



Homestake Mining Company of California

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24 February 2020

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**RE: Semi-Annual Environmental Monitoring Report for Period July-December 2019, In
Accordance with Nuclear Regulatory Commission Docket No. 40-8903, License No.
SUA 1471, and New Mexico Environment Department DP-200 Ground Water
Discharge Plan**

Dear All:

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 Environment Department, please find enclosed copies of the Semi-Annual Environmental Report for the second half of 2019 (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 at 505.238.9701.

Respectfully,

David W. Pierce

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Letter to Agencies
*RE: Semi-Annual Environmental Monitoring Report
July-December 2019*

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HOMESTAKE MINING COMPANY OF CALIFORNIA

Grants Reclamation Project



**SEMI-ANNUAL
ENVIRONMENTAL MONITORING REPORT**

**Reporting Period
July- December 2019**

**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 2019. 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 (ML12293A170) and approved by the NRC on January 28, 1999 (ML080030067). The large tailings pile (LTP) has been re-contoured and covered with an interim cover on the top and radon barrier on the out slopes. Bedding and erosion protection was placed on the out slopes 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 (ML12291A911) and approved by the NRC on January 28, 1999 (ML080030067).

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 groundwater corrective action program (GCAP) 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, pond monitoring wells DD, DD2 and X and background well P are included. 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 particulates 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 radionuclides in airborne particulates. The predominant wind direction is from the southwest; accordingly, HMC-1, HMC-1A, HMC-2 and HMC-3 are generally located downwind 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 Hi-Q HVP-4300 AFC 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 and Thorium-230. Air sampling flow volumes and run times 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 2019 are provided in Attachment 1.

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 (formerly Landauer Radon), 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 the 2nd half 2019. 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, clarifier tanks, and spray evaporators on the evaporation ponds) are insignificant relative to those of the LTP and STP.

Annual flux measurements for calendar year 2019 were conducted in the fall as two separate deployments, consisting of 100 canisters per deployment on the LTP and STP respectively. Deployments were conducted in accordance with the methods proposed in HMC's response to the NRC's 2017 notice of violation (NOV) regarding an average radon flux rate from the LTP that exceeded the 20 picocuries per square meter per second ($\text{pCi m}^{-2} \text{s}^{-1}$) standard given in 10 CFR 40, Appendix A (ERG, 2017 and NRC, 2017). The Radon Flux report for 2019 is provided in Attachment 5.

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), cannot 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 has been observed since 2017 as detailed in radon flux reports provided with corresponding semiannual environmental monitoring reports.

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 is 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.

$$J_s = \frac{J_1 A_1 + J_2 A_2 + \dots + J_i A_i}{A_t}$$

where:

J_s	=	Mean flux for the total pile (pCi/m ² -s)
J_i	=	Mean flux measured in region i (pCi/m ² -s)
A_i	=	Area of region i (m ²)
A_t	=	Total area of the pile (m ²)

The radon flux emission rate for the first half of 2019 is assumed equivalent to that measured in the 2nd half of 2019. Based on 2019 flux monitoring results, the calculated average radon flux effluent value for the LTP in 2019 was 35.4 pCi m⁻² s⁻¹ (see Attachment 5). With respect to the STP, the arithmetic mean flux for the earthen region of the pile (105,272 m² area) in 2019 was 22.1 pCi m⁻² s⁻¹. The area of EP1 is approximately 116,204 m², and this pond area was assigned a value of zero flux. The overall area-weighted average radon flux for the STP in 2019 was calculated as follows:

$$\begin{aligned} \text{STP Radon Flux} &= [(22.1 \text{ pCi/m}^2\text{-s})(105,272 \text{ m}^2) + (0 \text{ pCi/m}^2\text{-s})(116,204 \text{ m}^2)] / (221,488 \text{ m}^2) \\ &= 10.5 \text{ pCi/m}^2\text{-s} \end{aligned}$$

Thus, average Rn-222 flux values of 35.4 and 10.5 pCi m⁻² s⁻¹ for the LTP and STP respectively are assumed for 2019. Based on the 2019 average flux values (35.4 and 10.5 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 annual radon emissions from the tailings piles in 2019 were calculated to be 479 Ci and 73.3 Ci respectively. For the second half 2019 semi-annual reporting period only, effluent radon releases are assumed equivalent to half of these values, or 240 Ci and 36.7 Ci for the LTP and STP respectively. Detailed results of the 2019 radon flux measurements are provided in Attachment 5.

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 2nd half 2019. 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 or Evaporation Pond 3 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 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 and flow from the zeolite regeneration. 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. Pumps in these cells or adjacent cells were adequate to keep up with these rates.

The tailings sump volume for the Large Tailings Pile are presented in Table 3.1-6. Injection into the LTP ceased in July 2015 and dewatering well collection ceased after 2017. 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 low concentration re-injection ceased operation in July of 2016 and therefore not presented in this monitoring report.

Table 3.1-9 presents the influent totals for the active treatment systems. The inflow to the RO plant averaged 334 gpm in the 2nd half 2019 while the inputs to the 300 zeolite and 1200 zeolite cells were 0 and 120 gpm, respectively. Table 3.1-10 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 reversal pair wells B-BA, DZ-KZ, SM-SN and S2-S5 are presented in this table.

3.3 Pond and Pipeline Maintenance

During this semi-annual reporting period, liner repair was performed on the collection ponds and Evaporation Pond 1. Liner repairs are detailed below:

- After the EP-1 re-lining project was deferred until 2020, the East Collection Pond was pumped down approximately one foot between June 3rd and June 10th, 2019. On June 14th, a worker reported a hole in the liner above the water level. During subsequent inspection on June 17, numerous holes were identified in the east and west collection pond liners with many of them below the previous water line(s). HMC was unable to estimate a volume released. A contractor was engaged to make repairs to both liners using Deery Oil #6 and mesh fabric patches. The repairs were initiated on July 10, 2019 and completed on August 6, 2019. The collection ponds are currently undergoing cleanout and re-lining operations.
- Since the EP-1 re-lining project was deferred to 2020 and residual salts were exposed in EP-1, HMC commenced transferring water from Evaporation Pond #2 (EP-2) on July 11, 2019. The discharge stream into EP-1 resulted in a hole in the liner on July 23, 2019 and the transfer was stopped that afternoon, leaving an approximate six-inch hole in the liner slightly above the water line. An estimated volume of up to 12,000 gallons of brine was released through the tear.

Repairs were performed on July 31, 2019. Sandbags were used to isolate the tear and then a fabric patch was used to cover the tear prior to application of Deery Oil

#6 to seal the tear.

Two reportable discharges from impacted water conveyance pipelines to non-authorized areas occurred during this time period. The instances were injection water lines that had a meter burst from the cold in the Q wellfield on December 20th and 31st. The meters were isolated and fixed following the release. Onsite incidental leaks and spills resulting from equipment failure and/or weather-related are summarized in the leak register maintained at the site.

3.4 Well Drilling and Closures

One new well was drilled in South Felice Acres during the period from July through December of 2019 as indicated in Table 3.4-1.

3.5 Facilities Inspections and Maintenance

Facilities, structures, contaminated fluid pipelines, equipment, diversion structures and diversion channels associated with groundwater treatment, and drainages were inspected during the period from July through December of 2019. Minor surface water erosion piping was identified originating on top of the LTP and down the southern slope after several rain events. The erosional subsurface piping channel was backfilled to prevent further erosion in this area.

In addition, the following significant maintenance activities were performed during this semi-annual reporting period on the groundwater treatment systems:

Zeolite Groundwater Treatment

- No significant maintenance activities were performed on the zeolite system in the 2nd half 2019.

Reverse Osmosis Groundwater Treatment

- In February 2019, Clarifier 1 was shutdown due to shaft and rake displacement and scheduled for repair and repaint. Work was started in November 2019 and was ongoing as of the end of the year;
- In March 2019, anti-scalant was changed on all low pressure units from Vitec 3000 to Vitec 7400 due to silica scaling in the RO membranes;
- In June 2019, an additional 20 micro-filtration modules were installed to lower the flux rate and increase the capacity of the micro-filtration system.

4.0 WATER QUALITY MONITORING

4.1 Groundwater Quality Monitoring

Table 2-2 outlines the water quality sampling frequency and parameters monitored which was approved in November 2019 (ML19217A353). 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 4.1-6. A sample from background well P was not collected in the 2nd half 2019 (see Table 4.1-4). The water quality of the Point of Compliance (POC) wells is currently being restored; therefore, the reported levels are not representative of steady state aquifer conditions at the present time and the concentration levels are 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 and TDS concentrations naturally exceed the site standard in wells DD and DD2. The uranium concentrations in well DD2 naturally exceed the alluvial site standard as they have since this well was drilled. Total concentrations for manganese, selenium, molybdenum and uranium are presented for the ponds and are generally 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 SP2 concentrations in the 2nd half 2019 were less than all alluvial site standards for each of these samples.

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 RO product constituent concentrations measured in the 2nd half 2019 were less than or equal to the corresponding alluvial site standards. Table 4.3-2 also presents the treated water quality for the zeolite treatment process. In the 2nd half 2019, zeolite was used to treat Off-site water for uranium 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. No concentrations exceeded the site standards in the 2nd half 2019 in the zeolite samples.

5.0 DIRECT RADIATION

Gamma dose rates are continuously monitored using 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 outdoors. The OSLs 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 3.

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 Radiation Safety Officer (RSO) depending on the nature of the work being performed as specified in the Radiation Protection Program (RPP) Manual (HMC, 2018). The applicable procedure is found in SOP 12 (Contamination Surveys) which may or may not be conducted under a radiation work permit (RWP) at the discretion of the RSO. Documentation for personnel contamination surveys is maintained in RWP or miscellaneous surveys folders as applicable. For the 2nd half of 2019, no personnel contamination surveys showed evidence of significantly elevated activity (above background) with one exception. One individual, during survey demonstrations for initial training for the clarifier rebuild RWP, showed much higher than expected alpha count rates on his clothing and hands (prior to conducting any onsite work under the RWP). An investigation was conducted by the ARSO and a report submitted to the RSO. Based on subsequent measurements, it was determined that the elevated count rates were due to short-lived radon decay products from some unknown source other than the HMC facility. No further action was necessary, and the incident was documented and closed out.

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). Depending on the equipment use, sometimes the RSO will require equipment release surveys for projects that don't require an RWP. Standard Operating Procedures are used for all equipment release surveys. No surface contamination above NRC release criteria was observed during this reporting period.

7.0 LOWER LIMIT OF DETECTION

Homestake representatives have calculated the Lower Limit of Detection (LLD) for field survey instrumentation systems, where applicable, to better inform evaluation of survey results. 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 present at a given level of confidence. 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 [$\mu\text{Ci/mL}$]);
- 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 $\mu\text{Ci/mL}$
Rn-222 in air	30 pCi(d/L)
U-nat in air	1 E-16 $\mu\text{Ci/mL}$
U-nat in water	2 E-10 $\mu\text{Ci/mL}$
Ra-226, Th-230 in water	2 E-10 $\mu\text{Ci/mL}$

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

8.0 DATA SUMMARY AND CONCLUSIONS

The summaries of Homestake's effluent monitoring program included in this submittal contain data for applicable radiological parameters that could be 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 for the required monitoring period.

The data collected for Homestake's effluent monitoring program parameters can be readily compared to 10 CFR Part 20 Appendix B effluent concentration (EC) values, not for determinations of public dose, but as a qualitative indicator for identifying effluent levels or trends that could pose a concern in terms of compliance with public dose limits given in 10 CFR 20.1301. During the current reporting period (2nd half 2019), Homestake has not exceeded 10 CFR Part 20 EC values in any terrestrial effluents covered by this report. As discussed earlier, this does not include groundwater values at POC wells.

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 2. Homestake Grants Reclamation Project, Cibola County, New Mexico. October 26.

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
	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
	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
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 (2019, as modified by
Amendment 54)

Table 2-2. Groundwater Monitoring at the Grants Site (2019 as modified by Amendment 54)

Well	Parameter List Code	Frequency of Monitoring
<i>Alluvial Background Wells</i>		
P, Q, 921	B, F	Annual
<i>Operational Monitoring</i>		
Collection system wells	Total Volume	Monthly
Injection system wells	Total Volume	Monthly
Reversal wells KZ, DZ, SM, SN, S2, S5	B, BA, Water Level	Weekly
<i>San Andres Wells</i>		
Deep #1R, Deep #2R, 943M, 951R	B, F H	Annual Semiannual
<i>Alluvial Compliance Monitoring Wells</i>		
On-Site Monitoring Wells (Evap. Ponds) DD, DD2, X	B, F plus Mn H	Annual Quarterly
Additional On-Site Monitoring Wells 1A, 1K, 639, 802, B11, D1, F, FB, GH, GN, L, L5, K9, M3, MX, MB, MQ, NC, S4, SUB3, T2, T19, T23, T41, T54	B, F	Annual
South Off-Site Wells 490, 497, 540, 631, 643#, 644, 864, 869, Q5, R3, SUB2	B, F	Annual
Section 34 Land application wells 555, 556, 557, 844, 845, 846	B, F	Annual
North Off-Site Wells(includes Section 28 Land application wells) 688, 881, 882, 883, 884, 886, 888, 893, 659, H2A, MR, H55, MO	B, F	Annual
Western Portion of North Off-Site Wells (Includes Section 33 Land application wells) 541, 551, 647, 649, 654, 899, 996	B, F	Annual
<i>Chinle Compliance Monitoring Wells</i>		
Upper Chinle Wells 494, CE2, CE8, CE9, CE15, CF4, CW3, CW13#, CW18, CW25#	B, F	Annual
Middle Chinle Wells 493, ACW, CW17, CW2, CW28, CW45, CW55, CW62, CW76, R3, Y7	B, F	Annual
Lower Chinle Wells CW29, CW32, CW41, CW42, CW43, V6	B, F	Annual

Note: # Monitoring will start after well ceasing to be used for injection

Table 2-2. Groundwater Monitoring at the Grants Site (2019 as modified by Amendment 54), con't

Parameter List Code	Included Parameters (Dissolved)	Method	Reporting Limits	Units
B	Water level			
	pH	A4500-HB	0.01	s.u.
	Total dissolved solids (TDS)	A2540 C	20	mg/L
	Sulfate (SO ₄)	E300.0	4	mg/L
	Chloride (Cl)	E300.0	1	mg/L
	Bicarbonate (HCO ₃)	A2320 B	5	mg/L
	Carbonate (CO ₃)	A2320 B	5	mg/L
	Sodium (Na)	E200.7	0.9	mg/L
	Calcium (Ca)	E200.7	0.5	mg/L
	Magnesium (Mg)	E200.7	0.5	mg/L
	Potassium (K)	E200.7	0.5	mg/L
	Nitrate (NO ₃)	E353.2	0.1	mg/L
	Uranium (U)	E200.8	0.0003	mg/L
	Selenium (Se)	E200.8	0.005	mg/L
Molybdenum (Mo)	E200.8	0.03	mg/L	
Radium-226 (Ra-226)	E903.0	Precision Variable	pCi/L	
F	Vanadium (V)	E200.8	0.01	mg/L
	Radium-228 (Ra-228)	RA-05	Precision Variable	pCi/L
	Thorium-230 (Th-230)	E908.0	Precision Variable	pCi/L
H	Water Level			
	TDS	A2540 C	20	mg/L
	SO ₄	E300.0	4	mg/L
	U	E200.8	0.0003	mg/L
	Se	E200.8	0.005	mg/L
	Mo	E200.8	0.03	mg/L
	Cl	E300.0	1	mg/L

Table 2-3
Occupational Monitoring Program

Table 2-3 Occupational Monitoring Program

Type of Sample	Number	Locations	Method	Frequency	Analytical Parameters
Lapel Personal Air Sample	As required by RWP	As required by RWP (2 L/min or 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 RSO	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	Semiannually	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 RSO (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; RSO = Radiation Safety Officer;
 RWP = Radiation Work Permit; OSL = Optically Stimulated Luminescence dosimeter

**Tables 3.1-1 through 3.1-10
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	24,135,000

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

September	Interval Gallons
Transfer EP-2 to EP-1	10,504,000

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

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

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

Evap Pond 2

July	Interval Gallons
R.O. Flow to Evaporation Ponds	2,078,780
Tailings Sumps	268,830
Tailings Pile	0
Zeolite Regeneration & Overflow	2,593,100
E Coll Pond to EP-2	1,030,731

August	Interval Gallons
R.O. Flow to Evaporation Ponds	1,109,900
Tailings Sumps	213,110
Tailings Pile	0
Zeolite Regeneration & Overflow	987,500
E Coll Pond to EP-2	330,304

September	Interval Gallons
R.O. Flow to Evaporation Ponds	1,443,580
Tailings Sumps	262,570
Tailings Pile	0
Zeolite Regeneration & Overflow	1,193,100
E Coll Pond to EP-2	343,580

October	Interval Gallons
R.O. Flow to Evaporation Ponds	2,035,010
Tailings Sumps	209,290
Tailings Pile	0
Zeolite Regeneration & Overflow	2,107,100
E Coll Pond to EP-2	901,888

November	Interval Gallons
R.O. Flow to Evaporation Ponds	2,589,510
Tailings Sumps	197,240
Tailings Pile	0
Zeolite Regeneration & Overflow	1,436,200
E Coll Pond to EP-2	4,777,734

December	Interval Gallons
R.O. Flow to Evaporation Ponds	2,589,510
Tailings Sumps	243,340
Tailings Pile	0
Zeolite Regeneration & Overflow	0
E Coll Pond to EP-2	7,387,046

Evap Pond 3

July	Interval Gallons
Transfer EP-1 to EP-3	530,050

August	Interval Gallons
Transfer EP-1 to EP-3	4,662,100

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

October	Interval Gallons
Transfer EP-1 to EP-3	12,500
Transfer EP-2 to EP-3	12,463,879

November	Interval Gallons
Transfer EP-1 to EP-3	34,700

December	Interval Gallons
Transfer EP-1 to EP-3	170,500

Collection Ponds

July	Interval Gallons
Miscellaneous RO and Clarifier Flow	1,121,626
Tailings Sumps	0
Zeolite Regeneration	0

August	Interval Gallons
Miscellaneous RO and Clarifier Flow	1,527,826
Tailings Sumps	0
Zeolite Regeneration	0

September	Interval Gallons
Miscellaneous RO and Clarifier Flow	2,277,817
Tailings Sumps	0
Zeolite Regeneration	0

October	Interval Gallons
Miscellaneous RO and Clarifier Flow	2,654,504
Tailings Sumps	0
Zeolite Regeneration	0

November	Interval Gallons
Miscellaneous RO and Clarifier Flow	2,002,378
Tailings Sumps	0
Zeolite Regeneration	0

December	Interval Gallons
Miscellaneous RO and Clarifier Flow	2,139,200
Tailings Sumps	0
Zeolite Regeneration	0

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

	EP1	EP2	EP3A	EP3B	W Coll	E Coll
7/1/2019	10.75	3.4	3.31	3.04	O/F	5.5
7/8/2019	10.75	3.45	3.422	2.92	O/F	5.5
7/15/2019	8.75	4.52	3.569	3.21	O/F	5.5
7/22/2019	10.5	4.54	3.569	3.21	O/F	5.5
7/29/2019	9	7.13	3.809	3.13	O/F	5.5
8/5/2019	9.25	6.96	3.8	2.94	O/F	5.5
8/12/2019	9.25	6.91	3.029	2.95	O/F	5.5
8/19/2019	9.35	6.97	3.164	3.06	*	1.6
8/26/2019	9.55	7	3.317	3.19	*	2
9/2/2019	9.2	9.2	3.418	3.28	*	2.3
9/9/2019	9.15	7.12	3.545	3.39	*	1.95
9/16/2019	9.3	6.97	3.6	3.5	*	1.95
9/23/2019	9.3	6.97	3.7	3.5	*	1.9
9/30/2019	9.5	6.73	3.7	3.6	*	1.8
10/7/2019	9.6	7.5	2.8	3.3	*	1.95
10/14/2019	9.45	8.55	2.6	2	*	2.28
10/21/2019	9.65	8.5	2.7	2.09	*	1.75
10/28/2019	9.7	8.38	2.8	2.1	*	2
11/4/2019	9.7	8.35	2.9	2.3	*	1.55
11/11/2019	9.75	7.87	2.9	2.2	*	2.2
11/18/2019	9.75	7.45	2.9	2.2	*	1.18
11/25/2019	9.75	6.8	2.9	2.2	*	1.7
12/2/2019	9.75	6.25	2.9	2.2	*	2.1
12/9/2019	9.75	5.93	2.9	2.2	*	1.98
12/16/2019	9.85	5.76	3	2.2	*	1.87
12/23/2019	9.85	5.63	3.2	2.2	*	1.86
12/30/2019	9.85	5.38	3.2	2.2	*	1.8

Note: O/F = Overflowing to East Collection.
 Not O/F = Not Overflowing to East Collection.
 * = West Collection is being re-lined.

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	174,220			1,798,260			831,670			1,175,800			762,580		
7/1/2019	174,220	0	0	1,798,740	480	22	842,030	10,360	387	1,183,030	7,230	293	799,070	36,490	1,477
7/8/2019	174,220	0	0	1,798,760	20	1	847,730	5,700	213	1,188,140	5,110	207	815,190	16,120	652
7/15/2019	174,220	0	0	1,805,100	6,340	288	856,870	9,140	342	1,188,390	250	10	839,660	24,470	990
7/22/2019	174,220	0	0	1,808,070	2,970	135	857,460	590	22	1,189,590	1,200	49	849,750	10,090	408
7/29/2019	174,220	0	0	1,808,070	0	0	857,460	0	0	1,190,030	440	18	859,050	9,300	376
8/5/2019	174,220	0	0	1,808,070	0	0	857,460	0	0	1,190,390	360	15	863,160	4,110	166
8/12/2019	174,220	0	0	1,808,070	0	0	857,460	0	0	1,190,890	500	20	863,160	0	0
8/19/2019	174,220	0	0	1,808,070	0	0	857,460	0	0	1,191,250	360	15	863,160	0	0
8/26/2019	174,220	0	0	1,808,060	-10	0	857,460	0	0	1,191,250	0	0	863,160	0	0
9/2/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
9/9/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
9/16/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
9/23/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
9/30/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
10/7/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
10/14/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
10/21/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
10/28/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
11/4/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
11/11/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
11/18/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
11/25/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
12/2/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,160	0	0
12/9/2019	174,220	0	0	1,808,060	0	0	857,460	0	0	1,191,250	0	0	863,240	80	3
12/16/2019	174,220	0	0	1,808,070	10	0	859,730	2,270	85	1,191,250	0	0	880,870	17,630	713
12/23/2019	174,220	0	0	1,808,070	0	0	861,020	1,290	48	1,191,250	0	0	892,800	11,930	483
12/30/2019	174,220	0	0	1,808,060	-10	0	861,190	170	6	1,191,250	0	0	906,990	14,190	574

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 exceed 775 are in bold.

= Pump not installed due to collapsed standpipe

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			1,046,710			303,160			29,990			623,850		
7/1/2019	70	0	0	1,047,220	510	28	303,160	0	0	29,990	0	0	623,890	40	2
7/8/2019	70	0	0	1,047,620	400	22	303,160	0	0	29,990	0	0	623,900	10	1
7/15/2019	70	0	0	1,048,040	420	23	303,160	0	0	29,990	0	0	623,900	0	0
7/22/2019	70	0	0	1,048,040	0	0	303,160	0	0	29,990	0	0	623,900	0	0
7/29/2019	70	0	0	1,048,310	270	15	303,160	0	0	29,990	0	0	623,900	0	0
8/5/2019	70	0	0	1,049,940	1,630	90	303,160	0	0	29,990	0	0	625,050	1,150	64
8/12/2019	70	0	0	1,052,770	2,830	157	303,160	0	0	29,990	0	0	625,050	0	0
8/19/2019	70	0	0	1,052,770	0	0	303,160	0	0	29,990	0	0	625,050	0	0
8/26/2019	70	0	0	1,053,540	770	43	303,160	0	0	29,990	0	0	625,050	0	0
9/2/2019	70	0	0	1,053,550	10	1	303,160	0	0	29,990	0	0	625,050	0	0
9/9/2019	70	0	0	1,053,550	0	0	303,160	0	0	29,990	0	0	625,060	10	1
9/16/2019	70	0	0	1,053,550	0	0	303,160	0	0	29,990	0	0	625,060	0	0
9/23/2019	70	0	0	1,053,550	0	0	303,160	0	0	29,990	0	0	625,060	0	0
9/30/2019	70	0	0	1,053,550	0	0	303,160	0	0	29,990	0	0	625,060	0	0
10/7/2019	70	0	0	1,053,550	0	0	303,160	0	0	29,990	0	0	625,380	320	18
10/14/2019	70	0	0	1,053,550	0	0	303,160	0	0	29,990	0	0	630,410	5,030	279
10/21/2019	70	0	0	1,053,960	410	23	303,160	0	0	29,990	0	0	630,410	0	0
10/28/2019	70	0	0	1,053,960	0	0	303,160	0	0	29,990	0	0	630,410	0	0
11/4/2019	70	0	0	1,053,970	10	1	303,160	0	0	29,990	0	0	630,410	0	0
11/11/2019	70	0	0	1,053,980	10	1	303,160	0	0	29,990	0	0	630,420	10	1
11/18/2019	70	0	0	1,054,170	190	11	303,160	0	0	29,990	0	0	630,420	0	0
11/25/2019	70	0	0	1,057,010	2,840	157	303,160	0	0	29,990	0	0	630,420	0	0
12/2/2019	70	0	0	1,057,010	0	0	303,160	0	0	29,990	0	0	630,420	0	0
12/9/2019	70	0	0	1,061,690	4,680	259	303,160	0	0	29,990	0	0	632,980	2,560	142
12/16/2019	70	0	0	1,068,990	7,300	404	303,160	0	0	29,990	0	0	632,980	0	0
12/23/2019	70	0	0	1,072,340	3,350	185	303,160	0	0	29,990	0	0	632,980	0	0
12/30/2019	70	0	0	1,078,630	6,290	348	303,160	0	0	29,990	0	0	638,750	5,770	319

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 exceed 775 are in bold.

@ = Totalizer not connected

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	117,960			509,670			1,766,430			492,690			443,840		
7/1/2019	123,940	5,980	331	509,680	10	1	1,767,430	1,000	55	492,810	120	7	443,840	0	0
7/8/2019	125,470	1,530	85	509,700	20	1	1,767,450	20	1	492,850	40	2	443,840	0	0
7/15/2019	127,790	2,320	128	509,700	0	0	1,767,520	70	4	492,870	20	1	443,840	0	0
7/22/2019	129,710	1,920	106	509,700	0	0	1,767,770	250	14	492,870	0	0	443,840	0	0
7/29/2019	131,580	1,870	104	509,710	10	1	1,768,520	750	42	493,140	270	15	443,840	0	0
8/5/2019	131,580	0	0	509,710	0	0	1,769,490	970	54	493,330	190	11	443,840	0	0
8/12/2019	135,690	4,110	228	509,710	0	0	1,770,470	980	54	493,630	300	17	443,840	0	0
8/19/2019	137,030	1,340	74	509,710	0	0	1,776,390	5,920	328	493,630	0	0	443,840	0	0
8/26/2019	140,100	3,070	170	509,710	0	0	1,780,730	4,340	240	494,060	430	24	443,840	0	0
9/2/2019	143,080	2,980	165	509,710	0	0	1,785,760	5,030	279	494,070	10	1	443,840	0	0
9/9/2019	145,580	2,500	138	511,840	2,130	118	1,788,070	2,310	128	494,070	0	0	443,840	0	0
9/16/2019	147,640	2,060	114	512,850	1,010	56	1,789,980	1,910	106	494,070	0	0	443,840	0	0
9/23/2019	148,280	640	35	512,870	20	1	1,790,330	350	19	494,070	0	0	443,840	0	0
9/30/2019	148,450	170	9	512,870	0	0	1,790,900	570	32	494,070	0	0	443,840	0	0
10/7/2019	148,610	160	9	512,870	0	0	1,791,400	500	28	494,080	10	1	443,840	0	0
10/14/2019	148,900	290	16	512,870	0	0	1,792,130	730	40	494,080	0	0	443,840	0	0
10/21/2019	149,060	160	9	512,870	0	0	1,793,270	1,140	63	494,080	0	0	443,840	0	0
10/28/2019	149,200	140	8	512,870	0	0	1,793,290	20	1	494,300	220	12	443,840	0	0
11/4/2019	149,240	40	2	512,870	0	0	1,793,290	0	0	494,300	0	0	443,840	0	0
11/11/2019	149,240	0	0	512,870	0	0	1,793,290	0	0	494,590	290	16	443,840	0	0
11/18/2019	149,240	0	0	512,870	0	0	1,793,290	0	0	494,930	340	19	443,840	0	0
11/25/2019	149,240	0	0	512,870	0	0	1,793,290	0	0	496,100	1,170	65	443,840	0	0
12/2/2019	149,240	0	0	512,870	0	0	1,793,290	0	0	497,780	1,680	93	443,840	0	0
12/9/2019	149,240	0	0	512,930	60	3	1,793,290	0	0	503,790	6,010	333	443,840	0	0
12/16/2019	149,240	0	0	512,930	0	0	1,793,290	0	0	510,280	6,490	359	443,840	0	0
12/23/2019	149,240	0	0	512,930	0	0	1,793,290	0	0	511,800	1,520	84	443,840	0	0
12/30/2019	149,240	0	0	512,930	0	0	1,793,290	0	0	511,800	0	0	443,840	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 exceed 775 are in bold.
 # = Pump Maintenance; pumps off line.

Table 3.1-6. Monthly Tailings Collection and Injection Totals

	Sumps (gallons)
July	268,830
August	213,110
September	262,570
October	209,290
November	197,240
December	243,340

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	10,374,015	6,818,167	1,887,700	5,682,280	0	2,136,720	0	904,400
August	7,789,706	2,113,950	1,089,600	2,643,195	0	3,617,805	0	0
September	9,749,769	2,503,788	1,221,100	3,801,070	0	675,930	0	0
October	6,997,534	1,917,552	1,471,600	3,929,375	0	736,625	0	0
November	9,613,448	2,492,330	1,378,200	1,175,760	0	434,240	0	2,291,400
December	8,901,310	5,945,240	1,902,300	1,969,800	0	643,200	0	1,875,400

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	13,430,290	3,401,170	302,340	4,959,400	0	411,500	0	6,938,000
August	8,388,395	1,246,440	37,425	3,235,290	0	806,710	0	4,611,300
September	10,647,210	1,018,190	17,350	4,144,195	0	318,905	0	5,739,800
October	11,359,325	1,174,890	228,025	3,848,015	0	284,185	0	5,660,000
November	12,687,390	461,070	99,540	4,356,920	0	241,880	0	4,776,000
December	16,187,788	2,436,030	304,725	5,896,905	0	618,295	0	7,235,000

Table 3.1-9. Treatment System Influent Monthly Totals (gallons)

	300 GPM Zeolite	1200 GPM Zeolite.	RO Plant
July	0	7,051,600	21,074,260
August	0	5,628,800	11,865,926
September	0	4,344,700	14,482,820
October	0	4,633,500	11,516,196
November	0	3,971,800	14,336,320
December	0	6,994,200	17,507,960

Table 3.1-10. Treatment System Effluent and Fresh Water Monthly Totals (gallons)

	Treatment Systems				Fresh Water Injection		
	Zeolite		RO Plant		On-Site	South Off-Site	North Off-Site
	Treated	Regeneration	Treated	Brine			
July	4,458,500	2,593,100	14,780,200	2,078,780	6,863,501	1,457,603	1,882,897
August	4,641,300	987,500	8,285,260	1,109,900	3,736,106	776,746	886,148
September	3,151,600	1,193,100	9,984,050	1,443,580	5,104,739	1,265,840	2,379,421
October	2,526,400	2,107,100	9,905,040	2,035,010	5,518,890	1,825,328	2,778,782
November	2,535,600	1,436,200	9,273,200	2,589,510	3,487,375	3,594,069	3,732,555
December	6,994,200	0	11,063,543	3,427,471	5,923,508	4,121,096	4,576,396

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
7/1/2019	39.10	40.50	54.35	35.40		45.35	43.60	43.30	44.30	44.10
7/8/2019	39.18	40.53	54.84	35.44	40.31	45.19	43.51	43.23	44.28	40.02
7/15/2019	39.35	41.10	55.20	39.20		45.40	43.55	42.30	44.40	44.10
7/22/2019	39.50	41.40	55.60	35.60	40.70	45.60	43.70	43.45	44.40	44.40
7/29/2019	39.50	39.65	55.47	35.75	39.52	45.43	43.63	43.45	44.40	44.13
8/5/2019	39.38	40.40	55.53	35.66	40.52	45.45	43.63	43.35	44.43	44.18
8/12/2019	39.39	40.57	55.58	35.70	40.63	45.52	43.69	43.51	44.49	44.24
8/19/2019	39.42	40.68	55.59	35.63	40.67	45.55	43.74	43.60	44.55	44.30
8/26/2019	39.40	40.27	54.05	37.73	40.85	45.24	44.32	43.30	44.63	44.30
9/2/2019	39.43	40.47	55.20	35.57	40.76	45.52	43.76	43.46	44.61	44.32
9/9/2019	39.33	40.20	53.88	37.68	40.90	45.35	43.80	43.50	44.63	44.35
9/16/2019	39.32	44.40	55.30	35.55	40.98	45.50	44.00	43.75	44.73	44.45
9/23/2019	39.45	40.67	55.42	35.70	41.00	45.70	44.00	44.40	44.85	44.55
9/30/2019	39.32	40.40	55.36	35.69	40.98	45.71	44.02	43.84	44.87	44.58
10/7/2019	39.22	40.46	55.25	35.61	41.03	45.82	44.14	43.95	44.91	44.66
10/14/2019	39.45	39.73	55.08	35.97	41.00	45.87	44.18	44.00	44.90	44.68
10/21/2019	39.34	40.79	54.92	35.88	39.98	45.84	44.21	44.03	44.97	44.74
10/28/2019	39.35	40.64	54.65	35.91	41.08	45.84	44.19	44.02	44.94	44.72
11/4/2019	39.29	40.53	54.79	35.93	41.18	45.96	44.22	44.08	45.97	44.78
11/11/2019	39.36	40.65	55.32	35.95	41.06	45.95	44.21	44.06	44.96	44.76
11/18/2019	39.35	40.58	55.52	35.98	41.08	46.06	44.23	44.06	44.97	44.78
11/25/2019	39.47	41.31	55.52	35.98	40.98	45.93	44.13	43.99	44.86	44.69
12/2/2019	39.72	41.61	55.97	36.06	41.57	46.07	44.37	44.03	45.01	44.82
12/9/2019	39.66	41.48	55.66	36.01	41.02	46.02	44.17	44.03	44.90	44.73
12/16/2019	40.00	41.75	55.90	36.10	41.20	46.03	44.36	44.60	45.05	45.85
12/23/2019	39.90	41.80	55.35	36.10	41.02	46.00	44.15	44.02	44.90	44.70
12/30/2019	39.97	42.00	55.40	36.15	41.15	46.12	44.22	44.10	45.00	44.80

**Table 3.4-1
Wells Drilled**

Table 3.4-1. Wells Drilled and Abandoned

Well Name	Restoration Area
Q51	South Felice

Wells Abandoned

Well Name	Restoration Area

Table 4.1-1
Water Quality Analysis for Well D1



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Revised Date: 08/28/19

Report Date: 08/23/19

Collection Date: 07/19/19 11:01

Date Received: 07/24/19

Matrix: Aqueous

Client: Homestake Mining Co
Project: Grants
Lab ID: C19071017-001
Client Sample ID: D1

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
175 Alkalinity, Total as CaCO3	309	mg/L		5		A2320 B	07/26/19 21:30 / dmb
206 Carbonate as CO3	<5	mg/L		5		A2320 B	07/26/19 21:30 / dmb
505 Bicarbonate as HCO3	377	mg/L		5		A2320 B	07/26/19 21:30 / dmb
007 Chloride	131	mg/L		1		E300.0	07/30/19 11:22 / ljl
108 Sulfate	843	mg/L	D	2		E300.0	07/30/19 11:22 / ljl
001 Calcium	195	mg/L		0.5		E200.7	07/26/19 12:21 / meh
002 Magnesium	41.2	mg/L		0.5		E200.7	07/26/19 12:21 / meh
003 Potassium	3.8	mg/L		0.5		E200.7	07/26/19 12:21 / meh
004 Sodium	291	mg/L		0.5		E200.7	07/26/19 12:21 / meh
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1790	mg/L	D	20		A2540 C	07/26/19 09:28 / kjp
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	1.2	mg/L		0.1		E353.2	07/25/19 12:08 / dmb
METALS, DISSOLVED							
036 Molybdenum	1.35	mg/L		0.001		E200.8	07/30/19 01:23 / jcg
040 Selenium	0.068	mg/L		0.001		E200.8	07/30/19 01:23 / jcg
015 Uranium	1.03	mg/L		0.0003		E200.8	07/30/19 01:23 / jcg
244 Uranium Precision (±)	0.166	mg/L	D	0.00005		E200.8	07/30/19 01:23 / jcg
113 Uranium, Activity	7.0E-07	uCi/mL	D	2.0E-10		E200.8	07/30/19 01:23 / jcg
114 Uranium, Activity precision (±)	1.1E-07	uCi/mL	D	3.0E-11		E200.8	07/30/19 01:23 / jcg
042 Vanadium	<0.01	mg/L		0.01		E200.8	07/30/19 01:23 / jcg
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.2	pCi/L	U			E903.0	08/20/19 17:53 / ajl
245 Radium 226 precision (±)	0.2	pCi/L				E903.0	08/20/19 17:53 / ajl
Radium 226 MDC	0.2	pCi/L				E903.0	08/20/19 17:53 / ajl
057 Radium 228	0.5	pCi/L	U			RA-05	08/15/19 18:12 / plj
257 Radium 228 precision (±)	1.1	pCi/L				RA-05	08/15/19 18:12 / plj
Radium 228 MDC	1.8	pCi/L				RA-05	08/15/19 18:12 / plj
048 Thorium 230	0.1	pCi/L				E908.0	08/08/19 15:14 / nsr
248 Thorium 230 precision (±)	0.05	pCi/L				E908.0	08/08/19 15:14 / nsr
Thorium 230 MDC	0.06	pCi/L				E908.0	08/08/19 15:14 / nsr
DATA QUALITY							
079 Solids, Total Dissolved - Calculated	1700	mg/L				A1030 E	07/31/19 18:02 / ttf
192 A/C Balance	-3.12	%				A1030 E	07/31/19 18:02 / ttf
194 Anions	27.5	meq/L				A1030 E	07/31/19 18:02 / ttf
195 Cations	25.9	meq/L				A1030 E	07/31/19 18:02 / ttf

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.



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LABORATORY ANALYTICAL REPORT
Prepared by Casper, WY Branch

Revised Date: 08/28/19

Report Date: 08/23/19

Collection Date: 07/19/19 11:01

Date Received: 07/24/19

Matrix: Aqueous

Client: Homestake Mining Co
Project: Grants
Lab ID: C19071017-001
Client Sample ID: D1

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.40	s.u.				FIELD	07/19/19 10:40 / ***

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

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

Table 4.1-2
Water Quality Analysis for Well DD



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C19081026-002

Client Sample ID: DD

Report Date: 09/03/19

Collection Date: 08/19/19 13:46

Date Received: 08/22/19

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	77	mg/L	D	2		E300.0	08/23/19 22:19 / dmb
108 Sulfate	2180	mg/L	D	8		E300.0	08/23/19 22:19 / dmb
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	3560	mg/L	D	40		A2540 C	08/22/19 16:18 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.001	mg/L		0.001		E200.8	08/29/19 20:30 / meh
040 Selenium	0.110	mg/L		0.001		E200.8	08/27/19 03:08 / jcg
015 Uranium	0.110	mg/L		0.0003		E200.8	08/27/19 03:08 / jcg
244 Uranium Precision (±)	0.0177	mg/L	D	0.00005		E200.8	08/27/19 03:08 / jcg
113 Uranium, Activity	7.4E-08	uCi/mL	D	2.0E-10		E200.8	08/27/19 03:08 / jcg
114 Uranium, Activity precision (±)	1.2E-08	uCi/mL	D	3.0E-11		E200.8	08/27/19 03:08 / jcg
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.03	s.u.				FIELD	08/19/19 13:46 / ***

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.



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19100535-002
Client Sample ID: DD

Report Date: 10/28/19
Collection Date: 10/08/19 13:05
Date Received: 10/10/19
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	74	mg/L		1		E300.0	10/15/19 21:01 / ljl
108 Sulfate	2060	mg/L	D	4		E300.0	10/15/19 21:01 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	3540	mg/L	D	40		A2540 C	10/11/19 16:42 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.001	mg/L		0.001		E200.8	10/21/19 16:58 / meh
040 Selenium	0.066	mg/L		0.001		E200.8	10/21/19 16:58 / meh
015 Uranium	0.124	mg/L		0.0003		E200.8	10/21/19 16:58 / meh
244 Uranium Precision (±)	0.0201	mg/L		0.00005		E200.8	10/21/19 16:58 / meh
113 Uranium, Activity	8.4E-08	uCi/mL		2.0E-10		E200.8	10/21/19 16:58 / meh
114 Uranium, Activity precision (±)	1.4E-08	uCi/mL		3.0E-11		E200.8	10/21/19 16:58 / meh
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	6.97	s.u.				FIELD	10/08/19 13:05 / ***

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 4.1-3
Water Quality Analyses for Well DD2



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19081026-003
Client Sample ID: DD2

Report Date: 09/03/19
Collection Date: 08/19/19 10:51
Date Received: 08/22/19
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	64	mg/L		1		E300.0	08/23/19 22:38 / dmb
108 Sulfate	1580	mg/L	D	4		E300.0	08/23/19 22:38 / dmb
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	2760	mg/L	D	20		A2540 C	08/22/19 16:18 / kjp
METALS, DISSOLVED							
036 Molybdenum	<0.001	mg/L		0.001		E200.8	08/29/19 20:34 / meh
040 Selenium	<0.001	mg/L		0.001		E200.8	08/27/19 03:12 / jcg
015 Uranium	0.236	mg/L		0.0003		E200.8	08/27/19 03:12 / jcg
244 Uranium Precision (±)	0.0381	mg/L	D	0.00005		E200.8	08/27/19 03:12 / jcg
113 Uranium, Activity	1.6E-07	uCi/mL	D	2.0E-10		E200.8	08/27/19 03:12 / jcg
114 Uranium, Activity precision (±)	2.6E-08	uCi/mL	D	3.0E-11		E200.8	08/27/19 03:12 / jcg
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.00	s.u.				FIELD	08/19/19 10:51 / ***

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.



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C19100535-004

Client Sample ID: DD2

Report Date: 10/28/19

Collection Date: 10/08/19 10:30

Date Received: 10/10/19

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	63	mg/L		1		E300.0	10/15/19 21:39 / jlj
108 Sulfate	1570	mg/L	D	4		E300.0	10/15/19 21:39 / jlj
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	2750	mg/L	D	20		A2540 C	10/11/19 16:46 / kjp
METALS, DISSOLVED							
036 Molybdenum	<0.001	mg/L		0.001		E200.8	10/21/19 17:24 / meh
040 Selenium	<0.001	mg/L		0.001		E200.8	10/21/19 17:24 / meh
015 Uranium	0.246	mg/L		0.0003		E200.8	10/21/19 17:24 / meh
244 Uranium Precision (±)	0.0398	mg/L		0.00005		E200.8	10/21/19 17:24 / meh
113 Uranium, Activity	1.7E-07	uCi/mL		2.0E-10		E200.8	10/21/19 17:24 / meh
114 Uranium, Activity precision (±)	2.7E-08	uCi/mL		3.0E-11		E200.8	10/21/19 17:24 / meh
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	6.91	s.u.				FIELD	10/08/19 10:30 / ***

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

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

Table 4.1-4
Water Quality Analyses for Well P

**Well P Was Not Sampled in
the 2nd Half of 2019**

Table 4.1-5
Water Quality Analyses for Well S4



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19080101-001
Client Sample ID: S4

Report Date: 09/04/19
Collection Date: 07/31/19 11:00
Date Received: 08/02/19
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
175 Alkalinity, Total as CaCO3	412	mg/L		5		A2320 B	08/07/19 12:10 / dmb
206 Carbonate as CO3	<5	mg/L		5		A2320 B	08/07/19 12:10 / dmb
505 Bicarbonate as HCO3	503	mg/L		5		A2320 B	08/07/19 12:10 / dmb
007 Chloride	137	mg/L		1		E300.0	08/07/19 15:18 / ljl
108 Sulfate	633	mg/L	D	2		E300.0	08/07/19 15:18 / ljl
001 Calcium	183	mg/L		0.5		E200.7	08/06/19 19:55 / jcg
002 Magnesium	45.5	mg/L		0.5		E200.7	08/06/19 19:55 / jcg
003 Potassium	4.4	mg/L		0.5		E200.7	08/06/19 19:55 / jcg
004 Sodium	251	mg/L		0.5		E200.7	08/06/19 19:55 / jcg
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1590	mg/L	D	20		A2540 C	08/06/19 08:46 / kjp
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	1.1	mg/L		0.1		E353.2	08/06/19 14:49 / dmb
METALS, DISSOLVED							
036 Molybdenum	0.378	mg/L		0.001		E200.8	08/09/19 09:18 / jcg
040 Selenium	0.043	mg/L		0.001		E200.8	08/09/19 09:18 / jcg
015 Uranium	0.122	mg/L		0.0003		E200.8	08/09/19 09:18 / jcg
244 Uranium Precision (±)	0.0197	mg/L		0.00005		E200.8	08/09/19 09:18 / jcg
113 Uranium, Activity	8.3E-08	uCi/mL		2.0E-10		E200.8	08/09/19 09:18 / jcg
114 Uranium, Activity precision (±)	1.3E-08	uCi/mL		3.0E-11		E200.8	08/09/19 09:18 / jcg
042 Vanadium	<0.01	mg/L		0.01		E200.8	08/09/19 09:18 / jcg
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.2	pCi/L				E903.0	08/26/19 14:06 / ajl
245 Radium 226 precision (±)	0.1	pCi/L				E903.0	08/26/19 14:06 / ajl
Radium 226 MDC	0.2	pCi/L				E903.0	08/26/19 14:06 / ajl
057 Radium 228	1.2	pCi/L	U			RA-05	08/20/19 15:25 / plj
257 Radium 228 precision (±)	1.1	pCi/L				RA-05	08/20/19 15:25 / plj
Radium 228 MDC	1.5	pCi/L				RA-05	08/20/19 15:25 / plj
048 Thorium 230	-0.008	pCi/L	U			E908.0	08/21/19 16:07 / nsr
248 Thorium 230 precision (±)	0.04	pCi/L				E908.0	08/21/19 16:07 / nsr
Thorium 230 MDC	0.09	pCi/L				E908.0	08/21/19 16:07 / nsr
DATA QUALITY							
079 Solids, Total Dissolved - Calculated	1500	mg/L				A1030 E	08/09/19 10:27 / tlf
192 A/C Balance	-3.03	%				A1030 E	08/09/19 10:27 / tlf
194 Anions	25.4	meq/L				A1030 E	08/09/19 10:27 / tlf
195 Cations	23.9	meq/L				A1030 E	08/09/19 10:27 / tlf

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

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



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19080101-001
Client Sample ID: S4

Report Date: 09/04/19
Collection Date: 07/31/19 11:00
Date Received: 08/02/19
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.36	s.u.				FIELD	07/31/19 11:00 / ***

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

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

Table 4.1-6
Water Quality Analyses for Well X



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Report Date: 09/05/19

Collection Date: 07/31/19 14:00

Date Received: 08/02/19

Matrix: Aqueous

Client: Homestake Mining Co
Project: Grants
Lab ID: C19080105-001
Client Sample ID: X

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
175 Alkalinity, Total as CaCO3	251	mg/L		5		A2320 B	08/07/19 12:26 / dmb
206 Carbonate as CO3	<5	mg/L		5		A2320 B	08/07/19 12:26 / dmb
505 Bicarbonate as HCO3	307	mg/L		5		A2320 B	08/07/19 12:26 / dmb
007 Chloride	110	mg/L		1		E300.0	08/07/19 16:54 / ljl
108 Sulfate	468	mg/L	D	2		E300.0	08/07/19 16:54 / ljl
001 Calcium	153	mg/L		0.5		E200.7	08/06/19 20:25 / jcg
002 Magnesium	33.5	mg/L		0.5		E200.7	08/06/19 20:25 / jcg
003 Potassium	4.6	mg/L		0.5		E200.7	08/06/19 20:25 / jcg
004 Sodium	154	mg/L		0.5		E200.7	08/06/19 20:25 / jcg
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1150	mg/L		10		A2540 C	08/06/19 08:48 / kjp
NUTRIENTS							
310 Nitrogen, Nitrate+Nitrite as N	1.4	mg/L		0.1		E353.2	08/06/19 14:52 / dmb
METALS, DISSOLVED							
036 Molybdenum	0.122	mg/L		0.001		E200.8	08/09/19 10:21 / jcg
040 Selenium	0.033	mg/L		0.001		E200.8	08/09/19 10:21 / jcg
015 Uranium	0.0479	mg/L		0.0003		E200.8	08/09/19 10:21 / jcg
244 Uranium Precision (±)	0.00773	mg/L		0.00005		E200.8	08/09/19 10:21 / jcg
113 Uranium, Activity	3.2E-08	uCi/mL		2.0E-10		E200.8	08/09/19 10:21 / jcg
114 Uranium, Activity precision (±)	5.2E-09	uCi/mL		3.0E-11		E200.8	08/09/19 10:21 / jcg
042 Vanadium	0.01	mg/L		0.01		E200.7	08/06/19 20:25 / jcg
RADIONUCLIDES, DISSOLVED							
045 Radium 226	0.2	pCi/L	U			E903.0	09/03/19 13:10 / ajl
245 Radium 226 precision (±)	0.1	pCi/L				E903.0	09/03/19 13:10 / ajl
Radium 226 MDC	0.2	pCi/L				E903.0	09/03/19 13:10 / ajl
057 Radium 228	-0.5	pCi/L	U			RA-05	08/26/19 16:17 / trs
257 Radium 228 precision (±)	1.2	pCi/L				RA-05	08/26/19 16:17 / trs
Radium 228 MDC	2.1	pCi/L				RA-05	08/26/19 16:17 / trs
048 Thorium 230	-0.03	pCi/L	U			E908.0	08/21/19 16:07 / nsr
248 Thorium 230 precision (±)	0.03	pCi/L				E908.0	08/21/19 16:07 / nsr
Thorium 230 MDC	0.08	pCi/L				E908.0	08/21/19 16:07 / nsr
DATA QUALITY							
079 Solids, Total Dissolved - Calculated	1100	mg/L				A1030 E	08/09/19 10:28 / ttf
192 A/C Balance	-2.29	%				A1030 E	08/09/19 10:28 / ttf
194 Anions	18.0	meq/L				A1030 E	08/09/19 10:28 / ttf
195 Cations	17.2	meq/L				A1030 E	08/09/19 10:28 / ttf

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.



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Project: Grants

Lab ID: C19080105-001

Client Sample ID: X

Report Date: 09/05/19

Collection Date: 07/31/19 14:00

Date Received: 08/02/19

Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.46	s.u.				FIELD	07/31/19 14:00 / ***

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

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



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19100535-001
Client Sample ID: X

Report Date: 10/28/19
Collection Date: 10/08/19 14:11
Date Received: 10/10/19
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	108	mg/L		1		E300.0	10/15/19 20:41 / ljl
108 Sulfate	441	mg/L	D	2		E300.0	10/15/19 20:41 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1110	mg/L		10		A2540 C	10/11/19 16:42 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.105	mg/L		0.001		E200.8	10/21/19 16:53 / meh
040 Selenium	0.026	mg/L		0.001		E200.8	10/21/19 16:53 / meh
015 Uranium	0.0530	mg/L		0.0003		E200.8	10/21/19 16:53 / meh
244 Uranium Precision (±)	0.00855	mg/L		0.00005		E200.8	10/21/19 16:53 / meh
113 Uranium, Activity	3.6E-08	uCi/mL		2.0E-10		E200.8	10/21/19 16:53 / meh
114 Uranium, Activity precision (±)	5.8E-09	uCi/mL		3.0E-11		E200.8	10/21/19 16:53 / meh
CLIENT PROVIDED FIELD PARAMETERS							
109 Field pH	7.16	s.u.				FIELD	10/08/19 14:11 / ***

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.



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19100922-001
Client Sample ID: X

Report Date: 11/21/19
Collection Date: 10/18/19 13:19
Date Received: 10/22/19
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	105	mg/L		1		E300.0	10/25/19 05:31 / ljl
108 Sulfate	424	mg/L	D	2		E300.0	10/25/19 05:31 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1100	mg/L		10		A2540 C	10/23/19 17:41 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.107	mg/L		0.001		E200.8	11/02/19 18:30 / meh
040 Selenium	0.022	mg/L		0.001		E200.8	10/31/19 23:26 / meh
015 Uranium	0.0480	mg/L		0.0003		E200.8	10/31/19 23:26 / meh
244 Uranium Precision (±)	0.00775	mg/L		0.00005		E200.8	10/31/19 23:26 / meh
113 Uranium, Activity	3.3E-08	uCi/mL		2.0E-10		E200.8	10/31/19 23:26 / meh
114 Uranium, Activity precision (±)	5.3E-09	uCi/mL		3.0E-11		E200.8	10/31/19 23:26 / meh

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

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



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C19100922-002
Client Sample ID: 9999

Report Date: 11/21/19
Collection Date: 10/18/19 13:49
Date Received: 10/22/19
Matrix: Aqueous

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
MAJOR IONS							
007 Chloride	105	mg/L		1		E300.0	10/25/19 05:50 / ljl
108 Sulfate	425	mg/L	D	2		E300.0	10/25/19 05:50 / ljl
PHYSICAL PROPERTIES							
010 Solids, Total Dissolved TDS @ 180 C	1100	mg/L		10		A2540 C	10/23/19 17:41 / kjp
METALS, DISSOLVED							
036 Molybdenum	0.105	mg/L		0.001		E200.8	10/30/19 19:51 / meh
040 Selenium	0.020	mg/L		0.001		E200.8	10/30/19 19:51 / meh
015 Uranium	0.0546	mg/L		0.0003		E200.8	10/30/19 19:51 / meh
244 Uranium Precision (±)	0.00881	mg/L		0.00005		E200.8	10/30/19 19:51 / meh
113 Uranium, Activity	3.7E-08	uCi/mL		2.0E-10		E200.8	10/30/19 19:51 / meh
114 Uranium, Activity precision (±)	6.0E-09	uCi/mL		3.0E-11		E200.8	10/30/19 19:51 / meh

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

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

Table 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	7/17/19	25.90	8.75	7463	41	55.1	418	356	83	7.7	1690	3260	5940	3.8
	10/10/19	13.80	8.77	7116			367					3030	5470	
Evap Pond 1	7/18/19	20.30	9.18	28190	317	96.8	1920	983	334	37	8180	15500	27300	2
	10/10/19	13.20	9.61	35530			2460					20600	34800	
Evap Pond 2	7/18/19	20.00	9.00	20220	130	115	1340	610	245	21	5050	10500	18600	3
	10/10/19	13.40	8.78	23070			1510					12400	21400	
Evap Pond 3A	7/18/19	23.00	9.35	86660	5370	79.6	16900	6200	664	227	29700	31300	104000	1.4
	10/10/19	14.60	9.39	42380			5110					20300	42100	
Evap Pond 3B	7/18/19	23.30	9.36	80210	5530	76.8	13300	6440	635	174	26900	27200	72500	<0.1
	10/10/19	14.60	9.48	49430			6060					23900	50800	
W Coll Pond	7/17/19	23.70	9.15	6023	28	36.9	233	96	69.3	3.9	1380	2680	4690	6.8

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	372	48	42
E Coll Pond	7/17/19	0.02	0.482	0.482	16.9	17.6	6.7	6.92	1.8	1.2	3	0.7	<0.01
	10/10/19		0.475	0.489	16.5	16.3	6.19	6.11					
Evap Pond 1	7/18/19	0.05	0.659	0.737	65.9	70	38	34.3	2.8	2.4	5.2	0.8	0.03
	10/10/19		0.618	0.564	41.8	75.4	40.2	38.9					
Evap Pond 2	7/18/19	0.05	0.621	0.643	47.8	48.7	18.3	19.3	1.6	0.4	2	0.4	0.03
	10/10/19		0.452	0.515	46.3	48.5	23.2	22.1					
Evap Pond 3A	7/18/19	<0.06	0.73	0.7	412	425	199	197	11.2	4.6	15.8	73.3	0.07
	10/10/19		0.578	0.528	141	149	63.2	62.1					
Evap Pond 3B	7/18/19	<0.06	0.59	0.61	346	362	183	200	10.9	9.2	20.1	62.9	0.06
	10/10/19		0.611	0.594	164	187	99.3	68.5					
W Coll Pond	7/17/19	0.002	0.543	0.553	13.6	13.1	4.56	4.74	0.2	-0.2	0.2	0.2	<0.01

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								250				
Qal aquifer												
D1	7/19/19	43.13	13.60	7.40	2291	<5	195	131	377	41.2	3.8	291
DD	8/19/19	48.62	14.70	7.03	3634			77				
	10/8/19	48.59	13.40	6.97	3886			74				
DD2	8/19/19	46.14	13.80	7.00	3024			64				
	10/8/19	46.06	12.40	6.91	3160			63				
P	No Sample in the 2nd Half of 2019											
S4	7/31/19	41.47	14.60	7.36	2153	<5	183	731	503	45.5	4.4	251
X	7/31/19	33.56	15.11	7.46	1588	<5	153	110	307	33.5	4.6	154
	10/8/19	33.73	15.10	7.16	1582			108				
	10/18/19	33.78	15.30	7.39	1519			105				
	10/18/19#							105				

= Quality Control Sample

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)
Parameter Code		8	10	39	40	36	15	45	57	372	48	42
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
D1	7/19/19	843	1790	1.2	0.068	1.35	1.030	0.2	0.5	0.70	0.1	<0.01
DD	8/19/19	2180	3560		0.11	0.001	0.110					
	10/8/19	2060	3540		0.066	0.001	0.124					
DD2	8/19/19	1580	2760		<0.001	<0.001	0.236					
	10/8/19	1570	2750		<0.001	<0.001	0.246					
P	No Sample in the 2nd Half of 2019											
S4	7/31/19	63	1590	1.1	0.043	0.378	0.1220	0.20	1.20	1.40	-0.008	<0.01
X	7/31/19	468	1150	1.4	0.033	0.122	0.0479	0.2	-0.5	0.2	-0.03	<0.01
	10/8/19	441	1110		0.026	0.105	0.0530					
	10/18/19	424	1100		0.022	0.107	0.0480					
	10/18/19#	425	1100		0.02	0.105	0.0546					

= Quality Control Sample

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	7/31/2019	12.50	6.44	268	<5	16.4	20	48	5.3	1	27
	8/21/2019	21.90	6.69	2671	<5	199	197	300	60.7	9.7	282
	9/25/2019	17.50	5.85	53	<5	1.5	4	7	<0.5	<0.5	8
	10/30/2019	13.7	7.54	1454	<5		128				
	11/26/2019	15	6.89	1934	<5	186	176	436	59.6	10.1	234
	12/26/2019	16.8	7.37	2146	<5	176	175	433	57.7	9.1	218

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	372	48	42
Site Standard		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
Post Treatment Tank												
SP2	7/31/2019	53	156	0.7	<0.001	0.01	0.00	<0.2	1.5	<2.7	<0.07	<0.01
	8/21/2019	940	1930	1.7	0.021	0.01	0.02	0.2	0.9	<1.6	<0.1	<0.01
	9/25/2019	8	38	0.9	<0.001	0.01	0.00	<0.2	1.2	<3	<0.1	<0.01
	10/30/2019	416	1130		0.004	0.01	0.01					
	11/28/2019	567	1520	1.4	0.002	0.01	0.01	<0.1	0.8	<1.7	<0.1	<0.01
	12/26/2019	566	1540	1.4	0.005	0.01	0.01	0.3	1.1	<2.1	<0.2	<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							250				
RO Product											
RO SP1	7/31/2019	13.7	5.98	34	<5	<0.5	4	5	<0.5	<0.5	6.4
	8/21/2019	13.5	6.27	34	<5	8.4	11	25	2.7	<0.5	17.1
	9/25/2019	17.9	6.73	32	<5	<0.5	3	7	<0.5	<0.5	6.1
	10/30/2019	14.8	9.39	31			4				
	11/26/2019	14.4	6.08	38	<5	<0.5	3	9	<0.5	<0.5	7.9
12/26/2019	16.1	10.48	131	20	0.8	3	<5	<0.5	<0.5	19.6	
Zeolite Treated Water											
300Z	NO 2019 OPERATION										
1200Z Trains 1&2	10/16/2019	14	6.15	2503			164				
1200Z Trains 3&4	7/23/2019	18.3	5.73	2356			161				
	8/8/2019	18.4	5.95	2462			160				
	8/15/2019	18.9	5.6	2405			156				
	8/21/2019	18.1	5.57	2411			158				
	9/12/2019	18.7	5.78	2517			164				
	9/18/2019	16.9	5.85	2434			160				
12/11/2019	13	5.95	2598			172					

Concentrations greater than site standards are in bold.

f = field measurement

Table 4.3-2. Treated Water Quality, cont.

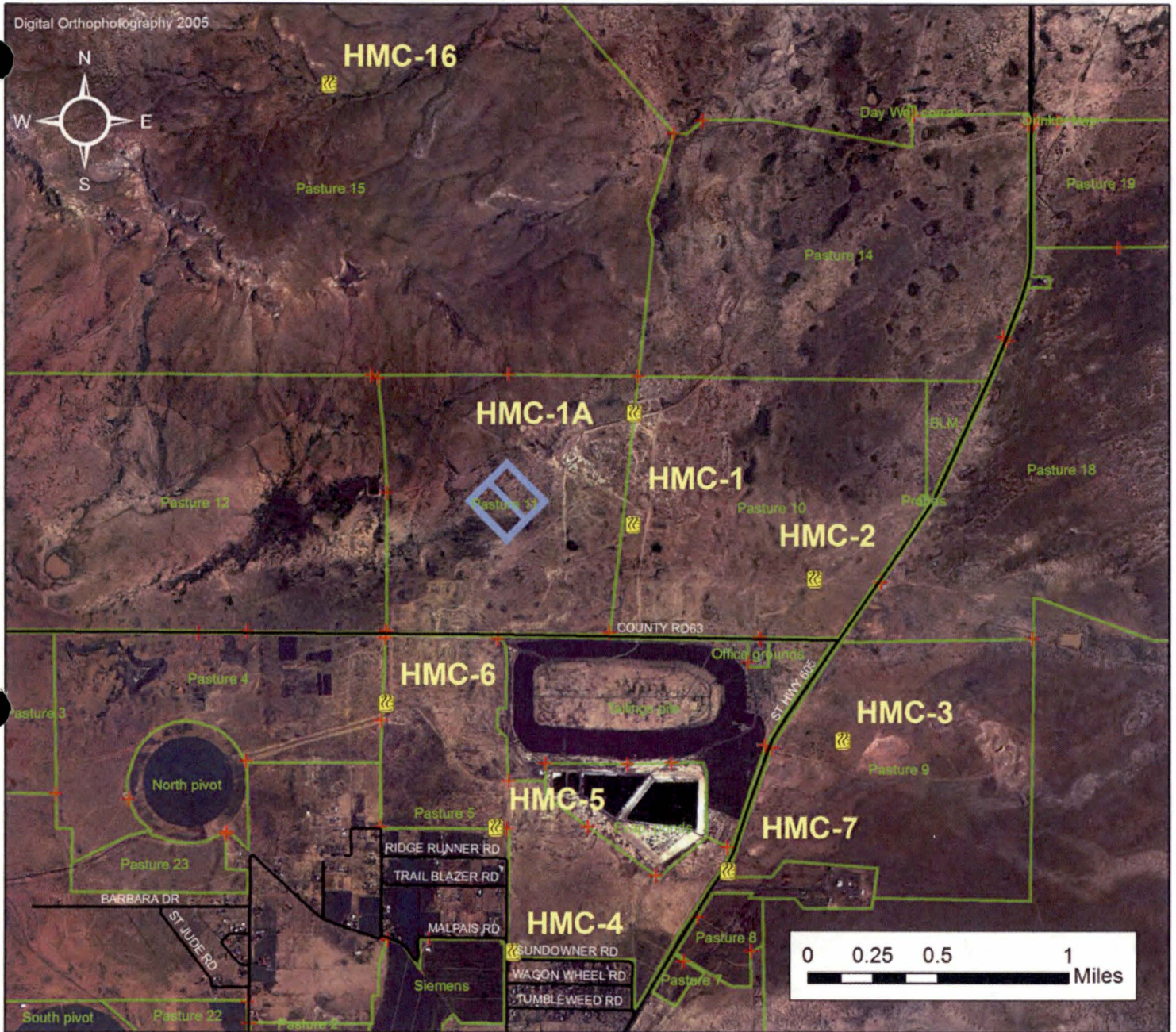
Sample Point Name	Date	SO4 (mg/L)	TDS (mg/L)	NO3 (mg/L)	Se (mg/L)	Mo (mg/L)	Unat (mg/L)	Ra226 (pCi/L)	Ra228 (pCi/L)	Ra226+ Ra228 (pCi/L)	Th230 (pCi/L)	V (mg/L)
Parameter Code		8	10	39	40	36	15	45	57	372	48	42
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
RO Product												
RO SP1	7/31/2019	3	19	0.5	<0.001	0.017	0.0015	0.3	<2.1	<2.4	<0.03	<0.01
	8/21/2019	32	94	0.6	<0.001	0.012	0.009	0.2	<1.5	<1.7	<0.1	<0.01
	9/25/2019	2	24	0.7	<0.001	0.01	0.0018	<0.2	2.7	<2.8	<0.1	<0.01
	10/30/2019	2	25		<0.001	0.015	0.0006					
	11/26/2019	5	26	0.5	0.001	0.029	0.0105	<0.2	1.3	<1.5	<0.1	<0.01
12/26/2019	4	65	0.4	<0.001	0.046	0.0136	<0.2	<1.9	<2.1	<0.2	<0.01	
Zeolite Treated Water												
300Z		NO 2019 OPERATION										
1200Z Trains 1&2	10/16/2019	1090	1990		0.046	0.045	0.0293					
1200Z Trains 3&4	7/23/2019	1070	1900		0.038	0.01	0.0311					
	8/8/2019	1050	1950		0.038	0.005	0.0362					
	8/15/2019	1030	1890		0.039	0.005	0.0183					
	8/21/2019	1040	1900		0.027	0.01	0.0158					
	9/12/2019	1080	2030		0.034	0.008	0.0123					
	9/18/2019	1050	1960		0.04	0.007	0.0181					
12/11/2019	1160	2040		0.046	0.014	0.0374						

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



Attachment 1
High Volume Air Sampling Results
(second half of 2019)



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ANALYTICAL SUMMARY REPORT

November 11, 2019

Homestake Mining Co
Hwy 605
Grants, NM 87020

Work Order: C19100407 Quote ID: C5150
Project Name: Hi-Vol Filters

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 10/8/2019 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C19100407-001	HMC-1	07/02/19 00:00	10/08/19	Filter	Metals by ICP/ICPMS, Total Composite of two or more samples Client Provided Field Parameters Metals, Total Digestion, Total Metals Digestion, Total Metals, Radiochemistry Radiochemistry Air Filter Compliance Calculations RAD-AIR, Routine Radiological Reports RAD Alternate Unit Reporting Air Filters Radium 226 Thorium, Isotopic
C19100407-002	HMC-1A	07/02/19 00:00	10/08/19	Filter	Same As Above
C19100407-003	HMC-2	07/02/19 00:00	10/08/19	Filter	Same As Above
C19100407-004	HMC-3	07/02/19 00:00	10/08/19	Filter	Same As Above
C19100407-005	HMC-4	07/02/19 00:00	10/08/19	Filter	Same As Above
C19100407-006	HMC-5	07/02/19 00:00	10/08/19	Filter	Same As Above
C19100407-007	HMC-6	07/02/19 00:00	10/08/19	Filter	Same As Above
C19100407-008	HMC-7	07/02/19 00:00	10/08/19	Filter	Same As Above

The analyses presented in this report were performed by 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. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

If you have any questions regarding these test results, please contact your Project Manager .

Report Approved By:



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C19100407-001
Client Sample ID: HMC-1

Report Date: 11/11/19
Collection Date: 07/02/19
Date Received: 10/08/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/02/19 15:00 / meh
METALS, IN AIR							
Uranium	1.9E-09	mg/L		1.5E-10		SW6020	11/02/19 15:00 / meh
Uranium, Activity	1.3E-15	uCi/mL		1.0E-16		SW6020	11/02/19 15:00 / meh
RADIONUCLIDES - IN AIR							
Radium 226	2.4E-17	uCi/mL				E903.0	10/28/19 11:42 / ajl
Radium 226 precision (±)	1.2E-17	uCi/mL				E903.0	10/28/19 11:42 / ajl
Radium 226 MDC	1.5E-17	uCi/mL				E903.0	10/28/19 11:42 / ajl
Thorium 230	8.0E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 precision (±)	1.5E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 MDC	1.7E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.6	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 precision (±)	1.7	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 MDC	2.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230	1.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 precision (±)	0.22	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 MDC	0.25	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Uranium, Activity	187	pCi/Filter		0.20		RADCALC	11/09/19 17:21 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	11/09/19 17:21 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/09/19 17:21 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/09/19 17:21 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, % of EFF	1.4E+00	%				RADCALC	11/09/19 17:21 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.47E+08	L				FIELD	07/02/19 00:00 / ***

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



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 11, 2019

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
C19100407-001	^{nat} U	1.3E-15	N/A	N/A	1E-16	9E-14	1.4E+00
Third Quarter 2019 Air Volume in mLs 1.47E+11	²³⁰ Th	8E-18	2E-18	2E-18	1E-16	3E-14	3E-02
	²²⁶ Ra	2E-17	1E-17	2E-17	1E-16	9E-13	3E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C19100407-002
Client Sample ID: HMC-1A

Report Date: 11/11/19
Collection Date: 07/02/19
Date Received: 10/08/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/02/19 15:31 / meh
METALS, IN AIR							
Uranium	8.5E-10	mg/L		1.5E-10		SW6020	11/02/19 15:31 / meh
Uranium, Activity	5.8E-16	uCi/mL		1.0E-16		SW6020	11/02/19 15:31 / meh
RADIONUCLIDES - IN AIR							
Radium 226	3.4E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 precision (±)	1.4E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 MDC	1.5E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Thorium 230	8.1E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 precision (±)	1.5E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 MDC	1.7E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	5.0	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 precision (±)	2.1	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 MDC	2.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230	1.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 precision (±)	0.23	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 MDC	0.25	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Uranium, Activity	85.5	pCi/Filter		0.20		RADCALC	11/09/19 17:21 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	11/09/19 17:21 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/09/19 17:21 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/09/19 17:21 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, % of EFF	6.4E-01	%				RADCALC	11/09/19 17:21 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.48E+08	L				FIELD	07/02/19 00:00 / ***

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

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



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 11, 2019

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
C19100407-002	^{nat} U	6E-16	N/A	N/A	1E-16	9E-14	6E-01
Third Quarter 2019 Air Volume in mLs 1.48E+11	²³⁰ Th	8E-18	2E-18	2E-18	1E-16	3E-14	3E-02
	²²⁶ Ra	3E-17	1E-17	1E-17	1E-16	9E-13	4E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C19100407-003
Client Sample ID: HMC-2

Report Date: 11/11/19
Collection Date: 07/02/19
Date Received: 10/08/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/02/19 15:35 / meh
METALS, IN AIR							
Uranium	5.1E-10	mg/L		1.5E-10		SW6020	11/02/19 15:35 / meh
Uranium, Activity	3.5E-16	uCi/mL		1.0E-16		SW6020	11/02/19 15:35 / meh
RADIONUCLIDES - IN AIR							
Radium 226	2.1E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 precision (±)	1.2E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 MDC	1.5E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Thorium 230	7.4E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 precision (±)	1.4E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 MDC	2.0E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 precision (±)	1.9	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 MDC	2.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230	1.1	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 precision (±)	0.21	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 MDC	0.30	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Uranium, Activity	52.7	pCi/Filter		0.20		RADCALC	11/09/19 17:21 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.0E-03	%				RADCALC	11/09/19 17:21 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/09/19 17:21 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, % of EFF	2.0E-02	%				RADCALC	11/09/19 17:21 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, % of EFF	3.8E-01	%				RADCALC	11/09/19 17:21 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.52E+08	L				FIELD	07/02/19 00:00 / ***

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



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 11, 2019

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
C19100407-003	^{nat} U	3E-16	N/A	N/A	1E-16	9E-14	4E-01
Third Quarter 2019 Air Volume in mLs 1.52E+11	²³⁰ Th	7E-18	1E-18	2E-18	1E-16	3E-14	2E-02
	²²⁶ Ra	2E-17	1E-17	1E-17	1E-16	9E-13	2E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C19100407-004
Client Sample ID: HMC-3

Report Date: 11/11/19
Collection Date: 07/02/19
Date Received: 10/08/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/02/19 15:39 / meh
METALS, IN AIR							
Uranium	8.3E-10	mg/L		1.5E-10		SW6020	11/02/19 15:39 / meh
Uranium, Activity	5.6E-16	uCi/mL		1.0E-16		SW6020	11/02/19 15:39 / meh
RADIONUCLIDES - IN AIR							
Radium 226	2.3E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 precision (±)	1.1E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 MDC	1.4E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Thorium 230	1.0E-17	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 precision (±)	2.0E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 MDC	1.8E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.5	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 precision (±)	1.7	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 MDC	2.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230	1.6	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 precision (±)	0.30	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 MDC	0.27	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Uranium, Activity	85.7	pCi/Filter		0.20		RADCALC	11/09/19 17:21 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	11/09/19 17:21 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/09/19 17:21 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/09/19 17:21 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, % of EFF	6.3E-01	%				RADCALC	11/09/19 17:21 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.52E+08	L				FIELD	07/02/19 00:00 / ***

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

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



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 11, 2019

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
C19100407-004	^{nat} U	6E-16	N/A	N/A	1E-16	9E-14	6E-01
Third Quarter 2019 Air Volume in mLs 1.52E+11	²³⁰ Th	1E-17	2E-18	2E-18	1E-16	3E-14	3E-02
	²²⁶ Ra	2E-17	1E-17	1E-17	1E-16	9E-13	3E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C19100407-005
Client Sample ID: HMC-4

Report Date: 11/11/19
Collection Date: 07/02/19
Date Received: 10/08/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/02/19 15:43 / meh
METALS, IN AIR							
Uranium	1.3E-09	mg/L		1.5E-10		SW6020	11/02/19 15:43 / meh
Uranium, Activity	8.7E-16	uCi/mL		1.0E-16		SW6020	11/02/19 15:43 / meh
RADIONUCLIDES - IN AIR							
Radium 226	4.6E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 precision (±)	2.6E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 MDC	2.7E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Thorium 230	1.4E-17	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 precision (±)	2.7E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 MDC	5.6E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.9	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 precision (±)	2.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 MDC	2.3	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230	1.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 precision (±)	0.23	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 MDC	0.48	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Uranium, Activity	74.9	pCi/Filter		0.20		RADCALC	11/09/19 17:21 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	5.0E-03	%				RADCALC	11/09/19 17:21 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/09/19 17:21 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, % of EFF	5.0E-02	%				RADCALC	11/09/19 17:21 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, % of EFF	9.7E-01	%				RADCALC	11/09/19 17:21 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	8.57E+07	L				FIELD	07/02/19 00:00 / ***

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 11, 2019

SAMPLE ID: HMC-4

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. ⁺ $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C19100407-005 Third Quarter 2019 Air Volume in mLs 8.57E+10	^{nat} U	9E-16	N/A	N/A	1E-16	9E-14	1E+00
	²³⁰ Th	1E-17	3E-18	6E-18	1E-16	3E-14	5E-02
	²²⁶ Ra	5E-17	3E-17	3E-17	1E-16	9E-13	5E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C19100407-006
Client Sample ID: HMC-5

Report Date: 11/11/19
Collection Date: 07/02/19
Date Received: 10/08/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/02/19 15:48 / meh
METALS, IN AIR							
Uranium	1.6E-09	mg/L		1.5E-10		SW6020	11/02/19 15:48 / meh
Uranium, Activity	1.1E-15	uCi/mL		1.0E-16		SW6020	11/02/19 15:48 / meh
RADIONUCLIDES - IN AIR							
Radium 226	3.5E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 precision (±)	1.4E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Radium 226 MDC	1.7E-17	uCi/mL				E903.0	10/28/19 11:41 / ajl
Thorium 230	8.2E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 precision (±)	1.6E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 MDC	2.1E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	4.7	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 precision (±)	1.9	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 MDC	2.2	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230	1.1	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 precision (±)	0.21	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 MDC	0.28	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Uranium, Activity	140	pCi/Filter		0.20		RADCALC	11/09/19 17:21 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	11/09/19 17:21 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/09/19 17:21 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, % of EFF	3.0E-02	%				RADCALC	11/09/19 17:21 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, % of EFF	1.2E+00	%				RADCALC	11/09/19 17:21 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.33E+08	L				FIELD	07/02/19 00:00 / ***

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



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 11, 2019

SAMPLE ID: HMC-5

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D. ⁺ $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C19100407-006	^{nat} U	1.1E-15	N/A	N/A	1E-16	9E-14	1.2E+00
Third Quarter 2019	²³⁰ Th	8E-18	2E-18	2E-18	1E-16	3E-14	3E-02
Air Volume in mLs 1.33E+11	²²⁶ Ra	4E-17	1E-17	2E-17	1E-16	9E-13	4E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C19100407-007
Client Sample ID: HMC-6

Report Date: 11/11/19
Collection Date: 07/02/19
Date Received: 10/08/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/02/19 15:52 / meh
METALS, IN AIR							
Uranium	6.2E-10	mg/L		1.5E-10		SW6020	11/02/19 15:52 / meh
Uranium, Activity	4.2E-16	uCi/mL		1.0E-16		SW6020	11/02/19 15:52 / meh
RADIONUCLIDES - IN AIR							
Radium 226	3.1E-17	uCi/mL				E903.0	10/28/19 11:42 / ajl
Radium 226 precision (±)	1.3E-17	uCi/mL				E903.0	10/28/19 11:42 / ajl
Radium 226 MDC	1.7E-17	uCi/mL				E903.0	10/28/19 11:42 / ajl
Thorium 230	6.8E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 precision (±)	2.2E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
Thorium 230 MDC	2.2E-18	uCi/mL				E908.0	10/31/19 16:21 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	4.1	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 precision (±)	1.8	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Radium 226 MDC	2.3	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230	0.91	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 precision (±)	0.29	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Thorium 230 MDC	0.29	pCi/Filter				RADCALC	11/09/19 17:21 / sec
Uranium, Activity	55.9	pCi/Filter		0.20		RADCALC	11/09/19 17:21 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	11/09/19 17:21 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/09/19 17:21 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, % of EFF	2.0E-02	%				RADCALC	11/09/19 17:21 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, % of EFF	4.7E-01	%				RADCALC	11/09/19 17:21 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/09/19 17:21 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/09/19 17:21 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.33E+08	L				FIELD	07/02/19 00:00 / ***

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

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



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 11, 2019

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
C19100407-007	^{nat} U	4E-16	N/A	N/A	1E-16	9E-14	5E-01
Third Quarter 2019 Air Volume in mLs 1.33E+11	²³⁰ Th	7E-18	2E-18	2E-18	1E-16	3E-14	2E-02
	²²⁶ Ra	3E-17	1E-17	2E-17	1E-16	9E-13	3E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



LABORATORY ANALYTICAL REPORT
Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Hi-Vol Filters
Lab ID: C19100407-008
Client Sample ID: HMC-7

Report Date: 11/11/19
Collection Date: 07/02/19
Date Received: 10/08/19
Matrix: Filter

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	11/02/19 15:56 / meh
METALS, IN AIR							
Uranium	0.00087	mg/L	L	0.00028		SW6020	11/02/19 15:56 / meh
Uranium, Activity	5.9E-10	uCi/mL	L	1.9E-10		SW6020	11/02/19 15:56 / meh
RADIONUCLIDES - IN AIR							
Radium 226	2.3E-09	uCi/mL				E903.0	10/28/19 11:42 / aji
Radium 226 precision (±)	1.3E-09	uCi/mL				E903.0	10/28/19 11:42 / aji
Radium 226 MDC	2.3E-09	uCi/mL				E903.0	10/28/19 11:42 / aji
Thorium 230	3.3E-10	uCi/mL				E908.0	11/06/19 16:00 / nsr
Thorium 230 precision (±)	1.9E-10	uCi/mL				E908.0	11/06/19 16:00 / nsr
Thorium 230 MDC	2.6E-10	uCi/mL				E908.0	11/06/19 16:00 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	2.1	pCi/Filter	U			RADCALC	11/06/19 10:57 / sec
Radium 226 precision (±)	1.3	pCi/Filter				RADCALC	11/06/19 10:57 / sec
Radium 226 MDC	2.2	pCi/Filter				RADCALC	11/06/19 10:57 / sec
Thorium 230	2.2	pCi/Filter				RADCALC	11/06/19 10:57 / sec
Thorium 230 precision (±)	0.41	pCi/Filter				RADCALC	11/06/19 10:57 / sec
Thorium 230 MDC	1.5	pCi/Filter				RADCALC	11/06/19 10:57 / sec
Uranium, Activity	0.56	pCi/Filter		0.20		RADCALC	11/06/19 10:57 / sec
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.5E+05	%				RADCALC	11/11/19 15:04 / sec
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	11/11/19 15:04 / sec
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	11/11/19 15:04 / sec
Thorium 230, % of EFF	1.1E+06	%				RADCALC	11/11/19 15:04 / sec
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	11/11/19 15:04 / sec
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	11/11/19 15:04 / sec
Uranium Natural, % of EFF	6.5E+05	%				RADCALC	11/11/19 15:04 / sec
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	11/11/19 15:04 / sec
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	11/11/19 15:04 / sec
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1	L				FIELD	07/02/19 00:00 / ***

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

MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
L - Lowest available reporting limit for the analytical method used.



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: November 11, 2019

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
C19100407-008	^{nat} U	2E-18	N/A	N/A	1E-16	9E-14	3E-03
Third Quarter 2019 Air Volume in mLs 2.46E+11	²³⁰ Th	9E-18	2E-18	6E-18	1E-16	3E-14	3E-02
	²²⁶ Ra	9E-18	5E-18	9E-18	1E-16	9E-13	1E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Work Order: C19100407

Report Date: 11/09/19

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020 Analytical Run: ICPMS5-C_191101A										
Lab ID: QCS	2	Initial Calibration Verification Standard								11/01/19 18:58
Uranium		0.0180	mg/L	0.00030	90	90	110			
Vanadium		0.0477	mg/L	0.010	95	90	110			
Lab ID: ICSA	2	Interference Check Sample A								11/01/19 19:43
Uranium		1.17E-05	mg/L	0.00030						
Vanadium		2.27E-05	mg/L	0.010						
Lab ID: IC SAB	2	Interference Check Sample AB								11/01/19 19:48
Uranium		9.14E-07	mg/L	0.00030						
Vanadium		0.0196	mg/L	0.010						
Method: SW6020 Batch: 55549										
Lab ID: MB-55549		Method Blank								Run: ICPMS5-C_191101A 11/02/19 14:48
Uranium		0.0003	mg/L	0.0001						
Lab ID: LCS2-55549		Laboratory Control Sample								Run: ICPMS5-C_191101A 11/02/19 14:52
Uranium		0.0936	mg/L	0.00014	89	85	115			
Lab ID: C19100407-001ADIL		Serial Dilution								Run: ICPMS5-C_191101A 11/02/19 15:19
Uranium		1.91E-09	mg/L	1.5E-10		0	0	1.8		20
Lab ID: C19100407-001APDS		Post Digestion/Distillation Spike								Run: ICPMS5-C_191101A 11/02/19 15:23
Uranium		2.19E-09	mg/L	1.5E-10		75	125			A
Method: SW6020 Batch: 55560										
Lab ID: C19100407-001BDIL		Serial Dilution								Run: ICPMS5-C_191101A 11/02/19 15:19
Vanadium		0.038	mg/filter	0.10		0	0			10
Lab ID: C19100407-001BPDS		Post Digestion/Distillation Spike								Run: ICPMS5-C_191101A 11/02/19 15:23
Vanadium		0.084	mg/filter	0.10	94	85	115			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

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

MDC - Minimum detectable concentration



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Work Order: C19100407

Report Date: 11/09/19

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0 Batch: 55549										
Lab ID: LCS-55549		Laboratory Control Sample								10/28/19 11:42
Radium 226		98.5	pCi/L	99		80	120			
Lab ID: MB-55549	3	Method Blank								10/28/19 11:42
Radium 226		0.3	pCi/L							U
Radium 226 precision (±)		0.3	pCi/L							
Radium 226 MDC		0.4	pCi/L							
Lab ID: C19100407-001AMS		Sample Matrix Spike								10/28/19 11:41
Radium 226		1.35E-06	pCi/L	103		70	130			
Lab ID: C19100407-001AMSD		Sample Matrix Spike Duplicate								10/28/19 11:41
Radium 226		1.35E-06	pCi/L	103		70	130	0.2	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Work Order: C19100407

Report Date: 11/09/19

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0 Batch: 55549										
Lab ID: MB-55549	3	Method Blank								
Thorium 230		0.1	pCi/L							U
Thorium 230 precision (±)		0.2	pCi/L							
Thorium 230 MDC		0.3	pCi/L							
Lab ID: LCS-55549		Laboratory Control Sample								
Thorium 230		51.1	pCi/L	107		80	120			10/31/19 16:21
Lab ID: C19100407-008AMS		Sample Matrix Spike								
Thorium 230		91.4	pCi/L	91		70	130			10/31/19 16:21
Lab ID: C19100407-008AMSD		Sample Matrix Spike Duplicate								
Thorium 230		104	pCi/L	102		70	130	12		10/31/19 16:21

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration



Work Order Receipt Checklist

Homestake Mining Co

C19100407

Login completed by: Dorian Quis

Date Received: 10/8/2019

Reviewed by: Steve Carlston

Received by: amm

Reviewed Date: 10/10/2019

Carrier name: NDA

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

Standard Reporting Procedures:

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

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

Contact and Corrective Action Comments:

None



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Chain of Custody & Analytical Request Record

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Page 1 of 1

Account Information (Billing information)

Company/Name Homestake Mining Company
 Contact Kyle Martinez
 Phone 1-505-287-1606
 Mailing Address P.O. Box 98
 City, State, Zip Grants, NM, 87030
 Email kmartinez1@barrick.com
 Receive Invoice Hard Copy Email Receive Report Hard Copy Email
 Purchase Order Quote Bottle Order

Report Information (if different than Account Information)

Company/Name
 Contact
 Phone SAME
 Mailing Address
 City, State, Zip
 Email
 Receive Report Hard Copy Email
 Special Report/Formats:
 LEVEL IV NELAC EDD/EDT (contact laboratory) Other

Comments

TR# 1282235889
55068220

Project Information

Project Name, PWSID, Permit, etc. GRANTS
 Sampler Name Kyle Martinez Sampler Phone 1-505-287-1606
 Sample Origin State NM EPA/State Compliance Yes No
 URANIUM MINING CLIENTS MUST indicate sample type.
 NOT Source or Byproduct Material
 Source/Processed Ore (Ground or Refined) **CALL BEFORE SENDING
 11e.(2) Byproduct Material (Can ONLY be Submitted to ELI Casper Location)

Matrix Codes

- A - Air
- W - Water
- S - Soils/Solids
- V - Vegetation
- B - Bioassay
- O - Other
- DW - Drinking Water

Analysis Requested

	Total Uranium	Total RA226	Total TH230	Total Vanadium									
1	X	X	X	X									
2	X	X	X	X									
3	X	X	X	X									
4	X	X	X	X									
5	X	X	X	X									
6	X	X	X	X									
7	X	X	X	X									
8	X	X	X	X									
9													
10													

See Attached

All turnaround times are standard unless marked as RUSH.
 Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling - See Instructions Page

Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers	Matrix (See Codes Above)	Total Uranium	Total RA226	Total TH230	Total Vanadium												RUSH TAT	ELI LAB ID		
	Date	Time																					
1 HMC-1	3rd	Qtr			X	X	X	X														1.47E+11	
2 HMC-1A					X	X	X	X															1.48E+11
3 HMC-2					X	X	X	X															1.52E+11
4 HMC-3	20	19			X	X	X	X															1.52E+11
5 HMC-4					X	X	X	X															9.57E+10
6 HMC-5					X	X	X	X															1.33E+11
7 HMC-6		Composite			X	X	X	X															1.33E+11
8 HMC-7					X	X	X	X															N/A
9																							C19100407
10																							

Custody Record MUST be signed
 Relinquished by (print) Kyle Martinez Date/Time 10-7-19/1000 Signature [Signature]
 Relinquished by (print) _____ Date/Time _____ Signature _____
 Received by (print) [Signature] Date/Time 10/8/19 Signature [Signature]

LABORATORY USE ONLY

Shipped By _____ Cooler ID(s) _____ Custody Seals Y N C B _____ Intact Y N _____ Receipt Temp °C _____ Temp Blank Y N _____ On Ice Y N _____ Payment Type CC Cash Check _____ Amount \$ _____ Receipt Number (cash/check only) _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This carries no notice of this possibility. All subcontracted data will be clearly noted on your analytical report.

Page 22 of 23

Dori Quis

From: Tracey Archer <tarcher@energylab.com>
Sent: Wednesday, October 09, 2019 2:58 PM
To: Dori / Dorian Quis
Subject: FW: Hi-Vol Filters - Collection Date

Dori-
Please use the start date below for the Homestake Filters.
Tracey

From: Chuck Farr [<mailto:ChuckFarr@ERGOFFICE.COM>]
Sent: Wednesday, October 09, 2019 2:09 PM
To: Tracey Archer
Subject: RE: Hi-Vol Filters - Collection Date

Tracy – Kyle and I just looked this up.

Filter Collection Start: 7/2/2019
Filter Collection Stop: 10/3/2019

Hopefully this helps.

Chuck Farr
ERG

*** NOTICE *** This communication may contain confidential and/or privileged information for use only by the individual to which it is addressed. If you have received this communication in error, please immediately notify the sender and delete this e-mail and any attachments. Thank you.***

From: Tracey Archer <tarcher@energylab.com>
Sent: Wednesday, October 9, 2019 1:29 PM
To: Chuck Farr <ChuckFarr@ERGOFFICE.COM>
Subject: FW: Hi-Vol Filters - Collection Date

Chuck,
Can you help me with this?
Tracey

From: Tracey Archer [<mailto:tarcher@energylab.com>]
Sent: Tuesday, October 08, 2019 3:00 PM
To: Martinez, Kyle (kmartinez1@barrick.com)
Subject: Hi-Vol Filters - Collection Date

Hi Kyle,
What are the collection dates for the samples on the attached COC?
Tracey

Tracey L. Archer
Project Manager – Casper & Gillette Locations
400 W Boxelder Rd
Gillette, WY 82718



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ANALYTICAL SUMMARY REPORT

February 05, 2020

Homestake Mining Co
Hwy 605
Grants, NM 87020

Work Order: C20010179 Quote ID: C5748

Project Name: Grants

Energy Laboratories, Inc. Casper WY received the following 8 samples for Homestake Mining Co on 1/7/2020 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C20010179-001	HMC-1	12/31/19 00:00	01/07/20	Air	Metals by ICP/ICPMS, Total Composite of two or more samples Client Provided Field Parameters Metals, Total Digestion, Total Metals Digestion, Total Metals, Radiochemistry Radiochemistry Air Filter Compliance Calculations RAD-AIR, Routine Radiological Reports RAD Alternate Unit Reporting Air Filters Radium 226 Thorium, Isotopic
C20010179-002	HMC-1A	12/31/19 00:00	01/07/20	Air	Same As Above
C20010179-003	HMC-2	12/31/19 00:00	01/07/20	Air	Same As Above
C20010179-004	HMC-3	12/31/19 00:00	01/07/20	Air	Same As Above
C20010179-005	HMC-4	12/31/19 00:00	01/07/20	Air	Same As Above
C20010179-006	HMC-5	12/31/19 00:00	01/07/20	Air	Same As Above
C20010179-007	HMC-6	12/31/19 00:00	01/07/20	Air	Same As Above
C20010179-008	HMC-7	12/31/19 00:00	01/07/20	Air	Same As Above

The analyses presented in this report were performed by 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. Any issues encountered during sample receipt are documented in the Work Order Receipt Checklist.

The results as reported relate only to the item(s) submitted for testing. This report shall be used or copied only in its entirety. Energy Laboratories, Inc. is not responsible for the consequences arising from the use of a partial report.

If you have any questions regarding these test results, please contact your Project Manager.

Report Approved By:



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Report Date: 02/05/20

Collection Date: 12/31/19

Date Received: 01/07/20

Matrix: Air

Client: Homestake Mining Co
Project: Grants
Lab ID: C20010179-001
Client Sample ID: HMC-1

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/20/20 17:32 / meh
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	01/17/20 14:01 / meh
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	01/17/20 14:01 / meh
RADIONUCLIDES - IN AIR							
Radium 226	2.6E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 precision (±)	1.2E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 MDC	1.5E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Thorium 230	5.5E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 precision (±)	1.9E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 MDC	2.2E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	3.8	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 precision (±)	1.8	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 MDC	2.2	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230	0.81	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 precision (±)	0.28	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 MDC	0.32	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Uranium, Activity	20.0	pCi/Filter		0.20		RADCALC	01/31/20 15:07 / dmf
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	3.0E-03	%				RADCALC	02/05/20 10:43 / dmf
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/05/20 10:43 / dmf
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, % of EFF	2.0E-04	%				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.47E08	L				FIELD	12/31/19 00:00 / sec

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



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CASPER, WY

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PO Box 247, Casper, WY 82602-0247 • 2393 Salt Creek Hwy (82601)

HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: February 5, 2020

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
C20010179-001	^{nat} U	1E-16	N/A	N/A	1E-16	9E-14	2E-01
Fourth Quarter 2019 Air Volume in mLs 1.47E+11	²³⁰ Th	6E-18	2E-18	2E-18	1E-16	3E-14	2E-02
	²²⁶ Ra	3E-17	1E-17	1E-17	1E-16	9E-13	3E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C20010179-002
Client Sample ID: HMC-1A

Report Date: 02/05/20
Collection Date: 12/31/19
Date Received: 01/07/20
Matrix: Air

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/20/20 17:50 / meh
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	01/17/20 14:22 / meh
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	01/17/20 14:22 / meh
RADIONUCLIDES - IN AIR							
Radium 226	3.6E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 precision (±)	1.6E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 MDC	1.8E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Thorium 230	5.6E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 precision (±)	1.7E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 MDC	1.4E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	5.1	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 precision (±)	2.3	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 MDC	2.6	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230	0.78	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 precision (±)	0.24	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 MDC	0.19	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Uranium, Activity	18.6	pCi/Filter		0.20		RADCALC	01/31/20 15:07 / dmf
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	02/05/20 10:43 / dmf
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/05/20 10:43 / dmf
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, % of EFF	1.0E-04	%				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.40E08	L				FIELD	12/31/19 00:00 / sec

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: February 5, 2020

SAMPLE ID: HMC-1A

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D.* $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C20010179-002 Fourth Quarter 2019 Air Volume in mLs 1.40E+11	^{nat} U	1E-16	N/A	N/A	1E-16	9E-14	1E-01
	²³⁰ Th	6E-18	2E-18	1E-18	1E-16	3E-14	2E-02
	²²⁶ Ra	4E-17	2E-17	2E-17	1E-16	9E-13	4E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C20010179-003
Client Sample ID: HMC-2

Report Date: 02/05/20
Collection Date: 12/31/19
Date Received: 01/07/20
Matrix: Air

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/20/20 17:54 / meh
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	01/17/20 14:27 / meh
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	01/17/20 14:27 / meh
RADIONUCLIDES - IN AIR							
Radium 226	3.9E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 precision (±)	1.6E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 MDC	1.5E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Thorium 230	7.1E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 precision (±)	1.4E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 MDC	1.5E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	6.3	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 precision (±)	2.6	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 MDC	2.4	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230	1.1	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 precision (±)	0.22	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 MDC	0.24	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Uranium, Activity	6.3	pCi/Filter		0.20		RADCALC	01/31/20 15:07 / dmf
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	02/05/20 10:43 / dmf
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/05/20 10:43 / dmf
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, % of EFF	4.0E-05	%				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.60E08	L				FIELD	12/31/19 00:00 / sec

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: February 5, 2020

SAMPLE ID: HMC-2

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D.* $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C20010179-003	^{nat} U	4E-17	N/A	N/A	1E-16	9E-14	4E-02
Fourth Quarter 2019 Air Volume in mLs 1.60E+11	²³⁰ Th	7E-18	1E-18	1E-18	1E-16	3E-14	2E-02
	²²⁶ Ra	4E-17	2E-17	2E-17	1E-16	9E-13	4E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C20010179-004
Client Sample ID: HMC-3

Report Date: 02/05/20
Collection Date: 12/31/19
Date Received: 01/07/20
Matrix: Air

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/20/20 18:15 / meh
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	01/17/20 14:31 / meh
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	01/17/20 14:31 / meh
RADIONUCLIDES - IN AIR							
Radium 226	3.9E-17	uCi/mL				E903.0	01/29/20 10:51 / aji
Radium 226 precision (±)	1.5E-17	uCi/mL				E903.0	01/29/20 10:51 / aji
Radium 226 MDC	1.6E-17	uCi/mL				E903.0	01/29/20 10:51 / aji
Thorium 230	6.3E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 precision (±)	1.7E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 MDC	1.6E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	5.8	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 precision (±)	2.2	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 MDC	2.4	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230	0.94	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 precision (±)	0.26	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 MDC	0.23	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Uranium, Activity	35.6	pCi/Filter		0.20		RADCALC	01/31/20 15:07 / dmf
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	4.0E-03	%				RADCALC	02/05/20 10:43 / dmf
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/05/20 10:43 / dmf
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, % of EFF	3.0E-04	%				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.48E08	L				FIELD	12/31/19 00:00 / sec

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: February 5, 2020

SAMPLE ID: HMC-3

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D.* $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C20010179-004	^{nat} U	2E-16	N/A	N/A	1E-16	9E-14	3E-01
Fourth Quarter 2019 Air Volume in mLs 1.48E+11	²³⁰ Th	6E-18	2E-18	2E-18	1E-16	3E-14	2E-02
	²²⁶ Ra	4E-17	1E-17	2E-17	1E-16	9E-13	4E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C20010179-005
Client Sample ID: HMC-4

Report Date: 02/05/20
Collection Date: 12/31/19
Date Received: 01/07/20
Matrix: Air

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/20/20 18:20 / meh
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	01/17/20 14:35 / meh
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	01/17/20 14:35 / meh
RADIONUCLIDES - IN AIR							
Radium 226	5.2E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 precision (±)	2.0E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 MDC	2.0E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Thorium 230	5.2E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 precision (±)	1.7E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 MDC	1.5E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	6.0	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 precision (±)	2.3	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 MDC	2.3	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230	0.60	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 precision (±)	0.19	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 MDC	0.17	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Uranium, Activity	16.7	pCi/Filter		0.20		RADCALC	01/31/20 15:07 / dmf
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	6.0E-03	%				RADCALC	02/05/20 10:43 / dmf
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/05/20 10:43 / dmf
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, % of EFF	2.0E-04	%				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.16E08	L				FIELD	12/31/19 00:00 / sec

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: February 5, 2020

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
C20010179-005	^{nat} U	1E-16	N/A	N/A	1E-16	9E-14	2E-01
Fourth Quarter 2019 Air Volume in mLs 1.16E+11	²³⁰ Th	5E-18	2E-18	1E-18	1E-16	3E-14	2E-02
	²²⁶ Ra	5E-17	2E-17	2E-17	1E-16	9E-13	6E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C20010179-006
Client Sample ID: HMC-5

Report Date: 02/05/20
Collection Date: 12/31/19
Date Received: 01/07/20
Matrix: Air

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/20/20 18:24 / meh
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	01/17/20 14:40 / meh
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	01/17/20 14:40 / meh
RADIONUCLIDES - IN AIR							
Radium 226	5.4E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 precision (±)	2.0E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 MDC	1.7E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Thorium 230	7.2E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 precision (±)	1.4E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 MDC	2.3E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	7.2	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 precision (±)	2.7	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 MDC	2.3	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230	0.97	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 precision (±)	0.18	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 MDC	0.30	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Uranium, Activity	28.0	pCi/Filter		0.20		RADCALC	01/31/20 15:07 / dmf
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	6.0E-03	%				RADCALC	02/05/20 10:43 / dmf
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, % of EFF	2.0E-02	%				RADCALC	02/05/20 10:43 / dmf
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, % of EFF	2.0E-04	%				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.34E08	L				FIELD	12/31/19 00:00 / sec

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: February 5, 2020

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
C20010179-006	^{nat} U	2E-16	N/A	N/A	1E-16	9E-14	2E-01
Fourth Quarter 2019 Air Volume in mLs 1.34E+11	²³⁰ Th	7E-18	1E-18	2E-18	1E-16	3E-14	2E-02
	²²⁶ Ra	5E-17	2E-17	2E-17	1E-16	9E-13	6E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C20010179-007
Client Sample ID: HMC-6

Report Date: 02/05/20
Collection Date: 12/31/19
Date Received: 01/07/20
Matrix: Air

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/20/20 18:28 / meh
METALS, IN AIR							
Uranium	<1.5E-10	mg/L		1.5E-10		SW6020	01/17/20 14:44 / meh
Uranium, Activity	<1.0E-16	uCi/mL		1.0E-16		SW6020	01/17/20 14:44 / meh
RADIONUCLIDES - IN AIR							
Radium 226	5.2E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 precision (±)	1.9E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 MDC	1.8E-17	uCi/mL				E903.0	01/29/20 10:51 / ajl
Thorium 230	1.0E-17	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 precision (±)	2.0E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 MDC	2.1E-18	uCi/mL				E908.0	01/30/20 14:31 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	6.9	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 precision (±)	2.5	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 MDC	2.3	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230	1.4	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 precision (±)	0.26	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 MDC	0.28	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Uranium, Activity	7.2	pCi/Filter		0.20		RADCALC	01/31/20 15:07 / dmf
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	6.0E-03	%				RADCALC	02/05/20 10:43 / dmf
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, % of EFF	3.0E-02	%				RADCALC	02/05/20 10:43 / dmf
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, % of EFF	6.0E-05	%				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1.32E08	L				FIELD	12/31/19 00:00 / sec

Report Definitions: RL - Analyte Reporting Limit
QCL - Quality Control Limit

MCL - Maximum Contaminant Level
ND - Not detected at the Reporting Limit (RL)



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - HI-Vol Filters
PROJECT: Grants
REPORT DATE: February 5, 2020

SAMPLE ID: HMC-6

Quarter/Date Sampled Air Volume	Radionuclide	Concentration $\mu\text{Ci/mL}$	Counting Precision $\mu\text{Ci/mL}$	MDC $\mu\text{Ci/mL}$	L.L.D.* $\mu\text{Ci/mL}$	Effluent Conc.* $\mu\text{Ci/mL}$	% Effluent Concentration
C20010179-007 Fourth Quarter 2019 Air Volume in mLs 1.32E+11	^{nat} U	5E-17	N/A	N/A	1E-16	9E-14	6E-02
	²³⁰ Th	1E-17	2E-18	2E-18	1E-16	3E-14	3E-02
	²²⁶ Ra	5E-17	2E-17	2E-17	1E-16	9E-13	6E-03

+LLD's are from NRC Reg. Guide 4.14

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

Year for Natural Uranium

Year for Thorium-230

Week for Radium-226

Day for Lead-210



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LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Homestake Mining Co
Project: Grants
Lab ID: C20010179-008
Client Sample ID: HMC-7

Report Date: 02/05/20
Collection Date: 12/31/19
Date Received: 01/07/20
Matrix: Air

Analyses	Result	Units	Qual	MCL/		Method	Analysis Date / By
				RL	QCL		
METALS, TOTAL							
Vanadium	<0.10	mg/filter		0.10		SW6020	01/20/20 18:33 / meh
METALS, IN AIR							
Uranium	0.00050	mg/L	L	0.00014		SW6020	01/16/20 23:24 / meh
Uranium, Activity	3.4E-10	uCi/mL	DL	9.3E-11		SW6020	01/16/20 23:24 / meh
RADIONUCLIDES - IN AIR							
Radium 226	1.9E-09	uCi/mL	U			E903.0	01/29/20 10:51 / ajl
Radium 226 precision (±)	1.6E-09	uCi/mL				E903.0	01/29/20 10:51 / ajl
Radium 226 MDC	2.7E-09	uCi/mL				E903.0	01/29/20 10:51 / ajl
Thorium 230	3.6E-10	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 precision (±)	1.7E-10	uCi/mL				E908.0	01/30/20 14:31 / nsr
Thorium 230 MDC	2.1E-10	uCi/mL				E908.0	01/30/20 14:31 / nsr
RADIONUCLIDES - IN AIR - PER FILTER							
Radium 226	1.8	pCi/Filter	U			RADCALC	01/31/20 15:07 / dmf
Radium 226 precision (±)	1.5	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Radium 226 MDC	2.6	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230	0.35	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 precision (±)	0.17	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Thorium 230 MDC	0.20	pCi/Filter				RADCALC	01/31/20 15:07 / dmf
Uranium, Activity	0.32	pCi/Filter		0.20		RADCALC	01/31/20 15:07 / dmf
RADIOCHEMISTRY AIR FILTER COMPLIANCE							
Radium 226, % of EFF	2.1E+05	%				RADCALC	02/05/20 10:43 / dmf
Radium 226, EFF Week	9.0E-13	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Radium 226, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, % of EFF	1.2E+06	%				RADCALC	02/05/20 10:43 / dmf
Thorium 230, EFF Year	3.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Thorium 230, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, % of EFF	3.8E+05	%				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, EFF Year	9.0E-14	uCi/mL				RADCALC	02/05/20 10:43 / dmf
Uranium Natural, LLD	1.0E-16	uCi/mL				RADCALC	02/05/20 10:43 / dmf
CLIENT PROVIDED FIELD PARAMETERS							
Air Filtering Volume	1	L				FIELD	12/31/19 00:00 / sec

Report Definitions:
 RL - Analyte Reporting Limit
 QCL - Quality Control Limit
 D - Reporting Limit (RL) increased due to sample matrix

MCL - Maximum Contaminant Level
 ND - Not detected at the Reporting Limit (RL)
 L - Lowest available reporting limit for the analytical method used



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: Homestake Mining Co - Hi-Vol Filters
PROJECT: Grants
REPORT DATE: February 5, 2020

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
C20010179-008 Fourth Quarter 2019 Air Volume in mLs 1.40E+11	^{nat} U	2E-18	N/A	N/A	1E-16	9E-14	3E-03
	²³⁰ Th	2E-18	1E-18	1E-18	1E-16	3E-14	8E-03
	²²⁶ Ra	1E-17	1E-17	2E-17	1E-16	9E-13	1E-03

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



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Work Order: C20010179

Report Date: 02/05/20

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020 Analytical Run: ICPMS5-C_200116A										
Lab ID: QCS		Initial Calibration Verification Standard								
Uranium		0.0186	mg/L	0.00030	93	90	110			01/16/20 12:14
Lab ID: ICSA Interference Check Sample A										
Uranium		1.33E-05	mg/L	0.00030						01/16/20 12:49
Lab ID: ICSAB Interference Check Sample AB										
Uranium		1.28E-05	mg/L	0.00030						01/16/20 12:53
Method: SW6020 Batch: 56470										
Lab ID: MB-56470		Method Blank								
Uranium		ND	mg/L	0.0001						Run: ICPMS5-C_200116A 01/16/20 21:49
Lab ID: LCS2-56470 Laboratory Control Sample										
Uranium		0.0472	mg/L	0.00013	97	70	130			Run: ICPMS5-C_200116A 01/16/20 21:53
Lab ID: C20010045-001ADIL Serial Dilution										
Uranium		4.75E-11	mg/L	1.5E-10		0	0			Run: ICPMS5-C_200116A 01/16/20 22:23 20 N
Lab ID: C20010045-001APDS Post Digestion/Distillation Spike										
Uranium		1.05E-09	mg/L	1.5E-10	91	75	125			Run: ICPMS5-C_200116A 01/16/20 22:27
Method: SW6020 Analytical Run: ICPMS5-C_200117A										
Lab ID: QCS		Initial Calibration Verification Standard								
Uranium		0.0187	mg/L	0.00030	93	90	110			01/17/20 12:08
Lab ID: ICSA Interference Check Sample A										
Uranium		1.44E-05	mg/L	0.00030						01/17/20 12:43
Lab ID: ICSAB Interference Check Sample AB										
Uranium		1.25E-05	mg/L	0.00030						01/17/20 12:47
Method: SW6020 Batch: 56470										
Lab ID: MB-56470		Method Blank								
Uranium		ND	mg/L	0.0001						Run: ICPMS5-C_200117A 01/17/20 13:52

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

N - Analyte concentration was not sufficiently high to calculate a Relative Percent Difference (RPD) for the serial dilution test



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Work Order: C20010179

Report Date: 02/05/20

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual	
Method: SW6020								Analytical Run: ICPMS5-C_200120A			
Lab ID: QCS	Initial Calibration Verification Standard										
Vanadium		0.0476	mg/L	0.010	95	90	110			01/20/20 11:00	
Lab ID: ICSA	Interference Check Sample A										
Vanadium		-0.000158	mg/L	0.010						01/20/20 11:35	
Lab ID: ICSAB	Interference Check Sample AB										
Vanadium		0.0192	mg/L	0.010						01/20/20 11:39	
Method: SW6020								Batch: 56473			
Lab ID: MB-56473	Method Blank										
Vanadium		0.0002	mg/filter	0.0002						Run: ICPMS5-C_200120A 01/20/20 17:19	
Lab ID: LCS2-56473	Laboratory Control Sample										
Vanadium		0.049	mg/filter	0.10	98	70	130			Run: ICPMS5-C_200120A 01/20/20 17:24	
Lab ID: C20010179-001BDIL	Serial Dilution										
Vanadium		0.022	mg/filter	0.10		0	0			Run: ICPMS5-C_200120A 01/20/20 17:37 10	
Lab ID: C20010179-001BPDS	Post Digestion/Distillation Spike										
Vanadium		0.069	mg/filter	0.10	95	85	115			Run: ICPMS5-C_200120A 01/20/20 17:41	

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Work Order: C20010179

Report Date: 02/05/20

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0 Batch: 56470										
Lab ID: LCS-56470	3	Laboratory Control Sample								01/29/20 10:51
Radium 226		107	pCi/L	107		80	120			
Radium 226 precision (±)		21.1	pCi/L							
Radium 226 MDC		2.54	pCi/L							
Lab ID: MB-56470	3	Method Blank								01/29/20 10:51
Radium 226		0.3	pCi/L							U
Radium 226 precision (±)		0.3	pCi/L							
Radium 226 MDC		0.5	pCi/L							
Lab ID: C20010179-001ADUP	3	Sample Duplicate								01/29/20 10:51
Radium 226		4.02E-11	pCi/L					200	20	R
Radium 226 precision (±)		1.80E-11	pCi/L							
Radium 226 MDC		3.17E-11	pCi/L							

- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than the limit of 2.0.

Qualifiers:

RL - Analyte Reporting Limit

R - Relative Percent Difference (RPD) exceeds advisory limit

ND - Not detected at the Reporting Limit (RL)

U - Not detected at Minimum Detectable Concentration (MDC)



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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Homestake Mining Co

Work Order: C20010179

Report Date: 02/05/20

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0 Batch: R255184										
Lab ID: LCS-56423	3	Laboratory Control Sample								
Thorium 230		46.4	pCi/L	102		80	120			
Thorium 230 precision (±)		8.81	pCi/L							
Thorium 230 MDC		0.401	pCi/L							
Lab ID: MB-56470	3	Method Blank								
Thorium 230		1	pCi/L							
Thorium 230 precision (±)		0.2	pCi/L							
Thorium 230 MDC		0.9	pCi/L							
Lab ID: C20010179-008ADUP	3	Sample Duplicate								
Thorium 230		0.451	pCi/L					21	20	R
Thorium 230 precision (±)		0.179	pCi/L							
Thorium 230 MDC		0.156	pCi/L							

- Duplicate RPD is outside of the acceptance range for this analysis. However, the RER is less than the limit of 2.0.

Qualifiers:

RL - Analyte Reporting Limit

ND - Not detected at the Reporting Limit (RL)

R - Relative Percent Difference (RPD) exceeds advisory limit



Work Order Receipt Checklist

Homestake Mining Co

C20010179

Login completed by: Dorian Quis

Date Received: 1/7/2020

Reviewed by: Steve Carlston

Received by: CCP

Reviewed Date: 1/14/2020

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 n/a
- 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



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Chain of Custody & Analytical Request Record

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Account Information (Billing information)

Company/Name Homestake Mining Company
 Contact Kyle Martinez
 Phone 1-505-287-1606
 Mailing Address P.O. Box 98
 City, State, Zip Grants, NM, 87020
 Email kmartinez1@barrick.com
 Receive Invoice Hard Copy Email Receive Report Hard Copy Email
 Purchase Order Quote Bottle Order

Report Information (if different than Account Information)

Company/Name
 Contact
 Phone
 Mailing Address SAME
 City, State, Zip
 Email
 Receive Report Hard Copy Email
 Special Report/Formats:
 LEVEL IV NELAC EDD/EDT (contact laboratory) Other _____

Comments

TR # 1282235284
 56909866

Project Information

Project Name, PWSID, Permit, etc. Grants
 Sampler Name Kyle Martinez Sampler Phone 1-505-287-1606
 Sample Origin State NM EPA/State Compliance Yes No
 URANIUM MINING CLIENTS MUST indicate sample type.
 NOT Source or Byproduct Material
 Source/Processed Ore (Ground or Refined) **CALL BEFORE SENDING
 11e.(2) Byproduct Material (Can ONLY be Submitted to ELI Casper Location)

Matrix Codes

- A - Air
- W - Water
- S - Soils/Solids
- V - Vegetation
- B - Bioassay
- O - Other
- DW - Drinking Water

Analysis Requested

	Total Uranium	Total RA226	Total TH-230	Total Vanadium						
1	X	X	X	X						
2	X	X	X	X						
3	X	X	X	X						
4	X	X	X	X						
5	X	X	X	X						
6	X	X	X	X						
7	X	X	X	X						
8	X	X	X	X						
9										
10										

See Attached

All turnaround times are standard unless marked as RUSH.
 Energy Laboratories MUST be contacted prior to RUSH sample submittal for charges and scheduling - See Instructions Page

Sample Identification (Name, Location, Interval, etc.)	Collection		Number of Containers	Matrix (See Codes Above)	Total Uranium	Total RA226	Total TH-230	Total Vanadium	RUSH	TAT	Result
	Date	Time									
1 HMC-1	4th	Qtr			X	X	X	X			1.47E + 11
2 HMC-1A					X	X	X	X			1.40E + 11
3 HMC-2					X	X	X	X			1.60E + 11
4 HMC-3					X	X	X	X			1.48E + 11
5 HMC-4	20	19			X	X	X	X			1.16E + 11
6 HMC-5					X	X	X	X			1.34E + 11
7 HMC-6					X	X	X	X			1.32E + 11
8 HMC-7	Composite				X	X	X	X			N/A
9											C20010179
10											

Custody Record MUST be signed

Relinquished by (print) Kyle Martinez Date/Time 1-6-20/0900 Signature [Signature]
 Relinquished by (print) _____ Date/Time _____ Signature _____

Received by (print) _____ Date/Time 1/16/20 11:18 Signature [Signature]
 Received by Laboratory (print) ASIE Thompson Date/Time _____ Signature _____

LABORATORY USE ONLY

Shipped By Cooler ID(s) Custody Seals Y N C B Intact Y N Receipt Temp °C Temp Blank Y N On Ice Y N Payment Type CC Cash Check _____ Amount \$ Receipt Number (cash/check only)

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 subcontracted data will be clearly notated on your analytical report.

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Attachment 2

Radon Gas Monitoring Results

Attachment 2 - Radon Gas Monitoring Results

Track-Etch Passive Survey

Location	Monitoring Period	Rn Concentration ($\mu\text{Ci/ml}$)	Uncertainty - 2 S.D. ($\mu\text{Ci/ml}$)	LLD ($\mu\text{Ci/ml}$)
HMC #1 (average) N Outer Perimeter	7/2/19 - 1/3/20	8.8E-10	2.2E-10	3.2E-10
HMC #1-A (average) N Outer Perimeter	7/2/19 - 1/3/20	7.6E-10	2.0E-10	3.2E-10
HMC #2 (average) NE Outer Perimeter	7/2/19 - 1/3/20	9.4E-10	2.2E-10	3.2E-10
HMC #3 (average) E Outer Perimeter	7/2/19 - 1/3/20	6.8E-10	1.9E-10	3.2E-10
HMC #4 (average) S Outer Perimeter	7/2/19 - 1/3/20	8.7E-10	2.2E-10	3.2E-10
HMC #5 (average) N of Nearest Residence	7/2/19 - 1/3/20	7.5E-10	2.0E-10	3.2E-10
HMC #6 (average) W of Outer Perimeter	7/2/19 - 1/3/20	7.3E-10	1.9E-10	3.2E-10
HMC #7 (average) S Boundary	7/2/19 - 1/3/20	7.6E-10	1.9E-10	3.2E-10
HMC #16 (average) Background	7/2/19 - 1/3/20	4.2E-10	1.5E-10	3.2E-10

Attachment 3 Environmental Gamma Radiation Results

Attachment 3 - 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	7/1/19 - 12/31/19	67.6	6.6
HMC #1-A N Outer Perimeter	7/1/19 - 12/31/19	62.3	6.1
HMC #2 NE Outer Perimeter	7/1/19 - 12/31/19	66.7	6.5
HMC #3 E Outer Perimeter	7/1/19 - 12/31/19	69.6	6.8
HMC #4 S Outer Perimeter	7/1/19 - 12/31/19	78.6	7.7
HMC #5 N of Nearest Residence	7/1/19 - 12/31/19	72.1	7.1
HMC #6 W of Outer Perimeter	7/1/19 - 12/31/19	68.8	6.7
HMC #16 Background	7/1/19 - 12/31/19	64.7	6.3

*Error is 1.96 std. dev.

Attachment 4
2019 Annual Public Dose Estimates

Annual Public Dose Estimates

1.0 Introduction

Operational activities in 2019 at the HMC Grants Reclamation Project (Site) were primarily associated with groundwater restoration, maintenance of containment facilities (e.g. tailings impoundments, ponds, tanks, pipes, etc.) and environmental monitoring. Historic windblown tailings beyond the two tailings impoundments were cleaned up and consolidated with the tailings in 1995 then covered with a minimum of several feet of clean soil. All tailings currently have either an interim or permanent cover in place. In the case of the Small Tailings Pile (STP), a large portion of the tailings are covered by Evaporation Pond 1 (EP-1). Specific activities that occurred on the tailings piles included maintenance of interim soil cover, operation of Zeolite water treatment facilities on the Large Tailings Pile (LTP), enhanced evaporation operations on EP-1, and use/maintenance of trash pits on the STP.

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 the TEDE from air emissions (excluding Rn-222 and its decay products) to the maximum exposed member of the public of 10 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 semiannual environmental monitoring reports for 2019 as required by 10 CFR 40.65 and License Condition 15 of radioactive materials license (RML) SUA-1471 with the NRC. The data provided in these reports were used in this dose assessment.

2.0 Dose Assessment

The important pathways for assessing the dose to the maximum exposed individual are: 1) inhalation of airborne particulate from the site, 2) exposure to radon generated at the site, and 3) 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. Nearby residents are believed to lead typical rural residential lifestyles.

NUREG/CR-5512 recommends default values for the residential scenario. The recommended values for indoor and outdoor occupancy are 200 and 71 effective days/year, respectively. This is approximately equivalent to an effective occupancy near the Site of 75%. These assumptions were used in this analysis for all radiological exposure/dose pathways.

2.1 Inhalation of Radionuclides

The committed effective dose equivalent (CEDE) from inhalation of particulate was calculated for five principal long-lived radionuclides, U-238, U-235, U-234, Th-230, and Ra-226, based on quarterly environmental monitoring data provided in the two 2019 Semiannual Environmental Reports.

The monitoring stations HMC-4 and HMC-5 are considered representative of exposure conditions for the nearest resident location for comparison of calculated doses with 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 exposure conditions at the nearest resident location are further from Site facilities and should thus be less than that at stations HMC-4 and HMC-5 near Site perimeter boundaries.

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

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

Isotopic uranium concentrations were derived from the expected activity abundances in natural (total) uranium (U-nat) (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. Net doses were summed to determine the total CEDE from inhalation of the net (above background)¹ concentrations of airborne particulate radionuclides in 2019 at each air monitoring station. Continuous occupancy and an average breathing rate of 20,000 liters/day (Table A-1, NUREG-0859) were assumed for the calculation. The calculated above-background CEDE at locations HMC-4 and HMC-5 for 100% occupancy was 0.27 mrem/year and 0.39 mrem/y. The results from these calculations are shown in Tables 2-1 and 2-2. Accounting for an assumed occupancy of 75% results in a dose rate of 0.2 and 0.3 mrem/year at HMC-4 and HMC-5 respectively. The nearby monitoring station with the highest exposure from all pathways is assumed representative for calculation of the TEDE to the nearest member of the public (Table 2-3).

2.2 Exposure to Radon

Outdoor radon levels in the Grants Uranium Belt are known to be somewhat elevated and variable, depending on the location relative to mine vents, naturally mineralized geologic deposits at or near the surface, and topographical features. Natural background radon concentrations, arising from the calm winds during the early morning hours and at times from temperature inversions, generally follow a downgradient drainage path. The HMC site is situated along the bottom of the San Mateo Creek valley, an area where downgradient flow converges from large upland source areas to the north, northwest, and Lobo Canyon to the east. In addition, the valley floor is known to contain naturally elevated Ra-226 concentrations from eons of erosion of

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.

upgradient mineralized outcrops, and this depositional geomorphic feature likely contributes to naturally elevated radon levels in the vicinity of the Site.

The radon data for the four quarterly monitoring periods are provided in Attachment 2 of semi-annual monitoring reports. Monitoring Station 16 has been accepted as the radon background location for the Site. The average radon concentration for 2019 at HMC-4 and HMC-5 was 0.73 and 0.63 pCi/L respectively. The average annual concentration at the background location (HMC-16) was 0.34 pCi/L. Subtracting the background concentration from the measured concentrations at HMC-4 and HMC-5 results in net radon concentrations of 0.39 and 0.29 pCi/L respectively.

Since the nearest residence is within a few hundred feet of the site perimeter and within 3500 feet of the major sources of onsite releases of radon (the tailings piles), the radon progeny/gas equilibrium ratio is expected to be low due to a relatively short time of atmospheric migration to reach the location of the nearest residence. HMC has historically assumed a 20% radon equilibrium ratio for public dose calculations. NRC regulations assume a continuous exposure to 0.1 pCi/L Rn-222, in equilibrium with its decay products, will result in a committed effective dose equivalent (CEDE) of 50 mrem/y (10 CFR Part 20, Appendix B). At 20% equilibrium, the corresponding radon dose conversion factor is 100 mrem/pCi/L. Considering the 75% occupancy factor, the net (above background) radon concentrations at HMC-4 and HMC-5 result in calculated CEDE values of 30 and 22 mrem/y respectively for 2019.

The NRC has issued RAIs concerning this public dose calculation method for radon based on a lack of consistency with NRC's recently finalized Interim Staff Guidance (ISR) for determination of public dose from radon. At this time, this issue is still under review by HMC and NRC because the background radon station (HMC-16) is known to have a significant low bias relative to the valley in which the Site is situated. Until this issue is resolved, NRC has directed HMC to continue using the current/historical method for calculating public dose from facility radon emissions.

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 semiannual monitoring periods are provided in Attachment 4 and Attachment 3 of the first-half and second-half semiannual monitoring reports, respectively. The total annual effective dose equivalents measured at HMC-4 and HMC-5 were 150 and 136 mrem/year, respectively. The average annual effective dose equivalent at the background location (HMC-16) was 129 mrem/year. The net annual effective dose equivalent for HMC-4 and HMC-5, assuming 100% occupancy, was 27 and 12 mrem/year, respectively. Considering the 75% occupancy factor, the calculated net annual effective dose equivalent was 20 and 9 mrem/year for HMC-4 and HMC-5, respectively.

2.4 Total Effective Dose Equivalent to the Nearest Resident

The TEDE to the Nearest Resident 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 50 mrem/year and at HMC-5 was 31 mrem/year. This is within the 100 mrem/year limit and the particulate TEDE is well below the 10 mrem/y constraint limit on particulate emissions.

Table 2-1: Measured average airborne radionuclide concentrations in 2019

Sample ID	Radionuclide	Q1 Conc. ($\mu\text{Ci}/\text{mL}$)	Q2 Conc. ($\mu\text{Ci}/\text{mL}$)	Q3 Conc. ($\mu\text{Ci}/\text{mL}$)	Q4 Conc. ($\mu\text{Ci}/\text{mL}$)	Total Annual Average Conc. ($\mu\text{Ci}/\text{mL}$)
HMC-1	U-nat	4.0E-17	5.0E-16	1.3E-15	1.0E-16	4.9E-16
	Th-230	3.0E-18	1.0E-17	8.0E-18	6.0E-18	6.8E-18
	Ra-226	1.0E-17	2.0E-17	2.0E-17	3.0E-17	2.0E-17
HMC-1-A	U-nat	4.0E-17	4.0E-16	6.0E-16	1.0E-16	2.9E-16
	Th-230	8.0E-18	1.0E-17	8.0E-18	6.0E-18	8.0E-18
	Ra-226	2.0E-17	2.0E-17	3.0E-17	4.0E-17	2.8E-17
HMC-2	U-nat	5.0E-17	2.0E-16	3.0E-16	4.0E-17	1.5E-16
	Th-230	7.0E-18	3.0E-17	7.0E-18	7.0E-18	1.3E-17
	Ra-226	2.0E-17	2.0E-17	2.0E-17	4.0E-17	2.5E-17
HMC-3	U-nat	2.0E-16	5.0E-16	6.0E-16	2.0E-16	3.8E-16
	Th-230	1.0E-17	1.0E-17	1.0E-17	6.0E-18	9.0E-18
	Ra-226	2.0E-17	3.0E-17	2.0E-17	4.0E-17	2.8E-17
HMC-4	U-nat	2.0E-16	4.0E-16	9.0E-16	1.0E-16	4.0E-16
	Th-230	6.0E-17	6.0E-17	1.0E-17	5.0E-18	3.4E-17
	Ra-226	8.0E-17	1.0E-16	5.0E-17	5.0E-17	7.0E-17
HMC-5	U-nat	9.0E-17	1.0E-15	1.1E-15	2.0E-16	6.0E-16
	Th-230	7.0E-18	1.0E-17	8.0E-18	7.0E-18	8.0E-18
	Ra-226	2.0E-17	3.0E-17	4.0E-17	5.0E-17	3.5E-17
HMC-6	U-nat	4.0E-17	2.0E-16	4.0E-16	5.0E-17	1.7E-16
	Th-230	7.0E-18	1.0E-17	7.0E-18	1.0E-17	8.5E-18
	Ra-226	2.0E-17	1.0E-17	3.0E-17	5.0E-17	2.8E-17
HMC-7 Blank	U-nat	2.0E-18	2.0E-18	2.0E-18	2.0E-18	2.0E-18
	Th-230	1.0E-18	2.0E-18	9.0E-18	2.0E-18	3.5E-18
	Ra-226	4.0E-18	-3.0E-18	9.0E-18	1.0E-17	5.0E-18

Table 2-2: 2019 Calculation of net internal dose (CEDE) due to radionuclides in air particulates from Site operations.

Sample ID	Radionuclide (Isotopic)	Calculated Isotopic Conc. ($\mu\text{Ci}/\text{mL}$)*	Net Annual Average Conc. ($\mu\text{Ci}/\text{mL}$)**	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	2.4E-16	1.5E-16	1.32E+05	1.5E-01	3.4E-01	2.5E-01
	U-235	1.1E-17	6.9E-18	1.23E+05	6.2E-03		
	U-238	2.4E-16	1.5E-16	1.18E+05	1.3E-01		
	Th-230	3.0E-17	2.2E-17	3.26E+05	5.2E-02		
	Ra-226	3.8E-17	1.0E-17	8.60E+03	6.3E-04		
HMC-1-A	U-234	1.4E-16	5.5E-17	1.32E+05	5.3E-02	1.0E-01	7.7E-02
	U-235	6.3E-18	2.5E-18	1.23E+05	2.2E-03		
	U-238	1.4E-16	5.5E-17	1.18E+05	4.7E-02		
	Th-230	8.0E-18	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	2.8E-17	3.1E-33	8.60E+03	1.9E-19		
HMC-2	U-234	7.2E-17	0.0E+00	1.32E+05	0.0E+00	1.0E-02	7.6E-03
	U-235	3.2E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	7.2E-17	0.0E+00	1.18E+05	0.0E+00		
	Th-230	1.3E-17	4.3E-18	3.26E+05	1.0E-02		
	Ra-226	2.5E-17	0.0E+00	8.60E+03	0.0E+00		
HMC-3	U-234	1.8E-16	9.9E-17	1.32E+05	9.5E-02	1.9E-01	1.4E-01
	U-235	8.3E-18	4.5E-18	1.23E+05	4.0E-03		
	U-238	1.8E-16	9.9E-17	1.18E+05	8.5E-02		
	Th-230	9.0E-18	5.0E-19	3.26E+05	1.2E-03		
	Ra-226	2.8E-17	3.1E-33	8.60E+03	1.9E-19		
HMC-4	U-234	2.0E-16	1.1E-16	1.32E+05	1.1E-01	2.7E-01	2.0E-01
	U-235	8.8E-18	5.0E-18	1.23E+05	4.5E-03		
	U-238	2.0E-16	1.1E-16	1.18E+05	9.6E-02		
	Th-230	3.4E-17	2.5E-17	3.26E+05	6.0E-02		
	Ra-226	7.0E-17	4.3E-17	8.60E+03	2.7E-03		
HMC-5	U-234	2.9E-16	2.1E-16	1.32E+05	2.0E-01	3.9E-01	2.9E-01
	U-235	1.3E-17	9.4E-18	1.23E+05	8.4E-03		
	U-238	2.9E-16	2.1E-16	1.18E+05	1.8E-01		
	Th-230	8.0E-18	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	3.5E-17	7.5E-18	8.60E+03	4.7E-04		
HMC-6 (Bkg. Station)	U-234	8.4E-17	N/A	N/A	N/A	N/A	N/A
	U-235	3.8E-18					
	U-238	8.4E-17					
	Th-230	8.5E-18					
	Ra-226	2.8E-17					
HMC-7	U-234	9.8E-19	0.0E+00	1.32E+05	0.0E+00	0.0E+00	0.0E+00
	U-235	4.4E-20	0.0E+00	1.23E+05	0.0E+00		
	U-238	9.8E-19	0.0E+00	1.18E+05	0.0E+00		
	Th-230	3.5E-18	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	5.0E-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: 2019 dose by pathway and calculated TEDE (mrem/yr)

Sample ID	Internal CEDE Air Particulates (mrem/yr)	Internal CEDE Radon (mrem/yr)	External EDE (mrem/yr)	TEDE (mrem/yr)
HMC-4	0.2	30	20	50
HMC-5	0.3	22	9	31

Attachment 5
2019 Annual Radon Flux Measurements

Radon Flux Measurements for the HMC Tailings Piles

October 2019

Prepare for:

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

Prepared by:



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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 the 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. Initial radon flux measurements were made on the LTP and STP on August 18-19, 1995.

As part of a request for a license amendment extending the milestones in the NRC License for placement of the final radon barrier over the tailings piles, 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 because the final radon barrier on the side slopes was completed and verified to meet the radon flux standard (an average radon flux of 3.27 pCi/m²s was measured in 1995 prior to placement of a final cap of rock armor for erosion control). In other words, only the top of the LTP is subject to annual radon flux measurements, and for this objective, 100 measurements are required. With respect to the STP, this is considered an operational impoundment under NRC definitions¹ and the previous method for measurement and calculation of radon flux from STP is consistent with Method 115 specifications for area-weighted averaging of various regions of the pile.

Annual flux measurements for calendar year 2019 were made in two separate deployments, consisting of 100 canisters per deployment. The first 100 canister measurements were made on the LTP on September 10-11, 2019. The second 100 canister measurements were made on the STP on October 7-8, 2019. 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/m²s standard given in 10 CFR 40, Appendix A (ERG, 2017 and NRC, 2017). The deployment locations, along with annotated 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). In some

¹As 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.

cases, small adjustments in planned sampling locations were necessary (e.g. locations that fell on groundwater well equipment or other operational infrastructure (e.g. zeolite water treatment cells) though such adjustments were minimized to the extent possible by selecting the nearest viable measurement location.

2. Radon Flux Results

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 only on the top of the LTP. The average measured flux from the top of the LTP for calendar year 2019 is 35.4 pCi/m²s, which exceeds the 20 pCi/m²s standard given in 10 CFR 40, Appendix A. 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 22.1 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 2019 is 10.5 pCi/m²s, which meets the flux standard specified in 10 CFR 40 Appendix A.

Equation 2-1:

$$Flux_{STP} = \frac{(0.0 \text{ pCi/m}^2\text{sec} * 116,204 \text{ m}^2) + (22.1 \text{ pCi/m}^2\text{sec} * 105,272 \text{ m}^2)}{(116,204 \text{ m}^2 + 105,272 \text{ m}^2)} = 10.5 \text{ pCi/m}^2\text{s}$$

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

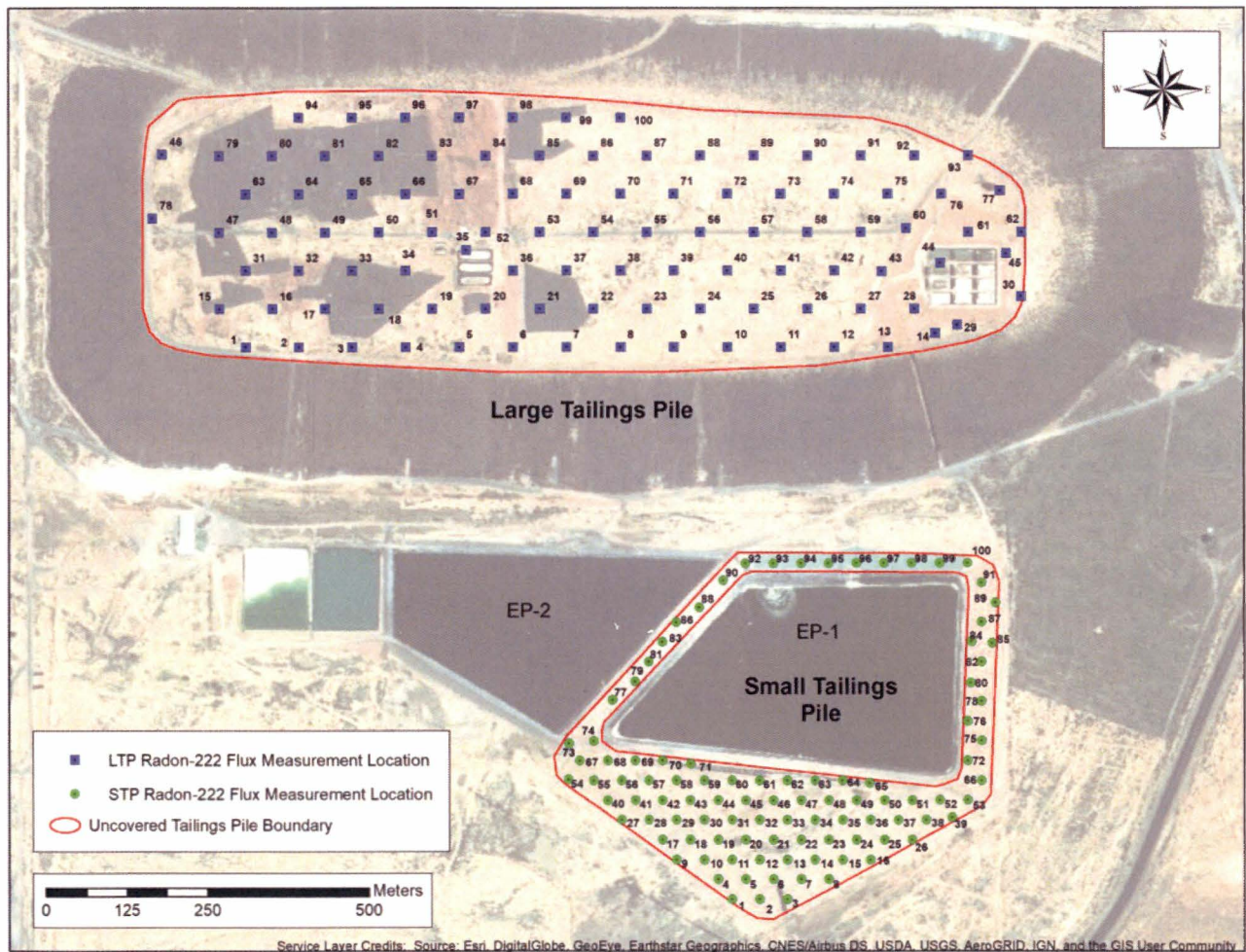
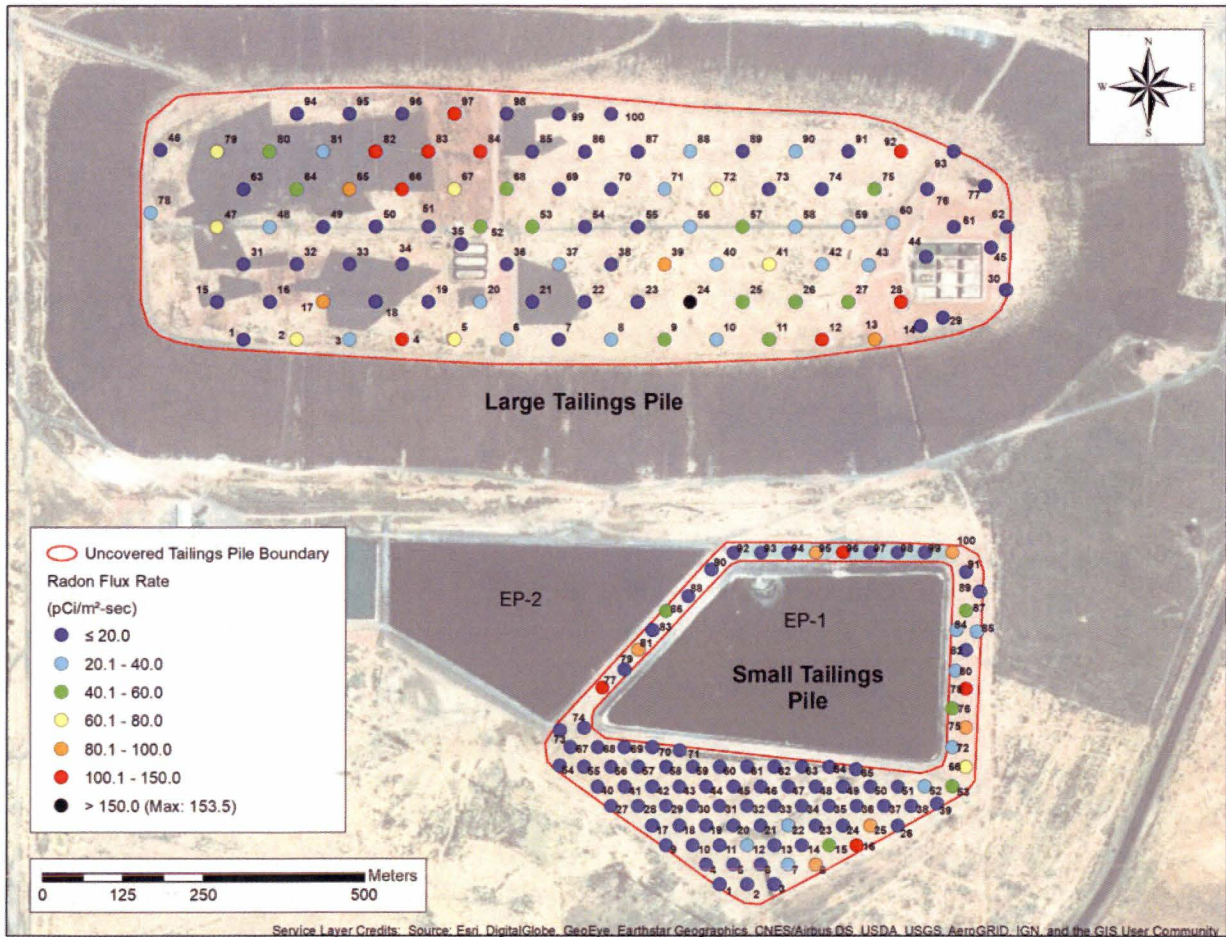


Figure 2-1 Radon Flux Measurement Results



3. Quality Assurance

The data quality requirements specified in EPA Method 115 were met for the measurements. Based on data from the onsite meteorological station, 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 used to measure radon flux canister samples, and identical geometry conditions to that of the canisters was maintained. 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 4.1 percent, less than the 10% accuracy required by EPA Method 115.

Twenty-three 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. All 23 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/m²s. The average RPD for all 23 canisters is 2.1 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 -0.09 and 1.01 pCi/m²s are near the expected 0 pCi/m²s 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	9/11/2019	1200	78.83	45441	3220.5	0.0121	6.30E-05
STD #1	9/11/2019	1200	80	48194	3220.5	0.0127	6.38E-05
STD #1	9/11/2019	1200	80	47782	3220.5	0.0125	6.36E-05
STD #1	9/11/2019	1200	80	47654	3220.5	0.0125	6.35E-05
STD #3	9/11/2019	1200	78.83	45928	3220.5	0.0122	6.33E-05
STD #1	9/12/2019	1200	80	46642	3191.5	0.0122	6.28E-05
STD #3	9/12/2019	1200	78.83	44712	3191.5	0.0119	6.25E-05
STD #3	9/12/2019	1200	78.83	45489	3191.5	0.0121	6.30E-05
STD #1	9/12/2019	1200	80	48065	3191.5	0.0126	6.37E-05
STD #3	9/12/2019	1200	78.83	45520	3191.5	0.0121	6.31E-05
STD #1	9/13/2019	1200	80	48093	3397.5	0.0126	6.39E-05
STD #3	9/13/2019	1200	78.83	46670	3397.5	0.0124	6.39E-05
STD #1	9/13/2019	1200	80	47399	3397.5	0.0124	6.35E-05
STD #3	9/13/2019	1200	78.83	46149	3397.5	0.0122	6.36E-05
STD #3	10/8/2019	1200	78.83	44583	3477.5	0.0117	6.26E-05
STD #3	10/8/2019	1200	78.83	43820	3477.5	0.0115	6.21E-05
STD #1	10/8/2019	1200	80	47568	3477.5	0.0124	6.36E-05
STD #1	10/8/2019	1200	80	48198	3477.5	0.0126	6.40E-05
STD #3	10/9/2019	1200	78.83	44848	3367.5	0.0119	6.27E-05
STD #1	10/9/2019	1200	80	47509	3367.5	0.0124	6.35E-05
STD #3	10/9/2019	1200	78.83	45367	3367.5	0.0120	6.31E-05
Mean of STD #1						0.0125	
Mean of STD #3						0.0120	
Relative Percent Difference of Standards						4.1%	

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 ² s)	Analysis 2 (pCi/m ² s)	Average Flux (pCi/m ² s)	RPD (%)
LTP	448	75.6	75.5	75.6	0.1
LTP	515	31.6	30.7	31.1	2.7
LTP	415	70.4	71.0	70.7	0.8
LTP	529	126.1	124.8	125.5	1.0
LTP	49	23.4	23.9	23.7	2.1
LTP	105	84.8	81.2	83.0	4.4
LTP	461	22.6	22.6	22.6	0.0
LTP	468	55.9	55.2	55.6	1.2
LTP	526	154.4	152.6	153.5	1.2
LTP	94	49.9	50.9	50.4	2.0
LTP	487	104.8	101.8	103.3	2.9
STP	104	56.8	57.7	57.3	1.5
STP	429	21.1	19.7	20.4	7.0
STP	263	10.5	9.9	10.2	5.8
STP	414	17.8	17.3	17.5	3.0
STP	504	17.2	17.2	17.2	0.2
STP	516	7.4	7.4	7.4	0.7
STP	428	10.1	10.3	10.2	1.9
STP	407	101.6	103.9	102.7	2.2
STP	485	42.2	41.1	41.6	2.7
STP	1	32.7	32.3	32.5	1.2
STP	518	36.8	36.3	36.5	1.5
STP	517	5.8	6.0	5.9	2.8

Appendix A

Radon Flux Measurement Results



Radon Flux Measurements

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Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ² s)			Remarks
			Deployment	Retrieval	Counting						Result	LLD	1.00 S.D.	
38		523	09/10/2019 11:27	09/11/2019 12:18	09/12/2019 12:56	222	3191.5		5008	0.0122	12.87	0.3	0.22	OK
39		105	09/10/2019 11:51	09/11/2019 12:30	09/13/2019 11:31	44	3397.5	D	5047	0.0124	84.85	0.9	1.24	OK
39		105	09/10/2019 11:51	09/11/2019 12:30	09/13/2019 11:30	48	3397.5		5276	0.0124	81.2	0.9	1.16	OK
40		459	09/10/2019 11:58	09/11/2019 12:40	09/12/2019 14:07	143	3191.5		5010	0.0122	21.18	0.4	0.34	OK
41		485	09/10/2019 12:12	09/11/2019 12:50	09/12/2019 15:49	50	3191.5		5072	0.0122	65.53	0.8	0.96	OK
42		486	09/10/2019 12:18	09/11/2019 13:03	09/12/2019 18:06	105	3191.5		5010	0.0122	30.23	0.5	0.46	OK
43		457	09/10/2019 12:51	09/11/2019 13:10	09/12/2019 17:47	131	3191.5		5024	0.0122	24.26	0.5	0.38	OK
44		430	09/10/2019 13:00	09/11/2019 13:26	09/12/2019 16:03	1200	3191.5		3739	0.0122	0.3	0.1	0.05	OK
45		514	09/10/2019 13:13	09/11/2019 13:20	09/12/2019 17:20	518	3191.5		5007	0.0122	4.78	0.2	0.11	OK
46		420	09/10/2019 13:32	09/11/2019 13:32	09/12/2019 16:47	189	3191.5		5011	0.0122	16.24	0.4	0.27	OK
47		450	09/10/2019 09:50	09/11/2019 11:25	09/11/2019 16:35	40	3220.5		5054	0.0124	66.06	0.7	0.96	OK
48		484	09/10/2019 10:13	09/11/2019 11:28	09/11/2019 16:44	114	3220.5		5025	0.0124	22.4	0.4	0.35	OK
49		524	09/10/2019 10:17	09/11/2019 11:30	09/11/2019 17:13	884	3220.5		5003	0.0124	1.62	0.1	0.05	OK
50		21	09/10/2019 10:41	09/11/2019 11:40	09/11/2019 17:02	644	3220.5		5002	0.0124	2.78	0.2	0.07	OK
51		428	09/10/2019 10:51	09/11/2019 11:48	09/11/2019 18:42	283	3220.5		5021	0.0124	8.34	0.3	0.15	OK
52		470	09/10/2019 11:08	09/11/2019 11:59	09/11/2019 18:39	51	3220.5		5166	0.0124	54.71	0.6	0.79	OK
53		513	09/10/2019 11:14	09/11/2019 12:02	09/12/2019 12:25	67	3191.5		5123	0.0122	47.72	0.6	0.7	OK
54		417	09/10/2019 11:30	09/11/2019 12:13	09/12/2019 11:54	511	3191.5		5001	0.0122	4.6	0.2	0.1	OK
55		510	09/10/2019 11:37	09/11/2019 12:26	09/12/2019 15:19	1131	3191.5		5782	0.0122	1.62	0.2	0.05	OK
56		488	09/10/2019 11:48	09/11/2019 12:28	09/12/2019 16:44	130	3191.5		5006	0.0122	23.99	0.5	0.38	OK
57		94	09/10/2019 12:02	09/11/2019 12:45	09/12/2019 14:48	63	3191.5		5054	0.0122	50.94	0.7	0.75	OK
57		94	09/10/2019 12:02	09/11/2019 12:45	09/12/2019 14:49	64	3191.5	D	5035	0.0122	49.92	0.7	0.74	OK

Types: D-Duplicate, TB-Trip Blank

Reviewed by: Charr



Radon Flux Measurements

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

Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ² s)		Error 1.00 S.D.	Remarks
			Deployment	Retrieval	Counting						Result	LLD		
58		200	09/10/2019 12:09	09/11/2019 12:48	09/12/2019 14:44	138	3191.5	5011	0.0122	22.14	0.4	0.35	OK	
59		104	09/10/2019 12:22	09/11/2019 12:57	09/12/2019 17:29	98	3191.5	5013	0.0122	32.61	0.5	0.5	OK	
60		522	09/10/2019 12:32	09/11/2019 13:05	09/12/2019 17:56	123	3191.5	5003	0.0122	25.66	0.5	0.4	OK	
61		42	09/10/2019 13:02	09/11/2019 13:19	09/12/2019 16:56	160	3191.5	5005	0.0122	19.33	0.4	0.31	OK	
62		528	09/10/2019 13:12	09/11/2019 13:17	09/12/2019 17:18	823	3191.5	5010	0.0122	2.34	0.2	0.07	OK	
63		406	09/10/2019 10:11	09/11/2019 11:27	09/11/2019 16:38	203	3220.5	5011	0.0124	11.89	0.3	0.2	OK	
64		490	09/10/2019 10:20	09/11/2019 11:32	09/11/2019 17:50	47	3220.5	5051	0.0124	57.24	0.6	0.84	OK	
65		451	09/10/2019 10:43	09/11/2019 11:38	09/11/2019 16:42	33	3220.5	5087	0.0124	82.82	0.8	1.19	OK	
66		414	09/10/2019 10:55	09/11/2019 11:50	09/11/2019 18:37	23	3220.5	5116	0.0124	121.72	1	1.73	OK	
67		433	09/10/2019 11:06	09/11/2019 11:57	09/11/2019 18:51	41	3220.5	5290	0.0124	70.21	0.7	1	OK	
68		452	09/10/2019 11:16	09/11/2019 12:03	09/12/2019 12:27	68	3191.5	5046	0.0122	46.29	0.6	0.69	OK	
69		508	09/10/2019 11:27	09/11/2019 12:12	09/12/2019 12:36	280	3191.5	5013	0.0122	9.88	0.3	0.18	OK	
70		472	09/10/2019 11:38	09/11/2019 12:28	09/12/2019 14:26	840	3191.5	5001	0.0122	2.15	0.2	0.07	OK	
71		49	09/10/2019 11:46	09/11/2019 12:35	09/12/2019 13:12	127	3191.5	5035	0.0122	23.94	0.5	0.37	OK	
71		49	09/10/2019 11:46	09/11/2019 12:35	09/12/2019 13:15	131	3191.5	D 5092	0.0122	23.45	0.4	0.36	OK	
72		64	09/10/2019 12:03	09/11/2019 12:45	09/12/2019 15:58	43	3191.5	5075	0.0122	76.48	0.8	1.11	OK	
73		411	09/10/2019 12:07	09/11/2019 12:50	09/12/2019 15:39	544	3191.5	5027	0.0122	4.35	0.2	0.1	OK	
74		402	09/10/2019 12:23	09/11/2019 12:59	09/12/2019 17:32	686	3191.5	5005	0.0122	3.12	0.2	0.08	OK	
75		507	09/10/2019 12:31	09/11/2019 13:04	09/12/2019 17:55	70	3191.5	5092	0.0122	47.3	0.6	0.7	OK	
76		425	09/10/2019 13:04	09/11/2019 13:14	09/12/2019 18:15	374	3191.5	5003	0.0122	7.35	0.3	0.14	OK	
77		495	09/10/2019 13:09	09/11/2019 13:17	09/12/2019 16:52	205	3191.5	5017	0.0122	14.81	0.4	0.25	OK	
78		460	09/10/2019 13:30	09/11/2019 13:30	09/12/2019 16:41	85	3191.5	5029	0.0122	38.44	0.6	0.58	OK	

Types: D-Duplicate, TB-Trip Blank

Reviewed by:

C. Fash



Radon Flux Measurements

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

Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ³)		Error 1.00 S.D.	Remarks
			Deployment	Retrieval	Counting						Result	LLD		
79		481	09/10/2019 10:05	09/11/2019 11:19	09/11/2019 16:03	48	3220.5		5870	0.0124	64.49	0.6	0.87	OK
80		521	09/10/2019 10:27	09/11/2019 11:33	09/11/2019 18:37	66	3220.5		5084	0.0124	41	0.5	0.61	OK
81		480	09/10/2019 10:37	09/11/2019 11:36	09/11/2019 17:52	88	3220.5		5024	0.0124	29.95	0.5	0.45	OK
82		254	09/10/2019 10:57	09/11/2019 11:51	09/11/2019 18:41	27	3220.5		5413	0.0124	109.67	0.9	1.52	OK
83		516	09/10/2019 11:04	09/11/2019 11:55	09/11/2019 18:52	24	3220.5		5036	0.0124	115.16	0.9	1.65	OK
84		529	09/10/2019 11:18	09/11/2019 12:05	09/12/2019 12:42	26	3191.5		5078	0.0122	124.84	1	1.79	OK
84		529	09/10/2019 11:18	09/11/2019 12:05	09/12/2019 12:43	26	3191.5	D	5129	0.0122	126.13	1	1.8	OK
85		445	09/10/2019 11:25	09/11/2019 12:10	09/12/2019 12:15	523	3191.5		5007	0.0122	4.47	0.2	0.1	OK
86		68	09/10/2019 11:40	09/11/2019 12:30	09/12/2019 13:52	175	3191.5		5022	0.0122	16.94	0.4	0.28	OK
87		493	09/10/2019 11:45	09/11/2019 12:34	09/12/2019 13:57	159	3191.5		5033	0.0122	18.88	0.4	0.3	OK
88		446	09/10/2019 12:05	09/11/2019 12:46	09/12/2019 13:55	93	3191.5		5031	0.0122	34.1	0.5	0.52	OK
89		263	09/10/2019 12:06	09/11/2019 12:48	09/12/2019 15:50	247	3191.5		5010	0.0122	11.67	0.3	0.2	OK
90		502	09/10/2019 12:24	09/11/2019 13:01	09/12/2019 17:52	104	3191.5		5034	0.0122	30.8	0.5	0.47	OK
91		503	09/10/2019 12:26	09/11/2019 13:02	09/12/2019 17:59	263	3191.5		5008	0.0122	11.05	0.3	0.19	OK
92		525	09/10/2019 13:06	09/11/2019 13:14	09/12/2019 18:26	31	3191.5		5028	0.0122	109.65	1	1.58	OK
93		431	09/10/2019 13:08	09/11/2019 13:16	09/12/2019 18:28	533	3191.5		5009	0.0122	4.63	0.2	0.1	OK
94		498	09/10/2019 10:30	09/11/2019 11:35	09/11/2019 17:43	176	3220.5		5003	0.0124	14.11	0.3	0.23	OK
95		418	09/10/2019 11:00	09/11/2019 11:52	09/11/2019 18:48	138	3220.5		5015	0.0124	18.7	0.4	0.3	OK
96		512	09/10/2019 11:03	09/11/2019 11:54	09/11/2019 18:55	324	3220.5		5133	0.0124	7.32	0.2	0.13	OK
97		426	09/10/2019 11:20	09/11/2019 12:06	09/12/2019 12:14	25	3191.5		5141	0.0122	131.14	1.1	1.86	OK
98		429	09/10/2019 11:23	09/11/2019 12:08	09/12/2019 12:44	288	3191.5		5009	0.0122	9.56	0.3	0.17	OK
99		443	09/10/2019 11:41	09/11/2019 12:31	09/12/2019 14:10	883	3191.5		5002	0.0122	1.96	0.2	0.06	OK

Types: D-Duplicate, TB-Trip Blank

Reviewed by: *Chen*



Radon Flux Measurements

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

Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ³)		Error 1.00 S.D.	Remarks
			Deployment	Retrieval	Counting						Result	ELD		
100		409	09/10/2019 11:44	09/11/2019 12:33	09/12/2019 13:37	595	3191.5		5000	0.0122	3.73	0.2	0.09	OK
TB1	TB	467	09/10/2019 12:00	09/11/2019 12:00	09/13/2019 12:09	1200	3397.5		4936	0.0124	1.01	0.2	0.06	OK
TB2	TB	469	09/10/2019 12:00	09/11/2019 12:00	09/13/2019 12:30	1200	3397.5		4793	0.0124	0.91	0.2	0.06	OK

Types: D-Duplicate, TB-Trip Blank

Reviewed by:

C. Lane



Radon Flux Measurements

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

2019 STP

Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ³)		Error 1.00 S.D.	Remarks
			Deployment	Retrieval	Counting						Result	LLD		
1		94	10/07/2019 10:41	10/08/2019 11:29	10/09/2019 15:45	1006	3367.5		5016	0.0122	1.45	0.2	0.06	OK
2		472	10/07/2019 10:43	10/08/2019 11:30	10/09/2019 16:39	615	3367.5		5038	0.0122	3.61	0.2	0.09	OK
3		428	10/07/2019 10:45	10/08/2019 11:32	10/09/2019 16:56	300	3367.5	D	5352	0.0122	10.09	0.3	0.18	OK
3		428	10/07/2019 10:45	10/08/2019 11:32	10/09/2019 16:50	300	3367.5		5441	0.0122	10.28	0.3	0.18	OK
4		493	10/07/2019 10:40	10/08/2019 11:28	10/09/2019 18:20	520	3367.5		5107	0.0122	4.76	0.2	0.11	OK
5		452	10/07/2019 09:28	10/08/2019 10:23	10/08/2019 14:49	374	3477.5		5047	0.0121	5.92	0.2	0.12	OK
6		475	10/07/2019 09:27	10/08/2019 10:19	10/08/2019 16:50	1016	3477.5		5012	0.0121	1.16	0.1	0.05	OK
7		425	10/07/2019 09:08	10/08/2019 10:40	10/08/2019 16:47	97	3477.5		5367	0.0121	29.03	0.5	0.43	OK
8		494	10/07/2019 09:06	10/08/2019 11:34	10/09/2019 13:56	46	3367.5		6130	0.0122	80.61	0.8	1.06	OK
9		411	10/07/2019 10:37	10/08/2019 11:24	10/09/2019 15:24	1200	3367.5		4482	0.0122	0.62	0.2	0.05	OK
10		436	10/07/2019 10:38	10/08/2019 11:26	10/09/2019 17:18	1080	3367.5		5131	0.0122	1.31	0.2	0.06	OK
11		509	10/07/2019 09:44	10/08/2019 10:24	10/08/2019 16:15	238	3477.5		5118	0.0121	10.61	0.3	0.18	OK
12		512	10/07/2019 09:29	10/08/2019 10:22	10/08/2019 15:27	118	3477.5		5674	0.0121	25.41	0.4	0.37	OK
13		415	10/07/2019 09:26	10/08/2019 10:21	10/08/2019 15:15	266	3477.5		5055	0.0121	9.04	0.3	0.16	OK
14		502	10/07/2019 09:09	10/08/2019 10:18	10/08/2019 15:09	308	3477.5		5203	0.0121	7.78	0.3	0.14	OK
15		104	10/07/2019 09:04	10/08/2019 11:34	10/09/2019 16:04	62	3367.5	D	5791	0.0122	56.82	0.7	0.78	OK
15		104	10/07/2019 09:04	10/08/2019 11:34	10/09/2019 16:02	61	3367.5		5783	0.0122	57.69	0.7	0.79	OK
16		407	10/07/2019 10:49	10/08/2019 11:36	10/09/2019 14:57	46	3367.5		7362	0.0122	103.88	0.8	1.24	OK
16		407	10/07/2019 10:49	10/08/2019 11:36	10/09/2019 14:58	49	3367.5	D	7670	0.0122	101.58	0.8	1.19	OK
17		490	10/07/2019 10:36	10/08/2019 11:23	10/09/2019 17:02	855	3367.5		5163	0.0122	2.17	0.2	0.07	OK
18		501	10/07/2019 09:55	10/08/2019 10:56	10/09/2019 13:10	296	3367.5		5081	0.0122	9.33	0.3	0.17	OK
19		477	10/07/2019 09:45	10/08/2019 10:50	10/09/2019 13:45	167	3367.5		5043	0.0122	17.84	0.4	0.29	OK

Types: D-Duplicate, TB-Trip Blank

Reviewed by: C. J.



Radon Flux Measurements

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

Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ² s)		Error 1.00 S.D.	Remarks
			Deployment	Retrieval	Counting						Result	LLD		
39		412	10/07/2019 11:01	10/08/2019 11:41	10/08/2019 19:40	511	3477.5	5442	0.0121	4.49	0.2	0.09	OK	
40		200	10/07/2019 10:31	10/08/2019 11:20	10/09/2019 14:28	310	3367.5	5091	0.0122	8.97	0.3	0.16	OK	
41		433	10/07/2019 10:07	10/08/2019 10:58	10/08/2019 17:26	302	3477.5	5972	0.0121	9.61	0.3	0.16	OK	
42		448	10/07/2019 10:05	10/08/2019 11:11	10/09/2019 15:00	543	3367.5	10363	0.0122	10.67	0.2	0.13	OK	
43		503	10/07/2019 09:58	10/08/2019 10:55	10/09/2019 13:39	278	3367.5	5279	0.0122	10.58	0.3	0.18	OK	
44		514	10/07/2019 09:52	10/08/2019 10:52	10/09/2019 12:54	213	3367.5	5034	0.0122	13.52	0.4	0.23	OK	
45		525	10/07/2019 09:48	10/08/2019 10:31	10/08/2019 17:38	196	3477.5	5261	0.0121	13.76	0.3	0.22	OK	
46		498	10/07/2019 09:38	10/08/2019 10:33	10/08/2019 15:20	306	3477.5	5030	0.0121	7.59	0.3	0.14	OK	
47		505	10/07/2019 09:33	10/08/2019 10:34	10/08/2019 16:03	210	3477.5	5063	0.0121	11.91	0.3	0.2	OK	
48		480	10/07/2019 09:21	10/08/2019 10:35	10/08/2019 17:08	232	3477.5	5388	0.0121	11.41	0.3	0.19	OK	
49		457	10/07/2019 09:13	10/08/2019 10:38	10/08/2019 15:53	290	3477.5	5031	0.0121	7.98	0.3	0.15	OK	
50		417	10/07/2019 08:59	10/08/2019 10:15	10/08/2019 14:57	387	3477.5	5062	0.0121	5.63	0.2	0.11	OK	
51		426	10/07/2019 08:57	10/08/2019 10:14	10/08/2019 18:00	188	3477.5	5728	0.0121	15.6	0.3	0.24	OK	
52		91	10/07/2019 11:00	10/08/2019 11:40	10/09/2019 18:30	100	3367.5	5573	0.0122	36.05	0.6	0.52	OK	
53		485	10/07/2019 11:03	10/08/2019 11:40	10/08/2019 19:33	70	3477.5	5158	0.0121	41.06	0.6	0.61	OK	
53		485	10/07/2019 11:03	10/08/2019 11:40	10/08/2019 19:34	72	3477.5	D 5446	0.0121	42.2	0.6	0.61	OK	
54		101	10/07/2019 10:24	10/08/2019 11:19	10/09/2019 14:38	659	3367.5	5039	0.0122	3.18	0.2	0.08	OK	
55		530	10/07/2019 10:15	10/08/2019 11:00	10/09/2019 13:29	572	3367.5	5032	0.0122	3.94	0.2	0.09	OK	
56		508	10/07/2019 10:14	10/08/2019 10:59	10/08/2019 20:33	421	3477.5	5137	0.0121	5.44	0.2	0.11	OK	
57		527	10/07/2019 10:09	10/08/2019 11:04	10/08/2019 20:26	340	3477.5	5046	0.0121	6.93	0.3	0.13	OK	
58		402	10/07/2019 10:03	10/08/2019 10:54	10/08/2019 20:13	721	3477.5	7668	0.0121	4.5	0.2	0.08	OK	
59		513	10/07/2019 09:59	10/08/2019 10:53	10/08/2019 17:54	214	3477.5	5080	0.0121	11.89	0.3	0.2	OK	

Types: D-Duplicate, TB-Trip Blank

Reviewed by: 



Radon Flux Measurements

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

Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ² s)		Error 1.00 S.D.	Remarks
			Deployment	Retrieval	Counting						Result	LLD		
60		467	10/07/2019 09:50	10/08/2019 10:53	10/08/2019 17:18	462	3477.5	5387	0.0121	4.95	0.2	0.1	OK	
61		431	10/07/2019 09:49	10/08/2019 10:32	10/08/2019 16:26	1200	3477.5	3979	0.0121	0.24	0.1	0.04	OK	
62		418	10/07/2019 09:37	10/08/2019 11:15	10/09/2019 14:14	513	3367.5	5016	0.0122	4.46	0.2	0.1	OK	
63		521	10/07/2019 09:35	10/08/2019 10:44	10/09/2019 12:48	310	3367.5	5042	0.0122	8.69	0.3	0.16	OK	
64		482	10/07/2019 09:19	10/08/2019 10:44	10/09/2019 12:38	589	3367.5	5040	0.0122	3.67	0.2	0.09	OK	
65		410	10/07/2019 09:16	10/08/2019 10:43	10/08/2019 15:29	717	3477.5	5056	0.0121	2.28	0.2	0.06	OK	
66		523	10/07/2019 11:04	10/08/2019 11:43	10/09/2019 14:55	51	3367.5	5327	0.0122	67.41	0.8	0.96	OK	
67		254	10/07/2019 10:24	10/08/2019 11:01	10/09/2019 13:02	401	3367.5	5031	0.0122	6.41	0.3	0.13	OK	
68		500	10/07/2019 10:16	10/08/2019 11:02	10/09/2019 12:32	268	3367.5	5589	0.0122	11.77	0.3	0.19	OK	
69		445	10/07/2019 10:12	10/08/2019 11:03	10/08/2019 20:40	240	3477.5	5038	0.0121	10.54	0.3	0.18	OK	
70		516	10/07/2019 10:12	10/08/2019 10:48	10/09/2019 13:22	379	3367.5	D 5313	0.0122	7.42	0.3	0.14	OK	
70		516	10/07/2019 10:12	10/08/2019 10:48	10/09/2019 13:16	360	3367.5	5021	0.0122	7.36	0.3	0.14	OK	
71		504	10/07/2019 10:01	10/08/2019 10:46	10/09/2019 12:25	173	3367.5	5053	0.0122	17.24	0.4	0.28	OK	
71		504	10/07/2019 10:01	10/08/2019 10:46	10/09/2019 12:28	177	3367.5	D 5158	0.0122	17.21	0.4	0.28	OK	
72		1	10/07/2019 11:07	10/08/2019 11:48	10/09/2019 13:51	97	3367.5	D 5096	0.0122	32.66	0.5	0.5	OK	
72		1	10/07/2019 11:07	10/08/2019 11:48	10/09/2019 13:49	98	3367.5	5092	0.0122	32.27	0.5	0.49	OK	
73		42	10/07/2019 10:20	10/08/2019 11:18	10/09/2019 14:01	713	3367.5	5009	0.0122	2.76	0.2	0.08	OK	
74		2	10/07/2019 10:18	10/08/2019 11:17	10/09/2019 14:52	171	3367.5	5647	0.0122	19.86	0.4	0.3	OK	
75		468	10/07/2019 11:08	10/08/2019 11:49	10/09/2019 14:50	76	3367.5	9480	0.0122	80.65	0.6	0.86	OK	
76		461	10/07/2019 11:10	10/08/2019 11:50	10/08/2019 19:56	60	3477.5	5272	0.0121	49.28	0.6	0.71	OK	
77		422	10/07/2019 11:57	10/08/2019 12:14	10/08/2019 18:19	43	3477.5	8771	0.0121	116.5	0.7	1.27	OK	
78		528	10/07/2019 11:11	10/08/2019 11:50	10/08/2019 19:10	41	3477.5	9804	0.0121	136.28	0.8	1.4	OK	

Types: D-Duplicate, TB-Trip Blank

Reviewed by: _____

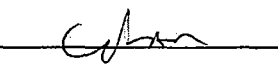


Radon Flux Measurements

Environmental Restoration Group, Inc.
8809 Washington St. NE, Suite 130
Albuquerque, NM, 87113

Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ² s)		Error 1.00 S.D.	Remarks
			Deployment	Retrieval	Counting						Result	LLD		
79		460	10/07/2019 11:57	10/08/2019 12:12	10/08/2019 19:15	657	3477.5		7332	0.0121	4.83	0.2	0.09	OK
80		49	10/07/2019 11:15	10/08/2019 11:51	10/08/2019 19:29	192	3477.5		13079	0.0121	37.79	0.3	0.35	OK
81		419	10/07/2019 11:56	10/08/2019 12:11	10/08/2019 18:22	55	3477.5		8119	0.0121	84.01	0.7	0.96	OK
82		522	10/07/2019 11:15	10/08/2019 11:53	10/09/2019 16:23	902	3367.5		6793	0.0122	3.17	0.2	0.07	OK
83		420	10/07/2019 11:55	10/08/2019 12:10	10/08/2019 19:59	744	3477.5		5225	0.0121	2.43	0.2	0.07	OK
84		487	10/07/2019 11:18	10/08/2019 11:54	10/08/2019 19:07	105	3477.5		5101	0.0121	26.38	0.5	0.4	OK
85		518	10/07/2019 11:15	10/08/2019 11:53	10/09/2019 17:40	90	3367.5	D	5149	0.0122	36.82	0.6	0.55	OK
85		518	10/07/2019 11:15	10/08/2019 11:53	10/09/2019 17:38	90	3367.5		5076	0.0122	36.26	0.6	0.55	OK
86		489	10/07/2019 11:51	10/08/2019 12:09	10/08/2019 18:16	83	3477.5		6867	0.0121	46.24	0.5	0.59	OK
87		424	10/07/2019 11:19	10/08/2019 11:56	10/09/2019 13:53	110	3367.5		9204	0.0122	53.19	0.5	0.58	OK
88		484	10/07/2019 11:49	10/08/2019 12:08	10/08/2019 19:12	167	3477.5		5850	0.0121	18.73	0.4	0.28	OK
89		64	10/07/2019 11:22	10/08/2019 11:57	10/09/2019 17:58	1200	3367.5		4423	0.0122	0.6	0.2	0.05	OK
90		4	10/07/2019 11:47	10/08/2019 12:07	10/08/2019 18:43	429	3477.5		5537	0.0121	5.81	0.2	0.11	OK
91		5	10/07/2019 11:23	10/08/2019 11:57	10/09/2019 15:11	706	3367.5		5337	0.0122	3.16	0.2	0.08	OK
92		450	10/07/2019 11:40	10/08/2019 12:06	10/08/2019 19:01	319	3477.5		9902	0.0121	16.32	0.3	0.19	OK
93		481	10/07/2019 11:39	10/08/2019 12:05	10/08/2019 18:09	363	3477.5		5034	0.0121	6.32	0.2	0.12	OK
94		517	10/07/2019 11:38	10/08/2019 12:04	10/08/2019 18:34	442	3477.5	D	5704	0.0121	5.79	0.2	0.11	OK
94		517	10/07/2019 11:38	10/08/2019 12:04	10/08/2019 18:26	389	3477.5		5136	0.0121	5.95	0.2	0.12	OK
95		473	10/07/2019 11:37	10/08/2019 12:04	10/08/2019 19:58	42	3477.5		5983	0.0121	81.46	0.8	1.09	OK
96		492	10/07/2019 11:35	10/08/2019 12:03	10/09/2019 15:10	41	3367.5		7436	0.0122	119.15	0.9	1.41	OK
97		21	10/07/2019 11:33	10/08/2019 12:01	10/09/2019 16:17	203	3367.5		5046	0.0122	14.85	0.4	0.25	OK
98		406	10/07/2019 11:33	10/08/2019 12:01	10/08/2019 19:49	258	3477.5		5282	0.0121	10.25	0.3	0.18	OK

Types: D-Duplicate, TB-Trip Blank

Reviewed by: 



Radon Flux Measurements

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

Location Name	Field Type	Canister Number	Date/Time			Count Time (sec)	BKG Counts	Lab Type	Sample Counts	Efficiency (cps/dps)	Flux (pCi/m ² s)		Error 1.00 S.D.	Remarks
			Deployment	Retrieval	Counting						Result	LLD		
99		515	10/07/2019 11:30	10/08/2019 11:59	10/08/2019 19:37	146	3477.5	5197	0.0121	19.03	0.4	0.3	OK	
100		451	10/07/2019 11:27	10/08/2019 11:58	10/08/2019 19:00	53	3477.5	7503	0.0121	80.22	0.7	0.96	OK	
TB1	TB	496	10/07/2019 12:00	10/08/2019 12:00	10/09/2019 18:54	1200	3367.5	3208	0.0122	-0.09	0.2	0.05	OK	
TB2	TB	524	10/07/2019 12:00	10/08/2019 12:00	10/09/2019 18:33	1200	3367.5	3208	0.0122	-0.09	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 Form

Site: 2019 HMC LTP

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
47	450	09/10/19	0950	1125	09/11/19	
79	481		1005	1119		
62	406		1011	1127		
48	484		1013	1128		
49	524		1017	1130		
64	490		1020	1132		
80	521		1027	1133		
94	498		1030	1135		
81	480		1037	1136		
65	451		1043	1138		
51	428		1051	1149		
66	414		1055	1150		
82	254		1057	1151		
95	418		1100	1152		
96	512		1103	1154		
83	516		1104	1155		
67	433		1106	1157		
52	470		1108	1159		
53	513		1114	1202		
68	452		1116	1203		
84	529		1118	1205		
97	426		1120	1206		
98	429		1123	1208		
85	445		1125	1210		
69	508		1127	1212		
54	417		1130	1213		
55	510		1137	1226		
70	472		1138	1228		
86	608		1140	1230		
99	443		1141	1231		

Review: _____

C. J. Am...

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ERG Canister Deployment and Retrieval Log Form

Site: 2019 HMC LTP

[Handwritten signatures and initials on the right margin]

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
31	473	09/10/19	0952	2/11/19	11:16	
15	489		0958		11:18	
1	517		1001		11:20	
16	492		1004		11:22	
32	410		1005		11:24	
33	494		10:15		11:11	
17						
11						
33	494		1015		11:29	
17	422		1025		11:32	
2	448		1027		11:34	
3	515		1029		11:35	
18	4		1033		11:37	
34	520		1036		11:38	
50	21		1041		11:40	
35	527		1051		11:49	moist point N. of 2000 site
19	500		1054		11:54	
4	477		1057		11:55 11:56	
5	415		1100		11:58	
20	505		1102		12:00	
36	2		1104		12:03	
37	504		1113		12:08	
21	501		1119		12:10	
6	511		1120		12:12	
7	518		1123		12:14	
22	530		1125		12:16	
38	523		1127		12:18	
43	457		1251		13:10	
27	437		1252		13:11	

Review: *[Signature]*

ERG Canister Deployment and Retrieval Log Form

Site: 2019 HMC LTP

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
100	409		1144		1233	
97	413		1145		1234	
71	49		1146		1235	
56	488		1148		12:28	
39	105		1151		12:30	
23	427		1152		12:32	
8	461		1154		12:34	
9	468		1155		12:36	
24	526		1157		12:38	
40	459		1158		12:40	
57	94		1202		12:45	
72	64		1203		12:45	
58	446		1205		12:46	
89	263		1206		12:48	
73	411		1207		12:47 12:50	
58	200		1209		12:48	
41	485		1212		12:50	
25	5		1213		12:55	
10	509		1214		12:57	
11	424		1216		12:59	
26	482		1217		13:00	
42	486		1218		13:03	
59	104		1222		12:57	
74	402		1223		12:59	
90	502		1224		1301	
41	503		1226		1302	
75	507		1231		1304	
60	522		1232		1305	moved point

Review: *clm*

ERG Canister Analysis Log Form

Site: HMC LTP 2019
 ROI: Channel 560 to Channel 625 ⁶²⁸

48194

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
STD3A		09/11/19	14:38	1200	45441	CF
STD1A			15:00	1200	260687	DN ←
BKGA			15:27	1200	3186	CF
492			15:52	190	5173	DN
410			15:58	159	5134	
481			16:03	48	5870	
473			16:04	273	5013	
489			16:10	1193	5002	
517			16:31	139	5166	
450			16:35	40	5054	
406			16:38	203	5011	
451			16:42	33	5087	
484			16:44	114	5025	
515			16:47	86	5091	
515A	✓(1)		16:48	83	5039	
520			16:51	315	5035	
4			16:57	196	5017	
21			17:02	644	5002	
524			17:13	884	5003	
494			17:29	719	5003	
422			17:41	33	5012	
498			17:43	176	5003	
448			17:47	36	5062	
448A	✓(2)		17:49	36	5068	
490			17:50	47	5051	
480			17:52	88	5024	
527			17:54	1200	4606	
* STD1B			18:15	1200	47782	
414		↓	18:37	23	5116	↓

Check Counts

Review: CFarr

Date: 9/18/19

ERG Canister Analysis Log Form

Site: HMC LTP 2019
 ROI: Channel 575 to Channel 645
 711

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
STD1D		09-12-19	10:47	1200	46642	DN
STD3C			11:08	1200	44712	DN
BKGC			11:28	1200	3043	
417			11:54	511	5001	
500			12:04	284	5104	
415			12:09	45	5096	
415A	✓ (#3)		12:10	45	5054	
505			12:11	88	5013	
426 413			12:14	25	5141	
445			12:15	523	5007	
513			12:25	67	5123	
452			12:27	68	5046	
508			12:36	280	5013	
529			12:42	26	5078	
529A	✓ (#4)		12:43	26	5129	
429			12:44	288	5009	
530			12:50	307	5004	
523			12:56	222	5008	
518			13:01	243	5013	
511			13:05	137	5024	
504			13:08	142	5170	
49			13:12	127	5035	
49A	✓ (#5)		13:15	131	5092	
501			13:18	1003	5002	
409			13:37	595	5000	
68			13:52	175	5022	
493			13:57	159	5033	
461			14:00	135	5008	
461A	✓ (#6)	✓	14:03	135	5008	✓

Review: C. J. Ann

Date: 7/18/19

ERG Canister Analysis Log Form

Site: HMC LTP 2019
 ROI: Channel 575 to Channel 645

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
459		09-12-19	14:07	143	5010	DN
443			14:10	883	5002	
472			14:26	840	5001	
260			14:44	138	5011	
94			14:48	63	5054	
94A	✓ (#7)		14:49	64	5035	
STD3D			14:52	1200	45489	
427			15:13	277	5128	
510			15:19	1131	5782	
411			15:39	544	5027	
485			15:49	50	5072	
263			15:50	247	5010	
446			15:55	93	5031	
64			15:58	43	5075	
509			16:00	145	5019	
430			16:03	1200	3739	
468			16:24	59	5048	
468A	✓ (#8)		16:32	59	5104	
460 dn	Adjusted ROI to 560-630					
460			16:41	85	5029	
488			16:44	130	5006	
420			16:47	189	5011	
495			16:52	205	5017	
42			16:56	160	5005	
528			17:18	823	5010	
514			17:20	518	5007	
104			17:29	98	5013	
402			17:32	686	5005	
			next page			

✓ w/ ADJUSTED ROI 560-630
 TOTAL COUNTS = 3874.

Review: C. [Signature]

Date: 9/18/19

ERG Canister Analysis Log Form

Site: HMC LTP 2619
 ROI: Channel 560 to Channel 630 ⁶⁹⁸
 Note Change

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
487		09-12-19	17:45	33	5067	DN
487A			17:45	33	5213	
457			17:47	131	5024	
437			17:50	64	5048	
502			17:52	104	5034	
507			17:55	70	5092	
522			17:56	123	5003	
503			17:59	263	5008	
5			18:04	75	5030	
486			18:06	105	5010	
482			18:09	61	5006	
526			18:10	23 ²²	5033	
526A	✓ (#10)		18:11	22	5090	
424			18:13	64	5036	
425			18:15	374	5003	
519			18:22	26	5025	
525			18:26	31	5028	
431			18:28	533	5009	
STD1E			18:56	1200	48065	
STD3E			19:17	1200	45520	
BKGD			19:38	1200	3340	✓
		END -	09-12-19			

Review: *CD*

Date: 9/18/19

ERG Canister Deployment and Retrieval Log Form

Site: HMC STP - 2019

• Minimum temperature during canister deployment: 36.5 °F

How was onsite minimum temperature measured? ONSITE NOT STATION

• 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? ONSITE NOT STATION

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
51	X 426	10/7/19	08:57	10/8/19	10:14	
50	2 417		8:59		10:15	
36	X 437		9:00		10:16	
24	A 526		9:02		10:39	
15	X 104		9:04		11:34	
9	X 494		9:06		11:34	
7	(X) 425		9:08		10:40	
14	X 502		9:09		10:18	
23	X 507		9:11		10:18	
35	X 520		9:12		10:17	
49	11 457		9:13		10:38	
65	12 410		9:16		10:43	
64	13 482 ^M		9:19		10:44	
48	14 480		9:21		10:35	
34	15 2968		9:23		10:35	
22	16 429		9:24		10:27	
13	X 415		9:26		10:21	
6	18 475		9:27		10:19	
5	19 452		9:28		10:23	
12	20 512		9:29		10:22	
21	(21) 409		9:30		10:26	
33	22 529		9:32		10:27 ^M	10:28
47	23 505		9:33		10:34	
63	24 521		9:35		10:44	
62	25 418		9:37		11:15	

Review: Celan



Canister Deployment and Retrieval Log Form

Site: HANC STP 2019

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
46	26	10/7/19	09:38	10/8/19	1033	
32	27		9:42		1029	
20	28 263		9:43		1025	
11	29 509		9:44		1024	
19	30		9:45		1050	
31	31		9:47		1050	
45	32 525		9:48		1031	
61	33 431		9:49		1032	
60	34 467		9:50		1053	
44	35		9:52		1052	
30	36		9:53		1051	
18	37		9:55		1056	
29	38		9:56		1057	
43	39		9:58		1055	
59	40 513		9:59		1053	LOCATION 59
71	41		10:01		1046	
58	42		10:03		1054	
42	43		10:05		1111	
41	44		10:07		1058	
57	45		10:09		1104	
70	46		10:12		1048	
69	47		10:12		1103	
56	48		10:14		1059	
55	49		10:15		1100	
68	50		10:16		1102	
74	51		10:18		1117	
73	52		10:20		1118	
67	53		10:24		1101	
54	(54) 101		10:24		1119	
40	55		10:31		1120	

Review: C. Jan

ERG Canister Deployment and Retrieval Log Form

Site: ITMC 5TP 2015

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
27	58 459	10/7/19	10:33	10/8/19	1121	
28	57 510		10:34		1125	
17	58 490		10:36		1123	
9	59 411		10:37		1124	
10	60 436		10:38		1126	
4	61 493		10:40		1128	
1	62 94		10:41		1129	
2	63 472		10:43		1130	
3	64 428		10:45		1132	
16	65 407		10:49		1136	
25	66 519		10:51		1137	
37	67 427		10:52		1138	
26	68 511		10:53		1114	
38	69 105		10:54		1139	
52	70 91		11:00		1140	
39	71 412		11:01		1141	
53	72 485		11:03		1140	
66	73 523		11:04		1143	
72	74 1		11:07		1148	
75	(75) 468		11:08		1149	
76	(76) 461		11:10		1150	
78	77 528		11:11		1150	
80	78 49		11:15		1151	
82	79 522		11:15		1153	
85	80 518		11:15		1153	
84	81 487		11:18		1154	
87	82 424		11:19		1156	
89	83 64		11:22		1157	
91	84 5		11:23		1157	
100	85 451		11:27		1158	

Review: _____

[Signature]

ERG Canister Deployment and Retrieval Log Form

Site: HMC STP 2019

Location Number	Canister Number	Deployment Date (mm/dd/yy)	Deployment Time (24:00)	Retrieval Date (mm/dd/yy)	Retrieval Time (24:00)	Comments
99	86 515	10/7/19	11:30	PH 10/21/19	1159	
98	87 406		11:33		1201	
97	88 21		11:33		1201	
96	89 492		11:35		1203	
95	90 473		11:37		1204	
94	91 517		11:38		1204	
93	92 481		11:39		1205	
92	93 450		11:40		1206	
90	94 4		11:47		1207	
88	95 484		11:49		1208	
86	96 489		11:51		1209	
83	97 420		11:55		1210	
81	98 419		11:56		1211	
79	99 460		11:57		1212	
77	100 422		11:57		1214	
	101					
TB 1	102 496		12:00		12:00	TRIP BLANK
TB 2	103 524		12:00		12:00	TRIP BLANK
	104					
	105					
	106					
	107					
	108					
	109					
	110					
	111					
	112					
	113					
	114					
	115					

Review: _____ *[Signature]*

ERG Canister Analysis Log Form

Site: HMC-STP
 ROI: Channel 580 to Channel 720

140

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
STD3A		10/8/19	1345	1200	43820	PH
STD1A		10/8/19	1406	1200	PH 41268 578	PH
BKGA		10/8/19	1428	1200	3548	PH
452		10/8/19	1449	374	5047	PH
417		10/8/19	1457	387	5062	PH
68		10/8/19	1504	222	5085	PH
502		10/8/19	1509	308	5203	PH
415		10/8/19	1515	266	5055	PH
498		10/8/19	1520	306	5030	PH
512		10/8/19	1527	118	5674	PH
410		10/8/19	1529	717	5056	PH
263		10/8/19	1542	248	5043	PH
263D	X	10/8/19	1547	240	5127	PH
457		10/8/19	1553	290	5031	PH
526		10/8/19	1559	176	5062	PH
505		10/8/19	1603	210	5063	PH
507		10/8/19	1607	228	5052	PH
470		10/8/19	1612	144	5089	PH
509		10/8/19	1615	238	5118	PH
429		10/8/19	1620	138	5235	PH
429D	X	10/8/19	1623	131	5302	PH
431		10/8/19	1626	1200	3979	PH
425		10/8/19	1647	97	5367	PH
475		10/8/19	1650	1016	5012	PH
480		10/8/19	1708	232	5388	PH
529		10/8/19	1713	189	5135	PH
467		10/8/19	1718	462	5387	PH
433		10/8/19	1726	302	5972	PH
486		10/8/19	1732	268	5080	PH

Review: Chan

Date: 10/11/19

ERG Canister Analysis Log Form

Site: HMC-STP
 ROI: Channel 580 to Channel 720

144

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
525		10/8/19	1738	196	5261	PH
409		10/8/19	1742	108 ^{PH} 169	5062	PH
414		10/8/19	1747	169	5626	PH
414 D	X	10/8/19	1750	152	5200	PH
513		10/8/19	1754	PH 214 152	5080	PH
426		10/8/19	1800	188	5728	PH
520		10/8/19	1804	234	5354	PH
481		10/8/19	1809	363	5034	PH
489		10/8/19	1816	83	6867	PH
422		10/8/19	1819	43	8771	PH
419		10/8/19	1822	55	8119	PH
517		10/8/19	1826	389	5136	PH
517 D	X	10/8/19	1834	442	5704	PH
4		10/8/19	1843	429	5537	PH
437		10/8/19	1851	421	5632	PH
451		10/8/19	1900	53	7503	PH
450		10/8/19	1901	319	9902	PH
487		10/8/19	1907	105	5101	PH
528		10/8/19	1910	41	9804	PH
484		10/8/19	1912	167	5850	PH
460		10/8/19	1915	657	7332	PH
519		10/8/19	1927	52	8398	PH
49		10/8/19	1929	192	13079	PH
485		10/8/19	1933	70	5158	PH
485 D	X	10/8/19	1934	72	5446	PH
515		10/8/19	1938 ^{PH}	146	5197	PH
412		10/8/19	1940	511	5442	PH
406		10/8/19	1949	258	5282	PH
461		10/8/19	1956	60	5272	PH

169 sec.
214 sec

Review: C. J. Am

Date: 10/11/19

ERG Canister Analysis Log Form

Site: HMC-STP 2019
 ROI: Channel 580 to Channel 720

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
473		10/08/19	1958	42	5983	PH
420		10/08/19	1959	744	5225	PH
402		10/08/19	2013	721	7668	PH
527		10/08/19	2026	340	5046	PH
508		10/08/19	2033	421	5137	PH
445		10/08/19	2040	240	5038	PH
BkgB		10/08/19	2045	1200	3407	PH
STD1B		10/08/19	2106	1200	48198	PH
STD3B		10/08/19	2127	1200	44583	PH
- END OF DAY -						
- SET ROI TO 585-725 -						
STD3C		10/09/19	1123	1200	44848	PH
STD1C		10/09/19	1143	1200	47509	PH
BKGC		10/09/19	1204	1200	3323	PH
504		10/09/19	1225	173	5053	PH
504D	X	10/09/19	1228	177	5158	PH
500		10/09/19	1232	268	5589	PH
482		10/09/19	1238	589	5040	PH
521		10/09/19	1248	310	5042	PH
514		10/09/19	1254	213	5034	PH
495		10/09/19	1259	171	5066	PH
254		10/09/19	1302	401	5031	PH
501		10/09/19	1310	296	5081	PH
516		10/09/19	1316	360	5021	PH
516D	X	10/09/19	1322	379	5313	PH
530		10/09/19	1329	572	5032	PH
503		10/09/19	1339	278	5279	PH
477		10/09/19	1345	167	5043	PH

now DAT
 R.O.I
 585-725
 (CP)

Review: CFM

Date: 10/11/19

ERG Canister Analysis Log Form

Site: HMC - STP ^{of} 2019
 ROI: Channel 585 to Channel 725 ₁₄₀

Canister Number	Duplicate Count	Count Date (mm/dd/yy)	Count Time (24:00)	Count Duration (seconds)	Total Counts	Technician Initials
1		10/09/19	1349	98	5092	PH
1D	X	10/09/19	1351	97	5096	PH
424		10/09/19	1353	110	9204	PH
494		10/09/19	1356	46	6130	PH
427		10/09/19	1358	158	5083	PH
42		10/09/19	1401	713	5009	PH
418		10/09/19	1414	513	5016	PH
511		10/09/19	1423	205	5038	PH
200		10/09/19	1428	310	5091	PH
510		10/09/19	1434	177	5044	PH
101		10/09/19	1438	659	5039	PH
468		10/09/19	1450	76	9480	PH
2		10/09/19	1452	171	5647	PH
523		10/09/19	1455	51	5327	PH
407		10/09/19	1457	46	7362	PH
407D	X	10/09/19	1458	49	7670	PH
448		10/09/19	1500	543	10363	PH
492		10/09/19	1510	41	7436	PH
5		10/09/19	1511	706	5337	PH
411		10/09/19	1524	1200	4482	PH
94		10/09/19	1545	1006	5016	PH
104		10/09/19	1602	61	5733	PH
104D	X	10/09/19	1604	62	5791	PH
105		10/09/19	1606	628	5020	PH
21		10/09/19	1617	203	5046	PH
522			16:23	902	6793	df
472			16:39	615	5038	df
428			16:50	300	5441	df
428D	X		16:56	300	5352	

Review: df

Date: 10/11/19

