Permittee Name: Homestake Mining Company of California
Project Name: Wood Gulch Mine Project
Permit Number: NEV0088010
Review Type/Year/Revision: 2022 Renewal, Fact Sheet Revision 00

A. Location and General Description

Location: The Wood Gulch Mine Project is a post-closure monitoring facility located in Elko County within Sections 23, 24, 25, 26, 35 and 36 of Township 44 North, Range 53 East, Mount Diablo Baseline and Meridian, approximately 60 miles northwest of Elko, Nevada. All project acreage is on public lands administered by the U.S. Forest Service (USFS), Humboldt-Toiyabe National Forest.

To access the Project from Elko, drive north on Nevada State Route (SR) 225 for approximately 75 miles, turn left on Maggie Creek Summit Road and continue for approximately 5 miles, where a gate is reached on the left. Drive approximately 3.5 miles west on the unpaved road through the gate. Access to the site must be approved and coordinated with the rancher who lives adjacent to the gate.

General Description: The Wood Gulch Mine Project was a small gold mining facility that consisted of two interconnected open pits, one waste rock facility, one valley-fill heap leach pad, one pregnant solution pond, one barren pond, one seepage collection pond, and one freshwater pond. Additional facilities onsite included a processing plant, crusher, road infrastructure, and office buildings. The facility is located at an elevation of approximately 7,500 feet above mean sea level (AMSL).

Processing facilities and extractive methods utilized for recovery of low-grade gold (Au) and silver (Ag) ore included an agglomerated ore valley-fill heap leach pad. The operation used cyanide solutions that were recirculated through a conventional carbon in column processing plant, loading and subsequent stripping of Au and Ag metals utilizing activated carbon, and product recovery using electrowinning. High-grade ore was slurried on site to produce a gravity concentrate, which was taken off site for subsequent smelting.

B. Synopsis

Anomalous mineralization in the area surrounding the Wood Gulch Mine Project was discovered in 1983, and operations began in 1988 under the Homestake Mining Company of California following an Environmental Assessment completed by the USFS. Mining operations were discontinued during the first winter of operation (November 1988 through April 1989). The Project then operated continuously through November of 1990 until production ceased. Operations resulted in the processing of approximately 664,000 tons of ore, and the production of approximately 35,000 ounces (oz) of Au and 67,000 oz of Ag. The Project was purchased by Barrick Gold Corporation (Barrick) as part of a merger in December 2001, although the operator of the Project has remained Homestake Mining Company of California (Permittee) as a wholly-owned subsidiary of Barrick.
The operation resulted in disturbance of approximately 100 acres, including access, exploration, and haul roads. All Project acreage is on USFS lands. The Project was completely reclaimed and initial permanent closure actions were completed by 1993. The Project has been in post-closure monitoring since 1993, although additional permanent closure actions were performed in 2001, 2009, and 2013. Despite the assignment of Water Pollution Control Permit number NEV0088010, regular monitoring and reporting by the Permittee, and frequent coordination between the Permittee and the Nevada Division of Environmental Protection (the Division), Water Pollution Control Permit NEV0088010 (the Permit) was not officially issued by the Division until 2017.

Regional and Site Geology:
The surficial geology of the area immediately surrounding the Wood Gulch Mine Project is dominated by the Paleozoic Schoonover Formation, a thinly-bedded primarily siliceous unit, with minor carbonate beds. Other Paleozoic bedrock units at the mine site include the Prospect Mountain Quartzite, Edgemont Formation, and Van Duzer Limestone. All Paleozoic lithologic units are intruded by Mesozoic diorite and quartz diorite. The youngest rock units in the mine vicinity are Tertiary volcanics, including the regionally extensive Jarbidge Rhyolite and an extensive dacite unit.

The Project area has been subject to several episodes of faulting, with both Mesozoic low-angle thrust faults and Tertiary/Quaternary high-angle normal faults documented across the site and in the surrounding Independence Mountains. The major fault in the immediate vicinity of the mine is the northwest striking Tomasina fault, which dips steeply to the northeast. Au and Ag mineralization is generally associated with faulting, and the main orebody is found near the intersection of the Tomasina fault zone and the Saddle fault zone, another steeply-dipping normal fault.

Alteration in the deposit is both structurally and lithologically controlled, with the highest intensity alteration found associated with fault zones. Alteration assemblages include silicification in the Schoonover Formation and argillization in the Tertiary dacite.

Open Pits:
Ore at the Wood Gulch operation was extracted from two connected pits, the North and South Pits. Both pits are approximately 100 to 150 feet deep and have a total combined length of approximately 850 feet in the longest dimension.

As noted in Site Hydrology below, groundwater elevations in the vicinity of the open pits prior to mining generally ranged from 150 feet below ground surface (bgs) to 200 feet bgs, with minimum depths to water of approximately 80 feet bgs in fault systems. Although both open pits were excavated to depths below which groundwater has been observed elsewhere on the property, neither pit has developed a persistent pit lake.

Waste Rock Facility:
The Wood Gulch Mine Project utilized one waste rock facility, with approximate dimensions of 450 feet by 400 feet. The waste rock facility is located approximately 1,000 feet to the northwest of the open pits.

Geochemical analysis of overburden material by inductively coupled plasma mass spectrometry indicated site materials are enriched in a number of elements compared with
average crustal values, including arsenic (As) and antimony (Sb). Enrichment is likely indicative of the geochemical character of the ore deposit type, and values observed at the Wood Gulch site are not uncommon to Nevada mines.

**Heap Leach Facility:**

One approximately 10-acre valley-fill heap leach facility was used during the operation of the mine, located in Tomasina Gulch. The leach pad contains approximately 664,000 short tons of agglomerated ore. The heap leach pad was designed and constructed in two phases, separated by a lined divider berm. The upstream northwestern phase is lined with 60-mil high-density polyethylene (HDPE), and the downstream southeastern phase is lined with 80-mil HDPE. Beneath these liners a 6-inch-thick layer of sand was installed, along with leakage collection systems. The prepared subbase under the sand layer has an estimated hydraulic conductivity of approximately $1 \times 10^{-6}$ centimeters per second (cm/sec), based on laboratory testing that indicated a hydraulic conductivity of $1 \times 10^{-1}$ to $1 \times 10^{-3}$ cm/sec when compacted to 95 percent of maximum dry density (Standard Proctor). The field hydraulic conductivity value is thought to be greater than the laboratory value due to material variability. Because the Wood Gulch facility was constructed prior to the September 1989 promulgation of Division regulations governing design, construction, operation, and closure of mining facilities, the leach pad and ponds may not meet current design criteria.

Following closure of the mine, the heap leach pad was rinsed with fresh water, treated with hydrogen peroxide to destroy cyanide (CN), and finally pH was adjusted using lime. Treated rinse water was land applied for disposal in an area of approximately 36 acres on the eastern portion of the site, spanning nearly from the North Pit to the heap leach pad. Following all treatment in 1993, six horizontal drains were installed into the spent ore ore deposit type, and values observed at the Wood Gulch site are not uncommon to Nevada mines.

Because spring runoff appeared to overwhelm the horizontal drain system, an infiltration gallery was constructed in 2001 in an attempt to infiltrate all drain-down flow immediately downgradient of the heap leach facility. Following construction of the infiltration gallery, additional Division-approved enhancements were made in 2009 when a 60-mil HDPE cap, covered with approximately 36 inches of waste rock followed by 8 inches of seeded growth media, was placed over the heap leach facility to preclude infiltration. Finally, alterations were made to the infiltration gallery system in 2011 to route all flow from the heap leach facility to the discharge point located at HD-2, one of the original horizontal drains, thereby effectively disconnecting the infiltration gallery. The east and west stormwater diversion channels were also modified in 2009. The storm channels, cap, and cover were all designed to withstand the 1,000-year, 24-hour storm event.

Following the installation of the cap, the drain-down flow rate was estimated to have decreased; direct measurements of flow rates were not possible prior to installation, however, so no quantitative comparisons can be made. Although drain-down rates are reported to have decreased, some drain-down fluid continued to emanate from the leach pad, prompting a geophysical investigation in 2012. The results of the geophysical investigation indicate that the bottom liner likely had three failures, which allowed
groundwater to seep into the leach pad. Several piezometers were installed in 2013 to evaluate the hydraulic conditions within and adjacent to the pad. Table 1 below summarizes the piezometer construction, and the locations of piezometers are illustrated in Figure 1. Piezometers UPZ-1 and HPZ-1 are located within the heap leach pad, and monitor the phreatic surface within the pad. Piezometers HPZ-2, HPZ-3, and HPZ-4 monitor the groundwater elevation in proximity to the pad. Piezometers HPZ-2 and HPZ-3 are completed in the same angled borehole, which angles beneath the leach pad to monitor possible seepage. Ongoing monitoring of the hydraulic conditions in the leach pad occurs in several of these piezometers, and one of the horizontal drains (HD-2) is sampled for water quality.

**Table 1: Wood Gulch Piezometers.**

<table>
<thead>
<tr>
<th>Piezometer</th>
<th>Total Depth (feet)</th>
<th>Angle (degrees from horizontal)</th>
<th>Parameters Monitored</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPZ-1</td>
<td>66</td>
<td>90</td>
<td>Depth to water, pH, electrical conductivity, temperature, Division Profile I</td>
</tr>
<tr>
<td>UPZ-1</td>
<td>54</td>
<td>90</td>
<td>Depth to water, pH, electrical conductivity, temperature</td>
</tr>
<tr>
<td>HPZ-2</td>
<td>230</td>
<td>53</td>
<td>Depth to water, pH, electrical conductivity, temperature, Division Profile I</td>
</tr>
<tr>
<td>HPZ-3</td>
<td>280</td>
<td>53</td>
<td>Depth to water, pH, electrical conductivity, temperature, Division Profile I</td>
</tr>
<tr>
<td>HPZ-4</td>
<td>50</td>
<td>90</td>
<td>Depth to water, pH, electrical conductivity, temperature</td>
</tr>
</tbody>
</table>

Although the leach pad continues to produce effluent, no downstream surface-water-quality impacts have been noted. Table 2 summarizes the most recent water quality for various monitoring locations.

The 2017 Permit required the submittal of an engineering design change (EDC) application for the installation of a monitoring well downgradient of the infiltration gallery to test for groundwater degradation. This was completed and the well now receives regular monitoring. Thus far, there have been no exceedances in Division Profile I reference values. All surface water expressions meet Profile III risk assessments.
Figure 1: Wood Gulch Mine Project monitoring locations.
Table 2: Second Quarter 2022 monitoring results.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Division Profile I Reference Values (mg/L)</th>
<th>Division Profile III Reference Values (mg/L)</th>
<th>MW-01</th>
<th>Surface Seep</th>
<th>TG-4 (SWP) (a)</th>
<th>Stock Pond (SWP) (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalinity (Total as CaCO₃)</td>
<td>--</td>
<td>--</td>
<td>84</td>
<td>96</td>
<td>58</td>
<td>27</td>
</tr>
<tr>
<td>Aluminum</td>
<td>0.2</td>
<td>4.47</td>
<td>1.1</td>
<td>&lt;0.05</td>
<td>N/A (b)</td>
<td>N/A (b)</td>
</tr>
<tr>
<td>Antimony</td>
<td>0.006</td>
<td>0.29</td>
<td>&lt;0.002</td>
<td>&lt;0.002</td>
<td>&lt;0.012</td>
<td>&lt;0.002</td>
</tr>
<tr>
<td>Arsenic</td>
<td>0.01</td>
<td>0.20</td>
<td>&lt;0.005</td>
<td>0.014</td>
<td>0.038</td>
<td>0.017</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.005</td>
<td>0.05</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.0003</td>
<td>&lt;0.0003</td>
</tr>
<tr>
<td>Chloride</td>
<td>400</td>
<td>--</td>
<td>&lt;1.0</td>
<td>1.0</td>
<td>&lt;1.0</td>
<td>&lt;1.0</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.1</td>
<td>1.0</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
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<tr>
<td>Cyanide (WAD)</td>
<td>0.2</td>
<td>--</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>N/A (b)</td>
<td>N/A (b)</td>
</tr>
<tr>
<td>Lead</td>
<td>0.015</td>
<td>0.10</td>
<td>&lt;0.002</td>
<td>&lt;0.002</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<tr>
<td>Magnesium</td>
<td>150</td>
<td>677</td>
<td>0.093</td>
<td>2.3</td>
<td>0.016</td>
<td>0.058</td>
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<tr>
<td>Mercury</td>
<td>0.002</td>
<td>0.01</td>
<td>&lt;0.005</td>
<td>&lt;0.0005</td>
<td>&lt;0.0003</td>
<td>&lt;0.0003</td>
</tr>
<tr>
<td>Nitrate + Nitrite (as N)</td>
<td>10</td>
<td>100</td>
<td>0.41</td>
<td>&lt;0.10</td>
<td>N/A (b)</td>
<td>N/A (b)</td>
</tr>
<tr>
<td>pH (standard units)</td>
<td>6.5 - 8.5</td>
<td>6.5 - 8.5</td>
<td>8.1</td>
<td>7.5</td>
<td>6.9</td>
<td>8.7</td>
</tr>
<tr>
<td>Selenium</td>
<td>0.05</td>
<td>0.05</td>
<td>&lt;0.005</td>
<td>&lt;0.005</td>
<td>&lt;0.012</td>
<td>&lt;0.0025</td>
</tr>
<tr>
<td>Sulfate</td>
<td>500</td>
<td>--</td>
<td>&lt;1.5</td>
<td>13</td>
<td>14</td>
<td>7.0</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>1,000</td>
<td>7,000</td>
<td>130</td>
<td>120</td>
<td>83</td>
<td>34</td>
</tr>
<tr>
<td>Zinc</td>
<td>5</td>
<td>25.0</td>
<td>&lt;0.02</td>
<td>&lt;0.02</td>
<td>&lt;0.020</td>
<td>&lt;0.020</td>
</tr>
</tbody>
</table>

Table Notes:
(a) SWP = Surface Water Profile
(b) N/A = Not applicable for Surface Water Profile.

Process Ponds:

Three ponds existed on the site during operations, a seepage collection pond, a barren solution pond, and a pregnant solution pond.

The seepage collection pond was located immediately downstream of the heap leach facility and the former infiltration gallery. This pond was approximately 1,000 square feet (ft²), single-lined with 60-mil HDPE, and its primary purpose was to collect any flows from the sand leak detection layer underneath the heap leach pad liner. Following closure activities, the seepage collection pond was converted to a passive treatment biocell and discharge system by cutting the liner and infilling the pond with hay to provide organic material for passive treatment. The pad leak detection flow apparently still reports to the biocell but is comingled with the pad draindown solution and cannot be separately monitored.

Both the barren solution pond and pregnant solution pond were located upstream of the heap leach facility in Tomasina Gulch. These ponds were both double lined with a primary liner of 60-mil HDPE, underlain by a 6-inch-thick layer of leak detection sand, and a 12-
inch-thick compacted-clay secondary liner. Both these ponds were permanently closed in 1993 by folding the liner edges over and in-place burial under native soil.

C. **Receiving Water Characteristics**

**Site Hydrology:**

The groundwater hydrology of the Wood Gulch site is controlled by generally low permeability, fine-grained lithologies. As a result, the majority of groundwater flow is centralized in zones of faulting or folding, and along stratigraphic horizons. Groundwater flow is also partially compartmentalized with some perched and artesian conditions. The springs in the vicinity of the mine are believed to be fault-controlled or perched alluvial systems.

The local groundwater table ranges from approximately 150 feet bgs to 200 feet bgs, with some water levels in fault systems representing a minimum groundwater depth of 80 feet bgs. Original estimates of groundwater depth in the vicinity of the pits indicated groundwater was approximately 150 feet bgs, while the pits were originally designed to be approximately 180 feet deep. Dewatering was therefore projected. Operations showed, however, a deeper groundwater table, and no dewatering was required. No pit lakes have formed to date in the pits.

No observations of background groundwater quality were made prior to mining activities. One piezometer (PZW-1) located downgradient of the mining operations in Tomasina Gulch monitored the composition of groundwater for approximately a two-year period from 1988 to 1990, during operations. Monitoring data from PZW-1 indicate that groundwater generally met Division Profile I reference values, with the possible exception of iron (Fe) and manganese (Mn), both of which exhibited slight exceedances based on data summarized for PZW-1. Water-quality samples were not filtered, however, and therefore may have included colloids or particles that are not representative of the groundwater composition. Although the coordinates of PZW-1 are unknown and the data were not collected prior to mining, the generally good water quality suggests that analyses from PZW-1 could represent background groundwater quality.

Climatologic characteristics described in the application indicate that the mine site receives between approximately 29 and 32 inches (in.) of precipitation per year (yr.), although the portion that is derived from snow is not described. Due to the high elevation of the site it is likely that a significant proportion of annual precipitation occurs as snow. The annual precipitation estimate appears to be slightly greater than the value estimated using the PRISM method of approximately 24 in./yr. Evaporation estimates were not provided in the application. The Division has estimated the potential evapotranspiration at the site as approximately 30 to 33 in./yr., although this is based on regional trends and not on site-specific data.

The mine site is located within the Owyhee River basin, near the headwaters of multiple low-order streams. These streams are Badger Creek, Wood Gulch, and Road Canyon, all of which flow to the Owyhee River upstream of Mill Creek, and are subject to regulations defined in NAC 445A.121, 445A.1236, and 445A.1354. The processing facilities are located at the head of Tomasina Gulch, which flows to Badger Creek. The upper reaches
of all surface waters on the site are ephemeral, while lower reaches are generally perennial, suggesting that lower reaches are likely gaining from groundwater.

Observations of surface water quality prior to mining operations indicate that background surface water was circumneutral, with pH values of approximately 7.3 standard units (SU). Surface water composition is calcium (Ca) bicarbonate (HCO$_3^-$) dominated, likely reflecting the surficial and bedrock lithologies found in the area. Pre-mining concentrations of metals and metalloids commonly associated with mining activities, including As, copper (Cu), Fe, and zinc (Zn) were generally low, with many concentrations below laboratory detection limits, although some seasonal patterns are evident. Stream samples did contain some concentrations of Fe and Mn greater than the applicable water-quality standard (NAC 445A.1236), although elevated concentrations were likely attributed to background concentrations in the area. No other constituents have been consistently elevated above standards since the mine began operations. Water quality within both Tomasina Gulch and Badger Creek are monitored on an ongoing basis to assess any possible environmental effects due to the mine site.

Surface-water monitoring points in the Permit include TG-1, TG-3, TG-4, BC-1, BC-2, and the Stock Pond, where TG and BC respectively indicate locations on Tomasina Gulch and Badger Creek. Monitoring points are located on Badger Creek both upstream (BC-1) and downstream (BC-2) of the confluence with Tomasina Gulch.

D. Procedures for Public Comment

The Notice of the Division’s intent to issue a Permit authorizing the facility to close, subject to the conditions within the Permit, is being published on the Division website: [https://ndep.nv.gov/posts](https://ndep.nv.gov/posts). The Notice is being mailed to interested persons on the Bureau of Mining Regulation and Reclamation mailing list. Anyone wishing to comment on the proposed Permit can do so in writing within a period of 30 days following the date the public notice is posted to the Division website. The comment period can be extended at the discretion of the Administrator. All written comments received during the comment period will be retained and considered in the final determination.

A public hearing on the proposed determination can be requested by the applicant, any affected State, any affected intrastate agency, or any interested agency, person or group of persons. The request must be filed within the comment period and must indicate the interest of the person filing the request and the reasons why a hearing is warranted.

Any public hearing determined by the Administrator to be held must be conducted in the geographical area of the proposed discharge or any other area the Administrator determines to be appropriate. All public hearings must be conducted in accordance with NAC 445A.403 through NAC 445A.406.

E. Proposed Determination

The Division has made the tentative determination to issue the renewed Permit.

F. Pathway to Final Closure and Permit Termination

In accordance with NAC 445A.409 and 445A.446, for final closure and Permit termination the Permittee must demonstrate to the Division that: 1) all sources at the facility have been stabilized, removed, or mitigated; 2) any applicable requirements in NAC 445A.429,
445A.430, and 445A.431 have been achieved; and 3) sufficient post-closure monitoring has occurred to verify the adequacy of these actions to ensure the long-term protection of waters of the State, human health, and wildlife under the physical, chemical, and climatic conditions reasonably expected to occur at the site. If the facility includes a long-term trust and/or requires perpetual treatment or maintenance, post-closure monitoring may never be reached, and the Division may not be able to terminate the Permit.

The pathway to final closure and Permit termination at this facility includes the following specific actions:

1. Submit a Final Closure Report for the heap leach pad and ancillary facilities once closure activities have been completed.

2. Discuss with the Division whether the facility is ready for final closure and Permit termination. If so, submit, for review and approval, a request for final closure and Permit termination including a demonstration of compliance with all applicable closure requirements per NAC 445A.379, 445A.409, 445A.424, 445A.429, 445A.430, 445A.431, 445A.446, 445A.447, as applicable.

The Division may require additional actions if warranted in accordance with site conditions and applicable statutes, regulations, orders, and Permit conditions.

G. **Rationale for Permit Requirements**

The facility is located in an area where annual evaporation is greater than annual precipitation. Therefore, it must operate under a standard of performance which authorizes no discharge(s) except for those accumulations resulting from a storm event beyond that required by design for containment, and except for the discharge from the biocell; however, the biocell discharge is authorized only in so far as it does not degrade waters of the State.

The primary method for identification of escaping process solution will be placed on required routine monitoring of several surface water locations downstream of the heap leach pad and biocell, and also on routine monitoring of the area of the toe of the heap leach pad, near monitoring point HD-2 and the former monitoring point TG-2. The latter area has shown ponded surface water in the past, possibly derived from process solution. Any ponded waters in this area which are determined to be process solution would be in excess of permit limitations, as described in Part I.G.2 of the Water Pollution Control Permit.

Specific monitoring requirements can be found in Part I.D of the Water Pollution Control Permit.

H. **Federal Migratory Bird Treaty Act**

Under the Federal Migratory Bird Treaty Act, 16 U.S. Code 701-718, it is unlawful to kill migratory birds without license or permit, and no permits are issued to take migratory birds using toxic ponds. The Federal list of migratory birds (50 Code of Federal Regulations 10, 15 April 1985) includes nearly every bird species found in the State of Nevada. The U.S. Fish and Wildlife Service is authorized to enforce the prevention of migratory bird mortalities at ponds and tailings impoundments. Compliance with State permits may not be adequate to ensure protection of migratory birds for compliance with provisions of Federal statutes to protect wildlife.
Open waters attract migratory waterfowl and other avian species. High mortality rates of birds have resulted from contact with toxic ponds at operations utilizing toxic substances. The Service is aware of two approaches that are available to prevent migratory bird mortality: 1) physical isolation of toxic water bodies through barriers (e.g., by covering with netting), and 2) chemical detoxification. These approaches may be facilitated by minimizing the extent of the toxic water. Methods which attempt to make uncovered ponds unattractive to wildlife are not always effective. Contact the U.S. Fish and Wildlife Service at 2800 Cottage Way, Room W-2606, Sacramento, California 95825, (916) 414-6464, for additional information.

Prepared by: L.A. Kreskey
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