has been performed according to the approved plan. The report shall also include summaries of results of the quality assurance and control testing to demonstrate that approved specifications were met.

[Applicable Amendments: 14, 21, 22]

38. The licensee is authorized to use water collected as part of the site ground-water corrective action program for conditioning soils during placement of the interim cover or the radon barrier on the tailings impoundments. The licensee shall also analyze samples of the collection water being used for this purpose for radium-226 and 228 content semiannually. If sample results exceed 30 pCi/l combined radium, the licensee shall perform an evaluation of the potential impacts of using this water on the required design of the radon barrier and submit the evaluation for NRC review within 30 days of receipt of sample results. [Applicable Amendment: 18]

License Number
SUA-1471, Amendment No. 22

Docket or Reference Number
40-8903

MATERIALS LICENSE
SUPPLEMENTARY SHEET

39. The licensee is authorized to construct and operate a lined evaporation pond, located between the existing evaporation pond (#1) and the existing brine ponds, in accordance with plans and commitments contained in submittals and correspondence from Homestake Mining Company dated July 26, 1994; August 16, 1994; August 19, 1994; and September 2, 1994; and September 15, 1994. The NRC shall be notified by the licensee of any changes or revisions to the design. The licensee shall notify the NRC 30 days prior to start of filling the pond, at which time the NRC may choose to inspect the pond and construction records. Final reclamation shall consist of movement of liner and dike material to the small tailings impoundment. Underlying soils will be sampled for radium-226 content, and if above site standard of 5.5 pCi/gram, soils will be excavated and placed on the small impoundment. [Applicable Amendment: 19]

FOR THE NUCLEAR REGULATORY COMMISSION

Date Oct 19 1995

Joseph J. Holonich, Chief
High-Level Waste and Uranium Recovery
Projects Branch
Division of Waste Management, NMSS