



Homestake Mining Company of California

Jesse R. Toepfer
Closure Manager

28 February 2014

Certified Mail: 70133020000034167982

Mr. Jack Parrott, Sr. 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 2013

Dear Mr. Parrott:

Pursuant to US Nuclear Regulatory Commission Regulation 10 CFR 40.65 and Part 20, Homestake Mining Company of California hereby submits two (2) copies of their semi-annual report for the second half of 2013 (July through December) for the Homestake Grants Reclamation Project.

The 600-gpm reverse osmosis (RO) plant operated at an average rate of 249-gpm during the July through December 2013 reporting period.

Validated data for direct radiation at the monitoring stations are not currently available from the vendor. They will be provided under separate cover when available.

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. 34 or via cell phone at (505) 290-3067.

Sincerely yours,

Jesse R. Toepfer
Closure Manager
HOMESTAKE MINING COMPANY OF CALIFORNIA

Enclosures (2)

xc: Mr. B. Spitzberg, Chief, Decommissioning Branch, 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
Ms. C. Stafford, Director of Library Services, NMSU Grants, w/enclosure

HOMESTAKE MINING COMPANY OF CALIFORNIA

Grants Reclamation Project



SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT

**Reporting Period
July – December 2013**

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

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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 2013. 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 249-gpm while producing an average of 144-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. This information for the first half of 2013 is also included in this report since it was inadvertently missing in the Semi-Annual Environmental Monitoring Report submitted on August 27, 2013 for the period of January through June 2013. 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. Quarterly 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 semi-annual average 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:

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

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);
 $3.7 E 4$ 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 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 2008, 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)

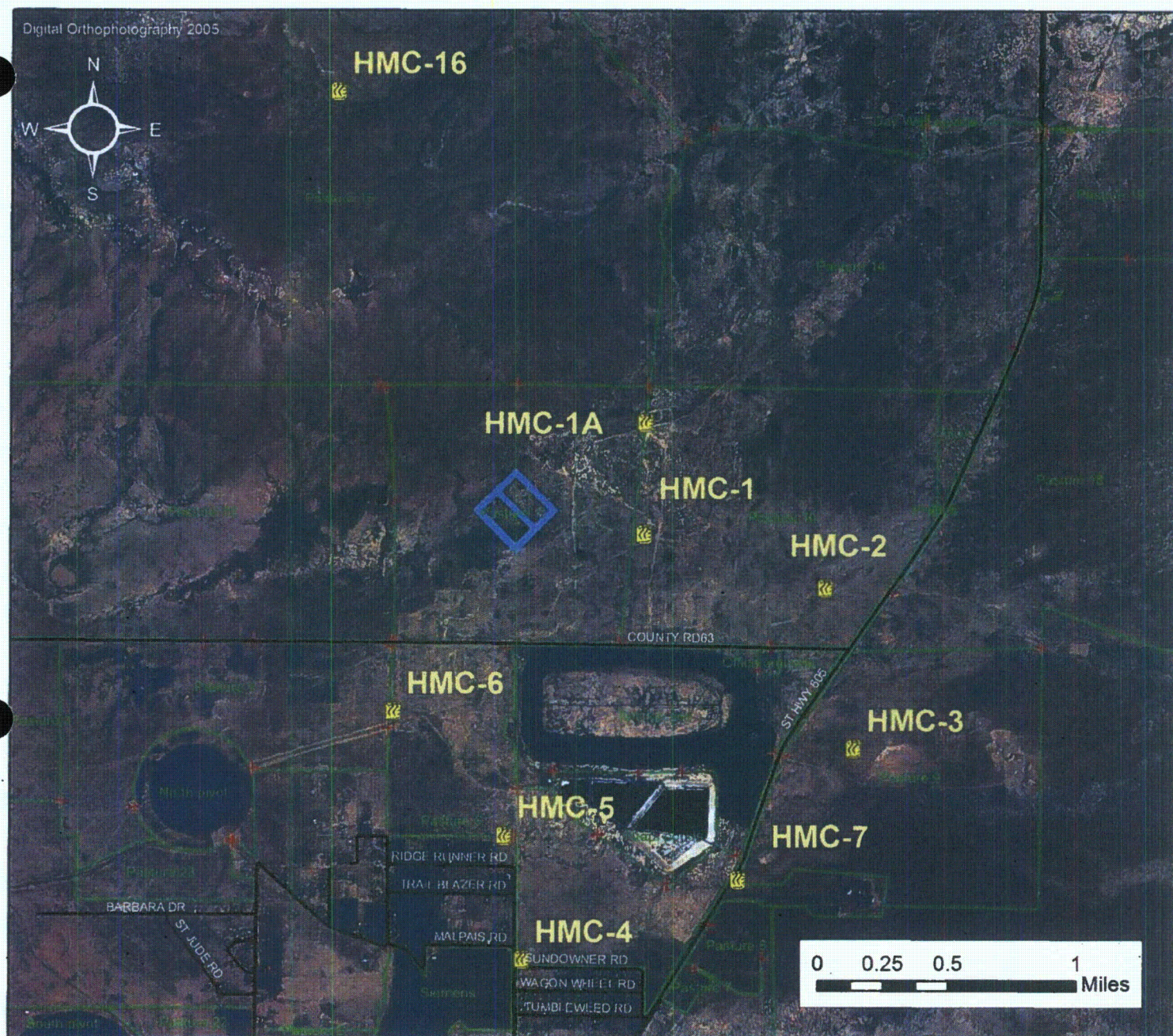
Table 3 – Occupational Monitoring Program (6-00)

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

ANALYTICAL SUMMARY REPORT

February 20, 2014

Homestake Mining Co

Hwy 605

Grants, NM 87020

Workorder No.: C14010376

Quote ID: C775 - Hi-Vol Filters

Project Name: 4th Quarter 2013 Comp.

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 1/14/2014 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C14010376-001	HMC-1	12/31/13 00:00	01/14/14	Filter	Metals by ICP/ICPMS, Total Field Parameters Digestion, Total Metals RAD Alternate Unit Reporting Air Filters Radium 226 Thorium, Isotopic
C14010376-002	HMC-1-A	12/31/13 00:00	01/14/14	Filter	Same As Above
C14010376-003	HMC-2	12/31/13 00:00	01/14/14	Filter	Same As Above
C14010376-004	HMC-3	12/31/13 00:00	01/14/14	Filter	Same As Above
C14010376-005	HMC-4	12/31/13 00:00	01/14/14	Filter	Same As Above
C14010376-006	HMC-5	12/31/13 00:00	01/14/14	Filter	Same As Above
C14010376-007	HMC-6	12/31/13 00:00	01/14/14	Filter	Same As Above
C14010376-008	HMC-7 Filter Comp	12/31/13 00:00	01/14/14	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:

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: 4th Quarter 2013 Comp.
REPORT DATE: February 20, 2014

SAMPLE ID: HMC-1

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
C13040267-001 First Quarter 2013 Air Volume in mLs 1.37E+11	^{238}U	6E-17	N/A	N/A	1E-16	9E-14	6E-02
	^{230}Th	1E-17	4E-18	4E-18	1E-16	3E-14	4E-02
	^{226}Ra	2E-17	5E-18	5E-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
C13070098-001 Second Quarter 2013 Air Volume in mLs 1.37E+11	^{238}U	9E-16	N/A	N/A	1E-16	9E-14	1E+00
	^{230}Th	4E-17	7E-18	4E-18	1E-16	3E-14	1E-01
	^{226}Ra	7E-17	7E-18	3E-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
C13100169-001 Third Quarter 2013 Air Volume in mLs 1.41E+11	^{238}U	2E-16	N/A	N/A	1E-16	9E-14	3E-01
	^{230}Th	2E-17	3E-18	1E-18	1E-16	3E-14	6E-02
	^{226}Ra	2E-17	5E-18	4E-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
C14010376-001 Fourth Quarter 2013 Air Volume in mLs 1.56E+11	^{238}U	1E-16	N/A	N/A	1E-16	9E-14	2E-01
	^{230}Th	2E-17	6E-18	5E-18	1E-16	3E-14	6E-02
	^{226}Ra	2E-17	7E-18	7E-18	1E-16	9E-13	3E-03

+LLD's are from NRC 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: 4th Quarter 2013 Comp.
Lab ID: C14010376-001
Client Sample ID: HMC-1

Report Date: 02/20/14
Collection Date: 12/31/13
Date Received: 01/14/14
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/25/14 10:08 / clm
RADIONUCLIDES - IN AIR							
Radium 226	2.3E-17	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 precision (±)	7.1E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 MDC	6.9E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Thorium 230	1.9E-17	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 precision (±)	6.1E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 MDC	4.6E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Uranium, Activity	1.5E-16	uCi/mL		1.0E-16		SW6020	01/25/14 10:08 / clm
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.5	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 precision (±)	1.1	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 MDC	1.1	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230	3.0	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 precision (±)	0.95	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 MDC	0.71	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Uranium, Activity	22.7	pCi/Filter		0.20		RADCALC	02/20/14 15:30 / sec
FIELD PARAMETERS							
Air Filtering Volume	156000000	L				FIELD	12/31/13 00:00 / ***
*** Field data provided by client							

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.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: 4th Quarter 2013 Comp.
REPORT DATE: February 20, 2014

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
C13040267-002 First Quarter 2013 Air Volume in mLs 1.35E+11	^{235}U	4E-17	N/A	N/A	1E-16	9E-14	5E-02
	^{230}Th	1E-17	4E-18	3E-18	1E-16	3E-14	4E-02
	^{226}Ra	2E-17	6E-18	5E-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
C13070098-002 Second Quarter 2013 Air Volume in mLs 1.29E+11	^{235}U	6E-16	N/A	N/A	1E-16	9E-14	6E-01
	^{230}Th	3E-17	8E-18	5E-18	1E-16	3E-14	1E-01
	^{226}Ra	5E-17	6E-18	3E-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
C13100169-002 Third Quarter 2013 Air Volume in mLs 1.18E+11	^{235}U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
	^{230}Th	3E-17	4E-18	1E-18	1E-16	3E-14	1E-01
	^{226}Ra	3E-17	6E-18	5E-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
C14010376-002 Fourth Quarter 2013 Air Volume in mLs 1.47E+11	^{235}U	4E-17	N/A	N/A	1E-16	9E-14	5E-02
	^{230}Th	2E-17	6E-18	4E-18	1E-16	3E-14	7E-02
	^{226}Ra	2E-17	7E-18	7E-18	1E-16	9E-13	3E-03

+LLD's are from NRC 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: 4th Quarter 2013 Comp.
Lab ID: C14010376-002
Client Sample ID: HMC-1-A

Report Date: 02/20/14
Collection Date: 12/31/13
Date Received: 01/14/14
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/25/14 10:12 / clm
RADIONUCLIDES - IN AIR							
Radium 226	2.4E-17	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 precision (±)	7.1E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 MDC	6.7E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Thorium 230	2.2E-17	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 precision (±)	6.4E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 MDC	4.4E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	01/25/14 10:12 / clm
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.5	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 precision (±)	1.0	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 MDC	0.99	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230	3.2	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 precision (±)	0.94	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 MDC	0.65	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Uranium, Activity	6.5	pCi/Filter		0.20		RADCALC	02/20/14 15:30 / sec
FIELD PARAMETERS							
Air Filtering Volume	147000000	L				FIELD	12/31/13 00:00 / ***
*** Field data provided by client							

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.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: 4th Quarter 2013 Comp.
REPORT DATE: February 20, 2014

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
C13040267-003 First Quarter 2013 Air Volume in mLs 1.33E+11	^{nat} U	5E-17	N/A	N/A	1E-16	9E-14	6E-02
	²³⁰ Th	1E-17	4E-18	3E-18	1E-16	3E-14	5E-02
	²²⁶ Ra	3E-17	7E-18	5E-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
C13070098-003 Second Quarter 2013 Air Volume in mLs 1.30E+11	^{nat} U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
	²³⁰ Th	4E-17	9E-18	4E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	7E-17	6E-18	3E-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
C13100169-003 Third Quarter 2013 Air Volume in mLs 1.13E+11	^{nat} U	9E-17	N/A	N/A	1E-16	9E-14	1E-01
	²³⁰ Th	2E-17	4E-18	1E-18	1E-16	3E-14	8E-02
	²²⁶ Ra	2E-17	5E-18	4E-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
C14010376-003 Fourth Quarter 2013 Air Volume in mLs 1.55E+11	^{nat} U	1E-16	N/A	N/A	1E-16	9E-14	1E-01
	²³⁰ Th	2E-17	6E-18	4E-18	1E-16	3E-14	6E-02
	²²⁶ Ra	2E-17	7E-18	6E-18	1E-16	9E-13	3E-03

+LLD's are from NRC 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: 4th Quarter 2013 Comp.
Lab ID: C14010376-003
Client Sample ID: HMC-2

Report Date: 02/20/14
Collection Date: 12/31/13
Date Received: 01/14/14
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/25/14 10:20 / clm
RADIONUCLIDES - IN AIR							
Radium 226	2.5E-17	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 precision (±)	7.0E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 MDC	6.5E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Thorium 230	1.9E-17	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 precision (±)	5.8E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 MDC	3.9E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Uranium, Activity	1.2E-16	uCi/mL		1.0E-16		SW6020	01/25/14 10:20 / clm
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.8	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 precision (±)	1.1	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230	2.9	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 precision (±)	0.90	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 MDC	0.60	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Uranium, Activity	17.9	pCi/Filter		0.20		RADCALC	02/20/14 15:30 / sec
FIELD PARAMETERS							
Air Filtering Volume	155000000	L				FIELD	12/31/13 00:00 / ***
*** Field data provided by client							

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.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: 4th Quarter 2013 Comp.
REPORT DATE: February 20, 2014

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
C13040267-004 First Quarter 2013 Air Volume in mLs 1.32E+11	^{235}U	8E-17	N/A	N/A	1E-16	9E-14	9E-02
	^{230}Th	1E-17	4E-18	3E-18	1E-16	3E-14	3E-02
	^{226}Ra	4E-17	7E-18	5E-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
C13070098-004 Second Quarter 2013 Air Volume in mLs 1.22E+11	^{235}U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
	^{230}Th	3E-17	7E-18	3E-18	1E-16	3E-14	1E-01
	^{226}Ra	6E-17	7E-18	4E-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
C13100169-004 Third Quarter 2013 Air Volume in mLs 1.36E+11	^{235}U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
	^{230}Th	2E-17	3E-18	1E-18	1E-16	3E-14	6E-02
	^{226}Ra	3E-17	6E-18	4E-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
C14010376-004 Fourth Quarter 2013 Air Volume in mLs 1.57E+11	^{235}U	1E-16	N/A	N/A	1E-16	9E-14	1E-01
	^{230}Th	2E-17	6E-18	6E-18	1E-16	3E-14	5E-02
	^{226}Ra	2E-17	6E-18	6E-18	1E-16	9E-13	2E-03

+LLD's are from NRC 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: 4th Quarter 2013 Comp.
Lab ID: C14010376-004
Client Sample ID: HMC-3

Report Date: 02/20/14
Collection Date: 12/31/13
Date Received: 01/14/14
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/25/14 10:24 / clm
RADIONUCLIDES - IN AIR							
Radium 226	2.1E-17	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 precision (±)	6.4E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 MDC	6.1E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Thorium 230	1.6E-17	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 precision (±)	6.2E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 MDC	6.4E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Uranium, Activity	1.3E-16	uCi/mL		1.0E-16		SW6020	01/25/14 10:24 / clm
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.3	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 precision (±)	1.0	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 MDC	0.96	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230	2.6	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 precision (±)	0.98	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 MDC	1.0	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Uranium, Activity	19.8	pCi/Filter		0.20		RADCALC	02/20/14 15:30 / sec
FIELD PARAMETERS							
Air Filtering Volume	157000000	L				FIELD	12/31/13 00:00 / ***
*** Field data provided by client							

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.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: 4th Quarter 2013 Comp.
REPORT DATE: February 20, 2014

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
C13040267-005 First Quarter 2013 Air Volume in mLs 1.41E+11	^{238}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	7E-02
	^{226}Ra	5E-17	8E-18	5E-18	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
C13070098-005 Second Quarter 2013 Air Volume in mLs 1.38E+11	^{238}U	3E-16	N/A	N/A	1E-16	9E-14	4E-01
	^{230}Th	5E-17	9E-18	4E-18	1E-16	3E-14	2E-01
	^{226}Ra	1E-16	8E-18	3E-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
C13100169-005 Third Quarter 2013 Air Volume in mLs 1.44E+11	^{238}U	3E-16	N/A	N/A	1E-16	9E-14	3E-01
	^{230}Th	1E-17	3E-18	1E-18	1E-16	3E-14	5E-02
	^{226}Ra	2E-17	5E-18	4E-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
C14010376-005 Fourth Quarter 2013 Air Volume in mLs 1.56E+11	^{238}U	3E-16	N/A	N/A	1E-16	9E-14	3E-01
	^{230}Th	2E-17	6E-18	5E-18	1E-16	3E-14	7E-02
	^{226}Ra	2E-17	6E-18	6E-18	1E-16	9E-13	3E-03

+LLD's are from NRC 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: 4th Quarter 2013 Comp.
Lab ID: C14010376-005
Client Sample ID: HMC-4

Report Date: 02/20/14
Collection Date: 12/31/13
Date Received: 01/14/14
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/25/14 10:45 / clm
RADIONUCLIDES - IN AIR							
Radium 226	2.3E-17	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 precision (±)	6.4E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 MDC	5.8E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Thorium 230	2.0E-17	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 precision (±)	6.3E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 MDC	5.0E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Uranium, Activity	2.9E-16	uCi/mL		1.0E-16		SW6020	01/25/14 10:45 / clm
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.6	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 precision (±)	1.0	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 MDC	0.91	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230	3.1	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 precision (±)	0.98	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 MDC	0.78	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Uranium, Activity	44.9	pCi/Filter		0.20		RADCALC	02/20/14 15:30 / sec
FIELD PARAMETERS							
Air Filtering Volume	156000000	L				FIELD	12/31/13 00:00 / ***
*** Field data provided by client							

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.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: 4th Quarter 2013 Comp.
REPORT DATE: February 20, 2014

SAMPLE ID: HMC-5

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
C13040267-006 First Quarter 2013 Air Volume in mLs 1.42E+11	^{nat} U	1E-16	N/A	N/A	1E-16	9E-14	1E-01
	²³⁰ Th	2E-17	6E-18	3E-18	1E-16	3E-14	8E-02
	²²⁶ Ra	4E-17	1E-17	8E-18	1E-16	9E-13	4E-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
C13070098-006 Second Quarter 2013 Air Volume in mLs 1.37E+11	^{nat} U	1.2E-15	N/A	N/A	1E-16	9E-14	1.3E+00
	²³⁰ Th	3E-17	7E-18	3E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	5E-17	6E-18	3E-18	1E-16	9E-13	6E-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
C13100169-006 Third Quarter 2013 Air Volume in mLs 1.37E+11	^{nat} U	5E-16	N/A	N/A	1E-16	9E-14	5E-01
	²³⁰ Th	2E-17	3E-18	1E-18	1E-16	3E-14	5E-02
	²²⁶ Ra	2E-17	5E-18	4E-18	1E-16	9E-13	2E-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
C14010376-006 Fourth Quarter 2013 Air Volume in mLs 1.56E+11	^{nat} U	5E-16	N/A	N/A	1E-16	9E-14	6E-01
	²³⁰ Th	2E-17	6E-18	5E-18	1E-16	3E-14	6E-02
	²²⁶ Ra	2E-17	7E-18	6E-18	1E-16	9E-13	2E-03

+LLD's are from NRC 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: 4th Quarter 2013 Comp.
Lab ID: C14010376-006
Client Sample ID: HMC-5

Report Date: 02/20/14
Collection Date: 12/31/13
Date Received: 01/14/14
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/25/14 11:01 / clm
RADIONUCLIDES - IN AIR							
Radium 226	2.2E-17	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 precision (±)	6.5E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 MDC	6.0E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Thorium 230	1.8E-17	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 precision (±)	6.0E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 MDC	5.2E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Uranium, Activity	5.1E-16	uCi/mL		1.0E-16		SW6020	01/25/14 11:01 / clm
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.5	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 precision (±)	1.0	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 MDC	0.94	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230	2.7	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 precision (±)	0.94	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 MDC	0.81	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Uranium, Activity	79.4	pCi/Filter		0.20		RADCALC	02/20/14 15:30 / sec
FIELD PARAMETERS							
Air Filtering Volume	156000000 L					FIELD	12/31/13 00:00 / ***
*** Field data provided by client							

*** Field data provided by client

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.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: 4th Quarter 2013 Comp.
REPORT DATE: February 20, 2014

SAMPLE ID: HMC-6

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
C13040267-007 First Quarter 2013 Air Volume in mLs 1.43E+11	^{nat} U	5E-17	N/A	N/A	1E-16	9E-14	5E-02
	²³⁰ Th	2E-17	5E-18	3E-18	1E-16	3E-14	6E-02
	²²⁶ Ra	3E-17	7E-18	5E-18	1E-16	9E-13	4E-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
C13070098-007 Second Quarter 2013 Air Volume in mLs 1.35E+11	^{nat} U	5E-16	N/A	N/A	1E-16	9E-14	5E-01
	²³⁰ Th	4E-17	8E-18	4E-18	1E-16	3E-14	1E-01
	²²⁶ Ra	6E-17	6E-18	3E-18	1E-16	9E-13	6E-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
C13100169-007 Third Quarter 2013 Air Volume in mLs 1.44E+11	^{nat} U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
	²³⁰ Th	1E-17	2E-18	1E-18	1E-16	3E-14	4E-02
	²²⁶ Ra	2E-17	5E-18	3E-18	1E-16	9E-13	2E-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
C14010376-007 Fourth Quarter 2013 Air Volume in mLs 1.51E+11	^{nat} U	1E-16	N/A	N/A	1E-16	9E-14	1E-01
	²³⁰ Th	2E-17	6E-18	4E-18	1E-16	3E-14	7E-02
	²²⁶ Ra	3E-17	7E-18	6E-18	1E-16	9E-13	3E-03

+LLD's are from NRC 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: 4th Quarter 2013 Comp.
Lab ID: C14010376-007
Client Sample ID: HMC-6

Report Date: 02/20/14
Collection Date: 12/31/13
Date Received: 01/14/14
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/25/14 11:05 / clm
RADIONUCLIDES - IN AIR							
Radium 226	3.0E-17	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 precision (±)	7.3E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 MDC	6.1E-18	uCi/mL				E903.0	01/29/14 05:03 / lmc
Thorium 230	2.0E-17	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 precision (±)	6.3E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 MDC	4.3E-18	uCi/mL				E908.0	02/12/14 09:38 / dmf
Uranium, Activity	1.2E-16	uCi/mL		1.0E-16		SW6020	01/25/14 11:05 / clm
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	4.5	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 precision (±)	1.1	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 MDC	0.92	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230	3.0	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 precision (±)	0.95	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 MDC	0.65	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Uranium, Activity	17.7	pCi/Filter		0.20		RADCALC	02/20/14 15:30 / sec
FIELD PARAMETERS							
Air Filtering Volume	151000000	L				FIELD	12/31/13 00:00 / ***
*** Field data provided by client							

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.

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co
PROJECT: 4th Quarter 2013 Comp.
REPORT DATE: February 20, 2014

SAMPLE ID: HMC-7 Filter Comp

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
C13040267-008 First Quarter 2013 Air Volume in mLs 1.38E+11	^{238}U	2E-18	N/A	N/A	1E-16	9E-14	2E-03
	^{230}Th	2E-18	1E-18	1E-18	1E-16	3E-14	8E-03
	^{226}Ra	1E-18	3E-18	5E-18	1E-16	9E-13	2E-04

Air Volumes on this page based on average of quarterly set.

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
C13070098-008 Second Quarter 2013 Air Volume in mLs 1.33E+11	^{238}U	2E-18	N/A	N/A	1E-16	9E-14	2E-03
	^{230}Th	2E-18	1E-18	2E-18	1E-16	3E-14	7E-03
	^{226}Ra	8E-19	3E-18	5E-18	1E-16	9E-13	9E-05

Air Volumes on this page based on average of quarterly set.

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
C13100169-008 Third Quarter 2013 Air Volume in mLs 1.33E+11	^{238}U	3E-18	N/A	N/A	1E-16	9E-14	3E-03
	^{230}Th	2E-18	1E-18	1E-18	1E-16	3E-14	7E-03
	^{226}Ra	-1E-18	2E-18	4E-18	1E-16	9E-13	-1E-04

Air Volumes on this page based on average of quarterly set.

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
C14010376-008 Fourth Quarter 2013 Air Volume in mLs 1.54E+11	^{238}U	3E-18	N/A	N/A	1E-16	9E-14	4E-03
	^{230}Th	4E-18	3E-18	4E-18	1E-16	3E-14	1E-02
	^{226}Ra	2E-18	2E-18	4E-18	1E-16	9E-13	2E-04

Air Volumes on this page based on average of quarterly set.

+LLD's are from NRC 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: 4th Quarter 2013 Comp.
Lab ID: C14010376-008
Client Sample ID: HMC-7 Filter Comp

Report Date: 02/20/14
Collection Date: 12/31/13
Date Received: 01/14/14
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS - TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/25/14 11:09 / clm
RADIONUCLIDES - IN AIR							
Radium 226	3.1E-10	uCi/mL	U			E903.0	01/29/14 05:03 / lmc
Radium 226 precision (±)	3.7E-10	uCi/mL				E903.0	01/29/14 05:03 / lmc
Radium 226 MDC	5.6E-10	uCi/mL				E903.0	01/29/14 05:03 / lmc
Thorium 230	5.6E-10	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 precision (±)	4.0E-10	uCi/mL				E908.0	02/12/14 09:38 / dmf
Thorium 230 MDC	5.6E-10	uCi/mL				E908.0	02/12/14 09:38 / dmf
Uranium, Activity	5.2E-10	uCi/mL		1.0E-16		SW6020	01/25/14 11:09 / clm
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	0.31	pCi/Filter	U			RADCALC	02/20/14 14:42 / sec
Radium 226 precision (±)	0.37	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Radium 226 MDC	0.56	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230	0.56	pCi/Filter	U			RADCALC	02/20/14 14:42 / sec
Thorium 230 precision (±)	0.40	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Thorium 230 MDC	0.56	pCi/Filter				RADCALC	02/20/14 14:42 / sec
Uranium, Activity	0.52	pCi/Filter		0.20		RADCALC	02/20/14 15:30 / sec
FIELD PARAMETERS							
Air Filtering Volume	1	L				FIELD	12/31/13 00:00 / ***
*** Field data provided by client							

*** Field data provided by client

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

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: 4th Quarter 2013 Comp.

Report Date: 02/20/14
Work Order: C14010376

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: 40381
Sample ID: C14010376-008AMS	Sample Matrix Spike			Run: BERTHOLD 770-2_140123A			01/29/14 05:03			
Radium 226		80.4	pCi/L	106		70	130			
Sample ID: C14010376-008AMSD	Sample Matrix Spike Duplicate			Run: BERTHOLD 770-2_140123A			01/29/14 06:44			
Radium 226		79.2	pCi/L	104		70	130	1.5		22.6
Sample ID: LCS-40381	Laboratory Control Sample			Run: BERTHOLD 770-2_140123A			01/29/14 06:44			
Radium 226		23.9	pCi/L	111		80	120			
Sample ID: MB-40381	3	Method Blank		Run: BERTHOLD 770-2_140123A			01/29/14 06:44			
Radium 226		-0.04	pCi/L							U
Radium 226 precision (±)		0.2	pCi/L							
Radium 226 MDC		0.3	pCi/L							

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

Report Date: 02/20/14

Project: 4th Quarter 2013 Comp.

Work Order: C14010376

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0									Batch: R183734	
Sample ID: C14010376-001AMS	Sample Matrix Spike			Run: ALPHANALYST_140127A			02/12/14 09:38			
Thorium 230		1.23E-06	pCi/L		106	70	130			
Sample ID: C14010376-001AMSD	Sample Matrix Spike Duplicate			Run: ALPHANALYST_140127A			02/12/14 09:38			
Thorium 230		1.11E-06	pCi/L		96	70	130	10	29.6	
Sample ID: LCS-40381	Laboratory Control Sample			Run: ALPHANALYST_140127A			02/12/14 09:38			
Thorium 230		19.3	pCi/L		105	80	120			
Sample ID: MB-40381	3	Method Blank			Run: ALPHANALYST_140127A			02/12/14 09:39		
Thorium 230		0.2	pCi/L							U
Thorium 230 precision (±)		0.1	pCi/L							
Thorium 230 MDC		0.2	pCi/L							
Sample ID: MB-40409	3	Method Blank			Run: ALPHANALYST_140127A			02/13/14 15:21		
Thorium 230		0.2	pCi/L							
Thorium 230 precision (±)		0.1	pCi/L							
Thorium 230 MDC		0.1	pCi/L							

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: 4th Quarter 2013 Comp.

Report Date: 02/12/14
Work Order: C14010376

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS4-C_140124A		
Sample ID: ICV	2	Initial Calibration Verification Standard								01/24/14 16:50
Uranium		0.0490	mg/L	0.00030	98	90	110			
Vanadium		0.0487	mg/L	0.0010	97	90	110			
Sample ID: ICSA	2	Interference Check Sample A								01/24/14 16:54
Uranium		4.92E-05	mg/L	0.00030						
Vanadium		-2.85E-05	mg/L	0.0010						
Sample ID: ICSAB	2	Interference Check Sample AB								01/24/14 16:58
Uranium		9.30E-06	mg/L	0.00030						
Vanadium		-7.12E-05	mg/L	0.0010						
Method: SW6020								Batch: 40381		
Sample ID: MB-40381	2	Method Blank								01/25/14 09:55
Uranium		6E-05	mg/filter	4E-05						
Vanadium		0.005	mg/filter	0.0002						
Sample ID: LCS2-40381	2	Laboratory Control Sample								01/25/14 09:59
Uranium		0.099	mg/filter	0.00030	99	70	130			
Vanadium		0.10	mg/filter	0.10	98	70	130			
Sample ID: C14010376-002ADIL	2	Serial Dilution								01/25/14 10:16
Uranium		2.2E-09	mg/filter	0.00030		0	0		10	
Vanadium		1.8E-09	mg/filter	0.10		0	0		10	N
Sample ID: C14010376-005AMS4	2	Sample Matrix Spike								01/25/14 10:49
Uranium		3.2E-09	mg/filter	0.00030	110	75	125			
Vanadium		3.2E-09	mg/filter	0.10	105	75	125			
Sample ID: C14010376-005AMSD	2	Sample Matrix Spike Duplicate								01/25/14 10:53
Uranium		3.2E-09	mg/filter	0.00030	112	75	125		20	
Vanadium		3.3E-09	mg/filter	0.10	109	75	125		20	

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.

Workorder Receipt Checklist

Homestake Mining Co

C14010376

Login completed by: Corinne Wagner

Date Received: 1/14/2014

Reviewed by: Kathy Hamre

Received by: dw

Reviewed Date: 1/15/2014

Carrier Next Day Air
name:

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on all shipping container(s)/cooler(s)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on all sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input checked="" type="checkbox"/>
Container/Temp Blank temperature:	N/A °C		
Water - VOA vials have zero headspace?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	No VOA vials submitted <input checked="" type="checkbox"/>
Water - pH acceptable upon receipt?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Applicable <input checked="" type="checkbox"/>

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as -dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

None



Chain of Custody and Analytical Request Record

Page of

PLEASE PRINT (Provide as much information as possible.)

Company Name: HOMESTAKE MINING CO.	Project Name, PWS, Permit, Etc. GRANTS	Sample Origin State:	EPA/State Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>
Report Mail Address: P.O. BOX 98 GRANTS, NM 87020	Contact Name: Adrian Venable	Phone/Fax: 1-505-287-4456	Email: Ext. 28
Invoice Address: SAME	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:			Number of Containers Sample Type: A W S V B O D W Air Water Soils/Solids Vegetation Bioassay Other DW - Drinking Water	ANALYSIS REQUESTED										SEE ATTACHED	Standard Turnaround (TAT)	R U S H	Contact ELI prior to RUSH sample submittal for charges and scheduling - See Instruction Page	Comments: AIR Volume IN MLS	Shipped by: UPS-NDA
<input type="checkbox"/> DW <input type="checkbox"/> EDD/EDT (Electronic Data) <input type="checkbox"/> POTW/WWTP <input type="checkbox"/> Format: <input type="checkbox"/> State: <input type="checkbox"/> LEVEL IV <input type="checkbox"/> Other: <input type="checkbox"/> NELAC																			Cooler ID(s): C1400376
SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)			Collection Date	Collection Time	MATRIX														Receipt Temp NA°C
1 HMC-1			4th		1-A	X	X	X	X								On Ice: <input type="checkbox"/> Y <input type="checkbox"/> N		
2 HMC-1-A			QUARTER		1-A	X	X	X	X								Custody Seal		
3 HMC-2			2013		1-A	X	X	X	X								On Bottle <input type="checkbox"/> Y <input type="checkbox"/> N		
4 HMC-3			Comp		1-A	X	X	X	X								On Cooler <input type="checkbox"/> Y <input type="checkbox"/> N		
5 HMC-4					1-A	X	X	X	X								Intact <input type="checkbox"/> Y <input type="checkbox"/> N		
6 HMC-5					1-A	X	X	X	X								Signature Match <input type="checkbox"/> Y <input type="checkbox"/> N		
7 HMC-6					1-A	X	X	X	X										
8 HMC-7 Filter Comp					1-A	X	X	X	X										
9																			
10																			

Custody Record MUST be Signed	Relinquished by (print): Adrian Venable	Date/Time: 1-10-2014	Signature: [Signature]	Received by (print):	Date/Time:	Signature:
	Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
	Sample Disposal:	Return to Client:	Lab Disposal:	Received by Laboratory: [Signature]	Date/Time: 1-14-14	Signature: 930

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.



Chain of Custody and Analytical Request Record

Page ____ of ____

PLEASE PRINT (Provide as much information as possible.)

Company Name: <i>HOMESTEAKE Mining Co.</i>	Project Name, PWS, Permit, Etc.: <i>GRANTS</i>	Sample Origin: State: _____	EPA/State Compliance: Yes <input type="checkbox"/> No <input type="checkbox"/>
Report Mail Address: <i>P.O. Box 96 GRANTS, NM 87020</i>	Contact Name: _____ Phone/Fax: _____ <i>Helen Vargab 1-505-267-4454 Ext. 28</i>	Email: _____	Sampler: (Please Print) _____
Invoice Address: <i>SAME</i>	Invoice Contact & Phone: _____	Purchase Order: _____	Quote/Bottle Order: _____

Special Report/Formats:

- ☐ DW
☐ POTW/WWTP
☐ State: _____
☐ Other: _____
- ☐ EDD/EDT (Electronic Data)
Format: _____
☐ LEVEL IV
☐ NELAC

Number of Containers
Sample Type: A W S V B O DW
Air Water Soils Solids
Vegetation Bioassay Other
DW - Drinking Water

ANALYSIS REQUESTED

SEE ATTACHED

Standard Turnaround (TAT)

R
U
S
H

Contact ELI prior to
RUSH sample submittal
for charges and
scheduling - See
Instruction Page

Comments:

AIR

Shipped by: _____

Cooler ID(s): _____

Receipt Temp: _____ °C

On Ice: Y N

Custody Seal

On Bottle Y N

On Cooler Y N

Intact Y N

Signature Match Y N

LABORATORY USE ONLY

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX
1 HMC-1	4/16	1-A	X X X X
2 HMC-1-A	QUARTER	1-A	X X X X
3 HMC-2	2013	1-A	X X X X
4 HMC-3	Camp	1-A	X X X X
5 HMC-4		1-A	X X X X
6 HMC-5		1-A	X X X X
7 HMC-6		1-A	X X X X
8 HMC-7 E. Her Camp		1-A	X X X X
9			
10			

UPS NEXT DAY AIR A.R.S. TRACKING NUMBER
1Z E81 832 27 1081 7822

REF #/ DATE
1-10-2014

Custody
Record
MUST be
Signed

Relinquished by (print): _____

Date/Time: _____

Signature: _____

Relinquished by (print): _____

Date/Time: _____

Signature: _____

Received by (print): _____

Date/Time: _____

Signature: _____

Received by (print): _____

Date/Time: _____

Signature: _____

Received by Laboratory: _____

Date/Time: _____

Signature: _____

Sample Disposal: Return to Client: _____

Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly noted on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Attachment 2 - Radon Gas Monitoring Results

Attachment 2 - Radon Gas Monitoring Results

Track-Etch Passive Survey

Location	Monitoring Period	Rn-222 Concentration ($\mu\text{Ci/ml}$)	Error Estimate ($\mu\text{Ci/ml}$)	% Limit* (%)	LLD ($\mu\text{Ci/ml}$)
Hi-Vol #1(average) N Outer Perimeter	6/27/13-1/6/14	1.0E-09	1.8E-10	10.0	3.1E-10
Hi-Vol #1-A (average) N Outer Perimeter	6/27/13-1/6/14	1.2E-09	2.0E-10	11.7	3.1E-10
Hi-Vol #2 (average) NE Outer Perimeter	6/27/13-1/6/14	1.2E-09	2.0E-10	12.0	3.1E-10
Hi-Vol #3 (average) E Outer Perimeter	6/27/13-1/6/14	8.5E-10	1.6E-10	8.5	3.1E-10
Hi-Vol #4 (average) S Outer Perimeter	6/27/13-1/6/14	1.6E-09	2.4E-10	15.8	3.1E-10
Hi-Vol #5 (average) N of Nearest Residence	6/27/13-1/6/14	1.3E-09	2.1E-10	13.3	3.1E-10
Hi-Vol #6 (average) W of Outer Perimeter	6/27/13-1/6/14	1.0E-09	1.8E-10	10.3	3.1E-10
HMC #7 (average) S Boundary	6/27/13-1/6/14	9.2E-10	1.7E-10	9.2	3.1E-10
HMC #16 (average) Background	6/27/13-1/6/14	6.2E-10	1.3E-10	6.2	3.1E-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)*
HMC #1 N Outer Perimeter	7/1/13 - 12/31/13	59	5.8
HMC #1-A N Outer Perimeter	7/1/13 - 12/31/13	56	5.5
HMC #2 NE Outer Perimeter	7/1/13 - 12/31/13	66	6.5
HMC #3 E Outer Perimeter	7/1/13 - 12/31/13	59	5.8
HMC #4 S Outer Perimeter	7/1/13 - 12/31/13	65	6.4
HMC #5 N of Nearest Residence	7/1/13 - 12/31/13	65	6.4
HMC #6 W of Outer Perimeter	7/1/13 - 12/31/13	64	6.3
#16 Background	7/1/13 - 12/31/13	57	5.6

*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 2013 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 decay products) 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 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 2013. 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 0.3 mrem/year and 0.6 mrem/y, respectively while that at the background location (HMC-6) was calculated to be 0.2 mrem/y, for a net CEDE at locations HMC-4 and HMC-5 of 0.1 mrem/y and 0.4 mrem/y. The results from these calculations are shown in Table 2-1, Table 2-2, and Table 2-3. The net dose equivalent, when accounting for the occupancy factor of 75%, results in a dose rate of 0.1 and 0.3 mrem/year at HMC-4 and HMC-5 respectively. 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 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 2013 at HMC-4 and HMC-5 was 1.7 and 1.6 pCi/L respectively. The average annual concentration at the background location (HMC-16) was 0.8 pCi/L. Subtracting the background concentration from the measured concentrations at HMC-4 and HMC-5 results in net radon concentrations of 0.9 and 0.8 pCi/L respectively.

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 progeny equilibrium is expected to be low due to a small flight time until it reaches the residence. We have selected 20 percent radon progeny equilibrium as an estimate for use in the dose calculations. NRC uses a continuous exposure to 0.1 pCi/l Rn-222, in full equilibrium with the decay 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 68 and 60 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 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 and 123 mrem/year, respectively. The average annual effective dose equivalent at the background location (HMC-16) was 111 mrem/year. The net annual effective dose equivalent for HMC-4 and HMC-5, assuming 100 percent occupancy, was 20 and 12 mrem/year, respectively. Considering the 75 percent occupancy factor, the net annual effective dose equivalent was 15 and 9 mrem/year for HMC-4 and HMC-5 respectively.

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. The TEDE at HMC-4 was 83 mrem/year and at HMC-5 was 69 mrem/year. This is clearly within the 100 mrem/year limit and the particulate TEDE is much below the 10 mrem/y constraint limit on particulate emissions.

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

Year 2013

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	3.00E-16	1.46E-16	1.46E-16	5.00E-17	1.00E-16
3rd qtr	3.00E-16	1.46E-16	1.46E-16	1.00E-17	2.00E-17
4th qtr	3.00E-16	1.46E-16	1.46E-16	2.00E-17	2.00E-17
Average	2.45E-16	1.19E-16	1.19E-16	2.50E-17	4.75E-17

	ANNUAL EFFECTIVE DOSE EQUIVALENT				
	U-234 mrem =====	U-238 mrem =====	Th-230 mrem =====	Ra-226 mrem =====	TOTAL mrem =====
	0.115	0.103	0.059	0.003	0.3

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

Year 2013

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	1.00E-16	4.87E-17	4.87E-17	2.00E-17	4.00E-17
2nd qtr	1.20E-15	5.85E-16	5.85E-16	3.00E-17	5.00E-17
3rd qtr	5.00E-16	2.44E-16	2.44E-16	2.00E-17	2.00E-17
4th qtr	5.00E-16	2.44E-16	2.44E-16	2.00E-17	2.00E-17
Average	5.75E-16	2.80E-16	2.80E-16	2.25E-17	3.25E-17

ANNUAL EFFECTIVE DOSE EQUIVALENT				
U-234 mrem =====	U-238 mrem =====	Th-230 mrem =====	Ra-226 mrem =====	TOTAL mrem =====
0.270	0.241	0.054	0.002	0.6

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

Year 2013

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	5.00E-17	2.44E-17	2.44E-17	2.00E-17	3.00E-17
2nd qtr	5.00E-16	2.44E-16	2.44E-16	4.00E-17	6.00E-17
3rd qtr	2.00E-16	9.75E-17	9.75E-17	1.00E-17	2.00E-17
4th qtr	1.00E-16	4.87E-17	4.87E-17	2.00E-17	3.00E-17
	-----	-----	-----	-----	-----
Average	2.13E-16	1.04E-16	1.04E-16	2.25E-17	3.50E-17

ANNUAL EFFECTIVE DOSE EQUIVALENT				
U-234 mrem	U-238 mrem	Th-230 mrem	Ra-226 mrem	TOTAL mrem
=====	=====	=====	=====	=====
0.100	0.089	0.054	0.002	0.2

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: C13030264-004

Client Sample ID: D1

Report Date: 03/12/13

Collection Date: 03/04/13 12:55

Date Received: 03/07/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
008 Sulfate	1100	mg/L	D	8		E300.0	03/08/13 17:38 / wc
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	2210	mg/L		20		A2540 C	03/08/13 15:51 / jz
METALS - DISSOLVED							
036 Molybdenum	2.70	mg/L		0.03		E200.8	03/08/13 23:42 / cp
040 Selenium	0.141	mg/L		0.005		E200.8	03/08/13 23:42 / cp
015 Uranium	2.15	mg/L		0.0003		E200.8	03/08/13 23:42 / cp
244 Uranium Precision (±)	0.346	mg/L		0.00005		E200.8	03/08/13 23:42 / cp
113 Uranium, Activity	1.5E-06	uCi/mL		2.0E-10		E200.8	03/08/13 23:42 / cp
114 Uranium, Activity precision (±)	2.3E-07	uCi/mL		3.0E-11		E200.8	03/08/13 23:42 / cp

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

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

Lab ID: C13070491-004

Client Sample ID: D1

Report Date: 08/07/13

Collection Date: 07/08/13 11:20

Date Received: 07/12/13

Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	300	mg/L		5		A2320 B	07/12/13 23:44 / jba
206 Carbonate as CO3	<5	mg/L		5		A2320 B	07/12/13 23:44 / jba
505 Bicarbonate as HCO3	366	mg/L		5		A2320 B	07/12/13 23:44 / jba
001 Calcium	283	mg/L		0.5		E200.7	07/30/13 21:45 / sf
007 Chloride	175	mg/L	D	2		E300.0	07/16/13 03:22 / wc
002 Magnesium	60.8	mg/L		0.5		E200.7	07/30/13 21:45 / sf
310 Nitrogen, Nitrate+Nitrite as N	2.2	mg/L		0.1		E353.2	07/17/13 12:45 / lr
003 Potassium	4.0	mg/L		0.5		E200.7	07/30/13 21:45 / sf
004 Sodium	436	mg/L	D	1		E200.7	07/30/13 21:45 / sf
108 Sulfate	1320	mg/L	D	8		E300.0	07/16/13 03:22 / wc
PHYSICAL PROPERTIES							
009 pH	7.35	s.u.	H	0.01		A4500-H B	07/12/13 16:49 / alp
010 Solids, Total Dissolved TDS @ 180 C	2520	mg/L		20		A2540 C	07/12/13 16:53 / alp
METALS - DISSOLVED							
036 Molybdenum	2.25	mg/L		0.03		E200.7	07/30/13 21:45 / sf
040 Selenium	0.152	mg/L		0.005		E200.8	08/01/13 20:25 / cp
015 Uranium	2.29	mg/L		0.0003		E200.8	08/01/13 20:25 / cp
244 Uranium Precision (±)	0.369	mg/L		0.00005		E200.8	08/01/13 20:25 / cp
113 Uranium, Activity	1.6E-06	uCi/mL		2.0E-10		E200.8	08/01/13 20:25 / cp
114 Uranium, Activity precision (±)	2.5E-07	uCi/mL		3.0E-11		E200.8	08/01/13 20:25 / cp
042 Vanadium	<0.01	mg/L		0.01		E200.7	07/30/13 21:45 / sf
RADIONUCLIDES - DISSOLVED							
045 Radium 226	0.38	pCi/L				E903.0	07/29/13 14:39 / trs
245 Radium 226 precision (±)	0.14	pCi/L				E903.0	07/29/13 14:39 / trs
Radium 226 MDC	0.14	pCi/L				E903.0	07/29/13 14:39 / trs
256 Radium 226 altu	4.0E-10	uCi/mL				E903.0	07/29/13 14:39 / trs
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	07/29/13 14:39 / trs
Radium 226 altu MDC	1.0E-10	uCi/mL				E903.0	07/29/13 14:39 / trs
057 Radium 228	0.1	pCi/L	U			RA-05	07/22/13 14:17 / plj
257 Radium 228 precision (±)	1	pCi/L				RA-05	07/22/13 14:17 / plj
Radium 228 MDC	1.7	pCi/L				RA-05	07/22/13 14:17 / plj
359 Radium 228 altu	1.0E-10	uCi/mL	U			RA-05	07/22/13 14:17 / plj
360 Radium 228 altu precision (±)	1.0E-09	uCi/mL				RA-05	07/22/13 14:17 / plj
Radium 228 altu MDC	2.0E-09	uCi/mL				RA-05	07/22/13 14:17 / plj

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: C13070491-004

Client Sample ID: D1

Report Date: 08/07/13

Collection Date: 07/08/13 11:20

Date Received: 07/12/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
RADIONUCLIDES - DISSOLVED							
048 Thorium 230	0.2	pCi/L				E908.0	07/26/13 08:57 / dmf
248 Thorium 230 precision (±)	0.1	pCi/L				E908.0	07/26/13 08:57 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	07/26/13 08:57 / dmf
362 Thorium 230 altu	2.0E-10	uCi/mL				E908.0	07/26/13 08:57 / dmf
363 Thorium 230 altu precision (±)	1.0E-10	uCi/mL				E908.0	07/26/13 08:57 / dmf
Thorium 230 altu MDC	1.0E-10	uCi/mL				E908.0	07/26/13 08:57 / dmf
DATA QUALITY							
192 A/C Balance (± 5)	-0.345	%				A1030 E	08/01/13 08:03 / kbh
194 Anions	38.5	meq/L				A1030 E	08/01/13 08:03 / kbh
195 Cations	38.2	meq/L				A1030 E	08/01/13 08:03 / kbh
079 Solids, Total Dissolved Calculated	2500	mg/L				A1030 E	08/01/13 08:03 / kbh
200 TDS Balance (0.80 - 1.20)	1.01	unitless				A1030 E	08/01/13 08:03 / 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.

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: C13030264-005

Client Sample ID: S4

Report Date: 03/12/13

Collection Date: 03/04/13 13:44

Date Received: 03/07/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
008 Sulfate	729	mg/L	D	8		E300.0	03/08/13 18:24 / wc
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1870	mg/L		20		A2540 C	03/08/13 15:52 / jz
METALS - DISSOLVED							
036 Molybdenum	0.65	mg/L		0.03		E200.8	03/08/13 23:46 / cp
040 Selenium	0.014	mg/L		0.005		E200.8	03/08/13 23:46 / cp
015 Uranium	0.315	mg/L		0.0003		E200.8	03/08/13 23:46 / cp
244 Uranium Precision (±)	0.0509	mg/L		0.00005		E200.8	03/08/13 23:46 / cp
113 Uranium, Activity	2.1E-07	uCi/mL		2.0E-10		E200.8	03/08/13 23:46 / cp
114 Uranium, Activity precision (±)	3.5E-08	uCi/mL		3.0E-11		E200.8	03/08/13 23:46 / cp

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

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

Lab ID: C13060741-007

Client Sample ID: S4 (061913)

Report Date: 06/25/13

Collection Date: 06/19/13 15:03

Date Received: 06/20/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	376	mg/L		5		A2320 B	06/21/13 14:28 / jba
006 Carbonate as CO3	<5	mg/L		5		A2320 B	06/21/13 14:28 / jba
005 Bicarbonate as HCO3	459	mg/L		5		A2320 B	06/21/13 14:28 / jba
001 Calcium	227	mg/L		0.5		E200.7	06/21/13 15:15 / sf
007 Chloride	227	mg/L	D	2		E300.0	06/22/13 02:21 / ljl
002 Magnesium	58.3	mg/L		0.5		E200.7	06/21/13 15:15 / sf
003 Potassium	4.5	mg/L		0.5		E200.7	06/21/13 15:15 / sf
004 Sodium	294	mg/L	D	1		E200.7	06/21/13 15:15 / sf
008 Sulfate	755	mg/L	D	8		E300.0	06/22/13 02:21 / ljl
PHYSICAL PROPERTIES							
009 pH	7.48	s.u.	H	0.01		A4500-H B	06/21/13 09:50 / ab
010 Solids, Total Dissolved TDS @ 180 C	1880	mg/L		20		A2540 C	06/21/13 15:22 / ab
METALS - DISSOLVED							
032 Iron	<0.03	mg/L		0.03		E200.7	06/21/13 15:15 / sf
036 Molybdenum	0.52	mg/L		0.03		E200.7	06/21/13 15:15 / sf
040 Selenium	0.021	mg/L		0.005		E200.8	06/25/13 05:38 / cp
015 Uranium	0.273	mg/L		0.0003		E200.8	06/25/13 05:38 / cp
244 Uranium Precision (±)	0.0441	mg/L		0.00005		E200.8	06/25/13 05:38 / cp
113 Uranium, Activity	1.9E-07	uCi/mL		2.0E-10		E200.8	06/25/13 05:38 / cp
114 Uranium, Activity precision (±)	3.0E-08	uCi/mL		3.0E-11		E200.8	06/25/13 05:38 / cp
DATA QUALITY							
192 A/C Balance (± 5)	-1.17	%				A1030 E	06/25/13 07:58 / kbh
194 Anions	29.7	meq/L				A1030 E	06/25/13 07:58 / kbh
195 Cations	29.0	meq/L				A1030 E	06/25/13 07:58 / kbh
079 Solids, Total Dissolved Calculated	1800	mg/L				A1030 E	06/25/13 07:58 / kbh
200 TDS Balance (0.80 - 1.20)	1.04	unitless				A1030 E	06/25/13 07:58 / kbh

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

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C13070442-003

Client Sample ID: S4

Report Date: 08/12/13

Collection Date: 07/09/13 09:30

Date Received: 07/11/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
175 Alkalinity, Total as CaCO3	374	mg/L		5		A2320 B	07/12/13 16:01 / jba
206 Carbonate as CO3	<5	mg/L		5		A2320 B	07/12/13 16:01 / jba
505 Bicarbonate as HCO3	456	mg/L		5		A2320 B	07/12/13 16:01 / jba
001 Calcium	228	mg/L		0.5		E200.7	07/17/13 02:09 / sf
007 Chloride	236	mg/L	D	2		E300.0	07/18/13 17:05 / wc
002 Magnesium	58.2	mg/L		0.5		E200.7	07/17/13 02:09 / sf
310 Nitrogen, Nitrate+Nitrite as N	0.6	mg/L		0.1		E353.2	07/12/13 13:10 / lr
003 Potassium	4.7	mg/L		0.5		E200.7	07/17/13 02:09 / sf
004 Sodium	296	mg/L	D	1		E200.7	07/17/13 02:09 / sf
108 Sulfate	746	mg/L	D	8		E300.0	07/18/13 17:05 / wc
PHYSICAL PROPERTIES							
009 pH	7.40	s.u.	H	0.01		A4500-H B	07/12/13 10:10 / alp
010 Solids, Total Dissolved TDS @ 180 C	1870	mg/L		20		A2540 C	07/15/13 14:59 / alp
METALS - DISSOLVED							
036 Molybdenum	0.55	mg/L		0.03		E200.7	07/17/13 02:09 / sf
040 Selenium	0.017	mg/L		0.005		E200.8	07/16/13 19:11 / clm
015 Uranium	0.289	mg/L		0.0003		E200.8	07/16/13 19:11 / clm
244 Uranium Precision (±)	0.0467	mg/L		0.00005		E200.8	07/16/13 19:11 / clm
113 Uranium, Activity	2.0E-07	uCi/mL		2.0E-10		E200.8	07/16/13 19:11 / clm
114 Uranium, Activity precision (±)	3.2E-08	uCi/mL		3.0E-11		E200.8	07/16/13 19:11 / clm
042 Vanadium	<0.01	mg/L		0.01		E200.7	07/17/13 02:09 / sf
RADIONUCLIDES - DISSOLVED							
045 Radium 226	0.03	pCi/L	U			E903.0	08/08/13 15:48 / lmc
245 Radium 226 precision (±)	0.07	pCi/L				E903.0	08/08/13 15:48 / lmc
Radium 226 MDC	0.12	pCi/L				E903.0	08/08/13 15:48 / lmc
256 Radium 226 altu	3.0E-11	uCi/mL	U			E903.0	08/08/13 15:48 / lmc
258 Radium 226 altu precision (±)	7.0E-11	uCi/mL				E903.0	08/08/13 15:48 / lmc
Radium 226 altu MDC	1.0E-10	uCi/mL				E903.0	08/08/13 15:48 / lmc
057 Radium 228	0.002	pCi/L	U			RA-05	07/31/13 14:17 / plj
257 Radium 228 precision (±)	0.7	pCi/L				RA-05	07/31/13 14:17 / plj
Radium 228 MDC	1.2	pCi/L				RA-05	07/31/13 14:17 / plj
359 Radium 228 altu	2.0E-12	uCi/mL	U			RA-05	07/31/13 14:17 / plj
360 Radium 228 altu precision (±)	7.0E-10	uCi/mL				RA-05	07/31/13 14:17 / plj
Radium 228 altu MDC	1.0E-09	uCi/mL				RA-05	07/31/13 14:17 / plj
048 Thorium 230	0.07	pCi/L	U			E908.0	07/19/13 15:28 / dmf
248 Thorium 230 precision (±)	0.1	pCi/L				E908.0	07/19/13 15:28 / dmf
Thorium 230 MDC	0.2	pCi/L				E908.0	07/19/13 15:28 / dmf
362 Thorium 230 altu	7.0E-11	uCi/mL	U			E908.0	07/19/13 15:28 / dmf
363 Thorium 230 altu precision (±)	1.0E-10	uCi/mL				E908.0	07/19/13 15:28 / dmf
Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	07/19/13 15:28 / 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: C13070442-003

Client Sample ID: S4

Report Date: 08/12/13

Collection Date: 07/09/13 09:30

Date Received: 07/11/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
DATA QUALITY							
192	A/C Balance (± 5)	-0.952	%			A1030 E	07/22/13 09:37 / kbh
194	Anions	29.7	meq/L			A1030 E	07/22/13 09:37 / kbh
195	Cations	29.1	meq/L			A1030 E	07/22/13 09:37 / kbh
079	Solids, Total Dissolved Calculated	1800	mg/L			A1030 E	07/22/13 09:37 / kbh
200	TDS Balance (0.80 - 1.20)	1.02	unitless			A1030 E	07/22/13 09:37 / 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.

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: C13020411-006

Client Sample ID: X

Report Date: 02/21/13

Collection Date: 02/11/13 13:16

Date Received: 02/13/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	83	mg/L		1		E300.0	02/15/13 01:02 / wc
008 Sulfate	247	mg/L	D	4		E300.0	02/15/13 01:02 / wc
PHYSICAL PROPERTIES							
009 pH	7.33	s.u.	H	0.01		A4500-H B	02/14/13 10:00 / ab
010 Solids, Total Dissolved TDS @ 180 C	844	mg/L		10		A2540 C	02/14/13 15:37 / jz
METALS - DISSOLVED							
036 Molybdenum	0.07	mg/L		0.03		E200.7	02/14/13 16:41 / sf
040 Selenium	0.027	mg/L		0.005		E200.8	02/15/13 01:00 / clm
015 Uranium	0.0422	mg/L	D	0.0005		E200.8	02/15/13 01:00 / clm
244 Uranium Precision (±)	0.00681	mg/L	D	0.00008		E200.8	02/15/13 01:00 / clm
113 Uranium, Activity	2.9E-08	uCi/mL	D	3.0E-10		E200.8	02/15/13 01:00 / clm
114 Uranium, Activity precision (±)	4.6E-09	uCi/mL	D	5.0E-11		E200.8	02/15/13 01:00 / clm

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

MCL - Maximum contaminant level.
 ND - Not detected at the reporting limit.
 H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C13040717-007

Client Sample ID: X

Report Date: 04/30/13

Collection Date: 04/19/13 13:30

Date Received: 04/23/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	89	mg/L		1		E300.0	04/23/13 22:07 / wc
108 Sulfate	289	mg/L	D	4		E300.0	04/23/13 22:07 / wc
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	953	mg/L		10		A2540 C	04/24/13 15:14 / ab
METALS - DISSOLVED							
036 Molybdenum	0.11	mg/L		0.03		E200.7	04/24/13 14:47 / sf
040 Selenium	0.017	mg/L		0.005		E200.8	04/24/13 20:15 / cp
015 Uranium	0.0582	mg/L		0.0003		E200.8	04/25/13 18:21 / cp
244 Uranium Precision (±)	0.00939	mg/L		0.00005		E200.8	04/25/13 18:21 / cp
113 Uranium, Activity	3.9E-08	uCi/mL		2.0E-10		E200.8	04/25/13 18:21 / cp
114 Uranium, Activity precision (±)	6.4E-09	uCi/mL		3.0E-11		E200.8	04/25/13 18:21 / cp

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

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

Lab ID: C13070491-005

Client Sample ID: X

Report Date: 08/07/13

Collection Date: 07/08/13 15:30

Date Received: 07/12/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
175 Alkalinity, Total as CaCO3	315	mg/L		5		A2320 B	07/12/13 23:52 / jba
206 Carbonate as CO3	<5	mg/L		5		A2320 B	07/12/13 23:52 / jba
505 Bicarbonate as HCO3	384	mg/L		5		A2320 B	07/12/13 23:52 / jba
001 Calcium	131	mg/L		0.5		E200.7	07/30/13 21:49 / sf
007 Chloride	88	mg/L		1		E300.0	07/16/13 04:08 / wc
002 Magnesium	28.9	mg/L		0.5		E200.7	07/30/13 21:49 / sf
310 Nitrogen, Nitrate+Nitrite as N	1.5	mg/L		0.1		E353.2	07/17/13 12:48 / lr
003 Potassium	4.6	mg/L		0.5		E200.7	07/30/13 21:49 / sf
004 Sodium	139	mg/L		0.5		E200.7	07/30/13 21:49 / sf
108 Sulfate	277	mg/L	D	4		E300.0	07/16/13 04:08 / wc
PHYSICAL PROPERTIES							
009 pH	7.50	s.u.	H	0.01		A4500-H B	07/12/13 16:52 / alp
010 Solids, Total Dissolved TDS @ 180 C	904	mg/L		10		A2540 C	07/12/13 16:53 / alp
METALS - DISSOLVED							
036 Molybdenum	0.08	mg/L		0.03		E200.7	07/30/13 21:49 / sf
040 Selenium	0.011	mg/L		0.005		E200.8	08/01/13 20:30 / cp
015 Uranium	0.0563	mg/L		0.0003		E200.8	08/01/13 20:30 / cp
244 Uranium Precision (±)	0.00909	mg/L		0.00005		E200.8	08/01/13 20:30 / cp
113 Uranium, Activity	3.8E-08	uCi/mL		2.0E-10		E200.8	08/01/13 20:30 / cp
114 Uranium, Activity precision (±)	6.2E-09	uCi/mL		3.0E-11		E200.8	08/01/13 20:30 / cp
042 Vanadium	0.01	mg/L		0.01		E200.7	07/30/13 21:49 / sf
RADIONUCLIDES - DISSOLVED							
045 Radium 226	0.33	pCi/L				E903.0	07/29/13 14:39 / trs
245 Radium 226 precision (±)	0.14	pCi/L				E903.0	07/29/13 14:39 / trs
Radium 226 MDC	0.15	pCi/L				E903.0	07/29/13 14:39 / trs
256 Radium 226 altu	3.0E-10	uCi/mL				E903.0	07/29/13 14:39 / trs
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	07/29/13 14:39 / trs
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	07/29/13 14:39 / trs
057 Radium 228	0.03	pCi/L	U			RA-05	07/22/13 14:17 / plj
257 Radium 228 precision (±)	1.0	pCi/L				RA-05	07/22/13 14:17 / plj
Radium 228 MDC	1.8	pCi/L				RA-05	07/22/13 14:17 / plj
359 Radium 228 altu	3.0E-11	uCi/mL	U			RA-05	07/22/13 14:17 / plj
360 Radium 228 altu precision (±)	1.0E-09	uCi/mL				RA-05	07/22/13 14:17 / plj
Radium 228 altu MDC	2.0E-09	uCi/mL				RA-05	07/22/13 14:17 / plj

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: C13070491-005

Client Sample ID: X

Report Date: 08/07/13

Collection Date: 07/08/13 15:30

Date Received: 07/12/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
RADIONUCLIDES - DISSOLVED							
048 Thorium 230	0.05	pCi/L	U			E908.0	07/26/13 16:01 / dmf
248 Thorium 230 precision (±)	0.07	pCi/L				E908.0	07/26/13 16:01 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	07/26/13 16:01 / dmf
362 Thorium 230 altu	5.0E-11	uCi/mL	U			E908.0	07/26/13 16:01 / dmf
363 Thorium 230 altu precision (±)	7.0E-11	uCi/mL				E908.0	07/26/13 16:01 / dmf
Thorium 230 altu MDC	1.0E-10	uCi/mL				E908.0	07/26/13 16:01 / dmf
DATA QUALITY							
192 A/C Balance (± 5)	1.50	%				A1030 E	08/01/13 08:03 / kbh
194 Anions	14.6	meq/L				A1030 E	08/01/13 08:03 / kbh
195 Cations	15.1	meq/L				A1030 E	08/01/13 08:03 / kbh
079 Solids, Total Dissolved Calculated	880	mg/L				A1030 E	08/01/13 08:03 / kbh
200 TDS Balance (0.80 - 1.20)	1.02	unitless				A1030 E	08/01/13 08:03 / 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.
U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C13110085-004

Client Sample ID: X

Report Date: 11/18/13

Collection Date: 10/31/13 15:16

Date Received: 11/04/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	98	mg/L		1		E300.0	11/06/13 00:57 / wc
108 Sulfate	285	mg/L	D	4		E300.0	11/06/13 00:57 / wc
PHYSICAL PROPERTIES							
009 pH	7.47	s.u.	H	0.01		A4500-H B	11/05/13 09:35 / alp
010 Solids, Total Dissolved TDS @ 180 C	902	mg/L		10		A2540 C	11/05/13 13:00 / alp
METALS - DISSOLVED							
036 Molybdenum	0.21	mg/L		0.03		E200.7	11/07/13 00:18 / sf
040 Selenium	0.014	mg/L		0.005		E200.8	11/14/13 20:44 / clm
015 Uranium	0.0635	mg/L		0.0003		E200.8	11/14/13 20:44 / clm
244 Uranium Precision (±)	0.0102	mg/L		0.00005		E200.8	11/14/13 20:44 / clm
113 Uranium, Activity	4.3E-08	uCi/mL		2.0E-10		E200.8	11/14/13 20:44 / clm
114 Uranium, Activity precision (±)	6.9E-09	uCi/mL		3.0E-11		E200.8	11/14/13 20:44 / clm

**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.

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: C13050428-001

Client Sample ID: P

Report Date: 05/31/13

Collection Date: 05/07/13 11:28

Date Received: 05/10/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
075 Alkalinity, Total as CaCO3	218	mg/L		5		A2320 B	05/13/13 15:27 / jba
006 Carbonate as CO3	<5	mg/L		5		A2320 B	05/13/13 15:27 / jba
005 Bicarbonate as HCO3	266	mg/L		5		A2320 B	05/13/13 15:27 / jba
001 Calcium	241	mg/L		0.5		E200.7	05/28/13 21:15 / sf
007 Chloride	51	mg/L		1		E300.0	05/14/13 18:59 / wc
002 Magnesium	50.1	mg/L		0.5		E200.7	05/28/13 21:15 / sf
039 Nitrogen, Nitrate+Nitrite as N	3.8	mg/L	D	0.5		E353.2	05/13/13 13:06 / lr
003 Potassium	4.9	mg/L		0.5		E200.7	05/28/13 21:15 / sf
004 Sodium	255	mg/L		0.5		E200.7	05/28/13 21:15 / sf
008 Sulfate	1100	mg/L	D	8		E300.0	05/18/13 00:35 / ljl
PHYSICAL PROPERTIES							
009 pH	7.20	s.u.	H	0.01		A4500-H B	05/13/13 12:36 / jz
010 Solids, Total Dissolved TDS @ 180 C	1940	mg/L		20		A2540 C	05/13/13 15:51 / jz
METALS - DISSOLVED							
036 Molybdenum	<0.03	mg/L		0.03		E200.8	05/13/13 20:47 / clm
040 Selenium	0.093	mg/L		0.005		E200.8	05/13/13 20:47 / clm
015 Uranium	0.0375	mg/L		0.0003		E200.8	05/13/13 20:47 / clm
244 Uranium Precision (±)	0.00605	mg/L		0.00005		E200.8	05/13/13 20:47 / clm
113 Uranium, Activity	2.5E-08	uCi/mL		2.0E-10		E200.8	05/13/13 20:47 / clm
114 Uranium, Activity precision (±)	4.1E-09	uCi/mL		3.0E-11		E200.8	05/13/13 20:47 / clm
042 Vanadium	<0.01	mg/L		0.01		E200.8	05/13/13 20:47 / clm
RADIONUCLIDES - DISSOLVED							
045 Radium 226	1.1	pCi/L				E903.0	05/28/13 19:38 / lmc
245 Radium 226 precision (±)	0.21	pCi/L				E903.0	05/28/13 19:38 / lmc
Radium 226 MDC	0.15	pCi/L				E903.0	05/28/13 19:38 / lmc
256 Radium 226 altu	1.0E-09	uCi/mL				E903.0	05/28/13 19:38 / lmc
258 Radium 226 altu precision (±)	2.0E-10	uCi/mL				E903.0	05/28/13 19:38 / lmc
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	05/28/13 19:38 / lmc
057 Radium 228	1.1	pCi/L	U			RA-05	05/21/13 17:51 / gb
257 Radium 228 precision (±)	0.8	pCi/L				RA-05	05/21/13 17:51 / gb
Radium 228 MDC	1.3	pCi/L				RA-05	05/21/13 17:51 / gb
359 Radium 228 altu	1.0E-09	uCi/mL	U			RA-05	05/21/13 17:51 / gb
360 Radium 228 altu precision (±)	8.0E-10	uCi/mL				RA-05	05/21/13 17:51 / gb
Radium 228 altu MDC	1.0E-09	uCi/mL				RA-05	05/21/13 17:51 / gb
048 Thorium 230	0.003	pCi/L	U			E908.0	05/15/13 09:46 / dmf
248 Thorium 230 precision (±)	0.03	pCi/L				E908.0	05/15/13 09:46 / dmf
Thorium 230 MDC	0.08	pCi/L				E908.0	05/15/13 09:46 / dmf
362 Thorium 230 altu	3.0E-12	uCi/mL	U			E908.0	05/15/13 09:46 / dmf
363 Thorium 230 altu precision (±)	3.0E-11	uCi/mL				E908.0	05/15/13 09:46 / dmf
Thorium 230 altu MDC	8.0E-11	uCi/mL				E908.0	05/15/13 09:46 / 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: C13050428-001

Client Sample ID: P

Report Date: 05/31/13

Collection Date: 05/07/13 11:28

Date Received: 05/10/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
DATA QUALITY							
192	A/C Balance (± 5)	-2.82	%			A1030 E	05/29/13 16:27 / sdw
194	Anions	28.9	meq/L			A1030 E	05/29/13 16:27 / sdw
195	Cations	27.3	meq/L			A1030 E	05/29/13 16:27 / sdw
079	Solids, Total Dissolved Calculated	1900	mg/L			A1030 E	05/29/13 16:27 / sdw
200	TDS Balance (0.80 - 1.20)	1.04	unitless			A1030 E	05/29/13 16:27 / sdw

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

Lab ID: C13110413-004

Client Sample ID: P

Report Date: 11/20/13

Collection Date: 11/05/13 09:10

Date Received: 11/11/13

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
108 Sulfate	1130	mg/L	D	4		E300.0	11/12/13 15:57 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1970	mg/L		20		A2540 C	11/11/13 12:00 / tmm
METALS - DISSOLVED							
036 Molybdenum	<0.03	mg/L		0.03		E200.7	11/15/13 01:20 / sf
040 Selenium	0.074	mg/L		0.005		E200.8	11/19/13 08:14 / cp
015 Uranium	0.0341	mg/L		0.0003		E200.8	11/19/13 08:14 / cp
244 Uranium Precision (±)	0.00551	mg/L		0.00005		E200.8	11/19/13 08:14 / cp
113 Uranium, Activity	2.3E-08	uCi/mL		2.0E-10		E200.8	11/19/13 08:14 / cp
114 Uranium, Activity precision (±)	3.7E-09	uCi/mL		3.0E-11		E200.8	11/19/13 08:14 / cp

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

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