ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

Douglas A. Ducey
Governor

Misael Cabrera
Director

Sent via U.S. Mail

March 17, 2020
VRP 20-134

Mr. David Rhoades
President and General Manager
Freeport-McMoRan Sierrita Inc.
P.O. Box 527
Green Valley, AZ 85614-0527

RE: Permission to Proceed with Request for Administrative Closure
Freeport Sierrita Mine, 6200 W. Duvall Mine Road, Green Valley, Arizona
VRP Site Code: 100073-03

Dear Mr. Rhoades:

The Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP) has completed a review of documents related to the Former Copper Leach Electrowinning and Regeneration (CLEAR) Plant Exposure Area (EA) and the Former Esperanza Mill EA, with the specific boundaries of the EAs as defined in the February 2020 *Baseline Human Health Risk Assessment* (BHHRA)[1]. The two aforementioned EAs are associated with the FMI Sierrita Mine, located at 6200 West Duval Mine Road in Green Valley, Arizona.

Although FMI has not met the statutory requirements[2,3] necessary to request a No Further Action (NFA) in soil, FMI has completed all of the objectives specified in the ADEQ-approved 2015

[1] The Former CLEAR Plant EA includes the Former CLEAR Plant, Former E Pond, Former Evaporation Pond, and the Old D Pond. The Former Esperanza Mill EA includes the Former Esperanza Mill, the Former C Pond and C Pond Spoils, the Former Raffinate Pond, and the Former Laydown Yard.

[2] While the soil and sediment data evaluated in the BHHRA were a sufficient data set to perform a human health risk assessment on the specific EAs evaluated in the BHHRA, Arizona Revised Statutes (A.R.S.) § 49-175(2) and (3) require characterization is completed prior to initiating a remedial action (a risk assessment is a remedial action, pursuant to A.R.S. § 49-151(5)(b)) if an NFA will be sought under A.R.S. § 49-181. As characterization was not completed pursuant to the definition cited in A.R.S. § 49-171(1) (as indicated in VRP letters dated February 26, 2013, November 18, 2014 and April 18, 2016.) nor the requirements of A.R.S. § 49-152 (and the rules associated with that statute), a media-specific (soil) NFA cannot be issued.

[3] Based on the uses evaluated in the BHHRA, ADEQ would require an intuitional control in the form of a Declaration of Environmental Use Restriction (DEUR) to maintain the uses predicted. However, the VRP is not requiring a DEUR for these EAs given the entirety of the FMI Sierrita Mine remains an active mine with strict controls in place to prevent trespass and residential construction. As such, placing a deed restriction (the DEUR) on the mine provides no additional protection to human health and the environment. The VRP has determined there is no benefit to requiring a DEUR on an active mine where use will not change until the mine moves into post-closure and other regulatory requirements take effect. As such, because A.R.S. § 49-152(C) is not met, the closure requirements of A.R.S. § 49-181 will not be met, thereby precluding issuance of an NFA.

BHHRA Work Plan[4] and the ADEQ-approved 2020 BHHRA[5]. **As such, Freeport-McMoRan Inc. Sierrita Operations (FMI) may proceed with requesting Administrative Closure for the human health risks associated with current and/or future outdoor commercial/industrial workers, future trespassers, or future construction workers within the Former CLEAR Plant EA and the Former Esperanza Mill EA**.

Findings in Support of Administrative Closure

1. Human Health Exposure Risk Associated with Soil: FMI prepared a BHHRA to determine whether there are any potential human health risks associated with current/future outdoor commercial/industrial workers, future trespassers, or future construction workers within the Former CLEAR Plant EA and the Former Esperanza Mill EA[6]. The contaminants of concern (COCs) evaluated for human health exposure from concentrations in sediment and soil in the BHHRA included arsenic, copper, lead, molybdenum, radium-226, radium-228, uranium-235, and uranium-238. The resulting Excess Lifetime Cancer Risk (ELCR) calculated using site-specific data, fell within the regulatory target ELCR range of 1×10^{-6} to 1×10^{-4}, and cumulative Hazard Indices (HI) were less than the target HI of 1 in both EAs. **Based on the findings, FMI has shown there are no risks to human health associated with current and/or future outdoor commercial/industrial workers, future trespassers, or future construction workers from the soil and sediment for the COCs evaluated in the BHHRA**.

   In addition to the COCs, additional contaminants of potential concern (COPCs) were also evaluated as part of the BHHRA. These soil and sediment COPCs include antimony, barium, beryllium, cadmium, chromium, cobalt, manganese, mercury, nickel, selenium, thallium, and zinc. As part of data evaluations completed prior to and during development of the BHHRA, these COPCs were screened out and therefore not included as COCs with regards to the BHHRA. **Based on the findings, FMI has shown there are no risks to human health associated with current and/or future outdoor commercial/industrial workers, future trespassers, or future construction workers from the soil and sediment for the additional COPCs evaluated in the BHHRA**.

2. Risk to Surface Water: Surface water washes are typically dry at the FMI Sierrita Mine, containing stormwater for short durations during precipitation events. The closest wash to the EAs is the Demetrie Wash. All stormwater run-off from the EAs is captured prior to reaching the downstream Santa Cruz River by way of ADEQ Aquifer Protection Program (APP) permitted facilities. All of the APP facilities contained in the Demetrie Wash area are non-stormwater lined impoundments[7, 7*].

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4 ARCADIS. 2015. *VRP Baseline Human Health Risk Assessment*. April 24.

5 ARCADIS. 2020. *Baseline Human Health Risk Assessment*. February.

6 The Former CLEAR Plant EA includes the Former CLEAR Plant, Former E Pond, Former Evaporation Pond, and the Old D Pond. The Former Esperanza Mill EA includes the Former Esperanza Mill, the Former C Pond and C Pond Spoils, the Former Raffinate Pond, and the Former Laydown Yard.

7 As detailed in ADEQ Fact Sheet May 2005 for APP Permit Number P-101679

7* All of the APP facilities contained in the Demetrie Wash area are non-stormwater lined impoundments with the exception of Tailing Pipeline Containment Structures, which are not related to the EAs.

Surface water runoff[8] from the Former Esperanza Mill EA is captured by the Duval Canal Extension, diverted into the lined Duval Canal[9], and then to the Duval Canal Impoundment[10], where the runoff is then pumped back into the processing water supply. Surface water runoff from the Former Clear Plant area is contained in the New D Pond[11]. Accumulated fluids from New D Pond are gravity fed into the lined Duval Canal through a 10-inch pipeline.

Based on this information, it appears there is no evidence of a threat to surface water from the COCs/COPCs emanating from the EAs evaluated in the BHHRA.

3. Potential for Leaching to Groundwater: FMI evaluated the potential for metals in soil in the EAs to leach to groundwater through comparison of EA-specific soil data to the default and/or site-specific groundwater protection levels (GPLs)[12]. Antimony and lead were the only metals detected at concentrations greater than their respective default GPLs during soil/sediment investigations in the EAs.

   On a site-specific basis, ADEQ allows for lines of evidence[13] to support a technical determination. In this case, the VRP used lines of evidence to evaluate the likelihood antimony and lead did not cause an impact to groundwater from the soil associated with the EAs, based on the data collected:

   a) Antimony exceeded the default GPL of 35 milligrams per kilogram (mg/kg) in two surface samples collected at the Former CLEAR Plant EA and in one surface sample at the Former Esperanza Mill EA. FMI did not calculate an alternative GPL for antimony, as synthetic precipitation leaching procedure data was not collected. Antimony was characterized to below the default GPL in numerous subsurface samples in both EAs, suggesting the limited number of samples containing antimony were isolated and located at or near surface only. Furthermore, antimony has not been detected in groundwater above the Arizona Water Quality Standard (AWQS) of 0.006 mg/L with the exception of well TW-2008-10, which is located upgradient of the EAs investigated in the BHHRA, and is related to monitoring associated with Bailey Lake[14] and Raffinate Pond #2[15]. As such, the VRP does not consider antimony a source of potential impact to groundwater emanating from the EAs investigated in the BHHRA.

   b) Lead exceeded the default GPL of 290 mg/kg in the Former CLEAR Plant EA. An alternative GPL of 25,556 mg/kg was calculated based on site-specific total and synthetic precipitation leaching procedure lead data. All detected lead concentrations in the EA are less than the alternative GPL. Furthermore, lead has not been detected

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8 AZPDES Stormwater Multi Sector Mining Permit Sector G J (AZMS-80944)
AZPDES Stormwater Multi Sector General Permit (AZMSG-63063)

9 APP Facility Number D-29 (Permit Number P-101679)

10 APP Facility Number D-62 (Permit Number P-101679)

11 APP Facility Number D-45 (Permit Number P-101679)

12 URS Corporation. 2011. *Soil and Sediment Characterization Report.* March.
ARCADIS. 2013. *Addendum to the Soil and Sediment Characterization Report*. August 14.
ARCADIS. 2013. *Groundwater Investigation Report*. December.

13 The BHHRA states "The calculated 95% UCL concentrations were less than corresponding GPLs…" As indicated in VRP letters dated August 29, 2013 and August 18, 2016, a 95% UCL cannot be compared to a GPL as the GPLs are screening levels treated as not-to-exceed values, based on the consideration that individual, isolated areas may contribute to groundwater contamination. As such, the VRP has taken the "lines of evidence" approach to address the exceedences of the GPL.

14 APP Facility Number D-03 (Permit Number P-101679)

15 APP Facility Number D-10 (Permit Number P-101679)

in groundwater above the AWQS of 0.05 mg/L with the exception of wells MW-2008-09 and TW-2008-10. Although MW-2008-09 is located within the Esperanza Mill EA, it is also located downgradient of Raffinate Pond #2 and with the data available data, it cannot be definitively determined if lead impacts are from historic facility operations within the Esperanza Mill EA. The alternative GPL for lead provides a line of evidence that can be used to support that lead in groundwater at MW-2008-09 is not likely sourced from the soil evaluated in the EAs.

Upon review, it appears there is no evident threat to groundwater from the COCs/COPCs emanating from the EAs evaluated in the BHHRA

Path Forward

In the request for Administrative Closure, FMI should include the following:

1. A figure showing the boundaries of the areas for which Administrative Closure is sought. The figure should clearly define any areas excluded from VRP closure due to regulatory oversight from the APP Program or any other ADEQ regulatory authority that supersedes that of the VRP.
2. A table listing the key findings from the BHHRA, including the ELCR and HIs developed based on *site-specific data*, and any other applicable information to support that exposure risk has been taken into account for said exposure (e.g.: site-specific GPL for lead supporting there is no risk to groundwater).
3. The request for Administrative Closure shall not include a media-specific (i.e.: soil) request for closure, nor reference the statutory requirements cited in A.R.S. § 49-181. The VRP will be evaluating Administrative Closure only for the COCs/COPCs for which there has been shown no risk to surface water, groundwater, nor human health for current and/or future outdoor commercial/industrial workers, future trespassers, or future construction workers, from the CLEAR Plant EA and the Former Esperanza Mill EA.

If you have any questions, please feel free to call me at (602) 771-1612 or contact me via electronic mail at green.scott@azdeq.gov.

Regards,

Scott Green, Manager
Voluntary Remediation Program

cc: Dave Gosen, FMI – *sent via email*
William Hart, FMI – *sent via email*
Katy Brantingham, ARCADIS – *sent via email*
Anne Thatcher, ARCADIS – *sent via email*