



Homestake Mining Company of California

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April 22, 2021

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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

**RE: Homestake Mining Company of California – Grants Reclamation Project - Request for
Amendment to License SUA-171, Docket No. 040-08903, to Remove Well CF4 from
Groundwater Monitoring Plan**

Mr. Linton:

Homestake Mining Company of California (HMC) is submitting this request to the U.S. Nuclear Regulatory Commission (NRC) to amend NRC License SUA-1471 for the Grants Reclamation Project (GRP) with respect to the removal of well CF4 from the monitoring program specified in Table 2-1 of the Groundwater Monitoring Plan Submitted on November 20, 2017 (ML18018A102) and updated on October 8, 2019 (ML19281C055) in License Condition 35A.

Attached is a Technical Memorandum prepared by Hydro-Engineering with justification for removal of Well CF4 from the Groundwater Monitoring Program. Also enclosed is the completed NRC Form 313.

No replacement monitoring well is proposed to replace well CF4. As discussed in the attached memorandum, sufficient wells exist in close proximity to the LTP in the Upper Chinle to adequately characterize contaminant transport behavior. In addition, HMC anticipates placing final cover on the LTP within the next few years, and the removal of any unnecessary infrastructure is vital to the expediency and quality of the cover placement.

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 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

BRB/ada

Attachments: LAR Attachment 1- Hydro-Engineering's Technical Memorandum on the Recommended Removal of Well CF4 from Groundwater Monitoring Program

LAR Attachment 2 – NRC Form 313

ec: B. Tsosie, DOE, Grand Junction, Colorado
M. Purcell, Region VI EPA, Dallas, Texas
A. Winton NMED, Santa Fe, NM
M. McCarthy, Barrick, Salt Lake City, Utah
D. Lattin, Barrick, Elko, Nevada

| <i>Technical Memorandum</i> | | | |
|------------------------------------|--|-----------------|---------------------------------------|
| To: | Brad Bingham (HMC) | Date: | January 20, 2021 |
| From: | Tom Michel (Hydro-Eng.) | Project: | HMC Grants Reclamation Project |
| Phone: | 307-266-6597 | | |
| Cc: | Adam Arguello (HMC), Jennifer Ortega (HMC) | | |
| Subject: | Recommended removal of well CF4 from groundwater monitoring program | | |

Summary and Introduction

The groundwater monitoring program approved by the NRC is specified in Table 2-1 as indicated in License Condition 35A. This program includes monitoring of Upper Chinle aquifer (UCA) well CF4 located within the footprint of the Large Tailings Pile (LTP) at the Homestake Mining Company's (HMC) Grants Reclamation Project (GRP) site. The analysis of a water sample collected in August of 2020 from well CF4 exhibited dramatic changes in water quality from the previous sample collected in June of 2018, and this prompted a review of the monitoring results from well CF4. Based on this review, it is recommended that well CF4 be removed as a monitoring well in the groundwater monitoring program. The justification for removal of CF4 from the monitoring program is presented below.

Groundwater Monitoring and Geologic Conditions

Figure 1 presents a map showing the location of well CF4, the location of other groundwater monitoring wells in the general vicinity of the LTP, the location of the Upper Chinle subcrop, the location of the East and West Faults through the GRP area, and a dashed line delineating the footprint of the LTP. Several monitoring wells are located in the vicinity of the LTP with well completions in the alluvial aquifer, UCA, Middle Chinle aquifer and San Andres aquifer. The well locations are shown on Figure 1 with different colors and text orientations for the well labels indicating which aquifer is monitored by the well. The groundwater monitoring program also includes many wells located outside of the area shown on Figure 1. As shown on Figure 1 with the wells labeled in blue, the groundwater in the UCA is monitored in several wells in and around the LTP, with well CF4 being the only Table 2-1 UCA monitoring well located within the footprint of the LTP. Because well CF4 is within the footprint of the LTP, the well casing penetrates over 80 feet of tailings that were placed above the original land surface, and the following review indicates the casing has likely been compromised within the tailings interval. The subcrop of the Upper Chinle sandstone is the western boundary of the UCA, and all of the UCA wells are located east of the western edge of the subcrop. The offset of the Upper Chinle sandstone along the East Fault also creates an eastern boundary of the UCA between the two faults. In effect, the UCA that is monitored by wells in the vicinity of the LTP is bounded on the west side by the subcrop and on the east side by the East Fault.

Well CF4 Monitoring

The monitoring of well CF4 since 2014 indicated an abrupt water level change occurring in December of 2017 as illustrated in Figure 2. However, the water level returned to a lower level in May of 2018 before rising abruptly and remaining above an elevation of 6588 feet above mean sea

level (MSL). Although the water level measured in December of 2017 may be erroneous, the water-level elevation since December of 2018 has remained at a level similar to that expected for the tailings at the well CF4 location. As shown in Figure 2, the water-level elevation in well CF4 was reasonably consistent with the expected water-level elevation in the alluvium through mid-2018 with the exclusion of the previously noted measurement in December of 2017. As shown in Figure 1, well CF4 is within 400 feet of the subcrop of the UCA against the base of the alluvium and the hydraulic connection at the subcrop results in very similar water-level elevations in the alluvial aquifer and UCA. After mid-2018, the water-level elevation in well CF4 abruptly rose by approximately 50 feet and is now similar to the expected water-level elevation in the tailings at the well CF4 location. This indicates that the water from the saturated tailings in the area of the well is likely entering the well CF4 casing causing both the elevated water-level elevation and the change in water quality.

A significant change in water quality occurred in the 2020 sample from well CF4 with key indicator constituents exhibiting significant changes in concentration from earlier samples. Because of proximity to the subcrop, the water quality in the UCA at well CF4 had been impacted by the entrance of seepage-impacted alluvial aquifer water along the subcrop beneath the LTP before the well was constructed. These impacts are reflected in elevated concentrations of uranium, molybdenum, radionuclides, major ions, TDS and other constituents in all three samples taken from the well since installation. However, the changes in water quality between samples taken in 2018 and 2020 were distinct enough to indicate that tailings water was directly entering well CF4 and affecting the 2020 sample.

A summary of significant water quality changes that occurred in well CF4 is presented in Table 1. The field pH for the 2020 sample was dramatically higher than that of the 2018 sample, with higher pH typically indicating tailings water or very severely impacted alluvial groundwater. A dramatic decrease in calcium and magnesium concentrations between the 6/7/2018 sample and the 8/14/2020 sample was also noted, along with a significant decrease in uranium concentration. In contrast, there was a dramatic increase in carbonate (CO_3), radium-226, radium-228 and thorium-230 concentration between the 2018 and 2020 samples. The increased pH and other water quality changes, as well as the water level changes after mid-2018, are strong indicators of a compromised well casing.

Well CF4 Maintenance

Maintenance performed on well CF4 during the 4th quarter of 2018, in attempts to remove a stuck and/or inoperable pump, is believed to have resulted in damage to the casing. The timing of the maintenance coincides with the previously described changes in water level and water quality in well CF4 and it is very likely that the casing was damaged during the maintenance. However, regardless of the cause for the change in water level and water quality in well CF4, the well is no longer representative of the UCA.

Well CF4 Recommendations

It is recommended that well CF4 be removed from the Table 2-1 groundwater monitoring program referenced by License Condition 35A, and that the well be plugged and abandoned in accordance with the New Mexico Office of the State Engineer's rules and regulations. The following listing summarizes the findings of this review and the justification for discontinuing of monitoring in well CF4 and for the abandonment of the well.

- The dramatic rise in water level in well CF4 to a water-level elevation similar to that of the tailings indicates the casing is compromised and that tailings water is entering the well casing.
- The water quality change in well CF4 since 2018 indicates that tailings water is entering the well casing.
- Well CF4 is no longer a representative sampling point for the Upper Chinle aquifer because of the compromised casing.
- The possibility that the compromised casing is allowing leakage of tailings water directly to the Upper Chinle aquifer justifies plugging and abandonment of the well. However, the Upper Chinle aquifer at well CF4 was already significantly impacted by entry of seepage-impacted alluvial aquifer groundwater at the nearby subcrop prior to the damage to the well. Therefore, the extent and severity of impacts to the Upper Chinle aquifer has not been greatly increased by the leakage in well CF4.

Other Groundwater Monitoring

The wells included in the groundwater monitoring program in the vicinity of the LTP are shown on Figure 1. For the UCA in the immediate area surrounding the LTP, there are four UCA monitoring wells (CW3, CE2, CE8 and CW25) in addition to well CF4. These four wells provide monitoring of the UCA extending from the subcrop to the eastern side of the UCA that is bounded by the East Fault (see Figure 1). Wells CE15 and CE9 also provide monitoring of the UCA further to the south. Well CW13 provides monitoring of the UCA on the east side of the East Fault with the fault acting as a boundary that effectively creates separate aquifers for the Upper Chinle sandstone east and west of the fault.

The source of the water quality impacts to the UCA is conveyance of seepage-impacted groundwater in the alluvium to the UCA along the subcrop shown in Figure 1. Beneath the LTP, past seepage from the tailings to the alluvium and then to the UCA along the subcrop has been at high concentrations of the constituents present in the tailings solution, and this is reflected in the relatively large concentrations of key constituents (e.g. uranium and molybdenum) in 2014 and 2018 samples from well CF4 (see Table 1).

As shown in Figure 1, the UCA within the footprint of the LTP is bounded on the west by the subcrop and on the east by the East Fault. Because the area of the UCA near and beneath the LTP is bounded, and because there is currently no nearby collection or injection within the UCA, there is very limited groundwater movement in the UCA in the area of the LTP, and the movement

would be primarily to the south. Additionally, the LTP area is controlled by HMC and there is no potential public exposure to the impacted groundwater in the UCA in the area of the LTP.

The preceding discussion describes the monitoring of the UCA in the vicinity of the LTP and the hydrogeologic conditions for the UCA. The remaining UCA monitoring wells in the area of the LTP will be sufficient to define water quality changes and impacts. The following factors were considered in evaluating the remaining UCA monitoring in the area of the LTP if well CF4 is removed from the monitoring program.

- The affected area of the UCA is bounded on the east and west sides and this limits the extent and rate of potential UCA groundwater movement.
- Well CW3 is located north and east of the LTP and wells CE2 and CE8 are located south of the LTP. Continued monitoring of these three UCA wells will reveal changes in groundwater conditions in the UCA in the area of the LTP.
- Control of the LTP area by HMC precludes public exposure to the UCA groundwater in the area of concern.

Summary

Well CF4 is no longer providing representative monitoring of the UCA, and the compromised casing is potentially allowing discharge of water from the tailings to the UCA in a location where the UCA is already impacted by the tailings seepage. The removal of well CF4 from the Table 2-1 groundwater monitoring program referenced in License Condition 35A is recommended, and once the removal is approved, the well will be plugged and abandoned. The distribution of the remaining Table 2-1 UCA monitoring wells in the LTP area is sufficient to define the extent and severity of impacts to the UCA and to reveal future changes in water quality.

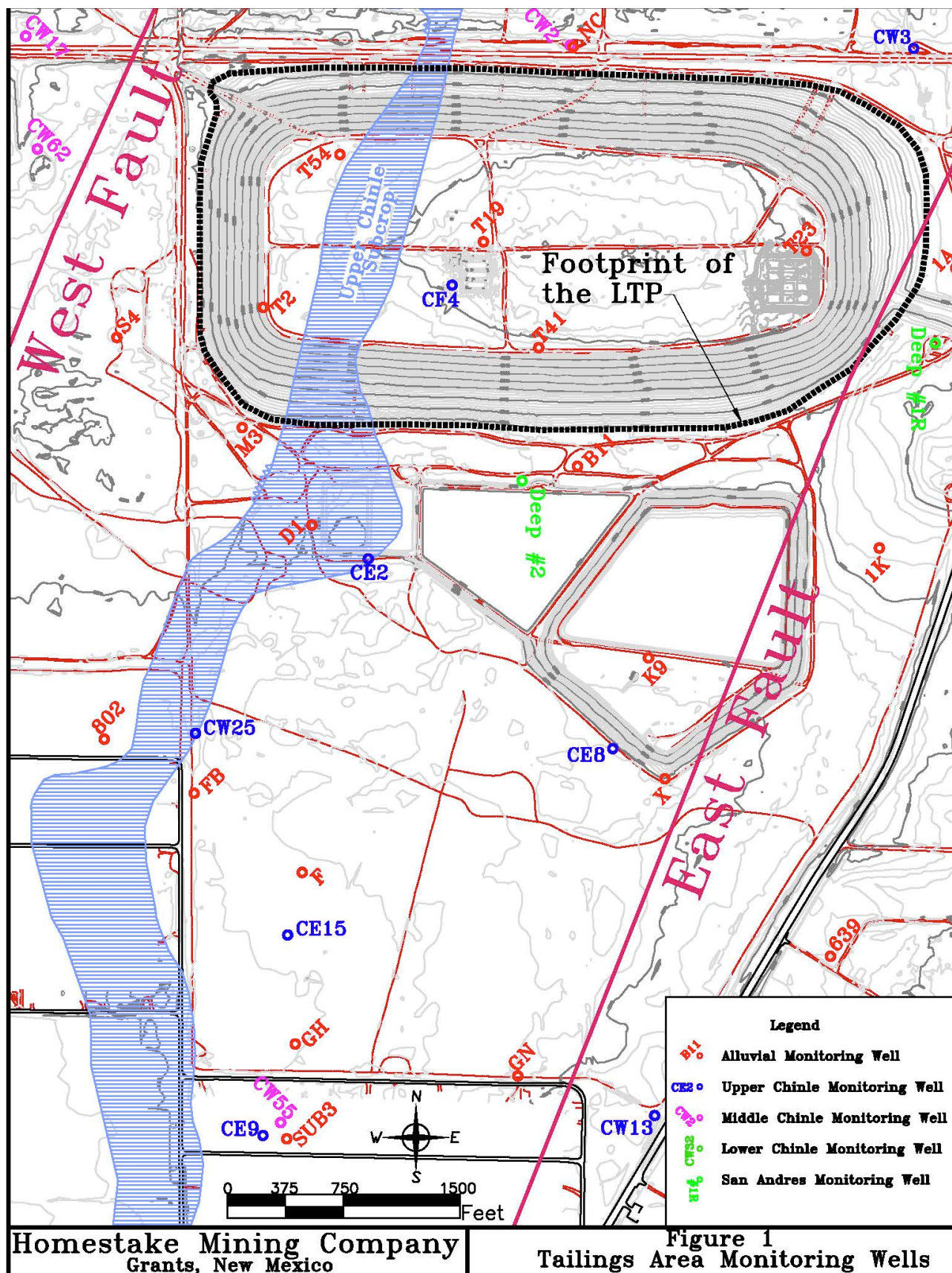


Figure 2. Measured Water-Level Elevation in Well CF4

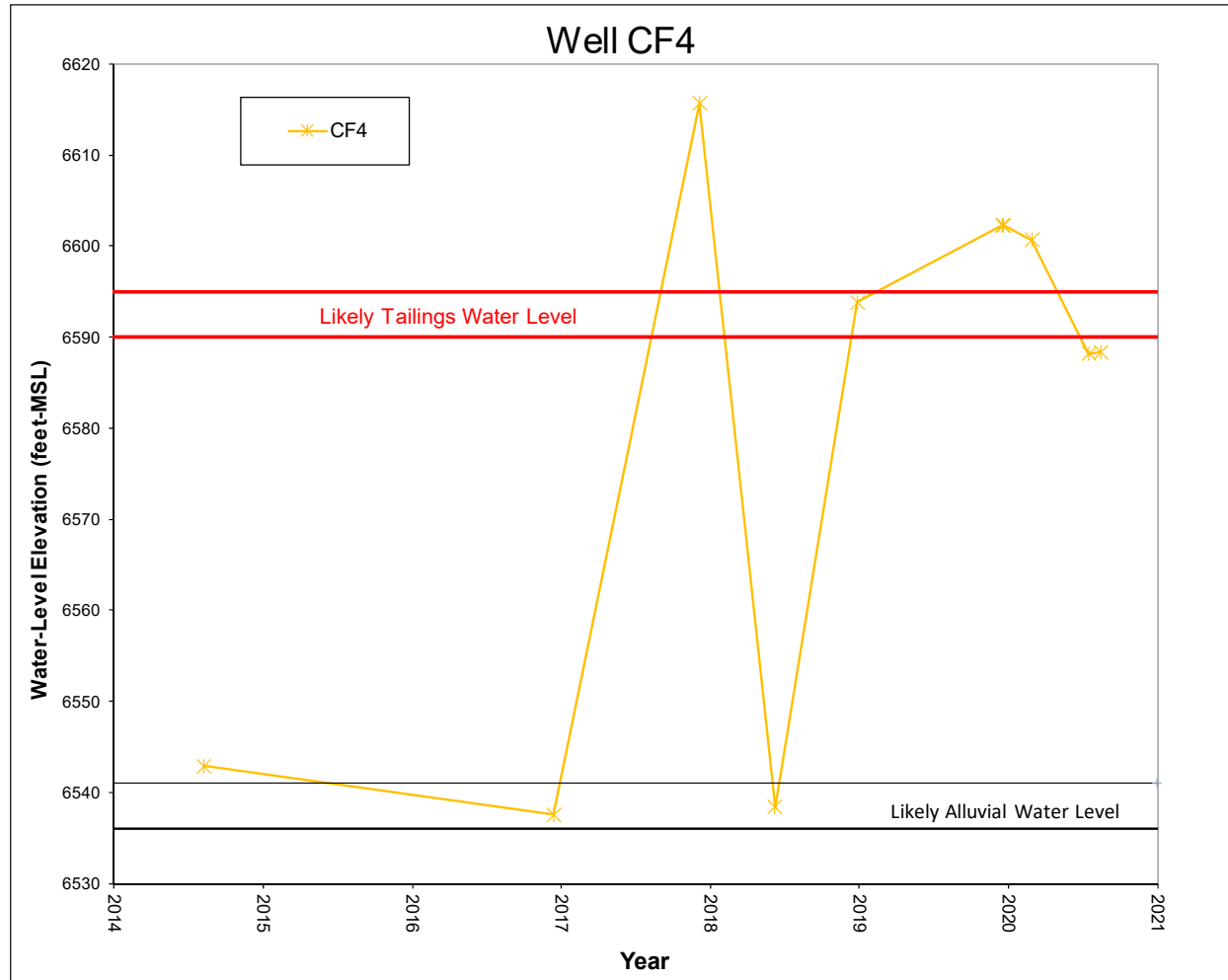


Table 1. Well CF4 Water Quality Results

| Date | pH(f) (std. units) | Unat (mg/L) | Mo (mg/L) | Se (mg/L) | NO3 (mg/L) | Ra226 (pCi/L) | Ra228 (pCi/L) | V (mg/L) | Th230 (pCi/L) |
|-----------|-----------------------|----------------|--------------|--------------|---------------|------------------|------------------|-------------|------------------|
| 8/8/2014 | 7.13 | 35 | 25.5 | 0.608 | -- | -- | -- | -- | -- |
| 6/7/2018 | 7.13 | 29.8 | 30 | 0.33 | 5.6 | 2.9 | 0.5 | < 0.01 | 0.3 |
| 8/14/2020 | 10.19 | 19.9 | <0.01 | <0.005 | 1.2 | 99.6 | 7.6 | < 0.01 | 363 |

| Date | Ca (mg/L) | Mg (mg/L) | K (mg/L) | Na (mg/L) | HCO3 (mg/L) | CO3 (mg/L) | Cl (mg/L) | SO4 (mg/L) | TDS (mg/L) |
|-----------|--------------|--------------|-------------|--------------|----------------|---------------|--------------|---------------|---------------|
| 8/8/2014 | -- | -- | -- | -- | -- | -- | 580 | 4880 | 9320 |
| 6/7/2018 | 686 | 197 | 10 | 2260 | 1640 | <5 | 561 | 4860 | 9260 |
| 8/14/2020 | <2 | <2 | 16 | 3430 | 1450 | 1300 | 357 | 3010 | 9280 |

| | | | | | |
|---|--|---|----------------------------|--------------|----------|
| NRC FORM 313 (01-2020) 10 CFR 30, 32, 33, 34, 35, 36, 37, 39, and 40 | U.S. NUCLEAR REGULATORY COMMISSION  APPLICATION FOR MATERIALS LICENSE | APPROVED BY OMB: NO. 3150-0120 Estimated burden per response to comply with this mandatory collection request: 4.3 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Information Services Branch (T-6 A10M), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to Infocollects.Resource@nrc.gov , and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection. | EXPIRES: 01/31/2023 | | |
| INSTRUCTIONS: SEE THE CURRENT VOLUMES OF THE NUREG-1556 TECHNICAL REPORT SERIES ("CONSOLIDATED GUIDANCE ABOUT MATERIALS LICENSES") FOR DETAILED INSTRUCTIONS FOR COMPLETING THIS FORM: http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1556/. SEND TWO COPIES OF THE COMPLETED APPLICATION TO THE NRC OFFICE SPECIFIED BELOW. | | | | | |
| APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS WITH: MATERIALS SAFETY LICENSING BRANCH DIVISION OF MATERIAL SAFETY, STATE, TRIBAL AND RULEMAKING PROGRAMS OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS U.S. NUCLEAR REGULATORY COMMISSION WASHINGTON, DC 20555-0001 ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS: IF YOU ARE LOCATED IN: ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEORGIA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRGINIA, SEND APPLICATIONS TO: LICENSING ASSISTANCE TEAM DIVISION OF NUCLEAR MATERIALS SAFETY U.S. NUCLEAR REGULATORY COMMISSION, REGION I 2100 RENAISSANCE BOULEVARD, SUITE 100 KING OF PRUSSIA, PA 19406-2713 | | IF YOU ARE LOCATED IN: ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO: MATERIALS LICENSING BRANCH U.S. NUCLEAR REGULATORY COMMISSION, REGION III 2443 WARRENVILLE ROAD, SUITE 210 Lisle, IL 60532-4352 IF YOU ARE LOCATED IN: ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO: NUCLEAR MATERIALS LICENSING BRANCH U.S. NUCLEAR REGULATORY COMMISSION, REGION IV 1600 E. LAMAR BOULEVARD ARLINGTON, TX 76011-4511 | | | |
| PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S. NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED MATERIAL IN STATES SUBJECT TO U.S. NUCLEAR REGULATORY COMMISSION JURISDICTIONS. | | | | | |
| 1. THIS IS AN APPLICATION FOR (Check appropriate item) <input type="checkbox"/> A. NEW LICENSE <input checked="" type="checkbox"/> B. AMENDMENT TO LICENSE NUMBER <u>SUA-1471</u> <input type="checkbox"/> C. RENEWAL OF LICENSE NUMBER _____ | | 2. NAME AND MAILING ADDRESS OF APPLICANT (Include zip code) Homestake Mining Company of California P.O. Box 98 Grants, NM 82070 | | | |
| 3. ADDRESS WHERE LICENSED MATERIALS WILL BE USED OR POSSESSED Homestake Mining Company of California 560 Anaconda Road Route 605 Milan, NM 87021 | | 4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION Brad Bingham BUSINESS TELEPHONE NUMBER <u>505.287.4456 x35</u> BUSINESS CELLULAR TELEPHONE NUMBER <u>505.290.8019</u> BUSINESS E-MAIL ADDRESS <u>bbingham@homestakeminingcoca.com</u> | | | |
| SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE. | | | | | |
| 5. RADIOACTIVE MATERIAL a. Element and mass number; b. chemical and/or physical form; and c. maximum amount which will be possessed at any one time. | | 6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED. | | | |
| 8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS. | | 7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING AND EXPERIENCE. | | | |
| 10. RADIATION SAFETY PROGRAM. | | 9. FACILITIES AND EQUIPMENT. | | | |
| 12. LICENSE FEES (Fees required only for new applications, with few exceptions*) (See 10 CFR 170 and Section 170.31) *Amendments/Renewals that increase the scope of the existing license to a new or higher fee category will require a fee. | | 11. WASTE MANAGEMENT. | | | |
| | | FEE CATEGORY | AMOUNT ENCLOSED \$ | | |
| | | [] | [] | | |
| PER THE DEBT COLLECTION IMPROVEMENT ACT OF 1996 (PUBLIC LAW 104-134), YOU ARE REQUIRED TO PROVIDE YOUR TAXPAYER IDENTIFICATION NUMBER. PROVIDE THIS INFORMATION BY COMPLETING NRC FORM 531: https://www.nrc.gov/reading-rm/doc-collections/forms/nrc531info.html. | | | | | |
| 13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING UPON THE APPLICANT. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BEHALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 32, 33, 34, 35, 36, 37, 39, AND 40, AND THAT ALL INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF. WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62 STAT. 749 MAKES IT A CRIMINAL OFFENSE TO MAKE A WILLFULLY FALSE STATEMENT OR REPRESENTATION TO ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER WITHIN ITS JURISDICTION. | | | | | |
| CERTIFYING OFFICER -- TYPED/PRINTED NAME AND TITLE Brad Bingham Closure Manager | | SIGNATURE  | DATE <u>01/12/21</u> | | |
| FOR NRC USE ONLY | | | | | |
| TYPE OF FEE | FEE LOG | FEE CATEGORY | AMOUNT RECEIVED | CHECK NUMBER | COMMENTS |
| | | | \$ | | |
| APPROVED BY | | | | DATE | |