



Homestake Mining Company of California

Alan D. Cox
Project Manager – Grants

25 February 2013

UPS Next Day Air:

Mr. John Buckley, Project Manager
c/o Document Control Desk
Mail Stop T8F5
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
U. S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852-2738

RE: **Docket No. 40-8903**
License No. SUA-1471
Semi-Annual Environmental Monitoring Report
Period – July through December 2012

Dear Mr. Buckley:

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 2012 (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 296-gpms during the July through December 2012 reporting period.

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. J. Giraudo, 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

HOMESTAKE MINING COMPANY OF CALIFORNIA GRANTS PROJECT



SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT

July – December

2012

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

HOMESTAKE MINING COMPANY OF CALIFORNIA GRANTS PROJECT



SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT

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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 July through December 2012. 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 296-gpm while producing an average of 198-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 seven locations around the reclamation site (see Figure 1). Those locations identified as HMC-1, HMC-1A, 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. HMC-1A is northeast of EP-3 located north of the mill site. 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. HMC-7 is a blank Whatman filter that is analyzed as a lab and filter manufacturer quality check sample. The results are presented in Attachment 1.

Homestake uses Sierra Instruments Model #305-200 High Volume Air Samplers (or equivalent) to continuously sample the ambient air at 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, Thorium-230 and Vanadium.

2.2 Radon Gas Monitoring

Radon gas concentrations are monitored on a continuous basis at the nine 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 eight 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 eight 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:

$$LLD = \frac{3 + 4.66 S_b}{3.7 \times 10^4 E v Y \exp(-\lambda t)}$$

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);
3.7×10^4	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 μ Ci/ml
Rn-222 in air	30 pCi(d/l)
U-nat in air	1 E-16 μ Ci/ml
U-rad in water	2 E-10 μ Ci/ml
Ra-226, Th-230 in water	2 E-10 μ Ci/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 2012, 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	4	HMC-1, HMC-1A, HMC-2, HMC-3 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 Vanadium
	2	HMC-4, HMC-5 at site boundary 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 Vanadium
	1	HMC-6 background location	Continuous (High Vol.)	Weekly filter change, or more frequently as required. Samples composited and analyzed quarterly.	Natural Uranium, Radium-226, Thorium-230 Vanadium
Radon Gas	9	Locations described in Air - Particulates & HMC-7 on S boundary, HMC-1A near Evaporation Pond (EP-3), & HMC-16 as a background	Continuous Track-etch	Quarterly	Rn-222
DIRECT RADIATION	8	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 3 - Occupational Monitoring Program (6-00)

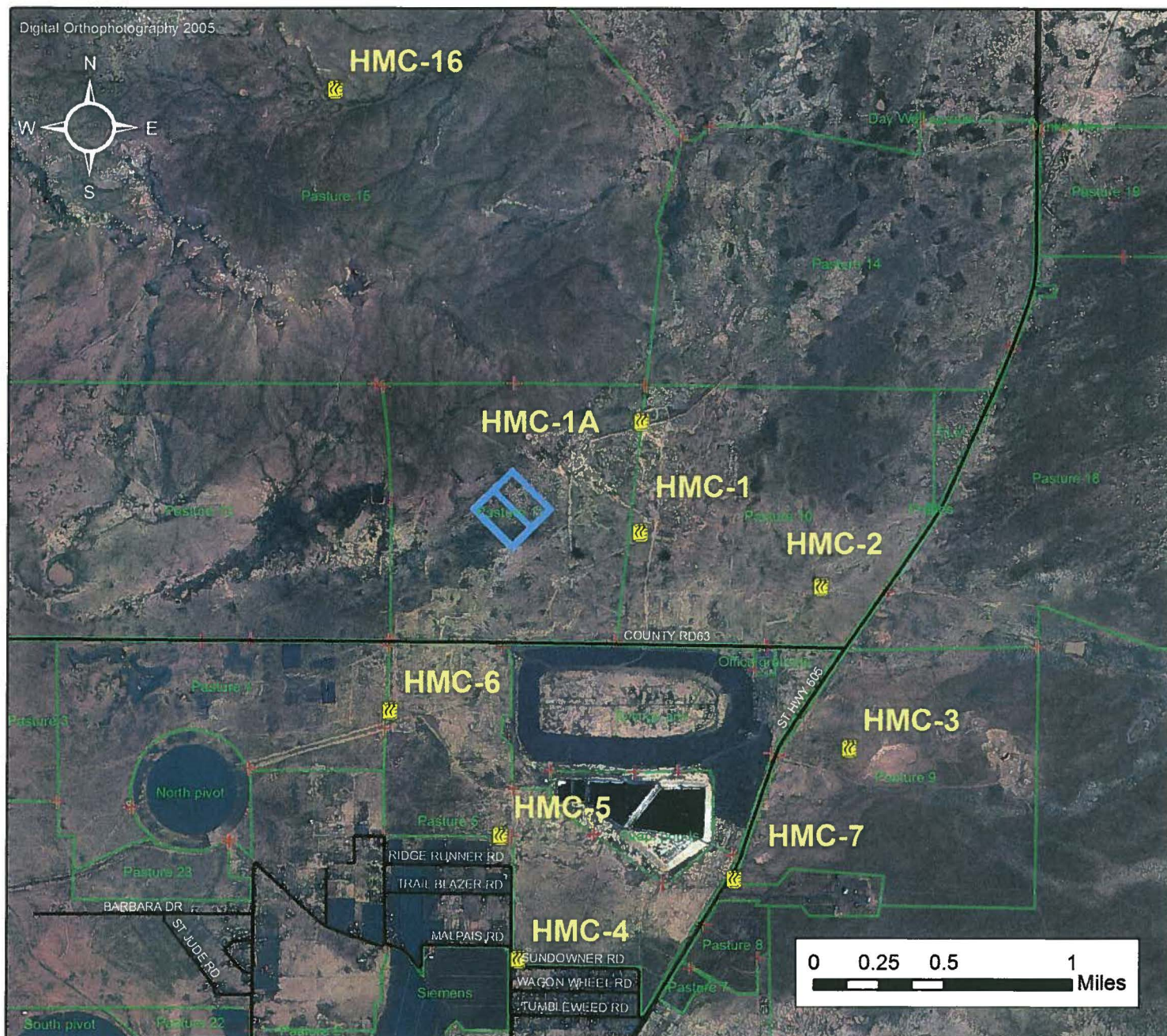
Table 3 – Occupational Monitoring Program (6-00)

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

FIGURE 1 : HMC Air Monitoring & Sampling Locations - Grants, NM



Location ID	Sampling Unit	Northing	Easting
HMC1	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1547458.8	491370.5
HMC1A	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1549715.8	491387.7
HMC2	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1546349.5	495053.2
HMC3	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1543048.7	495640.5
HMC4	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1538751.1	488918.0
HMC5	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1541268.4	488546.3
HMC6	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1543813.1	486297.3
HMC7	Track-Etch Cup (Radon)	1540395.7	493293.8
HMC16 (BKG)	Track-Etch Cup (Radon), OSL Badge (Gamma)	1556470.5	485135.1

	Location
	Road
	Gate
	EP-3
	Fence Line
	Section Line



Attachment 1 – High Volume Air Sampling Results

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: Grants 4th Quarter 2012 Comp
REPORT DATE: February 9, 2013

SAMPLE ID: HMC-1

Quarter/Date Sampled Air Volume	Radionuclide	Concentration μCi/mL	Counting Precision μCi/mL	MDC μCi/mL	L.L.D. μCi/mL	Effluent Conc.* μCi/mL	% Effluent Concentration
C12040023-001 First Quarter 2012 Air Volume in mLs 1.24E+11	^{nat} U	9E-17	N/A	N/A	1E-16	9E-14	1E-01
	²³⁰ Th	3E-17	7E-18	4E-18	1E-16	3E-14	9E-02
	²²⁶ Ra	6E-17	1E-17	1E-17	1E-16	9E-13	7E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration μCi/mL	Counting Precision μCi/mL	MDC μCi/mL	L.L.D. μCi/mL	Effluent Conc.* μCi/mL	% Effluent Concentration
C12070088-001 Second Quarter 2012 Air Volume in mLs 1.44E+11	^{nat} U	1.5E-15	N/A	N/A	1E-16	9E-14	1.7E+00
	²³⁰ Th	5E-17	8E-18	3E-18	1E-16	3E-14	2E-01
	²²⁶ Ra	9E-17	1E-17	5E-18	1E-16	9E-13	1E-02

Quarter/Date Sampled Air Volume	Radionuclide	Concentration μCi/mL	Counting Precision μCi/mL	MDC μCi/mL	L.L.D. μCi/mL	Effluent Conc.* μCi/mL	% Effluent Concentration
C12100037-001 Third Quarter 2012 Air Volume in mLs 1.43E+11	^{nat} U	8E-16	N/A	N/A	1E-16	9E-14	9E-01
	²³⁰ Th	2E-17	5E-18	5E-18	1E-16	3E-14	6E-02
	²²⁶ Ra	3E-17	7E-18	6E-18	1E-16	9E-13	3E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration μCi/mL	Counting Precision μCi/mL	MDC μCi/mL	L.L.D. μCi/mL	Effluent Conc.* μCi/mL	% Effluent Concentration
C13010183-001 Fourth Quarter 2012 Air Volume in mLs 1.33E+11	^{nat} U	7E-16	N/A	N/A	1E-16	9E-14	7E-01
	²³⁰ Th	3E-17	5E-18	2E-18	1E-16	3E-14	9E-02
	²²⁶ Ra	6E-17	8E-18	6E-18	1E-16	9E-13	6E-03

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp
Lab ID: C12100037-001
Client Sample ID: HMC-1

Report Date: 11/11/12
Collection Date: Not Provided
Date Received: 10/01/12
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/08/12 05:17 / cp
RADIONUCLIDES							
Radium 226	3.6	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Radium 226 precision (±)	0.9	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Radium 226 MDC	0.8	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Thorium 230	2.7	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 precision (±)	0.77	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 MDC	0.71	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Uranium, Activity	120	pCi/Filter		0.20		SW6020	11/08/12 05:17 / cp

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

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



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp
Lab ID: C13010183-001
Client Sample ID: HMC-1

Report Date: 02/09/13
Collection Date: Not Provided
Date Received: 01/08/13
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Uranium, Activity	87	pCi/Filter	D	0.96		SW6020	01/21/13 18:52 / clm
Vanadium	<0.10	mg/filter		0.10		SW6020	01/21/13 18:52 / clm
RADIONUCLIDES							
Radium 226	7.5	pCi/Filter				E903.0	01/28/13 14:22 / trs
Radium 226 precision (±)	1.1	pCi/Filter				E903.0	01/28/13 14:22 / trs
Radium 226 MDC	0.7	pCi/Filter				E903.0	01/28/13 14:22 / trs
Thorium 230	3.8	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 precision (±)	0.66	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 MDC	0.23	pCi/Filter				E908.0	01/21/13 09:08 / dmf

Report
Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: Grants 4th Quarter 2012 Comp
REPORT DATE: February 9, 2013

SAMPLE ID: HMC-1-A

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12040023-002 First Quarter 2012 Air Volume in mLs 1.30E+11	^{nat} U	9E-17	N/A	N/A	1E-16	9E-14	1E-01
	²³⁰ Th	3E-17	7E-18	4E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	6E-17	2E-17	1E-17	1E-16	9E-13	6E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12070088-002 Second Quarter 2012 Air Volume in mLs 1.42E+11	^{nat} U	6E-16	N/A	N/A	1E-16	9E-14	7E-01
	²³⁰ Th	3E-17	7E-18	5E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	6E-17	1E-17	5E-18	1E-16	9E-13	7E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12100037-002 Third Quarter 2012 Air Volume in mLs 1.40E+11	^{nat} U	5E-16	N/A	N/A	1E-16	9E-14	5E-01
	²³⁰ Th	2E-17	6E-18	4E-18	1E-16	3E-14	8E-02
	²²⁶ Ra	3E-17	8E-18	6E-18	1E-16	9E-13	4E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C13010183-002 Fourth Quarter 2012 Air Volume in mLs 1.33E+11	^{nat} U	2E-16	N/A	N/A	1E-16	9E-14	3E-01
	²³⁰ Th	3E-17	5E-18	2E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	5E-17	8E-18	5E-18	1E-16	9E-13	5E-03

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp
Lab ID: C12100037-002
Client Sample ID: HMC-1-A

Report Date: 11/11/12
Collection Date: Not Provided
Date Received: 10/01/12
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/08/12 05:34 / cp
RADIONUCLIDES							
Radium 226	4.7	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Radium 226 precision (±)	1.1	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Radium 226 MDC	0.9	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Thorium 230	3.4	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 precision (±)	0.83	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 MDC	0.49	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Uranium, Activity	67	pCi/Filter		0.20		SW6020	11/08/12 05:34 / cp

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

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

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp
Lab ID: C13010183-002
Client Sample ID: HMC-1-A

Report Date: 02/09/13
Collection Date: Not Provided
Date Received: 01/08/13
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Uranium, Activity	33	pCi/Filter	D	0.96		SW6020	01/21/13 19:18 / clm
Vanadium	<0.10	mg/filter		0.10		SW6020	01/21/13 19:18 / clm
RADIONUCLIDES							
Radium 226	6.6	pCi/Filter				E903.0	01/28/13 14:22 / trs
Radium 226 precision (±)	1.0	pCi/Filter				E903.0	01/28/13 14:22 / trs
Radium 226 MDC	0.7	pCi/Filter				E903.0	01/28/13 14:22 / trs
Thorium 230	3.9	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 precision (±)	0.68	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 MDC	0.28	pCi/Filter				E908.0	01/21/13 09:08 / dmf

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: Grants 4th Quarter 2012 Comp
REPORT DATE: February 9, 2013

SAMPLE ID: HMC-2

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12040023-003 First Quarter 2012 Air Volume in mLs 1.27E+11	^{238}U	1E-16	N/A	N/A	1E-16	9E-14	1E-01
	^{230}Th	5E-17	1E-17	3E-18	1E-16	3E-14	2E-01
	^{226}Ra	9E-17	2E-17	1E-17	1E-16	9E-13	1E-02

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12070088-003 Second Quarter 2012 Air Volume in mLs 1.36E+11	^{238}U	4E-16	N/A	N/A	1E-16	9E-14	4E-01
	^{230}Th	8E-17	1E-17	4E-18	1E-16	3E-14	3E-01
	^{226}Ra	2E-16	1E-17	5E-18	1E-16	9E-13	2E-02

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12100037-003 Third Quarter 2012 Air Volume in mLs 1.43E+11	^{238}U	3E-16	N/A	N/A	1E-16	9E-14	3E-01
	^{230}Th	2E-17	5E-18	4E-18	1E-16	3E-14	6E-02
	^{226}Ra	2E-17	6E-18	6E-18	1E-16	9E-13	2E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C13010183-003 Fourth Quarter 2012 Air Volume in mLs 1.28E+11	^{238}U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
	^{230}Th	2E-17	4E-18	2E-18	1E-16	3E-14	8E-02
	^{226}Ra	5E-17	8E-18	6E-18	1E-16	9E-13	6E-03

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp
Lab ID: C12100037-003
Client Sample ID: HMC-2

Report Date: 11/11/12
Collection Date: Not Provided
Date Received: 10/01/12
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/08/12 05:57 / cp
RADIONUCLIDES							
Radium 226	3.1	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Radium 226 precision (±)	0.9	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Radium 226 MDC	0.8	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Thorium 230	2.5	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 precision (±)	0.68	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 MDC	0.51	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Uranium, Activity	38	pCi/Filter		0.20		SW6020	11/08/12 05:57 / cp

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.
MDC - Minimum detectable concentration

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

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp
Lab ID: C13010183-003
Client Sample ID: HMC-2

Report Date: 02/09/13
Collection Date: Not Provided
Date Received: 01/08/13
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Uranium, Activity	23	pCi/Filter	D	0.96		SW6020	01/21/13 19:22 / clm
Vanadium	<0.10	mg/filter		0.10		SW6020	01/21/13 19:22 / clm
RADIONUCLIDES							
Radium 226	6.4	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 precision (±)	1.1	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 MDC	0.8	pCi/Filter				E903.0	01/28/13 17:28 / trs
Thorium 230	3.0	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 precision (±)	0.56	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 MDC	0.22	pCi/Filter				E908.0	01/21/13 09:08 / dmf

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: Grants 4th Quarter 2012 Comp
REPORT DATE: February 9, 2013

SAMPLE ID: HMC-3

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12040023-004 First Quarter 2012 Air Volume in mLs 1.45E+11	^{235}U	8E-17	N/A	N/A	1E-16	9E-14	9E-02
	^{230}Th	2E-17	6E-18	6E-18	1E-16	3E-14	5E-02
	^{226}Ra	5E-17	1E-17	1E-17	1E-16	9E-13	5E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12070088-004 Second Quarter 2012 Air Volume in mLs 1.38E+11	^{235}U	6E-16	N/A	N/A	1E-16	9E-14	6E-01
	^{230}Th	4E-17	8E-18	4E-18	1E-16	3E-14	1E-01
	^{226}Ra	9E-17	1E-17	5E-18	1E-16	9E-13	1E-02

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12100037-004 Third Quarter 2012 Air Volume in mLs 1.36E+11	^{235}U	4E-16	N/A	N/A	1E-16	9E-14	4E-01
	^{230}Th	2E-17	5E-18	5E-18	1E-16	3E-14	6E-02
	^{226}Ra	3E-17	8E-18	7E-18	1E-16	9E-13	3E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C13010183-004 Fourth Quarter 2012 Air Volume in mLs 1.35E+11	^{235}U	3E-16	N/A	N/A	1E-16	9E-14	3E-01
	^{230}Th	2E-17	4E-18	2E-18	1E-16	3E-14	8E-02
	^{226}Ra	5E-17	7E-18	5E-18	1E-16	9E-13	5E-03

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp
Lab ID: C12100037-004
Client Sample ID: HMC-3

Report Date: 11/11/12
Collection Date: Not Provided
Date Received: 10/01/12
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/08/12 06:01 / cp
RADIONUCLIDES							
Radium 226	3.9	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Radium 226 precision (±)	1.0	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Radium 226 MDC	0.9	pCi/Filter				E903.0	10/17/12 09:26 / lbb
Thorium 230	2.5	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 precision (±)	0.73	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 MDC	0.63	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Uranium, Activity	49	pCi/Filter		0.20		SW6020	11/08/12 06:01 / cp

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

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



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp
Lab ID: C13010183-004
Client Sample ID: HMC-3

Report Date: 02/09/13
Collection Date: Not Provided
Date Received: 01/08/13
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Uranium, Activity	40	pCi/Filter	D	0.96		SW6020	01/21/13 19:25 / clm
Vanadium	<0.10	mg/filter		0.10		SW6020	01/21/13 19:25 / clm
RADIONUCLIDES							
Radium 226	6.3	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 precision (±)	1	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 MDC	0.7	pCi/Filter				E903.0	01/28/13 17:28 / trs
Thorium 230	3.1	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 precision (±)	0.56	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 MDC	0.26	pCi/Filter				E908.0	01/21/13 09:08 / dmf

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: Grants 4th Quarter 2012 Comp
REPORT DATE: February 9, 2013

SAMPLE ID: HMC-4

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12040023-005 First Quarter 2012 Air Volume in mLs 1.29E+11	^{nat} U	8E-17	N/A	N/A	1E-16	9E-14	9E-02
	²³⁰ Th	2E-17	5E-18	3E-18	1E-16	3E-14	5E-02
	²²⁶ Ra	5E-17	1E-17	1E-17	1E-16	9E-13	6E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12070088-005 Second Quarter 2012 Air Volume in mLs 1.47E+11	^{nat} U	7E-16	N/A	N/A	1E-16	9E-14	8E-01
	²³⁰ Th	4E-17	7E-18	4E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	7E-17	1E-17	5E-18	1E-16	9E-13	8E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12100037-005 Third Quarter 2012 Air Volume in mLs 1.40E+11	^{nat} U	7E-16	N/A	N/A	1E-16	9E-14	7E-01
	²³⁰ Th	1E-17	5E-18	4E-18	1E-16	3E-14	5E-02
	²²⁶ Ra	3E-17	7E-18	6E-18	1E-16	9E-13	3E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C13010183-005 Fourth Quarter 2012 Air Volume in mLs 1.33E+11	^{nat} U	5E-16	N/A	N/A	1E-16	9E-14	6E-01
	²³⁰ Th	3E-17	5E-18	2E-18	1E-16	3E-14	9E-02
	²²⁶ Ra	7E-17	9E-18	5E-18	1E-16	9E-13	8E-03

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp
Lab ID: C12100037-005
Client Sample ID: HMC-4

Report Date: 11/11/12
Collection Date: Not Provided
Date Received: 10/01/12
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/08/12 06:05 / cp
RADIONUCLIDES							
Radium 226	3.5	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Radium 226 precision (±)	0.9	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Radium 226 MDC	0.8	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Thorium 230	1.9	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 precision (±)	0.66	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 MDC	0.60	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Uranium, Activity	92	pCi/Filter		0.20		SW6020	11/08/12 06:05 / cp

Report Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

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



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp
Lab ID: C13010183-005
Client Sample ID: HMC-4

Report Date: 02/09/13
Collection Date: Not Provided
Date Received: 01/08/13
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Uranium, Activity	67	pCi/Filter	D	0.96		SW6020	01/21/13 19:28 / clm
Vanadium	0.14	mg/filter		0.10		SW6020	01/21/13 19:28 / clm
RADIONUCLIDES							
Radium 226	9.2	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 precision (±)	1.2	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 MDC	0.7	pCi/Filter				E903.0	01/28/13 17:28 / trs
Thorium 230	3.6	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 precision (±)	0.62	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 MDC	0.26	pCi/Filter				E908.0	01/21/13 09:08 / dmf

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: Grants 4th Quarter 2012 Comp
REPORT DATE: February 9, 2013

SAMPLE ID: HMC-5

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12040023-006 First Quarter 2012 Air Volume in mLs 1.46E+11	^{nat} U	7E-17	N/A	N/A	1E-16	9E-14	8E-02
	²³⁰ Th	1E-17	4E-18	3E-18	1E-16	3E-14	3E-02
	²²⁶ Ra	3E-17	1E-17	1E-17	1E-16	9E-13	3E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12070088-006 Second Quarter 2012 Air Volume in mLs 1.45E+11	^{nat} U	1.4E-15	N/A	N/A	1E-16	9E-14	1.6E+00
	²³⁰ Th	3E-17	7E-18	4E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	5E-17	8E-18	5E-18	1E-16	9E-13	6E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12100037-006 Third Quarter 2012 Air Volume in mLs 1.41E+11	^{nat} U	1.1E-15	N/A	N/A	1E-16	9E-14	1.3E+00
	²³⁰ Th	2E-17	6E-18	5E-18	1E-16	3E-14	7E-02
	²²⁶ Ra	3E-17	7E-18	6E-18	1E-16	9E-13	3E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C13010183-006 Fourth Quarter 2012 Air Volume in mLs 1.46E+11	^{nat} U	9E-16	N/A	N/A	1E-16	9E-14	1E+00
	²³⁰ Th	3E-17	4E-18	2E-18	1E-16	3E-14	8E-02
	²²⁶ Ra	5E-17	7E-18	5E-18	1E-16	9E-13	6E-03

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp
Lab ID: C12100037-006
Client Sample ID: HMC-5

Report Date: 11/11/12
Collection Date: Not Provided
Date Received: 10/01/12
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/08/12 06:10 / cp
RADIONUCLIDES							
Radium 226	4.4	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Radium 226 precision (±)	1.0	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Radium 226 MDC	0.8	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Thorium 230	2.9	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 precision (±)	0.82	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 MDC	0.73	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Uranium, Activity	160	pCi/Filter		0.20		SW6020	11/08/12 06:10 / cp

Report Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

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

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp
Lab ID: C13010183-006
Client Sample ID: HMC-5

Report Date: 02/09/13
Collection Date: Not Provided
Date Received: 01/08/13
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Uranium, Activity	130	pCi/Filter	D	0.96		SW6020	01/21/13 19:31 / clm
Vanadium	0.10	mg/filter		0.10		SW6020	01/21/13 19:31 / clm
RADIONUCLIDES							
Radium 226	7.5	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 precision (±)	1.1	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 MDC	0.7	pCi/Filter				E903.0	01/28/13 17:28 / trs
Thorium 230	3.7	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 precision (±)	0.60	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 MDC	0.23	pCi/Filter				E908.0	01/21/13 09:08 / dmf

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: Grants 4th Quarter 2012 Comp
REPORT DATE: February 9, 2013

SAMPLE ID: HMC-6

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12040023-007 First Quarter 2012 Air Volume in mLs 1.38E+11	^{nat} U	6E-17	N/A	N/A	1E-16	9E-14	6E-02
	²³⁰ Th	2E-17	5E-18	4E-18	1E-16	3E-14	5E-02
	²²⁶ Ra	4E-17	1E-17	1E-17	1E-16	9E-13	4E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12070088-007 Second Quarter 2012 Air Volume in mLs 1.27E+11	^{nat} U	7E-16	N/A	N/A	1E-16	9E-14	8E-01
	²³⁰ Th	3E-17	7E-18	5E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	7E-17	2E-17	1E-17	1E-16	9E-13	8E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C12100037-007 Third Quarter 2012 Air Volume in mLs 1.32E+11	^{nat} U	7E-16	N/A	N/A	1E-16	9E-14	8E-01
	²³⁰ Th	2E-17	5E-18	4E-18	1E-16	3E-14	6E-02
	²²⁶ Ra	3E-17	7E-18	6E-18	1E-16	9E-13	3E-03

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C13010183-007 Fourth Quarter 2012 Air Volume in mLs 1.34E+11	^{nat} U	5E-16	N/A	N/A	1E-16	9E-14	5E-01
	²³⁰ Th	3E-17	5E-18	2E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	7E-17	9E-18	5E-18	1E-16	9E-13	7E-03

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp
Lab ID: C12100037-007
Client Sample ID: HMC-6

Report Date: 11/11/12
Collection Date: Not Provided
Date Received: 10/01/12
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/08/12 06:14 / cp
RADIONUCLIDES							
Radium 226	3.3	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Radium 226 precision (±)	0.9	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Radium 226 MDC	0.8	pCi/Filter				E903.0	10/17/12 12:37 / lbb
Thorium 230	2.4	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 precision (±)	0.71	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Thorium 230 MDC	0.51	pCi/Filter				E908.0	10/21/12 13:14 / dmf
Uranium, Activity	91	pCi/Filter		0.20		SW6020	11/08/12 06:14 / cp

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

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



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp
Lab ID: C13010183-007
Client Sample ID: HMC-6

Report Date: 02/09/13
Collection Date: Not Provided
Date Received: 01/08/13
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Uranium, Activity	60	pCi/Filter	D	0.96		SW6020	01/21/13 19:34 / clm
Vanadium	0.10	mg/filter		0.10		SW6020	01/21/13 19:34 / clm
RADIONUCLIDES							
Radium 226	8.9	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 precision (±)	1.1	pCi/Filter				E903.0	01/28/13 17:28 / trs
Radium 226 MDC	0.7	pCi/Filter				E903.0	01/28/13 17:28 / trs
Thorium 230	4.3	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 precision (±)	0.68	pCi/Filter				E908.0	01/21/13 09:08 / dmf
Thorium 230 MDC	0.23	pCi/Filter				E908.0	01/21/13 09:08 / dmf

Report
Definitions: RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

ANALYTICAL SUMMARY REPORT

November 11, 2012

Homestake Mining Co
 Hwy 605
 Grants, NM 87020

Workorder No.: C12100037 Quote ID: C775 - Hi-Vol Filters

Project Name: 3rd Quarter 2012 Comp

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 10/1/2012 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C12100037-001	HMC-1		10/01/12	Filter	Metals by ICP/ICPMS, Total Composite of two or more samples Digestion, Total Metals Radium 226 Thorium, Isotopic
C12100037-002	HMC-1-A		10/01/12	Filter	Same As Above
C12100037-003	HMC-2		10/01/12	Filter	Same As Above
C12100037-004	HMC-3		10/01/12	Filter	Same As Above
C12100037-005	HMC-4		10/01/12	Filter	Same As Above
C12100037-006	HMC-5		10/01/12	Filter	Same As Above
C12100037-007	HMC-6		10/01/12	Filter	Same As Above
C12100037-008	HMC-7 Filter Comp		10/01/12	Filter	Same As Above

The results as reported relate only to the item(s) submitted for testing. The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Radiochemistry analyses were performed at Energy Laboratories, Inc., 2325 Kerzell Lane, Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

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

Report Approved By:


 Interim Branch Manager

Digitally signed by
 Steve Carlston

Date: 2012.11.11 15:22:24 -07:00

ANALYTICAL SUMMARY REPORT

February 09, 2013

Homestake Mining Co
 Hwy 605
 Grants, NM 87020

Workorder No.: C13010183 Quote ID: C775 - Hi-Vol Filters

Project Name: Grants 4th Quarter 2012 Comp

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 1/8/2013 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C13010183-001	HMC-1		01/08/13	Filter	Metals by ICP/ICPMS, Total Composite of two or more samples Digestion, Total Metals Radium 226 Thorium, Isotopic
C13010183-002	HMC-1-A		01/08/13	Filter	Same As Above
C13010183-003	HMC-2		01/08/13	Filter	Same As Above
C13010183-004	HMC-3		01/08/13	Filter	Same As Above
C13010183-005	HMC-4		01/08/13	Filter	Same As Above
C13010183-006	HMC-5		01/08/13	Filter	Same As Above
C13010183-007	HMC-6		01/08/13	Filter	Same As Above
C13010183-008	HMC-7 Filter Comp		01/08/13	Filter	Same As Above

The results as reported relate only to the item(s) submitted for testing. The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Radiochemistry analyses were performed at Energy Laboratories, Inc., 2325 Kerzell Lane, Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

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

Report Approved By:


 Interim Branch Manager

Digitally signed by

Steve Carlston

Date: 2013.02.09 15:36:59 -07:00



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp

Report Date: 11/11/12
Work Order: C12100037

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: R165941
Sample ID: C12100037-004AMS										
Sample Matrix Spike										
Radium 226		89.4	pCi/Filter		94	70	130			10/17/12 09:26
Sample ID: C12100037-004AMSD										
Sample Matrix Spike Duplicate										
Radium 226		83.0	pCi/Filter		95	70	130	7.4		10/17/12 09:26
Sample ID: LCS-35265										
Laboratory Control Sample										
Radium 226		17.4	pCi/Filter		90	70	130			10/17/12 12:37
Sample ID: MB-35265										
3 Method Blank										
Radium 226		-0.06	pCi/Filter							10/17/12 12:37
Radium 226 precision (\pm)		0.2	pCi/Filter							U
Radium 226 MDC		0.3	pCi/Filter							

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp

Report Date: 11/11/12
Work Order: C12100037

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0										Batch: R166375
Sample ID: LCS-35265	Laboratory Control Sample			Run: ALPHANALYST_121015E			10/21/12 13:14			
Thorium 230		18.1	pCi/Filter	110		80	120			
Sample ID: MB-35265	3	Method Blank			Run: ALPHANALYST_121015E			10/21/12 13:14		
Thorium 230		0.2	pCi/Filter							
Thorium 230 precision (±)		0.1	pCi/Filter							
Thorium 230 MDC		0.2	pCi/Filter							
Sample ID: C12100446-001AMS	Sample Matrix Spike			Run: ALPHANALYST_121015E			10/21/12 13:14			
Thorium 230		51.0	pCi/Filter	103		70	130			
Sample ID: C12100446-001AMSD	Sample Matrix Spike Duplicate			Run: ALPHANALYST_121015E			10/21/12 13:14			
Thorium 230		51.6	pCi/Filter	105		70	130	1.3	29.9	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 3rd Quarter 2012 Comp

Report Date: 11/11/12
Work Order: C12100037

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS4-C_121107A		
Sample ID: ICV	2	Initial Calibration Verification Standard								11/07/12 07:50
Uranium		0.0512	mg/L	0.00030	102	90	110			
Vanadium		0.0476	mg/L	0.0010	95	90	110			
Sample ID: ICSA	2	Interference Check Sample A								11/07/12 07:55
Uranium		2.97E-05	mg/L	0.00030						
Vanadium		2.20E-05	mg/L	0.0010						
Sample ID: ICSAB	2	Interference Check Sample AB								11/07/12 07:59
Uranium		7.50E-06	mg/L	0.00030						
Vanadium		-6.50E-06	mg/L	0.0010						
Method: SW6020								Batch: 35265		
Sample ID: MB-35265	2	Method Blank				Run: ICPMS4-C_121107A			11/08/12 05:03	
Uranium		3E-05	mg/filter	9E-06						
Vanadium		0.003	mg/filter	4E-05						
Sample ID: LCS2-35265	2	Laboratory Control Sample				Run: ICPMS4-C_121107A			11/08/12 05:08	
Uranium		0.094	mg/filter	0.00030	94	70	130			
Vanadium		0.11	mg/filter	0.10	104	70	130			
Sample ID: C12100037-001AMS4	2	Sample Matrix Spike				Run: ICPMS4-C_121107A			11/08/12 05:21	
Uranium		0.42	mg/filter	0.00030	101	75	125			
Vanadium		0.31	mg/filter	0.10	104	75	125			
Sample ID: C12100037-001AMSD	2	Sample Matrix Spike Duplicate				Run: ICPMS4-C_121107A			11/08/12 05:25	
Uranium		0.44	mg/filter	0.00030	105	75	125	2.6	20	
Vanadium		0.31	mg/filter	0.10	102	75	125	1.6	20	
Sample ID: C12100037-008ADIL	2	Serial Dilution				Run: ICPMS4-C_121107A			11/08/12 06:23	
Uranium		0.00060	mg/filter	0.00030		0	0	10	N	
Vanadium		0.017	mg/filter	0.10		0	0	10		

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp

Report Date: 02/09/13
Work Order: C13010183

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: RA226-6490	
Sample ID: MB-36176	3	Method Blank				Run: TENNELEC-3_130116D			01/28/13 14:21	
Radium 226		0.3	pCi/Filter							
Radium 226 precision (\pm)		0.1	pCi/Filter							
Radium 226 MDC		0.2	pCi/Filter							
Sample ID: LCS-36176		Laboratory Control Sample				Run: TENNELEC-3_130116D			01/28/13 14:21	
Radium 226		14.8	pCi/Filter	115		80	120			
Sample ID: C13010270-002EMS		Sample Matrix Spike				Run: TENNELEC-3_130116D			01/28/13 17:28	
Radium 226		18	pCi/L	112		70	130			
Sample ID: C13010270-002EMSD		Sample Matrix Spike Duplicate				Run: TENNELEC-3_130116D			01/28/13 17:28	
Radium 226		18	pCi/L	113		70	130	0.2	19.1	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Report Date: 02/09/13

Project: Grants 4th Quarter 2012 Comp

Work Order: C13010183

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0										Batch: 36212
Sample ID: C13010183-008AMS	Sample Matrix Spike									
Thorium 230		44.6	pCi/Filter	92		70	130			01/21/13 09:08
Sample ID: C13010183-008AMSD	Sample Matrix Spike Duplicate									
Thorium 230		39.9	pCi/Filter	82		70	130	11		01/21/13 09:08
Sample ID: LCS-36212	Laboratory Control Sample									
Thorium 230		15.3	pCi/Filter	93		80	120			01/21/13 09:08
Sample ID: MB-36212	3 Method Blank									
Thorium 230		0.3	pCi/Filter							01/21/13 09:08
Thorium 230 precision (\pm)		0.1	pCi/Filter							
Thorium 230 MDC		0.2	pCi/Filter							

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants 4th Quarter 2012 Comp

Report Date: 02/09/13
Work Order: C13010183

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS2-C_130121A		
Sample ID: ICV	2	Initial Calibration Verification Standard								01/21/13 14:03
Uranium		0.0489	mg/L	0.00030	98	90	110			
Vanadium		0.0514	mg/L	0.0010	103	90	110			
Sample ID: ICSA	2	Interference Check Sample A								01/21/13 14:06
Uranium		9.20E-06	mg/L	0.00030						
Vanadium		0.000552	mg/L	0.0010						
Sample ID: ICSAB	2	Interference Check Sample AB								01/21/13 14:10
Uranium		-2.20E-06	mg/L	0.00030						
Vanadium		0.000296	mg/L	0.0010						
Method: SW6020								Batch: 36212		
Sample ID: MB-36212	2	Method Blank				Run: ICPMS2-C_130121A			01/21/13 18:43	
Uranium		3E-05	mg/filter	1E-05						
Vanadium		ND	mg/filter	0.003						
Sample ID: LCS2-36212	2	Laboratory Control Sample				Run: ICPMS2-C_130121A			01/21/13 18:46	
Uranium		0.079	mg/filter	0.0014	79	70	130			
Vanadium		0.078	mg/filter	0.10	78	70	130			
Sample ID: C13010183-001AMS4	2	Sample Matrix Spike				Run: ICPMS2-C_130121A			01/21/13 18:56	
Uranium		0.37	mg/filter	0.0014	98	75	125			
Vanadium		0.31	mg/filter	0.10	96	75	125			
Sample ID: C13010183-001AMSD	2	Sample Matrix Spike Duplicate				Run: ICPMS2-C_130121A			01/21/13 18:59	
Uranium		0.37	mg/filter	0.0014	97	75	125	0.3	20	
Vanadium		0.31	mg/filter	0.10	96	75	125	0.2	20	
Sample ID: C13010183-008ADIL	2	Serial Dilution				Run: ICPMS2-C_130121A			01/21/13 19:41	
Uranium		0.0012	mg/filter	0.0071		0	0		10	N
Vanadium		ND	mg/filter	0.10		0	0		10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

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 ($\mu\text{Ci/ml}$)
HMC-1 (average) N Outer Perimeter	6/29/12-1/4/13	1.2E-09	2.0E-10	11.8	3.2E-10
HMC-1A (average) N Outer Perimeter	6/29/12-1/4/13	1.9E-09	2.7E-10	18.7	3.2E-10
HMC-2 (average) NE Outer Perimeter	6/29/12-1/4/13	1.9E-09	2.6E-10	18.7	3.2E-10
HMC-3 (average) E Outer Perimeter	6/29/12-1/4/13	1.1E-09	1.9E-10	11.0	3.2E-10
HMC-4 (average) S Outer Perimeter	6/29/12-1/4/13	1.9E-09	2.6E-10	18.8	3.2E-10
HMC-5 (average) N of Nearest Residence	6/29/12-1/4/13	1.9E-09	2.7E-10	19.3	3.2E-10
HMC-6 (average) W of Outer Perimeter	6/29/12-1/4/13	1.6E-09	2.4E-10	15.5	3.2E-10
HMC-7 (average) S Boundary	6/29/12-1/4/13	1.0E-09	1.8E-10	10.2	3.2E-10
HMC-16 (average) Background	6/29/12-1/4/13	7.3E-10	1.4E-10	7.3	3.2E-10

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)*
HMC-1 N Outer Perimeter	7/1/12 - 12/31/12	55	5.4
HMC-1A N Outer Perimeter	7/1/12 - 12/31/12	50	4.9
HMC-2 NE Outer Perimeter	7/1/12 - 12/31/12	60	5.9
HMC-3 E Outer Perimeter	7/1/12 - 12/31/12	57	5.6
HMC-4 S Outer Perimeter	7/1/12 - 12/31/12	62	6.1
HMC-5 N of Nearest Residence	7/1/12 - 12/31/12	60	5.9
HMC-6 W of Outer Perimeter	7/1/12 - 12/31/12	58	5.7
HMC-16 Background	7/1/12 - 12/31/12	52	5.1

*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 2012 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. Other activities that occurred on the tailings piles include placing additional interim cover on top of the large tailings pile in order to reduce radon emissions and construction of a water treatment facility.

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 (i.e. the restricted area boundary) 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 2012. The monitoring stations HMC-4 and HMC-5 were considered as Nearest Residence locations and the point of compliance for public dose limits. 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 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 0.5 mrem/year and 0.8 mrem/y, respectively while that at the background location (HMC-6) was calculated to be 0.5 mrem/y, for a net CEDE at locations HMC-4 and HMC-5 of 0.0 mrem/y and 0.3 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 0.0 mrem/y net dose equivalent at HMC-4 and 0.2 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 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 four quarterly 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 average radon concentration for 2012 at HMC-4 and HMC-5 was 1.75 pCi/L at each location. The average annual concentration at the background location (HMC-16) was 0.97 pCi/l. Subtracting the background concentration from the measured concentrations at HMC-4 and HMC-5 results in net radon concentrations of 0.78 pCi/l at each location.

Since the nearest residence is within a few hundred feet of the site perimeter and within 3500 feet of the major source of on-site releases of radon, the radon daughter equilibrium should be low. We have selected 20 percent radon daughter equilibrium as an estimate for use in the dose calculations. NRC uses continuous exposure to 0.1 pCi/l Rn-222 in full equilibrium with the daughter products as being equivalent to a committed effective dose equivalent (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 results in a calculated CEDE of 59 mrem/y.

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 optically stimulated luminescence (OSL) dosimeters placed at each monitoring station. 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 131 mrem/year at 133 mrem/year, respectively. The average annual effective dose equivalent at the background location, HMC-16, was 116 mrem/year. The net annual effective dose equivalent for HMC-4 and HMC-5 was 15 mrem/year and 17 mrem/year, respectively, assuming 100 percent occupancy. Considering the 75 percent occupancy factor, the net annual effective dose equivalent is 11 mrem/year and 13 mrem/year 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 committed effective dose equivalent (CEDE) from inhalation of airborne particulate, the CEDE 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 at HMC-4 was 70 mrem/year and at HMC-5 was 72 mrem/year. 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 2012

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	8.00E-17	3.90E-17	3.90E-17	2.00E-17	5.00E-17
2nd qtr	7.00E-16	3.41E-16	3.41E-16	4.00E-17	7.00E-17
3rd qtr	7.00E-16	3.41E-16	3.41E-16	1.00E-17	3.00E-17
4th qtr	5.00E-16	2.44E-16	2.44E-16	3.00E-17	7.00E-17
Average	4.95E-16	2.41E-16	2.41E-16	2.50E-17	5.50E-17
ANNUAL EFFECTIVE DOSE EQUIVALENT					
	U-234 mrem =====	U-238 mrem =====	Th-230 mrem =====	Ra-226 mrem =====	TOTAL mrem =====
	0.232	0.208	0.059	0.003	0.5

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

Year 2012

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	7.00E-17	3.41E-17	3.41E-17	1.00E-17	3.00E-17
2nd qtr	1.40E-15	6.82E-16	6.82E-16	3.00E-17	5.00E-17
3rd qtr	1.10E-15	5.36E-16	5.36E-16	2.00E-17	3.00E-17
4th qtr	9.00E-16	4.39E-16	4.39E-16	3.00E-17	5.00E-17
Average	8.68E-16	4.23E-16	4.23E-16	2.25E-17	4.00E-17
ANNUAL EFFECTIVE DOSE EQUIVALENT					
	U-234 mrem =====	U-238 mrem =====	Th-230 mrem =====	Ra-226 mrem =====	TOTAL mrem =====
	0.407	0.364	0.054	0.003	0.8

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

Year 2012

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	6.00E-17	2.92E-17	2.92E-17	2.00E-17	4.00E-17
2nd qtr	7.00E-16	3.41E-16	3.41E-16	3.00E-17	7.00E-17
3rd qtr	7.00E-16	3.41E-16	3.41E-16	2.00E-17	3.00E-17
4th qtr	5.00E-16	2.44E-16	2.44E-16	3.00E-17	7.00E-17
	-----	-----	-----	-----	-----
Average	4.90E-16	2.39E-16	2.39E-16	2.50E-17	5.25E-17
ANNUAL EFFECTIVE DOSE EQUIVALENT					
U-234 mrem	U-238 mrem	Th-230 mrem	Ra-226 mrem	TOTAL mrem	
=====	=====	=====	=====	=====	
0.230	0.206	0.059	0.003	0.5	

Table 2.1.1 – Water Quality Analysis for Well D1



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C12070246-001

Client Sample ID: D1

Report Date: 07/31/12

Collection Date: 07/02/12 10:49

Date Received: 07/10/12

Matrix: Aqueous

ENTERED AUG 10 2012

Analyses	Result	Units	Qual	MCL/ RL QCL	Method	Analysis Date / By
MAJOR IONS						
075 Alkalinity, Total as CaCO3	251	mg/L		5	A2320 B	07/10/12 18:09 / jba
006 Carbonate as CO3	<5	mg/L		5	A2320 B	07/10/12 18:09 / jba
005 Bicarbonate as HCO3	306	mg/L		5	A2320 B	07/10/12 18:09 / jba
001 Calcium	219	mg/L		0.5	E200.7	07/13/12 16:11 / sf
007 Chloride	117	mg/L	D	2	E300.0	07/11/12 15:53 / wc
002 Magnesium	46.0	mg/L		0.5	E200.7	07/13/12 16:11 / sf
039 Nitrogen, Nitrate+Nitrite as N	2.1	mg/L		0.1	E353.2	07/12/12 13:03 / lr
003 Potassium	3.2	mg/L		0.5	E200.7	07/13/12 16:11 / sf
004 Sodium	307	mg/L		0.5	E200.7	07/13/12 16:11 / sf
008 Sulfate	1040	mg/L	D	8	E300.0	07/11/12 15:53 / wc
PHYSICAL PROPERTIES						
009 pH	7.52	s.u.	H	0.01	A4500-H B	07/11/12 09:30 / ab
010 Solids, Total Dissolved TDS @ 180 C	2020	mg/L	H	10	A2540 C	07/11/12 09:31 / ab
- The sample was received past the EPA-recommended holding time for TDS analysis.						
METALS - DISSOLVED						
036 Molybdenum	1.04	mg/L		0.03	E200.7	07/13/12 16:11 / sf
040 Selenium	0.157	mg/L		0.005	E200.8	07/26/12 13:57 / cp
015 Uranium	0.855	mg/L		0.0003	E200.8	07/26/12 13:57 / cp
244 Uranium Precision (±)	0.138	mg/L		0.00005	E200.8	07/26/12 13:57 / cp
113 Uranium, Activity	5.8E-07	uCi/mL		2.0E-10	E200.8	07/26/12 13:57 / cp
114 Uranium, Activity precision (±)	9.3E-08	uCi/mL		3.0E-11	E200.8	07/26/12 13:57 / cp
042 Vanadium	<0.01	mg/L		0.01	E200.7	07/13/12 16:11 / sf
RADIONUCLIDES - DISSOLVED						
045 Radium 226	-0.1	pCi/L	U		E903.0	07/24/12 10:05 / lbb
245 Radium 226 precision (±)	0.08	pCi/L			E903.0	07/24/12 10:05 / lbb
Radium 226 MDC	0.20	pCi/L			E903.0	07/24/12 10:05 / lbb
256 Radium 226 altu	-1.0E-10	uCi/mL	U		E903.0	07/24/12 10:05 / lbb
258 Radium 226 altu precision (±)	8.0E-11	uCi/mL			E903.0	07/24/12 10:05 / lbb
Radium 226 altu MDC	2.0E-10	uCi/mL			E903.0	07/24/12 10:05 / lbb
057 Radium 228	-0.3	pCi/L	U		RA-05	07/19/12 22:30 / gb
257 Radium 228 precision (±)	0.8	pCi/L			RA-05	07/19/12 22:30 / gb
Radium 228 MDC	1.3	pCi/L			RA-05	07/19/12 22:30 / gb
359 Radium 228 altu	-3.0E-10	uCi/mL	U		RA-05	07/19/12 22:30 / gb
360 Radium 228 altu precision (±)	8.0E-10	uCi/mL			RA-05	07/19/12 22:30 / gb
Radium 228 altu MDC	1.0E-09	uCi/mL			RA-05	07/19/12 22:30 / gb

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C12070246-001

Client Sample ID: D1

Report Date: 07/31/12

Collection Date: 07/02/12 10:49

Date Received: 07/10/12

Matrix: Aqueous

Analyses		Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED								
048	Thorium 230	0.06	pCi/L	U			E908.0	07/24/12 08:52 / dmf
248	Thorium 230 precision (±)	0.09	pCi/L				E908.0	07/24/12 08:52 / dmf
	Thorium 230 MDC	0.2	pCi/L				E908.0	07/24/12 08:52 / dmf
362	Thorium 230 altu	6.0E-11	uCi/mL	U			E908.0	07/24/12 08:52 / dmf
363	Thorium 230 altu precision (±)	9.0E-11	uCi/mL				E908.0	07/24/12 08:52 / dmf
	Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	07/24/12 08:52 / dmf
DATA QUALITY								
192	A/C Balance (± 5)	-3.21	%				A1030 E	07/31/12 13:57 / kbh
194	Anions	30.0	meq/L				A1030 E	07/31/12 13:57 / kbh
195	Cations	28.2	meq/L				A1030 E	07/31/12 13:57 / kbh
079	Solids, Total Dissolved Calculated	1900	mg/L				A1030 E	07/31/12 13:57 / kbh
200	TDS Balance (0.80 - 1.20)	1.05	unitless				A1030 E	07/31/12 13:57 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

Table 2.1.2 – Water Quality Analysis for Well S4

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C12070246-002

Client Sample ID: S4

Report Date: 07/31/12

Collection Date: 07/02/12 14:20

Date Received: 07/10/12

Matrix: Aqueous

ENTERED AUG 10 2012

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	452	mg/L		5		A2320 B	07/10/12 18:17 / jba
006 Carbonate as CO3	<5	mg/L		5		A2320 B	07/10/12 18:17 / jba
005 Bicarbonate as HCO3	551	mg/L		5		A2320 B	07/10/12 18:17 / jba
001 Calcium	251	mg/L		0.5		E200.7	07/13/12 16:15 / sf
007 Chloride	235	mg/L	D	2		E300.0	07/11/12 16:09 / wc
002 Magnesium	65.7	mg/L		0.5		E200.7	07/13/12 16:15 / sf
039 Nitrogen, Nitrate+Nitrite as N	0.7	mg/L		0.1		E353.2	07/12/12 13:06 / lr
003 Potassium	4.7	mg/L		0.5		E200.7	07/13/12 16:15 / sf
004 Sodium	296	mg/L		0.5		E200.7	07/13/12 16:15 / sf
008 Sulfate	806	mg/L	D	8		E300.0	07/11/12 16:09 / wc
PHYSICAL PROPERTIES							
009 pH	7.46	s.u.	H	0.01		A4500-H B	07/11/12 09:33 / ab
010 Solids, Total Dissolved TDS @ 180 C	2100	mg/L	H	10		A2540 C	07/11/12 09:31 / ab
- The sample was received past the EPA-recommended holding time for TDS analysis.							
METALS - DISSOLVED							
036 Molybdenum	0.53	mg/L		0.03		E200.7	07/13/12 16:15 / sf
040 Selenium	0.029	mg/L		0.005		E200.8	07/26/12 14:02 / cp
015 Uranium	0.373	mg/L		0.0003		E200.8	07/26/12 14:02 / cp
244 Uranium Precision (±)	0.0602	mg/L		0.00005		E200.8	07/26/12 14:02 / cp
113 Uranium, Activity	2.5E-07	uCi/mL		2.0E-10		E200.8	07/26/12 14:02 / cp
114 Uranium, Activity precision (±)	4.1E-08	uCi/mL		3.0E-11		E200.8	07/26/12 14:02 / cp
042 Vanadium	<0.01	mg/L		0.01		E200.7	07/13/12 16:15 / sf
RADIONUCLIDES - DISSOLVED							
045 Radium 226	0.14	pCi/L	U			E903.0	07/24/12 10:05 / lbb
245 Radium 226 precision (±)	0.14	pCi/L				E903.0	07/24/12 10:05 / lbb
Radium 226 MDC	0.21	pCi/L				E903.0	07/24/12 10:05 / lbb
256 Radium 226 altu	1.0E-10	uCi/mL	U			E903.0	07/24/12 10:05 / lbb
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	07/24/12 10:05 / lbb
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	07/24/12 10:05 / lbb
057 Radium 228	0.3	pCi/L	U			RA-05	07/19/12 22:30 / gb
257 Radium 228 precision (±)	0.8	pCi/L				RA-05	07/19/12 22:30 / gb
Radium 228 MDC	1.4	pCi/L				RA-05	07/19/12 22:30 / gb
359 Radium 228 altu	3.0E-10	uCi/mL	U			RA-05	07/19/12 22:30 / gb
360 Radium 228 altu precision (±)	8.0E-10	uCi/mL				RA-05	07/19/12 22:30 / gb
Radium 228 altu MDC	1.0E-09	uCi/mL				RA-05	07/19/12 22:30 / gb

Report RL - Analyte reporting limit.

Definitions: QCL - Quality control limit.

MDC - Minimum detectable concentration

MCL - Maximum contaminant level.

ND - Not detected at the reporting limit.

D - RL increased due to sample matrix.



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C12070246-002

Client Sample ID: S4

Report Date: 07/31/12

Collection Date: 07/02/12 14:20

Date Received: 07/10/12

Matrix: Aqueous

Analyses		Result	Units	Qual	MCL/		Method	Analysis Date / By
					RL	QCL		
RADIONUCLIDES - DISSOLVED								
048	Thorium 230	0.04	pCi/L	U			E908.0	07/24/12 08:53 / dmf
248	Thorium 230 precision (±)	0.09	pCi/L				E908.0	07/24/12 08:53 / dmf
	Thorium 230 MDC	0.2	pCi/L				E908.0	07/24/12 08:53 / dmf
362	Thorium 230 altu	4.0E-11	uCi/mL	U			E908.0	07/24/12 08:53 / dmf
363	Thorium 230 altu precision (±)	9.0E-11	uCi/mL				E908.0	07/24/12 08:53 / dmf
	Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	07/24/12 08:53 / dmf
DATA QUALITY								
192	A/C Balance (± 5)	-2.49	%				A1030 E	07/19/12 07:30 / kbh
194	Anions	32.5	meq/L				A1030 E	07/19/12 07:30 / kbh
195	Cations	30.9	meq/L				A1030 E	07/19/12 07:30 / kbh
079	Solids, Total Dissolved Calculated	2000	mg/L				A1030 E	07/19/12 07:30 / kbh
200	TDS Balance (0.80 - 1.20)	1.07	unitless				A1030 E	07/19/12 07:30 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

Table 2.1.3 – Water Quality Analysis for Well X



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C12070246-003

Client Sample ID: X

Report Date: 07/31/12

Collection Date: 07/02/12 11:30

Date Received: 07/10/12

Matrix: Aqueous

ENTERED AUG 10 2012

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	327	mg/L		5		A2320 B	07/10/12 18:25 / jba
006 Carbonate as CO3	<5	mg/L		5		A2320 B	07/10/12 18:25 / jba
005 Bicarbonate as HCO3	399	mg/L		5		A2320 B	07/10/12 18:25 / jba
001 Calcium	179	mg/L		0.5		E200.7	07/13/12 16:19 / sf
007 Chloride	152	mg/L		1		E300.0	07/11/12 16:58 / wc
002 Magnesium	39.7	mg/L		0.5		E200.7	07/13/12 16:19 / sf
039 Nitrogen, Nitrate+Nitrite as N	1.5	mg/L		0.1		E353.2	07/12/12 13:08 / lr
003 Potassium	4.8	mg/L		0.5		E200.7	07/13/12 16:19 / sf
004 Sodium	156	mg/L		0.5		E200.7	07/13/12 16:19 / sf
008 Sulfate	415	mg/L	D	4		E300.0	07/11/12 16:58 / wc
PHYSICAL PROPERTIES							
009 pH	7.49	s.u.	H	0.01		A4500-H B	07/11/12 09:36 / ab
010 Solids, Total Dissolved TDS @ 180 C	1250	mg/L	H	10		A2540 C	07/11/12 09:31 / ab
- The sample was received past the EPA-recommended holding time for TDS analysis.							
METALS - DISSOLVED							
036 Molybdenum	0.04	mg/L		0.03		E200.7	07/13/12 16:19 / sf
040 Selenium	0.008	mg/L		0.005		E200.8	07/26/12 14:06 / cp
015 Uranium	0.0649	mg/L		0.0003		E200.8	07/26/12 14:06 / cp
244 Uranium Precision (±)	0.0105	mg/L		0.00005		E200.8	07/26/12 14:06 / cp
113 Uranium, Activity	4.4E-08	uCi/mL		2.0E-10		E200.8	07/26/12 14:06 / cp
114 Uranium, Activity precision (±)	7.1E-09	uCi/mL		3.0E-11		E200.8	07/26/12 14:06 / cp
042 Vanadium	<0.01	mg/L		0.01		E200.7	07/13/12 16:19 / sf
RADIONUCLIDES - DISSOLVED							
045 Radium 226	-0.1	pCi/L	U			E903.0	07/24/12 10:05 / lbb
245 Radium 226 precision (±)	0.09	pCi/L				E903.0	07/24/12 10:05 / lbb
Radium 226 MDC	0.22	pCi/L				E903.0	07/24/12 10:05 / lbb
256 Radium 226 altu	-1.0E-10	uCi/mL	U			E903.0	07/24/12 10:05 / lbb
258 Radium 226 altu precision (±)	9.0E-11	uCi/mL				E903.0	07/24/12 10:05 / lbb
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	07/24/12 10:05 / lbb
057 Radium 228	-0.5	pCi/L	U			RA-05	07/19/12 22:30 / gb
257 Radium 228 precision (±)	0.9	pCi/L				RA-05	07/19/12 22:30 / gb
Radium 228 MDC	1.5	pCi/L				RA-05	07/19/12 22:30 / gb
359 Radium 228 altu	-5.0E-10	uCi/mL	U			RA-05	07/19/12 22:30 / gb
360 Radium 228 altu precision (±)	9.0E-10	uCi/mL				RA-05	07/19/12 22:30 / gb
Radium 228 altu MDC	1.0E-09	uCi/mL				RA-05	07/19/12 22:30 / gb

Report RL - Analyte reporting limit.

Definitions: QCL - Quality control limit.

MDC - Minimum detectable concentration

MCL - Maximum contaminant level.

ND - Not detected at the reporting limit.

D - RL increased due to sample matrix.



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C12070246-003

Client Sample ID: X

Report Date: 07/31/12

Collection Date: 07/02/12 11:30

Date Received: 07/10/12

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
RADIONUCLIDES - DISSOLVED							
048 Thorium 230	0.09	pCi/L	U			E908.0	07/24/12 08:53 / dmf
248 Thorium 230 precision (±)	0.1	pCi/L				E908.0	07/24/12 08:53 / dmf
Thorium 230 MDC	0.2	pCi/L				E908.0	07/24/12 08:53 / dmf
362 Thorium 230 altu	9.0E-11	uCi/mL	U			E908.0	07/24/12 08:53 / dmf
363 Thorium 230 altu precision (±)	1.0E-10	uCi/mL				E908.0	07/24/12 08:53 / dmf
Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	07/24/12 08:53 / dmf
DATA QUALITY							
192 A/C Balance (± 5)	-1.23	%				A1030 E	07/19/12 07:31 / kbh
194 Anions	19.6	meq/L				A1030 E	07/19/12 07:31 / kbh
195 Cations	19.1	meq/L				A1030 E	07/19/12 07:31 / kbh
079 Solids, Total Dissolved Calculated	1200	mg/L				A1030 E	07/19/12 07:31 / kbh
200 TDS Balance (0.80 - 1.20)	1.07	unitless				A1030 E	07/19/12 07:31 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

Table 2.1.4 – Water Quality Analysis for Well P



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C12050341-003

Client Sample ID: P

Report Date: 06/14/12

Collection Date: 05/03/12 14:40

Date Received: 05/09/12

Matrix: Aqueous

ENTERED JUN 28 2012

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	208	mg/L		5		A2320 B	05/09/12 17:32 / jba
006 Carbonate as CO3	<5	mg/L		5		A2320 B	05/09/12 17:32 / jba
005 Bicarbonate as HCO3	254	mg/L		5		A2320 B	05/09/12 17:32 / jba
001 Calcium	234	mg/L		0.5		E200.8	05/11/12 00:29 / smm
007 Chloride	50	mg/L		1		E300.0	05/15/12 12:12 / wc
002 Magnesium	45.6	mg/L		0.5		E200.8	05/11/12 00:29 / smm
039 Nitrogen, Nitrate+Nitrite as N	4.6	mg/L	D	0.5		E353.2	05/10/12 16:34 / dc
003 Potassium	5.0	mg/L		0.5		E200.8	05/11/12 00:29 / smm
004 Sodium	237	mg/L		0.5		E200.8	05/11/12 00:29 / smm
008 Sulfate	1010	mg/L	D	8		E300.0	05/17/12 12:57 / wc
PHYSICAL PROPERTIES							
009 pH	7.45	s.u.	H	0.01		A4500-H B	05/09/12 14:18 / ab
010 Solids, Total Dissolved TDS @ 180 C	1800	mg/L		10		A2540 C	05/10/12 10:46 / ab
METALS - DISSOLVED							
036 Molybdenum	<0.03	mg/L		0.03		E200.8	05/11/12 00:29 / smm
040 Selenium	0.117	mg/L		0.005		E200.8	05/11/12 00:29 / smm
015 Uranium	0.0311	mg/L		0.0003		E200.8	05/11/12 00:29 / smm
244 Uranium Precision (±)	0.00501	mg/L		0.00005		E200.8	05/11/12 00:29 / smm
113 Uranium, Activity	2.1E-08	uCi/mL		2.0E-10		E200.8	05/11/12 00:29 / smm
114 Uranium, Activity precision (±)	3.4E-09	uCi/mL		3.0E-11		E200.8	05/11/12 00:29 / smm
042 Vanadium	<0.01	mg/L		0.01		E200.8	05/11/12 00:29 / smm
RADIONUCLIDES - DISSOLVED							
045 Radium 226	0.27	pCi/L				E903.0	06/09/12 17:24 / trs
245 Radium 226 precision (±)	0.15	pCi/L				E903.0	06/09/12 17:24 / trs
Radium 226 MDC	0.18	pCi/L				E903.0	06/09/12 17:24 / trs
256 Radium 226 altu	3.0E-10	uCi/mL				E903.0	06/09/12 17:24 / trs
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	06/09/12 17:24 / trs
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	06/09/12 17:24 / trs
057 Radium 228	0.4	pCi/L	U			RA-05	06/04/12 13:31 / plj
257 Radium 228 precision (±)	0.6	pCi/L				RA-05	06/04/12 13:31 / plj
Radium 228 MDC	1	pCi/L				RA-05	06/04/12 13:31 / plj
359 Radium 228 altu	4.0E-10	uCi/mL	U			RA-05	06/04/12 13:31 / plj
360 Radium 228 altu precision (±)	6.0E-10	uCi/mL				RA-05	06/04/12 13:31 / plj
Radium 228 altu MDC	1.0E-09	uCi/mL				RA-05	06/04/12 13:31 / plj
048 Thorium 230	-0.008	pCi/L	U			E908.0	05/21/12 09:43 / dmf
248 Thorium 230 precision (±)	0.05	pCi/L				E908.0	05/21/12 09:43 / dmf
Thorium 230 MDC	0.2	pCi/L				E908.0	05/21/12 09:43 / dmf
362 Thorium 230 altu	-8.0E-12	uCi/mL	U			E908.0	05/21/12 09:43 / dmf
363 Thorium 230 altu precision (±)	5.0E-11	uCi/mL				E908.0	05/21/12 09:43 / dmf
Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	05/21/12 09:43 / dmf

Report RL - Analyte reporting limit.

Definitions: QCL - Quality control limit.

MDC - Minimum detectable concentration

MCL - Maximum contaminant level.

ND - Not detected at the reporting limit.

D - RL increased due to sample matrix.



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C12050341-003

Client Sample ID: P

Report Date: 06/14/12

Collection Date: 05/03/12 14:40

Date Received: 05/09/12

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
DATA QUALITY							
192 A/C Balance (± 5)	-1.95	%				Calculation	05/18/12 06:42 / kbh
194 Anions	26.9	meq/L				Calculation	05/18/12 06:42 / kbh
195 Cations	25.8	meq/L				Calculation	05/18/12 06:42 / kbh
079 Solids, Total Dissolved Calculated	1740	mg/L				Calculation	05/18/12 06:42 / kbh
200 TDS Balance (0.80 - 1.20)	1.03	unitless				Calculation	05/18/12 06:42 / kbh

Report RL - Analyte reporting limit.
Definitions: QCL - Quality control limit.
MDC - Minimum detectable concentration

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