



Homestake Mining Company of California

P.O. Box 98  
Grants, NM 87020

Tel +1 505 287 4456  
Fax +1 505 287 4457

February 29, 2024

**ATTN: Document Control Desk**

Document Control  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**ATTN: Mr. Ron C. Linton**

Project Manager / Hydrogeologist  
U.S. Nuclear Regulatory Commission  
Decommissioning, Uranium Recovery & Waste Programs  
Office of Nuclear Materials Safety and Safeguards  
MS T-5A10, 11545 Rockville Pike  
Rockville, MD 20852

**ATTN: Ms. Anne Maurer**

Ground Water Quality Bureau  
New Mexico Environment Department  
PO Box 5469  
Santa Fe, NM 87502-5469

**RE: 2<sup>nd</sup> Half 2023 Semi-Annual Environmental Monitoring Report for Period July -  
December 2023, In Accordance with Nuclear Regulatory Commission Docket No. 40-  
8903, License No. SUA 1471, and New Mexico Environmental Department DP-200  
Ground Water Discharge Plan**

Mr. Linton and Ms. Maurer:

Pursuant to US Nuclear Regulatory Commission License SUA-1471, Docket 40-8903, License Condition 35(E) and in accordance with the ground water discharge permit DP-200 issued by the New Mexico Environment Department, please find the Semi-Annual Environmental Monitoring Report for the second half of 2023 (July-December) for Homestake Mining Company's Grants Reclamation Project attached.

Thank you for your time and attention on this matter. If you have any questions, please contact me via e-mail at [bbingham@homestakeminingcoca.com](mailto:bbingham@homestakeminingcoca.com) or via phone at 505.290.8019.

Respectfully,

**Brad R. Bingham**

Closure Manager  
Homestake Mining Company, Grants, New Mexico  
Office: 505.287.4456 x35 | Cell: 505.290.8019

cc: N. Olin, DOE, Grand Junction, Colorado (electronic copy)  
S. Appaji, Region VI EPA, Dallas, Texas (electronic copy)  
M. McCarthy, Barrick, Salt Lake City, Utah (electronic copy)  
D. Lattin, Barrick, Elko, Nevada (electronic copy)  
R. Whicker, Environmental Restoration Group, Albuquerque, New Mexico (electronic copy)

# **HOMESTAKE MINING COMPANY OF CALIFORNIA**

## **Grants Reclamation Project**



### **SEMIANNUAL ENVIRONMENTAL MONITORING REPORT**

**Reporting Period  
July - December 2023**

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

TABLE OF CONTENTS

1.0 INTRODUCTION ..... 1

2.0 ENVIRONMENTAL MONITORING PROGRAMS ..... 1

    2.1 Air Particulate Monitoring..... 2

    2.2 Radon Gas Monitoring..... 2

    2.3 Effluent and Radon Flux Monitoring..... 3

3.0 OPERATIONS ..... 5

    3.1 Flow Rates ..... 5

    3.2 Reversal Wells ..... 5

    3.3 Pond and Pipeline Maintenance..... 6

    3.4 Well Drilling and Closures ..... 6

    3.5 Facilities Inspections and Maintenance ..... 6

4.0 WATER QUALITY MONITORING..... 6

    4.1 Groundwater Quality Monitoring ..... 6

    4.2 Pond Water Quality Monitoring ..... 7

    4.3 Treated Water Quality Monitoring ..... 7

5.0 DIRECT RADIATION ..... 7

6.0 SURFACE CONTAMINATION..... 8

    6.1 Personnel Skin and Clothing..... 8

    6.2 Survey of Equipment Prior to Release for Unrestricted Use ..... 8

7.0 LOWER LIMIT OF DETECTION..... 8

8.0 DATA SUMMARY AND CONCLUSIONS..... 9

REFERENCES..... 10

**TABLES**

Table 2-1 Environmental Monitoring Program Excluding Groundwater Monitoring

Table 2-2 Groundwater Monitoring Program (2022 as modified by Amendment 58)

Table 2-3 Occupational Monitoring Program

Table 3.1-1 Evaporation and Collection Pond Monthly Influent Totals

Table 3.1-2 Evaporation and Collection Pond Weekly Freeboard Measurements

Table 3.1-3 Evaporation Pond 2 Leak Detection

Table 3.1-4 Evaporation Pond 3A Leak Detection

Table 3.1-5 Evaporation Pond 3B Leak Detection

Table 3.1-6 Monthly Tailings Collection Totals

Table 3.1-7 Monthly Collection Totals by Aquifer and Area

Table 3.1-8 Monthly Injection Totals by Aquifer and Area

Table 3.1-9 RO Treatment System Influent Monthly Totals

Table 3.1-10 Treatment and Fresh Water System Effluent Monthly Totals

## **TABLES (cont.)**

Table 3.2-1	Depth to Water in Reversal Wells
Table 3.4-1	Wells Drilled and Abandoned
Table 4.1-1	Water Quality Analysis for Well D1
Table 4.1-2	Water Quality Analyses for Well DD
Table 4.1-3	Water Quality Analyses for Well DD2
Table 4.1-4	Water Quality Analyses for Well P
Table 4.1-5	Water Quality Analyses for Well S4
Table 4.1-6	Water Quality Analyses for Well X
Table 4.2-1	Lined Pond Water Quality
Table 4.2-2	Evaporation Pond Monitoring Wells Water Quality
Table 4.3-1	Compliant Water Quality
Table 4.3-2	Treated Water Quality

## **FIGURES**

Figure 1 – HMC Air Monitoring & Sampling Locations – Grants, NM

## **ATTACHMENTS**

Attachment 1 – 2023 2<sup>nd</sup> Half High Volume Air Sampling Results  
Attachment 2 – 2023 2<sup>nd</sup> Half Radon Gas Monitoring Results  
Attachment 3 – 2023 2<sup>nd</sup> Half Environmental Gamma Radiation Results  
Attachment 4 – 2023 Annual Public Dose Estimates

## 1.0 INTRODUCTION

This Semiannual Environmental Monitoring Report summarizes effluent monitoring data recorded for Homestake Mining Company of California - Grants Project (Homestake) from July through December 2023. 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 (LC) No. 35, continued throughout the reporting 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 semiannual reporting, groundwater-monitoring data for the point-of-compliance (POC) wells, pond monitoring wells DD, DD2 and X, and background well P are included in this report.

## 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 with windspeeds high enough to suspend soil particulates in air [exceeding an estimated emission threshold of 7 m/s (Whicker et al., 2002; Webb et al., 2016)] is from the west or southwest; accordingly, HMC1, HMC-1A, HMC-2 and HMC-3 are generally located downwind from potential sources of particulate emissions. The location identified as HMC-6 represents upwind background conditions for air particulates and is located due west of the large tailings pile at the westernmost side of the property boundary. Locations HMC-4 and HMC-5 are site proximal to the nearest, and maximally exposed, 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. Pace Analytical (PACE) 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 reported to PACE for calculation of average radionuclide concentrations in air particulates.

The results of environmental air particulate monitoring for 2<sup>nd</sup> half 2023 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. Due to characteristic nocturnal drainage airflow patterns with low windspeeds prevailing from the northeasterly direction, along with residual radiological impacts to surface soils on HMC property adjacent to monitoring station locations HMC-4 and HMC-5 have the highest effluent radon levels along HMC Site boundaries. With respect to radon gas, these stations are considered “downwind” from sources of effluent radon emissions at the Site. Rapiidos high-sensitivity track-etch passive radon monitors (PRM) from Radonova, 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 semiannual 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 2<sup>nd</sup> half 2023. 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 2023 were conducted as two separate deployments in May and July, 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 annual Radon Flux Report for 2023 is provided in Attachment 4 to the 2023 1<sup>st</sup> half Semiannual Environmental Monitoring Report (ADAMS Accession No. ML2341A816).

On April 20, 2017, the NRC issued an NOV for the manner in which average radon flux was measured and calculated for 2015. The 2016 annual flux report, dated January 2017, utilized 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. Although the 2017 radon flux NOV was recently withdrawn by NRC staff (ML21124A358), this protocol, utilized since 2017, continues to be followed as detailed in radon flux reports provided with corresponding semiannual environmental monitoring reports.

As indicated in the staff's May 5, 2021 withdrawal of the 2017 radon flux NOV (ML21124A358), HMC and NRC staff are continuing to work on resolution of the proper method for determination of the average radon flux from the LTP based on annual flux measurements on top of the LTP in accordance with License Condition 36E (see correspondences in ML21217A166, ML21257A126, and HMC, 2021). Until this issue is resolved, HMC will continue with the survey and reporting practices utilized since 2017.

With respect to the STP, this is an operational facility for disposal of additional materials in the STP which will continue through final reclamation. This interpretation is currently in conflict with NRC staff's October 20, 2021 interpretation that the STP is not an operational tailings impoundment (ML21257A126). HMC continues to contend that the STP is still operational

(HMC, 2021), and with this understanding of applicable regulations, the STP is broken into regions in accordance with EPA Method 115, with the pond being one region of zero flux (16.9 acres), and the remaining areas (earthen surfaces) representing a second region (36.3 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 <sup>2</sup> -s)
$J_i$	=	Mean flux measured in region i (pCi/m <sup>2</sup> -s)
$A_i$	=	Area of region i (m <sup>2</sup> )
$A_t$	=	Total area of the pile (m <sup>2</sup> )

Based on 2023 flux monitoring results, the calculated average radon flux effluent value for the LTP in 2023 was 56.4 pCi m<sup>-2</sup> s<sup>-1</sup>. With respect to the STP, the arithmetic mean flux for the earthen region of the pile (146,696 m<sup>2</sup> area) in 2023 was 19.3 pCi m<sup>-2</sup> s<sup>-1</sup>. The area of EP1 is approximately 68,290 m<sup>2</sup>, and this pond area was assigned a value of zero flux. The overall area-weighted average radon flux for the STP in 2023 was calculated as follows:

$$\text{STP Radon Flux} = [(19.3 \text{ pCi/m}^2\text{-s})(146,696 \text{ m}^2) + (0 \text{ pCi/m}^2\text{-s})(68,290 \text{ m}^2)] / (68,290 \text{ m}^2 + 146,696 \text{ m}^2) = 13.2 \text{ pCi/m}^2\text{-s}$$

Thus, average Rn-222 flux values of 56.4 and 13.2 pCi m<sup>-2</sup> s<sup>-1</sup> for the LTP and STP respectively are assumed for 2023. Based on the 2023 average flux values (56.4 and 13.2 pCi m<sup>-2</sup> s<sup>-1</sup> 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 (≈ 53.2 acres), the annual radon emissions from the tailings piles in 2023 were calculated to be 763 Ci and 90 Ci respectively. For the 2<sup>nd</sup> half 2023 semiannual reporting period only, effluent radon releases are assumed equivalent to half of these values, or 382 Ci and 45 Ci for the LTP and STP respectively. Detailed results of the 2023 radon flux measurements are provided in Attachment 4 to the 1<sup>st</sup> Half Semiannual Environmental Monitoring Report (ML2341A816).



### **3.0 OPERATIONS**

#### **3.1 Flow Rates**

The monthly influent totals for each of the evaporation ponds are presented in Table 3.1-1 for the 2<sup>nd</sup> half 2023. Inputs to Evaporation Pond 2 were RO brine and tailings sumps. Transfers from Evaporation Pond 2 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. Freeboard was not exceeded during this time based on the measurements taken from the evaporation and collection ponds and tabulated in Table 3.1-2. Although water level meters were inoperable for cells A and B in Evaporation Pond 3 after 8/21/2023, observation notes indicated that water levels in cells A and B were continuously one or more feet below the middle berm separating the two cells for seven weekly readings between 10/23/2023 and 12/11/2023. These observations indicate that adequate freeboard was maintained in Evaporation Pond 3 after 8/21/2023. The leak detection volumes pumped 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, if applicable. Pumps in these cells or adjacent cells were adequate to keep up with these rates and there were no exceedances in the reporting period.

The tailings sump volumes for the LTP 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 and RO Product water. The low concentration re-injection ceased operation in July of 2016 and therefore is not presented in this monitoring report. Likewise, the zeolite treatment systems were decommissioned in 2023 and the influent to and effluent from the zeolite system has been removed from tabulations in this report.

Table 3.1-9 presents the influent totals for the active treatment systems. The inflow to the RO plant averaged 396 gpm in the 2<sup>nd</sup> half 2023. Table 3.1-10 presents the total volumes of treated effluent. It also presents the brine effluent that was discharged into Evaporation Pond 2 from the treatment system. 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**

Soil was placed on top of the sideslope liner in Evaporation Pond 1 in the 2<sup>nd</sup> half of 2023. In addition, causeways were built on the bottom of the pond sediments to access and remove the Apex units stranded in the pond. Spent lime was removed from the West Collection Pond and deposited in Evaporation Pond 1 in August. No other significant repairs or maintenance the evaporation/collection ponds or pipelines were completed from July through December of 2023.

### **3.4 Well Drilling and Closures**

No new wells were drilled and no wells were abandoned during the period from July through December of 2023 in the On-Site and Off-Site areas, 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 2023. Piping was observed between the LTP top perimeter road and the LTP outer berm along the southern edge of the pile in September. No exit point downslope in the existing cover was found. The piping was filled with approximately 10 yards of flowable fill and the surface was regraded to promote drainage to the adjacent downdrains.

The following significant maintenance activities were performed during this semiannual reporting period on the groundwater treatment systems:

#### **Reverse Osmosis Groundwater Treatment**

- The annual scale cleaning of the RO Treatment system occurred in August of 2023.

## **4.0 WATER QUALITY MONITORING**

### **4.1 Groundwater Quality Monitoring**

Table 2-2 outlines the water quality sampling frequency and parameters monitored which was updated with License Amendment 58 in 2022 (ML21356B142). In addition, the volumes of water injected and recovered as part of the groundwater 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 35F. 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, included in this report. The water quality of POC wells is currently not representative of steady state aquifer conditions 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 well DD. The molybdenum concentration in well X slightly exceeds the site standard for the 7/31/2023 sample. 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 were measured in the Evaporation Pond 3 and the West Collection pond during the 2<sup>nd</sup> half 2023. 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 RO product and fresh water. This table also shows that all SP2 constituent concentrations in the 2<sup>nd</sup> half 2023 were less than all alluvial site standards for each of these samples. The laboratory results for the 12/29/2023 sample are not available at the time of this reporting.

Table 4.3-2 presents the treated water quality data for the RO product (RO SP1) with sample constituent concentrations that exceed the alluvial site standards highlighted in blue. All RO product constituent concentrations measured in the 2<sup>nd</sup> half 2023 were less than or equal to the corresponding alluvial site standards with the exception of Radium-226 plus Radium-228 concentration for two samples. The radium results are likely not representative of concentrations in the effluent water as the reporting limit of the analysis were above the 5 pCi/L standard. The laboratory results for the 12/29/2023 sample are not available at the time of this reporting.

The water quality of the 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.

## 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 currently 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 semiannually 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, 2022). 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 2<sup>nd</sup> half 2023, no personnel contamination surveys showed evidence of elevated activity in excess of the daily Action Level.

### 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 Manual (HMC, 2022). Depending on equipment use and potential for contact with tailings or other licensed radioactive material (e.g. residual solids from water treatment operations), the RSO may require equipment release surveys for projects that don't require an RWP. Where warranted, such requirements are stipulated by the RSO in Field Level Risk Assessment (FLRA) forms in accordance with Standard Operating Procedure SOP-2. Standard Operating Procedure SOP-12 is used for all equipment release surveys. No surface contamination above the release criteria specified in NRC Regulatory Guide 8.30 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 NRC 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 [ $\mu$ Ci/mL]);

- S<sub>b</sub> 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<sub>b</sub> 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, minimum detectable concentration (MDC), or reporting limit (RL) as applicable 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, MDC or RL as applicable for air and water samples will meet the specifications 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. Radonova (track-etch detector vendor lab) reports the LLD for radon-222. The LLDs for the constituents are:

Ra-226, Th-230 in air	1 E-16 μCi/mL
Rn-222 in air	3.4 E-10 μCi/mL
U-nat in air	1 E-16 μCi/mL
U-nat in water	2 E-10 μCi/mL
Ra-226, Th-230 in water	2 E-10 μCi/mL

## 8.0 DATA SUMMARY AND CONCLUSIONS

The summaries of Homestake's environmental effluent monitoring program included in this submittal contain data for applicable radiological parameters associated with potential effluent releases 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 environmental 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 (2<sup>nd</sup> half 2023), Homestake has not exceeded 10 CFR Part 20 EC values in any terrestrial or airborne effluents covered by this report. As discussed earlier, this evaluation 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). 2021. Homestake Mining Company of California – Grants Reclamation Project – License No. SUA-1471; Docket 040-08903. HMC Reply to NRC Staff Responses Regarding HMC’s Radon Flux Standard Questions. December 17, 2021.

Homestake Mining Company of California (HMC). 2022. Radiation Protection Program Manual, Revision 4. Homestake Grants Reclamation Project, Cibola County, New Mexico. February 1.

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

Webb, Nicholas P.; Magda S. Galloza; Ted M. Zobeck; Jeffrey E. Herrick. 2016. Threshold wind velocity dynamics as a driver of aeolian sediment mass flux. *Aeolian Research* 20 (2016) 45–58.

Whicker, Jeffrey J.; David D. Breshears, Piotr T. Wasiolek, Thomas B. Kirchner, Rebecca A. Tavani, David A. Schoep, and John C. Rodgers J. 2002. Temporal and Spatial Variation of Episodic Wind Erosion in Unburned and Burned Semiarid Shrubland. *J. Environ. Qual.* 31:599–612 (2002).

**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	HMC1, HMC1A, HMC2, and HMC3 at or near the site boundary (sectors with highest predicted levels of airborne radioactive particulates).	Continuous (High Vol.)	Weekly filter change, or as needed. Samples composited and analyzed quarterly.	U-nat, Ra-226, Th-230
Air Particulates	2	HMC4 and HMC5 (points of compliance for maximally exposed member of public)	Continuous (High Vol.)	Weekly filter change, or as needed. Samples composited and analyzed quarterly.	U-nat, Ra-226, Th-230
Air Particulates	1	HMC6 as a background location	Continuous (High Vol.)	Weekly filter change, or as needed. Samples composited and analyzed quarterly.	U-nat, Ra-226, Th-230
Radon Gas	24	2 each at the locations described above, plus HMC1OFF, HMC6OFF, HMC7, and HMC16 as a background location. Indoor locations in office and RO plant (1 each).	Continuous Track-etch	Quarterly	Rn-222
Direct Radiation	10 + 2 transit control badges	Locations described in Air - Particulates plus HMC1OFF, HMC6OFF, and HMC16 as a background location	Continuous OSL	Semiannually	Gamma Dose Rate



**Table 2-2**  
**Groundwater Monitoring Program (2022, as modified by**  
**Amendment 58)**

**Table 2-2. Groundwater Monitoring at the Grants Site (2022 as modified by Amendment 58)**

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 B, BA, KZ, DZ, SM, SN, S2, S5	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, CE7, CE8, CE9, CE15, 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 (2022 as modified by Amendment 58), cont.**

<b>Parameter List Code</b>	<b>Included Parameters (Dissolved)</b>	<b>Method</b>	<b>Reporting Limits</b>	<b>Units</b>
B	Water level			
	pH	Field	0.01	s.u.
	Total dissolved solids (TDS)	A2540 C	20	mg/L
	Sulfate (SO <sub>4</sub> )	E300.0	4	mg/L
	Chloride (Cl)	E300.0	1	mg/L
	Bicarbonate (HCO <sub>3</sub> )	A2320 B	5	mg/L
	Carbonate (CO <sub>3</sub> )	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 <sub>3</sub> )	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 <sub>4</sub>	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 Exposure/Dose Monitoring Program**

Type of Sample	Number	Locations	Procedure	Frequency	Analytical Parameters
Lapel Personal Air Sample	As required by RWP or at RSO discretion	As required by RWP (2-3 L/min or equivalent)	SOP 11 (HP-1)	As required by RWP or at RSO discretion	Alpha, U-nat
Lapel Air Sampler Calibration	All units in current use	N/A	Manufacturer Specifications	As required by RWP	Flow rate
Release of Equipment	As required by RWP	Potentially Contaminated Equipment and Materials	SOP 12 (HP-4)	As required by RWP	Alpha, beta gamma
ALARA	N/A	As required by RSO	Section 4.2 RPP Manual <sup>A</sup>	N/A	As required by RSO
Respiratory Protection <sup>B</sup>	As required by RWP	As required by RWP	N/A <sup>B</sup>	N/A	N/A
Bioassay	Entry/exit and routine semiannual samples, and as required by RWP	Routine Site workers and as required by RSO for RWP workers	SOP 14 (HP-8)	Entry/exit and routine semiannual samples, and as required by RWP	U-nat in urine
Instrument Calibration	Variable	Radiation Detection Instruments in use	SOP 16 (HP-10)	6 months or less	N/A
Dosimetry	Variable	Personnel onsite > 5 days per year	SOP 13 (HP-3)	Quarterly	Gamma
Personnel Contamination	As required by RWP	As required by RWP	SOP 12 (HP-12)	As required by RWP	Alpha
Radiation Protection Training	As required	HMC GRP site	Taught by RSO or RST designee. <sup>C</sup>	Initial & annual refresher for personnel that work in Controlled Areas.	Training class & written test

<sup>A</sup> In 2022 HP-6 was replaced with Section 4.2 of the Radiation Protection Program (RPP) Manual.

<sup>B</sup> Respiratory protection not expected to be necessary for current site decommissioning and reclamation activities. Procedure HP-7 has been inactivated and is not included in current RPP Manual or in the HMC Manual of Standard Practices.

<sup>C</sup> Annual refresher training is given by the RSO for all regular HMC employees that work in Controlled Areas. Temporary contractors are generally trained by the Radiation Safety Technician (RST) as a designee of the RSO, with the aid of a previously developed radiation safety video followed by testing.

**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	0

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

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

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	3,058,530
Tailings Sumps	154,430
Tailings Pile	0
W Coll Pond to EP-2	0

August	Interval Gallons
R.O. Flow to Evaporation Ponds	506,346
Tailings Sumps	126,030
Tailings Pile	0
W Coll Pond to EP-2	0

September	Interval Gallons
R.O. Flow to Evaporation Ponds	2,681,540
Tailings Sumps	132,600
Tailings Pile	0
W Coll Pond to EP-2	0

October	Interval Gallons
R.O. Flow to Evaporation Ponds	4,117,405
Tailings Sumps	167,160
Tailings Pile	0
W Coll Pond to EP-2	0

November	Interval Gallons
R.O. Flow to Evaporation Ponds	3,445,192
Tailings Sumps	125,350
Tailings Pile	0
W Coll Pond to EP-2	0

December	Interval Gallons
R.O. Flow to Evaporation Ponds	3,561,558
Tailings Sumps	123,790
Tailings Pile	0
W Coll Pond to EP-2	0

**Evap Pond 3**

July	Interval Gallons
Transfer EP-1 to EP-3	0
Transfer EP-2 to EP-3	6,902,704

August	Interval Gallons
Transfer EP-1 to EP-3	0
Transfer EP-2 to EP-3	90

September	Interval Gallons
Transfer EP-1 to EP-3	0
Transfer EP-2 to EP-3	0

October	Interval Gallons
Transfer EP-1 to EP-3	0
Transfer EP-2 to EP-3	5,766,588

November	Interval Gallons
Transfer EP-1 to EP-3	0
Transfer EP-2 to EP-3	1,522

December	Interval Gallons
Transfer EP-1 to EP-3	0
Transfer EP-2 to EP-3	0

**Collection Ponds**

July	Interval Gallons
Miscellaneous RO and Clarifier Flow	2,847,126
Tailings Sumps	0

August	Interval Gallons
Miscellaneous RO and Clarifier Flow	1,937,740
Tailings Sumps	0

September	Interval Gallons
Miscellaneous RO and Clarifier Flow	1,638,952
Tailings Sumps	0

October	Interval Gallons
Miscellaneous RO and Clarifier Flow	4,598,590
Tailings Sumps	0

November	Interval Gallons
Miscellaneous RO and Clarifier Flow	1,892,017
Tailings Sumps	0

December	Interval Gallons
Miscellaneous RO and Clarifier Flow	2,384,581
Tailings Sumps	0

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

	EP1	EP2	EP3A	EP3B	W Coll	E Coll
7/3/2023	15	7.93	2.98	2.51	3.51	-
7/10/2023	15	8.03	3.17	2.65	3.77	-
7/17/2023	15	8.06	3.31	2.69	3.95	-
7/24/2023	15	8.1	3.47	2.74	4.23	-
7/31/2023	15	8.11	3.64	2.78	4.57	-
8/7/2023	15	8.16	3.78	2.79	4.23	-
8/14/2023	15	8.3	3.84	2.81	No Reading	-
8/21/2023	15	8.47	4.00	2.94	4.27	-
8/28/2023	15	8.57	>2	>2	4.3	-
9/4/2023	15	8.69	>2	>2	4.35	-
9/11/2023	15	8.54	>2	>2	4.62	-
9/18/2023	15	8.5	>2	>2	4.35	-
9/25/2023	15	8.5	>2	>2	4.1	-
10/2/2023	15	8.48	>2	>2	4.11	-
10/9/2023	15	9.6	>2	>2	4.48	-
10/16/2023	15	9.53	>2	>2	4.94	-
10/23/2023	15	9.43	>2	>2	5.33	-
10/30/2023	15	9.29	>2	>2	5.78	-
11/6/2023	15	9.19	>2	>2	5.7	-
11/12/2023	15	9.07	>2	>2	6.25	-
11/20/2023	15	8.86	>2	>2	5.62	-
11/27/2023	15	8.68	>2	>2	5.42	-
12/4/2023	15	8.5	>2	>2	5.05	-
12/11/2023	15	8.34	>2	>2	4.7	-
12/18/2023	15	8.15	>2	>2	4.18	-
12/25/2023	15	7.91	>2	>2	3.96	-



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			2,362,280			990,090			172,200			2,337,790		
7/3/2023	174,220	0	0	2,363,620	1,340	61	990,090	0	0	172,200	0	0	2,337,790	0	0
7/10/2023	174,220	0	0	2,364,320	700	32	990,090	0	0	172,200	0	0	2,337,790	0	0
7/17/2023	174,220	0	0	2,364,320	0	0	990,090	0	0	172,200	0	0	2,337,790	0	0
7/24/2023	174,220	0	0	2,364,320	0	0	990,090	0	0	172,200	0	0	2,337,790	0	0
7/31/2023	174,220	0	0	2,364,320	0	0	990,090	0	0	172,200	0	0	2,337,790	0	0
8/7/2023	174,220	0	0	2,364,320	0	0	990,090	0	0	172,200	0	0	2,337,790	0	0
8/14/2023	174,220	0	0	2,364,320	0	0	990,090	0	0	172,200	0	0	2,337,790	0	0
8/21/2023	174,220	0	0	2,364,320	0	0	990,170	80	3	172,200	0	0	2,339,890	2,100	85
8/28/2023	174,220	0	0	2,364,320	0	0	990,190	20	1	173,830	1,630	66	2,344,900	5,010	203
9/4/2023	174,220	0	0	2,364,320	0	0	990,220	30	1	176,850	3,020	122	2,351,920	7,020	284
9/11/2023	174,220	0	0	2,364,320	0	0	990,220	0	0	178,890	2,040	83	2,352,320	400	16
9/18/2023	174,220	0	0	2,364,320	0	0	990,270	50	2	180,670	1,780	72	2,352,540	220	9
9/25/2023	174,220	0	0	2,364,320	0	0	990,310	40	1	183,580	2,910	118	2,359,340	6,800	275
10/2/2023	174,220	0	0	2,364,320	0	0	990,340	30	1	187,340	3,760	152	2,367,750	8,410	340
10/9/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	191,430	4,090	166	2,377,020	9,270	375
10/16/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	193,310	1,880	76	2,380,140	3,120	126
10/23/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	194,650	1,340	54	2,380,140	0	0
10/30/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	195,770	1,120	45	2,380,140	0	0
11/6/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	196,810	1,040	42	2,380,140	0	0
11/13/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	197,680	870	35	2,380,140	0	0
11/20/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	198,790	1,110	45	2,380,140	0	0
11/27/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	199,710	920	37	2,380,140	0	0
12/4/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	200,590	880	36	2,380,140	0	0
12/11/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	202,230	1,640	66	2,382,610	2,470	100
12/18/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	204,250	2,020	82	2,385,530	2,920	118
12/25/2023	174,220	0	0	2,364,320	0	0	990,340	0	0	206,630	2,380	96	2,386,670	1,140	46

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			1,247,150			303,160			29,990			719,620		
7/3/2023	70	0	0	1,249,150	2,000	111	303,160	0	0	29,990	0	0	724,600	4,980	276
7/10/2023	70	0	0	1,255,260	6,110	338	303,160	0	0	29,990	0	0	728,480	3,880	215
7/17/2023	70	0	0	1,258,210	2,950	163	303,160	0	0	29,990	0	0	728,500	20	1
7/24/2023	70	0	0	1,259,460	1,250	69	303,160	0	0	29,990	0	0	728,500	0	0
7/31/2023	70	0	0	1,261,220	1,760	97	303,160	0	0	29,990	0	0	728,540	40	2
8/7/2023	70	0	0	1,262,040	820	45	303,160	0	0	29,990	0	0	728,560	20	1
8/14/2023	70	0	0	1,262,040	0	0	303,160	0	0	29,990	0	0	728,720	160	9
8/21/2023	70	0	0	1,262,080	40	2	303,160	0	0	29,990	0	0	728,740	20	1
8/28/2023	70	0	0	1,262,100	20	1	303,160	0	0	29,990	0	0	728,750	10	1
9/4/2023	70	0	0	1,262,130	30	2	303,160	0	0	29,990	0	0	728,920	170	9
9/11/2023	70	0	0	1,262,180	50	3	303,160	0	0	29,990	0	0	728,940	20	1
9/18/2023	70	0	0	1,262,200	20	1	303,160	0	0	29,990	0	0	728,960	20	1
9/25/2023	70	0	0	1,262,250	50	3	303,160	0	0	29,990	0	0	728,970	10	1
10/2/2023	70	0	0	1,262,320	70	4	303,160	0	0	29,990	0	0	728,990	20	1
10/9/2023	70	0	0	1,263,480	1,160	64	303,160	0	0	29,990	0	0	729,010	20	1
10/16/2023	70	0	0	1,263,490	10	1	303,160	0	0	29,990	0	0	729,380	370	20
10/23/2023	70	0	0	1,263,510	20	1	303,160	0	0	29,990	0	0	729,400	20	1
10/30/2023	70	0	0	1,264,280	770	43	303,160	0	0	29,990	0	0	729,410	10	1
11/6/2023	70	0	0	1,265,330	1,050	58	303,160	0	0	29,990	0	0	729,420	10	1
11/13/2023	70	0	0	1,268,310	2,980	165	303,160	0	0	29,990	0	0	729,430	10	1
11/20/2023	70	0	0	1,269,540	1,230	68	303,160	0	0	29,990	0	0	729,440	10	1
11/27/2023	70	0	0	1,271,520	1,980	110	303,160	0	0	29,990	0	0	729,460	20	1
12/4/2023	70	0	0	1,271,880	360	20	303,160	0	0	29,990	0	0	729,480	20	1
12/11/2023	70	0	0	1,273,010	1,130	63	303,160	0	0	29,990	0	0	729,490	10	1
12/18/2023	70	0	0	1,274,180	1,170	65	303,160	0	0	29,990	0	0	729,510	20	1
12/25/2023	70	0	0	1,274,550	370	20	303,160	0	0	29,990	0	0	729,520	10	1

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	252,280			590,960			2,235,660			534,900			494,900		
7/3/2023	252,310	30	2	590,960	0	0	2,238,940	3,280	182	534,900	0	0	494,900	0	0
7/10/2023	252,310	0	0	590,960	0	0	2,239,040	100	6	534,900	0	0	494,900	0	0
7/17/2023	252,310	0	0	590,960	0	0	2,240,790	1,750	97	534,900	0	0	494,900	0	0
7/24/2023	252,310	0	0	590,960	0	0	2,240,890	100	6	534,900	0	0	494,900	0	0
7/31/2023	252,310	0	0	590,960	0	0	2,240,950	60	3	534,900	0	0	494,900	0	0
8/7/2023	252,310	0	0	590,960	0	0	2,241,100	150	8	534,900	0	0	494,900	0	0
8/14/2023	252,310	0	0	590,960	0	0	2,242,800	1,700	94	534,900	0	0	494,900	0	0
8/21/2023	252,310	0	0	590,960	0	0	2,242,930	130	7	534,900	0	0	494,900	0	0
8/28/2023	252,310	0	0	591,100	140	8	2,243,060	130	7	534,900	0	0	494,900	0	0
9/4/2023	252,310	0	0	591,110	10	1	2,245,790	2,730	151	534,900	0	0	494,900	0	0
9/11/2023	252,310	0	0	591,110	0	0	2,245,920	130	7	534,900	0	0	494,900	0	0
9/18/2023	252,320	10	1	591,490	380	21	2,246,080	160	9	534,900	0	0	494,900	0	0
9/25/2023	252,320	0	0	591,490	0	0	2,248,870	2,790	154	534,900	0	0	494,900	0	0
10/2/2023	252,320	0	0	591,500	10	1	2,251,820	2,950	163	534,900	0	0	494,900	0	0
10/9/2023	252,320	0	0	591,500	0	0	2,252,090	270	15	534,900	0	0	494,900	0	0
10/16/2023	252,320	0	0	591,520	20	1	2,252,090	0	0	534,900	0	0	494,900	0	0
10/23/2023	252,320	0	0	591,530	10	1	2,252,090	0	0	534,900	0	0	494,900	0	0
10/30/2023	252,320	0	0	591,530	0	0	2,252,090	0	0	534,900	0	0	494,900	0	0
11/6/2023	252,320	0	0	591,530	0	0	2,252,090	0	0	534,900	0	0	494,900	0	0
11/13/2023	252,320	0	0	591,530	0	0	2,252,090	0	0	534,900	0	0	494,900	0	0
11/20/2023	252,320	0	0	591,530	0	0	2,252,090	0	0	534,900	0	0	494,900	0	0
11/27/2023	252,320	0	0	591,530	0	0	2,252,090	0	0	534,900	0	0	494,900	0	0
12/4/2023	252,320	0	0	591,530	0	0	2,252,090	0	0	534,900	0	0	494,900	0	0
12/11/2023	252,320	0	0	591,530	0	0	2,252,090	0	0	534,900	0	0	494,900	0	0
12/18/2023	252,320	0	0	591,530	0	0	2,252,190	100	6	534,900	0	0	494,900	0	0
12/25/2023	252,320	0	0	591,530	0	0	2,252,090	-100	-6	534,900	0	0	494,900	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**

	<b>Sumps (gallons)</b>
<b>July</b>	154,430
<b>August</b>	126,030
<b>September</b>	132,600
<b>October</b>	167,160
<b>November</b>	125,350
<b>December</b>	123,790

**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
<b>July</b>	10,590,680	2,582,300	0	2,814,270	0	1,270	0	0
<b>August</b>	3,252,280	388,040	0	523,240	0	0	0	0
<b>September</b>	4,678,865	4,517,015	9,700	1,760,660	0	0	0	0
<b>October</b>	13,183,534	6,162,410	0	2,054,200	0	0	0	294,500
<b>November</b>	7,338,095	6,386,885	995,300	2,578,200	0	0	0	20,500
<b>December</b>	6,338,520	8,759,340	1,430,300	3,000,400	0	0	0	0

**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
<b>July</b>	17,565,672	1,873,400	302,815	3,569,400	0	199,400	0	3,628,600
<b>August</b>	9,111,493	1,446,120	295,180	1,326,890	0	-----	0	1,176,600
<b>September</b>	4,584,610	1,305,930	225,865	3,290,720	0	-----	0	4,099,400
<b>October</b>	19,250,505	1,514,950	80,450	4,497,050	0	504,550	0	6,353,500
<b>November</b>	16,472,206	1,029,890	66,815	3,730,280	0	117,520	0	3,884,000
<b>December</b>	9,773,006	558,070	56,015	3,941,730	0	108,570	0	4,086,100

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

	<b>RO Plant</b>
<b>July</b>	18,963,294
<b>August</b>	4,625,908
<b>September</b>	12,261,192
<b>October</b>	26,401,568
<b>November</b>	20,113,180
<b>December</b>	21,316,570

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

	Treatment Systems		Fresh Water Injection		
	RO Plant		On-Site	South Off-Site	North Off-Site
	Treated	Brine			
<b>July</b>	13,057,638	3,058,530	8,832,924	2,675,256	2,575,736
<b>August</b>	2,181,822	506,346	6,859,235	2,279,109	2,031,515
<b>September</b>	7,940,700	2,681,540	3,614,951	779,144	1,018,762
<b>October</b>	17,685,573	4,117,405	8,524,885	2,549,928	3,029,620
<b>November</b>	14,775,971	3,445,192	7,136,387	1,686,245	1,702,109
<b>December</b>	15,370,431	3,561,558	3,108,676	22,095	22,290



**Table 3.2-1**  
**Reversal Wells**

**Table 3.2-1. Depth to Water in Reversal Wells**

<b>Well Name</b>	<b>B</b>	<b>BA</b>	<b>DZ</b>	<b>KZ</b>	<b>S2</b>	<b>S5</b>	<b>SM</b>	<b>SN</b>	<b>SO</b>	<b>SP</b>
<b>MP Elev.</b>	<b>6570.9</b>	<b>6571.58</b>	<b>6590.53</b>	<b>6571.72</b>	<b>6573.72</b>	<b>6574.69</b>	<b>6578.74</b>	<b>6579.26</b>	<b>6578.79</b>	<b>6578.66</b>
<b>7/2/2023</b>	43.56	44.55	59.57	39.27	43.28	48.16	47.74	46.70	46.83	46.70
<b>7/9/2023</b>	42.91	43.82	59.10	39.70	43.22	47.90	47.40	46.50	47.02	46.09
<b>7/16/2023</b>	44.48	46.30	57.85	39.55	43.30	48.25	45.80	46.44	46.90	46.59
<b>7/23/2023</b>	43.90	44.33	59.00	39.40	43.20	48.00	47.70	46.50	46.71	46.13
<b>7/30/2023</b>	43.70	44.35	60.00	39.50	44.07	48.23	47.65	46.80	46.77	46.65
<b>8/6/2023</b>	44.07	44.90	59.35	39.61	44.39	48.00	47.66	46.80	46.81	46.75
<b>8/14/2023</b>	43.21	41.22	58.84	39.40	42.66	49.61	45.62	46.18	46.55	46.53
<b>8/20/2023</b>	43.75	44.30	57.82	39.20	43.44	48.00	47.70	46.93	46.80	46.85
<b>8/27/2023</b>	43.81	44.58	60.77	39.62	43.80	48.60	47.65	47.03	46.80	46.91
<b>9/3/2023</b>	44.03	44.56	59.80	39.77	44.80	49.09	47.70	46.95	47.00	46.80
<b>9/10/2023</b>	44.10	44.55	58.96	39.35	43.30	49.07	47.70	46.65	46.90	46.81
<b>9/18/2023</b>	42.90	44.30	59.70	39.00	43.17	48.06	47.40	46.59	46.77	46.80
<b>9/25/2023</b>	43.40	44.87	58.11	39.22	43.42	47.87	46.58	46.44	46.90	46.88
<b>10/1/2023</b>	43.50	44.56	58.93	39.91	43.90	48.85	46.41	46.50	47.46	47.40
<b>10/9/2023</b>	43.51	45.09	60.88	39.43	43.15	48.80	45.84	46.18	46.76	46.68
<b>10/17/2023</b>	43.34	44.74	59.44	39.22	43.19	49.91	45.98	46.30	46.85	46.72
<b>10/22/2023</b>	43.80	44.71	59.95	39.88	44.05	48.70	46.51	46.58	47.40	47.42
<b>10/30/2023</b>	43.80	45.41	59.60	39.72	42.47	48.99	46.28	38.15	46.61	46.88
<b>11/6/2023</b>	44.41	45.79	59.51	38.00	43.02	49.02	46.60	46.32	46.81	46.75
<b>11/13/2023</b>	44.01	46.19	60.33	39.04	43.22	49.09	45.99	46.38	46.88	46.79
<b>11/20/2023</b>	44.11	46.81	60.20	39.60	43.15	49.51	45.92	47.00	47.54	47.43
<b>11/27/2023</b>	44.12	46.30	57.85	38.98	43.09	49.03	45.90	46.32	46.83	46.71
<b>12/4/2023</b>	44.29	46.56	60.20	39.07	43.09	49.44	45.89	46.31	46.84	46.75
<b>12/10/2023</b>	44.50	46.42	57.83	39.80	42.95	48.55	45.68	47.00	47.22	46.98
<b>12/17/2023</b>	45.60	47.03	57.90	39.40	43.70	48.50	45.70	46.90	47.05	46.83
<b>12/26/2023</b>	43.50	44.50	58.70	40.00	43.80	48.60	46.50	46.50	47.30	47.40

**Table 3.4-1  
Wells Drilled**



**Table 4.1-1**  
**Water Quality Analysis for Well D1**

### Sample Analysis Report

**Company:** Barrick Homestake Company  
 560 Anaconda Rd Route 605  
 Milan, NM 87021

**Date Reported:** 11/6/2023  
**Report ID:** S2309202001

**ProjectName:** HMC GRP  
**Lab ID:** S2309202-001  
**ClientSample ID:** D1  
**COC:**  
**PWS ID:**

**WorkOrder:** S2309202  
**CollectionDate:** 9/10/2023 3:43:00 PM  
**DateReceived:** 9/12/2023 10:15:00 AM  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

pH	7.03	s.u.			Field	09/10/2023 1543
----	------	------	--	--	-------	-----------------

**Anions/Cations**

Alkalinity, Total (As CaCO3)	344	mg/L		5	SM 2320B	09/13/2023 1836 AB
Alkalinity, Bicarbonate as HCO3	419	mg/L		5	SM 2320B	09/13/2023 1836 AB
Alkalinity, Carbonate as CO3	<5	mg/L		5	SM 2320B	09/13/2023 1836 AB
Chloride	114	mg/L	D	2.24	EPA 300.0	09/21/2023 2114 AB
Nitrogen, Nitrate+Nitrite (as N)	1.9	mg/L		0.1	EPA 353.2	10/03/2023 1038 AMB
Sulfate	470	mg/L	D	6.27	EPA 300.0	09/21/2023 2114 AB
Calcium	190	mg/L		2	EPA 200.7	09/14/2023 2001 DG
Magnesium	38	mg/L		2	EPA 200.7	09/14/2023 2001 DG
Potassium	4	mg/L		2	EPA 200.7	09/14/2023 2001 DG
Sodium	224	mg/L		3	EPA 200.7	09/14/2023 2001 DG

**General Parameters**

Total Dissolved Solids (180)	1400	mg/L		20	SM 2540	09/13/2023 1206 SKR
------------------------------	------	------	--	----	---------	---------------------

**Metals - Dissolved**

Arsenic	<0.005	mg/L		0.005	EPA 200.8	09/19/2023 553 MS
Boron	0.6	mg/L		0.1	EPA 200.7	09/14/2023 2001 DG
Cadmium	<0.001	mg/L		0.001	EPA 200.8	09/19/2023 553 MS
Lithium	0.19	mg/L		0.01	EPA 200.7	09/14/2023 2001 DG
Manganese	<0.005	mg/L		0.005	EPA 200.8	09/19/2023 553 MS
Molybdenum	1.19	mg/L		0.01	EPA 200.8	09/19/2023 553 MS
Selenium	0.027	mg/L		0.005	EPA 200.8	09/19/2023 553 MS
Strontium	2.82	mg/L		0.02	EPA 200.7	09/14/2023 2001 DG
Uranium	0.716	mg/L		0.0003	EPA 200.8	09/19/2023 553 MS
Vanadium	<0.02	mg/L		0.02	EPA 200.8	09/19/2023 553 MS

**Radionuclides - Dissolved**

Gross Alpha	374	pCi/L		6	SM 7110B	11/01/2023 1413 AEF
Gross Alpha Precision (±)	18.0	pCi/L			SM 7110B	11/01/2023 1413 AEF
Gross Alpha(Excluding Radon and Uranium)	<6	pCi/L		6	Calculation	11/04/2023 1000 WN
Gross Alpha Precision (±)	<	pCi/L			Calculation	11/04/2023 1000 WN
Radium 226	1.0	pCi/L		0.2	SM 7500 Ra-B	10/19/2023 1700 WN
Radium 226 Precision (±)	0.1	pCi/L			SM 7500 Ra-B	10/19/2023 1700 WN
Radium 228	2.6	pCi/L		1	Ga-Tech	10/22/2023 510 WN
Radium 228 Precision (±)	2.3	pCi/L			Ga-Tech	10/22/2023 510 WN
Thorium 230	<0.3	pCi/L		0.3	ACW10	10/26/2023 1224 AEF
Thorium 230 Precision (±)	0.04	pCi/L			ACW10	10/26/2023 1224 AEF

**Table 4.1-2**  
**Water Quality Analysis for Well DD**

### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 8/31/2023  
**Report ID:** S2308375001

**ProjectName:** HMC GRP  
**Lab ID:** S2308375-001  
**ClientSample ID:** DD  
**COC:**  
**PWS ID:**

**WorkOrder:** S2308375  
**CollectionDate:** 8/15/2023 3:45:00 PM  
**DateReceived:** 8/18/2023 10:39:00 AM  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Field</b>							
pH	6.96	s.u.			Field	08/15/2023 1545	
<b>Anions/Cations</b>							
Chloride	59.9	mg/L	D	4.39	EPA 300.0	08/27/2023 811	AB
Sulfate	1790	mg/L	D	12.3	EPA 300.0	08/27/2023 811	AB
<b>General Parameters</b>							
Total Dissolved Solids (180)	3470	mg/L		20	SM 2540	08/22/2023 1547	AB
<b>Metals - Dissolved</b>							
Manganese	0.12	mg/L		0.02	EPA 200.7	08/22/2023 2055	DG
Molybdenum	<0.01	mg/L		0.01	EPA 200.8	08/21/2023 2314	MS
Selenium	0.062	mg/L		0.005	EPA 200.8	08/21/2023 2314	MS
Uranium	0.0942	mg/L		0.0003	EPA 200.8	08/21/2023 2314	MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 11/7/2023  
**Report ID:** S2310319001

**ProjectName:** HMC GRP  
**Lab ID:** S2310319-001  
**ClientSample ID:** DD  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310319  
**CollectionDate:** 10/17/2023 11:18:00 AM  
**DateReceived:** 10/20/2023 9:49:00 AM  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

<b>Field</b>						
pH	6.95	s.u.			Field	10/17/2023 1118
<b>Anions/Cations</b>						
Chloride	65.1	mg/L	D	4.39	EPA 300.0	10/25/2023 1339 AB
Sulfate	1820	mg/L	D	12.3	EPA 300.0	10/25/2023 1339 AB
<b>General Parameters</b>						
Total Dissolved Solids (180)	3180	mg/L		20	SM 2540	10/20/2023 1449 SKR
<b>Metals - Dissolved</b>						
Molybdenum	<0.01	mg/L		0.01	EPA 200.8	10/26/2023 553 MS
Selenium	0.053	mg/L		0.005	EPA 200.8	10/26/2023 553 MS
Uranium	0.119	mg/L		0.0003	EPA 200.8	10/26/2023 553 MS

**Table 4.1-3**  
**Water Quality Analyses for Well DD2**

### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 8/29/2023  
**Report ID:** S2308263001

**ProjectName:** HMC GRP  
**Lab ID:** S2308263-001  
**ClientSample ID:** DD2  
**COC:**  
**PWS ID:**

**WorkOrder:** S2308263  
**CollectionDate:** 8/10/2023 9:29:00 AM  
**DateReceived:** 8/14/2023 10:15:00 AM  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

<b>Field</b>						
pH	7.10	s.u.			Field	08/10/2023 929
<b>Anions/Cations</b>						
Chloride	53.0	mg/L	D	4.39	EPA 300.0	08/26/2023 011 AB
Sulfate	1310	mg/L	D	5	EPA 300.0	08/26/2023 011 AB
<b>General Parameters</b>						
Total Dissolved Solids (180)	2730	mg/L		20	SM 2540	08/16/2023 1512 SKR
<b>Metals - Dissolved</b>						
Manganese	2.64	mg/L		0.02	EPA 200.7	08/22/2023 2053 DG
Molybdenum	<0.01	mg/L		0.01	EPA 200.8	08/17/2023 525 MS
Selenium	<0.005	mg/L		0.005	EPA 200.8	08/17/2023 525 MS
Uranium	0.233	mg/L		0.0003	EPA 200.8	08/17/2023 525 MS

### Sample Analysis Report

**Company:** Barrick Homestake Company  
 560 Anaconda Rd Route 605  
 Milan, NM 87021

**Date Reported:** 11/6/2023  
**Report ID:** S2310312001

**ProjectName:** HMC GRP  
**Lab ID:** S2310312-001  
**ClientSample ID:** DD2  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310312  
**CollectionDate:** 10/16/2023 3:52:00 PM  
**DateReceived:** 10/19/2023 10:09:00 AM  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Field</b>							
pH	7.38	s.u.			Field	10/16/2023 1552	
<b>Anions/Cations</b>							
Chloride	56.3	mg/L	D	4.39	EPA 300.0	10/25/2023 606	AB
Sulfate	1370	mg/L	D	12.3	EPA 300.0	10/25/2023 606	AB
<b>General Parameters</b>							
Total Dissolved Solids (180)	2670	mg/L		20	SM 2540	10/20/2023 907	SKR
<b>Metals - Dissolved</b>							
Manganese	2.71	mg/L		0.02	EPA 200.7	10/21/2023 134	DG
Molybdenum	<0.01	mg/L		0.01	EPA 200.8	10/26/2023 448	MS
Selenium	<0.005	mg/L		0.005	EPA 200.8	10/26/2023 448	MS
Uranium	0.231	mg/L		0.0003	EPA 200.8	10/26/2023 448	MS

**Table 4.1-4**  
**Water Quality Analyses for Well P**

### Sample Analysis Report

**Company:** Barrick Homestake Company  
 560 Anaconda Rd Route 605  
 Milan, NM 87021

**Date Reported:** 2/9/2024  
**Report ID:** S2311433001

**ProjectName:** HMC GRP  
**Lab ID:** S2311433-003  
**ClientSample ID:** P  
**COC:**  
**PWS ID:**

**WorkOrder:** S2311433  
**CollectionDate:** 11/27/2023 9:35:00 AM  
**DateReceived:** 11/29/2023 10:21:00 AM  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

pH	6.97	s.u.			Field	11/27/2023 935
----	------	------	--	--	-------	----------------

**Anions/Cations**

Alkalinity, Total (As CaCO3)	209	mg/L		5	SM 2320B	11/30/2023 2325 AB
Alkalinity, Bicarbonate as HCO3	255	mg/L		5	SM 2320B	11/30/2023 2325 AB
Alkalinity, Carbonate as CO3	<5	mg/L		5	SM 2320B	11/30/2023 2325 AB
Chloride	45.2	mg/L	D	2.24	EPA 300.0	12/01/2023 1751 AB
Nitrogen, Nitrate+Nitrite (as N)	6.8	mg/L		0.1	EPA 353.2	12/15/2023 1211 JMS
Sulfate	997	mg/L	D	6.27	EPA 300.0	12/01/2023 1751 AB
Calcium	249	mg/L		2	EPA 200.7	11/30/2023 2239 DG
Magnesium	47	mg/L		2	EPA 200.7	11/30/2023 2239 DG
Potassium	7	mg/L		2	EPA 200.7	11/30/2023 2239 DG
Sodium	295	mg/L		3	EPA 200.7	11/30/2023 2239 DG

**General Parameters**

Total Dissolved Solids (180)	1880	mg/L		20	SM 2540	11/30/2023 1354 SKR
------------------------------	------	------	--	----	---------	---------------------

**Metals - Dissolved**

Arsenic	<0.005	mg/L		0.005	EPA 200.8	12/01/2023 555 MS
Boron	0.3	mg/L		0.1	EPA 200.7	11/30/2023 2239 DG
Cadmium	<0.001	mg/L		0.001	EPA 200.8	12/01/2023 555 MS
Lithium	0.10	mg/L		0.01	EPA 200.7	11/30/2023 2239 DG
Manganese	0.722	mg/L		0.005	EPA 200.8	12/01/2023 555 MS
Molybdenum	<0.01	mg/L		0.01	EPA 200.8	12/01/2023 555 MS
Selenium	0.157	mg/L		0.005	EPA 200.8	12/01/2023 555 MS
Strontium	4.46	mg/L		0.02	EPA 200.7	11/30/2023 2239 DG
Uranium	0.0294	mg/L		0.0003	EPA 200.8	12/01/2023 555 MS
Vanadium	<0.02	mg/L		0.02	EPA 200.8	12/01/2023 555 MS

**Radionuclides - Dissolved**

Gross Alpha	22.7	pCi/L		11	SM 7110B	02/02/2024 1014 AEF
Gross Alpha Precision (±)	5.0	pCi/L			SM 7110B	02/02/2024 1014 AEF
Gross Alpha(Excluding Radon and Uranium)	<11	pCi/L		11	Calculation	02/05/2024 1221 WN
Gross Alpha Precision (±)	5.0	pCi/L			Calculation	02/05/2024 1221 WN
Radium 226	0.5	pCi/L		0.2	SM 7500 Ra-B	02/08/2024 930 WN
Radium 226 Precision (±)	0.1	pCi/L			SM 7500 Ra-B	02/08/2024 930 WN
Radium 228	<1	pCi/L		1	Ga-Tech	01/27/2024 1828 WN
Radium 228 Precision (±)	2.1	pCi/L			Ga-Tech	01/27/2024 1828 WN
Thorium 230	<0.3	pCi/L		0.3	ACW10	01/13/2024 1112 AEF
Thorium 230 Precision (±)	0	pCi/L			ACW10	01/13/2024 1112 AEF

**Table 4.1-5**  
**Water Quality Analyses for Well S4**

### Sample Analysis Report

**Company:** Barrick Homestake Company  
 560 Anaconda Rd Route 605  
 Milan, NM 87021

**Date Reported:** 11/6/2023  
**Report ID:** S2309202001

**ProjectName:** HMC GRP  
**Lab ID:** S2309202-004  
**ClientSample ID:** S4  
**COC:**  
**PWS ID:**

**WorkOrder:** S2309202  
**CollectionDate:** 9/10/2023 4:54:00 PM  
**DateReceived:** 9/12/2023 10:15:00 AM  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Field</b>							
pH	7.45	s.u.			Field	09/10/2023 1654	
<b>Anions/Cations</b>							
Alkalinity, Total (As CaCO3)	337	mg/L		5	SM 2320B	09/13/2023 1905	AB
Alkalinity, Bicarbonate as HCO3	412	mg/L		5	SM 2320B	09/13/2023 1905	AB
Alkalinity, Carbonate as CO3	<5	mg/L		5	SM 2320B	09/13/2023 1905	AB
Chloride	145	mg/L	D	2.24	EPA 300.0	09/18/2023 2238	AB
Nitrogen, Nitrate+Nitrite (as N)	0.5	mg/L		0.1	EPA 353.2	10/03/2023 1043	AMB
Sulfate	525	mg/L	D	6.27	EPA 300.0	09/18/2023 2238	AB
Calcium	211	mg/L		2	EPA 200.7	09/14/2023 2015	DG
Magnesium	51	mg/L		2	EPA 200.7	09/14/2023 2015	DG
Potassium	6	mg/L		2	EPA 200.7	09/14/2023 2015	DG
Sodium	234	mg/L		3	EPA 200.7	09/14/2023 2015	DG
<b>General Parameters</b>							
Total Dissolved Solids (180)	1490	mg/L		20	SM 2540	09/13/2023 1209	SKR
<b>Metals - Dissolved</b>							
Arsenic	<0.005	mg/L		0.005	EPA 200.8	09/19/2023 611	MS
Boron	0.6	mg/L		0.1	EPA 200.7	09/14/2023 2015	DG
Cadmium	<0.001	mg/L		0.001	EPA 200.8	09/19/2023 611	MS
Lithium	0.51	mg/L		0.01	EPA 200.7	09/14/2023 2015	DG
Manganese	<0.005	mg/L		0.005	EPA 200.8	09/19/2023 611	MS
Molybdenum	0.42	mg/L		0.01	EPA 200.8	09/19/2023 611	MS
Selenium	0.009	mg/L		0.005	EPA 200.8	09/19/2023 611	MS
Strontium	2.65	mg/L		0.02	EPA 200.7	09/14/2023 2015	DG
Uranium	0.129	mg/L		0.0003	EPA 200.8	09/19/2023 611	MS
Vanadium	<0.02	mg/L		0.02	EPA 200.8	09/19/2023 611	MS
<b>Radionuclides - Dissolved</b>							
Gross Alpha	58.2	pCi/L		9	SM 7110B	11/01/2023 1413	AEF
Gross Alpha Precision (±)	6.7	pCi/L			SM 7110B	11/01/2023 1413	AEF
Gross Alpha(Excluding Radon and Uranium)	<9	pCi/L		9	Calculation	11/04/2023 1000	WN
Gross Alpha Precision (±)	<	pCi/L			Calculation	11/04/2023 1000	WN
Radium 226	0.3	pCi/L		0.2	SM 7500 Ra-B	10/20/2023 712	WN
Radium 226 Precision (±)	0.1	pCi/L			SM 7500 Ra-B	10/20/2023 712	WN
Radium 228	1.8	pCi/L		1	Ga-Tech	10/22/2023 1416	WN
Radium 228 Precision (±)	2.1	pCi/L			Ga-Tech	10/22/2023 1416	WN
Thorium 230	<0.3	pCi/L		0.3	ACW10	10/26/2023 1224	AEF
Thorium 230 Precision (±)	0	pCi/L			ACW10	10/26/2023 1224	AEF



**Table 4.1-6**  
**Water Quality Analyses for Well X**



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported** 8/8/2023  
**Report ID** S2308055001

**ProjectName:** HMC GRP  
**Lab ID:** S2308055-001  
**ClientSample ID:** X  
**COC:**  
**PWS ID:**

**WorkOrder:** S2308055  
**CollectionDate:** 7/31/2023 11:05:00 AM  
**DateReceived:** 8/2/2023  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

<b>Field</b>						
pH	7.19	s.u.			Field	07/31/2023 1105
<b>Anions/Cations</b>						
Chloride	99	mg/L		1	EPA 300.0	08/06/2023 451 AB
Sulfate	295	mg/L		2	EPA 300.0	08/06/2023 451 AB
<b>General Parameters</b>						
Total Dissolved Solids (180)	1040	mg/L		20	SM 2540	08/02/2023 1608 JMS
<b>Metals - Dissolved</b>						
Molybdenum	0.11	mg/L		0.01	EPA 200.8	08/04/2023 500 MS
Selenium	0.010	mg/L		0.005	EPA 200.8	08/04/2023 500 MS
Uranium	0.0510	mg/L		0.0003	EPA 200.8	08/04/2023 500 MS

### Sample Analysis Report

**Company:** Barrick Homestake Company  
 560 Anaconda Rd Route 605  
 Milan, NM 87021

**Date Reported:** 1/15/2024  
**Report ID:** S2310315001

**ProjectName:** HMC GRP  
**Lab ID:** S2310315-001  
**ClientSample ID:** X  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310315  
**CollectionDate:** 10/15/2023 11:14:00 AM  
**DateReceived:** 10/19/2023 10:07:00 AM  
**FieldSampler:** BF  
**Matrix:** Water

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

<b>Field</b>						
pH	7.64	s.u.			Field	10/15/2023 1114
<b>Anions/Cations</b>						
Alkalinity, Total (As CaCO3)	306	mg/L		5	SM 2320B	10/27/2023 2109 JMS
Alkalinity, Bicarbonate as HCO3	373	mg/L		5	SM 2320B	10/27/2023 2109 JMS
Alkalinity, Carbonate as CO3	<5	mg/L		5	SM 2320B	10/27/2023 2109 JMS
Chloride	119	mg/L	D	2.24	EPA 300.0	10/26/2023 2044 AB
Nitrogen, Nitrate+Nitrite (as N)	1.0	mg/L		0.1	EPA 353.2	11/01/2023 1458 JMS
Sulfate	322	mg/L	D	6.27	EPA 300.0	10/26/2023 2044 AB
Calcium	162	mg/L		2	EPA 200.7	10/21/2023 045 DG
Magnesium	35	mg/L		2	EPA 200.7	10/21/2023 045 DG
Potassium	6	mg/L		2	EPA 200.7	10/21/2023 045 DG
Sodium	169	mg/L		3	EPA 200.7	10/21/2023 045 DG
<b>General Parameters</b>						
Total Dissolved Solids (180)	1080	mg/L		20	SM 2540	10/20/2023 840 SKR
<b>Metals - Dissolved</b>						
Arsenic	<0.005	mg/L		0.005	EPA 200.8	10/26/2023 535 MS
Boron	0.6	mg/L		0.1	EPA 200.7	10/21/2023 045 DG
Cadmium	<0.001	mg/L		0.001	EPA 200.8	10/26/2023 535 MS
Lithium	0.42	mg/L		0.01	EPA 200.7	10/21/2023 045 DG
Manganese	<0.02	mg/L		0.02	EPA 200.7	10/21/2023 045 DG
Manganese	<0.005	mg/L		0.005	EPA 200.8	10/26/2023 535 MS
Molybdenum	0.09	mg/L		0.01	EPA 200.8	10/26/2023 535 MS
Selenium	0.007	mg/L		0.005	EPA 200.8	10/26/2023 535 MS
Strontium	1.70	mg/L		0.02	EPA 200.7	10/21/2023 045 DG
Uranium	0.0484	mg/L		0.0003	EPA 200.8	10/26/2023 535 MS
Vanadium	<0.02	mg/L		0.02	EPA 200.8	10/26/2023 535 MS
<b>Radionuclides - Dissolved</b>						
Gross Alpha	22.6	pCi/L		2	SM 7110B	11/22/2023 1301 AEF
Gross Alpha Precision (±)	4.5	pCi/L			SM 7110B	11/22/2023 1301 AEF
Gross Alpha(Excluding Radon and Uranium)	<12	pCi/L		12	Calculation	11/29/2023 1057 WN
Gross Alpha Precision (±)	<	pCi/L			Calculation	11/29/2023 1057 WN
Radium 226	0.5	pCi/L		0.2	SM 7500 Ra-B	11/15/2023 712 WN
Radium 226 Precision (±)	0.1	pCi/L			SM 7500 Ra-B	11/15/2023 712 WN
Radium 228	<1	pCi/L		1	Ga-Tech	11/27/2023 1652 WN
Radium 228 Precision (±)	2.5	pCi/L			Ga-Tech	11/27/2023 1652 WN
Thorium 230	<0.3	pCi/L		0.3	ACW10	11/15/2023 817 AEF
Thorium 230 Precision (±)	0.05	pCi/L			ACW10	11/15/2023 817 AEF

**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)
E Coll Pond		Not Enough Water											
	10/10/23	Not Enough Water											
Evap Pond 1	8/15/23	Not Enough Water											
	10/10/23	Not Enough Water											
Evap Pond 2	8/21/23	21.90	9.06	24110			1570					10900	26200
	10/16/23	7.30	9.97	24010			1960					14500	25800
Evap Pond 3A	8/22/23	21.90	9.42	111400	6380	44	40500	8550	476	833	42100	16900	136000
	10/16/23	7.90	9.91	63280			15300					20100	116000
Evap Pond 3B	8/22/23	22.80	9.66	98080	7810	43	25400	8790	574	684	42800	30300	120000
	10/16/23	9.80	9.61	92300			26100					15700	32600
W Coll Pond	8/10/23	17.50	7.79	5247	14	52	81.7	78	48	8	1260	579	4450
	10/10/23	17.50	7.64	5247			295					2110	4320

f = field measurement  
t = analyte, total

Sample Point Name	Date	NO3 (mg/L)	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)
E Coll Pond		Not Enough Water												
	10/10/23	Not Enough Water												
Evap Pond 1	8/15/23	Not Enough Water												
	10/10/23	Not Enough Water												
Evap Pond 2	8/21/23			0.864	0.906	51.9	61.7	13.5	13.9					
	10/16/23			0.946	1.02	60		13.6	13.2					
Evap Pond 3A	8/22/23	4.1	0.11	0.485	1.19	1050	1170	395	466	5.2	<1	<6.2	66.6	0.048
	10/16/23			1.55	1.81	615	622	190	192					
Evap Pond 3B	8/22/23	3.3	0.11	1.57	1.33	819	805	471	402	2.1	<1	<3.1	69.2	0.029
	10/16/23			0.553	1.19	1140	1150	644	663					
W Coll Pond	8/10/23	4.6	.02	0.316	0.35	11	11.8	2.57	2.8	<0.2	3.1	<3.3	<0.3	<0.02
	10/10/23			0.344	0.352	11.7	12.3	1.3	1.56					

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)
Site Standard Qal aquifer								250				
D1	9/10/23	45.63	13.10	7.03	1726	<5	190	114	419	38	4	224
DD	8/15/23	49.86	14.40	6.96	3445			60				
	10/17/23	49.83	14.40	6.95	3331			65				
DD2	8/10/23	47.16	14.50	7.10	2768			53				
	10/16/23	47.07	13.30	7.38	2794			56				
P	11/27/23	42.41	13.10	6.97	2183			65				
S4	9/10/23	43.79	14.30	7.45	1871	<5	211	145	412	51	6	234
X	7/31/23	34.68	16.80	7.19	1332			99				
	10/15/23	35.74	15.80	7.22	1448							

# = Quality Control Sample

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

f = field measurement

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)
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
D1	9/10/23	470	1400	1.9	0.027	1.19	<b>0.716</b>	1	2.6	3.60	<0.3	<0.02
DD	8/15/23	<b>1790</b>	<b>3470</b>		0.062	<0.01	0.094					
	10/17/23	<b>1820</b>	<b>3180</b>		0.053	<0.01	0.119					
DD2	8/10/23	1310	2730		<0.005	<0.01	<b>0.233</b>					
	10/16/23	1370	2670		<0.005	<0.01	<b>0.231</b>					
P	11/27/23	997	1880	6.8	0.157	<0.01	0.029	0.5	<1	<1.5	<0.3	<0.02
S4	9/10/23	525	1490	0.5	0.009	0.42	0.129	0.3	1.8	2.10	<0.3	<0.02
X	7/31/23	295	1040		0.01	<b>0.110</b>	0.0510					
	10/15/23	322	1080	1	0.007	0.09	0.0484	0.5	<1	<1.5	<0.3	<0.02

# = 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)
Site Standard Qal aquifer							250				
<b>Post Treatment Tank</b>											
SP2	7/26/2023	21.5	7.36	1205	<5	83	101	191	34	7	143
	8/29/2023	21.6	7.54	1838	<5	155	161	365	57	12	230
	9/25/2023	19.6	7.04	1124	<5	85	94	191	34	7	150
	10/25/2023	20	6.35	731	<5	58	57	148	18	3	82
	11/29/2023	11	6.94	134	<5	20	5	62	<2	<2	8
	12/19/2023	9.8	6.69	63	<5	10	4	33	<2	<2	5

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

f = field measurement

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)
Site Standard Qal aquifer		1500	2734	12	0.32	0.1	0.16			5	0.3	0.02
<b>Post Treatment Tank</b>												
SP2	7/26/2023	286	910	0.5	<0.005	0.01	0.0040	0.2	<1	<1.2	<0.3	<0.02
	8/29/2023	460	1400	0.3	<0.005	<0.01	0.0068	0.3	1	1.30	<0.3	<0.02
	9/25/2023	263	740	0.6	<0.005	0.04	0.0054	<0.2	2.3	<2.5	<0.3	<0.02
	10/25/2023	158	490	0.3	<0.005	<0.01	0.0023	0.3	<1	<1.3	<0.3	<0.02
	11/29/2023	6	70	0.3	<0.005	<0.01	0.0020	<0.2	3.3	<3.5	<0.3	<0.02
	12/19/2023	<2	30	0.4	<0.005	<0.01	0.0005	<0.2	<1	<1.2	**	<0.02

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

f = field measurement

\*\* Results not available

**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				
<b>RO Product</b>											
RO SP1	7/26/2023	21.5	7.87	43	<5	<2	6	7	<2	<2	9
	8/29/223	23.7	6.68	1831	<5	152	163	355	57	13	231
	9/25/2023	20.1	7.27	32	<5	14	5	7	<2	<2	9
	10/25/2023	20	6.85	57	<5	7	5	29	<2	<2	6
	11/29/2023	11	7.61	34	<5	<2	4	10	<2	<2	6
	12/19/2023	16	7.41	22	<5	<2	3	6	<2	<2	5

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

f = field measurement

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
<b>RO Product</b>												
RO SP1	7/26/2023	4	30	0.5	<0.005	0.02	0.001	0.3	<1	<1.3	<0.3	<0.2
	8/29/223	466	1440	1.1	<0.005	<0.01	0.008	0.2	<1	<1.2	<0.3	<0.2
	9/25/2023	<2	<20	0.4	<0.005	0.02	0.003	<0.2	5.9	<6.1	<0.3	<0.2
	10/25/2023	<2	50	0.4	<0.005	0.01	0.002	<0.2	6.7	<6.9	<0.3	<0.2
	11/29/2023	5	<20	0.5	<0.005	<0.01	0.0004	<0.2	<1	<1	<0.3	<0.2
	12/19/2023	<2	<20	0.5	<0.005	<0.01	0.0003	0.4	1.4	1.8	**	<0.2

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

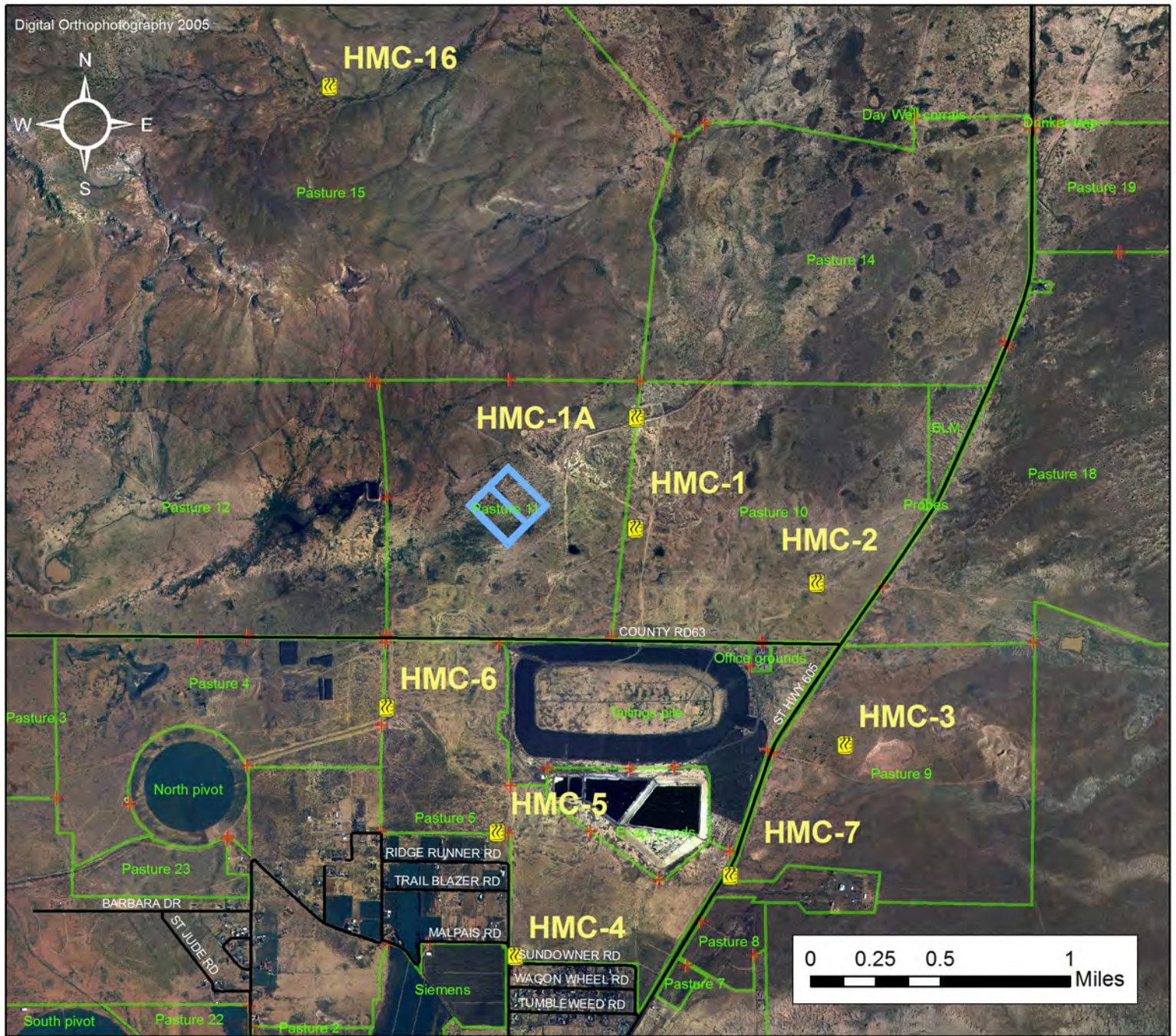
f = field measurement

\*\* Results not available

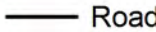


**Figure 1 – Monitoring & Sampling Locations**



**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 2023)**





**- CHAIN OF CUSTODY RECORD -**

All shaded fields must be completed.

This is a legal document; any misrepresentation may be construed as fraud.

#WEB

Client Name <b>Homestake Mining Company</b>		Project Identification HMC GRP		Sampler (Signature/Attestation of Authenticity)		Telephone # (505) 287-1606	
Report Address 560 Anaconda Rd Route 605 Milan, NM 87201		Contact Name Kyle Martinez		ANALYSES / PARAMETERS			
Invoice Address Same		Email kmartinez1@barrick.com					
		Phone (505) 287-1606		Purchase Order # 4500566437		Quote # 2546/2547	
REMARKS							

ITEM	LAB ID <i>(Lab Use Only)</i>	DATE	TIME	SAMPLE IDENTIFICATION	Matrix	# of Containers	Total Uranium	Total Ra-226	Total Th-230	ANALYSES / PARAMETERS				REMARKS
1	2310059-001	09/29/23	10:00	HMC-1	FT	1	x	x	x					Total Volume: 1.30E+08
2	-002	09/29/23	10:00	HMC-1A	FT	1	x	x	x					Total Volume: 1.26E+08
3	-003	09/29/23	10:00	HMC-2	FT	1	x	x	x					Total Volume: 1.52E+08
4	-004	09/29/23	10:00	HMC-3	FT	1	x	x	x					Total Volume: 1.48E+08
5	-005	09/29/23	10:00	HMC-4	FT	1	x	x	x					Total Volume: 1.33E+08
6	-006	09/29/23	10:00	HMC-5	FT	1	x	x	x					Total Volume: 5.76E+07
7	-007	09/29/23	10:00	HMC-6	FT	1	x	x	x					Total Volume: 1.27E+08
8	-008	09/29/23	10:00	HMC-7	FT	1	x	x	x					n/a
9														
10														
11														Volume in Liters
12														
13														
14														

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
rad sweep ok cust. seal intact	<i>[Signature]</i> Kyle Martinez	10-2-23	1000	<i>[Signature]</i> Daniel Smith	10/3/23	1006

<b>SHIPPING INFO</b>		<b>MATRIX CODES</b>		<b>TURN AROUND TIMES</b>		<b>COMPLIANCE INFORMATION</b>		<b>ADDITIONAL REMARKS</b>	
<input type="checkbox"/> UPS	Water WT	<b>Check desired service</b>		Compliance Monitoring ? <i>Y/N</i>					
<input checked="" type="checkbox"/> FedEx	Soil SL	<input checked="" type="checkbox"/> Standard turnaround		Program (SDWA, NPDES,...) <i>-</i>					
<input type="checkbox"/> USPS	Solid SD	<input type="checkbox"/> RUSH - 5 Working Days		PWSID / Permit # <i>-</i>					
<input type="checkbox"/> Hand Carried	Filter <i>ET</i>	<input type="checkbox"/> URGENT - < 2 Working Days		Chlorinated? <i>Y/N</i>					
<input type="checkbox"/> Other	Other OT	<i>Rush &amp; Urgent Surcharges will be applied</i>		Sample Disposal: Lab <input checked="" type="checkbox"/> Client					

Survey Meter # Model 2241-2; SN 182119  
 pH strip lot # HC312502  
 Thermometer SN# 27130475

**Condition Upon Receipt (Attach to COC)**

**Sample Receipt**

1 Number of ice chests/packages received: 1 ROI? Yes  No

Note as "OTC" if samples are received over the counter, unpackaged

2 Temperature of cooler/samples. (If more than 8 coolers, obtain an additional CUR form.)

Temps Observed (°C):								
Temps Corrected (°C):								

Acceptable is: 0.1° to 10°C for Bacteria; and 0.1° to 6°C for most other water parameters. Samples may not have had adequate time to cool following collection. Indicate ROI (Received on Ice) for iced samples received on the same day as sampled, in addition to temperature at receipt.

**Client contact for temperatures outside method criteria must be documented below.**

3 Emission rate of samples for radiochemical analyses < 0.5mR/hr?  Yes  No  N/A

4 COC Number (If applicable): \_\_\_\_\_

5 Do the number of bottles agree with the COC?  Yes  No  N/A

6 Were the samples received intact? (no broken bottles, leaks, etc.)  Yes  No  N/A

7 Were the sample custody seals intact?  Yes  No  N/A OS (4/4/23)

8 Is the COC properly completed, legible, and signed?  Yes  No

**Sample Verification, Labeling & Distribution**

1 Were all requested analyses understood and appropriate?  Yes  No

2 Did the bottle labels correspond with the COC information?  Yes  No

3 Samples collected in method-prescribed containers?  Yes  No

4 Sample Preservation:

pH at Receipt:	Final pH (if added in lab):	Preservative/Lot#	Date/Time Added:
____ Total Metals	____ Total Metals	HNO <sub>3</sub> _____	_____
____ Diss Metals	____ Diss Metals	Filtered and preserved in metals	Filtered and preserved in metals
____ Nutrient	____ Nutrient	H <sub>2</sub> SO <sub>4</sub> _____	
____ Cyanide	____ Cyanide	NaOH _____	
____ Sulfide	____ Sulfide	ZnAcet _____	
____ Phenol	____ Phenol	H <sub>2</sub> SO <sub>4</sub> _____	
____ SDWA Rads	____ SDWA Rads	HNO <sub>3</sub> _____	_____

5 VOA vials have <6mm headspace?  Yes  No  N/A

6 Were all analyses within holding time at the time of receipt?  Yes  No

7 Have rush or project due dates been checked and accepted?  Yes  No  N/A

8 Do samples require subcontracted analyses?  Yes  No

If "Yes", which type of subcontracting is required?  General  Customer-Specified  Certified

Sample Receipt, Verification, Login, Labeling & Distribution completed by (initials): OS  
 Set ID: 2276059

**Discrepancy Documentation (use back of sheet for notes on discrepancies)**

**Any items listed above with a response of "No" or do not meet specifications must be resolved.**

Person Contacted: \_\_\_\_\_ Method of Contact: \_\_\_\_\_ Phone: \_\_\_\_\_

Initiated By: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Email: \_\_\_\_\_

Problem: \_\_\_\_\_

Resolution: \_\_\_\_\_

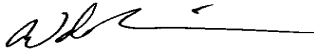




**Date:** 11/9/2023

**CLIENT:** Barrick Homestake Company  
**Project:** HMC GRP  
**Lab Order:** S2310059

**CASE NARRATIVE**  
**Report ID:** S2310059002  
(Replaces S2310059001)

**Entire Report Reviewed by:** 

Wade Nieuwsma, Laboratory Operations Manager

Samples HMC-1, HMC-1A, HMC-2, HMC-3, HMC-4, HMC-5, HMC-6 and HMC-7 were received on October 4, 2023.

All samples were received and analyzed within recommended holding times, except those noted below in this case narrative. Samples were analyzed using methods outlined in the following references:

- Standard Methods for the Examination of Water and Wastewater, approved method versions
- EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, online versions
- EPA methods 40 CFR Parts 136 and 141 EPA 600/2-78-054 methods
- NDEP Mining Methods
- 40 CFR Part 50, Appendices B, J, L, O and FEM EQL-0310-189
- IO Compendium Methods
- Clean Water Act Methods Update Rule for the Analysis of Effluent, current version.
- ASTM approved and recognized standards
- ISO approved and recognized standards
- USDA Handbook 60
- Soil Survey Laboratory Manual Ver 4.0
- ASA/SSSA 9 Methods of Analysis Part 2, 1982
- ASA/SSSA Methods of Analysis Book 5 Part 3, 1996
- Other industry approved methods

All Quality Control parameters met the acceptance criteria defined by EPA and Pace Analytical except as indicated in this case narrative:

Report S2310059002 replaces report S2310059001, client request no ND's on the report.



Date: 11/9/2023

## Definitions

RL Reporting Limit

---

## Qualifiers

- \* Value exceeds Maximum Contaminant Level
- A Check MSA specifications
- B Analyte detected in the associated Method Blank
- C Calculated Value
- D Report limit raised due to dilution
- E Value above quantitation range
- G Analyzed at Pace Gillette, WY laboratory
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- L Analyzed by another laboratory
- M Value exceeds Monthly Ave or MCL or is less than LCL
- N Sample analyzed outside of compliance requirements
- ND Not Detected at the Reporting Limit
- O Outside the Range of Dilutions
- P Sample preserved in lab at time of receipt
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- U Analyte below method detection limit
- X Matrix Effect

**Sample Analysis Report**

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

**ProjectName:** HMC GRP  
**Lab ID:** S2310059-001  
**ClientSample ID:** HMC-1  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310059  
**CollectionDate:** 9/29/2023 10:00:00 AM  
**DateReceived:** 10/4/2023 10:06:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Field</b>							
Actual Volume	130000000	Liters			Field	09/29/2023 1000	
<b>Radionuclides - Filter</b>							
Radium 226	4.8	pCi/Filter		0.2	SM 7500RAB	11/03/2023 949	WN
Radium 226 Precision (±)	0.5	pCi/Filter			SM 7500RAB	11/03/2023 949	WN
Radium 226	3.7E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849	WN
Radium 226 Precision (±)	3.8E-18	µCi/mL			Calculation	11/08/2023 849	WN
Thorium 230	1.5	pCi/Filter		0.2	ACW10	10/31/2023 1421	AEF
Thorium-230 Precision (±)	0.4	pCi/Filter			ACW10	10/31/2023 1421	AEF
Thorium 230	1.2E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849	WN
Thorium 230 Precision (±)	3.1E-18	µCi/mL			Calculation	11/08/2023 849	WN
Uranium	265	pCi/Filter		0.2	EPA 200.8	10/28/2023 054	MS
Uranium	2.0E-15	µCi/mL		1.0E-16	Calculation	11/08/2023 849	WN
<b>Metals - Total</b>							
Vanadium	0.03	mg/Filter		0.02	EPA 200.8	10/28/2023 054	MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

**ProjectName:** HMC GRP  
**Lab ID:** S2310059-002  
**ClientSample ID:** HMC-1A  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310059  
**CollectionDate:** 9/29/2023 10:00:00 AM  
**DateReceived:** 10/4/2023 10:06:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

Actual Volume 126000000 Liters Field 09/29/2023 1000

**Radionuclides - Filter**

Radium 226	3.4	pCi/Filter		0.2	SM 7500RAB	11/03/2023 949 WN
Radium 226 Precision (±)	0.4	pCi/Filter			SM 7500RAB	11/03/2023 949 WN
Radium 226	2.7E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Radium 226 Precision (±)	3.2E-18	µCi/mL			Calculation	11/08/2023 849 WN
Thorium 230	1.5	pCi/Filter		0.2	ACW10	10/31/2023 1421 AEF
Thorium-230 Precision (±)	0.4	pCi/Filter			ACW10	10/31/2023 1421 AEF
Thorium 230	1.2E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Thorium 230 Precision (±)	3.2E-18	µCi/mL			Calculation	11/08/2023 849 WN
Uranium	281	pCi/Filter		0.2	EPA 200.8	10/28/2023 116 MS
Uranium	2.2E-15	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN

**Metals - Total**

Vanadium 0.06 mg/Filter 0.02 EPA 200.8 10/28/2023 116 MS

### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

**ProjectName:** HMC GRP  
**Lab ID:** S2310059-003  
**ClientSample ID:** HMC-2  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310059  
**CollectionDate:** 9/29/2023 10:00:00 AM  
**DateReceived:** 10/4/2023 10:06:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Field</b>							
Actual Volume	152000000	Liters			Field	09/29/2023 1000	
<b>Radionuclides - Filter</b>							
Radium 226	4.2	pCi/Filter		0.2	SM 7500RAB	11/03/2023 949	WN
Radium 226 Precision (±)	0.4	pCi/Filter			SM 7500RAB	11/03/2023 949	WN
Radium 226	2.8E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849	WN
Radium 226 Precision (±)	2.6E-18	µCi/mL			Calculation	11/08/2023 849	WN
Thorium 230	1.9	pCi/Filter		0.2	ACW10	10/31/2023 1421	AEF
Thorium-230 Precision (±)	0.5	pCi/Filter			ACW10	10/31/2023 1421	AEF
Thorium 230	1.3E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849	WN
Thorium 230 Precision (±)	3.3E-18	µCi/mL			Calculation	11/08/2023 849	WN
Uranium	79.6	pCi/Filter		0.2	EPA 200.8	10/28/2023 122	MS
Uranium	5.2E-16	µCi/mL		1.0E-16	Calculation	11/08/2023 849	WN
<b>Metals - Total</b>							
Vanadium	0.07	mg/Filter		0.02	EPA 200.8	10/28/2023 122	MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

**ProjectName:** HMC GRP  
**Lab ID:** S2310059-004  
**ClientSample ID:** HMC-3  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310059  
**CollectionDate:** 9/29/2023 10:00:00 AM  
**DateReceived:** 10/4/2023 10:06:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

Actual Volume 148000000 Liters Field 09/29/2023 1000

**Radionuclides - Filter**

Radium 226	4.7	pCi/Filter		0.2	SM 7500RAB	11/03/2023 949 WN
Radium 226 Precision (±)	0.4	pCi/Filter			SM 7500RAB	11/03/2023 949 WN
Radium 226	3.2E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Radium 226 Precision (±)	2.7E-18	µCi/mL			Calculation	11/08/2023 849 WN
Thorium 230	2.5	pCi/Filter		0.2	ACW10	10/31/2023 1421 AEF
Thorium-230 Precision (±)	0.7	pCi/Filter			ACW10	10/31/2023 1421 AEF
Thorium 230	1.7E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Thorium 230 Precision (±)	4.7E-18	µCi/mL			Calculation	11/08/2023 849 WN
Uranium	75.2	pCi/Filter		0.2	EPA 200.8	10/28/2023 128 MS
Uranium	5.1E-16	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN

**Metals - Total**

Vanadium 0.07 mg/Filter 0.02 EPA 200.8 10/28/2023 128 MS

### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

**ProjectName:** HMC GRP  
**Lab ID:** S2310059-005  
**ClientSample ID:** HMC-4  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310059  
**CollectionDate:** 9/29/2023 10:00:00 AM  
**DateReceived:** 10/4/2023 10:06:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
<b>Field</b>						
Actual Volume	133000000	Liters			Field	09/29/2023 1000
<b>Radionuclides - Filter</b>						
Radium 226	3.6	pCi/Filter		0.2	SM 7500RAB	11/03/2023 949 WN
Radium 226 Precision (±)	0.4	pCi/Filter			SM 7500RAB	11/03/2023 949 WN
Radium 226	2.7E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Radium 226 Precision (±)	3.0E-18	µCi/mL			Calculation	11/08/2023 849 WN
Thorium 230	2.3	pCi/Filter		0.2	ACW10	11/01/2023 810 AEF
Thorium-230 Precision (±)	0.7	pCi/Filter			ACW10	11/01/2023 810 AEF
Thorium 230	1.7E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Thorium 230 Precision (±)	5.3E-18	µCi/mL			Calculation	11/08/2023 849 WN
Uranium	79.2	pCi/Filter		0.2	EPA 200.8	10/28/2023 134 MS
Uranium	6.0E-16	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
<b>Metals - Total</b>						
Vanadium	0.12	mg/Filter		0.02	EPA 200.8	10/28/2023 134 MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

**ProjectName:** HMC GRP  
**Lab ID:** S2310059-006  
**ClientSample ID:** HMC-5  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310059  
**CollectionDate:** 9/29/2023 10:00:00 AM  
**DateReceived:** 10/4/2023 10:06:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

Actual Volume 57600000 Liters Field 09/29/2023 1000

**Radionuclides - Filter**

Radium 226	3.1	pCi/Filter		0.2	SM 7500RAB	11/03/2023 949 WN
Radium 226 Precision (±)	0.4	pCi/Filter			SM 7500RAB	11/03/2023 949 WN
Radium 226	5.3E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Radium 226 Precision (±)	6.9E-18	µCi/mL			Calculation	11/08/2023 849 WN
Thorium 230	1.7	pCi/Filter		0.2	ACW10	11/01/2023 810 AEF
Thorium-230 Precision (±)	0.5	pCi/Filter			ACW10	11/01/2023 810 AEF
Thorium 230	3.0E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Thorium 230 Precision (±)	8.7E-18	µCi/mL			Calculation	11/08/2023 849 WN
Uranium	128	pCi/Filter		0.2	EPA 200.8	10/28/2023 152 MS
Uranium	2.2E-15	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN

**Metals - Total**

Vanadium 0.10 mg/Filter 0.02 EPA 200.8 10/28/2023 152 MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

**ProjectName:** HMC GRP  
**Lab ID:** S2310059-007  
**ClientSample ID:** HMC-6  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310059  
**CollectionDate:** 9/29/2023 10:00:00 AM  
**DateReceived:** 10/4/2023 10:06:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
<b>Field</b>						
Actual Volume	127000000	Liters			Field	09/29/2023 1000
<b>Radionuclides - Filter</b>						
Radium 226	2.5	pCi/Filter		0.2	SM 7500RAB	11/03/2023 949 WN
Radium 226 Precision (±)	0.3	pCi/Filter			SM 7500RAB	11/03/2023 949 WN
Radium 226	2.0E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Radium 226 Precision (±)	2.4E-18	µCi/mL			Calculation	11/08/2023 849 WN
Thorium 230	2.2	pCi/Filter		0.2	ACW10	11/01/2023 810 AEF
Thorium-230 Precision (±)	0.6	pCi/Filter			ACW10	11/01/2023 810 AEF
Thorium 230	1.7E-17	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
Thorium 230 Precision (±)	4.7E-18	µCi/mL			Calculation	11/08/2023 849 WN
Uranium	125	pCi/Filter		0.2	EPA 200.8	10/28/2023 158 MS
Uranium	9.9E-16	µCi/mL		1.0E-16	Calculation	11/08/2023 849 WN
<b>Metals - Total</b>						
Vanadium	0.09	mg/Filter		0.02	EPA 200.8	10/28/2023 158 MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

**ProjectName:** HMC GRP  
**Lab ID:** S2310059-008  
**ClientSample ID:** HMC-7  
**COC:**  
**PWS ID:**

**WorkOrder:** S2310059  
**CollectionDate:** 9/29/2023 10:00:00 AM  
**DateReceived:** 10/4/2023 10:06:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Radionuclides - Filter</b>							
Radium 226	3.6	pCi/Filter		0.2	SM 7500RAB	11/03/2023 949	WN
Radium 226 Precision (±)	0.4	pCi/Filter			SM 7500RAB	11/03/2023 949	WN
Thorium 230	0.27	pCi/Filter		0.2	ACW10	11/01/2023 810	AEF
Thorium-230 Precision (±)	0.2	pCi/Filter			ACW10	11/01/2023 810	AEF
Uranium	1.2	pCi/Filter		0.2	EPA 200.8	10/28/2023 203	MS
<b>Metals - Total</b>							
Vanadium	<0.02	mg/Filter		0.02	EPA 200.8	10/28/2023 203	MS



### ANALYTICAL QC SUMMARY REPORT

**CLIENT:** Barrick Homestake Company  
**Work Order:** S2310059  
**Project:** HMC GRP

**Date:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

Uranium, Air Filter Analysis		Sample Type	MBLK		Units: pCi/Filter					
MBLK (10/28/23 00:42)	Analyte		RunNo: 215540	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Uranium			ND	0.2					

Uranium, Air Filter Analysis		Sample Type	LCS		Units: pCi/Filter					
LCS (10/28/23 00:48)	Analyte		RunNo: 215540	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Uranium			65.6	0.2	67.7		96.9	85 - 115	

Uranium, Air Filter Analysis		Sample Type	MS		Units: pCi/Filter					
S2310059-001AS (10/28/23 01:06)	Analyte		RunNo: 215540	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Uranium			1730	0.2	1490	265	98.5	70 - 130	

Uranium, Air Filter Analysis		Sample Type	MSD		Units: pCi/Filter					
S2310059-001AMSD (10/28/23 01:11)	Analyte		RunNo: 215540	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
	Uranium			1780	0.2	1730	2.70	102	20	

Uranium, Air Filter Analysis		Sample Type	DUP		Units: pCi/Filter					
S2310059-001AD (10/28/23 01:00)	Analyte		RunNo: 215540	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
	Uranium			269	0.2	265	1.51		20	

Radium 226 Air Filter Analysis		Sample Type	MBLK		Units: pCi/Filter					
MB-2547 (11/03/23 07:44)	Analyte		RunNo: 215707	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Radium 226			ND	0.2					

Radium 226 Air Filter Analysis		Sample Type	LCS		Units: pCi/Filter					
LCS-2547 (11/03/23 07:44)	Analyte		RunNo: 215707	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Radium 226			8.7	0.2	8.08		108	79 - 112	

Radium 226 Air Filter Analysis		Sample Type	MS		Units: pCi/Filter					
MS-2547 (11/03/23 07:44)	Analyte		RunNo: 215707	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Radium 226			7.7	0.2	8.08	ND	95.6	68 - 123	

Radium 226 Air Filter Analysis		Sample Type	MSD		Units: pCi/Filter					
MSD-2547 (11/03/23 07:44)	Analyte		RunNo: 215707	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
	Radium 226			7.3	0.2	7.7	5.04	90.9	20	



### ANALYTICAL QC SUMMARY REPORT

**CLIENT:** Barrick Homestake Company  
**Work Order:** S2310059  
**Project:** HMC GRP

**Date:** 2/14/2024  
**Report ID:** S2310059002  
(Replaces S2310059001)

Total (3050) Metals by EPA 200.8-Soil		Sample Type	MBLK		Units: mg/Filter				
MBLK (10/28/23 00:42)				RunNo: 215781					
Analyte		Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	
Vanadium		ND	5						

Total (3050) Metals by EPA 200.8-Soil		Sample Type	LCS		Units: mg/Filter				
LCS (10/28/23 00:48)				RunNo: 215781					
Analyte		Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	
Vanadium		ND	5	0.1		99.1	85 - 115		

Total (3050) Metals by EPA 200.8-Soil		Sample Type	MS		Units: mg/Filter				
S2310059-001AS (10/28/23 01:06)				RunNo: 215781					
Analyte		Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	
Vanadium		2.25	0.02	2.2	0.03	101	70 - 130		

Total (3050) Metals by EPA 200.8-Soil		Sample Type	MSD		Units: mg/Filter				
S2310059-001AMSD (10/28/23 01:11)				RunNo: 215781					
Analyte		Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual	
Vanadium		2.26	0.02	2.25	0.547	101	20		

Total (3050) Metals by EPA 200.8-Soil		Sample Type	DUP		Units: mg/Filter				
S2310059-001AD (10/28/23 01:00)				RunNo: 215781					
Analyte		Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual	
Vanadium		0.03	0.02	0.03	0.443		20		



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-1**

Lab ID: S2310059-001		Sample Air Volume: 13000000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	4.8	0.5	3.7E-17	3.8E-18	1E-16	9 E-13	Week	0.0041
Thorium 230	1.5	0.4	1.2E-17	3.1E-18	1E-16	3 E-14	Year	0.040
Uranium	265		2.0E-15		1E-16	9 E-14	Year	2.2

Lab ID: S2306587-001		Sample Air Volume: 11100000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	1.9	0.3	1.7E-17	2.7E-18	1E-16	9 E-13	Week	0.0019
Thorium 230	1.4	0.5	1.2E-17	4.5E-18	1E-16	3 E-14	Year	0.040
Uranium	56.9		5.1E-16		1E-16	9 E-14	Year	0.57

Lab ID: S2304070-001		Sample Air Volume: 66100000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.7	0.4	4.1E-17	6.1E-18	1E-16	9 E-13	Week	0.0046
Thorium 230	2.0	0.6	3.0E-17	9.1E-18	1E-16	3 E-14	Year	0.10
Uranium	1.7		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-1-A**

Lab ID: S2310059-002		Client Sample ID: HMC-1A			Sample Air Volume: 12600000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.4	0.4	2.7E-17	3.2E-18	1E-16	9 E-13	Week	0.0030
Thorium 230	1.5	0.4	1.2E-17	3.2E-18	1E-16	3 E-14	Year	0.040
Uranium	281		2.2E-15		1E-16	9 E-14	Year	2.4

Lab ID: S2306587-002		Client Sample ID: HMC-1A			Sample Air Volume: 13400000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.1	0.3	1.6E-17	2.2E-18	1E-16	9 E-13	Week	0.0018
Thorium 230	2.7	0.7	2.0E-17	5.2E-18	1E-16	3 E-14	Year	0.067
Uranium	64.5		4.8E-16		1E-16	9 E-14	Year	0.53

Lab ID: S2304070-002		Client Sample ID: HMC-1A			Sample Air Volume: 13100000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.1	0.4	1.6E-17	3.1E-18	1E-16	9 E-13	Week	0.0018
Thorium 230	1.0	0.4	7.8E-18	3.1E-18	1E-16	3 E-14	Year	0.026
Uranium	3.1		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-2**

Lab ID: S2310059-003					Sample Air Volume: 15200000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	4.2	0.4	2.8E-17	2.6E-18	1E-16	9 E-13	Week	0.0031
Thorium 230	1.9	0.5	1.3E-17	3.3E-18	1E-16	3 E-14	Year	0.043
Uranium	79.6		5.2E-16		1E-16	9 E-14	Year	0.58

Lab ID: S2306587-003					Sample Air Volume: 14000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.7	0.4	2.7E-17	2.9E-18	1E-16	9 E-13	Week	0.0030
Thorium 230	3.4	1.1	2.4E-17	7.9E-18	1E-16	3 E-14	Year	0.080
Uranium	27.3		1.9E-16		1E-16	9 E-14	Year	0.21

Lab ID: S2304070-003					Sample Air Volume: 14000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.5	0.4	1.8E-17	2.9E-18	1E-16	9 E-13	Week	0.0020
Thorium 230	1.5	0.5	1.1E-17	3.6E-18	1E-16	3 E-14	Year	0.037
Uranium	3.5		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-3**

Lab ID: S2310059-004					Sample Air Volume: 14800000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	4.7	0.4	3.2E-17	2.7E-18	1E-16	9 E-13	Week	0.0036
Thorium 230	2.5	0.7	1.7E-17	4.7E-18	1E-16	3 E-14	Year	0.057
Uranium	75.2		5.1E-16		1E-16	9 E-14	Year	0.57

Lab ID: S2306587-004					Sample Air Volume: 13700000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.0	0.4	2.2E-17	2.9E-18	1E-16	9 E-13	Week	0.0024
Thorium 230	2.5	0.6	1.8E-17	4.4E-18	1E-16	3 E-14	Year	0.060
Uranium	31.0		2.3E-16		1E-16	9 E-14	Year	0.26

Lab ID: S2304070-004					Sample Air Volume: 11400000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.1	0.3	1.8E-17	2.6E-18	1E-16	9 E-13	Week	0.0020
Thorium 230	7.6	2.5	6.6E-17	2.2E-17	1E-16	3 E-14	Year	0.22
Uranium	4.5		<1.0E-16		1E-16	9 E-14	Year	0





### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-4**

Lab ID: S2310059-005					Sample Air Volume: 133000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.6	0.4	2.7E-17	3.0E-18	1E-16	9 E-13	Week	0.0030
Thorium 230	2.3	0.7	1.7E-17	5.3E-18	1E-16	3 E-14	Year	0.057
Uranium	79.2		6.0E-16		1E-16	9 E-14	Year	0.67

Lab ID: S2306587-005					Sample Air Volume: 101000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	14.9	0.7	1.5E-16	6.9E-18	1E-16	9 E-13	Week	0.017
Thorium 230	10.7	1.9	1.1E-16	1.9E-17	1E-16	3 E-14	Year	0.37
Uranium	35.1		3.5E-16		1E-16	9 E-14	Year	0.39

Lab ID: S2304070-005					Sample Air Volume: 116000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	14.3	0.9	1.2E-16	7.8E-18	1E-16	9 E-13	Week	0.013
Thorium 230	7.2	1.4	6.2E-17	1.2E-17	1E-16	3 E-14	Year	0.21
Uranium	17.4		1.5E-16		1E-16	9 E-14	Year	0.17



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-5**

Lab ID: S2310059-006		Sample Air Volume: 57600000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.1	0.4	5.3E-17	6.9E-18	1E-16	9 E-13	Week	0.0059
Thorium 230	1.7	0.5	3.0E-17	8.7E-18	1E-16	3 E-14	Year	0.10
Uranium	128		2.2E-15		1E-16	9 E-14	Year	2.4

Lab ID: S2306587-006		Sample Air Volume: 118000000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	4.0	0.4	3.4E-17	3.4E-18	1E-16	9 E-13	Week	0.0038
Thorium 230	3.3	0.8	2.8E-17	6.8E-18	1E-16	3 E-14	Year	0.093
Uranium	28.4		2.4E-16		1E-16	9 E-14	Year	0.27

Lab ID: S2304070-006		Sample Air Volume: 129000000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.1	0.4	1.6E-17	3.1E-18	1E-16	9 E-13	Week	0.0018
Thorium 230	1.1	0.4	8.2E-18	3.1E-18	1E-16	3 E-14	Year	0.027
Uranium	2.4		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-6**

Lab ID: S2310059-007					Sample Air Volume: 127000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.5	0.3	2.0E-17	2.4E-18	1E-16	9 E-13	Week	0.0022
Thorium 230	2.2	0.6	1.7E-17	4.7E-18	1E-16	3 E-14	Year	0.057
Uranium	125		9.9E-16		1E-16	9 E-14	Year	1.1

Lab ID: S2306587-007					Sample Air Volume: 120000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.3	0.3	1.9E-17	2.5E-18	1E-16	9 E-13	Week	0.0021
Thorium 230	2.4	0.7	2.0E-17	5.8E-18	1E-16	3 E-14	Year	0.067
Uranium	22.9		1.9E-16		1E-16	9 E-14	Year	0.21

Lab ID: S2304070-007					Sample Air Volume: 123000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	1.5	0.3	1.2E-17	2.4E-18	1E-16	9 E-13	Week	0.0013
Thorium 230	1.4	0.6	1.2E-17	4.9E-18	1E-16	3 E-14	Year	0.040
Uranium	1.1		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-7**

Lab ID: S2310059-008					Sample Air Volume:			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
	3.6	0.4				9 E-13	Week	
	0.27	0.2				3 E-14	Year	
	1.2					9 E-14	Year	

Lab ID: S2306587-008					Sample Air Volume:			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
	0.3	0.1				9 E-13	Week	
	0.20	0.2				3 E-14	Year	
	<0.2					9 E-14	Year	

Lab ID: S2304070-008					Sample Air Volume:			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
	0.6	0.2				9 E-13	Week	
	0.4	0.3				3 E-14	Year	
	<0.2					9 E-14	Year	



**Pace Analytical**  
Sheridan, WY and Gillette, WY

**- CHAIN OF CUSTODY RECORD -**

*All shaded fields must be completed.*

This is a legal document; any misrepresentation may be construed as fraud.

**#WEB**

Client Name <b>Homestake Mining Company</b>		Project Identification HMC GRP		Sampler (Signature/Attestation of Authenticity)		Telephone # (505) 287-1606		
Report Address 560 Anaconda Rd Route 605 Milan, NM 87201		Contact Name <b>Kyle Martinez</b>		ANALYSES / PARAMETERS				REMARKS
Invoice Address Same		Email kmartinez1@barrick.com						
		Phone (505) 287-1606		Purchase Order # 4500566437		Quote # 2546/2547		

ITEM	LAB ID <i>(Lab Use Only)</i>	DATE	TIME	SAMPLE IDENTIFICATION	Matrix	# of Containers	Total Uranium	Total Ra-226	Total Th-230	ANALYSES / PARAMETERS				REMARKS
1	52312367-001	12/27/23	10:00	HMC-1	FT	1	x	x	x					Total Volume: 1.44E+08
2	-002	12/27/23	10:00	HMC-1A	FT	1	x	x	x					Total Volume: 1.30E+08
3	-003	12/27/23	10:00	HMC-2	FT	1	x	x	x					Total Volume: 1.44E+08
4	-004	12/27/23	10:00	HMC-3	FT	1	x	x	x					Total Volume: 1.37E+08
5	-005	12/27/23	10:00	HMC-4	FT	1	x	x	x					Total Volume: 1.31E+08
6	-006	12/27/23	10:00	HMC-5	FT	1	x	x	x					Total Volume: 1.28E+08
7	-007	12/27/23	10:00	HMC-6	FT	1	x	x	x					Total Volume: 1.23E+08
8	-008	12/27/23	10:00	HMC-7	FT	1	x	x	x					n/a
9														
10														
11														Volume in Liters
12														
13														
14														

LAB COMMENTS	Relinquished By (Signature/Printed)	DATE	TIME	Received By (Signature/Printed)	DATE	TIME
Rads < 5000 Bq/K	<i>[Signature]</i> / Kyle Martinez	12-27-23	1000	<i>[Signature]</i>	12/28/23	10:40

SHIPPING INFO	MATRIX CODES	TURN AROUND TIMES	COMPLIANCE INFORMATION	ADDITIONAL REMARKS
<input type="checkbox"/> UPS <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> USPS <input type="checkbox"/> Hand Carried <input type="checkbox"/> Other	Water WT Soil SL Solid SD Filter <u>FT</u> Other OT	<b>Check desired service</b> <input type="checkbox"/> Standard turnaround <input type="checkbox"/> <b>RUSH - 5 Working Days</b> <input type="checkbox"/> <b>URGENT - &lt; 2 Working Days</b> <i>Rush &amp; Urgent Surcharges will be applied</i>	Compliance Monitoring ? <u>YDN</u> Program (SDWA, NPDES,...) <u>-</u> PWSID / Permit # _____ Chlorinated? <u>Y / N</u> Sample Disposal: Lab _____ Client _____	<u>Cost Seal</u> ✓



Survey Meter # Model: 12SA SN: 136491  
 pH strip lot # HC325179  
 Thermometer SN# 27130475

**Condition Upon Receipt (Attach to COC)**

**Sample Receipt**

1 Number of ice chests/packages received: 1 ROI? Yes  No

*Note as "OTC" if samples are received over the counter, unpackaged*

2 Temperature of cooler/samples. (If more than 8 coolers, obtain an additional CUR form.)

Temps Observed (°C):	<u>4</u>							
Temps Corrected (°C):								

*Acceptable is: 0.1° to 10°C for Bacteria; and 0.1° to 6°C for most other water parameters. Samples may not have had adequate time to cool following collection. Indicate ROI (Received on Ice) for iced samples received on the same day as sampled, in addition to temperature at receipt.*

**Client contact for temperatures outside method criteria must be documented below.**

- 3 Emission rate of samples for radiochemical analyses < 0.5mR/hr?  Yes  No  N/A
- 4 COC Number (If applicable): \_\_\_\_\_
- 5 Do the number of bottles agree with the COC?  Yes  No  N/A
- 6 Were the samples received intact? (no broken bottles, leaks, etc.)  Yes  No  N/A
- 7 Were the sample custody seals intact?  Yes  No  N/A
- 8 Is the COC properly completed, legible, and signed?  Yes  No

**Sample Verification, Labeling & Distribution**

- 1 Were all requested analyses understood and appropriate?  Yes  No
- 2 Did the bottle labels correspond with the COC information?  Yes  No
- 3 Samples collected in method-prescribed containers?  Yes  No
- 4 Sample Preservation:

pH at Receipt:	Final pH (if added in lab):	Preservative/Lot#	Date/Time Added:
____ Total Metals	____ Total Metals	HNO <sub>3</sub> _____	_____
____ Diss Metals	____ Diss Metals	Filtered and preserved in metals	Filtered and preserved in metals
____ Nutrient	____ Nutrient	H <sub>2</sub> SO <sub>4</sub> _____	
____ Cyanide	____ Cyanide	NaOH _____	
____ Sulfide	____ Sulfide	ZnAcet _____	
____ Phenol	____ Phenol	H <sub>2</sub> SO <sub>4</sub> _____	
____ SDWA Rads	____ SDWA Rads	HNO <sub>3</sub> _____	_____

- 5 VOA vials have <6mm headspace?  Yes  No  N/A
- 6 Were all analyses within holding time at the time of receipt?  Yes  No
- 7 Have rush or project due dates been checked and accepted?  Yes  No  N/A
- 8 Do samples require subcontracted analyses?  Yes  No

*If "Yes", which type of subcontracting is required?* General  Customer-Specified  Certified

Sample Receipt, Verification, Login, Labeling & Distribution completed by (initials): [Signature]  
 Set ID: 52312367

**Discrepancy Documentation (use back of sheet for notes on discrepancies)**

**Any items listed above with a response of "No" or do not meet specifications must be resolved.**

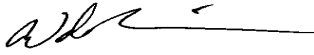
Person Contacted: \_\_\_\_\_ Method of Contact: \_\_\_ Phone: \_\_\_\_\_  
 Initiated By: \_\_\_\_\_ Date/Time: \_\_\_\_\_ \_\_\_ Email: \_\_\_\_\_  
 Problem: \_\_\_\_\_  
 Resolution: \_\_\_\_\_



Date: 2/14/2024

**CLIENT:** Barrick Homestake Company  
**Project:** HMC GRP  
**Lab Order:** S2312367

**CASE NARRATIVE**  
**Report ID:** S2312367001

**Entire Report Reviewed by:** 

Wade Nieuwsma, Laboratory Operations Manager

Samples HMC-1, HMC-1A, HMC-2, HMC-3, HMC-4, HMC-5, HMC-6 and HMC-7 were received on December 28, 2023.

All samples were received and analyzed within recommended holding times, except those noted below in this case narrative. Samples were analyzed using methods outlined in the following references:

- Standard Methods for the Examination of Water and Wastewater, approved method versions
- EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, online versions
- EPA methods 40 CFR Parts 136 and 141 EPA 600/2-78-054 methods
- NDEP Mining Methods
- 40 CFR Part 50, Appendices B, J, L, O and FEM EQL-0310-189
- IO Compendium Methods
- Clean Water Act Methods Update Rule for the Analysis of Effluent, current version.
- ASTM approved and recognized standards
- ISO approved and recognized standards
- USDA Handbook 60
- Soil Survey Laboratory Manual Ver 4.0
- ASA/SSSA 9 Methods of Analysis Part 2, 1982
- ASA/SSSA Methods of Analysis Book 5 Part 3, 1996
- Other industry approved methods

All Quality Control parameters met the acceptance criteria defined by EPA and Pace Analytical except as indicated in this case narrative:



Date: 2/14/2024

## Definitions

RL Reporting Limit

---

## Qualifiers

- \* Value exceeds Maximum Contaminant Level
- A Check MSA specifications
- B Analyte detected in the associated Method Blank
- C Calculated Value
- D Report limit raised due to dilution
- E Value above quantitation range
- G Analyzed at Pace Gillette, WY laboratory
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- L Analyzed by another laboratory
- M Value exceeds Monthly Ave or MCL or is less than LCL
- N Sample analyzed outside of compliance requirements
- ND Not Detected at the Reporting Limit
- O Outside the Range of Dilutions
- P Sample preserved in lab at time of receipt
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- U Analyte below method detection limit
- X Matrix Effect



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2312367001

**ProjectName:** HMC GRP  
**Lab ID:** S2312367-001  
**ClientSample ID:** HMC-1  
**COC:**  
**PWS ID:**

**WorkOrder:** S2312367  
**CollectionDate:** 12/28/2023 10:00:00 AM  
**DateReceived:** 12/28/2023 10:40:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

Actual Volume	144000000	Liters			Field	12/28/2023 1000
---------------	-----------	--------	--	--	-------	-----------------

**Radionuclides - Filter**

Radium 226	2.5	pCi/Filter		0.2	SM 7500RAB	02/13/2024 1244	WN
Radium 226 Precision (±)	0.4	pCi/Filter			SM 7500RAB	02/13/2024 1244	WN
Radium 226	1.7E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
Radium 226 Precision (±)	2.8E-18	µCi/mL			Calculation	02/14/2024 1255	WN
Thorium 230	2.1	pCi/Filter		0.2	ACW10	01/30/2024 904	AEF
Thorium-230 Precision (±)	0.6	pCi/Filter			ACW10	01/30/2024 904	AEF
Thorium 230	1.4E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
Thorium 230 Precision (±)	4.2E-18	µCi/mL			Calculation	02/14/2024 1255	WN
Uranium	13.7	pCi/Filter		0.2	EPA 200.8	01/10/2024 1944	MS
Uranium	9.5E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN

**Metals - Total**

Vanadium	0.02	mg/Filter		0.02	EPA 200.8	01/10/2024 1944	MS
----------	------	-----------	--	------	-----------	-----------------	----

### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2312367001

**ProjectName:** HMC GRP  
**Lab ID:** S2312367-002  
**ClientSample ID:** HMC-1A  
**COC:**  
**PWS ID:**

**WorkOrder:** S2312367  
**CollectionDate:** 12/28/2023 10:00:00 AM  
**DateReceived:** 12/28/2023 10:40:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

Actual Volume	130000000	Liters			Field	12/28/2023 1000
<b>Radionuclides - Filter</b>						
Radium 226	3.1	pCi/Filter		0.2	SM 7500RAB	02/13/2024 1244 WN
Radium 226 Precision (±)	0.3	pCi/Filter			SM 7500RAB	02/13/2024 1244 WN
Radium 226	2.4E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN
Radium 226 Precision (±)	2.3E-18	µCi/mL			Calculation	02/14/2024 1255 WN
Thorium 230	2.1	pCi/Filter		0.2	ACW10	01/30/2024 904 AEF
Thorium-230 Precision (±)	0.5	pCi/Filter			ACW10	01/30/2024 904 AEF
Thorium 230	1.6E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN
Thorium 230 Precision (±)	3.8E-18	µCi/mL			Calculation	02/14/2024 1255 WN
Uranium	21.1	pCi/Filter		0.2	EPA 200.8	01/10/2024 2018 MS
Uranium	1.6E-16	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN
<b>Metals - Total</b>						
Vanadium	0.04	mg/Filter		0.02	EPA 200.8	01/10/2024 2018 MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2312367001

**ProjectName:** HMC GRP  
**Lab ID:** S2312367-003  
**ClientSample ID:** HMC-2  
**COC:**  
**PWS ID:**

**WorkOrder:** S2312367  
**CollectionDate:** 12/28/2023 10:00:00 AM  
**DateReceived:** 12/28/2023 10:40:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

Actual Volume 144000000 Liters Field 12/28/2023 1000

**Radionuclides - Filter**

Radium 226	2.3	pCi/Filter		0.2	SM 7500RAB	02/13/2024 1245	WN
Radium 226 Precision (±)	0.3	pCi/Filter			SM 7500RAB	02/13/2024 1245	WN
Radium 226	1.6E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
Radium 226 Precision (±)	2.1E-18	µCi/mL			Calculation	02/14/2024 1255	WN
Thorium 230	2.1	pCi/Filter		0.2	ACW10	01/30/2024 904	AEF
Thorium-230 Precision (±)	0.5	pCi/Filter			ACW10	01/30/2024 904	AEF
Thorium 230	1.5E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
Thorium 230 Precision (±)	3.5E-18	µCi/mL			Calculation	02/14/2024 1255	WN
Uranium	3.9	pCi/Filter		0.2	EPA 200.8	01/10/2024 2024	MS
Uranium	2.7E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN

**Metals - Total**

Vanadium 0.05 mg/Filter 0.02 EPA 200.8 01/10/2024 2024 MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2312367001

**ProjectName:** HMC GRP  
**Lab ID:** S2312367-004  
**ClientSample ID:** HMC-3  
**COC:**  
**PWS ID:**

**WorkOrder:** S2312367  
**CollectionDate:** 12/28/2023 10:00:00 AM  
**DateReceived:** 12/28/2023 10:40:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

Actual Volume 137000000 Liters Field 12/28/2023 1000

**Radionuclides - Filter**

Radium 226	2.2	pCi/Filter		0.2	SM 7500RAB	02/13/2024 1245 WN
Radium 226 Precision (±)	0.3	pCi/Filter			SM 7500RAB	02/13/2024 1245 WN
Radium 226	1.6E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN
Radium 226 Precision (±)	2.2E-18	µCi/mL			Calculation	02/14/2024 1255 WN
Thorium 230	2.1	pCi/Filter		0.2	ACW10	01/30/2024 904 AEF
Thorium-230 Precision (±)	0.5	pCi/Filter			ACW10	01/30/2024 904 AEF
Thorium 230	1.5E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN
Thorium 230 Precision (±)	3.6E-18	µCi/mL			Calculation	02/14/2024 1255 WN
Uranium	31.4	pCi/Filter		0.2	EPA 200.8	01/10/2024 2030 MS
Uranium	2.3E-16	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN

**Metals - Total**

Vanadium 0.06 mg/Filter 0.02 EPA 200.8 01/10/2024 2030 MS

### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2312367001

**ProjectName:** HMC GRP  
**Lab ID:** S2312367-005  
**ClientSample ID:** HMC-4  
**COC:**  
**PWS ID:**

**WorkOrder:** S2312367  
**CollectionDate:** 12/28/2023 10:00:00 AM  
**DateReceived:** 12/28/2023 10:40:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Field</b>							
Actual Volume	131000000	Liters			Field	12/28/2023 1000	
<b>Radionuclides - Filter</b>							
Radium 226	1.7	pCi/Filter		0.2	SM 7500RAB	02/13/2024 1245	WN
Radium 226 Precision (±)	0.3	pCi/Filter			SM 7500RAB	02/13/2024 1245	WN
Radium 226	1.3E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
Radium 226 Precision (±)	2.3E-18	µCi/mL			Calculation	02/14/2024 1255	WN
Thorium 230	1.4	pCi/Filter		0.2	ACW10	01/30/2024 904	AEF
Thorium-230 Precision (±)	0.4	pCi/Filter			ACW10	01/30/2024 904	AEF
Thorium 230	1.1E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
Thorium 230 Precision (±)	3.1E-18	µCi/mL			Calculation	02/14/2024 1255	WN
Uranium	5.8	pCi/Filter		0.2	EPA 200.8	01/10/2024 2036	MS
Uranium	4.4E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
<b>Metals - Total</b>							
Vanadium	0.04	mg/Filter		0.02	EPA 200.8	01/10/2024 2036	MS

### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2312367001

**ProjectName:** HMC GRP  
**Lab ID:** S2312367-006  
**ClientSample ID:** HMC-5  
**COC:**  
**PWS ID:**

**WorkOrder:** S2312367  
**CollectionDate:** 12/28/2023 10:00:00 AM  
**DateReceived:** 12/28/2023 10:40:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Field</b>							
Actual Volume	128000000	Liters			Field	12/28/2023 1000	
<b>Radionuclides - Filter</b>							
Radium 226	2.2	pCi/Filter		0.2	SM 7500RAB	02/13/2024 1245	WN
Radium 226 Precision (±)	0.3	pCi/Filter			SM 7500RAB	02/13/2024 1245	WN
Radium 226	1.8E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
Radium 226 Precision (±)	2.3E-18	µCi/mL			Calculation	02/14/2024 1255	WN
Thorium 230	1.7	pCi/Filter		0.2	ACW10	01/30/2024 904	AEF
Thorium-230 Precision (±)	0.5	pCi/Filter			ACW10	01/30/2024 904	AEF
Thorium 230	1.3E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
Thorium 230 Precision (±)	3.9E-18	µCi/mL			Calculation	02/14/2024 1255	WN
Uranium	10.1	pCi/Filter		0.2	EPA 200.8	01/10/2024 2042	MS
Uranium	7.9E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255	WN
<b>Metals - Total</b>							
Vanadium	0.05	mg/Filter		0.02	EPA 200.8	01/10/2024 2042	MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2312367001

**ProjectName:** HMC GRP  
**Lab ID:** S2312367-007  
**ClientSample ID:** HMC-6  
**COC:**  
**PWS ID:**

**WorkOrder:** S2312367  
**CollectionDate:** 12/28/2023 10:00:00 AM  
**DateReceived:** 12/28/2023 10:40:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
----------	--------	-------	------	----	--------	--------------------

**Field**

Actual Volume 123000000 Liters Field 12/28/2023 1000

**Radionuclides - Filter**

Radium 226	3.4	pCi/Filter		0.2	SM 7500RAB	02/13/2024 1245 WN
Radium 226 Precision (±)	0.4	pCi/Filter			SM 7500RAB	02/13/2024 1245 WN
Radium 226	2.8E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN
Radium 226 Precision (±)	3.3E-18	µCi/mL			Calculation	02/14/2024 1255 WN
Thorium 230	2.1	pCi/Filter		0.2	ACW10	01/30/2024 904 AEF
Thorium-230 Precision (±)	0.6	pCi/Filter			ACW10	01/30/2024 904 AEF
Thorium 230	1.7E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN
Thorium 230 Precision (±)	4.9E-18	µCi/mL			Calculation	02/14/2024 1255 WN
Uranium	6.4	pCi/Filter		0.2	EPA 200.8	01/10/2024 2048 MS
Uranium	5.2E-17	µCi/mL		1.0E-16	Calculation	02/14/2024 1255 WN

**Metals - Total**

Vanadium 0.06 mg/Filter 0.02 EPA 200.8 01/10/2024 2048 MS



### Sample Analysis Report

**Company:** Barrick Homestake Company  
560 Anaconda Rd Route 605  
Milan, NM 87021

**Date Reported:** 2/14/2024  
**Report ID:** S2312367001

**ProjectName:** HMC GRP  
**Lab ID:** S2312367-008  
**ClientSample ID:** HMC-7  
**COC:**  
**PWS ID:**

**WorkOrder:** S2312367  
**CollectionDate:** 12/28/2023 10:00:00 AM  
**DateReceived:** 12/28/2023 10:40:00 AM  
**FieldSampler:**  
**Matrix:** Filter

**Comments**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init	
<b>Radionuclides - Filter</b>							
Radium 226	0.3	pCi/Filter		0.2	SM 7500RAB	02/13/2024 1245	WN
Radium 226 Precision (±)	0.1	pCi/Filter			SM 7500RAB	02/13/2024 1245	WN
Thorium 230	0.12	pCi/Filter		0.2	ACW10	01/30/2024 1308	AEF
Thorium-230 Precision (±)	0.2	pCi/Filter			ACW10	01/30/2024 1308	AEF
Uranium	<0.2	pCi/Filter		0.2	EPA 200.8	01/10/2024 2054	MS
<b>Metals - Total</b>							
Vanadium	<0.02	mg/Filter		0.02	EPA 200.8	01/10/2024 2054	MS





### ANALYTICAL QC SUMMARY REPORT

**CLIENT:** Barrick Homestake Company  
**Work Order:** S2312367  
**Project:** HMC GRP

**Date:** 2/14/2024  
**Report ID:** S2312367001

**Uranium, Air Filter Analysis**

Sample Type **MBLK**

Units: pCi/Filter

MBLK (01/10/24 19:32)	RunNo: 217551							
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Uranium ND 0.2

**Uranium, Air Filter Analysis**

Sample Type **LCS**

Units: pCi/Filter

LCS (01/10/24 19:38)	RunNo: 217551							
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Uranium 68.0 0.2 67.7 100 85 - 115

**Uranium, Air Filter Analysis**

Sample Type **MS**

Units: pCi/Filter

S2312367-001AS (01/10/24 19:56)	RunNo: 217551							
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Uranium 738 0.2 745 13.7 97.2 70 - 130

**Uranium, Air Filter Analysis**

Sample Type **MSD**

Units: pCi/Filter

S2312367-001AMSD (01/10/24 20:13)	RunNo: 217551							
Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual	

Uranium 739 0.2 738 0.214 97.5 20

**Uranium, Air Filter Analysis**

Sample Type **DUP**

Units: pCi/Filter

S2312367-001AD (01/10/24 19:50)	RunNo: 217551							
Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual	

Uranium 13.4 0.2 13.7 1.98 20

**Radium 226 Air Filter Analysis**

Sample Type **MBLK**

Units: pCi/Filter

MB-2590 (02/13/24 12:44)	RunNo: 218413	PrepDate: 02/03/24 11:27	BatchID: 21533					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Radium 226 ND 0.2

**Radium 226 Air Filter Analysis**

Sample Type **LCS**

Units: pCi/Filter

LCS-2590 (02/13/24 12:44)	RunNo: 218413	PrepDate: 02/03/24 11:27	BatchID: 21533					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Radium 226 6.8 0.2 7.74 87.2 79 - 112

**Radium 226 Air Filter Analysis**

Sample Type **MS**

Units: pCi/Filter

MS-2590 (02/13/24 12:44)	RunNo: 218413	PrepDate: 02/03/24 11:27	BatchID: 21533					
Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual	

Radium 226 7.4 0.2 7.74 ND 95.9 68 - 123

**Radium 226 Air Filter Analysis**

Sample Type **MSD**

Units: pCi/Filter

MSD-2590 (02/13/24 12:44)	RunNo: 218413	PrepDate: 02/03/24 11:27	BatchID: 21533					
Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual	

Radium 226 7.7 0.2 7.4 3.71 99.5 20



### ANALYTICAL QC SUMMARY REPORT

**CLIENT:** Barrick Homestake Company  
**Work Order:** S2312367  
**Project:** HMC GRP

**Date:** 2/14/2024  
**Report ID:** S2312367001

Thorium Air Filter Analysis		Sample Type	MBLK		Units: pCi/Filter				
MB-950 (01/29/24 12:37)	Analyte	RunNo:	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Thorium-230	218090	ND	0.2					

Thorium Air Filter Analysis		Sample Type	LCS		Units: pCi/Filter				
LCS-950 (01/29/24 12:37)	Analyte	RunNo:	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Thorium-230	218090	13.6	0.2	12.5		109	72 - 142	

Thorium Air Filter Analysis		Sample Type	LCSD		Units: pCi/Filter				
LCSD-950 (01/29/24 12:37)	Analyte	RunNo:	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
	Thorium-230	218090	13.9	0.2	13.6	2.07	111	20	

Total (3050) Metals by EPA 200.8-Soil		Sample Type	MBLK		Units: mg/Filter				
MBLK (01/10/24 19:32)	Analyte	RunNo:	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Vanadium	217552	ND	5					

Total (3050) Metals by EPA 200.8-Soil		Sample Type	LCS		Units: mg/Filter				
LCS (01/10/24 19:38)	Analyte	RunNo:	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Vanadium	217552	ND	5	0.1		98.7	85 - 115	

Total (3050) Metals by EPA 200.8-Soil		Sample Type	MS		Units: mg/Filter				
S2312367-001AS (01/10/24 19:56)	Analyte	RunNo:	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
	Vanadium	217552	1	1	1.01	ND	111	70 - 130	

Total (3050) Metals by EPA 200.8-Soil		Sample Type	MSD		Units: mg/Filter				
S2312367-001AMSD (01/10/24 20:13)	Analyte	RunNo:	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
	Vanadium	217552	1	1	1	0.978	110	20	

Total (3050) Metals by EPA 200.8-Soil		Sample Type	DUP		Units: mg/Filter				
S2312367-001AD (01/10/24 19:50)	Analyte	RunNo:	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
	Vanadium	217552	ND	1	ND			20	



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-1**

Lab ID: S2312367-001		Sample Air Volume: 144000000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.5	0.4	1.7E-17	2.8E-18	1E-16	9 E-13	Week	0.0019
Thorium 230	2.1	0.6	1.4E-17	4.2E-18	1E-16	3 E-14	Year	0.047
Uranium	13.7		9.5E-17		1E-16	9 E-14	Year	0.11

Lab ID: S2310059-001		Sample Air Volume: 130000000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	4.8	0.5	3.7E-17	3.8E-18	1E-16	9 E-13	Week	0.0041
Thorium 230	1.5	0.4	1.2E-17	3.1E-18	1E-16	3 E-14	Year	0.040
Uranium	265		2.0E-15		1E-16	9 E-14	Year	2.2

Lab ID: S2306587-001		Sample Air Volume: 111000000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	1.9	0.3	1.7E-17	2.7E-18	1E-16	9 E-13	Week	0.0019
Thorium 230	1.4	0.5	1.2E-17	4.5E-18	1E-16	3 E-14	Year	0.040
Uranium	56.9		5.1E-16		1E-16	9 E-14	Year	0.57

Lab ID: S2304070-001		Sample Air Volume: 66100000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.7	0.4	4.1E-17	6.1E-18	1E-16	9 E-13	Week	0.0046
Thorium 230	2.0	0.6	3.0E-17	9.1E-18	1E-16	3 E-14	Year	0.10
Uranium	1.7		<1.0E-16		1E-16	9 E-14	Year	0

### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-1-A**

Lab ID: S2312367-002		Client Sample ID: HMC-1A			Sample Air Volume: 13000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.1	0.3	2.4E-17	2.3E-18	1E-16	9 E-13	Week	0.0027
Thorium 230	2.1	0.5	1.6E-17	3.8E-18	1E-16	3 E-14	Year	0.053
Uranium	21.1		1.6E-16		1E-16	9 E-14	Year	0.18

Lab ID: S2310059-002		Client Sample ID: HMC-1A			Sample Air Volume: 12600000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.4	0.4	2.7E-17	3.2E-18	1E-16	9 E-13	Week	0.0030
Thorium 230	1.5	0.4	1.2E-17	3.2E-18	1E-16	3 E-14	Year	0.040
Uranium	281		2.2E-15		1E-16	9 E-14	Year	2.4

Lab ID: S2306587-002		Client Sample ID: HMC-1A			Sample Air Volume: 13400000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.1	0.3	1.6E-17	2.2E-18	1E-16	9 E-13	Week	0.0018
Thorium 230	2.7	0.7	2.0E-17	5.2E-18	1E-16	3 E-14	Year	0.067
Uranium	64.5		4.8E-16		1E-16	9 E-14	Year	0.53

Lab ID: S2304070-002		Client Sample ID: HMC-1A			Sample Air Volume: 13100000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.1	0.4	1.6E-17	3.1E-18	1E-16	9 E-13	Week	0.0018
Thorium 230	1.0	0.4	7.8E-18	3.1E-18	1E-16	3 E-14	Year	0.026
Uranium	3.1		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-2**

Lab ID: S2312367-003					Sample Air Volume: 144000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.3	0.3	1.6E-17	2.1E-18	1E-16	9 E-13	Week	0.0018
Thorium 230	2.1	0.5	1.5E-17	3.5E-18	1E-16	3 E-14	Year	0.050
Uranium	3.9		2.7E-17		1E-16	9 E-14	Year	0.030

Lab ID: S2310059-003					Sample Air Volume: 152000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	4.2	0.4	2.8E-17	2.6E-18	1E-16	9 E-13	Week	0.0031
Thorium 230	1.9	0.5	1.3E-17	3.3E-18	1E-16	3 E-14	Year	0.043
Uranium	79.6		5.2E-16		1E-16	9 E-14	Year	0.58

Lab ID: S2306587-003					Sample Air Volume: 140000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.7	0.4	2.7E-17	2.9E-18	1E-16	9 E-13	Week	0.0030
Thorium 230	3.4	1.1	2.4E-17	7.9E-18	1E-16	3 E-14	Year	0.080
Uranium	27.3		1.9E-16		1E-16	9 E-14	Year	0.21

Lab ID: S2304070-003					Sample Air Volume: 140000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.5	0.4	1.8E-17	2.9E-18	1E-16	9 E-13	Week	0.0020
Thorium 230	1.5	0.5	1.1E-17	3.6E-18	1E-16	3 E-14	Year	0.037
Uranium	3.5		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-3**

Lab ID: S2312367-004					Sample Air Volume: 137000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.2	0.3	1.6E-17	2.2E-18	1E-16	9 E-13	Week	0.0018
Thorium 230	2.1	0.5	1.5E-17	3.6E-18	1E-16	3 E-14	Year	0.050
Uranium	31.4		2.3E-16		1E-16	9 E-14	Year	0.26

Lab ID: S2310059-004					Sample Air Volume: 148000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	4.7	0.4	3.2E-17	2.7E-18	1E-16	9 E-13	Week	0.0036
Thorium 230	2.5	0.7	1.7E-17	4.7E-18	1E-16	3 E-14	Year	0.057
Uranium	75.2		5.1E-16		1E-16	9 E-14	Year	0.57

Lab ID: S2306587-004					Sample Air Volume: 137000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.0	0.4	2.2E-17	2.9E-18	1E-16	9 E-13	Week	0.0024
Thorium 230	2.5	0.6	1.8E-17	4.4E-18	1E-16	3 E-14	Year	0.060
Uranium	31.0		2.3E-16		1E-16	9 E-14	Year	0.26

Lab ID: S2304070-004					Sample Air Volume: 114000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.1	0.3	1.8E-17	2.6E-18	1E-16	9 E-13	Week	0.0020
Thorium 230	7.6	2.5	6.6E-17	2.2E-17	1E-16	3 E-14	Year	0.22
Uranium	4.5		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-4**

Lab ID: S2312367-005					Sample Air Volume: 131000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	1.7	0.3	1.3E-17	2.3E-18	1E-16	9 E-13	Week	0.0014
Thorium 230	1.4	0.4	1.1E-17	3.1E-18	1E-16	3 E-14	Year	0.037
Uranium	5.8		4.4E-17		1E-16	9 E-14	Year	0.049

Lab ID: S2310059-005					Sample Air Volume: 133000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.6	0.4	2.7E-17	3.0E-18	1E-16	9 E-13	Week	0.0030
Thorium 230	2.3	0.7	1.7E-17	5.3E-18	1E-16	3 E-14	Year	0.057
Uranium	79.2		6.0E-16		1E-16	9 E-14	Year	0.67

Lab ID: S2306587-005					Sample Air Volume: 101000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	14.9	0.7	1.5E-16	6.9E-18	1E-16	9 E-13	Week	0.017
Thorium 230	10.7	1.9	1.1E-16	1.9E-17	1E-16	3 E-14	Year	0.37
Uranium	35.1		3.5E-16		1E-16	9 E-14	Year	0.39

Lab ID: S2304070-005					Sample Air Volume: 116000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	14.3	0.9	1.2E-16	7.8E-18	1E-16	9 E-13	Week	0.013
Thorium 230	7.2	1.4	6.2E-17	1.2E-17	1E-16	3 E-14	Year	0.21
Uranium	17.4		1.5E-16		1E-16	9 E-14	Year	0.17



### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-5**

Lab ID: S2312367-006		Sample Air Volume: 12800000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.2	0.3	1.8E-17	2.3E-18	1E-16	9 E-13	Week	0.0020
Thorium 230	1.7	0.5	1.3E-17	3.9E-18	1E-16	3 E-14	Year	0.043
Uranium	10.1		7.9E-17		1E-16	9 E-14	Year	0.088

Lab ID: S2310059-006		Sample Air Volume: 57600000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.1	0.4	5.3E-17	6.9E-18	1E-16	9 E-13	Week	0.0059
Thorium 230	1.7	0.5	3.0E-17	8.7E-18	1E-16	3 E-14	Year	0.10
Uranium	128		2.2E-15		1E-16	9 E-14	Year	2.4

Lab ID: S2306587-006		Sample Air Volume: 118000000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	4.0	0.4	3.4E-17	3.4E-18	1E-16	9 E-13	Week	0.0038
Thorium 230	3.3	0.8	2.8E-17	6.8E-18	1E-16	3 E-14	Year	0.093
Uranium	28.4		2.4E-16		1E-16	9 E-14	Year	0.27

Lab ID: S2304070-006		Sample Air Volume: 129000000 Liters						
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.1	0.4	1.6E-17	3.1E-18	1E-16	9 E-13	Week	0.0018
Thorium 230	1.1	0.4	8.2E-18	3.1E-18	1E-16	3 E-14	Year	0.027
Uranium	2.4		<1.0E-16		1E-16	9 E-14	Year	0





### Air Filter Summary Report

**Client: Barrick Homestake Company**

**Client Sampler ID: HMC-6**

Lab ID: S2312367-007					Sample Air Volume: 123000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	3.4	0.4	2.8E-17	3.3E-18	1E-16	9 E-13	Week	0.0031
Thorium 230	2.1	0.6	1.7E-17	4.9E-18	1E-16	3 E-14	Year	0.057
Uranium	6.4		5.2E-17		1E-16	9 E-14	Year	0.058

Lab ID: S2310059-007					Sample Air Volume: 127000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.5	0.3	2.0E-17	2.4E-18	1E-16	9 E-13	Week	0.0022
Thorium 230	2.2	0.6	1.7E-17	4.7E-18	1E-16	3 E-14	Year	0.057
Uranium	125		9.9E-16		1E-16	9 E-14	Year	1.1

Lab ID: S2306587-007					Sample Air Volume: 120000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	2.3	0.3	1.9E-17	2.5E-18	1E-16	9 E-13	Week	0.0021
Thorium 230	2.4	0.7	2.0E-17	5.8E-18	1E-16	3 E-14	Year	0.067
Uranium	22.9		1.9E-16		1E-16	9 E-14	Year	0.21

Lab ID: S2304070-007					Sample Air Volume: 123000000 Liters			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Radium 226	1.5	0.3	1.2E-17	2.4E-18	1E-16	9 E-13	Week	0.0013
Thorium 230	1.4	0.6	1.2E-17	4.9E-18	1E-16	3 E-14	Year	0.040
Uranium	1.1		<1.0E-16		1E-16	9 E-14	Year	0



### Air Filter Summary Report

Client: **Barrick Homestake Company**

Client Sampler ID: **HMC-7**

Lab ID: <b>S2312367-008</b>					Sample Air Volume:			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
	0.3	0.1				9 E-13	Week	
	0.12	0.2				3 E-14	Year	
	<0.2					9 E-14	Year	

Lab ID: <b>S2310059-008</b>					Sample Air Volume:			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
	3.6	0.4				9 E-13	Week	
	0.27	0.2				3 E-14	Year	
	1.2					9 E-14	Year	

Lab ID: <b>S2306587-008</b>					Sample Air Volume:			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
	0.3	0.1				9 E-13	Week	
	0.20	0.2				3 E-14	Year	
	<0.2					9 E-14	Year	

Lab ID: <b>S2304070-008</b>					Sample Air Volume:			
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
	0.6	0.2				9 E-13	Week	
	0.4	0.3				3 E-14	Year	
	<0.2					9 E-14	Year	

## **Attachment 2**

# **Radon Gas Monitoring Results**

### Track-Etch Passive Survey

Location	Monitoring Period	Rn Concentration (μCi/ml)	Uncertainty - 2 S.D. (μCi/ml)	LLD (μCi/ml)
HMC #1 (average) N Outer Perimeter	06/30/23 - 01/03/24	9.8E-10	1.7E-10	3.2E-10
HMC #1-A (average) N Outer Perimeter	06/30/23 - 01/03/24	1.1E-09	1.8E-10	3.2E-10
HMC #2 (average) NE Outer Perimeter	06/30/23 - 01/03/24	1.1E-09	1.8E-10	3.2E-10
HMC #3 (average) E Outer Perimeter	06/30/23 - 01/03/24	8.7E-10	8.6E-10	3.2E-10
HMC #4 (average) S Outer Perimeter	06/30/23 - 01/03/24	1.1E-09	1.8E-10	3.2E-10
HMC #5 (average) N of Nearest Residence	06/30/23 - 01/03/24	1.1E-09	1.9E-10	3.2E-10
HMC #6 (average) W of Outer Perimeter	06/30/23 - 01/03/24	9.0E-10	1.6E-10	3.2E-10
HMC #7 (average) S Boundary	06/30/23 - 01/03/24	1.0E-09	1.8E-10	3.2E-10
HMC #16 (average) Background	06/30/23 - 01/03/24	5.1E-10	1.3E-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	7/1/23 - 12/31/23	58.6	5.7
HMC #1-A N Outer Perimeter	7/1/23 - 12/31/23	57.7	5.7
HMC #2 NE Outer Perimeter	7/1/23 - 12/31/23	60.2	5.9
HMC #3 E Outer Perimeter	7/1/23 - 12/31/23	56.0	5.5
HMC #4 S Outer Perimeter	7/1/23 - 12/31/23	67.9	6.7
HMC #5 N of Nearest Residence	7/1/23 - 12/31/23	65.3	6.4
HMC #6 W of Outer Perimeter	7/1/23 - 12/31/23	54.7	5.4
HMC #16 Background	7/1/23 - 12/31/23	59.1	5.8

\*Error is 1.96 std. dev.

**Attachment 4**  
**2023 Annual Public Dose Estimates**

## Annual Public Dose Estimates

### 1.0 Introduction

Operational activities in 2023 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 LTP, limited 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 2023 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 2023 Semiannual Environmental Reports.

The monitoring stations HMC-4 and HMC-5 are considered representative of exposure conditions for the maximally exposed nearest resident location(s) 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/<math>\mu</math>Ci)</u>
U-234	13.2E4
U-235	12.3E4
U-238	11.8E4
Th-230	32.6E4
Ra-226	8.6E3

The measured annual average radionuclide concentration in airborne particulates for each monitoring station are shown in Table 2-1. 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)<sup>1</sup> concentrations of airborne particulate radionuclides in 2022 at each air monitoring station (Table 2-2). 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 0.083 mrem/year and 0.31 mrem/y (Table 2-2). Accounting for an assumed occupancy of 75% results in a dose rate of 0.063 and 0.23 mrem/year at HMC-4 and HMC-5, respectively. The nearby monitoring station with the highest calculated TEDE from all pathways (in this case 44.2 mrem/yr at Station HMC-4) is assumed representative of the TEDE to the nearest member of the public in 2023 (Table 2-3), and the highest dose from airborne particulate radiation only (0.23 mrem/yr at HMC-5, excluding radon) meets the 10 mrem/yr constraint per 10 CFR 20.1101. The maximum external radiation dose to any member of the public (15 mrem/yr at HMC-4) is well below the limits mentioned in Section 1 (equivalent to 2 mrem/hr or 50 mrem/yr).

---

<sup>1</sup> 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.

## 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, a relatively flat area where nocturnal drainage flow converges from adjacent, nearfield upland source areas. In addition, the valley floor is known to contain naturally elevated Ra-226 concentrations from eons of erosion of upgradient mineralized uranium outcrops, and this depositional geomorphic feature contributes to naturally elevated radon levels in the vicinity of the Site.

The radon data for each semiannual monitoring period are provided in Attachment 2 of corresponding semiannual monitoring reports. Monitoring Station 16 has historically been used as the radon background location for the Site. The overall annual average radon concentration for 2022 at HMC-4 and HMC-5 was 0.80 and 0.86 pCi/L respectively. The average annual concentration at the background location (HMC-16) was 0.42 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 0.45 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 resulted in calculated CEDE values of 29.0 and 33.5 mrem/y respectively for 2023.

The NRC has issued a request for additional information (RAI) concerning this public dose calculation method for radon based on identified inconsistencies with NRC's recently finalized Interim Staff Guidance (ISR) for determination of public dose from radon (USNRC, 2019)<sup>2</sup>. In response, on December 18, 2020, HMC submitted a directly related license amendment request (ML20356A288) to move the background radon monitoring station (HMC-16) to a more representative location on the floor of the San Mateo Creek valley. Although NRC staff denied the

---

<sup>2</sup> U.S. Nuclear Regulatory Commission (USNRC). 2019. Evaluations of Uranium Recovery Facility Surveys of Radon and Radon Progeny in Air and Demonstrations of Compliance with 10 CFR 20.1301. Final Report. Division of Decommissioning, Uranium Recovery, and Waste Programs Interim Staff Guidance DUWP-ISG-01. June.

amendment request on August 15, 2023 (ML23186A150 and ML23186A151), HMC demanded and was granted a hearing and at this time, the hearing was deferred and settlement talks between HMC and NRC are in progress in an attempt to resolve this issue because the background radon station (HMC-16) has a significant low bias relative to the valley in which the Site is situated. Until this issue is resolved, HMC will 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 3 of the 1<sup>st</sup> and 2<sup>nd</sup> half semiannual monitoring reports, respectively. The total annual effective dose equivalents measured at HMC-4 and HMC-5 were 137 and 131 mrem/year, respectively. The average annual effective dose equivalent at the background location (HMC-16) was 117 mrem/year. The net annual effective dose equivalent for HMC-4 and HMC-5, assuming 100% occupancy, was 20 and 14 mrem/year, respectively. Considering the 75% occupancy factor, the calculated net annual effective dose equivalent was 15 and 10 mrem/year for HMC-4 and HMC-5, respectively. The maximum external radiation dose to any member of the public (15 mrem/yr at HMC-4) is well below the limits mentioned in Section 1 (equivalent to 2 mrem/hr or 50 mrem/yr).

### **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 44.2 mrem/year and at HMC-5 was 43.9 mrem/year. This is within the 100 mrem/year limit and the air particulate CEDE is well below the 10 mrem/y constraint limit on airborne particulate emissions. The dose from combined dose from external gamma and air particulates at HMC-4 and HMC-5 (15.21 and 10.43 mrem/yr respectively), are each below the 25 mrem/yr whole-body dose limit specified 40 CFR 190 for nuclear fuel cycle facilities.

**Table 2-1: Measured average airborne radionuclide concentrations**

Sample ID	Radionuclide	Q1 Conc. (μCi/mL)	Q2 Conc. (μCi/mL)	Q3 Conc. (μCi/mL)	Q4 Conc. (μCi/mL)	Total Annual Average Conc. (μCi/mL)
HMC-1	U-nat	1.0E-16	5.1E-16	2.0E-15	9.5E-17	6.9E-16
	Th-230	3.0E-17	1.2E-17	1.2E-17	1.4E-17	1.7E-17
	Ra-226	4.1E-17	1.7E-17	3.7E-17	1.7E-17	2.8E-17
HMC-1A	U-nat	1.0E-16	4.8E-16	2.2E-15	1.6E-16	7.4E-16
	Th-230	7.8E-18	2.0E-17	1.2E-17	1.6E-17	1.4E-17
	Ra-226	1.6E-17	1.6E-17	2.7E-17	2.4E-17	2.1E-17
HMC-2	U-nat	1.0E-16	1.9E-16	5.2E-16	2.7E-17	2.1E-16
	Th-230	1.1E-17	2.4E-17	1.3E-17	1.5E-17	1.6E-17
	Ra-226	1.8E-17	2.7E-17	2.8E-17	1.6E-17	2.2E-17
HMC-3	U-nat	1.0E-16	2.3E-16	5.1E-16	2.3E-16	2.7E-16
	Th-230	6.6E-17	1.8E-17	1.7E-17	1.5E-17	2.9E-17
	Ra-226	1.8E-17	2.2E-17	3.2E-17	1.6E-17	2.2E-17
HMC-4	U-nat	1.5E-16	3.5E-16	6.0E-16	4.4E-17	2.8E-16
	Th-230	6.2E-17	1.1E-16	1.7E-17	1.1E-17	5.0E-17
	Ra-226	1.2E-16	1.5E-16	2.7E-17	1.3E-17	7.8E-17
HMC-5	U-nat	1.0E-16	2.4E-16	2.2E-15	7.9E-17	6.6E-16
	Th-230	8.2E-18	2.8E-17	3.0E-17	1.3E-17	2.0E-17
	Ra-226	1.6E-17	3.4E-17	5.4E-17	1.8E-17	3.0E-17
HMC-6	U-nat	1.0E-16	1.9E-16	9.8E-16	5.2E-17	3.3E-16
	Th-230	1.2E-17	2.0E-17	1.7E-17	1.7E-17	1.7E-17
	Ra-226	1.2E-17	1.9E-17	2.0E-17	2.8E-17	2.0E-17

**Table 2-2: 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/ $\mu\text{Ci}$ )	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	3.4E-16	1.7E-16	1.32E+05	1.7E-01	3.2E-01	2.4E-01
	U-235	1.5E-17	7.8E-18	1.23E+05	7.0E-03		
	U-238	3.4E-16	1.7E-16	1.18E+05	1.5E-01		
	Th-230	1.7E-17	3.0E-19	3.26E+05	7.2E-04		
	Ra-226	2.8E-17	8.3E-18	8.60E+03	5.2E-04		
HMC-1-A	U-234	3.6E-16	2.0E-16	1.32E+05	1.9E-01	3.7E-01	2.8E-01
	U-235	1.6E-17	9.0E-18	1.23E+05	8.1E-03		
	U-238	3.6E-16	2.0E-16	1.18E+05	1.7E-01		
	Th-230	1.4E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	2.1E-17	1.1E-18	8.60E+03	6.7E-05		
HMC-2	U-234	1.0E-16	0.0E+00	1.32E+05	0.0E+00	1.6E-04	1.2E-04
	U-235	4.6E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	1.0E-16	0.0E+00	1.18E+05	0.0E+00		
	Th-230	1.6E-17	0.0E+00	3.26E+05	0.0E+00		
	Ra-226	2.2E-17	2.5E-18	8.60E+03	1.6E-04		
HMC-3	U-234	1.3E-16	0.0E+00	1.32E+05	0.0E+00	3.0E-02	2.2E-02
	U-235	5.9E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	1.3E-16	0.0E+00	1.18E+05	0.0E+00		
	Th-230	2.9E-17	1.2E-17	3.26E+05	2.9E-02		
	Ra-226	2.2E-17	2.3E-18	8.60E+03	1.4E-04		
HMC-4	U-234	1.4E-16	0.0E+00	1.32E+05	0.0E+00	8.3E-02	6.3E-02
	U-235	6.3E-18	0.0E+00	1.23E+05	0.0E+00		
	U-238	1.4E-16	0.0E+00	1.18E+05	0.0E+00		
	Th-230	5.0E-17	3.3E-17	3.26E+05	8.0E-02		
	Ra-226	7.8E-17	5.8E-17	8.60E+03	3.6E-03		
HMC-5	U-234	3.2E-16	1.6E-16	1.32E+05	1.5E-01	3.1E-01	2.3E-01
	U-235	1.5E-17	7.2E-18	1.23E+05	6.5E-03		
	U-238	3.2E-16	1.6E-16	1.18E+05	1.4E-01		
	Th-230	2.0E-17	3.1E-18	3.26E+05	7.4E-03		
	Ra-226	3.0E-17	1.1E-17	8.60E+03	6.8E-04		
HMC-6 (Bkg. Station)	U-234	1.6E-16	N/A	N/A	N/A	N/A	N/A
	U-235	7.3E-18					
	U-238	1.6E-16					
	Th-230	1.7E-17					
	Ra-226	2.0E-17					

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

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

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

Sample ID	Internal CEDE Air Particulates (mrem/yr)	Internal CEDE Radon (mrem/yr)	External EDE (mrem/yr)	TEDE (mrem/yr)
HMC-4	0.1	29	15	44.2
HMC-5	0.23	33	10	43.9