HOMESTAKE
Grants Project

Homestake Mining Company of California

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22 February 2018

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RE: Semi-Annual Environmental Monitoring Report for Period July-December 2017, In Accordance with Nuclear Regulatory Commission Docket No. 40-8903, License No. SUA 1471, and New Mexico Environmental Department DP-200 Ground Water Discharge Plan

Dear Sirs:

Pursuant to US Nuclear Regulatory Commission Regulation 10 CFR 40.65, Part 20, and in accordance with the applicable provisions stipulated in ground water discharge permit DP-200 issued by the New Mexico Environmental Department, please find enclosed copies of the subject Semi-Annual Environmental Report for the second half of 2017 (July-December) for Homestake Mining Company's Grants Reclamation Project.

Thank you for your time and attention on this matter. If you or anyone on your staff has any questions, please contact me directly on my cell phone at 505.290.2187.

IE25
NMSS20
NMSS

Respectfully,

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HOMESTAKE MINING COMPANY OF CALIFORNIA

Grants Reclamation Project

SEMI-ANNUAL
ENVIRONMENTAL MONITORING REPORT

Reporting Period
July- December 2017

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

HOMESTAKE MINING COMPANY OF CALIFORNIA

Grants Reclamation Project

SEMI-ANNUAL
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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 2017. 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 and Discharge Permit No. 200, dated September 18, 2014

Homestake's monitoring and surveillance program for radioactive effluent releases have been designed to ensure the project's 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 an interim cover on the top and radon barrier on the outslopes. Bedding and erosion protection was placed on the outslopes 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.

A summary of the operations of groundwater treatment technologies, as required by DP-200 is provided in Section 3.0.

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

2.0 ENVIRONMENTAL MONITORING PROGRAMS

The monitoring requirements for the site are summarized in Table 2-1, Table 2-2, and Table 2-3 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 for air particulates 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.

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. (ELI) analyzes the collected samples quarterly for Natural Uranium, Radium-226, Thorium-230 and Vanadium. Air sampling flow volumes are recorded by HMC and the data are reported to ELI for calculation of average radionuclide concentrations in air particulates.

The results of environmental air particulate monitoring for 2nd half 2017 are provided in Attachment 1 and are summarized/evaluated in Attachment 5.

2.2 Radon Gas Monitoring

Radon-222 gas concentrations in ambient outdoor air are monitored on a continuous basis at the nine locations identified in Figure 1. The background location for radon gas is HMC #16, located northwest of the site. Rapidos high-sensitivity track-etch passive radon monitors (PRM) from Radonova (a division of Landauer), or equivalent, are used to continuously monitor radon gas at each sampling location. Homestake personnel place new PRMs quarterly at the monitoring locations and the exposed detectors are retrieved and returned to the vendor for analysis. The PRM detectors measure radon gas concentrations in ambient outdoor air by exposing a special alpha-particle sensitive plastic chip mounted inside a chamber with a membrane filter on one end that is permeable to air and radon gas, but not to dust or solid phase particulate radionuclides. Radon-222 gas from ambient air diffuses through the membrane, and the subsequent decay of radon gas inside the chamber causes imprint tracks on the alpha-sensitive plastic chip that can be enhanced by a chemical etching process and counted after collection. The radon gas concentration is calculated by determining the number of tracks per unit area of the plastic chip. The semi-annual average results are presented in Attachment 2.

2.3 Effluent and Radon Flux Monitoring

Regulations in 10 CFR 40.65 require licensees to estimate and report the quantities of principal radionuclides released to unrestricted areas in gaseous effluents every six months.

Radon-222 was the only gaseous-phase effluent radionuclide released to unrestricted areas in 2017. The principal sources of radon-222 at the site are the large tailings pile (LTP) and Small Tailings Pile (STP). Radon-222 releases from components of the water treatment system (the Reverse Osmosis [RO] building and evaporation ponds) are insignificant relative to those of the LTP and STP.

Annual flux measurements for calendar year 2017 were made in two separate deployments, consisting of 100 canisters per deployment. The first 100 canister measurements were made on the top of the LTP on September 21-22, 2017. The second 100 canister measurements were made on the STP on October 12-13, 2017. These deployments were conducted in accordance with the methods proposed in HMC's response to the NRC's recent notice of violation (NOV) regarding an average radon flux rate from the LTP that exceeded the 20 pCi/m^2-s standard given in 10 CFR 40, Appendix A (ERG, 2017 and NRC, 2017).. The Radon Flux report is provided in Attachment 3. Average Rn-222 flux values of 46.6 and 3.5 picocuries per square meter per second ($pCi\ m^{-2}\ s^{-1}$) for the LTP and STP, respectively were measured in 2017 (Attachment 3).

On April 20, 2017, the NRC issued a notice of violation for the manner in which average radon flux was measured and calculated for 2015 (The 2016 annual flux report, dated January 2017, observed previously existing protocols pending NRC resolution of a regulatory decision on these matters). On April 24-26, 2017 the NRC conducted an onsite inspection, and in associated discussions indicated that side slopes of the LTP, upon which final cover was completed in 1995 (including flux measurements followed by placement of final erosion control material), can not be used for annual flux estimates unless new flux measurements on the side slopes are conducted. NRC indicated that 100 annual measurements across the top of the LTP, and calculation of the arithmetic mean of the 100 measurements, would be an acceptable approach to meet the requirements of License Condition 36(E) with respect to the LTP. This protocol was observed for the 2017 measurements as detailed in the Annual Radon Flux Report (Attachment 3).

With respect to the STP, the evaporation pond (EP1) is an operational facility as EP1 operations and disposal of additional materials in the STP will continue. Since the STP is still operational, it can be broken into regions in accordance with EPA Method 115, with the pond being one region of zero flux (28.7 acres), and the remaining areas (earthen surfaces) representing a second region (26 acres). Section 2.1.7 of EPA Method 115 provides an explicit mathematical formula for area-weighted averaging of various regions to determine the overall weighted average flux for the entire pile. Under Method 115, calculation of effluent release of radon from the STP for 2017 was based on the flux measurement data noted above (100 flux measurements), and a calculated overall area-weighted average flux for the two regions as follows (excerpted from EPA Method 115):

(b) The mean radon flux for the total uranium mill tailings pile shall be calculated as follows.

$$J_s = \frac{J_1A_1 + J_2A_2 + \ldots + J_iA_i}{A_t}$$

where:

J_s	=	Mean flux for the total pile (pCi/m²-s)
J_i	=	Mean flux measured in region i (pCi/m²-s)
A_i	=	Area of region i (m²)
A_t	=	Total area of the pile (m²)

Based on the above information and 2017 flux monitoring results, the calculated average radon flux effluent value for the LTP in 2017 is 46.6 pCi/m²-s as reported in the 2017 Annual Radon Flux Report (Attachment 3). With respect to the STP, the arithmetic mean flux for the earthen region of the pile (105,272 m^2 area) was 7.3 pCi/m²-sec. The area of EP1 is approximately 116,204 m^2, and this pond area was assigned a value of zero flux. The overall area-weighted average radon flux for the STP was calculated as follows:

STP Radon Flux = [(7.3 pCi/m^2-s)(105,272 m^2) + (0 pCi/m^2-s)(116,204 m^2)] / (221,148 m^2)
= 3.5 pCi/m^2-s

Based on the measured/calculated 2017 average flux values (46.6 and 3.5 pCi m^{-2} s^{-1} for the LTP and STP, respectively), along with the approximate areal extent of the applicable surfaces including the top of the LTP (≈ 106 acres) and the entire STP (≈ 54.7 acres), the radon emissions from the tailings piles in 2017 are calculated to be 630 Ci and 54.4 Ci respectively.

3.0 OPERATIONS

3.1 Flow Rates

The monthly influent totals to each of the evaporation ponds are presented in Table 3.1-1 for the second half of 2017. Inputs to Evaporation Pond 2 were RO brine, zeolite regeneration, tailings sumps, and transfers from the collection pond. Transfers from Evaporation Pond 2 to Evaporation Pond 1 and transfers from Evaporation Pond 1 to Evaporation Pond 3 are presented in this table as well. The influent into the collection ponds was from well 802, and miscellaneous flow from the RO plant which includes any diverted flow, flow from the RO sumps, backwash from the microfiltration system, and blow down from the clarifiers. The freeboard measurements taken from the evaporation and collection ponds are tabulated in Table 3.1-2. The readings on the West Collection Pond are taken as either overflowing (O/F) into the East Collection Pond via a spillway or not overflowing (Not O/F). The leak detection volumes pumped for from Evaporation Ponds 2 and 3 are presented in Tables 3.1-3 through 3.1-5. These three tables give the gallons per day per acre (GPD/AC) with values that exceed 775 GPD/AC highlighted in blue.

The tailings sump volume, collection and injection totals for the Large Tailings Pile are presented in Table 3.1-6. Injection into the LTP ceased in July 2015. The monthly collection totals broken out by aquifer and restoration area are shown in Table 3.1-7. The monthly injection totals broken out by aquifer and area are presented in Table 3.1-8. The On-Site, South Off-Site, and North Off-site injection water is a combination of San Andres water, zeolite treated water, and RO Product water. The monthly totals for the low concentration and in-situ injectate are presented in Table 3.1-9, which were not operated in the second half of 2017. The low concentration re-injection ceased operation in July of 2016.

Table 3.1-10 presents the influent totals for the active treatment systems. The inflow to the RO plant averaged 543 gpm in the second half of 2017 while the inputs to the 300 zeolite and 1200 zeolite cells were 43 and 124, respectively. Table 3.1-11 presents the total volumes of treated effluent. It also presents the regeneration and brine effluents that were discharged into Evaporation Pond 2 from the treatment systems. The fresh water injection totals from each of the three restoration areas are also presented in this table.

3.2 Reversal Wells

The depth to water measurements for the Reversal Wells are presented in Table 3.2-1. Water levels in alluvial well S5 have been used in place of well S1 for the S1-S2 reversal pair due to the effects of the nearby S injection line on water levels in well S1. Because the operation of the S injection line results in water level changes in both S1 and S2, it is necessary to monitor water levels in well S5 which is closer to the collection area in order to effectively monitor gradient reversal.

3.3 Pond and Pipeline Maintenance

No liner repair work was done in the 2nd half of 2017. Slumps in the berms of Evaporation Pond 1 were found during an inspection in early 2017 and options for repair of EP1 are being evaluated. The pond level was decreased and improvements to the berm and liner are in progress.

There were no discharges from conveyance pipelines to non-authorized areas and no major pipeline repairs were done during this time period.

3.4 Well Drilling and Closures

Five new alluvial wells were drilled adjacent to EP3 during the period from July through December of 2017 as indicated in Table 3.4-1. Drilling of San Andres monitoring well 943M and San Andres replacement well #1R Deep were initiated near the end of the quarter and will be reported in the first half 2018 report. The abandonment of San Andres well 928 was also initiated near the end of the quarter.

4.0 WATER QUALITY MONITORING

4.1 Groundwater Quality Monitoring

Table 2-2 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, as required to comply with 10 CFR 40.65, are reported in Tables 4.1-1 through 4.1-3. Two samples from background well P were collected in the second half of 2017 and are presented in Table 4.1-4. 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.

4.2 Pond Water Quality Monitoring

Table 4.2-1 presents the water quality data associated with the collection and evaporation ponds. The water quality data for the Evaporation Pond alluvial monitoring wells are presented in Table 4.2-2. This table highlights the concentrations that exceed the alluvial site standards in blue. The sulfate concentrations naturally exceed the site standard in wells DD and DD2. The TDS in well DD also exceeds the site standard. The uranium concentration in well DD2 naturally exceeds the alluvial site standard as it has since this well was drilled. Total concentrations for manganese, selenium, molybdenum and uranium are presented for the ponds and are generally fairly similar to the dissolved concentrations. Table 4 from the Discharge Permit DP-200 requests uranium activity as one of the analytes for monitoring but is not included because it is a calculated value from the uranium concentrations.

4.3 Treated Water Quality Monitoring

Table 4.3-1 presents the effluent water quality analysis from the Post Treatment Tank (SP2). The SP2 sample is collected after mixing of the RO product, zeolite treated and fresh water. This table also shows that all of the SP2 concentrations in the second half of 2017 were less than the alluvial site standards except nitrate concentrations for the July 28 and September 27 samples. An investigation of these very high values indicates that the samples were mistakenly preserved with nitric acid and no exceedance of water injected into the ground water occurred during the second half of 2017.

Table 4.3-2 presents the treated water quality data for the RO product (SP1) and the zeolite treated water (300Z, 1200Z Trains 1 & 2, and 1200Z Trains 3 & 4) with sample constituent concentrations that exceed the alluvial site standards highlighted in blue. All of the RO product constituent concentrations measured in the second half of 2017 were less than or equal to the corresponding alluvial site standards with the exception of two nitrate and one molybdenum

values. The molybdenum concentration for the SP1 7/10/17 sample slightly exceeded the standard but did not result in an exceedance in the SP2 sample after the RO product water was mixed with fresh water. The nitrate concentrations for the SP1 samples on July 28 and September 27 were very large and an investigation of these two exceedance indicate the samples must have been preserved mistakenly with nitric acid.

Table 4.3-2 also presents the treated water quality for the zeolite treatment process. In the second half of 2017, zeolite was used to treat Off-site water for uranium in the 300 zeolite system and four trains in the 1200 zeolite systems. The zeolite treated water is monitored for the discharge from the 300 zeolite and Trains 1 & 2 and Trains 3 & 4 from the 1200 systems. None of the uranium concentrations or other site standards were exceeded in the second half of 2017 zeolite samples. Additional monitoring of the treated zeolite water discharged to the Post Treatment Tank has been implemented with more frequent measurements of the approximate uranium concentration using the Kinetic Phosphorescence Analyzer (KPA) instrument. The KPA samples can be processed within a few hours of collection. In conjunction with other field water quality measurements, the frequent KPA sample results allow adjustments of the pretreatment and also provide an indication of the uranium loading condition within the zeolite.

5.0 DIRECT RADIATION

Gamma dose 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). The levels of direct environmental radiation are recorded for each of the eight locations. Pertinent sample data are reported in Attachment 4.

6.0 SURFACE CONTAMINATION

The Occupational Monitoring Program requirements are summarized in Table 2-3. The aspects related to contamination control are discussed briefly below.

6.1 Personnel Skin and Clothing

The monitoring of personnel for alpha contamination may be required by the RSO depending on the nature of the work being performed as specified in the Radiation Protection Program (RPP) Manual (HMC, 2018), which may or may not be conducted under a radiation work permit (RWP). No releases of personnel or clothing above administrative limits were reported during this reporting period.

6.2 Survey of Equipment Prior to Release for Unrestricted Use

Equipment surveys are required for all equipment that is to be removed from Restricted Areas as specified in the RPP (HMC, 2018). Standard Operating Procedures are used for these surveys. No releases of contaminated material above NRC release criteria were reported during this reporting period.

7.0 LOWER LIMIT OF DETECTION

Homestake representatives have calculated the Lower Limit of Detection (LLD) for each measurement system, where applicable; to more accurately evaluate concentrations of radioactive material measured in the environment surrounding the mill site. The lower limit of detection is defined in U.S. Nuclear Regulatory Guide 8.30 – Appendix B as the smallest concentration of radioactive material that has a 95% probability of being detected. Radioactive material is "detected" if the value measured on an instrument is high enough to conclude that activity above the system background is probably present. Since the LLD is a function of sample volume, counting efficiency, radiochemical yield, etc., it varies for different sampling and analysis procedures.

For the individual measurement systems for which Homestake calculates LLDs, the following formula is utilized:

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

Where:

LLD	is the lower limit of detection (microcuries per milliliter [μCi/ml]);
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 (ml);
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 E 9 ml. Landauer (vendor lab) reports the LLD for radon-222. The LLDs for the constituents are:

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

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

8.0 DATA SUMMARY AND CONCLUSIONS

The summaries of Homestake's effluent monitoring program included in this submittal contain data for each of the regulated parameters released to unrestricted areas. DP-200 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.

9.0 REFERENCES

Environmental Restoration Group, Inc. (ERG). 2017. Proposal to address radon flux NOV for the LTP (NRC Docket No. 040-08903/2016-001 License No. SUA-1471). In: Reply to Notice of Violation, Docket No. 040-08903/2016-001, License No. SUA-1471 [Submitted to NRC by Homestake Mining Company of California (HMC) on September 13, 2017].

Homestake Mining Company of California (HMC). 2018. Radiation Protection Program Manual, Revision 0. Homestake Grants Reclamation Project, Cibola County, New Mexico. January.

U.S. Nuclear Regulatory Commission (NRC). 2017. NRC Inspection Report 040-08903/2016-001 and Notice of Violation. April 20, 2017.

Table 2-1
Environmental Monitoring Program Excluding Groundwater Monitoring

Table 2-1 - 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 2-2
Groundwater Monitoring Program (8-99, as modified by Amendment 34)

Table 2-2 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, DZ, SO, SP, S1, S2	Water Level	Weekly
Point of Compliance Wells D1, X, S4	B, F	Annually
Background Well P	B	Annually

B = Water Level, pH, TDS, SO_4, Cl, HCO_3, CO_3, Na, Ca, Mg, K, NO_3, U, Se, Mo, Ra-226
D = Ca, Mg, K, Na, HCO_3, CO_3, Cl, SO_4, pH, TDS, Al, As, Ba, Cd, Co, Cu, CN, F, Fe, Pb, Mn, Hg, Mo, Ni, NO_3 as N, Se, Ag, Zn, U, Filtered Ra-226
F = V, Ra-228, Th-230
G = Water Level, SO_4, U, Se, TDS, Mo

Table 2-3
Occupational Monitoring Program (6-00)

Table 2-3 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

Tables 3.1-1 through 3.1-11
Flow Rates

Table 3.1-1. Evaporation and Collection Pond Monthly Influent Totals

Evap Pond 1

July	Interval Gallons
Transfer EP-2 to EP-1	4,018,000

August	Interval Gallons
Transfer EP-2 to EP-1	3,073,000

Septebmer	Interval Gallons
Transfer EP-2 to EP-1	0

October	Interval Gallons
Transfer EP-2 to EP-1	19,341,000

November	Interval Gallons
Transfer EP-2 to EP-1	2,850,000

December	Interval Gallons
Transfer EP-2 to EP-1	0

Evap Pond 2

July	Interval Gallons
R.O. Flow to Evaporation Ponds	5,063,206
Tailings Sumps	408,240
Tailings Pile	0
Zeolite Regeneration & Overflow	6,486,600
E Coll Pond to EP-2	2,787,344
August	**Interval Gallons**
R.O. Flow to Evaporation Ponds	1,806,337
Tailings Sumps	314,496
Tailings Pile	0
Zeolite Regeneration & Overflow	129,915
E Coll Pond to EP-2	2,913,640
September	**Interval Gallons**
R.O. Flow to Evaporation Ponds	3,286,348
Tailings Sumps	266,112
Tailings Pile	0
Zeolite Regeneration & Overflow	0
E Coll Pond to EP-2	1,630,616
October	**Interval Gallons**
R.O. Flow to Evaporation Ponds	5,006,776
Tailings Sumps	609,840
Tailings Pile	0
Zeolite Regeneration & Overflow	0
E Coll Pond to EP-2	899,432
November	**Interval Gallons**
R.O. Flow to Evaporation Ponds	5,471,514
Tailings Sumps	415,750
Tailings Pile	0
Zeolite Regeneration & Overflow	201,800
E Coll Pond to EP-2	365,856
December	**Interval Gallons**
R.O. Flow to Evaporation Ponds	4,402,766
Tailings Sumps	417,130
Tailings Pile	0
Zeolite Regeneration & Overflow	3,291,000
E Coll Pond to EP-2	0

Evap Pond 3

July	Interval Gallons
Transfer EP-1 to EP-3	0

August	Interval Gallons
Transfer EP-1 to EP-3	0

September	Interval Gallons
Transfer EP-1 to EP-3	0

October	Interval Gallons
Transfer EP-1 to EP-3	0

November	Interval Gallons
Transfer EP-1 to EP-3	0

December	Interval Gallons
Transfer EP-1 to EP-3	0

Collection Ponds

July	Interval Gallons
Miscellanous RO and Clarifier Flow	2,572,144
Tailings Sumps	0
802	113,090

August	Interval Gallons
Miscellanous RO and Clarifier Flow	3,689,007
Tailings Sumps	0
802	4,960

September	Interval Gallons
Miscellanous RO and Clarifier Flow	1,740,199
Tailings Sumps	0
802	180

October	Interval Gallons
Miscellanous RO and Clarifier Flow	2,210,047
Tailings Sumps	0
802	88,200

November	Interval Gallons
Miscellanous RO and Clarifier Flow	591,525
Tailings Sumps	0
802	86,930

December	Interval Gallons
Miscellanous RO and Clarifier Flow	43,915
Tailings Sumps	0
802	47,430

Table 3.1-2. Evaporation and Collection Pond Weekly Freeboard Measurements (feet)

	EP1	EP2	EP3A	EP3B	W Coll	E Coll
7/3/2017	10.5	5.55	3.8	3.2	O/F	4.1
7/10/2017	9	5.32	3.4	3.3	O/F	4.8
7/17/2017	10.5	4.85	3.4	3.4	O/F	4.8
7/24/2017	10	4.5	3.5	3.5	O/F	5.9
7/31/2017	10.8	4.8	3.5	3.5	O/F	4.6
8/7/2017	9	4.91	3.6	3.6	O/F	4.5
8/14/2017	8.75	4.3	3.75	3.75	O/F	5.2
8/21/2017	8.83	4.4	3.8	3.8	O/F	4.3
8/28/2017	9	4.7	3.9	3.9	O/F	4.2
9/4/2017	9	5	3.4	3.4	O/F	4.6
9/11/2017	8.8	5.47	3.5	3.5	O/F	5.3
9/18/2017	9	5.3	3.5	3.5	O/F	4.4
9/25/2017	9	5.4	4.4	4.4	O/F	3.6
10/2/2017	8.8	5.3	4.4	4.4	O/F	3.5
10/9/2017	8.9	5.35	4.35	4.4	O/F	3.8
10/16/2017	7.32	6.41	4.4	4.4	O/F	3.8
10/23/2017	5.6	7.75	4.55	4.55	O/F	4.8
10/30/2017	4.25	8.8	4.55	4.55	O/F	4.1
11/6/2017	3.9	9.03	4.7	4.65	O/F	2.99
11/13/2017	3.99	9.1	4.7	4.7	O/F	3.38
11/20/2017	4.15	9.16	4.7	4.65	O/F	4.15
11/27/2017	4	8.15	5.1	5	O/F	4.8
12/4/2017	4.1	7.15	4.95	4.8	O/F	4.6
12/11/2017	4.1	7.55	5.1	4.9	O/F	4.4
12/18/2017	4.2	7.25	5.1	4.9	O/F	4.2
12/25/2017	4.2	6.15	5.1	4.9	O/F	4

Table 3.1-3. Evaporation Pond 2 Leak Detection

Date	No. 1			No. 2			No. 3			No. 4			No. 5		
	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC
Previous Reading	95,120			617,750			292,520			1,049,690			351,070		
7/3/2017	95,130	10	0	617,750	0	0	292,520	0	0	1,049,690	0	0	351,070	0	0
7/10/2017	95,130	0	0	617,750	0	0	292,560	40	1	1,049,670	-20	-1	351,070	0	0
7/17/2017	99,030	3,900	171	617,750	0	0	292,520	-40	-1	1,049,690	20	1	351,070	0	0
7/24/2017	105,400	6,370	280	617,750	0	0	292,520	0	0	1,049,690	0	0	351,070	0	0
7/31/2017	107,690	2,290	101	617,790	40	2	292,520	0	0	1,049,690	0	0	351,070	0	0
8/7/2017	107,690	0	0	715,480	97,690	**4,430**	292,520	0	0	1,049,690	0	0	351,070	0	0
8/14/2017	107,690	0	0	745,480	30,000	**1,361**	292,520	0	0	1,049,690	0	0	351,090	20	1
8/21/2017	107,690	0	0	757,730	12,250	556	292,530	10	0	1,049,690	0	0	351,090	0	0
8/28/2017	107,690	0	0	765,310	7,580	344	292,530	0	0	1,049,690	0	0	351,090	0	0
9/4/2017	107,690	0	0	782,010	16,700	757	292,530	0	0	1,049,690	0	0	351,090	0	0
9/11/2017	107,690	0	0	791,530	9,520	432	292,520	-10	0	1,049,690	0	0	351,090	0	0
9/18/2017	107,680	-10	0	795,900	4,370	198	292,520	0	0	1,049,690	0	0	351,090	0	0
9/25/2017	107,690	10	0	795,900	0	0	292,520	0	0	1,049,920	230	9	351,090	0	0
10/2/2017	107,690	0	0	795,900	0	0	292,520	0	0	1,047,480	2,440	99	351,090	0	0
10/9/2017	107,690	0	0	795,900	0	0	292,520	0	0	1,045,520	1,960	79	351,090	0	0
10/16/2017	107,650	-40	-2	795,900	0	0	292,520	0	0	1,044,690	830	34	351,090	0	0
10/23/2017	107,690	40	2	795,900	0	0	292,520	0	0	1,044,570	120	5	351,090	0	0
10/30/2017	107,690	0	0	795,900	0	0	292,520	0	0	1,044,640	70	3	351,090	0	0
11/6/2017	107,690	0	0	795,900	0	0	292,520	0	0	1,045,140	500	20	351,090	0	0
11/13/2017	107,690	0	0	795,900	0	0	292,520	0	0	1,044,450	690	28	351,090	0	0
11/20/2017	107,690	0	0	795,900	0	0	292,520	0	0	1,044,150	300	12	351,090	0	0
11/27/2017	108,170	480	21	795,900	0	0	292,520	0	0	1,046,930	2,780	113	351,380	290	12
12/4/2017	108,170	0	0	795,900	0	0	317,650	25,130	**940**	1,052,940	6,010	243	351,380	0	0
12/11/2017	108,170	0	0	795,900	0	0	324,630	6,980	261	1,054,720	1,780	72	351,380	0	0
12/18/2017	108,170	0	0	795,900	0	0	324,630	0	0	1,054,720	0	0	351,380	0	0
12/25/2017	108,170	0	0	795,900	0	0	324,630	0	0	1,054,720	0	0	351,380	0	0

NOTE: Totalizer readings that result in minor positive or negative volumes should not be given any significance. No.4 Sump was installed backwards in early October and corrected in Novemeber. GPD/AC = Gallons per day per acre; those that exeed 775 are in bold.

Table 3.1-4. Evaporation Pond 3A Leak Detection

Cell A Sumps	A-1			A-2			A-3			A-4			A-5		
	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC
Previous Reading	70			203,060			303,130			29,980			324,290		
7/3	70	0	0	204,640	1,580	87	303,150	20	1	29,980	0	0	324,300	10	1
7/10	70	0	0	204,710	70	4	303,130	-20	-1	29,980	0	0	324,310	10	1
7/17	70	0	0	207,410	2,700	150	303,130	0	0	29,980	0	0	324,310	0	0
7/24	70	0	0	207,470	60	3	303,130	0	0	29,980	0	0	324,320	10	1
7/31	70	0	0	211,360	3,890	215	303,130	0	0	29,980	0	0	327,910	3,590	199
8/7	70	0	0	211,560	200	11	303,130	0	0	29,980	0	0	327,910	0	0
8/14	70	0	0	211,570	10	1	303,130	0	0	29,980	0	0	327,910	0	0
8/21	70	0	0	211,570	0	0	303,160	30	2	29,990	10	1	328,100	190	11
8/28	70	0	0	211,570	0	0	303,160	0	0	29,990	0	0	328,160	60	3
9/4	70	0	0	211,780	210	12	303,160	0	0	29,990	0	0	328,160	0	0
9/11	70	0	0	211,850	70	4	303,160	0	0	29,990	0	0	328,160	0	0
9/18	70	0	0	211,960	110	6	303,160	0	0	29,990	0	0	328,170	10	1
9/25	70	0	0	213,130	1,170	65	303,160	0	0	29,990	0	0	328,220	50	3
10/2	70	0	0	214,500	1,370	76	303,160	0	0	29,990	0	0	328,500	280	16
10/9	70	0	0	221,070	6,570	364	303,160	0	0	29,990	0	0	330,350	1,850	102
10/16	70	0	0	227,520	6,450	357	303,160	0	0	29,990	0	0	333,400	3,050	169
10/23	70	0	0	228,590	1,070	59	303,160	0	0	29,990	0	0	333,940	540	30
10/30	70	0	0	229,010	420	23	303,160	0	0	29,990	0	0	334,030	90	5
11/6	70	0	0	229,010	0	0	303,160	0	0	29,990	0	0	334,030	0	0
11/13	70	0	0	229,010	0	0	303,160	0	0	29,990	0	0	334,030	0	0
11/20	70	0	0	229,010	0	0	303,160	0	0	29,990	0	0	334,110	80	4
11/27	70	0	0	229,060	50	3	303,160	0	0	29,990	0	0	334,840	730	40
12/4	70	0	0	229,060	0	0	303,160	0	0	29,990	0	0	336,050	1,210	67
12/11	70	0	0	229,060	0	0	303,160	0	0	29,990	0	0	336,090	40	2
12/18	70	0	0	229,220	160	9	303,160	0	0	29,990	0	0	336,400	310	17
12/25	70	0	0	229,220	0	0	303,160	0	0	29,990	0	0	336,400	0	0

NOTE: Totalizer readings that result in minor positive or negative volumes should not be given any significance
GPD/AC = Gallons per day per acre; those that exeed 775 are in bold.

Table 3.1-5. Evaporation Pond 3B Leak Detection

Cell B Sumps	B-1			B-2			B-3			B-4			B-5		
	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC	Reading	Gallons	GPD/AC
Previous Reading	260			428,010			920,980			39,810			360,300		
7/3	270	10	1	428,010	0	0	923,800	0	0	45,050	5,240	290	363,110	2,810	156
7/10	280	10	1	428,010	0	0	923,800	0	0	45,110	60	3	363,120	10	1
7/17	290	10	1	428,010	0	0	923,800	0	0	48,530	3,420	189	363,130	10	1
7/24	300	10	1	428,010	0	0	923,810	10	1	53,980	5,450	302	363,140	10	1
7/31	320	20	1	428,010	0	0	923,820	10	1	54,040	60	3	363,210	70	4
8/7	330	10	1	428,010	0	0	923,830	10	1	54,090	50	3	365,380	2,170	120
8/14	330	0	0	428,010	0	0	923,830	0	0	54,090	0	0	365,380	0	0
8/21	590	260	14	428,020	10	1	926,200	2,370	131	55,110	1,020	56	366,050	670	37
8/28	590	0	0	428,020	0	0	927,440	1,240	69	55,110	0	0	366,050	0	0
9/4	590	0	0	428,020	0	0	928,500	1,060	59	55,110	0	0	366,050	0	0
9/11	590	0	0	428,020	0	0	929,270	770	43	55,110	0	0	366,050	0	0
9/18	590	0	0	428,020	0	0	929,930	660	37	55,110	0	0	366,050	0	0
9/25	590	0	0	428,020	0	0	930,370	440	24	55,110	0	0	366,050	0	0
10/2	590	0	0	428,020	0	0	930,910	540	30	55,110	0	0	366,050	0	0
10/9	590	0	0	428,020	0	0	931,960	1,050	58	55,110	0	0	366,050	0	0
10/16	590	0	0	428,020	0	0	931,910	-50	-3	55,110	0	0	366,050	0	0
10/23	590	0	0	428,020	0	0	932,680	770	43	55,110	0	0	366,050	0	0
10/30	590	0	0	428,020	0	0	949,020	16,340	**905**	55,110	0	0	366,050	0	0
11/6	590	0	0	428,020	0	0	974,900	25,880	**1,433**	55,110	0	0	366,050	0	0
11/13	590	0	0	428,020	0	0	1,001,400	26,500	**1,467**	55,110	0	0	366,050	0	0
11/20	1,430	840	47	428,020	0	0	1,026,520	25,120	**1,391**	55,110	0	0	366,050	0	0
11/27	1,430	0	0	428,020	0	0	1,099,310	72,790	**4,030**	55,110	0	0	366,050	0	0
12/4	1,430	0	0	428,020	0	0	1,161,540	62,230	**3,446**	71,300	16,190	**896**	366,050	0	0
12/11	1,430	#	#	428,020	#	#	1,161,540	#	#	71,300	#	#	366,050	#	#
12/18	30,970	29,540	**1,636**	445,780	17,760	**983**	1,189,910	28,370	**1,571**	83,630	12,330	683	366,050	0	0
12/25	30,970	0	0	463,770	17,990	**996**	1,263,680	73,770	**4,085**	83,630	0	0	366,050	0	0

NOTE: Totalizer readings that result in minor positive or negative volumes should not be given any significance.
GPD/AC = Gallons per day per acre; those that exeed 775 are in bold.
 # = Pump Maintenance; pumps off line.

Table 3.1-6. Monthly Tailings Collection and Injection Totals

	Sumps (gallons)	Dewatering (gallons)	Injection (gallons)
July	205,530	201,900	0
August	636,190	267,900	0
September	303,910	170,700	0
October	612,260	33,700	0
November	415,750	0	0
December	417,130	100	0

Table 3.1-7. Monthly Collection Totals by Aquifer and Area (gallons)

	On-Site Collection			South Off-Site Collection				North Off-Site Collection
	Alluvial	Upper Chinle	Middle Chinle	Alluvial	Upper Chinle	Middle Chinle	Lower Chinle	Alluvial
July	19,083,452	6,037,670	2,211,600	2,123,000	0	0	0	1,869,000
August	9,920,260	1,269,740	446,200	0	0	0	0	1,597,000
September	12,028,514	3,760,580	1,419,600	0	0	0	0	165,000
October	21,117,248	6,829,620	2,211,000	0	0	0	0	52,000
November	15,032,542	5,571,000	1,832,200	4,000,006	0	745,984	0	6,112,000
December	17,673,710	4,470,710	1,874,000	14,632,469	0	2,687,532	0	7,803,000

Table 3.1-8. Monthly Injection Totals by Aquifer and Area (gallons)

	On-Site Injection			South Off-Site Injection				North Off-Site Injection
	Alluvial	Upper Chinle	Middle Chinle	Alluvial	Upper Chinle	Middle Chinle	Lower Chinle	Alluvial
July	18,573,118	1,819,540	200,310	5,572,765	0	493,335	0	10,801,200
August	14,019,976	1,014,670	142,760	3,265,095	0	377,905	0	6,029,000
September	14,900,244	404,590	85,820	3,330,435	0	332,665	0	10,343,100
October	27,257,436	15,280	248,150	5,993,520	0	1,165,580	0	14,608,700
November	23,544,266	1,584,730	236,570	6,393,080	0	801,220	0	14,709,900
December	29,735,857	52,620	200,460	11,203,590	0	1,163,820	0	22,441,500

Table 3.1-9. Monthly Totals of Low-concentration and In-situ Injectate (gallons)

	L well Collection for Reinjection	*In-situ* Injection
July	0	0
August	0	0
September	0	0
October	0	0
November	0	0
December	0	0

Table 3.1-10. Treatment System Influents Monthly Totals (gallons)

	300 GPM Zeolite	1200 GPM Zeolite	RO Plant
July	3,038,400	3,448,200	30,270,618
August	129,915	909,400	14,091,850
September	468,915	0	18,264,486
October	2,174,021	0	31,657,568
November	1,555,105	10,423,800	23,323,700
December	3,925,846	24,934,700	25,512,482

Table 3.1-11. Treatment System Effluent and Fresh Water Monthly Totals (gallons)

	Treatment Systems				Fresh Water Injection		
	Zeolite		RO Plant				
	Treated	Regeneration	Treated	Brine	On-Site	South Off-Site	North Off-Site
July	0	6,486,600	22,635,268	5,063,206	9,316,000	0	5,509,000
August	909,400	129,915	8,596,506	1,806,337	12,549,000	42,500	2,752,000
September	468,915	0	13,234,939	3,289,348	9,010,000	0	6,683,000
October	2,174,021	0	24,440,745	5,006,776	14,271,000	127,900	8,275,000
November	11,777,105	201,800	17,260,661	5,471,514	11,724,000	0	6,508,000
December	25,569,046	3,291,500	21,065,801	4,402,766	11,469,000	0	6,694,000

Table 3.2-1
Reversal Wells

Table 3.2-1. Depth to Water in Reversal Wells

Well Name	B	BA	DZ	KZ	S2	S5	SM	SN	SO	SP
MP Elev.	6570.9	6571.58	6590.53	6571.72	6573.72	6574.69	6578.74	6579.26	6578.79	6578.66
7/3/2017	36.62	38.20	52.76	33.51	36.79	42.77	39.62	40.06	40.50	40.40
7/10/2017	37.06	37.85	51.50	33.50	39.81	43.75	39.78	40.18	40.58	40.48
7/17/2017	36.05	38.75	53.30	33.45	37.20	42.90	39.75	40.25	40.80	40.60
7/24/2017	36.62	39.10	55.20	33.69	37.07	43.00	39.95	40.30	40.88	40.75
7/31/2017	36.27	37.92	54.60	33.76	32.04	41.85	40.03	40.00	41.02	41.05
8/7/2017	36.25	38.16	53.16	33.94	37.12	42.90	40.08	40.39	40.95	40.81
8/14/2017	36.50	38.50	54.60	34.40	38.10	43.70	40.19	41.80	40.53	40.91
8/21/2017	34.15	37.55	52.90	34.20	46.60	43.40	41.70	40.90	41.40	41.30
8/28/2017	36.10	37.20		33.80	37.80	43.30	40.80	40.70	41.50	41.10
9/4/2017	34.15	37.84	52.47	33.50	37.41	42.95	40.55	40.41	41.29	41.11
9/11/2017	34.00	38.40	33.00	50.00	38.00	43.00	52.00	41.00	42.00	41.00
9/18/2017	34.50	38.72	52.75	33.46	38.21	43.44	40.72	41.21	41.61	41.40
9/25/2017	36.60	38.90	52.30	33.90	39.80	42.30	40.60	40.70	41.50	42.30
10/2/2017	36.70	39.42	53.48	34.30	41.10	43.35	40.62	40.81	41.50	43.80
10/9/2017	36.65	39.37	34.15	33.70	37.23	43.38	40.69	40.90	41.46	41.35
10/16/2017	36.72	39.70	55.82	33.45	44.17	43.50	40.81	41.05	48.52	48.40
10/23/2017	36.70	39.50	55.00	33.00	38.00	41.00	41.00	41.00	41.00	41.00
10/30/2017	36.64	39.50	54.41	33.10	37.57	43.22	40.59	40.82	41.27	44.15
11/6/2017	34.69	39.59	54.45	33.13	37.68	43.57	40.66	40.88	41.40	41.40
11/13/2017	38.43	38.42	54.80	33.11	37.55	43.12	40.68	40.82	41.31	41.19
11/20/2017	36.20	38.39	54.79	33.54	37.11	42.88	40.47	40.61	41.17	41.05
11/27/2017	36.32	39.18	54.72	33.47	35.67	42.85	44.50	43.80	41.10	40.98
12/4/2017	36.21	38.77	53.56	33.52	37.32	42.80	40.83	40.52	40.12	40.88
12/11/2017	34.65	35.84	54.87	33.45	38.11	42.81	40.29	40.45	40.98	40.92
12/18/2017	35.55	38.64	54.79	33.64	37.21	42.90	40.30	40.49	41.05	41.00
12/25/2017	43.68	42.17	56.73	33.68	46.72	42.78	40.17	41.12	40.31	40.70

Note: Numbers are depth to water, ft.

Table 3.4-1
Wells Drilled

Table 3.4-1. Wells Drilled

Well Name	Restoration Area
DD3	EP3
DD4	EP3
DD5	EP3
DD6	EP3
DD7	EP3

Table 4.1-1
Water Quality Analysis for Well D1

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17060949-002
Client Sample ID: D1

Report Date: 08/04/17
Collection Date: 06/28/17 08:27
Date Received: 06/30/17
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	306	mg/L		5		A2320 B	07/01/17 20:23 / mvr
206 Carbonate as CO3	<5	mg/L		5		A2320 B	07/01/17 20:23 / mvr
505 Bicarbonate as HCO3	374	mg/L		5		A2320 B	07/01/17 20:23 / mvr
007 Chloride	130	mg/L		1		E300.0	07/03/17 11:41 / jcg
108 Sulfate	692	mg/L	D	2		E300.0	07/03/17 11:41 / jcg
001 Calcium	179	mg/L		0.5		E200.7	07/10/17 12:38 / eli-b
002 Magnesium	35.3	mg/L		0.5		E200.7	07/07/17 15:58 / eli-b
003 Potassium	3.3	mg/L		0.5		E200.7	07/07/17 15:58 / eli-b
004 Sodium	262	mg/L		0.5		E200.7	07/07/17 15:58 / eli-b
PHYSICAL PROPERTIES							
009 pH	7.47	s.u.	H	0.01		A4500-H B	07/01/17 19:30 / mvr
010 Solids, Total Dissolved TDS @ 180 C	1460	mg/L	D	20		A2540 C	07/01/17 19:36 / mvr
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	1.0	mg/L		0.1		E353.2	07/03/17 12:30 / ljl
METALS, DISSOLVED							
036 Molybdenum	1.33	mg/L		0.03		E200.8	07/13/17 18:44 / eli-b
040 Selenium	0.044	mg/L		0.005		E200.8	07/13/17 18:44 / eli-b
015 Uranium	0.908	mg/L		0.0003		E200.8	07/13/17 18:44 / eli-b
244 Uranium Precision (±)	0.146	mg/L		0.00005		E200.8	07/13/17 18:44 / eli-b
113 Uranium, Activity	6.1E-07	uCi/mL		2.0E-10		E200.8	07/13/17 18:44 / eli-b
114 Uranium, Activity Precision (±)	9.9E-08	uCi/mL		3.0E-11		E200.8	07/13/17 18:44 / eli-b
042 Vanadium	<0.01	mg/L		0.01		E200.8	07/13/17 18:44 / eli-b
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.08	pCi/L	U			E903.0	07/31/17 15:43 / dmf
245 Radium 226 precision (±)	0.1	pCi/L				E903.0	07/31/17 15:43 / dmf
Radium 226 MDC	0.2	pCi/L				E903.0	07/31/17 15:43 / dmf
256 Radium 226 altu	8.0E-11	uCi/mL	U			E903.0	07/31/17 15:43 / dmf
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	07/31/17 15:43 / dmf
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	07/31/17 15:43 / dmf
057 Radium 228	1.3	pCi/L	U			RA-05	07/25/17 12:08 / plj
257 Radium 228 precision (±)	0.9	pCi/L				RA-05	07/25/17 12:08 / plj
Radium 228 MDC	1.6	pCi/L				RA-05	07/25/17 12:08 / plj
359 Radium 228 altu	1.0E-09	uCi/mL	U			RA-05	07/25/17 12:08 / plj
360 Radium 228 altu precision (±)	9.0E-10	uCi/mL				RA-05	07/25/17 12:08 / plj
Radium 228 altu MDC	2.0E-09	uCi/mL				RA-05	07/25/17 12:08 / plj
048 Thorium 230	0.08	pCi/L	U			E908.0	08/03/17 10:38 / dmf
248 Thorium 230 precision (±)	0.1	pCi/L				E908.0	08/03/17 10:38 / dmf

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

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17060949-002
Client Sample ID: D1

Report Date: 08/04/17
Collection Date: 06/28/17 08:27
Date Received: 06/30/17
Matrix: Aqueous

Analyses		Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, DISSOLVED								
	Thorium 230 MDC	0.2	pCi/L				E908.0	08/03/17 10:38 / dmf
362	Thorium 230 altu	8.0E-11	uCi/mL	U			E908.0	08/03/17 10:38 / dmf
363	Thorium 230 altu precision (±)	1.0E-10	uCi/mL				E908.0	08/03/17 10:38 / dmf
	Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	08/03/17 10:38 / dmf
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	1500	mg/L				A1030 E	07/18/17 09:46 / tla
192	A/C Balance	-2.06	%				A1030 E	07/18/17 09:46 / tla
194	Anions	24.3	meq/L				A1030 E	07/18/17 09:46 / tla
195	Cations	23.3	meq/L				A1030 E	07/18/17 09:46 / tla
200	TDS Ratio	0.96	unitless				A1030 E	07/18/17 09:46 / tla

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

Table 4.1-2
Water Quality Analysis for Well S4

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17070659-001
Client Sample ID: S4

Report Date: 08/23/17
Collection Date: 07/18/17 13:06
Date Received: 07/20/17
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	444	mg/L		5		A2320 B	07/21/17 18:14 / mvr
206 Carbonate as CO3	<5	mg/L		5		A2320 B	07/21/17 18:14 / mvr
505 Bicarbonate as HCO3	541	mg/L		5		A2320 B	07/21/17 18:14 / mvr
007 Chloride	229	mg/L		1		E300.0	07/27/17 20:56 / jcg
108 Sulfate	822	mg/L	D	4		E300.0	07/27/17 20:56 / jcg
001 Calcium	272	mg/L	D	0.7		E200.7	07/24/17 23:36 / eli-b
002 Magnesium	72.2	mg/L		0.5		E200.7	07/24/17 23:36 / eli-b
003 Potassium	5.1	mg/L		0.5		E200.7	07/24/17 23:36 / eli-b
004 Sodium	298	mg/L		0.5		E200.7	07/24/17 23:36 / eli-b
PHYSICAL PROPERTIES							
009 pH	7.26	s.u.	H	0.01		A4500-H B	07/21/17 11:14 / mvr
010 Solids, Total Dissolved TDS @ 180 C	2020	mg/L	D	20		A2540 C	07/21/17 12:10 / mvr
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	1.2	mg/L		0.1		E353.2	07/28/17 16:42 / ljl
METALS, DISSOLVED							
036 Molybdenum	0.30	mg/L		0.03		E200.8	08/01/17 23:09 / eli-b
040 Selenium	0.021	mg/L		0.005		E200.8	08/01/17 23:09 / eli-b
015 Uranium	0.149	mg/L		0.0003		E200.8	08/01/17 23:09 / eli-b
244 Uranium Precision (±)	0.0241	mg/L		0.00005		E200.8	08/01/17 23:09 / eli-b
113 Uranium, Activity	1.0E-07	uCi/mL		2.0E-10		E200.8	08/01/17 23:09 / eli-b
114 Uranium, Activity Precision (±)	1.6E-08	uCi/mL		3.0E-11		E200.8	08/01/17 23:09 / eli-b
042 Vanadium	<0.01	mg/L		0.01		E200.8	08/01/17 23:09 / eli-b
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.2	pCi/L	U			E903.0	08/21/17 11:41 / dmf
245 Radium 226 precision (±)	0.1	pCi/L				E903.0	08/21/17 11:41 / dmf
Radium 226 MDC	0.2	pCi/L				E903.0	08/21/17 11:41 / dmf
256 Radium 226 altu	2.0E-10	uCi/mL	U			E903.0	08/21/17 11:41 / dmf
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	08/21/17 11:41 / dmf
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	08/21/17 11:41 / dmf
057 Radium 228	1.7	pCi/L				RA-05	08/15/17 16:14 / plj
257 Radium 228 precision (±)	1	pCi/L				RA-05	08/15/17 16:14 / plj
Radium 228 MDC	1.5	pCi/L				RA-05	08/15/17 16:14 / plj
359 Radium 228 altu	2.0E-09	uCi/mL				RA-05	08/15/17 16:14 / plj
360 Radium 228 altu precision (±)	1.0E-09	uCi/mL				RA-05	08/15/17 16:14 / plj
Radium 228 altu MDC	1.0E-09	uCi/mL				RA-05	08/15/17 16:14 / plj
048 Thorium 230	0.08	pCi/L	U			E908.0	08/17/17 09:33 / cng
248 Thorium 230 precision (±)	0.09	pCi/L				E908.0	08/17/17 09:33 / cng

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.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17070659-001
Client Sample ID: S4

Report Date: 08/23/17
Collection Date: 07/18/17 13:06
Date Received: 07/20/17
Matrix: Aqueous

	Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, DISSOLVED								
	Thorium 230 MDC	0.1	pCi/L				E908.0	08/17/17 09:33 / cng
362	Thorium 230 altu	8.0E-11	uCi/mL	U			E908.0	08/17/17 09:33 / cng
363	Thorium 230 altu precision (±)	9.0E-11	uCi/mL				E908.0	08/17/17 09:33 / cng
	Thorium 230 altu MDC	1.0E-10	uCi/mL				E908.0	08/17/17 09:33 / cng
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	2000	mg/L				A1030 E	07/31/17 08:44 / tla
192	A/C Balance	0.14	%				A1030 E	07/31/17 08:44 / tla
194	Anions	32.5	meq/L				A1030 E	07/31/17 08:44 / tla
195	Cations	32.6	meq/L				A1030 E	07/31/17 08:44 / tla
200	TDS Ratio	1.03	unitless				A1030 E	07/31/17 08:44 / tla

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

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17110513-003
Client Sample ID: S4_20171113

Report Date: 12/11/17
Collection Date: 11/13/17 12:59
Date Received: 11/15/17
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	466	mg/L		5		A2320 B	11/22/17 11:56 / mvr
206 Carbonate as CO3	<5	mg/L		5		A2320 B	11/22/17 11:56 / mvr
505 Bicarbonate as HCO3	568	mg/L		5		A2320 B	11/22/17 11:56 / mvr
007 Chloride	202	mg/L		1		E300.0	11/16/17 19:34 / jcg
108 Sulfate	724	mg/L	D	4		E300.0	11/16/17 19:34 / jcg
001 Calcium	257	mg/L		0.5		E200.7	11/20/17 17:18 / eli-b
002 Magnesium	70.3	mg/L		0.5		E200.7	11/20/17 17:18 / eli-b
003 Potassium	4.8	mg/L		0.5		E200.7	11/20/17 17:18 / eli-b
004 Sodium	294	mg/L		0.5		E200.7	11/20/17 17:18 / eli-b
PHYSICAL PROPERTIES							
009 pH	7.32	s.u.	H	0.01		A4500-H B	11/16/17 13:10 / mvr
010 Solids, Total Dissolved TDS @ 180 C	1950	mg/L	D	20		A2540 C	11/17/17 14:37 / mvr
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	1.0	mg/L		0.1		E353.2	11/20/17 12:10 / ljl
METALS, DISSOLVED							
036 Molybdenum	0.31	mg/L		0.03		E200.8	11/20/17 19:31 / eli-b
040 Selenium	0.024	mg/L		0.005		E200.8	11/20/17 19:31 / eli-b
015 Uranium	0.153	mg/L		0.0003		E200.8	11/20/17 19:31 / eli-b
244 Uranium Precision (±)	0.0247	mg/L		0.00005		E200.8	11/20/17 19:31 / eli-b
113 Uranium, Activity	1.0E-07	uCi/mL		2.0E-10		E200.8	11/20/17 19:31 / eli-b
114 Uranium, Activity Precision (±)	1.7E-08	uCi/mL		3.0E-11		E200.8	11/20/17 19:31 / eli-b
042 Vanadium	<0.01	mg/L		0.01		E200.8	11/20/17 19:31 / eli-b
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.2	pCi/L				E903.0	12/05/17 10:58 / arh
245 Radium 226 precision (±)	0.1	pCi/L				E903.0	12/05/17 10:58 / arh
Radium 226 MDC	0.2	pCi/L				E903.0	12/05/17 10:58 / arh
256 Radium 226 altu	2.0E-10	uCi/mL				E903.0	12/05/17 10:58 / arh
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	12/05/17 10:58 / arh
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	12/05/17 10:58 / arh
057 Radium 228	1.2	pCi/L	U			RA-05	11/30/17 10:05 / trs
257 Radium 228 precision (±)	0.8	pCi/L				RA-05	11/30/17 10:05 / trs
Radium 228 MDC	1.4	pCi/L				RA-05	11/30/17 10:05 / trs
359 Radium 228 altu	1.0E-09	uCi/mL	U			RA-05	11/30/17 10:05 / trs
360 Radium 228 altu precision (±)	8.0E-10	uCi/mL				RA-05	11/30/17 10:05 / trs
Radium 228 altu MDC	1.0E-09	uCi/mL				RA-05	11/30/17 10:05 / trs
048 Thorium 230	0.07	pCi/L	U			E908.0	12/08/17 09:27 / cnh
248 Thorium 230 precision (±)	0.1	pCi/L				E908.0	12/08/17 09:27 / cnh

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.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17110513-003
Client Sample ID: S4_20171113

Report Date: 12/11/17
Collection Date: 11/13/17 12:59
Date Received: 11/15/17
Matrix: Aqueous

	Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, DISSOLVED								
	Thorium 230 MDC	0.2	pCi/L				E908.0	12/08/17 09:27 / cnh
362	Thorium 230 altu	7.0E-11	uCi/mL	U			E908.0	12/08/17 09:27 / cnh
363	Thorium 230 altu precision (±)	1.0E-10	uCi/mL				E908.0	12/08/17 09:27 / cnh
	Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	12/08/17 09:27 / cnh
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	1900	mg/L				A1030 E	11/27/17 08:31 / tla
192	A/C Balance	2.19	%				A1030 E	11/27/17 08:31 / tla
194	Anions	30.2	meq/L				A1030 E	11/27/17 08:31 / tla
195	Cations	31.5	meq/L				A1030 E	11/27/17 08:31 / tla
200	TDS Ratio	1.04	unitless				A1030 E	11/27/17 08:31 / tla

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

Table 4.1-3
Water Quality Analyses for Well X

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17070694-001
Client Sample ID: X

Report Date: 08/23/17
Collection Date: 07/18/17 14:45
Date Received: 07/21/17
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	308	mg/L		5		A2320 B	07/27/17 14:50 / jcg
206 Carbonate as CO3	<5	mg/L		5		A2320 B	07/27/17 14:50 / jcg
505 Bicarbonate as HCO3	376	mg/L		5		A2320 B	07/27/17 14:50 / jcg
007 Chloride	123	mg/L		1		E300.0	07/28/17 06:09 / jcg
108 Sulfate	369	mg/L	D	2		E300.0	07/28/17 06:09 / jcg
001 Calcium	151	mg/L		0.5		E200.7	07/27/17 02:41 / eli-b
002 Magnesium	34.9	mg/L		0.5		E200.7	07/27/17 02:41 / eli-b
003 Potassium	4.7	mg/L		0.5		E200.7	07/28/17 15:37 / eli-b
004 Sodium	159	mg/L		0.5		E200.7	07/27/17 02:41 / eli-b
PHYSICAL PROPERTIES							
009 pH	7.40	s.u.	H	0.01		A4500-H B	07/24/17 11:43 / mvr
010 Solids, Total Dissolved TDS @ 180 C	1080	mg/L		10		A2540 C	07/24/17 11:57 / mvr
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	1.3	mg/L		0.1		E353.2	07/28/17 17:03 / ljl
METALS, DISSOLVED							
036 Molybdenum	0.08	mg/L		0.03		E200.8	08/01/17 23:12 / eli-b
040 Selenium	0.021	mg/L		0.005		E200.8	08/01/17 23:12 / eli-b
015 Uranium	0.0543	mg/L		0.0003		E200.8	08/01/17 23:12 / eli-b
244 Uranium Precision (±)	0.00876	mg/L		0.00005		E200.8	08/01/17 23:12 / eli-b
113 Uranium, Activity	3.7E-08	uCi/mL		2.0E-10		E200.8	08/01/17 23:12 / eli-b
114 Uranium, Activity Precision (±)	5.9E-09	uCi/mL		3.0E-11		E200.8	08/01/17 23:12 / eli-b
042 Vanadium	0.01	mg/L		0.01		E200.8	08/01/17 23:12 / eli-b
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.2	pCi/L	U			E903.0	08/21/17 15:41 / meh
245 Radium 226 precision (±)	0.1	pCi/L				E903.0	08/21/17 15:41 / meh
Radium 226 MDC	0.2	pCi/L				E903.0	08/21/17 15:41 / meh
256 Radium 226 altu	2.0E-10	uCi/mL	U			E903.0	08/21/17 15:41 / meh
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	08/21/17 15:41 / meh
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	08/21/17 15:41 / meh
057 Radium 228	0.9	pCi/L	U			RA-05	08/16/17 11:27 / plj
257 Radium 228 precision (±)	0.9	pCi/L				RA-05	08/16/17 11:27 / plj
Radium 228 MDC	1.5	pCi/L				RA-05	08/16/17 11:27 / plj
359 Radium 228 altu	9.0E-10	uCi/mL	U			RA-05	08/16/17 11:27 / plj
360 Radium 228 altu precision (±)	9.0E-10	uCi/mL				RA-05	08/16/17 11:27 / plj
Radium 228 altu MDC	2.0E-09	uCi/mL				RA-05	08/16/17 11:27 / plj
048 Thorium 230	0.07	pCi/L	U			E908.0	08/17/17 09:33 / cng
248 Thorium 230 precision (±)	0.09	pCi/L				E908.0	08/17/17 09:33 / cng

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.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17070694-001
Client Sample ID: X

Report Date: 08/23/17
Collection Date: 07/18/17 14:45
Date Received: 07/21/17
Matrix: Aqueous

	Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, DISSOLVED								
	Thorium 230 MDC	0.1	pCi/L				E908.0	08/17/17 09:33 / cng
362	Thorium 230 altu	7.0E-11	uCi/mL	U			E908.0	08/17/17 09:33 / cng
363	Thorium 230 altu precision (±)	9.0E-11	uCi/mL				E908.0	08/17/17 09:33 / cng
	Thorium 230 altu MDC	1.0E-10	uCi/mL				E908.0	08/17/17 09:33 / cng
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	1000	mg/L				A1030 E	07/31/17 08:46 / tla
192	A/C Balance	0.12	%				A1030 E	07/31/17 08:46 / tla
194	Anions	17.4	meq/L				A1030 E	07/31/17 08:46 / tla
195	Cations	17.4	meq/L				A1030 E	07/31/17 08:46 / tla
200	TDS Ratio	1.03	unitless				A1030 E	07/31/17 08:46 / tla

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

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17100969-004
Client Sample ID: X

Report Date: 11/09/17
Collection Date: 10/26/17 07:51
Date Received: 10/31/17
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
007 Chloride	121	mg/L		1		E300.0	11/03/17 11:38 / jcg
108 Sulfate	438	mg/L	D	2		E300.0	11/03/17 11:38 / jcg
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1200	mg/L		10		A2540 C	11/01/17 16:04 / mvr
METALS, DISSOLVED							
036 Molybdenum	0.08	mg/L		0.03		E200.8	11/07/17 17:53 / eli-b
040 Selenium	0.010	mg/L		0.005		E200.8	11/07/17 17:53 / eli-b
015 Uranium	0.0694	mg/L		0.0003		E200.8	11/07/17 17:53 / eli-b
244 Uranium Precision (±)	0.0112	mg/L		0.00005		E200.8	11/07/17 17:53 / eli-b
113 Uranium, Activity	4.7E-08	uCi/mL		2.0E-10		E200.8	11/07/17 17:53 / eli-b
114 Uranium, Activity precision (±)	7.6E-09	uCi/mL		3.0E-11		E200.8	11/07/17 17:53 / eli-b

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: C17110827-007
Client Sample ID: X_20171128

Report Date: 12/28/17
Collection Date: 11/28/17 12:58
Date Received: 11/30/17
Matrix: Aqueous

Analyses		Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS								
175	Alkalinity, Total as CaCO3	230	mg/L		5		A2320 B	12/01/17 16:20 / mvr
206	Carbonate as CO3	<5	mg/L		5		A2320 B	12/01/17 16:20 / mvr
505	Bicarbonate as HCO3	281	mg/L		5		A2320 B	12/01/17 16:20 / mvr
007	Chloride	98	mg/L		1		E300.0	12/02/17 09:35 / ljl
108	Sulfate	350	mg/L	D	2		E300.0	12/02/17 09:35 / ljl
001	Calcium	130	mg/L		0.5		E200.7	12/07/17 18:26 / eli-b
002	Magnesium	29.5	mg/L		0.5		E200.7	12/06/17 18:50 / eli-b
003	Potassium	4.6	mg/L		0.5		E200.7	12/06/17 18:50 / eli-b
004	Sodium	146	mg/L		0.5		E200.7	12/07/17 18:26 / eli-b
PHYSICAL PROPERTIES								
009	pH	7.51	s.u.	H	0.01		A4500-H B	12/01/17 10:44 / mvr
010	Solids, Total Dissolved TDS @ 180 C	908	mg/L		10		A2540 C	12/01/17 11:20 / mvr
NUTRIENTS								
310	Nitrogen, Nitrate+Nitrite as N	1.3	mg/L		0.1		E353.2	12/04/17 17:17 / ljl
METALS, DISSOLVED								
034	Manganese	<0.001	mg/L		0.001		E200.8	12/06/17 15:15 / eli-b
036	Molybdenum	0.087	mg/L		0.001		E200.8	12/06/17 15:15 / eli-b
040	Selenium	0.007	mg/L		0.001		E200.8	12/06/17 15:15 / eli-b
015	Uranium	0.0397	mg/L		0.0003		E200.8	12/06/17 15:15 / eli-b
244	Uranium Precision (±)	0.00641	mg/L		0.00005		E200.8	12/06/17 15:15 / eli-b
113	Uranium, Activity	2.7E-08	uCi/mL		2.0E-10		E200.8	12/06/17 15:15 / eli-b
114	Uranium, Activity precision (±)	4.3E-09	uCi/mL		3.0E-11		E200.8	12/06/17 15:15 / eli-b
042	Vanadium	0.01	mg/L		0.01		E200.8	12/06/17 15:15 / eli-b
RADIONUCLIDES, DISSOLVED								
045	Radium 226	0.1	pCi/L	U			E903.0	12/18/17 09:10 / arh
245	Radium 226 precision (±)	0.2	pCi/L				E903.0	12/18/17 09:10 / arh
	Radium 226 MDC	0.2	pCi/L				E903.0	12/18/17 09:10 / arh
256	Radium 226 altu	1.0E-10	uCi/mL	U			E903.0	12/18/17 09:10 / arh
258	Radium 226 altu precision (±)	2.0E-10	uCi/mL				E903.0	12/18/17 09:10 / arh
	Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	12/18/17 09:10 / arh
057	Radium 228	1.6	pCi/L				RA-05	12/13/17 12:23 / trs
257	Radium 228 precision (±)	1.0	pCi/L				RA-05	12/13/17 12:23 / trs
	Radium 228 MDC	1.6	pCi/L				RA-05	12/13/17 12:23 / trs
359	Radium 228 altu	2.0E-09	uCi/mL				RA-05	12/13/17 12:23 / trs
360	Radium 228 altu precision (±)	1.0E-09	uCi/mL				RA-05	12/13/17 12:23 / trs
	Radium 228 altu MDC	2.0E-09	uCi/mL				RA-05	12/13/17 12:23 / trs
048	Thorium 230	0.02	pCi/L	U			E908.0	12/12/17 09:17 / cnh

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.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17110827-007
Client Sample ID: X_20171128

Report Date: 12/28/17
Collection Date: 11/28/17 12:58
Date Received: 11/30/17
Matrix: Aqueous

Analyses		Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, DISSOLVED								
248	Thorium 230 precision (±)	0.08	pCi/L				E908.0	12/12/17 09:17 / cnh
	Thorium 230 MDC	0.2	pCi/L				E908.0	12/12/17 09:17 / cnh
362	Thorium 230 altu	2.0E-11	uCi/mL	U			E908.0	12/12/17 09:17 / cnh
363	Thorium 230 altu precision (±)	8.0E-11	uCi/mL				E908.0	12/12/17 09:17 / cnh
	Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	12/12/17 09:17 / cnh
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	920	mg/L				A1030 E	12/13/17 11:47 / tjp
192	A/C Balance	1.96	%				A1030 E	12/13/17 11:47 / tjp
194	Anions	14.8	meq/L				A1030 E	12/13/17 11:47 / tjp
195	Cations	15.4	meq/L				A1030 E	12/13/17 11:47 / tjp
200	TDS Ratio	0.98	unitless				A1030 E	12/13/17 11:47 / tjp

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

Table 4.1-4
Water Quality Analyses for Well P

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17090521-002
Client Sample ID: P

Report Date: 10/23/17
Collection Date: 09/14/17 12:10
Date Received: 09/18/17
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
175 Alkalinity, Total as CaCO3	204	mg/L		5		A2320 B	09/19/17 12:13 / mvr
206 Carbonate as CO3	<5	mg/L		5		A2320 B	09/19/17 12:13 / mvr
505 Bicarbonate as HCO3	249	mg/L		5		A2320 B	09/19/17 12:13 / mvr
007 Chloride	52	mg/L		1		E300.0	09/20/17 10:27 / jcg
108 Sulfate	999	mg/L	D	2		E300.0	09/20/17 10:27 / jcg
001 Calcium	244	mg/L		0.5		E200.7	09/25/17 19:00 / eli-b
002 Magnesium	52.5	mg/L		0.5		E200.7	09/25/17 19:00 / eli-b
003 Potassium	4.8	mg/L		0.5		E200.7	09/25/17 19:00 / eli-b
004 Sodium	269	mg/L	D	0.9		E200.7	09/25/17 19:00 / eli-b
PHYSICAL PROPERTIES							
009 pH	7.60	s.u.	H	0.01		A4500-H B	09/19/17 09:50 / mvr
010 Solids, Total Dissolved TDS @ 180 C	1820	mg/L	D	20		A2540 C	09/19/17 09:11 / mvr
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	5.3	mg/L		0.1		E353.2	09/19/17 17:56 / ljl
METALS, DISSOLVED							
036 Molybdenum	<0.03	mg/L		0.03		E200.8	09/22/17 04:50 / eli-b
040 Selenium	0.136	mg/L		0.005		E200.8	09/22/17 04:50 / eli-b
015 Uranium	0.0285	mg/L		0.0003		E200.8	09/22/17 04:50 / eli-b
244 Uranium Precision (±)	0.00459	mg/L		0.00005		E200.8	09/22/17 04:50 / eli-b
113 Uranium, Activity	1.9E-08	uCi/mL		2.0E-10		E200.8	09/22/17 04:50 / eli-b
114 Uranium, Activity Precision (±)	3.1E-09	uCi/mL		3.0E-11		E200.8	09/22/17 04:50 / eli-b
042 Vanadium	<0.01	mg/L		0.01		E200.8	09/22/17 04:50 / eli-b
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.3	pCi/L				E903.0	10/13/17 13:45 / arh
245 Radium 226 precision (±)	0.1	pCi/L				E903.0	10/13/17 13:45 / arh
Radium 226 MDC	0.2	pCi/L				E903.0	10/13/17 13:45 / arh
256 Radium 226 altu	3.0E-10	uCi/mL				E903.0	10/13/17 13:45 / arh
258 Radium 226 altu precision (±)	1.0E-10	uCi/mL				E903.0	10/13/17 13:45 / arh
Radium 226 altu MDC	2.0E-10	uCi/mL				E903.0	10/13/17 13:45 / arh
057 Radium 228	0.8	pCi/L	U			RA-05	10/08/17 10:59 / trs
257 Radium 228 precision (±)	0.8	pCi/L				RA-05	10/08/17 10:59 / trs
Radium 228 MDC	1.2	pCi/L				RA-05	10/08/17 10:59 / trs
359 Radium 228 altu	8.0E-10	uCi/mL	U			RA-05	10/08/17 10:59 / trs
360 Radium 228 altu precision (±)	8.0E-10	uCi/mL				RA-05	10/08/17 10:59 / trs
Radium 228 altu MDC	1.0E-09	uCi/mL				RA-05	10/08/17 10:59 / trs
048 Thorium 230	0.1	pCi/L	U			E908.0	10/20/17 11:18 / cnh
248 Thorium 230 precision (±)	0.1	pCi/L				E908.0	10/20/17 11:18 / cnh

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.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17090521-002
Client Sample ID: P

Report Date: 10/23/17
Collection Date: 09/14/17 12:10
Date Received: 09/18/17
Matrix: Aqueous

	Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES, DISSOLVED								
	Thorium 230 MDC	0.2	pCi/L				E908.0	10/20/17 11:18 / cnh
362	Thorium 230 altu	1.0E-10	uCi/mL	U			E908.0	10/20/17 11:18 / cnh
363	Thorium 230 altu precision (±)	1.0E-10	uCi/mL				E908.0	10/20/17 11:18 / cnh
	Thorium 230 altu MDC	2.0E-10	uCi/mL				E908.0	10/20/17 11:18 / cnh
DATA QUALITY								
079	Solids, Total Dissolved - Calculated	1800	mg/L				A1030 E	10/02/17 09:01 / tla
192	A/C Balance	2.87	%				A1030 E	10/02/17 09:01 / tla
194	Anions	26.7	meq/L				A1030 E	10/02/17 09:01 / tla
195	Cations	28.3	meq/L				A1030 E	10/02/17 09:01 / tla
200	TDS Ratio	1.03	unitless				A1030 E	10/02/17 09:01 / tla

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

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C17100969-001
Client Sample ID: P

Report Date: 11/09/17
Collection Date: 10/26/17 13:58
Date Received: 10/31/17
Matrix: Aqueous

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
108 Sulfate	980	mg/L	D	2		E300.0	11/01/17 23:45 / jcg
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1780	mg/L	D	20		A2540 C	11/01/17 16:03 / mvr
METALS, DISSOLVED							
036 Molybdenum	<0.03	mg/L		0.03		E200.8	11/07/17 16:38 / eli-b
040 Selenium	0.156	mg/L		0.005		E200.8	11/07/17 16:38 / eli-b
015 Uranium	0.0264	mg/L		0.0003		E200.8	11/07/17 16:38 / eli-b
244 Uranium Precision (±)	0.00426	mg/L		0.00005		E200.8	11/07/17 16:38 / eli-b
113 Uranium, Activity	1.8E-08	uCi/mL		2.0E-10		E200.8	11/07/17 16:38 / eli-b
114 Uranium, Activity precision (±)	2.9E-09	uCi/mL		3.0E-11		E200.8	11/07/17 16:38 / eli-b

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.

Table 4.2- 1
Lined Pond Water Quality

Table 4.2-1. Lined Pond Water Quality

Sample Point Name	Date	Temp (deg.C)	pH (f) (std. units)	Conductivity (micromhos/cm)	CO3 (mg/l)	Ca (mg/l)	Cl (mg/l)	HCO3 (mg/l)	Mg (mg/l)	K (mg/l)	Na (mg/l)	SO4 (mg/l)	TDS (mg/l)	NO3 (mg/l)
Parameter Code		12	109	51	6	1	7	5	2	3	4	8	10	39
E Coll Pond	8/7/17	24.20	8.84	6236	<5	75.6	340	233	75.4	7	1290	2500	4480	4.1
	10/11/17						409					3380	5790	
Evap Pond 1	8/7/17	24.60	9.59	53050	2640	10.2	4330	2860	393	71	17800	29600	56000	<0.1
	10/12/17						4040					29600	51700	
Evap Pond 2	8/7/17	20.20	9.18	24630	237	97.3	1480	1360	245	28	6480	11600	21500	2.1
	10/12/17						1660					13600	22200	
Evap Pond 3-A	8/7/17	29.80	9.54	102000	8630	18	19700	7370	459	348	38200	41700	116000	<0.1
	10/12/17	20.80	9.49	130500			27100					28400	131000	
Evap Pond 3-B	8/7/17	20.80	9.56	78000	7200	15	9480	7310	525	162	31000	36600	90100	<0.1
	10/12/17	28.50	9.51	80070			11900					46700	103000	
W Coll Pond	8/7/17	24.30	9.42	10660	107	19.2	540	344	114	9.6	2460	4100	7820	9
	10/11/17						380					3090	5450	

f = field measurement
t = analyte, total

Table 4.2-1. Lined Pond Water Quality, cont.

Sample Point Name	Date	Mn(t) (mg/l)	Se (mg/l)	Se (t) (mg/l)	Mo (mg/l)	Mo (t) (mg/l)	Unat (mg/l)	Unat (t) (mg/l)	Ra226 (pCi/l)	Ra228 (pCi/l)	Ra226+ Ra228 (pCi/l)	Th230 (pCi/l)	V (mg/l)
Parameter Code		134	40	140	36	136	15	115	45	57	272	48	42
E Coll Pond	8/7/17	0.017	0.401	0.419	12.3	12.6	4.77	4.86	0.2	1	1.2	1.8	<0.01
	10/11/17		0.592	0.574	15.9	15.7	7.47	7.73					
Evap Pond 1	8/7/17	0.026	0.772	0.67	169	135	104	105	0.06	-0.02	0.04	3.6	0.05
	10/12/17		0.271	0.221	91.7	115	95.6	98.4					
Evap Pond 2	8/7/17	0.103	0.855	0.75	67.9	63.6	31.8	32.7	3.5	0.4	3.9	1.1	0.05
	10/12/17		0.707	0.718	41	57	34.7	35.2					
Evap Pond 3-A	8/7/17	0.014	0.52	0.62	730	615	227	235	28.6	16.9	45.5	267	0.11
	10/12/17		0.718	0.663	993	949	340	307					
Evap Pond 3-B	8/7/17	0.04	0.636	0.44	395	386	269	268	0.3	-0.2	0.1	136	0.15
	10/12/17		0.443	0.478	453	429	311	282					
W Coll Pond	8/7/17	0.003	0.896	0.928	51.5	29	12.7	13.9	0.3	0.6	0.9	0.08	0.02
	10/11/17		0.564	0.577	26.4	15.4	7.04	7.45					

f = field measurement
t = analyte, total

Table 4.2- 2
Evaporation Pond Monitoring Wells Water Quality

Table 4.2-2. Evaporation Pond Monitoring Wells Water Quality

Sample Point Name	Date	WL (feet)	Temp (deg.C)	pH (f) (std. units)	Conductivity (micromhos/cm)	CO3 (mg/l)	Ca (mg/l)	Cl (mg/l)	HCO3 (mg/l)	Mg (mg/l)	K (mg/l)	Na (mg/l)
Parameter Code		13	12	109	51	6	1	7	5	2	3	4
Site Standard Qal aquifer								250				
DD	8/8/17	56.20	17.00	7.27	3712			70				
	10/12/17	47.10	14.00	7.43	3842	<5	468	66	350	110	6.5	358
	11/23/17					<5	538	74	316	122	7.1	427
DD2	8/8/17	45.20	17.60	7.20	3052			72				
	10/12/17	45.28	13.90	7.34	3080	<5	358	72	364	89.8	5.2	327
	11/2/17	45.40	13.80	6.69	2837	<5	336	74	367	85.7	6.3	348
	11/23/17					<5	374	71	341	91.9	6.6	336
X	7/18/17					<5	151	123	376	34.9	4.7	159
	10/26/17	29.62	14.70	7.08	1630			121				
	11/28/17					<5	130	98	281	29.5	4.6	146

Concentrations greater than site standards are in **bold**.

f = field measurement

Table 4.2-2. Evaporation Pond Monitoring Wells Water Quality, cont.

Sample Point Name	Date	SO4 (mg/l)	TDS (mg/l)	NO3 (mg/l)	Se (mg/l)	Mo (mg/l)	Unat (mg/l)	Ra226 (pCi/l)	Ra228 (pCi/l)	Ra226+ Ra228 (pCi/l)	Th230 (pCi/l)	V (mg/l)	Mn (mg/l)
Parameter Code		8	10	39	40	36	15	45	57	272	48	42	34
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02	
DD	8/8/17	**1930**	**3510**		0.113	<0.03	0.10						
	10/12/17	**1950**	**3430**	9.8	0.071	<0.03	0.11	0.1	1.5	1.60	0.01	<0.01	
	11/23/17	**2160**	**3390**	11.7	0.091	0.002	0.10	0.2	0.6	0.80	0.04	<0.01	0.13
DD2	8/8/17	1440	2650		<0.005	<0.03	**0.22**						
	10/12/17	1480	2660	<0.1	<0.005	<0.03	**0.22**	0.4	2.60	3.00	0.07	<0.01	
	11/2/17	**1520**	2630	<0.1	<0.005	<0.03	**0.22**	0.5	0.80	1.30	0.03	<0.01	
	11/23/17	**1560**	2630	<0.1	<0.005	0.002	**0.21**	0.6	1.30	1.90	0.09	<0.01	2.86
X	7/18/17	369	1080	1.3	0.021	0.08	0.05	0.2	0.9	1.1	0.07	0.01	
	10/26/17	438	1200		0.01	0.08	0.07						
	11/28/17	350	908	1.3	0.007	0.087	0.04	0.1	1.6	1.7	0.02	0.01	<0.001

Concentrations greater than site standards are in **bold**.

f = field measurement

Table 4.3-1
Compliant Water Quality

Table 4.3-1. Compliant Water Quality

Sample Point Name	Date	Temp (deg.C)	pH (f) (std. units)	Conductivity (micromhos/cm)	CO3 (mg/l)	Ca (mg/l)	Cl (mg/l)	HCO3 (mg/l)	Mg (mg/l)	K (mg/l)	Na (mg/l)
Parameter Code		12	109	51	6	1	7	5	2	3	4
Site Standard Qal aquifer							250				
Post Treatment Tank											
SP2	7/10/2017				<5	99.1	91	231	31.6	4.9	129
	7/14/2017				<5	118	114	271	40.8	6.4	155
	7/21/2017	12.80	6.56	1364	<5	79.9	82	122	25.5	4.3	120
	7/28/2017				<5	72.5	59	<5	22.9	4	102
	8/22/2017				<5	101	112	275	35	5.6	137
	9/27/2017	18.10	7.51	1151	<5	86	84	<5	31.4	5	129
	10/25/2017	16.6	7.9	1080	<5	77.3	94	183	30.6	4.6	119
	11/28/2017				<5	103	99	197	34.4	5.4	127
	12/19/2017	13.9	6.53		<5	123	111	126	36.1	5.3	180

Concentrations greater than site standards are in **bold**.

f = field measurement

Table 4.3-1. Compliant Water Quality, cont.

Sample Point Name	Date	SO4 (mg/l)	TDS (mg/l)	NO3 (mg/l)	Se (mg/l)	Mo (mg/l)	Unat (mg/l)	Ra226 (pCi/l)	Ra228 (pCi/l)	Ra226+ Ra228 (pCi/l)	Th230 (pCi/l)	V (mg/l)
Parameter Code		8	10	39	40	36	15	45	57	272	48	42
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
						Post Treatment Tank						
SP2	7/10/2017	296	822	1.2	<0.005	0.03	0.02	0.3	-0.5	-0.2	0.07	<0.01
	7/14/2017	373	1010	1.2	0.006	0.05	0.03	0.3	0.1	0.4	0.02	<0.01
	7/21/2017	330	797	1.5	0.009	0.05	0.04	0.5	2.5	3	0.07	<0.01
	7/28/2017	214	792	590	0.006	0.05	0.03	0.2	0.05	0.25	0.05	<0.01
	8/22/2017	347	977	1.7	<0.005	0.04	0.03	0.1	0.5	0.6	0.2	<0.01
	9/27/2017	260	1800	1660	<0.005	0.04	0.02	0.07	3.2	3.27	0.04	<0.01
	10/25/2017	304	760	1.3	<0.005	0.05	0.02	0.2	-0.6	-0.4	0.03	<0.01
	11/28/2017	374	863	1.4	0.007	0.02	0.02	0.09	0.9	0.99	0.06	<0.01
	12/19/2017	589	1160	1.6	0.02	0.056	0.07	0.3	1.2	1.5	0.02	<0.01

Concentrations greater than site standards are in **bold**.

f = field measurement

Table 4.3-2
Treated Water Quality

Table 4.3-2. Treated Water Quality

Sample Point Name	Date	Temp (deg.C)	pH (f) (std. units)	Conductivity (micromhos/cm)	CO3 (mg/l)	Ca (mg/l)	Cl (mg/l)	HCO3 (mg/l)	Mg (mg/l)	K (mg/l)	Na (mg/l)
Parameter Code		12	109	51	6	1	7	5	2	3	4
Site Standard Qal aquifer							250				
RO Product											
RO SP1	7/10/2017				<5	69.4	54	19	18.4	3.3	121
	7/14/2017				<5	<0.5	5	6	<0.5	<0.5	10.7
	7/21/2017	10.8	4.63	1364	<5	2.7	9	10	1.1	<0.5	19.6
	7/28/2017				<5	14.3	11	<5	3.8	2	40.5
	8/22/2017				<5	235	208	568	79.3	11.2	290
	9/27/2017	17.5	6.69	548.8	<5	2.4	7	<5	1.3	4	39
	10/25/2017	17.1	5.37	18.01	<5	<0.5	9	9	<0.5	<0.5	11.3
	11/28/2017				<5	<0.5	9	10	<0.5	<0.5	12.7
	12/19/2017	16.5	7.64	1489	<5	<0.5	3	7	<0.5	<0.5	8.9
Zeolite Treated Water											
300Z	7/17/2017				<5	178	166	<5	50.6	8.1	249
	7/24/2017		3.5		<5	202	153	<5	54	8	238
	8/31/2017				<5	249	169	30	67.6	6.5	263
	10/26/2017				<5	230	181	30	62.2	6.5	251
	10/31/2017	12.9	5.56	5458	<5	246	172	28	67.8	6.1	268
	11/20/2017				<5	237	178	40	62.1	6.4	265
	12/6/2017				<5	213	160	75	57	6.4	260
	12/11/2017				<5	206	165	65	56.1	5.3	234
	12/18/2017	16	6.66	2090	<5	227	161	80	60.6	6.7	279
	12/26/2017	16.2	6.78	2188	<5	202	157	63	53.1	5.5	235
1200Z Trains 1&2											
1200Z Trains 3&4	11/20/2017				<5	203	161	16	57.9	6.9	268
	11/28/2017				<5	206	109	109	53.4	8	285
	12/6/2017				<5	189	152	71	49.1	7.3	272
	12/11/2017				<5	163	145	64	42	7.2	274
	12/18/2017	15.7	5.99	2076	<5	163	147	69	43.8	7.3	282
	12/26/2017	17.3	6.55	2264	<5	169	149	62	42.5	7.1	286

Concentrations greater than site standards are in **bold**.

f = field measurement

Table 4.3-2. Treated Water Quality, cont.

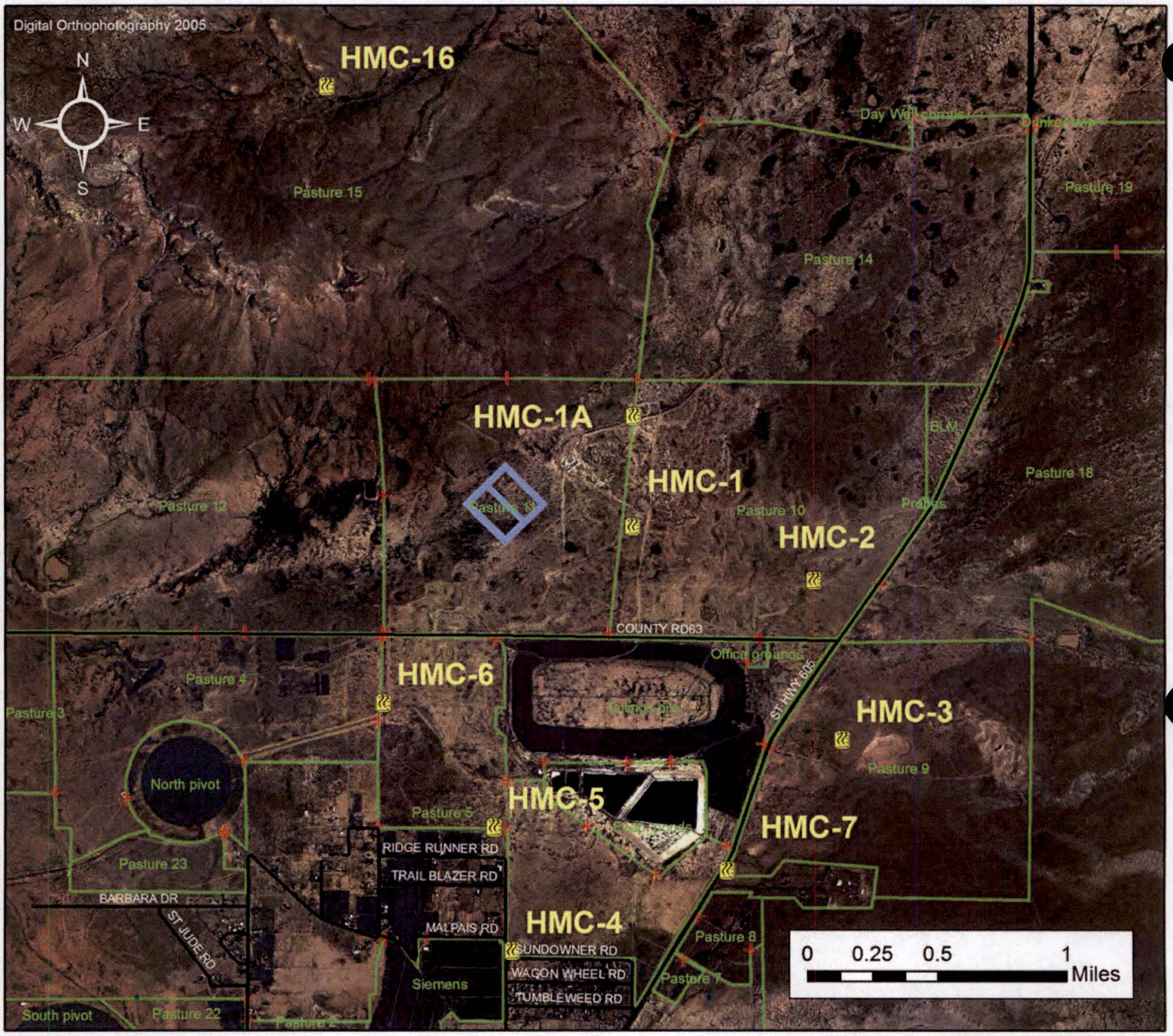
Sample Point Name	Date	SO4 (mg/l)	TDS (mg/l)	NO3 (mg/l)	Se (mg/l)	Mo (mg/l)	Unat (mg/l)	Ra226 (pCi/l)	Ra228 (pCi/l)	Ra226+ Ra228 (pCi/l)	Th230 (pCi/l)	V (mg/l)
Parameter Code		8	10	39	40	36	15	45	57	272	48	42
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
RO Product												
RO SP1	7/10/2017	352	671	1.1	0.016	**0.12**	0.040	0.06	0.2	0.26	0.08	<0.01
	7/14/2017	11	29	0.4	<0.005	0.05	0.020	0.1	0.1	0.2	-0.009	<0.01
	7/21/2017	27	79	0.6	<0.005	0.09	0.045	0.2	1	1.2	0.04	<0.01
	7/28/2017	59	270	**500**	<0.005	0.06	0.025	0.1	3.7	3.8	0.2	<0.01
	8/22/2017	667	1880	1.8	0.006	<0.03	0.016	0.3	1.4	1.7	0.1	<0.01
	9/27/2017	13	1000	**1490**	<0.005	0.05	0.036	0.1	0.8	0.9	0.07	<0.01
	10/25/2017	5	31	1.1	<0.005	0.03	0.010	0.1	-0.7	-0.6	0.1	<0.01
	11/28/2017	6	36	0.8	<0.001	0.026	0.015	0.1	0.04	0.14	0.05	<0.01
	12/19/2017	9	37	0.3	0.001	0.039	0.0082	0.05	1	1.05	0.07	<0.01
Zeolite Treated Water												
300Z	7/17/2017	921	1860	3	0.041	<0.03	0.129	0.3	0.5	0.8	0.06	<0.01
	7/24/2017	915	1820	2.3	0.036	<0.03	0.0714	0.3	2.4	2.7	0.1	<0.01
	8/31/2017	1110	1870	2.6	0.031	<0.03	0.059	0.2	2.6	2.8	0.005	<0.01
	10/26/2017	1080	2030		0.045	0.05	0.05					
	10/31/2017	1140	2010		0.042	0.03	0.0559					
	11/20/2017	983	1970	3.1	0.035	0.044	0.0176	0.04	0.6	0.64	0.05	<0.01
	12/6/2017	985	1850	2.4	0.031	0.037	0.0256	-0.03	0.7	0.67	0.3	<0.01
	12/11/2017	1010	1850	2.4	0.036	0.029	0.0212	0.1	0.5	0.6	0.03	<0.01
	12/18/2017	970	1760	2.2	0.032	0.039	0.0538	0.08	2.6	2.68	0.06	<0.01
	12/26/2017	942	1730	2.2	0.028	0.029	0.0276	0.2	-0.3	-0.1	0.2	<0.01
1200Z Trains 1&2												
1200Z Trains 3&4	11/20/2017	999	1790	2.8	0.033	0.007	0.0248	0.3	0.5	0.8	0.05	<0.01
	11/28/2017	988	1800	2.9	0.035	0.013	0.0085	0.06	0.6	0.66	-0.04	<0.01
	12/6/2017	961	1790	2.5	0.033	0.01	0.0118	-0.08	-0.4	-0.48	0.2	<0.01
	12/11/2017	920	1670	2.4	0.039	0.009	0.0158	0.2	1.4	1.6	0.02	<0.01
	12/18/2017	947	1730	2.3	0.037	0.008	0.0153	0.1	2.2	2.3	0.2	<0.01
	12/26/2017	965	1740	2.5	0.038	0.005	0.0156	0.1	0.2	0.3	0.04	<0.01

Concentrations greater than site standards are in **bold**.

f = field measurement

Figure 1 – Monitoring & Sampling Locations

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



Location ID	Sampling Unit	Northing	Easting
HMC-1	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1547458.8	491370.5
HMC-1A	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1549715.8	491387.7
HMC-2	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1546349.5	495053.2
HMC-3	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1543048.7	495640.5
HMC-4	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1538751.1	488918.0
HMC-5	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1541268.4	488546.3
HMC-6	Hi-Vol Particulate (Air), Track-Etch Cup (Radon), OSL Badge (Gamma)	1543813.1	486297.3
HMC-7	Track-Etch Cup (Radon)	1540395.7	493293.8
HMC-16	Track-Etch Cup (Radon), OSL Badge (Gamma)	1556470.5	485135.1

Location
Road
Gate
EP-3
Fence Line
Section Line

HOMESTAKE

Attachment 1
High Volume Air Sampling Results
(Second half of 2017)

ANALYTICAL SUMMARY REPORT

November 28, 2017

Homestake Mining Co
Hwy 605
Grants, NM 87020

Work Order: C17100404 Quote ID: C775

Project Name: Hi-Vol Filters

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 10/10/2017 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C17100404-001	HMC-1	09/30/17 00:00	10/10/17	Filter	Metals by ICP/ICPMS, Total Client Provided Field Parameters Metals, Total Digestion, Total Metals, Radiochemistry Radiochemistry Air Filter Compliance Calculations RAD-AIR, Routine Radiological Reports RAD Alternate Unit Reporting Air Filters Radium 226 Thorium, Isotopic
C17100404-002	HMC-1A	09/30/17 00:00	10/10/17	Filter	Same As Above
C17100404-003	HMC-2	09/30/17 00:00	10/10/17	Filter	Same As Above
C17100404-004	HMC-3	09/30/17 00:00	10/10/17	Filter	Same As Above
C17100404-005	HMC-4	09/30/17 00:00	10/10/17	Filter	Same As Above
C17100404-006	HMC-5	09/30/17 00:00	10/10/17	Filter	Same As Above
C17100404-007	HMC-6	09/30/17 00:00	10/10/17	Filter	Same As Above
C17100404-008	HMC-7	09/30/17 00:00	10/10/17	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. 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:

CLIENT: Homestake Mining Co .
Project: Hi-Vol Filters
Work Order: C17100404

Report Date: 11/28/17

CASE NARRATIVE

ANALYSIS NOTE
The LCS (LCS2-50571) recovery for the preparation batch is low for the Uranium and Vanadium analyses. The response appears to reflect a split taken before the container was homogenized. The reported sample response was not affected since a new split was taken from the remaining sample fraction. There was no remaining volume in the LCS container; therefore the Uranium/Vanadium sample was reanalyzed with a LFB prepared by the subcontract laboratory.

SUBCONTRACTED DATATests associated with analyst identified as ELI-H were subcontracted to Energy Laboratories, 3161 E.Lyndale Ave., Helena, MT, EPA Number MT00945.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C17100404-001
Client Sample ID: HMC-1

Report Date: 11/28/17
Collection Date: 09/30/17
Date Received: 10/10/17
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	8.1E-10	mg/L		1.7E-12		SW6020	11/17/17 03:05 / eli-h
Uranium, Activity	5.5E-16	uCi/mL		1.2E-18		SW6020	11/17/17 03:05 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/17/17 02:39 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	2.6E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Radium 226 precision (±)	1.1E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Radium 226 MDC	1.2E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Thorium 230	1.2E-17	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 precision (±)	2.3E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 MDC	3.7E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.7	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 precision (±)	1.6	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 MDC	1.8	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230	1.7	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 precision (±)	0.32	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 MDC	0.52	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Uranium, Activity	78.4	pCi/Filter		0.20		RADCALC	11/27/17 12:55 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	11/27/17 13:09 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/27/17 13:09 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, % of EFF	4.0E-02	%				RADCALC	11/27/17 13:09 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, % of EFF	6.1E-01	%				RADCALC	11/27/17 13:09 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	143000000	L				FIELD	09/30/17 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 - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 28, 2017

SAMPLE ID: HMC-1

Quarter/Date Sampled Air Volume	Radionuclide	Concentration µCi/mL	Counting Precision µCi/mL	MDC µCi/mL	L.L.D.+ µCi/mL	Effluent Conc.* µCi/mL	% Effluent Concentration
C17100404-001	^{nat}U	5E-16	N/A	N/A	1E-16	9E-14	6E-01
Third Quarter 2017	^{230}Th	1E-17	2E-18	4E-18	1E-16	3E-14	4E-02
Air Volume in mLs	^{226}Ra	3E-17	1E-17	1E-17	1E-16	9E-13	3E-03
1.43E+11							

+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: Hi-Vol Filters
Lab ID: C17100404-002
Client Sample ID: HMC-1A

Report Date: 11/28/17
Collection Date: 09/30/17
Date Received: 10/10/17
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	5.0E-10	mg/L		3.5E-13		SW6020	11/17/17 03:07 / eli-h
Uranium, Activity	3.4E-16	uCi/mL		2.4E-19		SW6020	11/17/17 03:07 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/17/17 02:42 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	3.5E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Radium 226 precision (±)	1.3E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Radium 226 MDC	1.3E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Thorium 230	1.6E-17	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 precision (±)	3.0E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 MDC	3.5E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	5.0	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 precision (±)	1.8	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 MDC	1.8	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230	2.3	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 precision (±)	0.43	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 MDC	0.50	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Uranium, Activity	47.8	pCi/Filter		0.20		RADCALC	11/27/17 12:55 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	11/27/17 13:09 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/27/17 13:09 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, % of EFF	5.0E-02	%				RADCALC	11/27/17 13:09 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, % of EFF	3.7E-01	%				RADCALC	11/27/17 13:09 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	142000000	L				FIELD	09/30/17 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 - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 28, 2017

SAMPLE ID: HMC-1A

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
C17100404-002	^{nat}U	3E-16	N/A	N/A	1E-16	9E-14	4E-01
Third Quarter 2017	^{230}Th	2E-17	3E-18	4E-18	1E-16	3E-14	5E-02
Air Volume in mLs	^{226}Ra	4E-17	1E-17	1E-17	1E-16	9E-13	4E-03
1.42E+11							

+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: Hi-Vol Filters
Lab ID: C17100404-003
Client Sample ID: HMC-2

Report Date: 11/28/17
Collection Date: 09/30/17
Date Received: 10/10/17
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	7.2E-10	mg/L		3.5E-13		SW6020	11/17/17 03:10 / eli-h
Uranium, Activity	4.9E-16	uCi/mL		2.4E-19		SW6020	11/17/17 03:10 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/17/17 02:44 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	4.9E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Radium 226 precision (±)	1.5E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Radium 226 MDC	1.3E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Thorium 230	1.2E-17	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 precision (±)	2.2E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 MDC	3.2E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	7.0	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 precision (±)	2.2	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 MDC	1.9	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230	1.7	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 precision (±)	0.32	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 MDC	0.46	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Uranium, Activity	70.0	pCi/Filter		0.20		RADCALC	11/27/17 12:55 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	5.0E-03	%				RADCALC	11/27/17 13:09 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/27/17 13:09 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, % of EFF	4.0E-02	%				RADCALC	11/27/17 13:09 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, % of EFF	5.4E-01	%				RADCALC	11/27/17 13:09 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	143000000	L				FIELD	09/30/17 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 - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 28, 2017

SAMPLE ID: HMC-2

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
C17100404-003	^{nat}U	5E-16	N/A	N/A	1E-16	9E-14	5E-01
Third Quarter 2017	^{230}Th	1E-17	2E-18	3E-18	1E-16	3E-14	4E-02
Air Volume in mLs	^{226}Ra	5E-17	2E-17	1E-17	1E-16	9E-13	5E-03
1.43E+11							

+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: Hi-Vol Filters
Lab ID: C17100404-004
Client Sample ID: HMC-3

Report Date: 11/28/17
Collection Date: 09/30/17
Date Received: 10/10/17
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	1.5E-09	mg/L		3.6E-13		SW6020	11/17/17 03:11 / eli-h
Uranium, Activity	1.0E-15	uCi/mL		2.4E-19		SW6020	11/17/17 03:11 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/17/17 02:45 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	3.6E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Radium 226 precision (±)	1.3E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Radium 226 MDC	1.3E-17	uCi/mL				E903.0	10/29/17 11:51 / arh
Thorium 230	2.1E-17	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 precision (±)	4.1E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 MDC	5.0E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	5.0	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 precision (±)	1.9	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 MDC	1.9	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230	3.0	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 precision (±)	0.57	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 MDC	0.69	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Uranium, Activity	141	pCi/Filter		0.20		RADCALC	11/27/17 12:55 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	11/27/17 13:09 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/27/17 13:09 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, % of EFF	7.0E-02	%				RADCALC	11/27/17 13:09 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, % of EFF	1.1E+00	%				RADCALC	11/27/17 13:09 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	140000000	L				FIELD	09/30/17 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 - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 28, 2017

SAMPLE ID: HMC-3

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
C17100404-004	^{nat}U	1.0E-15	N/A	N/A	1E-16	9E-14	1.1E+00
Third Quarter 2017	^{230}Th	2E-17	4E-18	5E-18	1E-16	3E-14	7E-02
Air Volume in mLs	^{226}Ra	4E-17	1E-17	1E-17	1E-16	9E-13	4E-03
1.40E+11							

+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: Hi-Vol Filters
Lab ID: C17100404-005
Client Sample ID: HMC-4

Report Date: 11/28/17
Collection Date: 09/30/17
Date Received: 10/10/17
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	2.8E-09	mg/L		3.5E-13		SW6020	11/17/17 03:13 / eli-h
Uranium, Activity	1.9E-15	uCi/mL		2.4E-19		SW6020	11/17/17 03:13 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/17/17 02:47 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	3.1E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Radium 226 precision (±)	1.3E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Radium 226 MDC	1.3E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Thorium 230	7.6E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 precision (±)	1.4E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 MDC	1.8E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	4.3	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 precision (±)	1.8	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 MDC	1.8	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230	1.1	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 precision (±)	0.20	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 MDC	0.26	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Uranium, Activity	264	pCi/Filter		0.20		RADCALC	11/27/17 12:55 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	11/27/17 13:09 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/27/17 13:09 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/27/17 13:09 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, % of EFF	2.1E+00	%				RADCALC	11/27/17 13:09 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	141000000	L				FIELD	09/30/17 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 - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 28, 2017

SAMPLE ID: HMC-4

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
C17100404-005	^{nat}U	1.9E-15	N/A	N/A	1E-16	9E-14	2.1E+00
Third Quarter 2017	^{230}Th	8E-18	1E-18	2E-18	1E-16	3E-14	3E-02
Air Volume in mLs	^{226}Ra	3E-17	1E-17	1E-17	1E-16	9E-13	3E-03
1.41E+11							

+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: Hi-Vol Filters
Lab ID: C17100404-006
Client Sample ID: HMC-5

Report Date: 11/28/17
Collection Date: 09/30/17
Date Received: 10/10/17
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	5.4E-09	mg/L		3.4E-13		SW6020	11/17/17 03:25 / eli-h
Uranium, Activity	3.6E-15	uCi/mL		2.3E-19		SW6020	11/17/17 03:25 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/17/17 02:48 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	4.3E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Radium 226 precision (±)	1.4E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Radium 226 MDC	1.2E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Thorium 230	7.1E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 precision (±)	1.4E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 MDC	4.4E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	6.2	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 precision (±)	2.0	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 MDC	1.7	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230	1.0	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 precision (±)	0.20	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 MDC	0.64	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Uranium, Activity	533	pCi/Filter		0.20		RADCALC	11/27/17 12:55 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	5.0E-03	%				RADCALC	11/27/17 13:09 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/27/17 13:09 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, % of EFF	2.0E-02	%				RADCALC	11/27/17 13:09 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, % of EFF	4.1E+00	%				RADCALC	11/27/17 13:09 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	146000000	L				FIELD	09/30/17 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 - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 28, 2017

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
C17100404-006	^{nat}U	3.6E-15	N/A	N/A	1E-16	9E-14	4.1E+00
Third Quarter 2017	^{230}Th	7E-18	1E-18	4E-18	1E-16	3E-14	2E-02
Air Volume in mLs	^{226}Ra	4E-17	1E-17	1E-17	1E-16	9E-13	5E-03
1.46E+11							

+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: Hi-Vol Filters
Lab ID: C17100404-007
Client Sample ID: HMC-6

Report Date: 11/28/17
Collection Date: 09/30/17
Date Received: 10/10/17
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	9.1E-10	mg/L		3.5E-13		SW6020	11/17/17 03:26 / eli-h
Uranium, Activity	6.2E-16	uCi/mL		2.4E-19		SW6020	11/17/17 03:26 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/17/17 02:50 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	4.6E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Radium 226 precision (±)	1.5E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Radium 226 MDC	1.2E-17	uCi/mL				E903.0	10/29/17 13:23 / arh
Thorium 230	9.5E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 precision (±)	1.8E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 MDC	4.3E-18	uCi/mL				E908.0	11/06/17 15:49 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	6.6	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 precision (±)	2.1	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 MDC	1.7	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230	1.4	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 precision (±)	0.26	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 MDC	0.62	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Uranium, Activity	88.8	pCi/Filter		0.20		RADCALC	11/27/17 12:55 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	5.0E-03	%				RADCALC	11/27/17 13:09 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/27/17 13:09 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/27/17 13:09 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, % of EFF	6.8E-01	%				RADCALC	11/27/17 13:09 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	144000000	L				FIELD	09/30/17 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 - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 28, 2017

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
C17100404-007	^{nat}U	6E-16	N/A	N/A	1E-16	9E-14	7E-01
Third Quarter 2017	^{230}Th	9E-18	2E-18	4E-18	1E-16	3E-14	3E-02
Air Volume in mLs	^{226}Ra	5E-17	1E-17	1E-17	1E-16	9E-13	5E-03
1.44E+11							

+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: Hi-Vol Filters
Lab ID: C17100404-008
Client Sample ID: HMC-7

Report Date: 11/28/17
Collection Date: 09/30/17
Date Received: 10/10/17
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	0.00064	mg/L		0.000050		SW6020	11/17/17 03:28 / eli-h
Uranium, Activity	4.3E-10	uCi/mL		3.4E-11		SW6020	11/17/17 03:28 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/17/17 02:51 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	1.3E-09	uCi/mL				E903.0	11/02/17 03:38 / arh
Radium 226 precision (±)	3.0E-10	uCi/mL				E903.0	11/02/17 03:38 / arh
Radium 226 MDC	2.3E-10	uCi/mL				E903.0	11/02/17 03:38 / arh
Thorium 230	7.3E-10	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 precision (±)	4.6E-10	uCi/mL				E908.0	11/06/17 15:49 / cnh
Thorium 230 MDC	6.9E-10	uCi/mL				E908.0	11/06/17 15:49 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	1.3	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 precision (±)	0.30	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Radium 226 MDC	0.23	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230	0.73	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 precision (±)	0.46	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Thorium 230 MDC	0.69	pCi/Filter				RADCALC	11/27/17 12:55 / sec
Uranium, Activity	0.43	pCi/Filter		0.20		RADCALC	11/27/17 12:55 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	1.4E+05	%				RADCALC	11/27/17 13:09 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/27/17 13:09 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, % of EFF	2.4E+06	%				RADCALC	11/27/17 13:09 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, % of EFF	4.8E+05	%				RADCALC	11/27/17 13:09 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/27/17 13:09 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/27/17 13:09 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1	L				FIELD	09/30/17 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 - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 28, 2017

SAMPLE ID: HMC-7

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
C17100404-008	^{nat}U	3E-18	N/A	N/A	1E-16	9E-14	3E-03
Third Quarter 2017	^{230}Th	5E-18	3E-18	5E-18	1E-16	3E-14	2E-02
Air Volume in mLs	^{226}Ra	9E-18	2E-18	2E-18	1E-16	9E-13	1E-03
1.43E+11							

Air Volumes on this page based on average of quarterly set; accompanying standard report uses a 1 L default volume.

+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

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters

Report Date: 11/28/17
Work Order: C17100404

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: RA226-8719
Lab ID: LCS-50530		Laboratory Control Sample				Run: G5000W_171019A				10/29/17 11:51
Radium 226		96.0	pCi/L		96	80	120			
Lab ID: MB-50530	3	Method Blank				Run: G5000W_171019A				10/29/17 11:51
Radium 226		0.2	pCi/L							U
Radium 226 precision (±)		0.2	pCi/L							
Radium 226 MDC		0.4	pCi/L							
Lab ID: C17100404-001AMS		Sample Matrix Spike				Run: G5000W_171019A				10/29/17 11:51
Radium 226		6.53E-07	pCi/L		96	70	130			
Lab ID: C17100404-001AMSD		Sample Matrix Spike Duplicate				Run: G5000W_171019A				10/29/17 11:51
Radium 226		7.76E-07	pCi/L		113	70	130	17	20	
Method: E903.0										Batch: R228910
Lab ID: LCS-50530		Laboratory Control Sample				Run: TENNELEC-3_171019D				11/02/17 03:38
Radium 226		93.5	pCi/L		93	80	120			
Lab ID: MB-50530	3	Method Blank				Run: TENNELEC-3_171019D				11/02/17 03:38
Radium 226		0.2	pCi/L							
Radium 226 precision (±)		0.04	pCi/L							
Radium 226 MDC		0.05	pCi/L							
Lab ID: C17100404-001AMS		Sample Matrix Spike				Run: TENNELEC-3_171019D				11/02/17 03:38
Radium 226		6.32E-07	pCi/L		87	70	130			
Lab ID: C17100404-001AMSD		Sample Matrix Spike Duplicate				Run: TENNELEC-3_171019D				11/02/17 03:38
Radium 226		6.04E-07	pCi/L		82	70	130	4.5	20	

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: Hi-Vol Filters

Report Date: 11/28/17
Work Order: C17100404

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0										Batch: 50571
Lab ID: LCS-50571		Laboratory Control Sample				Run: EGG-ORTEC_171026A				11/06/17 15:49
Thorium 230		27.3	pCi/L		107	80	120			
Lab ID: C17100404-008AMS		Sample Matrix Spike				Run: EGG-ORTEC_171026A				11/06/17 15:49
Thorium 230		105	pCi/L		104	70	130			
Lab ID: C17100404-008AMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_171026A				11/06/17 15:49
Thorium 230		114	pCi/L		113	70	130	8.2	20	
Lab ID: MB-50571	3	Method Blank				Run: EGG-ORTEC_171026A				11/06/17 15:49
Thorium 230		0.5	pCi/L							
Thorium 230 precision (±)		0.2	pCi/L							
Thorium 230 MDC		0.3	pCi/L							

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

Homestake Mining Co

C17100404

Login completed by: Tessa Parke
Reviewed by: Kasey Vidick
Reviewed Date: 10/12/2017

Date Received: 10/10/2017
Received by: bam
Carrier name: Next Day Air

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

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 Company	Project Name, PWS, Permit, Etc.: GRANTS	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address (Required): P.O. Box 98 Grants NM, 87020 ☐ No Hard Copy Email:	Contact Name: Kyle Marthez Phone/Fax: 1-505-287-4456 ex. 29 Cell:		Sampler: (Please Print)
	Invoice Contact & Phone: TR# 782235884558 94464	Purchase Order:	Quote/Bottle Order:
Invoice Address (Required): SAME ☐ No Hard Copy Email:			

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

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

ANALYSIS REQUESTED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Total Uranium	Total RA 226	Total TH 230	Total Vanadium	SEE ATTACHED
1 HMC-1	3rd	Q		X	X	X	X	
2 HMC-1A				X	X	X	X	
3 HMC-2	2017			X	X	X	X	
4 HMC-3				X	X	X	X	
5 HMC-4	Composite			X	X	X	X	
6 HMC-5				X	X	X	X	
7 HMC-6				X	X	X	X	
8 HMC-7				X	X	X	X	
9								
10								

Standard Turnaround (TAT)

RUSH

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

Comments: I will send air volumes in the next week.

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

C1760404

Custody Record MUST be Signed

Relinquished by (print): Kyle Marthez	Date/Time: 10-5-17	Signature:	Received by (print): Barb McGarvern	Date/Time: 10/10/17 1000	Signature:
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Sample Disposal: Return to Client: _____ Lab Disposal: _____			Received by Laboratory:	Date/Time:	Signature:

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.

...for additional information, downloadable fee schedule, forms, and links.

ENERGY LABORATORIES
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Gillette, WY 866.686.7175 • Helena, MT 877.472.0711

ANALYTICAL SUMMARY REPORT

February 07, 2018

Homestake Mining Co
Hwy 605
Grants, NM 87020

Work Order: C18010257 Quote ID: C5150 - Hi-Vol Filters
Project Name: Grants

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 1/9/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C18010257-001	HMC-1_20171231	12/31/17 00:00	01/09/18	Filter	Metals by ICP/ICPMS, Total Composite of two or more samples Client Provided Field Parameters Metals, Total Digestion, Total Metals, Radiochemistry Radiochemistry Air Filter Compliance Calculations RAD-AIR, Routine Radiological Reports RAD Alternate Unit Reporting Air Filters Radium 226 Thorium, Isotopic
C18010257-002	HMC-1-A_20171231	12/31/17 00:00	01/09/18	Filter	Same As Above
C18010257-003	HMC-2_20171231	12/31/17 00:00	01/09/18	Filter	Same As Above
C18010257-004	HMC-3_20171231	12/31/17 00:00	01/09/18	Filter	Same As Above
C18010257-005	HMC-4_20171231	12/31/17 00:00	01/09/18	Filter	Same As Above
C18010257-006	HMC-5_20171231	12/31/17 00:00	01/09/18	Filter	Same As Above
C18010257-007	HMC-6_20171231	12/31/17 00:00	01/09/18	Filter	Same As Above
C18010257-008	HMC-7_20171231	12/31/17 00:00	01/09/18	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. 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:

CLIENT: Homestake Mining Co
Project: Grants
Work Order: C18010257

Report Date: 02/07/18

CASE NARRATIVE

Tests associated with analyst identified as ELI-H were subcontracted to Energy Laboratories, 3161 E.Lyndale Ave., Helena, MT, EPA Number MT00945.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C18010257-001
Client Sample ID: HMC-1_20171231

Report Date: 02/07/18
Collection Date: 12/31/17
Date Received: 01/09/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	2.5E-10	mg/L		4.7E-14		SW6020	01/23/18 16:05 / eli-h
Uranium, Activity	1.7E-16	uCi/mL		3.2E-20		SW6020	01/23/18 16:05 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/23/18 16:05 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	6.5E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 precision (±)	1.6E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 MDC	7.9E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Thorium 230	2.2E-08	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 precision (±)	4.1E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 MDC	5.6E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	9.5	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 precision (±)	2.3	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 MDC	1.2	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230	3.2	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 precision (±)	0.60	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 MDC	0.83	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Uranium, Activity	24.6	pCi/Filter		0.20		RADCALC	02/06/18 09:11 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	7.0E-03	%				RADCALC	02/06/18 09:15 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/06/18 09:15 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, % of EFF	7.0E-02	%				RADCALC	02/06/18 09:15 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, % of EFF	1.9E-01	%				RADCALC	02/06/18 09:15 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.47E+8	L				FIELD	12/31/17 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 - Grants
PROJECT: Grants
REPORT DATE: February 7, 2018

SAMPLE ID: HMC-1_20171231

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
C18010257-001	^{nat}U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
Fourth Quarter 2017	^{230}Th	2E-17	4E-18	6E-18	1E-16	3E-14	7E-02
Air Volume in mLs	^{226}Ra	6E-17	2E-17	8E-18	1E-16	9E-13	7E-03
1.47E+11							

+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: Grants
Lab ID: C18010257-002
Client Sample ID: HMC-1-A_20171231

Report Date: 02/07/18
Collection Date: 12/31/17
Date Received: 01/09/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	2.0E-10	mg/L		4.9E-14		SW6020	01/23/18 16:09 / eli-h
Uranium, Activity	1.3E-16	uCi/mL		3.3E-20		SW6020	01/23/18 16:09 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/23/18 16:09 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	4.2E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 precision (±)	1.0E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 MDC	7.2E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Thorium 230	2.4E-08	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 precision (±)	4.6E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 MDC	4.7E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	6.0	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 precision (±)	1.5	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230	3.4	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 precision (±)	0.65	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 MDC	0.67	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Uranium, Activity	18.8	pCi/Filter		0.20		RADCALC	02/06/18 09:11 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	5.0E-03	%				RADCALC	02/06/18 09:15 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/06/18 09:15 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, % of EFF	8.0E-02	%				RADCALC	02/06/18 09:15 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, % of EFF	1.5E-01	%				RADCALC	02/06/18 09:15 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.42E+8	L				FIELD	12/31/17 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 - Grants
PROJECT: Grants
REPORT DATE: February 7, 2018

SAMPLE ID: HMC-1-A_20171231

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
C18010257-002	^{nat}U	1E-16	N/A	N/A	1E-16	9E-14	1E-01
Fourth Quarter 2017	^{230}Th	2E-17	5E-18	5E-18	1E-16	3E-14	8E-02
Air Volume in mLs	^{226}Ra	4E-17	1E-17	7E-18	1E-16	9E-13	5E-03
1.42E+11							

+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: Grants
Lab ID: C18010257-003
Client Sample ID: HMC-2_20171231

Report Date: 02/07/18
Collection Date: 12/31/17
Date Received: 01/09/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	1.5E-10	mg/L		4.8E-14		SW6020	01/23/18 16:11 / eli-h
Uranium, Activity	1.0E-16	uCi/mL		3.2E-20		SW6020	01/23/18 16:11 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/23/18 16:11 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	3.7E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 precision (±)	9.2E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 MDC	7.1E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Thorium 230	2.4E-08	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 precision (±)	4.5E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 MDC	3.4E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	5.4	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 precision (±)	1.3	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230	3.5	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 precision (±)	0.66	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 MDC	0.49	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Uranium, Activity	14.9	pCi/Filter		0.20		RADCALC	02/06/18 09:11 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	02/06/18 09:15 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/06/18 09:15 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, % of EFF	8.0E-02	%				RADCALC	02/06/18 09:15 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, % of EFF	1.1E-01	%				RADCALC	02/06/18 09:15 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.45E+8	L				FIELD	12/31/17 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 - Grants
PROJECT: Grants
REPORT DATE: February 7, 2018

SAMPLE ID: HMC-2_20171231

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
C18010257-003	^{nat}U	1E-16	N/A	N/A	1E-16	9E-14	1E-01
Fourth Quarter 2017	^{230}Th	2E-17	5E-18	3E-18	1E-16	3E-14	8E-02
Air Volume in mLs	^{226}Ra	4E-17	9E-18	7E-18	1E-16	9E-13	4E-03
1.45E+11							

+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: Grants
Lab ID: C18010257-004
Client Sample ID: HMC-3_20171231

Report Date: 02/07/18
Collection Date: 12/31/17
Date Received: 01/09/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	4.5E-10	mg/L		4.8E-14		SW6020	01/23/18 16:13 / eli-h
Uranium, Activity	3.0E-16	uCi/mL		3.2E-20		SW6020	01/23/18 16:13 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/23/18 16:13 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	3.7E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 precision (±)	8.9E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 MDC	7.1E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Thorium 230	2.3E-08	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 precision (±)	4.3E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 MDC	4.0E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	5.4	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 precision (±)	1.3	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230	3.3	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 precision (±)	0.62	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 MDC	0.58	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Uranium, Activity	44.2	pCi/Filter		0.20		RADCALC	02/06/18 09:11 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	02/06/18 09:15 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/06/18 09:15 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, % of EFF	8.0E-02	%				RADCALC	02/06/18 09:15 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, % of EFF	3.4E-01	%				RADCALC	02/06/18 09:15 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.45E+8	L				FIELD	12/31/17 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 - Grants
PROJECT: Grants
REPORT DATE: February 7, 2018

SAMPLE ID: HMC-3_20171231

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
C18010257-004	^{nat}U	3.0E-16	N/A	N/A	1E-16	9E-14	3.4E-01
Fourth Quarter 2017	^{230}Th	2E-17	4E-18	4E-18	1E-16	3E-14	8E-02
Air Volume in mLs	^{226}Ra	4E-17	9E-18	7E-18	1E-16	9E-13	4E-03
1.45E+11							

+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: Grants
Lab ID: C18010257-005
Client Sample ID: HMC-4_20171231

Report Date: 02/07/18
Collection Date: 12/31/17
Date Received: 01/09/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	1.5E-09	mg/L		4.8E-14		SW6020	01/23/18 16:16 / eli-h
Uranium, Activity	1.0E-15	uCi/mL		3.2E-20		SW6020	01/23/18 16:16 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	0.11	mg/filter		0.10		SW6020	01/23/18 16:16 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	4.3E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 precision (±)	1.0E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 MDC	7.1E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Thorium 230	2.9E-08	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 precision (±)	5.5E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 MDC	4.4E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	6.3	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 precision (±)	1.5	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230	4.2	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 precision (±)	0.80	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 MDC	0.63	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Uranium, Activity	147	pCi/Filter		0.20		RADCALC	02/06/18 09:11 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	5.0E-03	%				RADCALC	02/06/18 09:15 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/06/18 09:15 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, % of EFF	1.0E-01	%				RADCALC	02/06/18 09:15 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, % of EFF	1.1E+00	%				RADCALC	02/06/18 09:15 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.45E+8	L				FIELD	12/31/17 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 - Grants
PROJECT: Grants
REPORT DATE: February 7, 2018

SAMPLE ID: HMC-4_20171231

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
C18010257-005	^{nat}U	1.0E-15	N/A	N/A	1E-16	9E-14	1.1E+00
Fourth Quarter 2017	^{230}Th	3E-17	6E-18	4E-18	1E-16	3E-14	1E-01
Air Volume in mLs	^{226}Ra	4E-17	1E-17	7E-18	1E-16	9E-13	5E-03
1.45E+11							

+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: Grants
Lab ID: C18010257-006
Client Sample ID: HMC-5_20171231

Report Date: 02/07/18
Collection Date: 12/31/17
Date Received: 01/09/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	2.9E-09	mg/L		4.8E-14		SW6020	01/23/18 16:18 / eli-h
Uranium, Activity	2.0E-15	uCi/mL		3.2E-20		SW6020	01/23/18 16:18 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	0.12	mg/filter		0.10		SW6020	01/23/18 16:18 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	5.3E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 precision (±)	1.2E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 MDC	6.8E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Thorium 230	3.4E-08	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 precision (±)	6.4E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 MDC	2.8E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	7.6	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 precision (±)	1.8	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 MDC	0.99	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230	4.9	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 precision (±)	0.93	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 MDC	0.41	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Uranium, Activity	283	pCi/Filter		0.20		RADCALC	02/06/18 09:11 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	6.0E-03	%				RADCALC	02/06/18 09:15 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/06/18 09:15 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, % of EFF	1.1E-01	%				RADCALC	02/06/18 09:15 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, % of EFF	2.2E+00	%				RADCALC	02/06/18 09:15 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.45E+8	L				FIELD	12/31/17 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 - Grants
PROJECT: Grants
REPORT DATE: February 7, 2018

SAMPLE ID: HMC-5_20171231

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
C18010257-006	^{nat}U	2.0E-15	N/A	N/A	1E-16	9E-14	2.2E+00
Fourth Quarter 2017	^{230}Th	3E-17	6E-18	3E-18	1E-16	3E-14	1E-01
Air Volume in mLs	^{226}Ra	5E-17	1E-17	7E-18	1E-16	9E-13	6E-03
1.45E+11							

+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: Grants
Lab ID: C18010257-007
Client Sample ID: HMC-6_20171231

Report Date: 02/07/18
Collection Date: 12/31/17
Date Received: 01/09/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	3.8E-10	mg/L		4.7E-14		SW6020	01/23/18 16:20 / eli-h
Uranium, Activity	2.6E-16	uCi/mL		3.2E-20		SW6020	01/23/18 16:20 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	0.10	mg/filter		0.10		SW6020	01/23/18 16:20 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	6.0E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 precision (±)	1.3E-17	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 MDC	7.2E-18	uCi/mL				E903.0	01/30/18 13:32 / arh
Thorium 230	4.7E-08	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 precision (±)	9.0E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 MDC	5.7E-09	pCi/L				E908.0	01/30/18 08:16 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	8.8	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 precision (±)	1.9	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 MDC	1.0	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230	6.9	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 precision (±)	1.3	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 MDC	0.83	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Uranium, Activity	37.9	pCi/Filter		0.20		RADCALC	02/06/18 09:11 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	7.0E-03	%				RADCALC	02/06/18 09:15 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/06/18 09:15 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, % of EFF	1.6E-01	%				RADCALC	02/06/18 09:15 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, % of EFF	2.9E-01	%				RADCALC	02/06/18 09:15 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.46E+8	L				FIELD	12/31/17 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 - Grants
PROJECT: Grants
REPORT DATE: February 7, 2018

SAMPLE ID: HMC-6_20171231

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
C18010257-007	^{nat}U	3E-16	N/A	N/A	1E-16	9E-14	3E-01
Fourth Quarter 2017	^{230}Th	5E-17	9E-18	6E-18	1E-16	3E-14	2E-01
Air Volume in mLs	^{226}Ra	6E-17	1E-17	7E-18	1E-16	9E-13	7E-03
1.46E+11							

+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: Grants
Lab ID: C18010257-008
Client Sample ID: HMC-7_20171231

Report Date: 02/07/18
Collection Date: 12/31/17
Date Received: 01/09/18
Matrix: Filter

Analyses	Result	Units	Qual	RL	MCL/ QCL	Method	Analysis Date / By
METALS, IN AIR							
Uranium	0.00059	mg/L		6.9E-06		SW6020	01/23/18 16:22 / eli-h
Uranium, Activity	4.0E-10	uCi/mL		4.7E-12		SW6020	01/23/18 16:22 / eli-h
METALS, TOTAL - EPA SW846							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/23/18 16:22 / eli-h
RADIONUCLIDES - IN AIR							
Radium 226	1.1E-09	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 precision (±)	6.3E-10	uCi/mL				E903.0	01/30/18 13:32 / arh
Radium 226 MDC	1.1E-09	uCi/mL				E903.0	01/30/18 13:32 / arh
Thorium 230	0.97	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 precision (±)	0.45	pCi/L				E908.0	01/30/18 08:16 / cnh
Thorium 230 MDC	0.57	pCi/L				E908.0	01/30/18 08:16 / cnh
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	1.1	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 precision (±)	0.60	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Radium 226 MDC	1.1	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230	0.92	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 precision (±)	0.43	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Thorium 230 MDC	0.55	pCi/Filter				RADCALC	02/06/18 09:11 / sec
Uranium, Activity	0.38	pCi/Filter		0.20		RADCALC	02/06/18 09:11 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	1.3E+05	%				RADCALC	02/06/18 09:15 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/06/18 09:15 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, % of EFF	3.2E+06	%				RADCALC	02/06/18 09:15 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, % of EFF	4.5E+05	%				RADCALC	02/06/18 09:15 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/06/18 09:15 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/06/18 09:15 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1	L				FIELD	12/31/17 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 - Grants
PROJECT: Grants
REPORT DATE: February 7, 2018

SAMPLE ID: HMC-7_20171231

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
C18010257-008	^{nat}U	3E-18	N/A	N/A	1E-16	9E-14	3E-03
Fourth Quarter 2017	^{230}Th	6E-18	3E-18	4E-18	1E-16	3E-14	2E-02
Air Volume in mLs	^{226}Ra	7E-18	4E-18	7E-18	1E-16	9E-13	8E-04
1.45E+11							

Air Volumes on this page based on average of quarterly set; accompanying standard report uses a 1 L default volume.

+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

QA/QC Summary Report

Prepared by Helena, MT Branch

Client: Homestake Mining Co
Project: Grants

Report Date: 02/02/18
Work Order: C18010257

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS205-H_180123C	
Lab ID: ICV	Initial Calibration Verification Standard								01/23/18 14:18
Uranium	0.0571	mg/L	0.00030	95	90	110			
Vanadium	0.0582	mg/L	0.0010	97	90	110			
Method: SW6020									Batch: 40316
Lab ID: MB-50994	Method Blank				Run: ICPMS205-H_180123C				01/23/18 16:03
Uranium	2E-05	mg/L	1E-06						
Lab ID: C18010257-001ADIL	Serial Dilution				Run: ICPMS205-H_180123C				01/23/18 16:07
Uranium	2.42E-10	mg/L	1.5E-10		0	0	2.2	20	
Lab ID: LFB-50994	Laboratory Fortified Blank				Run: ICPMS205-H_180123C				01/23/18 16:24
Uranium	0.216	mg/L	6.9E-06	91	80	120			
Lab ID: LCS2-50994	Laboratory Control Sample				Run: ICPMS205-H_180123C				01/23/18 16:26
Uranium	0.0918	mg/L	1.4E-06	87	70	130			
Lab ID: C18010257-001AMS	Sample Matrix Spike				Run: ICPMS205-H_180123C				01/23/18 16:28
Uranium	1.67E-09	mg/L	1.5E-10	95	75	125			
Method: SW6020									Batch: 40317
Lab ID: MB-50994	Method Blank				Run: ICPMS205-H_180123C				01/23/18 16:03
Vanadium	ND	mg/filter	7E-05						
Lab ID: LFB-50994	Laboratory Fortified Blank				Run: ICPMS205-H_180123C				01/23/18 16:24
Vanadium	0.22	mg/filter	0.10	95	80	120			
Lab ID: LCS2-50994	Laboratory Control Sample				Run: ICPMS205-H_180123C				01/23/18 16:26
Vanadium	0.093	mg/filter	0.10	89	70	130			
Lab ID: C18010257-001AMS	Sample Matrix Spike				Run: ICPMS205-H_180123C				01/23/18 16:28
Vanadium	0.31	mg/filter	0.10	96	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Report Date: 02/08/18
Project: Grants
Work Order: C18010257

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: 50994
Lab ID: LCS-50994		Laboratory Control Sample				Run: G542M_180123A				01/30/18 13:32
Radium 226		97.0	pCi/L		103	80	120			
Lab ID: MB-50994	3	Method Blank				Run: G542M_180123A				01/30/18 13:32
Radium 226		0.4	pCi/L							
Radium 226 precision (±)		0.2	pCi/L							
Radium 226 MDC		0.2	pCi/L							
Lab ID: C18010257-001AMS		Sample Matrix Spike				Run: G542M_180123A				01/30/18 13:32
Radium 226		5.86E-07	pCi/L		81	70	130			
Lab ID: C18010257-001AMSD		Sample Matrix Spike Duplicate				Run: G542M_180123A				01/30/18 13:32
Radium 226		7.06E-07	pCi/L		99	70	130	19	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants

Report Date: 02/08/18
Work Order: C18010257

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0										Batch: 50994
Lab ID: LCS-50994		Laboratory Control Sample				Run: EGG-ORTEC_180123A				01/30/18 08:16
Thorium 230		53.9	pCi/L		113	80	120			
Lab ID: C18010257-004AMS		Sample Matrix Spike				Run: EGG-ORTEC_180123A				01/30/18 08:16
Thorium 230		1.42E-06	pCi/L		107	70	130			
Lab ID: C18010257-004AMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_180123A				01/30/18 08:16
Thorium 230		1.43E-06	pCi/L		108	70	130	1.0	20	
Lab ID: MB-50994	3	Method Blank				Run: EGG-ORTEC_180123A				01/30/18 08:16
Thorium 230		0.8	pCi/L							
Thorium 230 precision (±)		0.3	pCi/L							
Thorium 230 MDC		0.2	pCi/L							

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

Work Order Receipt Checklist

Homestake Mining Co

C18010257

Login completed by: Dorian Quis
Reviewed by: Kasey Vidick
Reviewed Date: 1/11/2018

Date Received: 1/9/2018
Received by: kak
Carrier name: NDA

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

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 Company	Project Name, PWS, Permit, Etc.: GRANTS	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 98 Grants NM, 87020	Contact Name: Phone/Fax: Kyle Martinez 1-505-287-4456 ext. 29	Email:	Sampler: (Please Print)
Invoice Address: SAME	Invoice Contact & Phone: TRK 128223588455210951	Purchase Order:	Quote/Bottle Order:

Special Report/Formats:

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

Standard Turnaround (TAT) ➡ R U S H

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

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

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Total Uranium	Total RA 226	Total TH 230	Total Vanadium	SEE ATTACHED	Comments
1	HMC-1	4th	Q		X	X	X	X		See attached
2	HMC-1A	2017			X	X	X	X		Air Volumes.
3	HMC-2	Composite			X	X	X	X		
4	HMC-3				X	X	X	X		C18010257
5	HMC-4				X	X	X	X		
6	HMC-5				X	X	X	X		
7	HMC-6				X	X	X	X		
8	HMC-7				X	X	X	X		
9										
10										

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by (print): Kyle Martinez	Date/Time: 1-8-18	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: K Kaver 1/9/18 2:02 Signature: Kristina Kraver

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.

2017 4th Quarter Sampling Volumes

[redacted]							
1	1A	2	3	4	5	6	7
1.47E+11	1.42E+11	1.45E+11	1.45E+11	1.45E+11	1.45E+11	1.46E+11	n/a

NOTE: If end sampler flow is

Attachment 2

Radon Gas Monitoring Results

Attachment 2 - Radon Gas Monitoring Results

Track-Etch Passive Survey

Location	Monitoring Period	Rn Concentration (µCi/ml)	Uncertainty - 2 S.D. (µCi/ml)	% EC* (%)	LLD (µCi/ml)
HMC #1(average) N Outer Perimeter	7/5/17 - 01/09/18	8.3E-10	1.9E-10	8.3	3.2E-10
HMC #1-A (average) N Outer Perimeter	7/5/17 - 01/09/18	6.8E-10	1.8E-10	6.8	3.2E-10
HMC #2 (average) NE Outer Perimeter	7/5/17 - 01/09/18	7.7E-10	1.9E-10	7.7	3.2E-10
HMC #3 (average) E Outer Perimeter	7/5/17 - 01/09/18	6.6E-10	1.7E-10	6.6	3.2E-10
HMC #4 (average) S Outer Perimeter	7/5/17 - 01/09/18	7.9E-10	1.9E-10	7.9	3.2E-10
HMC #5 (average) N of Nearest Residence	7/5/17 - 01/09/18	7.4E-10	1.8E-10	7.4	3.2E-10
HMC #6 (average) W of Outer Perimeter	7/5/17 - 01/09/18	6.6E-10	1.7E-10	6.6	3.2E-10
HMC #7 (average) S Boundary	7/5/17 - 01/09/18	7.2E-10	1.8E-10	7.2	3.2E-10
HMC #16 (average) Background	7/5/17 - 01/09/18	3.3E-10	1.4E-10	3.3	3.2E-10

*EC of 1E-8 µCi/ml for radon-222 with daughters removed as given in 10 CFR20, Appendix B, Table 2

Attachment 3
2017 Radon Flux Monitoring Report

Radon Flux Measurements for the HMC Tailings Piles

December 2017

Prepare for:

Homestake Mining Company of California
P. O. Box 98
Grants, New Mexico 87020

Prepared by:

Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM 87113

Radon Flux Measurements for the HMC Tailings Piles

1. Introduction

Reclamation activities associated with the Large Tailings Pile (LTP) at the Grants Uranium Mill, owned by Homestake Mining Company of California (HMC), were completed in phases. The pile was contoured in 1994 at which time an interim cover was placed on the top of the pile to control the dispersal of tailings by wind and water erosion. Radon barriers were applied to the north, west, and south side slopes, with completion of the work in 1994. Radon flux measurements were made on these side slopes on October 24-25, 1994. Completion of the placement of radon barrier on the east side slope and aprons occurred just prior to making the radon flux measurements on July 24-25, 1995. An evaporation pond was constructed on the Small Tailings Pile (STP) and an interim cover placed on the remainder of the pile. Radon flux measurements were made on the top of the LTP and the interim cover of the Small Tailings Pile (STP) on August 18-19, 1995.

As part of a request for a license amendment extending the milestones in the NRC License, radon flux measurements were repeated in the areas with interim cover on October 21-22, 2003. This license amendment required HMC to repeat these measurements annually.

In 2017, the U.S. Nuclear Regulatory Commission (NRC) notified HMC (NRC, 2017) that the method historically used for calculating the average radon-222 flux release from the LTP was inconsistent with EPA's Method 115 specifications and could no longer include area-weighted averaging of the radon flux from the LTP's rock-covered side slopes (65% of the LTP surface area, with a radon flux of 3.27 pCi/m^2s, as measured in 1995 prior to placement of a final cap of rock armor for erosion control). With respect to the STP, the previous method for calculating radon flux from STP is consistent with Method 115 specifications on area-weighted averaging of various regions of the pile because the STP is considered an operational tailings pile under NRC definitions.[1]

Annual flux measurements for calendar year 2017 were made in two separate deployments, consisting of 100 canisters per deployment. The first 100 canister measurements were made on the LTP on September 21-22, 2017. The second 100 canister measurements were made on the STP on October 12-13, 2017. These deployments were conducted in accordance with the methods proposed in HMC's response to the NRC's recent notice of violation (NOV) regarding an average radon flux rate from the LTP that exceeded the 20 pCi/m^2s standard given in 10 CFR 40, Appendix A (ERG, 2017 and NRC, 2017). The deployment locations, with location identification (ID) numbers are shown in Figure 1-1. The flux measurement locations design was based on a triangular-grid pattern with randomized start point as generated using the U.S. Department of Energy's statistical design software package Visual Sampling Plan (VSP, 2016).

2. Radon Flux Results

---

[1]As indicated in 10 CFR 40, Appendix A, "*Operation* means that a uranium or thorium mill tailings pile or impoundment is being used for the continued placement of byproduct material or is in standby status for such placement. A pile or impoundment is in operation from the day that byproduct material is first placed in the pile or impoundment until the day final closure begins." Since 11e.(2) byproduct material will continue to be disposed in the STP until groundwater restoration is complete, and because the final closure process for the STP has not been initiated, this pile is considered an operational tailings impoundment.

The results of the 200 flux measurements, consisting of 100 canisters on top of the LTP and 100 across all accessible portions of the STP are presented in Figure 2-1, and in tabular form in Appendix A. Per HMC's response to the NRC's radon flux NOV for the LTP (ERG, 2017), canisters were placed on the top of the pile only. The average measured flux from the top of the LTP for calendar year 2017 is 46.6 pCi/m²s, which exceeds the 20 pCi/m²s standard given in 10 CFR 40, Appendix A. This flux compares to an average measured flux on the top of the LTP in 1995 of 42.1 pCi/m²s. Since the STP is considered an operational impoundment, canisters were placed on the side slopes and southern portion of the pile, and area-weighted averaging was used to calculate the average rate of radon emissions from the pile (the evaporation pond area [28.7 acres, or 116,204 m²] was assigned a value of zero radon flux for the calculation, and the side slopes and southern portion area [26.0 acres, or 105,272 m²] were assigned a value of 7.3 pCi/m²s, based on the guidance specified in Method 115). Using Equation 2-1 below, the overall average measured radon flux from the STP for calendar year 2017 is 3.5 pCi/m²s, which meets the flux standard specified in 10 CFR 40 Appendix A.

Equation 2-1:

$$Flux_{STP} = \frac{(0.0\,pCi/m^2sec * 116{,}204\,m^2) + (7.3\,pCi/m^2sec * 105{,}272\,m^2)}{(116{,}204\,m^2 + 105{,}272\,m^2)} = 3.5\,pCi/m^2sec$$

The assumed radon flux for locations that included duplicate sample analysis (same canister analyzed twice) was based on the average of the duplicate analysis results.

Figure 1-1 - Measurement Locations

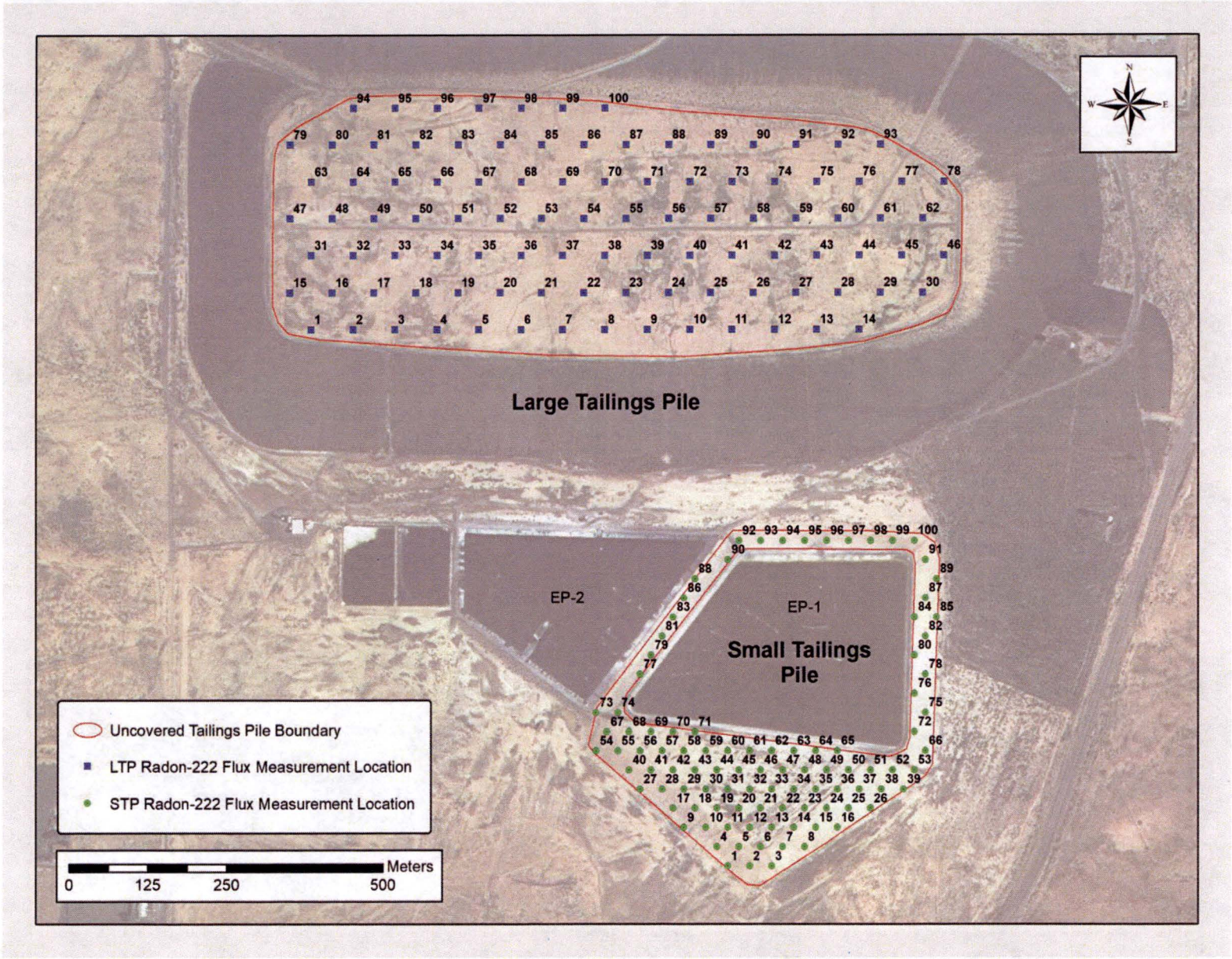
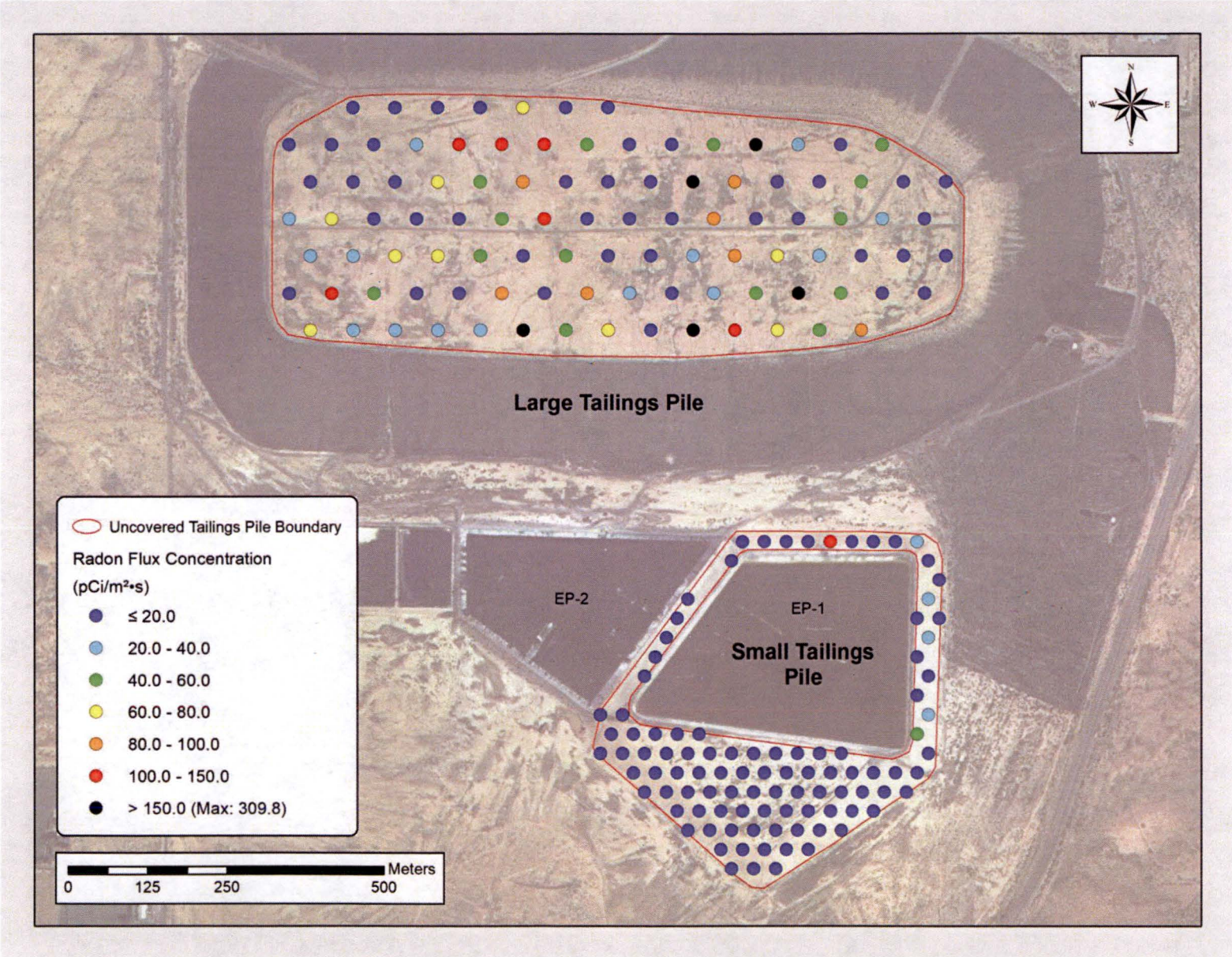


Figure 2-1 Radon Flux Measurement Results



3. Quality Assurance

The data quality requirements specified in EPA Method 115 were met for the measurements. There was no rainfall in the 24 hours prior to or during deployment and ambient temperatures did not fall below 35 degrees Fahrenheit during deployment.

Two independent sources were used to calibrate the spectrometer, using identical geometry conditions to that of the canisters. Good agreement between calibration factors was obtained as shown in Table 3.1. The relative percent difference (RPD) of the average efficiencies for the two sources was 6.8 percent, less than the 10% accuracy required by EPA Method 115.

Twenty-two canisters were reanalyzed for laboratory duplicate analysis comparisons. The second analysis is indicated in the Appendix A results table with a "D" shown in the Lab Type column. The comparison results are shown in Table 3.2 and are consistent with typical gamma spectroscopy results. Twenty-one (21) of the 22 canisters analyzed for duplicate measurement comparisons met the EPA Method 115 criteria requiring a relative percent difference (RPD) no greater than 10% for flux rates above 1.0 pCi/m^2s. The one canister which did not meet this criterion had an RPD of 10.4%. While no explanation for this slight exceedance can be identified, the fact that only one RPD out of 22 duplicate analyses slightly exceeded this measurement performance criterion suggests that overall analytical precision was acceptable, and the one slight exceedance is unlikely to have significant implications with respect to the reliability of the calculated average radon flux. Including the one exceedance, the average RPD for all 22 canisters is 2.2 percent.

Two trip blanks for each 100-canister deployment (4 total) were included in the batch, and were counted without exposing them to radon. The measured fluxes ranged from -0.07 and 0.05 pCi/m^2s are near the expected 0 pCi/m^2s value. These results indicate that the canisters had not been exposed while sealed in the plastic bags, confirming the integrity of the bags during both deployments.

References

Environmental Restoration Group, Inc. (ERG). 2017. Proposal to address radon flux NOV for the LTP (NRC Docket No. 040-08903/2016-001 License No. SUA-1471). In: Reply to Notice of Violation, Docket No. 040-08903/2016-001, License No. SUA-1471 [Submitted to NRC by Homestake Mining Company of California (HMC) on September 13, 2017].

U.S. Nuclear Regulatory Commission (NRC). 2017. NRC Inspection Report 040-08903/2016-001 and Notice of Violation. April 20, 2017.

VSP Development Team (VSP). 2016. Visual Sample Plan: A Tool for Design and Analysis of Environmental Sampling. Version 7.7. Pacific Northwest National Laboratory. Richland, WA. http://vsp.pnnl.gov

Table 3.1 Quality Assurance Results of Standard Analysis

Identifier	Date	Count Duration (sec)	Activity (nCi)	Total Counts	Average BKG Counts	Efficiency	Error
STD #3	9/22/2017	1200	78.83	40358	3420.25	0.0106	5.98E-05
STD #1	9/22/2017	1200	80	44172	3420.25	0.0115	6.14E-05
STD #3	9/22/2017	1200	78.83	40218	3420.25	0.0105	5.97E-05
STD #1	9/22/2017	1200	80	43784	3420.25	0.0114	6.12E-05
STD #1	9/23/2017	1200	80	40143	3420.25	0.0103	5.88E-05
STD #3	9/23/2017	1200	78.83	37799	3420.25	0.0098	5.80E-05
STD #3	9/23/2017	1200	78.83	41029	3420.25	0.0107	6.02E-05
STD #1	9/23/2017	1200	80	43409	3420.25	0.0113	6.09E-05
STD #1	10/15/2017	1200	80	42778	3411.875	0.0111	6.05E-05
STD #1	10/15/2017	1200	80	42676	3411.875	0.0111	6.04E-05
STD #3	10/15/2017	1200	78.83	39934	3411.875	0.0104	5.95E-05
STD #3	10/16/2017	1200	78.83	39395	3411.875	0.0103	5.91E-05
STD #1	10/16/2017	1200	80	42834	3411.875	0.0111	6.05E-05
STD #1	10/13/2017	1200	80	45445	3411.875	0.0118	6.22E-05
STD #3	10/13/2017	1200	78.83	42325	3411.875	0.0111	6.11E-05
STD #3	10/13/2017	1200	78.83	41683	3411.875	0.0109	6.07E-05
STD #1	10/13/2017	1200	80	46024	3411.875	0.0120	6.26E-05
STD #3	10/14/2017	1200	78.83	39984	3411.875	0.0104	5.95E-05
STD #1	10/14/2017	1200	80	43113	3411.875	0.0112	6.07E-05
STD #3	10/14/2017	1200	78.83	41366	3411.875	0.0108	6.05E-05
STD #1	10/14/2017	1200	80	43353	3411.875	0.0112	6.09E-05
STD #3	10/15/2017	1200	78.83	39293	3411.875	0.0103	5.90E-05
STD #1	10/16/2017	1200	80	42243	3411.875	0.0109	6.02E-05
STD #3	10/16/2017	1200	78.83	39127	3411.875	0.0102	5.89E-05
Mean of STD #1						0.011242	
Mean of STD #3						0.0105	
Relative Percent Difference of Standards						6.8%	

Note:

[1] Efficiency unit is net counts-per-second per source activity in becquerels.

[2] SD: standard deviation of efficiency.

Table 3.2 Duplicate Analysis Comparison

Pile	Canister	Analysis 1 (pCi/m^2s)	Analysis 2 (pCi/m^2s)	Average Flux (pCi/m^2s)	RPD (%)
LTP	431	23.8	23.7	23.7	0.5
LTP	459	58.3	56.6	57.5	2.9
LTP	458	309.5	310.1	309.8	0.2
LTP	474	51.9	51.1	51.5	1.7
LTP	491	48.4	48.3	48.3	0.3
LTP	429	41.3	40.8	41.0	1.4
LTP	475	7.4	7.2	7.3	2.5
LTP	426	190.7	194.1	192.4	1.7
LTP	435	14.7	14.6	14.6	0.9
LTP	470	79.8	88.6	84.2	10.4
LTP	49	4.0	4.2	4.1	4.1
STP	417	9.7	9.8	9.8	0.7
STP	480	9.1	9.0	9.1	0.6
STP	425	44.3	43.7	44.0	1.4
STP	94	6.8	6.4	6.6	6.0
STP	483	12.1	11.9	12.0	1.8
STP	469	10.0	10.2	10.1	2.2
STP	2	3.9	4.0	4.0	2.1
STP	420	2.8	2.9	2.8	4.4
STP	443	3.4	3.4	3.4	1.8
STP	453	17.6	17.7	17.6	0.4
STP	21	132.4	134.1	133.3	1.3

Appendix A

Radon Flux Measurement Results

Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM, 87113

Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Flux (pCi/m²s) Error 1.00 S.D.	Remarks
1		42	09/21/2017 11:39	09/22/2017 12:42	09/22/2017 19:48	52	3420.25		5059	0.0108	60.12	0.7	0.88	OK
2		431	09/21/2017 11:41	09/22/2017 12:44	09/22/2017 20:33	126	3420.25	D	5043	0.0108	23.8	0.5	0.37	OK
2		431	09/21/2017 11:41	09/22/2017 12:44	09/22/2017 20:14	1112	3420.25		44360	0.0108	23.68	0.2	0.13	OK
3		406	09/21/2017 11:49	09/22/2017 12:53	09/22/2017 20:37	472	3420.25		17865	0.0108	22.39	0.2	0.19	OK
4		440	09/21/2017 11:51	09/22/2017 12:54	09/22/2017 19:52	229	3420.25		13975	0.0108	37.01	0.3	0.34	OK
5		419	09/21/2017 12:05	09/22/2017 13:02	09/22/2017 20:58	180	3420.25		9909	0.0108	33.57	0.4	0.36	OK
6		461	09/21/2017 12:07	09/22/2017 13:03	09/22/2017 21:01	16	3420.25		5253	0.0108	209.45	1.4	2.93	OK
7		401	09/21/2017 12:17	09/22/2017 13:10	09/22/2017 21:13	189	3420.25		14940	0.0108	49.17	0.4	0.42	OK
8		478	09/21/2017 12:19	09/22/2017 13:11	09/22/2017 21:05	54	3420.25		6393	0.0108	74.5	0.7	0.97	OK
9		472	09/21/2017 12:29	09/22/2017 13:18	09/23/2017 12:20	332	3420.25		5051	0.0108	8.96	0.3	0.17	OK
10		458	09/21/2017 12:31	09/22/2017 13:19	09/23/2017 12:19	12	3420.25	D	5162	0.0108	309.55	1.8	4.35	OK
10		458	09/21/2017 12:31	09/22/2017 13:19	09/23/2017 12:18	12	3420.25		5171	0.0108	310.05	1.8	4.35	OK
11		483	09/21/2017 12:41	09/22/2017 13:27	09/23/2017 13:08	26	3420.25		5131	0.0108	141.8	1.2	2.02	OK
12		427	09/21/2017 12:43	09/22/2017 13:29	09/23/2017 13:15	61	3420.25		5686	0.0108	65.92	0.8	0.92	OK
13		476	09/21/2017 12:53	09/22/2017 13:40	09/23/2017 13:20	93	3420.25		6099	0.0108	45.7	0.6	0.62	OK
14		465	09/21/2017 12:55	09/22/2017 13:42	09/23/2017 13:14	44	3420.25		6135	0.0108	99.4	0.9	1.31	OK
15		430	09/21/2017 11:37	09/22/2017 12:39	09/22/2017 19:33	866	3420.25		8370	0.0108	4.34	0.2	0.08	OK
16		1	09/21/2017 11:43	09/22/2017 12:46	09/22/2017 19:32	30	3420.25		5129	0.0108	106.76	1	1.53	OK
17		411	09/21/2017 11:47	09/22/2017 12:51	09/22/2017 20:36	54	3420.25		5106	0.0108	58.64	0.7	0.86	OK
18		439	09/21/2017 11:53	09/22/2017 12:55	09/22/2017 19:57	947	3420.25		5376	0.0108	1.8	0.2	0.06	OK
19		254	09/21/2017 12:03	09/22/2017 13:00	09/22/2017 19:15	678	3420.25		11431	0.0108	8.9	0.2	0.11	OK
20		455	09/21/2017 12:09	09/22/2017 13:04	09/22/2017 20:54	87	3420.25		13569	0.0108	98.5	0.6	0.87	OK

Types: D-Duplicate, TB-Trip Blank

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Albuquerque, NM, 87113

Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Flux (pCi/m²s) Error 1.00 S.D.	Remarks
21		456	09/21/2017 12:15	09/22/2017 13:09	09/22/2017 21:55	246	3420.25		5475	0.0108	12.58	0.3	0.21	OK
22		481	09/21/2017 12:21	09/22/2017 13:13	09/22/2017 21:02	44	3420.25		5786	0.0108	82.9	0.8	1.13	OK
23		446	09/21/2017 12:27	09/22/2017 13:17	09/23/2017 12:26	1200	3420.25		50904	0.0108	28.7	0.2	0.14	OK
24		5	09/21/2017 12:33	09/22/2017 13:21	09/22/2017 21:35	1200	3420.25		4146	0.0108	0.39	0.1	0.05	OK
25		437	09/21/2017 12:39	09/22/2017 13:25	09/23/2017 13:09	255	3420.25		13774	0.0108	37.32	0.4	0.34	OK
26		460	09/21/2017 12:45	09/22/2017 13:31	09/23/2017 13:00	211	3420.25		17827	0.0108	59.44	0.4	0.47	OK
27		312	09/21/2017 12:51	09/22/2017 13:38	09/23/2017 13:25	24	3420.25		5254	0.0108	157.54	1.3	2.22	OK
28		474	09/21/2017 12:57	09/22/2017 13:44	09/23/2017 13:19	72	3420.25	D	5341	0.0108	51.93	0.7	0.75	OK
28		474	09/21/2017 12:57	09/22/2017 13:44	09/23/2017 13:17	69	3420.25		5037	0.0108	51.06	0.7	0.76	OK
29		441	09/21/2017 13:02	09/22/2017 13:54	09/23/2017 14:50	1200	3420.25		5654	0.0108	1.37	0.2	0.06	OK
30		415	09/21/2017 13:03	09/22/2017 13:56	09/23/2017 10:10	1200	3420.25		3865	0.0108	0.26	0.2	0.05	OK
31		443	09/21/2017 11:35	09/22/2017 12:37	09/22/2017 19:27	209	3420.25		12264	0.0108	35.5	0.4	0.35	OK
32		448	09/21/2017 11:45	09/22/2017 12:49	09/22/2017 20:46	165	3420.25		9920	0.0108	36.68	0.4	0.4	OK
33		482	09/21/2017 11:55	09/22/2017 12:57	09/22/2017 19:50	52	3420.25		6374	0.0108	76.15	0.7	0.99	OK
34		452	09/21/2017 11:57	09/22/2017 12:59	09/22/2017 20:56	45	3420.25		5162	0.0108	71.72	0.8	1.04	OK
35		447	09/21/2017 12:11	09/22/2017 13:05	09/22/2017 21:03	73	3420.25		5364	0.0108	45.51	0.6	0.66	OK
36		420	09/21/2017 12:13	09/22/2017 13:07	09/22/2017 21:10	1200	3420.25		3911	0.0108	0.26	0.1	0.05	OK
37		459	09/21/2017 12:23	09/22/2017 13:14	09/22/2017 21:07	83	3420.25		7523	0.0108	56.64	0.6	0.68	OK
37		459	09/21/2017 12:23	09/22/2017 13:14	09/22/2017 21:08	78	3420.25	D	7267	0.0108	58.27	0.6	0.72	OK
38		424	09/21/2017 12:25	09/22/2017 13:16	09/23/2017 12:47	203	3420.25		5031	0.0108	15.92	0.4	0.27	OK
39		421	09/21/2017 12:35	09/22/2017 13:22	09/23/2017 12:52	412	3420.25		5223	0.0108	7.15	0.3	0.14	OK
40		494	09/21/2017 12:38	09/22/2017 13:24	09/23/2017 13:05	126	3420.25		5024	0.0108	26.99	0.5	0.42	OK

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Albuquerque, NM, 87113

Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Flux (pCi/m²s) Error 1.00 S.D.	Remarks
41		423	09/21/2017 12:47	09/22/2017 13:33	09/23/2017 13:04	47	3420.25		5631	0.0108	85.16	0.9	1.18	OK
42		21	09/21/2017 12:49	09/22/2017 13:36	09/23/2017 10:51	116	3420.25		10663	0.0108	63.72	0.5	0.65	OK
43		480	09/21/2017 12:59	09/22/2017 13:47	09/23/2017 13:22	149	3420.25		7778	0.0108	35.91	0.5	0.44	OK
44		492	09/21/2017 13:01	09/22/2017 13:51	09/23/2017 14:37	753	3420.25		8314	0.0108	6.01	0.2	0.1	OK
45		467	09/21/2017 13:05	09/22/2017 13:59	09/23/2017 10:31	1200	3420.25		3589	0.0108	0.1	0.2	0.05	OK
46		453	09/21/2017 13:07	09/22/2017 14:03	09/23/2017 09:48	1200	3420.25		3590	0.0108	0.1	0.2	0.05	OK
47		498	09/21/2017 14:50	09/22/2017 15:46	09/22/2017 22:25	86	3420.25		5057	0.0108	35.65	0.6	0.54	OK
48		104	09/21/2017 14:34	09/22/2017 15:33	09/22/2017 22:30	48	3420.25		5122	0.0108	66.21	0.8	0.96	OK
49		462	09/21/2017 14:32	09/22/2017 15:31	09/22/2017 22:19	183	3420.25		5023	0.0108	15.67	0.4	0.26	OK
50		499	09/21/2017 14:18	09/22/2017 15:21	09/23/2017 07:23	956	3420.25		5157	0.0108	1.73	0.2	0.06	OK
51		488	09/21/2017 14:17	09/22/2017 15:19	09/23/2017 08:34	200	3420.25		5046	0.0108	15.39	0.4	0.26	OK
52		433	09/21/2017 14:05	09/22/2017 15:08	09/22/2017 22:03	76	3420.25		5031	0.0108	40.28	0.6	0.61	OK
53		425	09/21/2017 14:03	09/22/2017 15:07	09/23/2017 13:51	50	3420.25		9571	0.0108	135.01	0.8	1.41	OK
54		428	09/21/2017 13:53	09/22/2017 14:57	09/23/2017 09:17	768	3420.25		5727	0.0108	3.19	0.2	0.08	OK
55		410	09/21/2017 13:51	09/22/2017 14:55	09/23/2017 16:39	489	3420.25		7970	0.0108	9.85	0.3	0.14	OK
56		68	09/21/2017 13:42	09/22/2017 14:45	09/23/2017 14:02	1200	3420.25		5451	0.0108	1.22	0.2	0.06	OK
57		408	09/21/2017 13:41	09/22/2017 14:41	09/23/2017 16:36	159	3420.25		18232	0.0108	82.21	0.5	0.63	OK
58		475	09/21/2017 13:32	09/22/2017 14:29	09/23/2017 16:58	791	3420.25	D	10154	0.0108	7.39	0.2	0.1	OK
58		475	09/21/2017 13:32	09/22/2017 14:29	09/23/2017 16:50	408	3420.25		5143	0.0108	7.21	0.3	0.14	OK
59		412	09/21/2017 13:30	09/22/2017 14:27	09/23/2017 16:10	313	3420.25		6243	0.0108	12.58	0.3	0.2	OK
60		491	09/21/2017 13:17	09/22/2017 14:14	09/23/2017 16:17	159	3420.25	D	10888	0.0108	48.39	0.5	0.49	OK
60		491	09/21/2017 13:17	09/22/2017 14:14	09/23/2017 16:15	79	3420.25		5398	0.0108	48.26	0.7	0.7	OK

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ERG

Radon Flux Measurements

Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM, 87113

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Flux (pCi/m²s) Error 1.00 S.D.	Remarks
61		409	09/21/2017 13:15	09/22/2017 14:12	09/23/2017 15:48	117	3420.25		5010	0.0108	29.37	0.6	0.46	OK
62		422	09/21/2017 13:09	09/22/2017 14:05	09/23/2017 15:15	258	3420.25		6633	0.0108	16.75	0.4	0.24	OK
63		402	09/21/2017 14:47	09/22/2017 15:44	09/22/2017 23:10	681	3420.25		10340	0.0108	7.91	0.2	0.1	OK
64		49	09/21/2017 14:36	09/22/2017 15:34	09/23/2017 08:10	573	3420.25	D	5004	0.0108	4.04	0.2	0.1	OK
64		49	09/21/2017 14:36	09/22/2017 15:34	09/23/2017 08:00	558	3420.25		5016	0.0108	4.21	0.2	0.1	OK
65		493	09/21/2017 14:30	09/22/2017 15:29	09/22/2017 22:27	179	3420.25		5011	0.0108	16.03	0.4	0.26	OK
66		407	09/21/2017 14:19	09/22/2017 15:22	09/23/2017 09:01	44	3420.25		5110	0.0108	78.1	0.9	1.13	OK
67		436	09/21/2017 14:15	09/22/2017 15:17	09/23/2017 09:15	80	3420.25		6172	0.0108	51.38	0.6	0.69	OK
68		470	09/21/2017 14:06	09/22/2017 15:09	09/22/2017 22:22	37	3420.25		5251	0.0108	88.62	0.9	1.26	OK
68		470	09/21/2017 14:06	09/22/2017 15:09	09/22/2017 22:23	40	3420.25	D	5125	0.0108	79.84	0.8	1.15	OK
69		487	09/21/2017 14:01	09/22/2017 15:06	09/23/2017 13:27	487	3420.25		6750	0.0108	7.86	0.3	0.13	OK
70		435	09/21/2017 13:55	09/22/2017 14:59	09/23/2017 09:38	595	3420.25	D	14273	0.0108	14.68	0.2	0.15	OK
70		435	09/21/2017 13:55	09/22/2017 14:59	09/23/2017 09:32	297	3420.25		7078	0.0108	14.56	0.3	0.21	OK
71		417	09/21/2017 13:49	09/22/2017 14:53	09/23/2017 13:55	228	3420.25		5034	0.0108	13.8	0.4	0.24	OK
72		426	09/21/2017 13:43	09/22/2017 14:47	09/23/2017 14:00	21	3420.25		5732	0.0108	194.09	1.3	2.6	OK
72		426	09/21/2017 13:43	09/22/2017 14:47	09/23/2017 14:01	19	3420.25	D	5097	0.0108	190.74	1.4	2.71	OK
73		405	09/21/2017 13:39	09/22/2017 14:39	09/23/2017 16:30	223	3420.25		25838	0.0108	83.06	0.4	0.54	OK
74		256	09/21/2017 13:34	09/22/2017 14:32	09/23/2017 16:23	393	3420.25		7535	0.0108	12.01	0.3	0.17	OK
75		495	09/21/2017 13:28	09/22/2017 14:25	09/23/2017 15:56	434	3420.25		6834	0.0108	9.47	0.3	0.15	OK
76		457	09/21/2017 13:22	09/22/2017 14:16	09/23/2017 16:05	248	3420.25		16985	0.0108	48.4	0.4	0.4	OK
77		445	09/21/2017 13:13	09/22/2017 14:10	09/23/2017 15:50	316	3420.25		6323	0.0108	12.62	0.3	0.2	OK
78		473	09/21/2017 13:11	09/22/2017 14:07	09/23/2017 15:11	173	3420.25		5019	0.0108	19.16	0.5	0.31	OK

Types: D-Duplicate, TB-Trip Blank

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Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Flux (pCi/m²s) Error 1.00 S.D.	Remarks
79		471	09/21/2017 14:52	09/22/2017 15:47	09/23/2017 08:20	274	3420.25		8430	0.0108	19.18	0.3	0.24	OK
80		477	09/21/2017 14:45	09/22/2017 15:42	09/23/2017 08:38	1200	3420.25		5169	0.0108	1	0.2	0.05	OK
81		432	09/21/2017 14:38	09/22/2017 15:36	09/22/2017 22:39	962	3420.25		6070	0.0108	2.21	0.2	0.06	OK
82		416	09/21/2017 14:28	09/22/2017 15:28	09/22/2017 22:15	140	3420.25		5367	0.0108	22.58	0.4	0.35	OK
83		496	09/21/2017 14:22	09/22/2017 15:23	09/23/2017 09:00	25	3420.25		5128	0.0108	139.58	1.2	1.99	OK
84		64	09/21/2017 14:13	09/22/2017 15:15	09/22/2017 22:02	22	3420.25		5092	0.0108	145.28	1.2	2.07	OK
85		485	09/21/2017 14:07	09/22/2017 15:11	09/22/2017 22:00	42	3420.25		7273	0.0108	108.13	0.8	1.3	OK
86		490	09/21/2017 13:59	09/22/2017 15:04	09/23/2017 13:52	134	3420.25		8481	0.0108	43.27	0.5	0.5	OK
87		105	09/21/2017 13:56	09/22/2017 15:01	09/23/2017 09:02	549	3420.25		6111	0.0108	5.72	0.2	0.11	OK
88		468	09/21/2017 13:47	09/22/2017 14:51	09/23/2017 14:23	697	3420.25		5913	0.0108	4.06	0.2	0.09	OK
89		400	09/21/2017 13:45	09/22/2017 14:49	09/23/2017 16:47	116	3420.25		9772	0.0108	59.72	0.6	0.64	OK
90		463	09/21/2017 13:37	09/22/2017 14:37	09/23/2017 16:35	16	3420.25		5754	0.0108	262.38	1.6	3.5	OK
91		4	09/21/2017 13:36	09/22/2017 14:35	09/23/2017 16:20	107	3420.25		5023	0.0108	32.4	0.6	0.5	OK
92		486	09/21/2017 13:27	09/22/2017 14:22	09/23/2017 15:20	182	3420.25		5014	0.0108	18.09	0.4	0.3	OK
93		429	09/21/2017 13:26	09/22/2017 14:18	09/23/2017 15:23	886	3420.25		51669	0.0108	40.75	0.2	0.19	OK
93		429	09/21/2017 13:26	09/22/2017 14:18	09/23/2017 15:46	86	3420.25	D	5074	0.0108	41.34	0.7	0.62	OK
94		449	09/21/2017 14:42	09/22/2017 15:40	09/23/2017 08:27	343	3420.25		8192	0.0108	14.45	0.3	0.19	OK
95		450	09/21/2017 14:40	09/22/2017 15:38	09/22/2017 23:22	547	3420.25		6176	0.0108	5.42	0.2	0.1	OK
96		500	09/21/2017 14:26	09/22/2017 15:27	09/22/2017 22:32	363	3420.25		6572	0.0108	9.73	0.3	0.15	OK
97		479	09/21/2017 14:24	09/22/2017 15:25	09/22/2017 22:56	808	3420.25		12764	0.0108	8.29	0.2	0.1	OK
98		418	09/21/2017 14:11	09/22/2017 15:14	09/22/2017 22:14	42	3420.25		5197	0.0108	76.91	0.8	1.1	OK
99		91	09/21/2017 14:09	09/22/2017 15:13	09/22/2017 22:05	414	3420.25		5768	0.0108	7.04	0.3	0.13	OK

Types: D-Duplicate, TB-Trip Blank

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8809 Washington St. NE, Suite 150
Albuquerque, NM, 87113

Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Flux (pCi/m²s) Error 1.00 S.D.	Remarks
100		75	09/21/2017 13:58	09/22/2017 15:02	09/23/2017 13:36	893	3420.25		5778	0.0108	2.59	0.2	0.07	OK
TB1	TB	489	09/21/2017 12:00	09/22/2017 15:49	09/23/2017 11:15	1200	3420.25		3323	0.0108	-0.05	0.1	0.04	OK
TB2	TB	94	09/21/2017 12:00	09/22/2017 15:51	09/23/2017 10:55	1200	3420.25		3456	0.0108	0.02	0.1	0.04	OK

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Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Flux (pCi/m²s) Error 1.00 S.D.	Remarks
1		409	10/12/2017 10:04	10/13/2017 10:44	10/13/2017 21:24	1200	3411.88		4355	0.0109	0.51	0.1	0.05	OK
2		451	10/12/2017 09:47	10/13/2017 10:43	10/13/2017 21:45	1185	3411.88		6204	0.0109	1.55	0.1	0.05	OK
3		463	10/12/2017 09:45	10/13/2017 10:30	10/13/2017 22:23	976	3411.88		5007	0.0109	1.5	0.2	0.06	OK
4		491	10/12/2017 10:05	10/13/2017 10:57	10/15/2017 20:04	1182	3411.88		5061	0.0109	1.32	0.2	0.07	OK
5		412	10/12/2017 10:03	10/13/2017 10:45	10/13/2017 21:11	666	3411.88		5029	0.0109	3.07	0.2	0.08	OK
6		424	10/12/2017 09:48	10/13/2017 10:42	10/13/2017 20:42	703	3411.88		5095	0.0109	2.84	0.2	0.08	OK
7		256	10/12/2017 09:44	10/13/2017 10:30	10/13/2017 22:40	694	3411.88		5087	0.0109	2.95	0.2	0.08	OK
8		472	10/12/2017 09:28	10/13/2017 10:28	10/13/2017 22:15	475	3411.88		5619	0.0109	5.85	0.2	0.11	OK
9		441	10/12/2017 10:23	10/13/2017 10:58	10/13/2017 19:15	1200	3411.88		4832	0.0109	0.76	0.1	0.05	OK
10		433	10/12/2017 10:22	10/13/2017 10:58	10/13/2017 19:35	1069	3411.88		5022	0.0109	1.2	0.2	0.05	OK
11		486	10/12/2017 10:06	10/13/2017 10:55	10/13/2017 14:34	1006	3411.88		5590	0.0109	1.67	0.2	0.06	OK
12		2	10/12/2017 10:02	10/13/2017 10:46	10/13/2017 19:54	588	3411.88		5349	0.0109	4.03	0.2	0.09	OK
12		2	10/12/2017 10:02	10/13/2017 10:46	10/13/2017 20:06	603	3411.88	D	5400	0.0109	3.94	0.2	0.09	OK
13		402	10/12/2017 09:49	10/13/2017 10:42	10/13/2017 21:06	330	3411.88		6246	0.0109	10.4	0.3	0.17	OK
14		263	10/12/2017 09:43	10/13/2017 10:31	10/14/2017 17:11	918	3411.88		5772	0.0109	2.6	0.2	0.08	OK
15		483	10/12/2017 09:29	10/13/2017 10:25	10/14/2017 17:28	280	3411.88		5207	0.0109	11.88	0.4	0.21	OK
15		483	10/12/2017 09:29	10/13/2017 10:25	10/14/2017 17:33	272	3411.88	D	5132	0.0109	12.09	0.4	0.21	OK
16		94	10/12/2017 09:26	10/13/2017 10:20	10/16/2017 14:14	855	3411.88		7568	0.0109	6.37	0.3	0.12	OK
16		94	10/12/2017 09:26	10/13/2017 10:20	10/16/2017 14:29	752	3411.88	D	6927	0.0109	6.76	0.3	0.13	OK
17		455	10/12/2017 10:36	10/13/2017 11:04	10/15/2017 19:22	1200	3411.88		4630	0.0109	0.94	0.2	0.07	OK
18		485	10/12/2017 10:24	10/13/2017 11:03	10/15/2017 19:02	1200	3411.88		4910	0.0109	1.15	0.2	0.07	OK
19		492	10/12/2017 10:21	10/13/2017 10:59	10/15/2017 20:19	695	3411.88		5015	0.0109	4.07	0.3	0.11	OK

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Albuquerque, NM, 87113

Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Flux (pCi/m²s) Error 1.00 S.D.	Remarks
20		475	10/12/2017 10:08	10/13/2017 10:54	10/13/2017 14:57	1200	3411.88		16797	0.0109	6.91	0.1	0.07	OK
21		473	10/12/2017 10:01	10/13/2017 10:47	10/13/2017 19:07	428	3411.88		6159	0.0109	7.38	0.2	0.13	OK
22		438	10/12/2017 09:50	10/13/2017 10:41	10/13/2017 20:33	459	3411.88		6731	0.0109	7.62	0.2	0.13	OK
23		408	10/12/2017 09:40	10/13/2017 10:31	10/15/2017 13:19	600	3411.88		5429	0.0109	5.45	0.3	0.12	OK
24		458	10/12/2017 09:30	10/13/2017 10:24	10/15/2017 12:37	968	3411.88		5355	0.0109	2.35	0.2	0.08	OK
25		446	10/12/2017 09:25	10/13/2017 10:21	10/14/2017 18:55	1200	3411.88		11226	0.0109	4.97	0.2	0.08	OK
26		423	10/12/2017 09:20	10/13/2017 10:24	10/15/2017 12:58	1200	3411.88		3963	0.0109	0.4	0.2	0.06	OK
27		406	10/12/2017 10:47	10/13/2017 11:13	10/16/2017 11:18	1200	3411.88		4219	0.0109	0.7	0.2	0.08	OK
28		411	10/12/2017 10:37	10/13/2017 11:12	10/16/2017 12:12	1181	3411.88		5041	0.0109	1.5	0.2	0.08	OK
29		456	10/12/2017 10:35	10/13/2017 11:06	10/15/2017 19:43	1200	3411.88		4189	0.0109	0.6	0.2	0.07	OK
30		495	10/12/2017 10:26	10/13/2017 11:03	10/15/2017 20:35	1057	3411.88		5396	0.0109	2.11	0.2	0.08	OK
31		401	10/12/2017 10:20	10/13/2017 11:00	10/16/2017 07:30	919	3411.88		5984	0.0109	3.71	0.3	0.1	OK
31		401	10/12/2017 10:20	10/13/2017 11:00	10/16/2017 07:16	774	3411.88		5033	0.0109	3.69	0.3	0.11	OK
32		445	10/12/2017 10:09	10/13/2017 10:53	10/13/2017 14:52	244	3411.88		6243	0.0109	14.08	0.3	0.21	OK
33		400	10/12/2017 09:59	10/13/2017 10:48	10/13/2017 18:46	1118	3411.88		11547	0.0109	4.77	0.2	0.07	OK
34		434	10/12/2017 09:51	10/13/2017 10:40	10/13/2017 22:05	495	3411.88		6190	0.0109	6.31	0.2	0.11	OK
35		200	10/12/2017 09:39	10/13/2017 10:37	10/14/2017 17:55	806	3411.88		5034	0.0109	2.57	0.2	0.08	OK
36		437	10/12/2017 09:31	10/13/2017 10:23	10/15/2017 13:55	705	3411.88		5439	0.0109	4.3	0.3	0.11	OK
37		403	10/12/2017 09:24	10/13/2017 10:21	10/14/2017 18:39	850	3411.88		5658	0.0109	2.9	0.2	0.08	OK
38		421	10/12/2017 09:20	10/13/2017 10:19	10/15/2017 13:30	1200	3411.88		5567	0.0109	1.58	0.2	0.07	OK
39		490	10/12/2017 09:18	10/13/2017 10:13	10/15/2017 11:47	1200	3411.88		4565	0.0109	0.83	0.2	0.06	OK
40		430	10/12/2017 10:48	10/13/2017 11:17	10/16/2017 15:03	1200	3411.88		5333	0.0109	1.72	0.2	0.08	OK

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Albuquerque, NM, 87113

Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Error 1.00 S.D.	Remarks
41		443	10/12/2017 10:46	10/13/2017 11:13	10/16/2017 12:33	822	3411.88		5019	0.0109	3.45	0.3	0.11	OK
41		443	10/12/2017 10:46	10/13/2017 11:13	10/16/2017 12:47	1200	3411.88	D	7249	0.0109	3.39	0.2	0.09	OK
42		420	10/12/2017 10:38	10/13/2017 11:11	10/16/2017 10:17	963	3411.88	D	5305	0.0109	2.76	0.3	0.1	OK
42		420	10/12/2017 10:38	10/13/2017 11:11	10/16/2017 09:58	1118	3411.88		6300	0.0109	2.88	0.2	0.09	OK
43		5	10/12/2017 10:33	10/13/2017 11:08	10/16/2017 10:58	1131	3411.88		5564	0.0109	2.16	0.2	0.09	OK
44		91	10/12/2017 10:27	10/13/2017 11:02	10/16/2017 07:47	1200	3411.88		4830	0.0109	1.2	0.2	0.08	OK
45		422	10/12/2017 10:18	10/13/2017 11:00	10/16/2017 08:08	952	3411.88		6331	0.0109	3.86	0.3	0.1	OK
46		457	10/12/2017 10:10	10/13/2017 10:52	10/13/2017 18:09	656	3411.88		6535	0.0109	4.53	0.2	0.09	OK
47		405	10/12/2017 09:58	10/13/2017 10:48	10/13/2017 18:21	376	3411.88		5011	0.0109	6.64	0.3	0.13	OK
48		469	10/12/2017 09:52	10/13/2017 10:40	10/13/2017 21:00	309	3411.88	D	5648	0.0109	10	0.3	0.17	OK
48		469	10/12/2017 09:52	10/13/2017 10:40	10/13/2017 20:55	287	3411.88		5346	0.0109	10.22	0.3	0.18	OK
49		4	10/12/2017 09:38	10/13/2017 10:38	10/14/2017 18:10	471	3411.88		5676	0.0109	6.95	0.3	0.13	OK
50		489	10/12/2017 09:32	10/13/2017 10:17	10/14/2017 19:28	1200	3411.88		8165	0.0109	3.06	0.2	0.07	OK
51		494	10/12/2017 09:23	10/13/2017 10:13	10/15/2017 11:30	1018	3411.88		5015	0.0109	1.81	0.2	0.08	OK
52		476	10/12/2017 09:21	10/13/2017 10:12	10/15/2017 12:08	471	3411.88		5092	0.0109	6.95	0.3	0.15	OK
53		312	10/12/2017 09:17	10/13/2017 10:11	10/15/2017 12:25	661	3411.88		5132	0.0109	4.3	0.3	0.11	OK
54		1	10/12/2017 10:55	10/13/2017 11:17	10/16/2017 14:42	1200	3411.88		4664	0.0109	1.12	0.2	0.08	OK
55		440	10/12/2017 10:54	10/13/2017 11:17	10/15/2017 17:51	1200	3411.88		4404	0.0109	0.76	0.2	0.07	OK
56		452	10/12/2017 10:50	10/13/2017 11:16	10/16/2017 13:33	1111	3411.88		5044	0.0109	1.81	0.3	0.09	OK
57		448	10/12/2017 10:44	10/13/2017 11:14	10/15/2017 18:12	1200	3411.88		4822	0.0109	1.08	0.2	0.07	OK
58		481	10/12/2017 10:40	10/13/2017 11:11	10/16/2017 09:07	1200	3411.88		6300	0.0109	2.47	0.2	0.08	OK
59		478	10/12/2017 10:32	10/13/2017 11:09	10/16/2017 09:38	1126	3411.88		6429	0.0109	2.95	0.2	0.09	OK

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Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	Flux (pCi/m²s) LLD	Error 1.00 S.D.	Remarks
60		64	10/12/2017 10:28	10/13/2017 11:01	10/16/2017 08:46	1200	3411.88		5035	0.0109	1.39	0.2	0.08	OK
61		447	10/12/2017 10:17	10/13/2017 11:01	10/16/2017 08:25	1200	3411.88		4262	0.0109	0.72	0.2	0.07	OK
62		484	10/12/2017 10:11	10/13/2017 10:51	10/13/2017 17:48	1200	3411.88		5032	0.0109	0.86	0.1	0.05	OK
63		429	10/12/2017 09:56	10/13/2017 10:49	10/13/2017 20:16	997	3411.88		5319	0.0109	1.6	0.2	0.06	OK
64		80	10/12/2017 09:53	10/13/2017 10:39	10/14/2017 17:39	989	3411.88		5257	0.0109	1.88	0.2	0.07	OK
65		410	10/12/2017 09:37	10/13/2017 10:17	10/14/2017 18:20	1144	3411.88		5509	0.0109	1.51	0.2	0.06	OK
66		465	10/12/2017 09:11	10/13/2017 10:11	10/15/2017 12:54	215	3411.88		5101	0.0109	18.22	0.5	0.31	OK
67		42	10/12/2017 10:56	10/13/2017 11:17	10/16/2017 11:53	1073	3411.88		5667	0.0109	2.57	0.3	0.09	OK
68		439	10/12/2017 10:53	10/13/2017 11:18	10/15/2017 18:33	658	3411.88		5023	0.0109	4.42	0.3	0.12	OK
69		459	10/12/2017 10:51	10/13/2017 11:15	10/16/2017 13:53	1200	3411.88		5068	0.0109	1.48	0.2	0.08	OK
70		461	10/12/2017 10:43	10/13/2017 11:15	10/15/2017 18:45	938	3411.88		5028	0.0109	2.32	0.2	0.09	OK
71		419	10/12/2017 10:41	10/13/2017 11:10	10/16/2017 10:34	1200	3411.88		4550	0.0109	0.99	0.2	0.08	OK
72		425	10/12/2017 09:10	10/13/2017 10:10	10/14/2017 20:48	87	3411.88		5163	0.0109	43.65	0.7	0.65	OK
72		425	10/12/2017 09:10	10/13/2017 10:10	10/14/2017 20:50	88	3411.88	D	5292	0.0109	44.28	0.7	0.65	OK
73		467	10/12/2017 10:59	10/13/2017 11:21	10/15/2017 15:30	678	3411.88		5553	0.0109	4.83	0.3	0.12	OK
74		431	10/12/2017 10:58	10/13/2017 11:21	10/15/2017 15:16	798	3411.88		5076	0.0109	3.17	0.3	0.1	OK
75		427	10/12/2017 09:09	10/13/2017 10:10	10/14/2017 20:52	129	3411.88		5204	0.0109	28.97	0.6	0.45	OK
76		500	10/12/2017 09:08	10/13/2017 10:09	10/15/2017 11:08	440	3411.88		5746	0.0109	8.79	0.3	0.16	OK
77		453	10/12/2017 11:01	10/13/2017 11:25	10/15/2017 17:11	402	3411.88		8915	0.0109	17.65	0.4	0.23	OK
77		453	10/12/2017 11:01	10/13/2017 11:25	10/15/2017 17:19	238	3411.88	D	5254	0.0109	17.57	0.5	0.3	OK
78		480	10/12/2017 09:04	10/13/2017 10:09	10/15/2017 10:58	414	3411.88	D	5570	0.0109	9.1	0.3	0.17	OK
78		480	10/12/2017 09:04	10/13/2017 10:09	10/15/2017 10:50	376	3411.88		5038	0.0109	9.04	0.4	0.18	OK

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Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	LLD	Error 1.00 S.D.	Remarks
79		482	10/12/2017 11:02	10/13/2017 11:25	10/15/2017 16:51	688	3411.88		5874	0.0109	5.19	0.3	0.12	OK
80		426	10/12/2017 09:04	10/13/2017 10:08	10/15/2017 11:16	758	3411.88		7155	0.0109	5.68	0.2	0.11	OK
81		254	10/12/2017 11:03	10/13/2017 11:26	10/15/2017 16:22	525	3411.88		6277	0.0109	8.27	0.3	0.15	OK
82		418	10/12/2017 09:03	10/13/2017 10:06	10/15/2017 11:05	144	3411.88		5161	0.0109	28.36	0.6	0.45	OK
83		496	10/12/2017 11:05	10/13/2017 11:26	10/15/2017 16:32	1126	3411.88		6063	0.0109	2.31	0.2	0.08	OK
84		68	10/12/2017 09:01	10/13/2017 10:05	10/14/2017 20:55	489	3411.88		5051	0.0109	5.78	0.3	0.13	OK
85		470	10/12/2017 09:02	10/13/2017 10:06	10/15/2017 12:17	466	3411.88		8573	0.0109	13.49	0.3	0.19	OK
86		435	10/12/2017 11:06	10/13/2017 11:27	10/15/2017 15:41	955	3411.88		5413	0.0109	2.56	0.2	0.09	OK
87		487	10/12/2017 09:00	10/13/2017 10:05	10/14/2017 20:25	107	3411.88		5129	0.0109	34.66	0.6	0.53	OK
88		415	10/12/2017 11:08	10/13/2017 11:28	10/15/2017 15:59	1200	3411.88		3333	0.0109	-0.06	0.2	0.06	OK
89		417	10/12/2017 08:57	10/13/2017 10:04	10/14/2017 20:11	369	3411.88		5763	0.0109	9.79	0.3	0.17	OK
89		417	10/12/2017 08:57	10/13/2017 10:04	10/14/2017 20:18	326	3411.88	D	5060	0.0109	9.73	0.3	0.18	OK
90		428	10/12/2017 11:09	10/13/2017 11:29	10/15/2017 17:05	362	3411.88		5049	0.0109	10.15	0.4	0.2	OK
91		474	10/12/2017 08:56	10/13/2017 10:03	10/14/2017 21:05	450	3411.88		5471	0.0109	7.19	0.3	0.14	OK
92		407	10/12/2017 11:11	10/13/2017 11:30	10/15/2017 17:26	1007	3411.88		5444	0.0109	2.35	0.2	0.08	OK
93		105	10/12/2017 11:12	10/13/2017 11:31	10/15/2017 14:19	688	3411.88		5254	0.0109	4.29	0.3	0.11	OK
94		488	10/12/2017 11:13	10/13/2017 11:31	10/15/2017 14:30	1196	3411.88		5894	0.0109	1.87	0.2	0.07	OK
95		49	10/12/2017 11:15	10/13/2017 11:32	10/15/2017 15:05	144	3411.88		5106	0.0109	29.4	0.6	0.46	OK
95		49	10/12/2017 11:15	10/13/2017 11:32	10/15/2017 14:09	477	3411.88		5102	0.0109	7.03	0.3	0.15	OK
96		21	10/12/2017 11:16	10/13/2017 11:33	10/15/2017 15:03	36	3411.88		5461	0.0109	134.12	1.3	1.87	OK
96		21	10/12/2017 11:16	10/13/2017 11:33	10/15/2017 15:04	38	3411.88	D	5692	0.0109	132.42	1.2	1.81	OK
97		449	10/12/2017 11:18	10/13/2017 11:33	10/15/2017 14:50	643	3411.88		6237	0.0109	6.18	0.3	0.13	OK

Types: D-Duplicate, TB-Trip Blank

Reviewed by: _____

Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 150
Albuquerque, NM, 87113

Radon Flux Measurements

Location Name	Field Type	Canister Number	Date/Time Deployment	Date/Time Retrieval	Date/Time Counting	Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m²s) Result	LLD	Error 1.00 S.D.	Remarks
98		498	10/12/2017 11:19	10/13/2017 11:34	10/15/2017 15:09	369	3411.88		6394	0.0109	13.08	0.4	0.21	OK
99		471	10/12/2017 11:20	10/13/2017 11:34	10/15/2017 17:44	443	3411.88		7933	0.0109	13.88	0.4	0.2	OK
100		460	10/12/2017 11:21	10/13/2017 11:35	10/15/2017 17:23	136	3411.88		5118	0.0109	31.96	0.6	0.5	OK
TB	TB	499	10/12/2017 11:28	10/13/2017 11:28	10/14/2017 20:27	1200	3411.88		3485	0.0109	0.05	0.2	0.05	OK
TB	TB	432	10/12/2017 11:28	10/13/2017 11:28	10/14/2017 19:50	1200	3411.88		3309	0.0109	-0.07	0.2	0.05	OK

Types: D-Duplicate, TB-Trip Blank

Reviewed by: _____

Appendix B

Field Deployment and Laboratory Analysis Log Forms

ERG Canister Deployment and Retrieval Log

Site: HMC

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
31	443	09/21/17	1135	09/22/17	1237	
15	430		1137		1239	
1	42		1139		1242	
2	431		1141		1244	
16	1		1143		1246	
32	448		1145		1249	
17	411		1147		1251	
3	406		1149		1253	
4	440		1151		1254	
18	439		1153		1255	
33	482		1155		1257	
34	452		1157		1259	
19	254		1203		1300	
5	419		1205		1302	
6	461		1207		1303	
20	455		1209		1304	
35	447		1211		1305	
36	420		1213		1307	
21	456		1215		1309	
7	401		1217		1310	
8	478		1219		1311	
22	481		1221		1313	
37	459		1223		1314	
38	424		1225		1316	
23	446		1227		1317	
9	472		1229		1318	
10	458		1231		1319	
24	5		1233		1321	
39	421		1235		1322	
40	494		1238		1324	

Review: _____

ERG Canister Deployment and Retrieval Log

Site: HMC

- Minimum temperature during canister deployment: _____ °F

  How was onsite minimum temperature measured? _____

- Was there rain onsite in the 24 hours prior to or during deployment? Yes No *(circle one)*

  How was the amount of onsite precipitation determined? _____

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retreival Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
25	437	09/21/17	1239	09/22/17	1325	
11	483		1241		1327	
12	427		1243		1329	
26	460		1245		1331	
41	423		1247		1333	
42	21		1249		1336	
27	312		1251		1338	
13	476		1253		1340	
14	465		1255		1342	
28	474		1257		1344	
43	480		1259		1347	
44	492		1301		1351	
29	441		1302		1354	
30	415		1303		1356	
45	467		1305		1359	
46	453		1307		1403	
62	422		1309		1405	
78	473		1311		1407	
77	445		1313		1410	
61	409		1315		1412	
60	491		1317		1414	
76	457		1322		1416	
93	429		1326		1418	
92	486		1327		1422	
75	495		1328		1425	

Review: _____

Canister Deployment and Retrieval Log

Site: HMC

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
59	412	09/21/17	1330	09/22/17	1427	
58	475		1332		1429	
74	256		1334		1432	
91	4		1336		1435	
90	463		1337		1437	
73	405		1339		1439	
57	408		1341		1441	
56	68		1342		1445	
72	426		1343		1447	
89	400		1345		1449	
88	468		1347		1451	
71	417		1349		1453	
55	410		1351		1455	
54	428		1353		1457	
70	435		1355		1459	
87	105		1356		1501	
100	75		1358		1502	
86	490		1359		1504	
69	487		1401		1506	
53	425		1403		1507	
52	433		1405		1508	
68	470		1406		1509	
85	485		1407		1511	
99	91		1409		1513	
98	418		1411		1514	
84	64		1413		1515	
67	436		1415		1517	
51	488		1417		1519	
50	499		1418		1821	
66	407		1419		1522	

Review: _____

ERG Canister Deployment and Retrieval Log

Site: HMC

- Minimum temperature during canister deployment: _____ °F

  How was onsite minimum temperature measured? _____

- Was there rain onsite in the 24 hours prior to or during deployment? Yes No *(circle one)*

  How was the amount of onsite precipitation determined? _____

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retreival Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
83	496	09/21/17	1422	09/22/17	1523	
97	479		1424		1525	
96	500		1426		1527	
82	416		1428		1528	
65	493		1430		1529	
49	462		1432		1531	
48	104		1434		1533	
64	49		1436		1534	
81	432		1438		1536	
95	450		1440		1538	
94	449		1442		1540	
80	477		1445		1542	
63	402		1447		1544	
47	498		1450		1546	
79	471		1462		1547	
TB1	489		1200		1549	
TB2	94		1200		1551	

Review: _____

ERG Canister Analysis Log Form

Site: HMC

ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
STD 3		04-22-17	1717	1200	40358	JDH
STD 1			1741	1200	44172	
BKG			1802	1200	3306	
254			1915	678	11431	
443			1927	209	12264	
1			1932	30	5129	
430			1933	866	8370	
42			1948	52	5059	
482			1950	52	6374	
440			1952	229	13975	
439			1957	947	5376	
431			2014	1112	44360	
431	✓		2033	126	5043	
411			2036	54	5106	
406			2037	472	17865	
448			2046	165	9920	
455			2054	87	13569	
452			2056	45	5162	
419			2058	180	9909	
461			2101	16	5253	
481			2102	44	5786	
447			2103	73	5364	
478			2105	54	6393	
459			2107	83	7523	
459	✓		2108	78	7267	
420			2110	1200	3911	
401			2131	189	14940	
5			2135	1200	4146	
456		↓	2155	246	5475	↓

Review: _____ Date: _____

ERG Canister Analysis Log Form

Site: HMC
ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
485		09/22/17	2200	42	7273	JDH
64			2202	(22) ~~5092~~ 5114	5092	22 sec.
433			2203	76	5031	
91			2205	414	5768	
418			2214	42	5197	
416			2215	140 ~~180~~ 184	5367	
462			2219	183	5023	
470			2222	37	5251	
470	✓		2223	40	5125	
498			2225	86	5057	
493			2227	179	5011	
104			2230	48	5122	
500			2232	363	6572	
432			2239	962	6070	
479			2256	808	12764	
402			2310	681	10340	
450			2322	547	6176	
STD #3			2333	1200	40218	
STD #1			2354	1200	43784	
BKG		09/23/17	0016	1200	3357	
BKG		09-23-17	0641	1200	3365	BSH
STD1			0702	1200	40143	
STD 3			0722	1200	37799	
499			0743	956	5157	
49			0800	558	5016	
49	✓		0810	573	5004	
471			0820	274	8430	
449			0827	343	8192	
488			0834	200	5046	

Review: _____ **Date:** _____

ERG Canister Analysis Log Form

Site: HMC

ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
477		09/23/17	0838	1200	5169	ESH
496		↓	0900	25	5128	↓
407			0901	44	5110	
105			0902	549	6111	JDH
436			0915	80	6172	
428			0917	768	5727	
435			0932	297	7078	
435	✓		0938	595	14273	
453			0948	1200	3590	
415			1010	1200	3865	
467			1031	1200	3589	
21			1051	116	10663	
~~94~~ 94			1055	1200	3456	
489			~~1115~~ 1115	1200	3323	
403			1136	1200	3480	
451			1157	1200	3612	
458			1218	12	5171	
458	✓		1219	12	5162	
472			1220	332	5051	
446			1226	1200	50904	
424			1247	203	5031	
421			1252	412	5223	
460			1300	211	17827	
423			1304	47	5631	
494			1305	126	5024	
483			1308	26	5131	
437			1309	255	13774	
465			1314	44	6135	
427		↓	1315	~~101~~ 61	5686	↓

Review: _____ Date: _____

ERG Canister Analysis Log Form

Site: HMC

ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
474		09/23/17	1317	69	5037	JDH
474	✓		1319	72	5341	
476			1320	93	6099	
480			1322	149	7778	
312			1325	24	5254	
487			1327	487	6750	
75			1336	893	5778	
425			1351	50	9571	
490			1352	134	8481	
417			1355	228	5034	
426			1400	21	5732	
426	✓		1401	19	5097	
68			1402	1200	5451	
468			1423	697	5913	
492			1437	753	8314	
441			1450	1200	5654	
473			1511	173	5019	
422			1515	258	6633	
486			1520	182	5014	
429			1523	886	51669	
429	✓		1546	86	5074	
409			1548	117	5010	
445			1550	316	6323	
495			1556	~~364~~ 434	6834	
457			1605	248	16985	
412			1610	313	6243	
491			1615	79	5398	
491	✓		1617	159	10888	
4		✓	1620	107	5023	

Review: _____ Date: _____

Canister Analysis Log Form

Site: HMC

ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
256		09/23/17	1623	393	7535	JDH
405			1630	223	25838	
463			1635	16	5754	
408			1636	159	18232	
410			1639	489	7970	
400			1647	116	9772	
475			1650	408	5143	
475	✓		1658	791	10154	
STD #3			1713	1200	41029	
STD #1			1734	1200	43409	
BKG			1755	1200	3658	

Review: _____ **Date:** _____

ERG Canister Deployment and Retrieval Log

Site: HMC STP

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
91	474	10/12/17	0856	~~10/12/17~~ 10/13/17	1003	
89	417		0857	10/13/17	1004	
87	487		0900		1005	
84	68		0901		1005	
85	470		0902		1006	
82	418		0903		1006	
80	426		0904		1008	
78	480		0906		1009	
76	500		0908		1009	
75	427		0909		1010	
72	425		0910		1010	
66	465		0911		1011	
53	312		0917		1011	
39	490		0918		1013	
26	423		0920		1024	
38	421		0920		1019	
52	476		0921		1012	
51	494		0923		1013	
37	403		0924		1021	
25	446		0925		1021	
16	94		0926		1020	
8	472		0928		1028	
15	483		0929		1025	
24	458		0930		1024	
36	437		0931		1023	
50	489		0932		1017	
65	410		0937		1017	
49	4		0938		1038	
35	200		0939		1037	
23	408		0940		1031	

Review: _____

ERG Canister Deployment and Retrieval Log

Site: HMC STP

- Minimum temperature during canister deployment: _____ °F

  How was onsite minimum temperature measured? _____

- Was there rain onsite in the 24 hours prior to or during deployment? Yes No *(circle one)*

  How was the amount of onsite precipitation determined? _____

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retreival Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
14	263	10/12/17 ~~0943~~ TA	0943	10/13/17	1031	
7	256	10/12/17	0944		1030	
3	463		0945		1030	
2	451		0947		1043	
6	424		0948		1042	
13	402		0949		1042	
22	438		0950		1041	
34	434		0951		1040	
48	469		0952		1040	
64	80		0953		1039	
63	429		0956		1049	
47	405		0958		1048	
33	400		0959		1048	
21	473		1001		1047	
12	2		1002		1046	
5	412		1003		1045	
1	409		1004		1044	
4	491		1005		1057	
11	486		1006		1055	
20	475		1008		1054	
32	445		1009		1053	
46	457		1010		1052	
62	484		1011		1051	
61	447		1017		1101	
45	422		1018		1100	

Review: _____

ERG Canister Deployment and Retrieval Log

Site: HMC STP

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
31	401	10/12/17	1020	10/13/17	1100	
19	492		1021		1059	
10	433		1022		1058	
9	441		1023		1058	
18	485		1024		103	
30	495		1026		1103	
44	91		1027		1102	
60	64		1028		1101	
59	478		1032		1109	
43	5		1033		1108	
29	456		1035		1106	
17	455		1036		1104	
28	411		1037		1112	
42	420		1038		1111	
58	481		1040		1111	
71	419		1041		1110	
70	461		1043		1115	
57	448		1044		1114	
41	443		1046		1113	
27	406		1047		1113	
40	430		1048		1117	
56	452		1050		1116	
69	459		1051		1115	
68	439		1053		1118	
55	440		1054		1117	
54	1		1055		1117	
67	42		1056		1117	
74	431		1058		1121	
73	467		1059		1121	
77	453		1101		1125	

Review: _____

ERG Canister Deployment and Retrieval Log

Site: HMC STP

- Minimum temperature during canister deployment: _____ °F

  How was onsite minimum temperature measured? _____

- Was there rain onsite in the 24 hours prior to or during deployment? Yes No *(circle one)*

  How was the amount of onsite precipitation determined? _____

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retreival Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
79	482	10/12/17	1102	10/13/17	1125	
81	254	↓	1103	↓	1126	
83	496		1105		1126	
86	435		1106		N27	
88	415		1108		1128	
90	428		1109		1129	
92	407		1111		1130	
93	105		1112		1131	
94	488		1113		1131	
95	49		1115		1132	
96	21		1116		1133	
97	449		1118		1133	
98	498		1119		1134	
99	471		1120		1134	
100	460		1121		1135	
TB	499		1128			
TB	432	↓	1128	↓		

Review: _____

ERG Canister Analysis Log Form

Site: STP & HMC

ROI: Channel 762 to Channel 967

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
STD 1		10-13-17	1110	1200	45445	RSH
STD 3			1133	1200	42325	
BKG			1202	1200	3464	
486			1434	1006	5590	
445			1452	244	6243	
475			1457	1200	16797	SOH
484			1748	1200	5032	
457			~~1809~~ 1809	656	6535	
405			1821	376	5011	
400			1846	1118	11547	
473			~~1907~~ 1907	428	6159	
441			1915	1200	4832	
433			1935	1069	5022	
2			1954	588	5349	
2	✓1		2006	603	5400	
429			2016	997	5319	
438			2033	459	6731	
424			2042	703	5095	
469			2055	287	5346	
469	✓2		2100	309	5648	
402			2106	330	6246	
412			2111	666	5029	
409			2124	1200	4355	
451			2145	1185	6204	
434			2205	495	6190	
472			2215	475	5619	
463			2223	976	5007	
256			2240	694	5087	
STD #3			2253	1200	41683	

Review: _____ Date: _____

ERG Canister Analysis Log Form

Site: STP HMC

ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
STD #1		10-13-17	2314	1200	46024	JDH
BKG		10-13-17	2335	1200	3758	JDH
~~BKG JH~~						
STD #3		10-14-17	1600	1200	41366	JDH
BKG			1623	1200	3841	
STD #1			1648	1200	43353	
263			1711	918	5772	
483			~~1738~~ 1728	280	5207	
483	✓3		1733	272	5132	
80			1739	989	5257	
200			1755	806	5034	
4			1810	471	5676	
410			1820	1144	5509	
403			1839	850	5658	
446			1855	1200	11226	
489			1928	1200	8165	
432			1950	1200	3309	
417			2011	369	~~5506~~ 5763	
417	✓4		2018	326	5060	
487			2025	107	5129	
499			2027	1200	3485	
425			2048	87	5163	
425	✓5		2050	88	5292	
427			2052	129	5204	
68			~~25~~ 2055	489	5051	
474			2105	450	5471	
BKG			2112	1200	3162	
STD #1			2133	1200	43113	
STD #3			2155	1200	39984	

Review: _____ Date: _____

ERG Canister Analysis Log Form

Site: STP HMC

ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
STD #3		10-15-17	0944	1200	39293	JOH
STD #1			1006	1200	42778	
BKG			1028	1200	3110	
480			1050	376	5038	
480	✓6		1058	414	5570	
418			1105	144	5161	
500			1108	440	5746	
426			1116	758	7155	
494			1130	1018	5015	
490			1147	1200	4565	
476			1208	471	5092	
470			1217	466	8573	
312			1225	661	5132	
458			1237	968	5355	
465			1254	215	5101	
423			1258	1200	3963	
408			1319	600	5429	
421			1330	1200	5567	
437			1355	705	5439	
49			1409	477	5102	
105			1419	688	5254	
488			1430	1196	5894	
449			1450	643	6237	
21			1503	36	5461	
21	✓7		1504	38	5692	
49			1505	144	5106	
498			1509	369	6394	
431			1516	798	5076	
467			1530	678	5553	

Review: _____ Date: _____

ERG Canister Analysis Log Form

Site: STP HMC

ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
435		10-15-17	1541	955	5413	JOH
415			1559	1200	3333	
254			1622	525	6277	
496			1632	1126	6063	
482			1651	688	5874	
428			1705	362	5049	
453			1711	402	8915	
453	✓8		1719	238	5254	
460			1723	136	5118	
407			1726	1007	5444	
471			1744	443	7933	
440			1751	1200	4404	
448			1812	1200	4822	
439			1833	658	5023	
461			1845	938	5028	
485			1902	1200	4910	
455			1922	1200	4630	
456			1943	1200	4189	
491			2004	1182	5061	
492			2019	695	5015	
495			2035	1057	5396	
BKG			2055	1200	3299	
STD #1			2117	1200	42676	
STD #3			2139	1200	39934	
STD 3		10-16-17	0610	1200	39395	PSH
STD 1			0633	1200	42834	
BKG			0655	1200	3231	
401			0716	774	5033	
401	X		0730	919	5984	

Review: _____ Date: _____

ERG Canister Analysis Log Form

Site: STP HMC

ROI: Channel _____ to Channel _____

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
91		10-16-17	0747	1200	4830	RSH
422			0808	952	6331	
447			0825	1200	4262	
64			0846	1200	5035	
481			0907	1200	6300	
478			0938	1126	6429	
420			0958	1118	6300	
420	x		1017	963	5305	
419			1034	1200	4550	
5			1058	1131	5564	
406			1118	1200	4219	
42			1153	1073	5667	
411			1212	1181	5041	
443			1233	822	5019	
443	x		1247	1200	7249	
452			1333	1111	5044	
459			esn 1353	1200	5068	
94			1414	855	7568	
94	x		1429	752	6927	
1			1442	1200	4664	
430			1503	1200	5333	
STD 1			1524	1200	42243	
STD 3			1546	1200	39127	
BKG			1607	1200	3430	

Review: _____ Date: _____

Attachment 4
Environmental Gamma Radiation Results

Attachment 4 - Environmental Gamma Radiation Results
OSL Perimeter Survey

Direct Radiation Measurements

Location	Monitoring Period	Dose Rate (mrem/6 mo)	Error (mrem/6 mo)*
HMC #1 N Outer Perimeter	7/1/17 - 12/31/17	61	6.0
HMC #1-A N Outer Perimeter	7/1/17 - 12/31/17	60	5.9
HMC #2 NE Outer Perimeter	7/1/17 - 12/31/17	63	6.2
HMC #3 E Outer Perimeter	7/1/17 - 12/31/17	59	5.8
HMC #4 S Outer Perimeter	7/1/17 - 12/31/17	69	6.8
HMC #5 N of Nearest Residence	7/1/17 - 12/31/17	66	6.5
HMC #6 Background	7/1/17 - 12/31/17	65	6.4
HMC #16	7/1/17 - 12/31/17	54	5.3

*Error is 1.96 std. dev.

Attachment 5
Public Dose Evaluation

Annual Effective Dose Equivalent to Individuals of the Public

1.0 Introduction

There were very few activities in 2017 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 well abandonment and maintenance of the Zeolite water treatment facilities on the Large Tailings Pile (LTP).

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 to10 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 measured effluent concentrations to those specified in Table 2 of Appendix B to 10 CFR Part 20. In addition, 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 2017 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 TEDE to the maximum exposed individual. It is known that the nearby residents lead 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 (CEDE) 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 2017.

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 doses at the residences should be less than that at the site perimeter.

The CEDE per Unit Intake via Inhalation factors were taken from ICRP 30 tables. The values are given below:

Nuclide	CEDE (mrem/μCi)
U-234	13.2E4
U-235	12.3E4
U-238	11.8E4
Th-230	32.6E4
Ra-226	8.6E3

Isotopic uranium concentrations were assumed present in natural activity abundances of 48.9% each for U-238 and U-234, and 2.2% for U-235 for calculation of the dose per net annual unit intake of each radionuclide, and the net doses were summed to determine the total CECE from inhalation of the net (above background)[1] concentrations of airborne particulate radionuclides in 2017 at each air monitoring station. Continuous occupancy at a breathing rate of 20,000 liters/day (Table A-1, NUREG-0859) was assumed for the calculation. The total above-background CEDE at locations HMC-4 and HMC-5 for 100 percent occupancy was calculated to be 0.73 mrem/year and 1.2 mrem/y. The results from these calculations are shown in Tables 2-1 and 2-2. The net dose equivalent, when accounting for the occupancy factor of 75%, results in a dose rate of 0.6 and 0.9 mrem/year at HMC-4 and HMC-5 respectively. The location with the highest exposure from all pathways is used for calculating the TEDE to the public (Table 2-3).

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 2017 at HMC-4 and HMC-5 was 0.72 and 0.68 pCi/L respectively. The average annual concentration at the background location (HMC-16) was 0.32 pCi/L. Subtracting the background concentration from the measured concentrations at HMC-4 and HMC-5 results in net radon concentrations of 0.40 and 0.36 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/1 Rn-222, in full equilibrium with the decay products, as being equivalent to a committed effective dose equivalent (CEDE) of 50 mrem/y (10 CFR 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

[1] The average background concentration (considered to be air station HMC-6) was subtracted from the annual average concentration for each radionuclide at other stations to obtain the average net concentration of each radionuclide at each air monitoring station for use in determining the net dose estimates.

HMC-5 results in a calculated CEDE of 30 and 27 mrem/y respectively for 2017. The method to calculate public dose from radon-222 is the same used in previous years.

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 128 and 125 mrem/year, respectively. The average annual effective dose equivalent at the background location (HMC-6) was 108 mrem/year. The net annual effective dose equivalent for HMC-4 and HMC-5, assuming 100 percent occupancy, was 20 and 17 mrem/year, respectively. Considering the 75 percent occupancy factor, the net annual effective dose equivalent was 15 and 13 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 was calculated by adding the 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 (Table 2-3). The TEDE at HMC-4 was 46 mrem/year and at HMC-5 was 41 mrem/year. This is 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: Measured average airborne radionuclide concentrations

Sample ID	Radionuclide	Q1 Conc. (µCi/mL)	Q2 Conc. (µCi/mL)	Q3 Conc. (µCi/mL)	Q4 Conc. (µCi/mL)	Total Annual Average Conc. (µCi/mL)
HMC-1	U-nat	4.0E-17	7.0E-17	5.0E-16	2.0E-16	2.0E-16
	Th-230	2.0E-17	2.0E-17	1.0E-17	2.0E-17	1.8E-17
	Ra-226	1.0E-17	2.0E-17	3.0E-17	6.0E-17	3.0E-17
HMC-1-A	U-nat	3.0E-17	6.0E-17	3.0E-16	1.0E-16	1.2E-16
	Th-230	2.0E-17	2.0E-17	2.0E-17	2.0E-17	2.0E-17
	Ra-226	9.0E-18	2.0E-17	4.0E-17	4.0E-17	2.7E-17
HMC-2	U-nat	2.0E-17	1.0E-16	5.0E-16	1.0E-16	1.8E-16
	Th-230	4.0E-18	2.0E-17	1.0E-17	2.0E-17	1.4E-17
	Ra-226	1.0E-17	2.0E-17	5.0E-17	4.0E-17	3.0E-17
HMC-3	U-nat	6.0E-17	4.0E-16	1.0E-15	3.0E-16	4.4E-16
	Th-230	5.0E-18	4.0E-17	2.0E-17	2.0E-17	2.1E-17
	Ra-226	2.0E-17	6.0E-17	4.0E-17	4.0E-17	4.0E-17
HMC-4	U-nat	2.0E-16	9.7E-16	1.9E-15	1.0E-15	1.0E-15
	Th-230	5.0E-17	1.0E-16	8.0E-18	3.0E-17	4.7E-17
	Ra-226	1.0E-16	2.0E-16	3.0E-17	4.0E-17	9.3E-17
HMC-5	U-nat	7.0E-17	9.0E-16	3.6E-15	2.0E-15	1.6E-15
	Th-230	4.0E-17	2.0E-17	7.0E-18	3.0E-17	2.4E-17
	Ra-226	2.0E-17	4.0E-17	4.0E-17	5.0E-17	3.8E-17
HMC-6	U-nat	3.0E-17	2.0E-16	6.0E-16	3.0E-16	2.8E-16
	Th-230	7.0E-18	2.0E-17	9.0E-18	5.0E-17	2.2E-17
	Ra-226	2.0E-17	3.0E-17	5.0E-17	6.0E-17	4.0E-17
HMC-7 Blank	U-nat	< 1E-18	6.0E-18	3.0E-18	3.0E-18	4.0E-18
	Th-230	6.0E-18	5.0E-18	5.0E-18	6.0E-18	5.5E-18
	Ra-226	7.0E-18	1.0E-17	9.0E-18	7.0E-18	8.3E-18

Table 2-2: Calculation of net internal dose (CEDE) due to radionuclides in air particulates from Site operations.

Sample ID	Radionuclide (Isotopic)	Calculated Istotopic Conc. (µCi/mL)*	Net Annual Average Conc. (µCi/mL)**	Inhalation DCF from ICRP 30 (mrem/µCi)	Calculated net CEDE (mrem/yr)	Total net CEDE by Station @100% Occupancy (mrem/yr)	Total net CEDE by Station @75% Occupancy (mrem/yr)
HMC-1	U-234	9.9E-17	0.0E+00	1.32E+05	0.0E+00	0.0E+00	0.0E+00
	U-235	4.5E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	9.9E-17	0.0E+00	1.18E+05	0.0E+00		
	Th-230	1.8E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	3.0E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-1-A	U-234	6.0E-17	0.0E+00	1.32E+05	0.0E+00	0.0E+00	0.0E+00
	U-235	2.7E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	6.0E-17	0.0E+00	1.18E+05	0.0E+00		
	Th-230	2.0E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	2.7E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-2	U-234	8.8E-17	0.0E+00	1.32E+05	0.0E+00	0.0E+00	0.0E+00
	U-235	4.0E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	8.8E-17	0.0E+00	1.18E+05	0.0E+00		
	Th-230	1.4E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	3.0E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-3	U-234	2.2E-16	7.7E-17	1.32E+05	7.4E-02	1.4E-01	1.1E-01
	U-235	9.7E-18	3.5E-18	1.23E+05	3.1E-03		
	U-238	2.2E-16	7.7E-17	1.18E+05	6.6E-02		
	Th-230	2.1E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	4.0E-17	6.2E-33	8.60E+03	3.9E-19		
HMC-4	U-234	5.0E-16	3.6E-16	1.32E+05	3.5E-01	7.3E-01	5.5E-01
	U-235	2.2E-17	1.6E-17	1.23E+05	1.5E-02		
	U-238	5.0E-16	3.6E-16	1.18E+05	3.1E-01		
	Th-230	4.7E-17	2.6E-17	3.26E+05	6.1E-02		
	Ra-226	9.3E-17	5.3E-17	8.60E+03	3.3E-03		
HMC-5	U-234	8.0E-16	6.7E-16	1.32E+05	6.4E-01	1.2E+00	9.4E-01
	U-235	3.6E-17	3.0E-17	1.23E+05	2.7E-02		
	U-238	8.0E-16	6.7E-16	1.18E+05	5.7E-01		
	Th-230	2.4E-17	2.8E-18	3.26E+05	6.5E-03		
	Ra-226	3.8E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-6 (Bkg. Station)	U-234	1.4E-16					
	U-235	6.2E-18					
	U-238	1.4E-16	N/A	N/A	N/A	N/A	N/A
	Th-230	2.2E-17					
	Ra-226	4.0E-17					
HMC-7	U-234	2.0E-18	0.0E+00	1.32E+05	0.0E+00	0.0E+00	0.0E+00
	U-235	8.8E-20	0.0E+00	1.23E+05	0.0E+00		
	U-238	2.0E-18	0.0E+00	1.18E+05	0.0E+00		
	Th-230	5.5E-18	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	8.3E-18	0.0E+00	8.60E+03	0.0E+00		

*Measured U-nat converted to isotopic concentrations assuming natural abundances of 2.2% for U-235, and 48.9% for U-234 and U-238

**Isotopic average values for Station HMC-6 subtracted from measured result at other stations to obtain the net concentration.

Table 2-3: Estimated dose by pathway and calculated TEDE (mrem/yr)

Sample ID	Internal CEDE Air Particulates (mrem/yr)	Internal CEDE Radon (mrem/yr)	Exernal EDE (mrem/yr)	TEDE (mrem/yr)
HMC-4	0.6	30	15	46
HMC-5	0.9	27	13	41