



Alan D. Cox
Manager – Grants & Southwest U.S.

August 28, 2001

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Ms. Elaine Brummett, Project Manager
c/o Document Control Desk
Chief of Fuel Cycle Facilities Branch (Mailstop T8-A33)
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Materials Safety and Safeguards
U. S. Nuclear Regulatory Commission
11545 Rockville Pike
Two White Flint North
Rockville, MD 20852-2738

RE: **Docket No. 40-8903**
License No. SUA-1471
Semi-Annual Environmental Monitoring Report
Period - January through June 2002

Dear Ms. Brummett:

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 2002 (January - June) for the Homestake Grants Project.

The content of the attached semi-annual report follows the general format used for previously submitted reports. The ground water data required under LC 15 of the license (per License Amendment 31) will be included in the July – December, 2002 semi-annual report.

The second reverse osmosis (RO) unit for expanding the RO water treatment plant to a 600-gpm capacity was completed in early 2002. Due to existing evaporation pond storage limitations, the plant was cut back to a one RO unit operating level (300-gpm) in late May; operation of the plant at this level is anticipated until a new evaporation pond is added to the current pond system.

Any questions or comments regarding this report can be directed to me at my Albuquerque office (505) 828-1621 or at the Grants office (505) 287-4456.

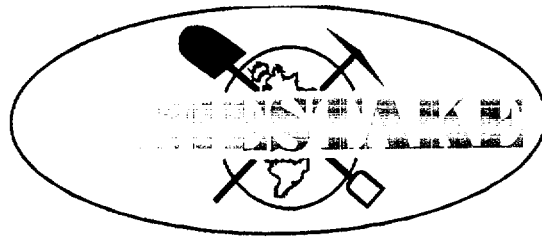
Sincerely,

Enclosures (2)

xc: Mr. Blair Spilzberg, Chief, Decommissioning Branch, w/enclosure
Mr. Bob Ingersoll, Barrick, SLC, 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 MONITORING REPORT

JANUARY – JUNE

2002

**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 2002. 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 has 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 reverse osmosis water treatment plant as part of the ongoing ground water restoration program at the site. For the operating period from January through June, the RO plant processed an average 434-gpm while producing an average of 331-gpm of product water that was used for re-injection. In late May, operation of the RO plant was cut back to operating one unit to address limitations on existing pond storage capacities at the project. Operation of one unit will continue during 2002.

Homestake's groundwater monitoring program, as outlined in license Condition No. 35, continued throughout the report 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 the 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 attached. 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 as 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 are site proximal to 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 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 the 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, as modified) 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 steady state aquifer conditions at the present time. 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

Gamma exposure rates are continuously monitored through the use of thermo luminescent dosimeters (TLDs) 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. Pertinent sample 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:

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

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 2002 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, as modified)

TABLE 2 – Groundwater Monitoring Program (8-99 as modified)

Well Number	Parameters to be Monitored	Frequency of Monitoring
#1 & #2 Deepwells	D	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 F, FB, GH, MO, CW2	G	Annually
Collection System Wells	Total Volume	Monthly
Injection System Wells	Total Volume	Monthly
Reversal Wells B, BA, KZ, DZ, SO, SP, S1, S2	Water Level	Weekly
Point of Compliance Wells D1, X, S4	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, Cu, CN, F, Fe, Pb, Mn, Hg, Mo, Ni, NO₃ as N, Se, Ag, Zn, U, Filtered Ra-226

F = V, Ra-228, Th-230

G = Water Level, SO₄, U, Se, TDS, Mo

Table 3 - Occupational Monitoring Program

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	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)

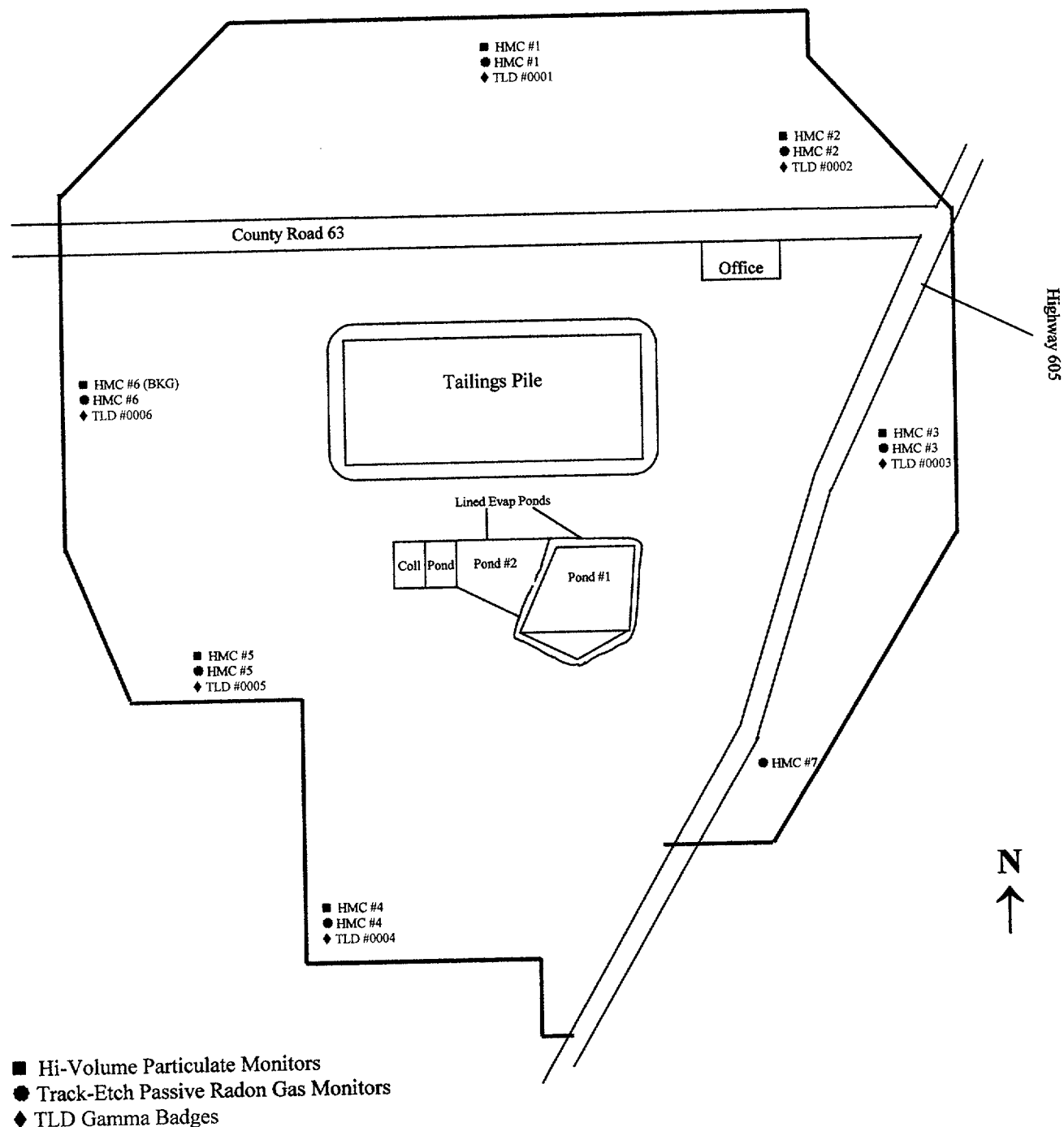


FIGURE 1

Attachment 1 – High Volume Air Sampling Results



HIGH VOLUME AIR ANALYSIS REPORT

CLIENT: HOMESTAKE MINING - GRANTS, NEW MEXICO
REPORT DATE: April 16, 2002
DATE SAMPLED: 1st Quarter 2002

EPA Method		200.8	903.0		907.0	
Laboratory Number	Sample I.D.	Uranium-nat pCi/filt.	Radium 226 pCi/filt.	+/-	Thorium 230 pCi/filt.	+/-
C02040043-001A	HMC 1	20.0	6.5	1.2	42.7	4.5
C02040043-002A	HMC 2	26.6	9.5	1.3	6.8	1.9
C02040043-003A	HMC 3	175	5.2	1.1	3.6	1.3
C02040043-004A	HMC 4	45	3.4	0.9	2.5	1.1
C02040043-005A	HMC 5	69	5.2	1.1	3.4	1.3
C02040043-006A	HMC 6	14	2.7	0.9	3.8	1.3
C02040043-007A	HMC 7	<0.4	<0.4	N/A	<0.4	N/A
LLD	pCi/filter	0.4	0.4		0.4	



HIGH VOLUME AIR ANALYSIS REPORT

CLIENT: HOMESTAKE MINING - GRANTS, NEW MEXICO
REPORT DATE: July 23, 2002
DATE SAMPLED: 2nd Quarter 2002

EPA Method		200.8	903.0		907.0	
Laboratory Number	Sample I.D.	Uranium-nat pCi/filt.	Radium 226 pCi/filt. +/-		Thorium 230 pCi/filt. +/-	
C02070123-001A	HMC 1	133	21.5	1.9	13.6	3.0
C02070123-002A	HMC 2	202	20.2	1.9	14.4	2.6
C02070123-003A	HMC 3	1185	8.9	0.4	6.2	1.9
C02070123-004A	HMC 4	939	11.9	0.4	9.5	2.3
C02070123-005A	HMC 5	2725	9.1	0.4	20.6	3.6
C02070123-006A	HMC 6	315	13.0	0.4	7.7	2.3
C02070123-007A	HMC 7	<0.4	<0.4	N/A	<0.4	N/A
LLD	pCi/filter	0.4	0.4		0.4	



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: June 23, 2002

SAMPLE ID: HMC 1

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
C02040043-001A First Quarter 2002 Air Volume in mLs 1.44E+11	^{235}U	1.39E-16	N/A	1.00E-16	9.00E-14	1.54E-01
	^{230}Th	2.97E-16	3.15E-17	1.00E-16	2.00E-14	1.48E+00
	^{226}Ra	< 1.00E-16	8.66E-18	1.00E-16	9.00E-13	< 1.11E-02
C02070123-001A Second Quarter 2002 Air Volume in mLs 1.43E+11	^{235}U	9.31E-16	N/A	1.00E-16	9.00E-14	1.03E+00
	^{230}Th	< 1.00E-16	2.11E-17	1.00E-16	2.00E-14	< 5.00E-01
	^{226}Ra	1.51E-16	1.32E-17	1.00E-16	9.00E-13	1.67E-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

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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: June 23, 2002

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
C02040043-002A First Quarter 2002 Air Volume in mLs 1.43E+11	^{nat} U	1.86E-16	N/A	1.00E-16	9.00E-14	2.07E-01
	²³⁰ Th	< 1.00E-16	1.32E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	8.86E-18	1.00E-16	9.00E-13	< 1.11E-02
C02070123-002A Second Quarter 2002 Air Volume in mLs 1.44E+11	^{nat} U	1.40E-15	N/A	1.00E-16	9.00E-14	1.56E+00
	²³⁰ Th	< 1.00E-16	1.84E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	1.40E-16	1.31E-17	1.00E-16	9.00E-13	1.56E-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

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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: June 23, 2002

SAMPLE ID: HMC 3

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
C02040043-003A First Quarter 2002 Air Volume in mLs 1.44E+11	^{238}U	1.21E-15	N/A	1.00E-16	9.00E-14	1.35E+00
	^{230}Th	< 1.00E-16	9.19E-18	1.00E-16	2.00E-14	< 5.00E-01
	^{226}Ra	< 1.00E-16	7.48E-18	1.00E-16	9.00E-13	< 1.11E-02
C02070123-003A Second Quarter 2002 Air Volume in mLs 1.46E+11	^{238}U	8.12E-15	N/A	1.00E-16	9.00E-14	9.02E+00
	^{230}Th	< 1.00E-16	1.29E-17	1.00E-16	2.00E-14	< 5.00E-01
	^{226}Ra	< 1.00E-16	2.59E-18	1.00E-16	9.00E-13	< 1.11E-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

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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: June 23, 2002

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
C02040043-004A First Quarter 2002 Air Volume in mLs 1.27E+11	^{nat} U	3.58E-16	N/A	1.00E-16	9.00E-14	3.98E-01
	²³⁰ Th	< 1.00E-16	8.93E-18	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	7.14E-18	1.00E-16	9.00E-13	< 1.11E-02
C02070123-004A Second Quarter 2002 Air Volume in mLs 1.45E+11	^{nat} U	6.48E-15	N/A	1.00E-16	9.00E-14	7.20E+00
	²³⁰ Th	< 1.00E-16	1.56E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	2.61E-18	1.00E-16	9.00E-13	< 1.11E-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: June 23, 2002

SAMPLE ID: HMC 5

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
C02040043-005A First Quarter 2002 Air Volume in mLs 1.35E+11	^{238}U	5.13E-16	N/A	1.00E-16	9.00E-14	5.70E-01
	^{230}Th	< 1.00E-16	9.80E-18	1.00E-16	2.00E-14	< 5.00E-01
	^{226}Ra	< 1.00E-16	7.98E-18	1.00E-16	9.00E-13	< 1.11E-02

C02070123-005A Second Quarter 2002 Air Volume in mLs 1.30E+11	^{238}U	2.10E-14	N/A	1.00E-16	9.00E-14	2.33E+01
	^{230}Th	1.58E-16	2.76E-17	1.00E-16	2.00E-14	7.92E-01
	^{226}Ra	< 1.00E-16	2.91E-18	1.00E-16	9.00E-13	< 1.11E-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: June 23, 2002

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
C02040043-006A First Quarter 2002 Air Volume in mLs 1.33E+11	^{nat} U	1.04E-16	N/A	1.00E-16	9.00E-14	1.15E-01
	²³⁰ Th	< 1.00E-16	9.95E-18	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	6.82E-18	1.00E-16	9.00E-13	< 1.11E-02
C02070123-006A Second Quarter 2002 Air Volume in mLs 1.37E+11	^{nat} U	2.30E-15	N/A	1.00E-16	9.00E-14	2.55E+00
	²³⁰ Th	< 1.00E-16	1.66E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	2.76E-18	1.00E-16	9.00E-13	< 1.11E-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

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**QUALITY ASSURANCE REPORT
HOMESTAKE MINING CORPORATION**

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

C02040043-001A-007A
Air Filter
1st Quarter 2002
04/02/2002
April 16, 2002

	Method	Relative Percent Difference ¹	Spike Recovery (Percent) ²	LCS Recovery (Percent)	Method Blank pCi/Filter	Date Analyzed	Analyst
Laboratory #:	C02040043-004A		C02040043-004A				
Uranium:	6020	4.3	101	91.7	<0.4	04/08/2002	ts
Laboratory #:	C02040060-001A		C02040060-011A		RA-103		
Radium 226:	903.0	0.0	87	110	<0.4	04/10/2002	rs
Laboratory #:	C02030728-002C		C02030728-002C				
Thorium 230:	907.0	11.8	96.3	101	<0.4	04/04/2002	ph
Digestion:	SW3050	Volume 1.89	Units Liters		Batch 1141	04/03/2002	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:

C02070123-001A-007A
Air Filter
2nd Quarter 2002
06/29/2002
June 23, 2002

	Method	Relative Percent Difference ¹	Spike Recovery (Percent) ²	LCS Recovery (Percent)	Method Blank pCi/Filter	Date Analyzed	Analyst
Laboratory #:	C02070038-005A		C02070038-005A				
Uranium:	6020	3.0	96	93	<0.4	07/11/2002	jl
Laboratory #:	C020700136-011A		C020700136-011A				
Radium 226:	903.0	0.0	109	110	<0.4	07/13/2002	rs
Laboratory #:	C02070123-007A		C02070123-007A				
Thorium 230:	907.0	2.8	97	104	<0.4	07/08/2002	ph
Digestion:	SW3050	1.89	Liter		1653	07/05/2002	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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Attachment 2 - Radon Gas Monitoring Results

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

Location	Monitoring Period	Rn Concentration ($\mu\text{Ci}/\text{ml}$)	Error Estimate ($\mu\text{Ci}/\text{ml}$)	% Limit* (%)	LLD ($\mu\text{Ci}/\text{ml}$)
Hi-Vol #1 N Outer Perimeter	12/28/2001 - 6/28/02	1.3E-09	3.2E-10	13	1.6E-10
Hi-Vol #2 NE Outer Perimeter	12/28/2001 - 6/28/02	1.6E-09	2.9E-10	16	1.6E-10
Hi-Vol #3 E Outer Perimeter	12/28/2001 - 6/28/02	1.1E-09	2.4E-10	11	1.6E-10
Hi-Vol #4 S Outer Perimeter	12/28/2001 - 6/28/02	1.6E-09	3.5E-10	16	1.6E-10
Hi-Vol #5 N of Nearest Residence	12/28/2001 - 6/28/02	1.3E-09	3.1E-10	13	1.6E-10
Hi-Vol #6 W of Outer Perimeter	12/28/2001 - 6/28/02	1.5E-09	3.5E-10	15	1.6E-10
HMC #7 S Boundary	12/28/2001 - 6/28/02	1.1E-09	2.8E-10	11	1.6E-10
HMC #16 Background	12/28/2001 - 6/28/02	9.0E-10	2.5E-10	9	1.6E-10

*Limit of $1\text{E}-8 \mu\text{Ci}/\text{ml}$ 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/6 mo)	Error (mrem/6 mo)*
Hi-Vol #1 N Outer Perimeter	07/01/2001 - 12/31/2001	13	1.3
Hi-Vol #2 NE Outer Perimeter	07/01/2001 - 12/31/2001	21	2.1
Hi-Vol #3 E Outer Perimeter	07/01/2001 - 12/31/2001	15	1.5
Hi-Vol #4 S Outer Perimeter	07/01/2001 - 12/31/2001	19	1.9
Hi-Vol #5 N of Nearest Residence	07/01/2001 - 12/31/2001	18	1.8
Hi-Vol #6 W of Outer Perimeter	07/01/2001 - 12/31/2001	18	1.8
#16 Background	07/01/2001 - 12/31/2001	11	1.1

*Error is 1.96 std. dev.