

January 11, 1995

MEMORANDUM TO: Joseph J. Holonich, Chief
HLUR/DWM/NMSS

FROM: Michael J. Bell, Chief
ENGB/DWM/NMSS

SUBJECT: EVALUATION OF THE HOMESTAKE MINING COMPANY REQUEST TO REVISE
THE SOIL CLEANUP VERIFICATION PROCEDURE

By letter dated September 15, 1994, Homestake Mining Company requested that License Condition 29 be amended to approve the enclosed "Soil Cleanup Verification Survey and Sampling Plan." After discussions with NRC staff, additional data was provided October 31, 1994, and the plan (proposed procedure) was revised in a December 13, 1994, submittal. Our evaluation of the verification procedure is attached.

If you have any questions, please contact Elaine Brummett at 415-6606.

Attachment: As stated

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TECHNICAL EVALUATION OF THE HOMESTAKE MINING COMPANY
AMENDMENT REQUEST TO REVISE THE SOIL CLEANUP VERIFICATION PROCEDURE

DOCKET NO. 40-8903

LICENSE NO. SUA-1471

LICENSEE: Homestake Mining Company of California

FACILITY: Homestake (Grants Uranium Mill)

PROJECT MANAGER: Kenneth Hooks

TECHNICAL REVIEWER: Elaine Brummett

SUMMARY AND CONCLUSIONS:

By letter dated September 15, 1994, Homestake Mining Company (Homestake) requested that License Condition 29 be amended to approve the enclosed "Soil Cleanup Verification Survey and Sampling Plan." After discussions with the Nuclear Regulatory Commission staff, Homestake provided additional data October 31, 1994, and a revised plan December 13, 1994. The plan relies on an improved gamma survey procedure and a conservative gamma action (cleanup) level. The plan places greater reliance on gamma levels by requiring fewer soil sample analyses, to demonstrate cleanup to the radium (Ra-226) surface soil standard of 5 pCi/g above background. NRC staff has determined that the revised plan (verification procedure) should provide adequate data to demonstrate compliance with the soil cleanup standard.

BACKGROUND:

The soil cleanup standards in Criterion 6 of Appendix A to 10 CFR Part 40, require that the concentration of Ra-226 in land, averaged over areas of 100 square meters (m^2), which as a result of uranium byproduct material does not exceed the background level by more than 5 pCi/g averaged over the first 15 cm below the surface, or 15 pCi/g averaged over 15-cm thick layers more than 15 cm below the surface.

License Conditions 29A, 29B, and 29C require Homestake, in part, to:

- 1) collect soil samples for Ra-226 analysis as a minimum at every 50 meters and document the ground level gamma reading every 10 meters for the area around the tailings piles (inner zone, see Attachment A);
- 2) collect soils samples as a minimum at every 100 meters and document the ground level gamma reading every 100 meters for the windblown areas (outer zone) until results indicate background levels of Ra-226 in soil; and
- 3) the gamma action level shall be based on a correlation with Ra-226 concentration that provides at least a 95 percent probability of identifying a Ra-226 concentration of 10.5 pCi/g.

Attachment

Homestake proposes to use a new gamma survey procedure and a conservative gamma action level. In addition, the site is to be cleaned to the surface soil Ra-226 concentration standard of 5 pCi/g plus background (5.5 pCi/g is the approved background value for this site), even though some areas are to be backfilled. Homestake proposes to demonstrate compliance with the soil cleanup standard utilizing a verification procedure that includes specifications to:

- 1) collect five soil samples to composite from the 100 m² area with the highest gamma values in every 152 by 152-meter (500 by 500-foot) area of the inner zone (see Attachment A), and document a minimum of 7 gamma measurements for each 100 m² area;
- 2) collect five soil samples to composite from the 100 m² area with the highest gamma values in every 305 by 305-meter (1000 by 1000-foot) area in the outer zone, except for 50 blocks next to the inner zone, and document a minimum of 5 gamma measurements for each 100 m² area; and
- 3) demonstrate that the mean Ra-226 concentration of the sampled grids is 10.5 pCi/g or less at the 95 percent confidence level.

AMENDMENT REQUEST:

Homestake requested that License Condition 29 be amended to approve the "Soil Cleanup Verification Survey and Sampling Plan" of September 15, 1994, as modified by the submittal of December 13, 1994. This would replace the verification survey and sampling program specified by License Conditions 29 A, 29 B, and 29 C. In addition, Homestake requested (page 12, September 15, 1994, report) acceptance of the slight modification to the verification procedure that was used along the highway right-of-way.

TECHNICAL EVALUATION:

Gamma Survey Procedure

Homestake proposes (September 15, 1994) to use a Global Positioning System (GPS) land surveyor and computer mapping system coupled to radiological survey data. This gamma-mapping system consists of digital gamma-ray monitoring equipment using a 2 by 2-inch sodium iodide detector. This provides a gamma count rate every 2 seconds to the survey system that tags the data with the coordinates. The data is loaded into AutoCAD software for mapping and developing isocontours. Apparently, the accuracy of the coordinates is better than 1 meter. Homestake indicates that the proposed verification plan utilizing this high-density gamma survey provides greater assurance of compliance with the cleanup standards than that originally proposed.

For the survey, the gamma detector is placed 18 inches above the ground surface and is moved slowly so that each reading (count rate) represents approximately 3 meters by 2 meters. Generally there are 8 or 9 count rates recorded for each 100 m², and the average distance between data points is less than 20 feet. NRC staff determined that this method provides a better

approximation of the average gamma field than the ground level measurement every 10 meters required by License Condition 29 A.

Gamma Action Levels

The gamma action level for the outer zone is based on data provided October 31, 1994. Homestake took composite soil samples from 20 10-m by 10-m grids for Ra-226 analysis. The Ra-226 values were correlated to gamma count rates obtained using the GPS equipment. Ra-226 values ranged from 6.6 to 14.0 pCi/g. At these low levels, the correlation coefficient was understandably low. Homestake chose what they consider to be a conservative gamma action of 21,000 counts/minute (cpm). Background values for the site are about 15,000 to 18,000 cpm. The 11 grids that exceeded the 10.5 pCi/g Ra-226 level and 2 grids that met the Ra-226 standard had average count rates above 21,000 cpm. The proposed gamma survey for the inner zone will assure that all areas are below 28,000 cpm. This value is based on the September 15, 1994, data and takes into consideration the shine from the uncovered portions of the small tailings pile and that the area will be covered by more than 1 foot of fill. NRC staff determined that the gamma action levels are acceptable, considering the limitations of the correlation method.

Soil Sampling Plan

Homestake proposes to composite 5 soil samples from 100 m² areas (verification grids) to determine the Ra-226 concentration. This is a standard method and meets the regulation by providing an average value. Homestake's rationale for sampling fewer grids in the outer zone is that the contamination level is less, is all surficial, and is more uniform than the contamination in the inner zone. NRC staff determined that this sampling approach is acceptable.

If any Ra-226 analysis exceeds the criterion, Homestake proposes to clean the grid and resurvey it. Then the grid within that same block that has the highest gamma levels would be sampled. Also, Homestake proposes to perform a statistical test to demonstrate that the mean Ra-226 concentration meets the surface soil criterion at the 95 percent confidence level. Passing this test provides assurance that the error rate is very low, since the samples are from the grids most likely to have the highest Ra-226 concentration.

Homestake estimated (December 28, 1994, communication) that the area undergoing soil cleanup is approximately 1700 acres. The proposed sampling plan would substantially reduce costs for this large area, because fewer soil samples (approximately 10 percent of the number specified in the license condition) would be taken and analyzed for Ra-226. NRC staff determined that, considering the cost savings and the revised gamma verification system, the proposed soil sampling plan and statistical analysis should provide adequate assurance that the soil cleanup standard has been met.

Highway Right-of-Way Verification

Homestake modified the NRC-approved cleanup verification procedure for the right-of-way along State Highway 605 (September 15, 1994). Since the excavated areas required immediate backfill to protect the public health and

safety, a gamma action level for use with the shielded microR meter was used. An integrated count was taken while walking over the excavated area and recorded at 7.6-meter (25-foot) intervals. Soil samples were taken at 45.7-meter (150-foot) intervals. NRC staff determined that the modifications result in a higher density of gamma and Ra-226 data than originally proposed, and the gamma action level is adequate. Therefore, this verification procedure for the highway right-of-way is acceptable.

RECOMMENDATION:

The staff recommends a change to Source Material License SUA-1471, License Condition 29, to reflect: 1) the new gamma survey procedure to be used for soil cleanup verification (September 15, 1994); and 2) the proposed gamma action levels and the soil sampling plan (December 13, 1994). The revised License Condition will read as follows:

29. The licensee shall decommission 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.

A. DELETED

B. DELETED

C. DELETED

ENVIRONMENTAL IMPACT EVALUATION:

In accordance with the categorical exclusion contained in paragraph (c)(11) of 10 CFR 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 effluents 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.

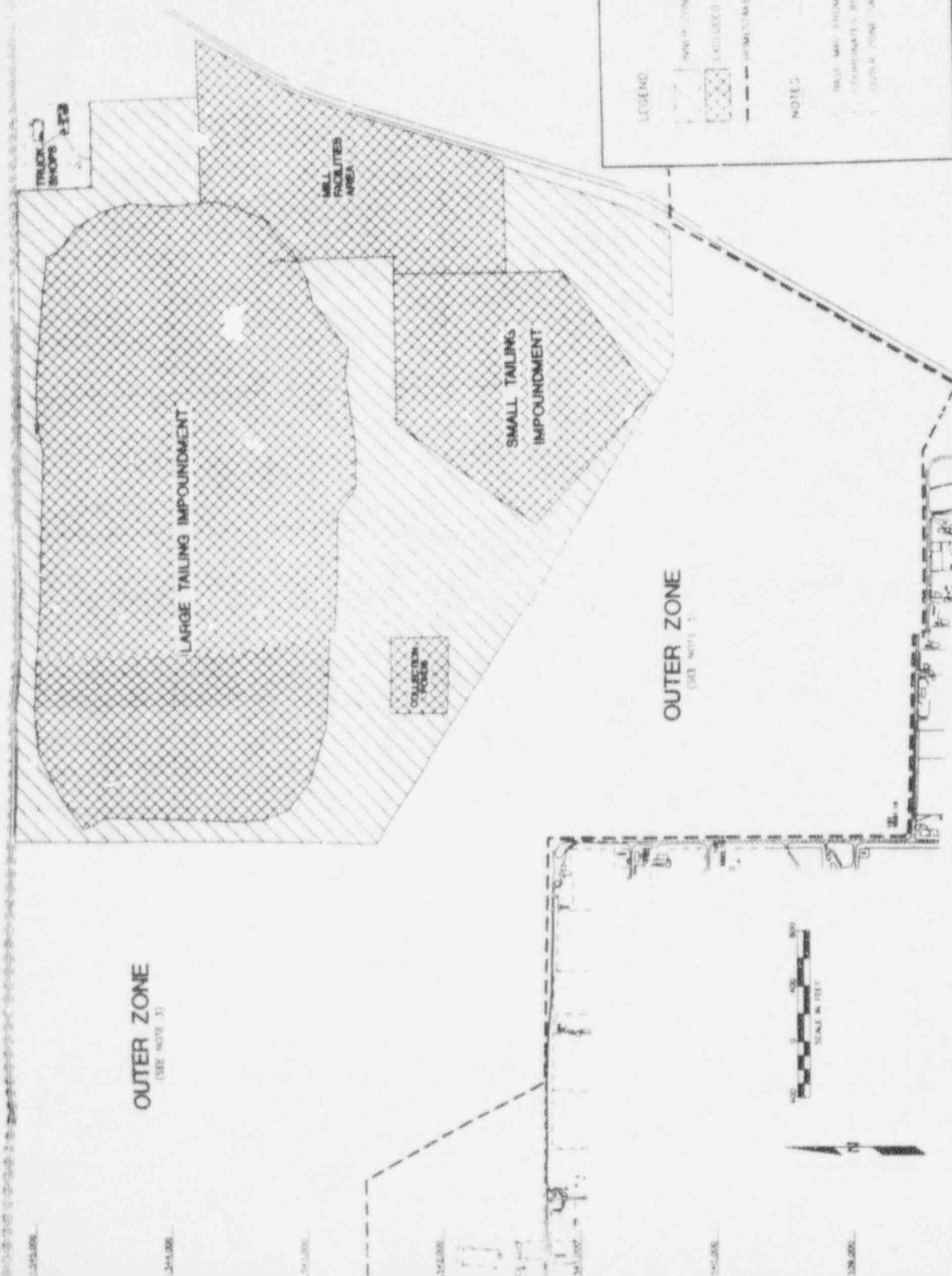
The licensing action discussed in this memorandum modifies the radon barrier design in accordance with Criterion 6 of 10 CFR Part 40, Appendix A. An environmental report is not required from the licensee since the amendment does not meet the criteria of 10 CFR 51.60 (b)(2).

OUTER ZONE
(SEE NOTE 3)

OUTER ZONE
(SEE NOTE 3)

OUTER ZONE
(SEE NOTE 3)

OUTER ZONE
(SEE NOTE 3)



LEGEND

500' 10" ZONE 1: 500' X 500' SAMPLE SPACING

EXCLUDED AREA

HOMESTAKE PROPERTY BOUNDARY

NOTES

DATA WAS FROM AERIAL PHOTOGRAPHY, JANUARY 1993
 COORDINATES REFER TO NEW MEXICO STATE PLANS GRID, WEST ZONE
 ZONE ONE SAMPLE SPACING 500' X 500' TO 1000' X 1000'

SOIL CLEANUP VERIFICATION
 SURVEY PLAN

HOMESTAKE MINING COMPANY
 OF CALIFORNIA
 GRANTS OPERATION

Prepared by
 M. G. Goss, Inc.