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ENVIRONMENTAL, HEALTH, SAFETY
AND GOVERNMENT AFFAIRS

August 15, 2001

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Mr. Melvyn N. Leach, Branch Chief
U.S. Nuclear Regulatory Commission
Mail Stop T-8A33
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

RE: Docket No. 40-8903
License No. SUA-1471
Semi-Annual Environmental Monitoring Report
Period - January through June 2001

Dear Mr. Leach:

Pursuant to US Nuclear Regulatory Commission Regulation 10 CFR 40.85 and Part 20, Homestake Mining Company of California hereby submits two (2) copies of their semi-annual report for the first half of 2001 (January - June) for the Homestake Grants Project.

The content of the attached semi-annual report follows the general theme used for previously submitted reports. In past reporting years the ground water data was sampled and included in both halves of the yearly report. Starting with this year all of the ground water data required to meet compliance of LC 15 of Amendment 31 will be included only in the second half semi-annual report.

If you or your staff has any questions or comments regarding this report, please do not hesitate to contact me at the Grants site (505) 287-4456.

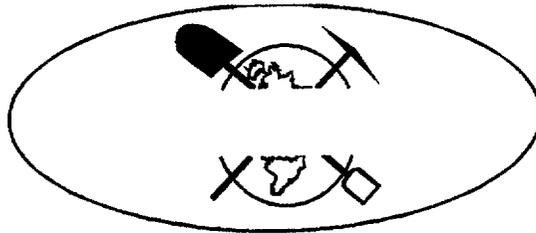
Sincerely,

Enclosures (2)

xc: Mr. Blair Spilzberg, Chief, Decommissioning Branch, w/enclosure
Mr. Harold F. Barnes, Director EHS&GA, w/enclosure
Mr. George Hoffman, Hydro Engineering, w/enclosure
Mr. Mark Purcell, EPA, w./enclosure

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**HOMESTAKE MINING COMPANY
OF
CALIFORNIA
GRANTS PROJECT**



**SEMI-ANNUAL ENVIRONMENTAL
REPORT**

JANUARY – JUNE

2001

**State of New Mexico DP-200
U.S. Nuclear Regulatory Commission License SUA-1471**

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1.0 INTRODUCTION

This Semi-Annual Environmental Monitoring Report summarizes effluent monitoring data recorded for Homestake Mining Company of California - Grants Project (Homestake) from January through June December 2001. The submittal of this report to the appropriate Nuclear Regulatory Commission (NRC) Regional Office and State of New Mexico within 60 days after January 1, and July 1 for each year of operation is required for all uranium mill facilities pursuant to 10 CFR Part 40.65. The monitoring data and the report format have been selected by Homestake representatives to satisfy the requirements of 10 CFR Part 40.65.

Homestake's monitoring and surveillance program for radioactive effluent releases have been designed to ensure the project compliance with 10 CFR Part 40, and Part 20 U.S. NRC Standards for Protection Against Radiation and closely approximates programs as described in NRC's Regulatory Guide 4.14, Radiological Effluent and Environmental Monitoring at Uranium Mills. Some effluent monitoring activities differ from those presented in the Regulatory Guide 4.14 as required by Homestake's Radioactive Materials License (SUA-1471).

Recontouring reclamation activities began in September 1993 and mill demolition commenced in late October 1993 and was completed December 10, 1995. A mill decommissioning completion report was submitted in February 1996 and approved by the NRC on January 28, 1999. The large tailings pile has been recontoured and covered with interim cover on the top and radon barrier on the outcrops. Bedding and erosion protection was placed on outcrops. Soil verification of the removal of off-pile contaminated soil is complete; the completion report submitted December 18, 1995 and approved by the NRC on January 29, 1999. In addition, a decommissioning report for the mine ion-exchange (IX) plant was completed and approved on December 22, 1997.

During the reporting period Homestake operated a water treatment plant or reverse osmosis (RO) plant. For the operating period from January through July, the RO plant processed an average 295-gpm while producing an average of 252-gpm of product water that was used for re-injection.

Homestake's groundwater monitoring program, as outlined in license Condition No. 35, continued as an ongoing program during this period. The requirements set forth in Condition No. 35 include the reporting of both radiological and non-radiological water quality parameters for specified wells, as well as the documentation of water injection and collection volumes of the groundwater cleanup system. The performance review of the corrective action program is submitted annually as a separate document and contains the groundwater monitoring information for January 1 through December 31 of each year. In order to meet NRC's requirement for semi-annual reporting, groundwater-monitoring data for the point-of-compliance (POC) wells and background well P will be included in the second half semi-annual environmental monitoring report. It should be noted that while these POC wells will eventually be used to demonstrate groundwater restoration, they are not representative of off-site effluent levels.

2.0 ENVIRONMENTAL MONITORING PROGRAMS

The monitoring requirements for the site are summarized in Tables 1, 2, and 3. Details of the monitoring program are discussed in the following sections:

2.1 Air Particulate Monitoring

Homestake continuously samples total suspended particulate at six locations around the reclamation site (see Figure 1). Those locations identified as HMC-1, HMC-2 and HMC-3 are areas at the property boundary expected to have the highest predictable concentrations of airborne radioactive particulate. The predominant wind direction is from the Southwest; accordingly, HMC-1, HMC-2 and HMC-3 are generally located down wind from Homestake's reclamation activities. The location identified at HMC-6 represents background conditions, and is located due west of the large tailings pile at the western most side of the property boundary. Locations HMC-4 and HMC-5 represent the sites of the nearest residences. The results are presented in Attachment 1.

Homestake uses a Sierra Instruments Model #305-200 High Volume Air Sampler (or equivalent) to continuously sample the ambient air of the locations shown in Figure 1. The samples are collected on 8-inch by 10-inch Whatman glass fiber filters (or equivalent), which are changed weekly or more frequently as required by dust loading. Energy Laboratories, Inc analyzes the collected samples quarterly for Natural Uranium, Radium-226, and Thorium-230.

2.2 Radon Gas Monitoring

Radon gas concentrations are monitored on a continuous basis at the eight locations identified in Figure 1. The background station for radon gas is HMC #16, located Northwest of the site. Landauer Corporation's track-etch passive radon monitors (PRM), or the equivalent, are used to continuously monitor radon gas at each sampling location. Semi-annually Homestake personnel place new alpha particle sensitive detectors at monitoring locations and the exposed detectors are retrieved and returned to Landauer Corporation for analysis. The technique by which the PRM detectors measure radon gas concentrations consists of exposing an alpha-particle sensitive plastic detector, which is mounted in a plastic container, to ambient air. The decay of radon gas contained in the ambient air causes imprint tracks on the alpha-sensitive detector that can then be counted at a later time. The radon gas concentration can subsequently be calculated by determining the number of tracks per unit area of the detector. A filter is placed over the container opening to inhibit the entrance of any alpha-emitting dust particles. The results are presented in Attachment 2.

3.0 WATER QUALITY MONITORING

Table 2 (8-99) outlines the sampling frequency and parameters monitored. Additionally, the volumes of water injected and recovered as part of the ground-water cleanup program is monitored on a weekly frequency and the values are documented. A performance review report is submitted by March 31 of each year according to License Condition 35E. In order to comply with 10 CFR 40.65, the groundwater monitoring data for the POC wells and background well P will be included in the July - December Semi-Annual Environmental Report.

The water quality of the POC wells is currently being restored and therefore the reported levels are not representative of effluent from the site. The concentration levels are therefore not compared to

10 CFR 20 effluent limits. A hydraulic barrier forces the water in the aquifer near these POC wells to move in the direction of the collection wells where the water is withdrawn and treated.

4.0 DIRECT RADIATION

Gamma exposure rates are continuously monitored through the use of thermoluminescent dosimeter (TLD) badges placed at each of the seven locations identified in Figure 1. HMC #16 is considered the background location for direct radiation. The data is reported in Attachment 3.

Gamma exposure rates are continuously monitored through the use of thermo luminescent dosimeter (TLD) at each of the seven locations identified in Figure 1. Each TLD badge consists of five LiF chips selected for uniform response and placed in a plastic holder. The plastic provides adequate protection from weather for these badges to be used out-of-doors. The TLD's are exchanged semi-annually and analyzed by an approved independent laboratory (currently Landauer Inc.). The integrated levels of direct environmental radiation are recorded for each of the seven locations. HMC #16 is considered the background location for direct radiation. The data are reported in Attachment 3.

5.0 SURFACE CONTAMINATION

The Occupational Monitoring Program requirements are summarized in Table 3. The aspects related to contamination control are discussed briefly below.

5.1 Personnel Skin and Clothing

The monitoring of personnel for alpha contamination is required as part of all radiation work permits using standard operating procedures. No releases of personnel or clothing above administrative limits were reported during this reporting period.

5.2 Survey of Equipment Prior to Release for Unrestricted Use

Equipment surveys are required for all equipment that is to be removed from contaminated areas as specified in radiation work permits. Standard Operating Procedures are used for these surveys. No releases of contaminated material above NRC release criteria were reported.

6.0 LOWER LIMIT OF DETECTION

Homestake representatives have calculated the Lower Limit of Detection (LLD) for each measurement system, where applicable; to more accurately evaluate concentrations of radioactive material measured in the environment surrounding the mill site. The lower limit of detection is defined in the U.S. Nuclear Regulatory Guide 4.14 as the smallest concentration of radioactive material sampled that has a 95% probability of being detected, with only a 5% probability that a blank sample will yield a response interpreted to mean that radioactive material is present. Since the LLD is a function of sample volume, counting efficiency, radiochemical yield, etc., it varies for different sampling and analysis procedures.

For the individual measurement systems for which Homestake has calculated LLDs, the following formula was utilized:

$$LLD = \frac{4.66 S_b}{3.7 E 4 EVY \exp(-\lambda \Delta t)}$$

Where:

- LLD is the lower limit of detection (microCuries per milliliter);
- S_b is the standard deviation of the instrument background counting rate (counts per second);
- 3.7 E 4 is the number of disintegrations per second per microCurie;
- E is the counting efficiency (counts per disintegration);
- V is the sample volume (milliliters);
- Y is the fractional radiochemical yield (when applicable);
- λ is the radioactive decay constant for the particular radionuclide; and;
- Δt is the elapsed time between sample collection and counting

The value of S_b used in the calculation of the LLD for a particular measurement system will be based on the actual observed variance of the instrument background counting rate. The laboratory has been instructed to report the LLD for each measurement considering all of the parameters associated with the measurement system and the sample size.

The vendor laboratory that performed the analyses reported herein has documented that the LLD for air and water samples will meet or exceed the requirements in Regulatory Guide 4.14. This assumes a minimum water sample size of 1 liter and an air sample volume of 2 E09 ml. Landauer, Inc reports the LLD for radon-222. The LLDs for the constituents are:

Ra-226, Th-230 in air	1 E-16 μ Ci/ml
Rn-222 in air	30 pCi(d/l)
U-nat in air	1 E-16 μ Ci/ml
U-nat in water	2 E-10 μ Ci/ml
Ra-226, Th-230 in water	2 E-9 μ Ci/ml
Ra-228 in water	1 E-9 μ Ci/ml

U-nat is analyzed by a fluorometric method by the current vendor laboratory. In order to determine the LLD, the laboratory has performed the analysis on a blank sample many times and uses the standard deviation of these background measurements to calculate the LLD. This LLD is specified for all analyses as long as the sample size or volume meets the minimum value.

7.0 ANNUAL STATUS REPORT FOR TAILINGS AND EVAPORATION POND EMBANKMENTS

License Condition 12 specifies that periodic inspection of the large and small tailing embankments are made and documented. The results of the inspection for 2001 will be included in the second half Semi-Annual Environmental Report.

8.0 DATA SUMMARY AND CONCLUSIONS

The summaries of Homestake's effluent monitoring program included in this submittal contain data for each of the regulated parameters released to unrestricted areas. DP-200, dated November 15, 1995, and 10 CFR Part 40.65 requires that Homestake submit its effluent release monitoring data to the State of New Mexico and the NRC within 60 days of the end of the six-month period ending January 1 and July 1 of each year. Homestake is submitting this report to satisfy the regulatory requirements cited above. Included in this report's attachments are summaries of the results of the effluent monitoring activities conducted by Homestake and pertinent to the required monitoring time period.

The data collected in many of Homestake's effluent monitoring programs can be readily compared to 10 CFR Part 20 values. Homestake has not exceeded 10 CFR Part 20 values in any of their effluents monitored during the period covered by this report. This, of course, does not include the ground water values at the POC wells as discussed earlier.

Vegetation and soil samples are no longer required on an annual basis per Amendment 24 to Source Material License.

**Table 1 - Environmental Monitoring Program Excluding
Groundwater Monitoring**

TABLE 1 - Environmental Monitoring Program Excluding Groundwater Monitoring

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
AIR Particulates	3	HMC1, HMC2, HMC3 at or near the site boundary in sectors that have the highest predicted concentrations of radioactive airborne particulates.	Continuous (High Vol.)	Weekly filter change or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Radium-226, Thorium-230
	2	HMC4, HMC5 at nearest occupied residences	Continuous (High Vol.)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Radium-226, Thorium-230
	1	HMC6 background location	Continuous (High Vol.)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Radium-226, Thorium-230
Radon Gas	8	Locations described in Air - Particulates & HMC7 on S boundary & HMC16 as a background	Continuous Track-etch	Semi-Annual	Rn-222
DIRECT RADIATION	7	Locations described in Air - Particulates & HMC-16 as a background	Continuous Track-etch	Semi-Annual	Gamma Exposure Rate

Table 2 – Groundwater Monitoring Program (8-99)

TABLE 2 – Groundwater Monitoring Program (8-99)

Well Number	Parameters to be Monitored	Frequency of Monitoring
#1 & #2 Deepwells	D	Annually
E Coll Pond, W Coll Pond	G	Annually
Broadview Acres Wells 446, SUB1, SUB2, SUB3	G	Annually
Felice Acres Wells 490, 492, 493, 494	G	Annually
Murray Acres Wells 802, 844	G	Annually
Pleasant Valley Wells 688, 846	G	Annually
Regional Wells 920, 942	G	Annually
Site Monitoring Wells 453, 804, 820, CW2-1, CW3, CW4R, F, FB, GH, MO, N PM, S, T	G	Annually
Site Monitoring Wells 493, 920, DQ, FB, M5, MO, S2, S4,	G	Semi-Annually
Collection System Wells	Total Volume	Monthly
Injection System Wells	Total Volume	Monthly
Reversal Wells B, BA, KZ, KF, SO, SP, S1, S2	Water Level	Weekly
Point of Compliance Wells BP, D1, DQ, M5, S3, S4 X, Y	B, F	Annually
Background Well P	B	Annually

B = Water Level, pH, TDS, SO₄, Cl, HCO₃, CO₃, Na, Ca, Mg, K, NO₃, U, Se, Mo, Ra-226

D = Ca, Mg, K, Na, HCO₃, CO₃, Cl, SO₄, pH, TDS, Al, As, Ba, Cd, Co, Cr, Cu, CN, F, Fe, Pb, Mn, Hg, Mo, Ni, NO₃ as N, Se, Ag, Zn, U, Filtered Ra-226

F = Cr, V, Ra-228, Th-230

G = Water Level, SO₄, U, Se, TDS, Mo

Table 3 - Occupational Monitoring Program

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
Lapel Personal Air Sample	As required by RWP	As required by RWP (2 L/min or eq.)	HP-1	As required by RWP	Alpha, U-Nat
Lapel Personal Air Sampler Calibration	As required by RWP	N/A	HP-1	As required by RWP	Flow rate
Release of Equip.	As required by RWP	Potentially Contaminated Equipment and Materials	HP-4	As required by RWP	Alpha, beta gamma
ALARA	N/A	As required by RPA	HP-6	N/A	As required by RPA
Respiratory Protection Protection	As required by RWP	As required by RWP	HP-7	N/A	N/A
Bioassay	As required by RWP	As required by RWP	HP-8 after mill decommissioning; termination	Baseline, Semi-annual	U-Nat in urine
Instrument Calibration	Variable	Radiation Detection Instruments in use	HP-10	6 months or less	N/A
Personnel Gamma (TLD)	Variable	Personnel	HP-11	Quarterly	Gamma
Personnel Contam.	As required by RWP	As required by RWP	HP-12	As required by RWP	Alpha
Radiation Protection Training	As required	Mill Site taught by RPA (certified individual) subjects as per Reg Guide 8.31	HP-14 for people working with groundwater or physical work with tailings sand/slimes	Initial & annual refresher	Training Class & Written Test

HP-# = Homestake procedure number; RPA = Radiation Protection Administrator; RWP =

Radiation Work Permit; TLD = Thermoluminescent Dosimeter

Figure 1 – Monitoring & Sampling Locations

HOMESTAKE MINING COMPANY GRANTS PROJECT Monitoring & Sampling Locations

- HMC #0016 (BKG)
- ◆ TLD #0016 (BKG)

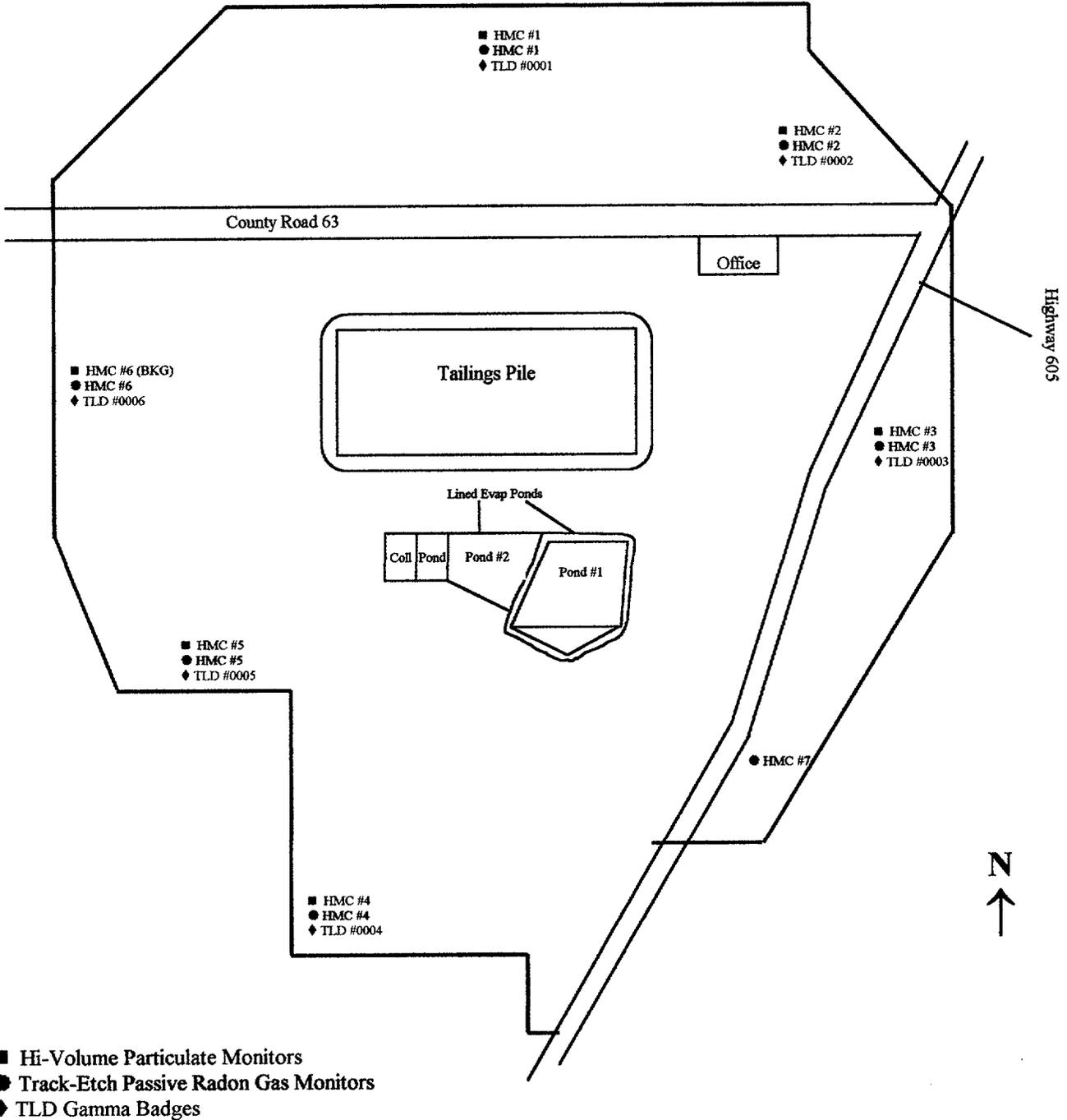


FIGURE 1

Attachment 1 – High Volume Air Sampling Results

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: July 26, 2001
REVISED REPORT DATE: August 14, 2001
SAMPLE ID: HMC 1

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Error Estimate µCi/mL	L.L.D. µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
01-31995-1 First Quarter 2001 Air Volume in mLs 1.50E+11	²³⁵ U	1.71E-16	N/A	1.00E-16	9.00E-14	1.90E-01
	²³⁰ Th	< 1.00E-16	1.01E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.26E-17	1.00E-16	9.00E-13	< 1.11E-02
01-33054-1 03/30/2001-05/22/2001 Air Volume in mLs 7.44E+10	²³⁵ U	1.41E-15	N/A	1.00E-16	9.00E-14	1.57E+00
	²³⁰ Th	< 1.00E-16	2.03E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	1.07E-16	1.52E-17	1.00E-16	9.00E-13	1.19E-02
01-34230-1 05/22/2001-06/29/2001 Air Volume in mLs 5.51E+10	²³⁵ U	1.42E-15	N/A	1.00E-16	9.00E-14	1.58E+00
	²³⁰ Th	< 1.00E-16	2.74E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	1.10E-16	2.74E-17	1.00E-16	9.00E-13	1.22E-02
Composite 2nd Quarter 2001 Air Volume in mLs 1.30E+11	²³⁵ U	1.41E-15	N/A	1.00E-16	9.00E-14	1.57E+00
	²³⁰ Th	5.23E-17	2.31E-17	1.00E-16	2.00E-14	2.62E-01
	²²⁶ Ra	1.07E-16	2.00E-17	1.00E-16	9.00E-13	1.19E-02

N/A not applicable for ICP-MS

LLD = Lower Limit of Detection per Regulatory Guide 4.14

All LLDs were met

*Effluent Concentrations per 10 CFR Part 20 Appendix B Table 2, Effluent Concentration

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: July 26, 2001
REVISED REPORT DATE: August 14, 2001
SAMPLE ID: HMC 2

Quarter/Date Sampled	Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Error Estimate $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
01-31995-2 First Quarter 2001	Air Volume in mLs 1.51E+11	²³⁸ U	1.12E-16	N/A	1.00E-16	9.00E-14	1.24E-01
		²³⁰ Th	< 1.00E-16	1.00E-17	1.00E-16	2.00E-14	< 5.00E-01
		²²⁶ Ra	< 1.00E-16	5.01E-18	1.00E-16	9.00E-13	< 1.11E-02
01-33054-2 03/30/2001-05/22/2001	Air Volume in mLs 8.45E+10	²³⁸ U	1.21E-15	N/A	1.00E-16	9.00E-14	1.34E+00
		²³⁰ Th	< 1.00E-16	2.01E-17	1.00E-16	2.00E-14	< 5.00E-01
		²²⁶ Ra	< 1.00E-16	1.12E-17	1.00E-16	9.00E-13	< 1.11E-02
01-34230-2 05/22/2001-06/29/2001	Air Volume in mLs 5.24E+10	²³⁸ U	1.57E-15	N/A	1.00E-16	9.00E-14	1.75E+00
		²³⁰ Th	< 1.00E-16	4.33E-17	1.00E-16	2.00E-14	< 5.00E-01
		²²⁶ Ra	< 1.00E-16	2.16E-17	1.00E-16	9.00E-13	< 1.11E-02
Composite 2nd Quarter 2001	Air Volume in mLs 1.37E+11	²³⁸ U	1.35E-15	N/A	1.00E-16	9.00E-14	1.50E+00
		²³⁰ Th	4.96E-17	2.92E-17	1.00E-16	2.00E-14	2.48E-01
		²²⁶ Ra	5.91E-17	1.46E-17	1.00E-16	9.00E-13	6.57E-03

N/A not applicable for ICP-MS

LLD = Lower Limit of Detection per Regulatory Guide 4.14

All LLDs were met

*Effluent Concentrations per 10 CFR Part 20 Appendix B Table 2, Effluent Concentration

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: July 26, 2001
REVISED REPORT DATE: August 14, 2001
SAMPLE ID: HMC 3

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Error Estimate µCi/mL	L.L.D. µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
01-31995-3 First Quarter 2001 Air Volume in mLs 1.60E+11	²³⁵ U	3.52E-16	N/A	1.00E-16	9.00E-14	3.91E-01
	²³⁰ Th	< 1.00E-16	0.00E+00	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	9.45E-18	1.00E-16	9.00E-13	< 1.11E-02
01-33054-3 03/30/2001-05/22/2001 Air Volume in mLs 8.59E+10	²³⁵ U	7.55E-15	N/A	1.00E-16	9.00E-14	8.39E+00
	²³⁰ Th	< 1.00E-16	1.98E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	8.80E-18	1.00E-16	9.00E-13	< 1.11E-02
01-34230-3 05/22/2001-06/29/2001 Air Volume in mLs 6.12E+10	²³⁵ U	1.38E-14	N/A	1.00E-16	9.00E-14	1.53E+01
	²³⁰ Th	1.79E-16	4.94E-17	1.00E-16	2.00E-14	8.96E-01
	²²⁶ Ra	< 1.00E-16	2.47E-17	1.00E-16	9.00E-13	< 1.11E-02
Composite 2nd Quarter 2001 Air Volume in mLs 1.47E+11	²³⁵ U	1.01E-14	N/A	1.00E-16	9.00E-14	1.13E+01
	²³⁰ Th	1.04E-16	3.20E-17	1.00E-16	2.00E-14	5.20E-01
	²²⁶ Ra	4.76E-17	1.56E-17	1.00E-16	9.00E-13	5.29E-03

N/A not applicable for ICP-MS

LLD = Lower Limit of Detection per Regulatory Guide 4.14

All LLDs were met

*Effluent Concentrations per 10 CFR Part 20 Appendix B Table 2, Effluent Concentration

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: July 26, 2001

REVISED REPORT DATE: August 14, 2001

SAMPLE ID: HMC 4

Quarter/Date Sampled	Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Error Estimate $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
01-31995-4 First Quarter 2001	Air Volume in mLs 1.58E+11	²³⁵ U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
		²³⁰ Th	< 1.00E-16	9.57E-18	1.00E-16	2.00E-14	< 5.00E-01
		²²⁶ Ra	< 1.00E-16	9.57E-18	1.00E-16	9.00E-13	< 1.11E-02
01-33054-4 03/30/2001-05/22/2001	Air Volume in mLs 8.38E+10	²³⁵ U	3.36E-15	N/A	1.00E-16	9.00E-14	3.73E+00
		²³⁰ Th	< 1.00E-16	1.13E-17	1.00E-16	2.00E-14	< 5.00E-01
		²²⁶ Ra	< 1.00E-16	9.02E-18	1.00E-16	9.00E-13	< 1.11E-02
01-34230-4 05/22/2001-06/29/2001	Air Volume in mLs 4.97E+10	²³⁵ U	2.25E-15	N/A	1.00E-16	9.00E-14	2.50E+00
		²³⁰ Th	< 1.00E-16	4.56E-17	1.00E-16	2.00E-14	< 5.00E-01
		²²⁶ Ra	1.14E-16	3.04E-17	1.00E-16	9.00E-13	1.27E-02
Composite 2nd Quarter 2001	Air Volume in mLs 1.33E+11	²³⁵ U	2.95E-15	N/A	1.00E-16	9.00E-14	3.28E+00
		²³⁰ Th	3.01E-17	2.41E-17	1.00E-16	2.00E-14	1.50E-01
		²²⁶ Ra	7.14E-17	1.73E-17	1.00E-16	9.00E-13	7.94E-03

N/A not applicable for ICP-MS

LLD = Lower Limit of Detection per Regulatory Guide 4.14

All LLDs were met

*Effluent Concentrations per 10 CFR Part 20 Appendix B Table 2, Effluent Concentration

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: July 26, 2001
REVISED REPORT DATE: August 14, 2001
SAMPLE ID: HMC 5

Quarter/Date Sampled Air Volume	Radionuclide	Concentration μCi/mL	Error Estimate μCi/mL	L.L.D. μCi/mL	Effluent Conc.* μCi/mL	% Effluent Concentration
01-31995-5 First Quarter 2001 Air Volume in mLs 1.49E+11	²³⁸ U	1.49E-16	N/A	1.00E-16	9.00E-14	1.66E-01
	²³⁰ Th	< 1.00E-16	0.00E+00	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.01E-17	1.00E-16	9.00E-13	< 1.11E-02
01-33054-5 03/30/2001-05/22/2001 Air Volume in mLs 7.62E+10	²³⁸ U	2.94E-15	N/A	1.00E-16	9.00E-14	3.27E+00
	²³⁰ Th	< 1.00E-16	1.74E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	9.92E-18	1.00E-16	9.00E-13	< 1.11E-02
01-34230-5 05/22/2001-06/29/2001 Air Volume in mLs 6.01E+10	²³⁸ U	5.02E-15	N/A	1.00E-16	9.00E-14	5.58E+00
	²³⁰ Th	< 1.00E-16	3.77E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	2.52E-17	1.00E-16	9.00E-13	< 1.11E-02
Composite 2nd Quarter 2001 Air Volume in mLs 1.36E+11	²³⁸ U	3.87E-15	N/A	1.00E-16	9.00E-14	4.30E+00
	²³⁰ Th	3.38E-17	2.65E-17	1.00E-16	2.00E-14	1.69E-01
	²²⁶ Ra	3.09E-17	1.69E-17	1.00E-16	9.00E-13	3.43E-03

N/A not applicable for ICP-MS

LLD = Lower Limit of Detection per Regulatory Guide 4.14

All LLDs were met

*Effluent Concentrations per 10 CFR Part 20 Appendix B Table 2, Effluent Concentration

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: July 26, 2001
REVISED REPORT DATE: August 14, 2001
SAMPLE ID: HMC 6

Quarter/Date Sampled	Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Error Estimate $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
01-31995-6 First Quarter 2001	Air Volume in mLs 1.47E+11	^{238}U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
		^{230}Th	< 1.00E-16	1.29E-17	1.00E-16	2.00E-14	< 5.00E-01
		^{226}Ra	< 1.00E-16	1.29E-17	1.00E-16	9.00E-13	< 1.11E-02
01-33054-6 03/30/2001-05/22/2001	Air Volume in mLs 7.56E+10	^{238}U	9.82E-16	N/A	1.00E-16	9.00E-14	1.09E+00
		^{230}Th	< 1.00E-16	1.25E-17	1.00E-16	2.00E-14	< 5.00E-01
		^{226}Ra	< 1.00E-16	1.00E-17	1.00E-16	9.00E-13	< 1.11E-02
01-34230-6 05/22/2001-06/29/2001	Air Volume in mLs 5.99E+10	^{238}U	7.31E-16	N/A	1.00E-16	9.00E-14	8.12E-01
		^{230}Th	< 1.00E-16	3.79E-17	1.00E-16	2.00E-14	< 5.00E-01
		^{226}Ra	< 1.00E-16	1.89E-17	1.00E-16	9.00E-13	< 1.11E-02
Composite 2nd Quarter 2001	Air Volume in mLs 1.36E+11	^{238}U	8.68E-16	N/A	1.00E-16	9.00E-14	9.64E-01
		^{230}Th	2.94E-17	2.35E-17	1.00E-16	2.00E-14	1.47E-01
		^{226}Ra	5.29E-17	1.40E-17	1.00E-16	9.00E-13	5.88E-03

N/A not applicable for ICP-MS

LLD = Lower Limit of Detection per Regulatory Guide 4.14

All LLDs were met

*Effluent Concentrations per 10 CFR Part 20 Appendix B Table 2, Effluent Concentration



**RADIOCHEMICAL QUALITY ASSURANCE REPORT
HOMESTAKE MINING CORPORATION**

Laboratory ID Range:
Sample Matrix:
Sample Date:
Date Received:
Report Date:

01-31995-1-7
Air Filter
1st Quarter 2001
04/06/01
May 8, 2001

	Method	Relative Percent Difference ¹	Spike Recovery (Percent) ²	LCS Recovery (Percent)	Method Blank pCi/Filter	Date Analyzed	Analyst
Laboratory #:		01-31995-4	01-32185-4				
Uranium:	200.8	0.9	97	-	<0.8	04/20/2001	ts
Laboratory #:		01-32012-6	01-32012-7		RA-91		
Radium 226:	903.0	11.0	118	122	<0.8	04/28/2001	rs
Laboratory #:		01-31999-6	01-31999-6		AS-31		
Thorium 230:	907.0	3.4	109	96	<0.8	04/23/2001	ph
Digestion:		Volume	Units				
	SW3050	3.78	Liter			04/17/2001	rcb

- (1) These values are an assessment of analytical precision. The acceptance range is 0-20% for sample results above 10 times the reporting limit. This range is not applicable to samples with results below 10 times the reporting limit.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

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**QUALITY ASSURANCE REPORT
HOMESTAKE MINING CORPORATION**

Laboratory ID Range:
Sample Matrix:
Sample Date:
Date Received:
Report Date:

01-34230-1-7
Air Filter
05/22/2001-06/29/2001
07/06/2001
July 26, 2001

	Method	Relative Percent Difference ¹	Spike Recovery (Percent) ²	LCS Recovery (Percent)	Method Blank pCi/Filter	Date Analyzed	Analyst
Laboratory #:		01-33119-9	01-33119-9				
Uranium:	200.8	0.7	92	-	<0.4	05/31/2001	ts
Laboratory #:		01-32665-80	01-32665-90		RA-133		
Radium 226:	903.0	11.7	80	94	<0.4	06/02/2001	rs
Laboratory #:		01-33058-1	01-33058-1		AS-49		
Thorium 230:	907.0	0.3	99	107	<0.4	06/05/2001	ph
Calcium:	EPA 6010B	1.8	100	-	-	07/18/2001	jal
Chloride:	EPA 6010B	1.0	94	-	-	07/18/2001	jal
Magnesium:	EPA 6010B	1.6	106	-	-	07/18/2001	jal
Molybdenum:	EPA 6020	1.0	95	-	-	07/24/2001	ts
Potassium:	EPA 6010B	0.8	102	-	-	07/18/2001	jal
Selenium:	EPA 6020	4.4	105	-	-	07/24/2001	ts
Sodium:	EPA 6010B	0.2	105	-	-	07/18/2001	jal
Sulfate:	SM 4500-SO ₄ -E	1.2	93	-	-	06/06/2001	jal
Digestion:		Volume	Units				
	SW3050	3.78	Liter			07/09/2001	rcb

- (1) These values are an assessment of analytical precision. The acceptance range is 0-20% for sample results above 10 times the reporting limit. This range is not applicable to samples with results below 10 times the reporting limit.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

Attachment 2 - Radon Gas Monitoring Results

**Attachment 2 - Radon Gas Monitoring Results
Track-Etch Passive Survey**

Location	Monitoring Period	Rn Concentration ($\mu\text{Ci/ml}$)	Error Estimate ($\mu\text{Ci/ml}$)	% Limit* (%)	LLD ($\mu\text{Ci/ml}$)
Hi-Vol #1 N Outer Perimeter	12/29/2000 - 6/29/2001	1.5E-09	3.1E-10	15	1.6E-10
Hi-Vol #2 NE Outer Perimeter	12/29/2000 - 6/29/2001	2.2E-09	3.9E-10	22	1.6E-10
Hi-Vol #3 E Outer Perimeter	12/29/2000 - 6/29/2001	1.2E-09	2.7E-10	12	1.6E-10
Hi-Vol #4 S Outer Perimeter	12/29/2000 - 6/29/2001	1.8E-09	3.4E-10	18	1.6E-10
Hi-Vol #5 N of Nearest Residence	12/29/2000 - 6/29/2001	2.0E-09	4.6E-10	20	1.6E-10
Hi-Vol #6 W of Outer Perimeter	12/29/2000 - 6/29/2001	1.4E-09	3.0E-10	14	1.6E-10
HMC #7 S Boundary	12/29/2000 - 6/29/2001	1.7E-09	3.4E-10	17	1.6E-10
HMC #16 Background	12/29/2000 - 6/29/2001	1.1E-09	2.6E-10	11	1.6E-10

*Limit of $1\text{E-}8 \mu\text{Ci/ml}$ for radon-222 with daughters removed as given in 10 CFR20, Appendix B, Table 2

Attachment 3 - Environmental Gamma Radiation Results

**Attachment 3 - Environmental Gamma Radiation Results
TLD Perimeter Survey**

Direct Radiation Measurements

Location	Monitoring Period	Exposure Rate (mrem/qr)	Error (mrem/qr)*
Hi-Vol #1 N Outer Perimeter	01/01/2001 - 06/30/2001	17	1.7
Hi-Vol #2 NE Outer Perimeter	01/01/2001 - 06/30/2001	21	2.1
Hi-Vol #3 E Outer Perimeter	01/01/2001 - 06/30/2001	16	0.1
Hi-Vol #4 S Outer Perimeter	01/01/2001 - 06/30/2001	30	2.9
Hi-Vol #5 N of Nearest Residence	01/01/2001 - 06/30/2001	24	2.4
Hi-Vol #6 W of Outer Perimeter	01/01/2001 - 06/30/2001	18	1.8
#16 Background	01/01/2001 - 06/30/2001	15	1.5

*Error is 1.96 std. dev.