



Homestake Mining Company of California

Alan D. Cox
Project Manager – Grants

20 February 2007

UPS Next Day Air:

Mr. Ron Linton, Project Manager
c/o Document Control Desk
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 – July through December 2006

Dear Mr. Linton:

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 second-half of 2006 (July through December) for the Homestake Grants Reclamation Project.

Groundwater data for the project is filed with the year-end semi-annual report (as attached) pursuant to our current NRC license condition LC-15.

The 600-gpm reverse osmosis (RO) plant operated at an average rate of 250-gpms during the July through December 2006 reporting period. Operating rates for the plant are related to the existing evaporation pond storage volume capacities and associated seasonal forced evaporative spray systems on Evaporations ponds #1 and #2.

Thank you for your time and attention on this matter. If you have any questions or require additional information, please contact me at the Grants office (505) 287-4456, ext. 25 or via cell phone at (505) 400-2794.

Sincerely yours,

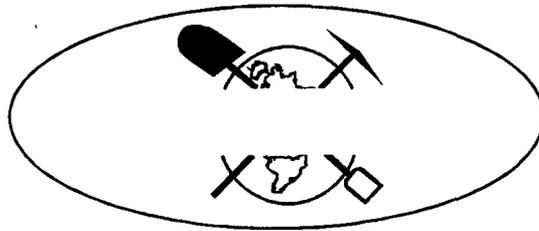
HOMESTAKE MINING COMPANY OF CALIFORNIA
Alan D. Cox

Enclosures (2)

xc: Mr. B. Spitzberg, Chief, Decommissioning Branch, w/enclosure
Mr. R. Chase, Barrick - SLC, w/enclosure
Mr. B. Ferdinand, Barrick - SLC, w/enclosure
Mr. G. Hoffman, Hydro Engineering - Casper w/enclosure
Mr. S. Appaji, Region VI EPA - Dallas w/enclosure

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**HOMESTAKE MINING COMPANY
OF
CALIFORNIA
GRANTS PROJECT**



**SEMI-ANNUAL ENVIRONMENTAL
MONITORING REPORT**

JULY – DECEMBER

2006

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

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	ENVIRONMENTAL MONITORING PROGRAMS	2
2.1	Air Particulate Monitoring.....	2
2.2	Radon Gas Monitoring.....	2
3.0	WATER QUALITY MONITORING.....	2
4.0	DIRECT RADIATION.....	3
5.0	SURFACE CONTAMINATION.....	3
5.1	Personnel Skin and Clothing.....	3
5.2	Survey of Equipment Prior to Release for Unrestricted Use	3
6.0	LOWER LIMIT OF DETECTION.....	3
7.0	DATA SUMMARY AND CONCLUSIONS.....	4

TABLES

Table 1 – Environmental Monitoring Program Excluding Groundwater Monitoring
Table 2 – Groundwater Monitoring Program (8-99 as modified by Amendment 34)
Water Quality – Point of Compliance and Background
Table 2.1.1 – Water Quality Analysis for Well D1
Table 2.1.2 – Water Quality Analysis for Well S4
Table 2.1.3 – Water Quality Analysis for Well X
Table 2.1.4 – Water Quality Analysis for Background Well P
Table 3 – Occupational Monitoring Program

FIGURES

Figure 1 – Monitoring & Sampling Locations
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ATTACHMENTS

Attachment 1 – High Volume Air Sampling Results
Attachment 2 – Radon Gas Monitoring Results
Attachment 3 – Environmental Gamma Radiation Results
Attachment 4 – Annual Effective Dose Equivalent to Individuals of the Public

1.0 INTRODUCTION

This Semi-Annual Environmental Monitoring Report summarizes effluent monitoring data recorded for Homestake Mining Company of California - Grants Project (Homestake) from July through December 2006. 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 re-contoured and covered with interim cover on the top and radon barrier on the outcrops. Bedding and erosion protection was placed on the outcrops after placement of the radon barrier. Soil cleanup verification of the off-pile contaminated soil (windblown tailings) is complete; the completion report was 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 this 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 July through December, the RO plant processed an average 250-gpm while producing an average of 184-gpm of product water that was used for re-injection.

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 is included in this report. It should be noted that while the POC wells will eventually be used to demonstrate groundwater restoration, they are not currently representative of off-site groundwater quality conditions.

2.0 ENVIRONMENTAL MONITORING PROGRAMS

The monitoring requirements for the site are summarized in Table 1, Table 2, and Table 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 Samplers (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 by Amendment 34), as attached, outlines the water quality sampling frequency and parameters monitored. In addition, the volumes of water injected and recovered as part of the ground-water cleanup program are monitored on a weekly frequency and the rates documented. A performance review report is submitted by March 31 of each year according to

License Condition 35E. The groundwater monitoring data for the POC wells and background well P, as required to comply with 10 CFR 40.65, are reported in Tables 2.1.1 through 2.1.4. 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. Due to these conditions water level data on these wells are also not reflective of steady state conditions, and therefore are not reported here.

4.0 DIRECT RADIATION

Gamma exposure rates are continuously monitored through the use of optically stimulated luminescence (OSL) dosimeter badges placed at each of the seven locations identified in Figure 1. HMC #16 is considered the background location for direct radiation. Each OSL badge consists of an aluminum oxide detector within a plastic holder. The plastic provides adequate protection from weather for these badges to be used out-of-doors. The OSL's are exchanged semi-annually and analyzed by an approved independent laboratory (currently Landauer Inc.). The levels of direct environmental radiation are recorded for each of the seven locations. 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 U.S. Nuclear Regulatory Guide 8.30 – Appendix B as the smallest concentration of radioactive material that has a 95% probability of being detected. Radioactive material is “detected” if the value measured on an instrument is high enough to conclude that activity above the system background is probably 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 calculates LLDs, the following formula is utilized:

$$LLD = \frac{3+4.66 S_b}{3.7 E 4 EVY \exp (-\lambda t)}$$

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;
t 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 (vendor lab) reports the LLD for radon-222. The LLDs for the constituents are:

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

Uranium is analyzed by ICP-MS methods 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 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 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. The attachments included in this report summarize 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. During the report period, Homestake has not exceeded 10 CFR Part 20 values in any of their effluents covered by this report. This, of course, does not include the ground water values at the POC wells as discussed earlier. The maximum annual effective dose equivalent to the public has been calculated for the year 2006, based upon the environmental monitoring data.

The report, Attachment 4, shows that the effective dose equivalent to the nearest resident is less than the 100-mrem/year NRC limit.

**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	OSL	Semi-Annual	Gamma Exposure Rate

**Table 2 – Groundwater Monitoring Program (8-99, as modified by
Amendment 34)**

Table 2 – Groundwater Monitoring Program (8-99 as modified by Amendment 34)

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, KF, 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 2.1.1 – Water Quality Analysis for Well D1



LABORATORY ANALYTICAL REPORT

ENTERED SEP 06 2006

Client: Homestake Mining Company

Report Date: 08/31/06

Project: Grants

Collection Date: 07/24/06 14:00

Lab ID: C06071270-003

Date Received: 07/28/06

Client Sample ID: D1

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	412	mg/L		1		A2320 B	07/31/06 09:19 / th
006 Carbonate as CO3	<1	mg/L		1		A2320 B	07/31/06 09:19 / th
005 Bicarbonate as HCO3	502	mg/L		1		A2320 B	07/31/06 09:19 / th
001 Calcium	220	mg/L	D	2		E200.7	08/11/06 00:13 / cp
007 Chloride	211	mg/L		1		E200.7	08/11/06 00:13 / cp
002 Magnesium	52	mg/L	D	2		E200.7	08/11/06 00:13 / cp
039 Nitrogen, Nitrate+Nitrite as N	3.5	mg/L		0.1		E353.2	08/02/06 10:45 / jal
003 Potassium	4.8	mg/L		0.5		E200.7	08/11/06 12:48 / cp
004 Sodium	338	mg/L	D	3		E200.7	08/11/06 09:23 / cp
008 Sulfate	846	mg/L	D	1		E200.7	08/11/06 00:13 / cp
PHYSICAL PROPERTIES							
009 pH	7.43	s.u.		0.01		A4500-H B	07/31/06 16:55 / jdh
010 Solids, Total Dissolved TDS @ 180 C	1900	mg/L		10		A2540 C	08/01/06 13:01 / kes
METALS - DISSOLVED							
036 Molybdenum	0.87	mg/L		0.03		E200.8	07/28/06 19:48 / bws
040 Selenium	0.169	mg/L		0.005		E200.8	07/28/06 19:48 / bws
015 Uranium	1.06	mg/L		0.0003		E200.8	07/28/06 19:48 / bws
244 Uranium Precision (±)	0.0106	mg/L				E200.8	07/28/06 19:48 / bws
114 Uranium, Activity	7.2E-07	uCi/mL		2.0E-10		E200.8	07/28/06 19:48 / bws
113 Uranium, Activity precision (±)	7.2E-09	uCi/mL				E200.8	07/28/06 19:48 / bws
042 Vanadium	<0.01	mg/L		0.01		E200.8	07/28/06 19:48 / bws
RADIONUCLIDES - DISSOLVED							
045 Radium 226	<0.2	pCi/L		0.2		E903.0	08/12/06 22:07 / trs
245 Radium 226 precision (±)	0.2	pCi/L				E903.0	08/12/06 22:07 / trs
256 Radium 226 altu	<2.0E-10	uCi/mL		2.0E-10		E903.0	08/12/06 22:07 / trs
258 Radium 226 altu precision (±)	2.0E-10	uCi/mL				E903.0	08/12/06 22:07 / trs
057 Radium 228	<1	pCi/L		1		RA-05	08/07/06 16:21 / pj
257 Radium 228 precision (±)	0.6	pCi/L				RA-05	08/07/06 16:21 / pj
359 Radium 228 altu	<1.0E-09	uCi/mL		1.0E-09		RA-05	08/07/06 16:21 / pj
360 Radium 228 altu precision (±)	6.0E-10	uCi/mL				RA-05	08/07/06 16:21 / pj
048 Thorium 230	<0.2	pCi/L		0.2		E907.0	08/11/06 09:00 / df
363 Thorium 230 precision (±)	0.4	pCi/L				E907.0	08/11/06 09:00 / df
248 Thorium 230 altu	<2.0E-10	uCi/mL		2.0E-10		E907.0	08/11/06 09:00 / df
362 Thorium 230 altu precision (±)	4.0E-10	uCi/mL				E907.0	08/11/06 09:00 / df

Report Definitions: RL - Analyte reporting limit.

MCL - Maximum contaminant level.

QCL - Quality control limit.

ND - Not detected at the reporting limit.

D - RL increased due to sample matrix interference.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
 Project: Grants
 Lab ID: C06071270-003
 Client Sample ID: D1

Report Date: 08/31/06
 Collection Date: 07/24/06 14:00
 Date Received: 07/28/06
 Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
DATA QUALITY							
192 A/C Balance (± 5)	-3.18	%				Calculation	08/11/06 15:11 / cp
194 Anions	32.0	meq/L				Calculation	08/11/06 15:11 / cp
195 Cations	30.1	meq/L				Calculation	08/11/06 15:11 / cp
079 Solids, Total Dissolved Calculated	1930	mg/L				Calculation	08/11/06 15:11 / cp
200 TDS Balance (0.80 - 1.20)	0.980	dec. %				Calculation	08/11/06 15:11 / cp

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

Table 2.1.2 – Water Quality Analysis for Well S4



LABORATORY ANALYTICAL REPORT

ENTERED SEP 06 2006

Client: Homestake Mining Company
 Project: Grants
 Lab ID: C06071270-001
 Client Sample ID: S4

Report Date: 08/31/06
 Collection Date: 07/24/06 13:30
 Date Received: 07/28/06
 Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	460	mg/L		1		A2320 B	07/31/06 09:14 / th
006 Carbonate as CO3	<1	mg/L		1		A2320 B	07/31/06 09:14 / th
005 Bicarbonate as HCO3	561	mg/L		1		A2320 B	07/31/06 09:14 / th
001 Calcium	241	mg/L	D	2		E200.7	08/11/06 00:06 / cp
007 Chloride	250	mg/L		1		E200.7	08/11/06 00:06 / cp
002 Magnesium	65	mg/L	D	2		E200.7	08/11/06 00:06 / cp
039 Nitrogen, Nitrate+Nitrite as N	2.6	mg/L		0.1		E353.2	08/02/06 10:40 / jal
003 Potassium	5.9	mg/L		0.5		E200.7	08/11/06 12:42 / cp
004 Sodium	331	mg/L	D	3		E200.7	08/11/06 09:16 / cp
008 Sulfate	870	mg/L	D	1		E200.7	08/11/06 00:06 / cp
PHYSICAL PROPERTIES							
009 pH	7.56	s.u.		0.01		A4500-H B	07/31/06 16:52 / jdh
010 Solids, Total Dissolved TDS @ 180 C	2010	mg/L		10		A2540 C	08/01/06 13:00 / kes
METALS - DISSOLVED							
036 Molybdenum	1.71	mg/L		0.03		E200.8	07/28/06 19:33 / bws
040 Selenium	0.063	mg/L		0.005		E200.8	07/28/06 19:33 / bws
015 Uranium	1.85	mg/L		0.0003		E200.8	07/28/06 19:33 / bws
244 Uranium Precision (±)	0.0185	mg/L				E200.8	07/28/06 19:33 / bws
114 Uranium, Activity	1.3E-06	uCi/mL		2.0E-10		E200.8	07/28/06 19:33 / bws
113 Uranium, Activity precision (±)	1.3E-08	uCi/mL				E200.8	07/28/06 19:33 / bws
042 Vanadium	<0.01	mg/L		0.01		E200.8	07/28/06 19:33 / bws
RADIONUCLIDES - DISSOLVED							
045 Radium 226	<0.2	pCi/L		0.2		E903.0	08/12/06 20:07 / trs
245 Radium 226 precision (±)	0.3	pCi/L				E903.0	08/12/06 20:07 / trs
256 Radium 226 altu	<2.0E-10	uCi/mL		2.0E-10		E903.0	08/12/06 20:07 / trs
258 Radium 226 altu precision (±)	3.0E-10	uCi/mL				E903.0	08/12/06 20:07 / trs
057 Radium 228	<1	pCi/L		1		RA-05	08/07/06 16:21 / pj
257 Radium 228 precision (±)	0.6	pCi/L				RA-05	08/07/06 16:21 / pj
359 Radium 228 altu	<1.0E-09	uCi/mL		1.0E-09		RA-05	08/07/06 16:21 / pj
360 Radium 228 altu precision (±)	6.0E-10	uCi/mL				RA-05	08/07/06 16:21 / pj
048 Thorium 230	<0.2	pCi/L		0.2		E907.0	08/11/06 09:00 / df
363 Thorium 230 precision (±)	0.5	pCi/L				E907.0	08/11/06 09:00 / df
248 Thorium 230 altu	<2.0E-10	uCi/mL		2.0E-10		E907.0	08/11/06 09:00 / df
362 Thorium 230 altu precision (±)	5.0E-10	uCi/mL				E907.0	08/11/06 09:00 / df

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 D - RL increased due to sample matrix interference.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
 Project: Grants
 Lab ID: C06071270-001
 Client Sample ID: S4

Report Date: 08/31/06
 Collection Date: 07/24/06 13:30
 Date Received: 07/28/06
 Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
DATA QUALITY							
192 A/C Balance (± 5)	-3.95	%				Calculation	08/11/06 15:10 / cp
194 Anions	34.5	meq/L				Calculation	08/11/06 15:10 / cp
195 Cations	31.9	meq/L				Calculation	08/11/06 15:10 / cp
079 Solids, Total Dissolved Calculated	2050	mg/L				Calculation	08/11/06 15:10 / cp
200 TDS Balance (0.80 - 1.20)	0.980	dec. %				Calculation	08/11/06 15:10 / cp

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

Table 2.1.3 – Water Quality Analysis for Well X



LABORATORY ANALYTICAL REPORT

ENTERED SEP 06 2006
 ENTERED SEP 06 2006

Client: Homestake Mining Company
 Project: Grants
 Lab ID: C06071270-004
 Client Sample ID: X

Report Date: 08/31/06
 Collection Date: 07/24/06 14:30
 Date Received: 07/28/06
 Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	216	mg/L		1		A2320 B	07/31/06 09:22 / th
006 Carbonate as CO3	<1	mg/L		1		A2320 B	07/31/06 09:22 / th
005 Bicarbonate as HCO3	264	mg/L		1		A2320 B	07/31/06 09:22 / th
001 Calcium	122	mg/L	D	2		E200.7	08/11/06 00:16 / cp
007 Chloride	93	mg/L		1		E200.7	08/11/06 00:16 / cp
002 Magnesium	12	mg/L	D	2		E200.7	08/11/06 00:16 / cp
039 Nitrogen, Nitrate+Nitrite as N	0.8	mg/L		0.1		E353.2	08/02/06 10:48 / jal
003 Potassium	2.3	mg/L		0.5		E200.7	08/11/06 12:52 / cp
004 Sodium	99.1	mg/L		0.5		E200.7	08/11/06 12:52 / cp
008 Sulfate	261	mg/L	D	1		E200.7	08/11/06 00:16 / cp
PHYSICAL PROPERTIES							
009 pH	7.78	s.u.		0.01		A4500-H B	07/31/06 16:57 / jdh
010 Solids, Total Dissolved TDS @ 180 C	736	mg/L		10		A2540 C	08/01/06 13:01 / kes
METALS - DISSOLVED							
036 Molybdenum	0.13	mg/L		0.03		E200.8	07/28/06 19:55 / bws
040 Selenium	0.019	mg/L		0.005		E200.8	07/28/06 19:55 / bws
015 Uranium	0.119	mg/L		0.0003		E200.8	07/28/06 19:55 / bws
244 Uranium Precision (±)	0.0012	mg/L				E200.8	07/28/06 19:55 / bws
114 Uranium, Activity	8.1E-08	uCi/mL		2.0E-10		E200.8	07/28/06 19:55 / bws
113 Uranium, Activity precision (±)	8.1E-10	uCi/mL				E200.8	07/28/06 19:55 / bws
042 Vanadium	0.01	mg/L		0.01		E200.8	07/28/06 19:55 / bws
RADIONUCLIDES - DISSOLVED							
045 Radium 226	<0.2	pCi/L		0.2		E903.0	08/12/06 23:08 / trs
245 Radium 226 precision (±)	0.2	pCi/L				E903.0	08/12/06 23:08 / trs
256 Radium 226 altu	<2.0E-10	uCi/mL		2.0E-10		E903.0	08/12/06 23:08 / trs
258 Radium 226 altu precision (±)	2.0E-10	uCi/mL				E903.0	08/12/06 23:08 / trs
057 Radium 228	<1	pCi/L		1		RA-05	08/07/06 16:21 / pj
257 Radium 228 precision (±)	0.6	pCi/L				RA-05	08/07/06 16:21 / pj
359 Radium 228 altu	<1.0E-09	uCi/mL		1.0E-09		RA-05	08/07/06 16:21 / pj
360 Radium 228 altu precision (±)	6.0E-10	uCi/mL				RA-05	08/07/06 16:21 / pj
048 Thorium 230	<0.2	pCi/L		0.2		E907.0	08/11/06 09:00 / df
363 Thorium 230 precision (±)	0.5	pCi/L				E907.0	08/11/06 09:00 / df
248 Thorium 230 altu	<2.0E-10	uCi/mL		2.0E-10		E907.0	08/11/06 09:00 / df
362 Thorium 230 altu precision (±)	5.0E-10	uCi/mL				E907.0	08/11/06 09:00 / df

Report Definitions: RL - Analyte reporting limit. MCL - Maximum contaminant level.
 QCL - Quality control limit. ND - Not detected at the reporting limit.
 D - RL increased due to sample matrix interference.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
Project: Grants
Lab ID: C06071270-004
Client Sample ID: X

Report Date: 08/31/06
Collection Date: 07/24/06 14:30
Date Received: 07/28/06
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
DATA QUALITY							
192 A/C Balance (± 5)	-4.11	%				Calculation	08/11/06 15:11 / cp
194 Anions	12.4	meq/L				Calculation	08/11/06 15:11 / cp
195 Cations	11.5	meq/L				Calculation	08/11/06 15:11 / cp
079 Solids, Total Dissolved Calculated	723	mg/L				Calculation	08/11/06 15:11 / cp
200 TDS Balance (0.80 - 1.20)	1.02	dec. %				Calculation	08/11/06 15:11 / cp

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

Table 2.1.4 – Water Quality Analysis for Well P



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Co
 Project: Grants
 Lab ID: C06051137-003
 Client Sample ID: P

Report Date: 06/20/06
 Collection Date: 05/23/06 15:08
 Date Received: 05/25/06
 Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	205	mg/L		1		A2320 B	06/02/06 14:25 / th
006 Carbonate as CO3	5	mg/L		1		A2320 B	06/02/06 14:25 / th
005 Bicarbonate as HCO3	243	mg/L		1		A2320 B	06/02/06 14:25 / th
001 Calcium	224	mg/L		0.5		E200.7	06/06/06 21:58 / cp
007 Chloride	77	mg/L		1		E200.7	06/06/06 19:39 / cp
002 Magnesium	48.9	mg/L		0.5		E200.7	06/06/06 21:58 / cp
039 Nitrogen, Nitrate+Nitrite as N	7.1	mg/L	D	0.2		E353.2	05/30/06 13:02 / jal
003 Potassium	5.0	mg/L		0.5		E200.7	06/06/06 21:58 / cp
004 Sodium	234	mg/L	D	3		E200.7	06/06/06 19:39 / cp
008 Sulfate	1010	mg/L	D	1		E200.7	06/06/06 19:39 / cp
PHYSICAL PROPERTIES							
009 pH	8.52	s.u.		0.01		A4500-H B	06/01/06 16:22 / jdh
010 Solids, Total Dissolved TDS @ 180 C	1820	mg/L		10		A2540 C	06/01/06 15:20 / jdh
METALS - DISSOLVED							
036 Molybdenum	<0.03	mg/L		0.03		E200.8	06/05/06 19:23 / bws
040 Selenium	0.162	mg/L		0.005		E200.8	06/05/06 19:23 / bws
015 Uranium	0.0286	mg/L		0.0003		E200.8	06/05/06 19:23 / bws
244 Uranium Precision (±)	0.0003	mg/L				E200.8	06/05/06 19:23 / bws
114 Uranium, Activity	1.9E-08	uCi/mL		2.0E-10		E200.8	06/05/06 19:23 / bws
113 Uranium, Activity precision (±)	2.3E-10	uCi/mL				E200.8	06/05/06 19:23 / bws
042 Vanadium	<0.01	mg/L		0.01		E200.8	06/05/06 19:23 / bws
RADIONUCLIDES - DISSOLVED							
045 Radium 226	<0.2	pCi/L		0.2		E903.0	06/13/06 10:02 / trs
245 Radium 226 precision (±)	0.5	pCi/L				E903.0	06/13/06 10:02 / trs
256 Radium 226 altu	<2.0E-10	uCi/mL		2.0E-10		E903.0	06/13/06 10:02 / trs
258 Radium 226 altu precision (±)	5.0E-10	uCi/mL				E903.0	06/13/06 10:02 / trs
057 Radium 228	<1	pCi/L		1		RA-05	06/08/06 13:23 / trs
257 Radium 228 precision (±)	1.5	pCi/L				RA-05	06/08/06 13:23 / trs
359 Radium 228 altu	<1.0E-09	uCi/mL		1.0E-09		RA-05	06/08/06 13:23 / trs
360 Radium 228 altu precision (±)	1.5E-09	uCi/mL				RA-05	06/08/06 13:23 / trs
048 Thorium 230	<0.2	pCi/L		0.2		E907.0	05/30/06 11:00 / df
363 Thorium 230 precision (±)	0.3	pCi/L				E907.0	05/30/06 11:00 / df
248 Thorium 230 altu	<2.0E-10	uCi/mL		2.0E-10		E907.0	05/30/06 11:00 / df
362 Thorium 230 altu precision (±)	3.0E-10	uCi/mL				E907.0	05/30/06 11:00 / df

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.
 D - RL increased due to sample matrix interference.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

ENTERED JUL - 6 2006



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Co
Project: Grants
Lab ID: C06051137-003
Client Sample ID: P

Report Date: 06/20/06
Collection Date: 05/23/06 15:08
Date Received: 05/25/06
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
DATA QUALITY							
192	A/C Balance (± 5)	-4.21	%			Calculation	06/08/06 15:03 / cp
194	Anions	27.8	meq/L			Calculation	06/08/06 15:03 / cp
195	Cations	25.6	meq/L			Calculation	06/08/06 15:03 / cp
079	Solids, Total Dissolved Calculated	1750	mg/L			Calculation	06/08/06 15:03 / cp
200	TDS Balance (0.80 - 1.20)	1.04	dec. %			Calculation	06/08/06 15:03 / cp

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.

Table 3 - Occupational Monitoring Program (6-00)

Table 3 – Occupational Monitoring Program (6-00)

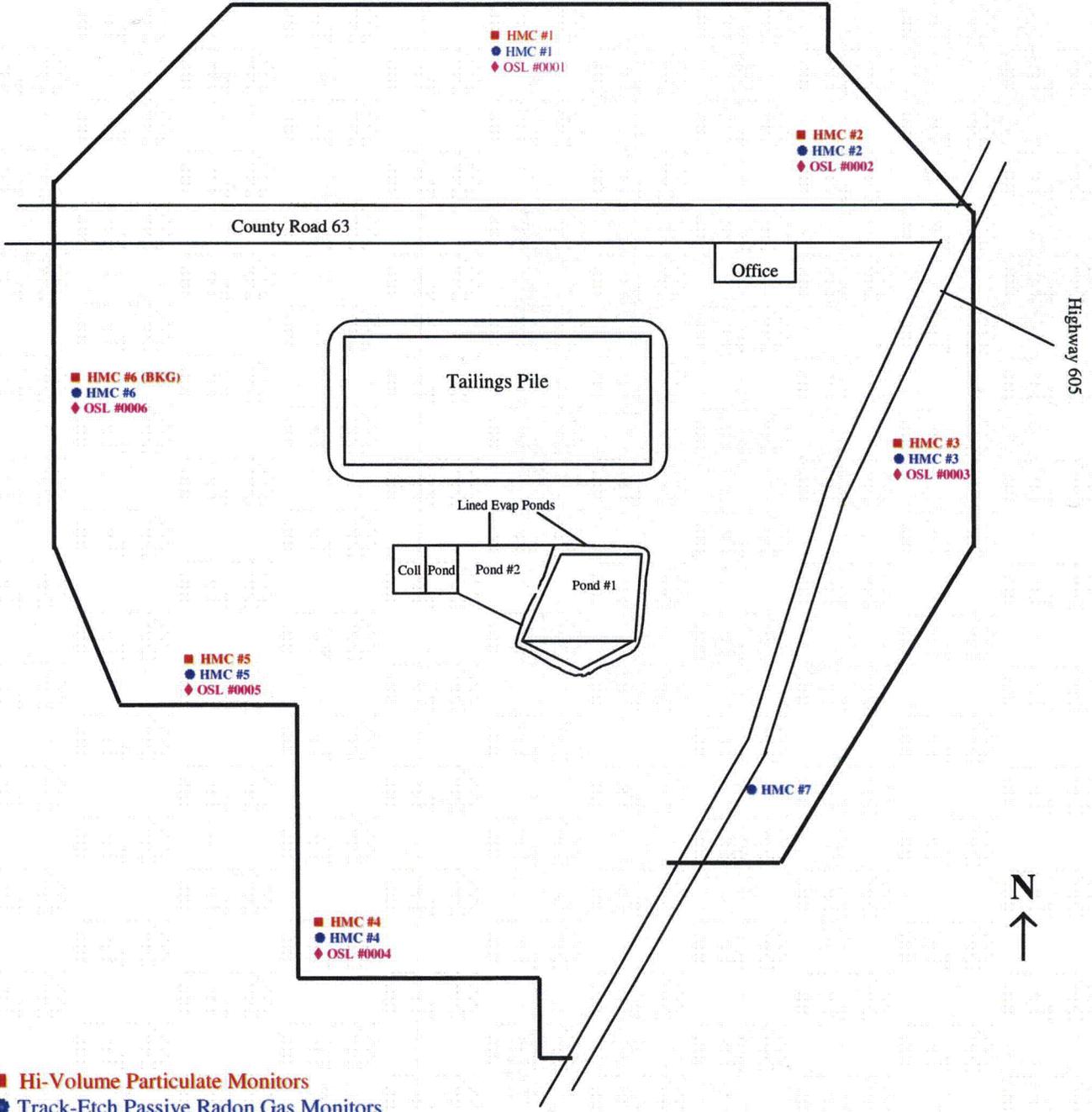
Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
Lapel Personal Air Sample	As required by RWP	As required by RWP (2 L/min or equivalent)	HP-1	As required by RWP	Alpha, U-Nat
Lapel Personal Air Sampler Calibration	As required by RWP	N/A	HP-1	As required by RWP	Flow rate
Release of Equipment	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	Annually	N/A
Personnel Gamma (OSL)	Variable	Personnel	HP-11	Quarterly	Gamma
Personnel Contamination	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; OSL = Optically Stimulated Luminescence dosimeter

Figure 1 – Monitoring & Sampling Locations

HOMESTAKE MINING COMPANY GRANTS PROJECT Monitoring & Sampling Locations

- HMC #0016 (BKG)
- ◆ OSL #0016 (BKG)



- Hi-Volume Particulate Monitors
- Track-Etch Passive Radon Gas Monitors
- ◆ OSL Gamma Badges

FIGURE 1

Attachment 1 – High Volume Air Sampling Results



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: January 29, 2007

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
C06040080-001 First Quarter 2006 Air Volume in mLs 1.44E+11	^{nat} U	1.37E-16	N/A	1.00E-16	9.00E-14	1.52E-01
	²³⁰ Th	< 1.00E-16	2.08E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.67E-17	1.00E-16	9.00E-13	< 1.11E-02
C06070040-001 Second Quarter 2006 Air Volume in mLs 1.43E+11	^{nat} U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
	²³⁰ Th	1.78E-16	2.52E-17	1.00E-16	2.00E-14	8.92E-01
	²²⁶ Ra	3.08E-16	3.64E-17	1.00E-16	9.00E-13	3.42E-02
C06091359-001 Third Quarter 2006 Air Volume in mLs 1.26E+11	^{nat} U	1.84E-15	N/A	1.00E-16	9.00E-14	2.05E+00
	²³⁰ Th	< 1.00E-16	1.03E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.27E-17	1.00E-16	9.00E-13	< 1.11E-02
C07010333-001 Fourth Quarter 2006 Air Volume in mLs 1.21E+11	^{nat} U	6.37E-16	N/A	1.00E-16	9.00E-14	7.08E-01
	²³⁰ Th	< 1.00E-16	1.24E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.90E-17	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



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
Project: Grants 3rd Quarter 2006 Comp
Lab ID: C06091359-001
Client Sample ID: HMC-1 Hi-Vol Filter

Report Date: 11/03/06
Collection Date: Not Provided
Date Received: 09/29/06
Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	3.0	pCi/Filter		0.2		E903.0	10/19/06 09:39 / cw
Radium 226 precision (±)	1.6	pCi/Filter				E903.0	10/19/06 09:39 / cw
Thorium 230	2.8	pCi/Filter		0.2		E907.0	10/12/06 15:00 / df
Thorium 230 precision (±)	1.3	pCi/Filter				E907.0	10/12/06 15:00 / df
Uranium, Activity	232	pCi/Filter		0.2		SW6020	10/05/06 15:18 / sml

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
Project: Grants 4th Quarter 2006 Comp
Lab ID: C07010333-001
Client Sample ID: HMC-1 Hi-Vol Filter

Report Date: 01/31/07
Collection Date: Not Provided
Date Received: 01/09/07
Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	9.2	pCi/Filter		0.2		E903.0	01/23/07 13:41 / trs
Radium 226 precision (±)	2.3	pCi/Filter				E903.0	01/23/07 13:41 / trs
Thorium 230	4.9	pCi/Filter		0.2		E907.0	01/16/07 15:00 / dmf
Thorium 230 precision (±)	1.5	pCi/Filter				E907.0	01/16/07 15:00 / dmf
Uranium, Activity	77.1	pCi/Filter		0.2		SW6020	01/13/07 02:31 / sml

Report Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: January 29, 2007

SAMPLE ID: HMC 2

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Error Estimate µCi/mL	L.L.D. µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C06040080-002 First Quarter 2006 Air Volume in mLs 1.28E+11	^{nat} U	1.45E-16	N/A	1.00E-16	9.00E-14	1.61E-01
	²³⁰ Th	1.38E-16	2.50E-17	1.00E-16	2.00E-14	6.88E-01
	²²⁶ Ra	< 1.00E-16	1.95E-17	1.00E-16	9.00E-13	< 1.11E-02
C06070040-002 Second Quarter 2006 Air Volume in mLs 1.43E+11	^{nat} U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
	²³⁰ Th	1.34E-16	2.38E-17	1.00E-16	2.00E-14	6.71E-01
	²²⁶ Ra	2.10E-16	3.15E-17	1.00E-16	9.00E-13	2.33E-02
C06091359-002 Third Quarter 2006 Air Volume in mLs 1.36E+11	^{nat} U	2.03E-15	N/A	1.00E-16	9.00E-14	2.25E+00
	²³⁰ Th	< 1.00E-16	1.25E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.47E-17	1.00E-16	9.00E-13	< 1.11E-02
C07010333-002 Fourth Quarter 2006 Air Volume in mLs 1.19E+11	^{nat} U	4.29E-16	N/A	1.00E-16	9.00E-14	4.77E-01
	²³⁰ Th	< 1.00E-16	1.43E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.68E-17	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



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
 Project: Grants 3rd Quarter 2006 Comp
 Lab ID: C06091359-002
 Client Sample ID: HMC-2 Hi-Vol Filter

Report Date: 11/03/06
 Collection Date: Not Provided
 Date Received: 09/29/06
 Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	5.7	pCi/Filter		0.2		E903.0	10/19/06 09:39 / cw
Radium 226 precision (±)	2.0	pCi/Filter				E903.0	10/19/06 09:39 / cw
Thorium 230	6.2	pCi/Filter		0.2		E907.0	10/12/06 15:00 / df
Thorium 230 precision (±)	1.7	pCi/Filter				E907.0	10/12/06 15:00 / df
Uranium, Activity	276	pCi/Filter		0.2		SW6020	10/05/06 15:51 / sml

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
Project: Grants 4th Quarter 2006 Comp
Lab ID: C07010333-002
Client Sample ID: HMC-2 Hi-Vol Filter

Report Date: 01/31/07
Collection Date: Not Provided
Date Received: 01/09/07
Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	7.8	pCi/Filter		0.2		E903.0	01/23/07 13:41 / trs
Radium 226 precision (±)	2.0	pCi/Filter				E903.0	01/23/07 13:41 / trs
Thorium 230	8.1	pCi/Filter		0.2		E907.0	01/16/07 15:00 / dmf
Thorium 230 precision (±)	1.7	pCi/Filter				E907.0	01/16/07 15:00 / dmf
Uranium, Activity	51.1	pCi/Filter		0.2		SW6020	01/13/07 02:35 / sml

Report Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: January 29, 2007

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
C06040080-003 First Quarter 2006 Air Volume in mLs 1.42E+11	^{nat} U	3.75E-16	N/A	1.00E-16	9.00E-14	4.17E-01
	²³⁰ Th	1.10E-16	1.55E-17	1.00E-16	2.00E-14	5.49E-01
	²²⁶ Ra	1.48E-16	2.32E-17	1.00E-16	9.00E-13	1.64E-02
C06070040-003 Second Quarter 2006 Air Volume in mLs 1.33E+11	^{nat} U	3.71E-16	N/A	1.00E-16	9.00E-14	4.12E-01
	²³⁰ Th	3.13E-16	3.83E-17	1.00E-16	2.00E-14	1.56E+00
	²²⁶ Ra	1.03E-15	6.92E-17	1.00E-16	9.00E-13	1.14E-01
C06091359-003 Third Quarter 2006 Air Volume in mLs 1.08E+11	^{nat} U	4.69E-15	N/A	1.00E-16	9.00E-14	5.22E+00
	²³⁰ Th	< 1.00E-16	1.76E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.57E-17	1.00E-16	9.00E-13	< 1.11E-02
C07010333-003 Fourth Quarter 2006 Air Volume in mLs 1.32E+11	^{nat} U	2.64E-15	N/A	1.00E-16	9.00E-14	2.93E+00
	²³⁰ Th	< 1.00E-16	1.44E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.36E-17	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



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
 Project: Grants 3rd Quarter 2006 Comp
 Lab ID: C06091359-003
 Client Sample ID: HMC-3 Hi-Vol Filter

Report Date: 11/03/06
 Collection Date: Not Provided
 Date Received: 09/29/06
 Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	3.7	pCi/Filter		0.2		E903.0	10/19/06 09:39 / cw
Radium 226 precision (±)	1.7	pCi/Filter				E903.0	10/19/06 09:39 / cw
Thorium 230	6.6	pCi/Filter		0.2		E907.0	10/12/06 15:00 / df
Thorium 230 precision (±)	1.9	pCi/Filter				E907.0	10/12/06 15:00 / df
Uranium, Activity	507	pCi/Filter		0.2		SW6020	10/05/06 15:55 / sml

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
 Project: Grants 4th Quarter 2006 Comp
 Lab ID: C07010333-003
 Client Sample ID: HMC-3 Hi-Vol Filter

Report Date: 01/31/07
 Collection Date: Not Provided
 Date Received: 01/09/07
 Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	6.5	pCi/Filter		0.2		E903.0	01/23/07 13:41 / trs
Radium 226 precision (±)	1.8	pCi/Filter				E903.0	01/23/07 13:41 / trs
Thorium 230	8.5	pCi/Filter		0.2		E907.0	01/16/07 15:00 / dmf
Thorium 230 precision (±)	1.9	pCi/Filter				E907.0	01/16/07 15:00 / dmf
Uranium, Activity	348	pCi/Filter		0.2		SW6020	01/13/07 02:40 / sml

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: January 29, 2007

SAMPLE ID: HMC 4

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Error Estimate µCi/mL	L.L.D. µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C06040080-004 First Quarter 2006 Air Volume in mLs 1.45E+11	^{nat} U	1.48E-16	N/A	1.00E-16	9.00E-14	1.65E-01
	²³⁰ Th	< 1.00E-16	1.59E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.86E-17	1.00E-16	9.00E-13	< 1.11E-02
C06070040-004 Second Quarter 2006 Air Volume in mLs 1.42E+11	^{nat} U	2.77E-16	N/A	1.00E-16	9.00E-14	3.08E-01
	²³⁰ Th	2.59E-16	3.59E-17	1.00E-16	2.00E-14	1.30E+00
	²²⁶ Ra	< 1.00E-16	2.04E-17	1.00E-16	9.00E-13	< 1.11E-02
C06091359-004 Third Quarter 2006 Air Volume in mLs 1.38E+11	^{nat} U	4.46E-15	N/A	1.00E-16	9.00E-14	4.96E+00
	²³⁰ Th	< 1.00E-16	1.52E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.30E-17	1.00E-16	9.00E-13	< 1.11E-02
C07010333-004 Fourth Quarter 2006 Air Volume in mLs 1.42E+11	^{nat} U	2.56E-15	N/A	1.00E-16	9.00E-14	2.84E+00
	²³⁰ Th	< 1.00E-16	1.06E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.48E-17	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



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
 Project: Grants 3rd Quarter 2006 Comp
 Lab ID: C06091359-004
 Client Sample ID: HMC-4 Hi-Vol Filter

Report Date: 11/03/06
 Collection Date: Not Provided
 Date Received: 09/29/06
 Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	4.4	pCi/Filter		0.2		E903.0	10/19/06 09:39 / cw
Radium 226 precision (±)	1.8	pCi/Filter				E903.0	10/19/06 09:39 / cw
Thorium 230	7.7	pCi/Filter		0.2		E907.0	10/12/06 15:00 / df
Thorium 230 precision (±)	2.1	pCi/Filter				E907.0	10/12/06 15:00 / df
Uranium, Activity	616	pCi/Filter		0.2		SW6020	10/05/06 15:59 / sml

Report RL - Analyte reporting limit.
 Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
Project: Grants 4th Quarter 2006 Comp
Lab ID: C07010333-004
Client Sample ID: HMC-4 Hi-Vol Filter

Report Date: 01/31/07
Collection Date: Not Provided
Date Received: 01/09/07
Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	8.9	pCi/Filter		0.2		E903.0	01/23/07 13:41 / trs
Radium 226 precision (±)	2.1	pCi/Filter				E903.0	01/23/07 13:41 / trs
Thorium 230	5.1	pCi/Filter		0.2		E907.0	01/16/07 15:00 / dmf
Thorium 230 precision (±)	1.5	pCi/Filter				E907.0	01/16/07 15:00 / dmf
Uranium, Activity	363	pCi/Filter		0.2		SW6020	01/13/07 02:44 / sml

Report Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: January 29, 2007

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
C06040080-005 First Quarter 2006 Air Volume in mLs 1.43E+11	^{nat} U	1.83E-16	N/A	1.00E-16	9.00E-14	2.03E-01
	²³⁰ Th	< 1.00E-16	1.96E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.75E-17	1.00E-16	9.00E-13	< 1.11E-02
C06070040-005 Second Quarter 2006 Air Volume in mLs 1.43E+11	^{nat} U	5.02E-16	N/A	1.00E-16	9.00E-14	5.58E-01
	²³⁰ Th	1.03E-16	1.82E-17	1.00E-16	2.00E-14	5.14E-01
	²²⁶ Ra	1.12E-16	2.24E-17	1.00E-16	9.00E-13	1.24E-02
C06091359-005 Third Quarter 2006 Air Volume in mLs 1.37E+11	^{nat} U	6.60E-15	N/A	1.00E-16	9.00E-14	7.33E+00
	²³⁰ Th	< 1.00E-16	2.04E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.61E-17	1.00E-16	9.00E-13	< 1.11E-02
C07010333-005 Fourth Quarter 2006 Air Volume in mLs 1.35E+11	^{nat} U	2.46E-15	N/A	1.00E-16	9.00E-14	2.73E+00
	²³⁰ Th	< 1.00E-16	1.11E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.56E-17	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



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
 Project: Grants 3rd Quarter 2006 Comp
 Lab ID: C06091359-005
 Client Sample ID: HMC-5 Hi-Vol Filter

Report Date: 11/03/06
 Collection Date: Not Provided
 Date Received: 09/29/06
 Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	7.4	pCi/Filter		0.2		E903.0	10/19/06 09:39 / cw
Radium 226 precision (±)	2.2	pCi/Filter				E903.0	10/19/06 09:39 / cw
Thorium 230	13.2	pCi/Filter		0.2		E907.0	10/12/06 15:00 / df
Thorium 230 precision (±)	2.8	pCi/Filter				E907.0	10/12/06 15:00 / df
Uranium, Activity	904	pCi/Filter		0.2		SW6020	10/05/06 16:03 / sml

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
Project: Grants 4th Quarter 2006 Comp
Lab ID: C07010333-005
Client Sample ID: HMC-5 Hi-Vol Filter

Report Date: 01/31/07
Collection Date: Not Provided
Date Received: 01/09/07
Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	8.4	pCi/Filter		0.2		E903.0	01/23/07 13:41 / trs
Radium 226 precision (±)	2.1	pCi/Filter				E903.0	01/23/07 13:41 / trs
Thorium 230	6.6	pCi/Filter		0.2		E907.0	01/16/07 15:00 / dmf
Thorium 230 precision (±)	1.5	pCi/Filter				E907.0	01/16/07 15:00 / dmf
Uranium, Activity	332	pCi/Filter		0.2		SW6020	01/13/07 02:48 / sml

Report Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: HOMESTAKE MINING COMPANY - GRANTS, NEW MEXICO

REPORT DATE: January 29, 2007

SAMPLE ID: HMC 6

Quarter/Date Sampled Air Volume	Radionuclide	Concentration μCi/mL	Error Estimate μCi/mL	L.L.D. μCi/mL	Effluent Conc.* μCi/mL	% Effluent Concentration
C06040080-006 First Quarter 2006 Air Volume in mLs 1.43E+11	^{nat} U	1.05E-16	N/A	1.00E-16	9.00E-14	1.17E-01
	²³⁰ Th	< 1.00E-16	1.75E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.75E-17	1.00E-16	9.00E-13	< 1.11E-02
C06070040-006 Second Quarter 2006 Air Volume in mLs 1.44E+11	^{nat} U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
	²³⁰ Th	1.07E-16	1.94E-17	1.00E-16	2.00E-14	5.35E-01
	²²⁶ Ra	1.25E-16	2.36E-17	1.00E-16	9.00E-13	1.39E-02
C06091359-006 Third Quarter 2006 Air Volume in mLs 1.39E+11	^{nat} U	1.37E-15	N/A	1.00E-16	9.00E-14	1.52E+00
	²³⁰ Th	< 1.00E-16	1.22E-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
C07010333-006 Fourth Quarter 2006 Air Volume in mLs 1.20E+11	^{nat} U	3.66E-16	N/A	1.00E-16	9.00E-14	4.06E-01
	²³⁰ Th	< 1.00E-16	1.42E-17	1.00E-16	2.00E-14	< 5.00E-01
	²²⁶ Ra	< 1.00E-16	1.50E-17	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



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
Project: Grants 3rd Quarter 2006 Comp
Lab ID: C06091359-006
Client Sample ID: HMC-6 Hi-Vol Filter

Report Date: 11/03/06
Collection Date: Not Provided
Date Received: 09/29/06
Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	4.2	pCi/Filter		0.2		E903.0	10/19/06 09:39 / cw
Radium 226 precision (±)	1.8	pCi/Filter				E903.0	10/19/06 09:39 / cw
Thorium 230	4.3	pCi/Filter		0.2		E907.0	10/12/06 15:00 / df
Thorium 230 precision (±)	1.7	pCi/Filter				E907.0	10/12/06 15:00 / df
Uranium, Activity	190	pCi/Filter		0.2		SW6020	10/05/06 16:08 / sml

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



LABORATORY ANALYTICAL REPORT

Client: Homestake Mining Company
Project: Grants 4th Quarter 2006 Comp
Lab ID: C07010333-006
Client Sample ID: HMC-6 Hi-Vol Filter

Report Date: 01/31/07
Collection Date: Not Provided
Date Received: 01/09/07
Matrix: Filter

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - TOTAL							
Radium 226	6.9	pCi/Filter		0.2		E903.0	01/23/07 13:41 / trs
Radium 226 precision (±)	1.8	pCi/Filter				E903.0	01/23/07 13:41 / trs
Thorium 230	5.1	pCi/Filter		0.2		E907.0	01/16/07 15:00 / dmf
Thorium 230 precision (±)	1.7	pCi/Filter				E907.0	01/16/07 15:00 / dmf
Uranium, Activity	43.9	pCi/Filter		0.2		SW6020	01/13/07 02:52 / sml

Report Definitions: RL - Analyte reporting limit.
 QCL - Quality control limit.

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.



ANALYTICAL SUMMARY REPORT

January 31, 2007

Homestake Mining Company

Hwy 601
 PO Box 98
 Grants, NM 87020

Workorder No.: C07010333

Project Name: Grants 4th Quarter 2006 Comp

Energy Laboratories, Inc. received the following 8 samples from Homestake Mining Company on 1/9/2007 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C07010333-001	HMC-1 Hi-Vol Filter		01/09/07	Filter	Metals, Total Digestion, Total Metals Radium 226 Thorium, Isotopic
C07010333-002	HMC-2 Hi-Vol Filter		01/09/07	Filter	Same As Above
C07010333-003	HMC-3 Hi-Vol Filter		01/09/07	Filter	Same As Above
C07010333-004	HMC-4 Hi-Vol Filter		01/09/07	Filter	Same As Above
C07010333-005	HMC-5 Hi-Vol Filter		01/09/07	Filter	Same As Above
C07010333-006	HMC-6 Hi-Vol Filter		01/09/07	Filter	Same As Above
C07010333-007	HMC-7 Filter Comp		01/09/07	Filter	Same As Above
C07010333-008	HMC-8 Hi Vol Filter		01/09/07	Filter	Same As Above

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative or Report.

If you have any questions regarding these tests results, please call.

Report Approved By:



ROGER GARLING
LABORATORY SUPERVISOR



QA/QC Summary Report

Client: Homestake Mining Company
Project: Grants 4th Quarter 2006 Comp

Report Date: 01/31/07
Work Order: C07010333

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0							Batch: RA226-1864		
Sample ID: C07010333-002ADUP Radium 226	Sample Duplicate 8.77	pCi/Filter	0.40				12		01/23/07 13:41
Sample ID: C07010333-007AMS Radium 226	Sample Matrix Spike 59.3	pCi/Filter	0.40	99	70	130			01/23/07 13:41
Sample ID: MB-RA226-1864 Radium 226	Method Blank ND	pCi/L	0.2						01/23/07 13:41
Sample ID: LCS-RA226-1864 Radium 226	Laboratory Control Sample 14	pCi/L	0.20	107	70	130			01/23/07 16:40
Method: E907.0							Batch: 13225		
Sample ID: LCS-R78762 Thorium 230	Laboratory Control Sample 4.10	pCi/Filter	0.20	84	70	130			01/16/07 15:00
Sample ID: C07010333-005AMS Thorium 230	Sample Matrix Spike 45.5	pCi/Filter	0.40	84	70	130			01/16/07 15:00
Sample ID: C07010333-005AMSD Thorium 230	Sample Matrix Spike Duplicate 49.0	pCi/Filter	0.40	91	70	130	7.2		01/16/07 15:00
Sample ID: MB-R78762 Thorium 230	Method Blank ND	pCi/Filter	0.2						01/16/07 15:00
Method: SW6020							Batch: 13225		
Sample ID: MB-13225 Uranium	Method Blank ND	mg/filter	6E-05						01/13/07 02:19
Sample ID: LCS-13225 Uranium	Laboratory Control Sample 0.0503	mg/filter	0.00030	101	75	125			01/13/07 02:23
Sample ID: C07010333-008AMS Uranium	Sample Matrix Spike 1.21	mg/filter	0.00030		75	125			01/13/07 03:21 A
Sample ID: C07010333-008AMSD Uranium	Sample Matrix Spike Duplicate 1.22	mg/filter	0.00030		75	125	1.0		01/13/07 03:25 A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

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	6/29/2006 - 1/4/2007	1.7E-09	1.8E-10	17	1.6E-10
Hi-Vol #2 NE Outer Perimeter	6/29/2006 - 1/4/2007	2.0E-09	2.0E-10	20	1.6E-10
Hi-Vol #3 E Outer Perimeter	6/29/2006 - 1/4/2007	1.0E-09	1.4E-10	10	1.6E-10
Hi-Vol #4 S Outer Perimeter	6/29/2006 - 1/4/2007	2.1E-09	2.1E-10	21	1.6E-10
Hi-Vol #5 N of Nearest Residence	6/29/2006 - 1/4/2007	1.8E-09	1.9E-10	18	1.6E-10
Hi-Vol #6 W of Outer Perimeter	6/29/2006 - 1/4/2007	1.4E-09	1.7E-10	14	1.6E-10
HMC #7 S Boundary	6/29/2006 - 1/4/2007	1.3E-09	1.6E-10	13	1.6E-10
HMC #16 Background	6/29/2006 - 1/4/2007	1.0E-09	1.4E-10	10	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
OSL Perimeter Survey

Direct Radiation Measurements

Location	Monitoring Period	Exposure Rate (mrem/6 mo)	Error (mrem/6 mo)*
Hi-Vol #1 N Outer Perimeter	7/1/2006 - 12/31/2006	13	1.3
Hi-Vol #2 NE Outer Perimeter	7/1/2006 - 12/31/2006	18	1.8
Hi-Vol #3 E Outer Perimeter	7/1/2006 - 12/31/2006	16	1.6
Hi-Vol #4 S Outer Perimeter	7/1/2006 - 12/31/2006	19	1.9
Hi-Vol #5 N of Nearest Residence	7/1/2006 - 12/31/2006	17	1.7
Hi-Vol #6 W of Outer Perimeter	7/1/2006 - 12/31/2006	2	0.2
#16 Background	7/1/2006 - 12/31/2006	12	1.2

*Error is 1.96 std. dev.

**Attachment 4 – Annual Effective Dose Equivalent to
Individuals of the Public**

Annual Effective Dose Equivalent to Individuals of the Public

1.0 Introduction

There were very few activities in 2006 at the Grants Uranium Mill Site other than those associated with the groundwater restoration program. All off-pile tailings were consolidated with the tailings in 1995 and covered with a soil cover. All tailings currently have either an interim or permanent cover.

The 10 CFR 20.1301 radiation dose limit for individual members of the public from NRC-licensed facilities is specified as a total effective dose equivalent (TEDE) of 100 mrem/year. In addition, 10 CFR 20.1101 has a constraint on air emissions (excluding Rn-222 and its daughters) from a site limiting the TEDE to the maximum exposed member of the public from such emissions to 10 mrem/year. A licensee may request permission from the NRC to operate a facility up to a maximum of 500 mrem/year. Compliance may be demonstrated by calculations or measurements showing that the individual likely to receive the maximum dose from the facility does not exceed the limit, or by comparing the concentrations at the site perimeter to those specified in Table 2 of Appendix B to 10 CFR Part 20. Radiation from external sources for individuals in the unrestricted area may not deliver a dose equivalent of 0.002 rem in any hour or 0.050 rem in one year.

HMC has submitted environmental monitoring reports as required by 10 CFR 40.65 and License No. SUA-1471. The data from these reports have been used in this dose assessment.

2.0 Dose Assessment

The important pathways for assessing the dose to the maximum exposed individual are: inhalation of airborne particulate from the site, exposure to radon generated at the site, and the exposure to direct gamma radiation originating from the site. The nearest residence is located within 100 yards of the HMC-4 and HMC-5 monitoring stations and therefore the exposure may be conservatively assumed to be comparable to that at the monitoring stations. The exposure at both monitoring stations is considered and the station with the highest exposure is used for calculating the total effective dose equivalent to the maximum exposed individual. It is known that the nearby residents have typical lifestyles.

NUREG/CR-5512 recommends default values for the residential scenario. The values for indoor and outdoor occupancy are 200 effective days/year and 71 effective days/year, respectively. This is equivalent to a 75 percent total occupancy factor. This has been used in this analysis for all pathways.

2.1 Inhalation of Radionuclides

The committed effective dose equivalent from inhalation of particulate was calculated for the four principal long-lived radionuclides, U-238, U-234, Th-230, and Ra-226, using the quarterly environmental monitoring data given in the Semi-Annual Environmental Reports for 2006. The monitoring stations HMC #4 and HMC#5 were considered as Nearest Residence Locations. These stations are located on the southwestern perimeter of the site near existing residences. The use of these data to predict the dose to the nearest resident is very conservative in that the exposure at the residences should be less than that at the site perimeter.

Committed Effective Dose Equivalent per Unit Intake via Inhalation factors were taken from ICRP 30 tables. The values are given below:

<u>Nuclide</u>	<u>CEDE (mrem/μCi)</u>
U-234	13.2E4
U-238	11.8E4
Th-230	32.6E4
Ra-226	8.6E3

Continuous occupancy at a breathing rate of 20,000 liters/day (Table A-1, NUREG-0859) was assumed. The CEDE was calculated for each of the radionuclides at each station. The CEDE at locations HMC#4 and HMC#5 for 100 percent occupancy was calculated to be 2.0 mrem/year and 2.4 mrem/y, respectively while that at the background location (HMC#6) was calculated to be 0.7 mrem/y, for a net CEDE at locations HMC #4 and HMC#5 of 1.3 mrem/y and 1.7 mrem/y. The results from these calculations are shown in Table 2-1, Table 2-2, and Table 2-3. Considering the 75 percent occupancy factor, this results in a net dose equivalent of 1.0 mrem/y at HMC #4 and 1.3 mrem/year at HMC #5. The location with the highest exposure from all pathways will be chosen for calculating the TEDE to the public.

2.2 Exposure to Radon

The outdoor radon levels in the Grants Uranium Belt are known to be high and variable, depending on the location relative to mine vents, surface ore deposits, and topographical features. The natural background radon concentrations, arising from the calm winds during the evenings and at times from temperature inversions, generally follow the drainage path of the heavy air. The HMC site is situated at the lowest point in the drainage path for radon generated over a very large area to the North, Northwest, and Lobo Canyon to the East. Therefore the natural background levels at the site are expected to be very high and variable over short periods of time due to being in this drainage path.

The radon data for the two monitoring periods are provided in Attachment 2 of the semi-annual monitoring reports. Monitoring Station 16 has been accepted as the radon background location for the site. The yearly average of the radon concentration for HMC#4 and HMC#5 was 2.2 pCi/l and 2.0 pCi/l; the average concentration for the background location was 1.0 pCi/l. This results in net radon concentrations at HMC#4 and HMC#5 of 1.2 pCi/l and 1.0 pCi/l.

Since the nearest residence is within a few hundred feet of the site perimeter and within 3500 feet of the major source of radon, the radon daughter equilibrium should be low. We have selected 20 percent radon daughter equilibrium as an estimate for use in the calculations. NRC uses continuous exposure to 0.1 pCi/l Rn-222 in full equilibrium with the daughter products as being equivalent to a CEDE of 50 mrem/y (10CFR Part 20, Appendix B). With 20 percent equilibrium, the CEDE would be 100 mrem/pCi/l. Considering the 75 percent occupancy factor, the net radon concentration at the nearest residence locations HMC#4 and HMC#5 therefore results in a calculated CEDE of 90 and 75 mrem/y, respectively.

2.3 Dose from Exposure to Direct Radiation

An estimate of the dose equivalent from direct exposure to radiation sources at the site is obtained from the environmental Luxel dosimeters placed at the monitoring stations. The direct radiation measurements for the two monitoring periods are provided in Attachment 3 of the semi-annual monitoring reports. The average annual effective dose equivalents measured at HMC#4 and

HMC#5 locations was 28 mrem/year and 34 mrem/y, respectively. The average annual effective dose equivalent at the background location, HMC#16, was 23 mrem/year. The net annual effective dose equivalents for HMC#4 and HMC#5 were therefore 5 mrem/y and 11 mrem/y, respectively assuming 100 percent occupancy. Considering the 75 percent occupancy factor, the net annual effective dose equivalent is 3.8 mrem/year and 8.3 mrem/y, respectively for HMC#4 and HMC#5.

2.4 Total Effective Dose Equivalent to the Nearest Resident

The TEDE to the Nearest Resident can be calculated by adding the effective dose equivalent (EDE) from inhalation of airborne particulate, the EDE from the exposure to radon coming from the site, and the dose equivalent from direct gamma radiation. Comparing the TEDEs for the two monitoring stations, the TEDE is larger for location HMC#4. Using the HMC#4 data, the TEDE is obtained by summing 1.3 mrem/y from airborne particulate, 90 mrem/y from radon, and 3.8 mrem/y from direct gamma radiation exposure for a total TEDE of 95.1 mrem/y. This is clearly within the 100 mrem/year limit and the particulate TEDE is within the 10 mrem/y constraint limit on particulate emissions.

Table 2-1 Annual Effective Dose at the Nearest Residence from Airborne Particulate

Year 2006

STATION: HMC #4 Nearest Residence

AIRBORNE CONCENTRATION

	U-nat μCi/ml	U-234 μCi/ml	U-238 μCi/ml	Th-230 μCi/ml	Ra-226 μCi/ml
1st qtr	1.48E-16	7.21E-17	7.21E-17	1.00E-16	1.00E-16
2nd qtr	2.77E-16	1.35E-16	1.35E-16	2.59E-16	1.00E-16
3rd qtr	4.46E-15	2.17E-15	2.17E-15	1.00E-16	1.00E-16
4th qtr	2.56E-15	1.25E-15	1.25E-15	1.00E-16	1.00E-16
Average	1.86E-15	9.07E-16	9.07E-16	1.40E-16	1.00E-16

ANNUAL EFFECTIVE DOSE EQUIVALENT

U-234 mrem	U-238 mrem	Th-230 mrem	Ra-226 mrem	TOTAL mrem
0.874	0.781	0.333	0.006	2.0

Table 2-2 Annual Effective Dose at the Nearest Residence from Airborne Particulate

Year: 2006

STATION: HMC #5 Nearest Residence

AIRBORNE CONCENTRATION

	U-nat μCi/ml	U-234 μCi/ml	U-238 μCi/ml	Th-230 μCi/ml	Ra-226 μCi/ml
1st qtr	1.83E-16	8.92E-17	8.92E-17	1.00E-16	1.00E-16
2nd qtr	5.02E-16	2.45E-16	2.45E-16	1.03E-16	1.12E-16
3rd qtr	6.60E-15	3.22E-15	3.22E-15	1.00E-16	1.00E-16
4th qtr	2.46E-15	1.20E-15	1.20E-15	1.00E-16	1.00E-16
Average	2.44E-15	1.19E-15	1.19E-15	1.01E-16	1.03E-16

ANNUAL EFFECTIVE DOSE EQUIVALENT

U-234 mrem	U-238 mrem	Th-230 mrem	Ra-226 mrem	TOTAL mrem
1.144	1.023	0.240	0.006	2.4

Table 2-3 Annual Effective Dose at the Site Background Location from Airborne Particulate

Year:2006

STATION: HMC #6 Background

AIRBORNE CONCENTRATION

	U-nat μCi/ml	U-234 μCi/ml	U-238 μCi/ml	Th-230 μCi/ml	Ra-226 μCi/ml
1st qtr	1.05E-16	5.12E-17	5.12E-17	1.00E-16	1.00E-16
2nd qtr	1.00E-16	4.87E-17	4.87E-17	1.07E-16	1.25E-16
3rd qtr	1.37E-15	6.68E-16	6.68E-16	1.00E-16	1.00E-16
4th qtr	3.66E-16	1.78E-16	1.78E-16	1.00E-16	1.00E-16
Average	4.85E-16	2.37E-16	2.37E-16	1.02E-16	1.06E-16

ANNUAL EFFECTIVE DOSE EQUIVALENT

U-234 mrem	U-238 mrem	Th-230 mrem	Ra-226 mrem	TOTAL mrem
0.228	0.204	0.242	0.007	0.7