Additional Operational Waste Rock and Tailings Characterization Plan

As Required By: Mitigation Measure FS-GW-03

October 2018

Prepared by:

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HUDBAY

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Monitoring and Reporting Schedule

Task Schedule	*Purpose/ Description*	*Active Mining Phase/ Operations Phase*				
		AN	*M*	*Q*	*SA*	*A*
Sample & Analyze PAG Waste Rock	Whole rock analysis; mineralogy (visual descriptions and quantitative) - every 250,000 tons	X				
Sample & Analyze PAG Waste Rock	Humidity cell testing				X	
Sample & Analyze Non-acid Generating Waste Rock	Whole rock analysis; mineralogy (visual descriptions and quantitative) - every 5 million tons	X				
Sample & Analyze Dry Stack Tailings	Whole rock analysis; mineralogy (quantitative)		X			
Sample & Analyze Dry Stack Tailings	Acid-base accounting (ABA)		X			
Sample & Analyze Dry Stack Tailings	Humidity cell testing					X
Sample & Analyze Tailings Process Water	Inorganics, metals			X		
Sample & Analyze Tailings Process Water	Organics, radiochemicals					X
Prepare / submit report [1]	To USFS					X

A = Annually; AN = As Needed (based on tonnage); SA = Semi-Annually; M = Monthly; Q = Quarterly.

[1] = Wrap-up of exiting testing and reporting, such as humidity cells, anticipated in the Closure Phase.

Revision Log

Revision Number	*Revision Lead*	*Purpose of Revision*	*Revision Date*
1	Rosemont	Based on Forest Service review of June 2017 MPO submittal.	March 2018
2	Rosemont	Based on Forest Service review of March 2018 MPO submittal.	June 2018
3	Rosemont	Added Data Management Language per FS	October 2018

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1.0 PLAN OBJECTIVES AND DESCRIPTION

This *Additional Operational Waste Rock and Tailings Characterization Plan* (Plan) was developed as a mitigation measure and monitoring requirement of the U.S. Forest Service's (USFS, Forest Service) Coronado National Forest (Coronado) Final Environmental Impact Statement (FEIS; USFS, 2013) for the Rosemont Copper Project (Project). The Mitigation Measure requirement is specified as "FS-GW-03: Additional operational waste rock and tailings characterization" on pages B-19 through B-21 in Appendix B of the FEIS. Corrections to any of the mitigation measures listed in Appendix B are provided in an Errata to the FEIS (USFS, 2017a). The Record of Decision (ROD; USFS, 2017b) for the Rosemont Project also lists the required mitigation measures.

Under a separate plan, Mitigation Measure OA-GW-02 *Waste Rock Handling Plan* (MPO Volume IV-v), Rosemont is required to sample non-ore waste rock for acid-base accounting (ABA) data at a frequency of every 250,000 tons of waste rock mined. As stated in the *Waste Rock Handling Plan*, those samples will be submitted for ABA and Synthetic Precipitation Leaching Procedure (SPLP) leachability testing (ASTM, 2013). This Plan, *Additional Operational Waste Rock and Tailings Characterization Plan,* provides procedures for additional geochemical testing on potentially-acid generating (PAG) and non-acid generating (NAG) waste rock, as well as analytical testing of tailings material and tailings pore water (i.e. process water).

Previous waste rock testing has shown that less than 3% of the Project waste rock has the potential to form acid rock drainage (ARD; Tetra Tech, 2007). Simulated tailings samples have consistently shown no potential for ARD formation (Tetra Tech, 2010).

Monitoring for Mitigation Measure FS-GW-03 will begin in the Active Mining Phase once waste rock materials are being excavated from, and placed outside of, the open pit area. Monitoring will end once waste rock ceases to be excavated from, and placed outside of, the open pit or when tailings placement in the Dry Stack Tailings Facility ceases and tailings are capped with 3-5' of waste rock and 1' of growth media has been placed upon the waste rock capping. On-going, long-term testing (such as humidity cell testing) may also need to extend into the Final Reclamation and Closure Phase (Closure Phase). Waste rock samples under this Plan will be collected from the blast face, waste rock storage area (WRSA), waste rock perimeter buttresses, and the tailings facility (Dry Stack Tailings Facility) and analyzed according to the protocol described within this Plan.

1.1 PLAN OBJECTIVES

The objectives of Mitigation Measure FS-GW-03 are to:

- Provide additional information to the Forest Service regarding the long-term management of the waste rock and tailings facilities (i.e., assess the potential for acid generation);
- Assist the Forest Service in understanding the long-term management responsibilities with regard to the waste rock and tailings facilities after release of bonding and discontinuation of surface and groundwater quality monitoring; and
- Develop a comprehensive data set of the geochemical characteristics of specific geological units that span both the pre-operational and operational time-frames.

Other Forest Service mitigation measures and/or other permits/requirements/certifications associated with geochemical related issues include:

- OA-GW-02: Reduction in potential for acid rock drainage per monitoring requirements in Rosemont's Aquifer Protection Permit (APP; No. P-106100). This mitigation measure requires monitoring of waste rock placement and the segregation of PAG materials. Limited geochemical characterization is also part of this *measure. A Waste Rock Handling Plan* (MPO Volume IV-v) was developed for this mitigation measure. See page B-84 in Appendix B of the FEIS;

- FS-GW-01: Monitoring of waste rock for seepage. This mitigation measure includes the monitoring of waste rock placed in the Waste Rock Storage Area and in the perimeter buttress of the Dry Stack Tailings Facility for evidence of seepage via infiltration of meteoric water/stormwater. If occurring, a sample of this water would be collected and analyzed. A *Waste Rock Seepage Monitoring Plan* (MPO Volume II-dd) was developed for this measure. See pages B-16 and B-17 in Appendix B of the FEIS;

- OA-GW-06: Groundwater quality and water-level monitoring required under the aquifer protection permit (APP). This mitigation measure is tied to the APP with regard to monitoring point-of-compliance (POC) wells located around the down-gradient perimeter of the Project facilities. An *APP Groundwater Monitoring Plan* (MPO Volume IV-b) was developed for this measure. See pages B-87 and B-88 in Appendix B of the FEIS;

- FS-GW-04: Periodic update and rerunning of pit lake geochemistry model throughout life of mine. This mitigation measure includes a periodic assessment of the predicted water quality in the post-closure pit lake based on mine plan updates and on-going data collection, including updates to the groundwater model. A *Pit Lake Geochemistry Model Update Plan* (MPO Volume II-r) was developed for this measure. See pages B-21 and B-22 in Appendix B of the FEIS; and

- OA-SW-01: Detention and testing of stormwater. This mitigation measure is tied to Rosemont's Multi-Sector General Industrial Stormwater Permit No. AZMSG-74939 with regard to monitoring stormwater quality at the Sediment Control Structures located down-gradient of the Project facilities. An *AZDPES Stormwater Monitoring Plan* (MPO Volume IV-c) was developed for this measure. See pages B-88 and B-89 in Appendix B of the FEIS.

1.2 PLAN DESCRIPTION

The remainder of this Plan includes the following sections:

- Section 2.0: Monitoring Frequencies and Objectives;

- Section 3.0: Specific Analytical Tests;

- Section 4.0: Quality Assurance;

- Section 5.0: Reporting;

- Section 6.0: Closure and Bond Release;

- Section 7.0: Data Management; and

- Section 8.0: References.

2.0 MONITORING FREQUENCIES AND OBJECTIVES

The following subsections outline the additional sampling frequencies and testing objectives for the following categories:

- Waste Rock
    - PAG – waste rock
    - NAG – waste rock
- Dry Stack Tailings
- Tailings Process Water

Table 1 lists the analytical tests, objectives, and sampling frequencies for the waste rock and tailings monitoring required under Mitigation Measure FS-GW-03. Tables 2 through 6 list the specific parameters that will be analyzed in the various waste rock and tailings characterization tests.

Estimated sample collection volumes associated with waste rock or tailings are specified in this subsection. Sample volumes will vary depending on the analyses to be performed. In general, up to one or two five (5)-pound sample bags will be filled during sampling. Waste rock sampling will be performed in conjunction with Mitigation Measure OA-GW-02: *Waste Rock Handling Plan* (MPO Volume IV-v). The Rosemont *Quality Assurance Project Plan* (Water Programs QAPP; MPO Volume II-ff) provides details on water sample collection and handling procedures.

2.1 MONITORING FREQUENCY

Monitoring for Mitigation Measure FS-GW-03 will consist of sampling the following materials at the following schedules:

<u>Potentially Acid-Generating (PAG) Waste Rock</u>

- One composite sample every 250,000 tons of PAG material – Whole Rock, Mineralogy (visual) and Quantitative Mineralogical analysis (x-ray diffraction [XRD]).
- One sample every six (6) months – Humidity cell test

<u>Non-Acid Generating (NAG) Waste Rock</u>

- One random sample every 5,000,000 tons of NAG material – Whole Rock, Mineralogy (visual) and Quantitative Mineralogical analysis (XRD).

<u>Dry Stack Tailings</u>

- One grab sample every month – Whole Rock, ABA, Mineralogy
- One grab sample annually – Humidity cell test

<u>Tailings Process Water</u>

- One sample every three (3) months (quarterly) – Inorganics, Metals
- One sample every year (annually) – Organics, Radiochemicals

2.2 WASTE ROCK MONITORING

Waste rock samples for this Plan will be collected from the blast face, the WRSA, waste rock perimeter buttresses of the DSTF, and/or tailings from the DSTF.

2.2.1 PAG Waste Rock: Whole Rock/Mineralogy

Whole rock analysis is used to determine the elemental composition (as oxides) of a rock. This analysis provides an indication as to elements of environmental concern that are contained in a particular material; however, it does not provide information as to the mobility of these elements. Test results obtained from sampling under this Plan will be used in conjunction with other rock characterization test results (i.e., ABA tests, leachability tests collected under the *Waste Rock Handling Plan* [MPO Volume IV-v]) to provide an overall characterization of the rock material.

One (1) composite sample will be collected for every approximate 250,000 tons of PAG waste rock excavated from the open pit. This sample would be collected in accordance with compositing techniques identified in the *Waste Rock Handling Plan*. Typical blasts will contain about 250,000 tons of material. Therefore, a blast could contain between 0 to 250,000 tons of PAG material. Based on the *Waste Rock Handling Plan*, a five (5) pound (2.3 kilogram) to ten (10) pound (4.6 kilogram) composite sample will be collected from each blast zone having PAG material. The amount of sample collected will depend on the analyses to be performed. Additionally, the major rock type expressed by the composite PAG sample will be assigned to the sample. PAG lithologies can include, at a minimum, andesite and arkose as well as Bolsa Quartzite and Abrigo shale.

A running log will be kept of the PAG tonnage excavated from the pit. At each approximate 250,000-ton mark, a PAG sample will be selected from the current blast. Overall sample selection will be based on providing analyses on a range of major PAG rock types according to their anticipated percentage of occurrence.

PAG tonnages are categorized in both Net Neutralization Potential (NNP) and Neutralization Potential Ratio (NPR). As explained in the *Waste Rock Handling Plan* (MPO Volume IV-v), this data is part of the block model/database used to inform the mine plan.

As noted in the *Waste Rock Handling Plan*, Rosemont is currently working on a surrogate method to determine PAG, AG, and NAG materials. This method uses the analytical data generated as part of analysis planned for operations. The operational data will be more readily available. The neutralization potential of the Rosemont mine rock is highly correlated with calcium and magnesium, while the acid potential generally correlates with total sulfur. Further analysis will be completed, as well as discussions with the agencies, before Rosemont proposes this surrogate method.

For each PAG sample selected at each cumulative 250,000-ton mark, the following will be recorded per the *Waste Rock Handling Plan*:

- Blast number of composite PAG sample
- Rock type assigned to the composite PAG sample
- ABA number assigned to the composite PAG sample

Additionally, the placement location within the Waste Rock Storage Area (WRSA) or Dry Stack Tailings Facility (DSTF) will be tracked per the *Waste Rock Handling Plan*. This will tie the analytical results to a physical deposit location within one of these two facilities.

Under this Plan, each of the selected composite PAG samples would be analyzed for:

- Whole rock analysis (see Table 2 for parameters)
- Detailed visual descriptions of mineralogy (conducted by geologist in field)
- Quantitative mineralogical analysis (x-ray diffraction [XRD])

For this testing, up to a five (5) pound (2.3 kilogram) sample will be taken. As a note, only about 2.2 pounds (1 kilogram) are needed for ABA/Whole Rock/Mineralogy testing.

2.2.2 PAG Waste Rock: Humidity Cell Testing

One (1) sample of PAG material would be collected every six (6) months for humidity cell testing. In this case, a ten (10) pound (4.5 kilograms) sample of PAG material would be collected for each humidity cell test. While only 6.6 pounds (3 kilograms) of material will be needed for this humidity cell testing, the sample collection will coincide with the ABA/Whole Rock/Mineralogy testing, requiring an additional 2.2 pounds (1 kilogram). Sampling will be collected in accordance with compositing techniques identified in the *Waste Rock Handling Plan* (MPO Volume IV-v).

Sample selection will occur to insure coverage over the range of the major PAG rock types. This will provide a correlation, if needed, between the different analyses, including ABA. In summary, the following will be recorded for each humidity cell sample.

- Blast number of composite PAG sample
- Rock type assigned to the composite PAG sample
- ABA number assigned to the composite PAG sample
- Whole rock analysis of composite PAG sample
- Detailed visual descriptions of mineralogy of composite PAG sample
- Quantitative mineralogical analysis of composite PAG sample

Again, the origin of the material will be known via the blast number and tracked to a placement location within the WRSA or DSTF.

Leachate from the humidity cells will be analyzed for the following:

- Inorganics
- Metals

Upon completion of the humidity cells, they will be disassembled per the protocol listed in Section 3.0. This protocol is designed to clarify the conditions in the cell. The residual material will also be tested for the following:

- ABA

2.2.3 NAG Waste Rock: Whole Rock/Mineralogy

One (1) sample would be collected every 5,000,000 tons of non-acid generating waste rock. This sample would be collected in accordance with the techniques identified in the *Waste Rock Handling Plan* (MPO Volume IV-v). The samples would be preferentially selected to insure coverage over the range of the major non-acid generating rock types.

For each selected sample, the following will be recorded per the *Waste Rock Handling Plan* (MPO Volume IV-v):

- Blast number of selected NAG sample
- Rock type assigned to the NAG sample
- ABA number assigned to the NAG sample

The placement location within the WRSA or DSTF will be tracked as per the *Waste Rock Handling Plan* (MPO Volume IV-v*)*. This will tie the analytical results to a physical location within one of these two facilities.

In addition to the information stated above, each of the selected non-acid generating samples would be analyzed for:

- Whole rock analysis (using Methods 3050B and 6010B)
- Detailed visual descriptions of mineralogy (conducted by geologist in field)
- Quantitative mineralogical analysis (Reitveld X-ray diffraction [XRD])

Although up to a five (5) pound (2.3 kilogram) sample will be taken, only about 2.2 pounds (1 kilogram) are needed for testing (ABA/Whole Rock/Mineralogy). Excess sample, after the appropriate blending, will be disposed of by the off-site lab or, if generated on-site, placed in the waste rock facility.

2.3 DRY STACK TAILINGS MONITORING

A grab sample of dry stack tailings will be taken from either a point in the process between the tailings filter presses (Tailings Filter Plant) and the DSTF or at a point after deposition in the DSTF. Regardless, the sample would be taken as to not interfere with normal operations.

The following will be recorded for each sampling event:

- Date and time of sample collection
- Location of sample location (GPS coordinates of sample if taken after deposition in DSTF)
- Estimated date/time of sample placement in DSTF
- Weather conditions at time of sample collection (if sample is exposed to weather, i.e., outside of Tailings Filter Plant)

2.3.1 Tailings Materials: ABA/Whole Rock/Mineralogy

The single grab sample of dry stack tailings would be collected monthly. Analysis of the following is required for each sample collected:

- ABA (required annually will be used to support humidity cell testing criteria if needed)
- Whole rock analysis (using Methods 3050B and 6010B)
- Quantitative mineralogical analysis (XRD)

Although not specifically required under Mitigation Measure FS-GW-03, ABA testing may be conducted on the tailings material sample for the purpose of providing supportive data for the humidity cell testing (Section 2.3.2). A five (5) pound (2.3 kilograms) tailings sample will be taken. However, only about 2.2 pounds (1 kilogram) are needed for this testing.

2.3.2 Tailings Material: Humidity Cell Testing

One (1) grab sample of dry stack tailings would be collected annually and would be coincident with the monthly tailings sample.

Leachate from the humidity cells would be tested for the following (see Table 5):

- Inorganics
- Metals

Upon completion of the humidity cells, they will be disassembled per the protocol listed in Section 3.0. This protocol is designed to clarify the conditions in the cell. The residual material will also be tested for the following:

- ABA

To accommodate humidity cell testing and the additional analyses associated with this sampling event (ABA/Whole Rock/Mineralogy), up to a ten (10) pound sample (4.5 kilograms) of dry stack tailings will be selected.

2.4 TAILINGS PROCESS WATER

“Tailings process water” generated from the tailings filtering process, aka reclaim water, is the largest component of process water and is representative of the residual water that is entrained in filtered tailings. A sample of this water will be taken quarterly and will likely be taken from a tap (valve) off a water line routed from the Tailings Filter Plant to the process Water Tank. Sampling procedures for Tailings Water can be found in the Water Programs QAPP in MPO Volume II-ff.

3.0 SPECIFIC ANALYTICAL TESTS

This section describes the specific testing that will be conducted under Mitigation Measure FS-GW-03 for the following:

- Waste Rock
- Dry stack tailings
- Tailings process water

Tables 2 through 6 provide the lists of parameters to be analyzed in the additional waste rock and tailings tests, along with analytical methods and detection limits. There are no regulatory water quality or soil standards that are applicable to waste rock or tailings testing.

3.1 WASTE ROCK

Samples of both PAG and NAG waste rock will be collected and submitted for the following analyses:

- Whole rock analysis (i.e. total element composition);
- Visual mineral description; and
- Quantitative mineralogical analysis.

Additionally, samples of PAG waste rock will be collected and submitted for:

- Humidity cell testing.

3.1.1 Whole Rock Analysis

Whole rock analysis will be conducted using Method 3050B digestion coupled with Method 6010B (major elements), Method 7471A (Mercury), and Method 340.1 (Fluoride). Digestion Method 3050B will liberate all elements except those held in silicate mineral structures (which are not released to the environment). The parameters to be analyzed in the whole rock analysis are listed in Table 2 and include major ions and selected trace metals. Table 4 lists the parameters that will be analyzed in the tailings material whole rock analysis.

3.1.2 Mineralogical Analysis

Mineralogy of waste rock samples will be addressed at both the hand sample scale and detailed laboratory analysis. After collection of drill hole blast cuttings at the frequency and location described in Section 2.0 above, cuttings will be examined by a staff geologist and a description of the mineralogy will be added to a sample collection field sheet. This examination will include descriptions typically used during geologic logging, including:

- Minerals observed;
- Grainsize of observed minerals;
- Color;
- Texture;
- Any obvious chemical alteration (e.g., oxidation); and
- Mineral associations (minerals in close proximity to one another).

Samples of waste rock will also be submitted for quantitative mineralogical analysis using Reitveld X-ray diffraction (Raudsepp and Pani, 2003) or equivalent method. This analysis will detail the minerals present that may not be captured during visual inspection as well as the percent occurrence of each detected mineral.

3.1.3 Humidity Cell Testing

Humidity cell testing will be conducted by an outside lab and will be performed in general accordance to ASTM Method D5744-12 (ASTM, 2012). Tests will run for a minimum of 20 weeks and will be terminated when concentrations of chemical constituents in the test leachate reach steady state values. Steady state is defined as variation in concentration of key constituents of concern less than 15% over a four-week period, with no clear trend (either increasing or decreasing). Weekly leachates will be analyzed for the following:

- pH, specific conductance, oxidation-reduction potential (ORP)
- sulfate,
- iron,
- alkalinity,
- acidity, and
- selected dissolved metals.

Table 3 and 5 list the specific parameters that will be analyzed in the humidity cell leachate for waste rock and tailings material, respectively. Metals will be filtered by the analytical laboratory and analyzed as dissolved metals. (Dissolved metals will describe the mobile (soluble) portion of metal concentrations.) Although the metal analytical results will be compared with the respective numeric Arizona Aquifer Water Quality Standards (AWQSs), AWQSs are not applicable to metals in leachate or process water. (Additionally, AWQSs are only applicable to total recoverable metals.) Constituents will be analyzed at detection limits that are equal to or below the AWQS to allow for comparison.

Weekly leachates will be composited in four-week batches.

Following completion of the test, the test cells will be disassembled and the solids will be retained for assessment. Solids will be removed with limited disturbance, and retained in air- and moisture-excluding plastic containers. Solids will be examined visually for any obvious indications of reactivity (color, etching). A sub-sample will be taken and submitted for acid-base accounting (ABA).

3.2 DRY STACK TAILINGS

The Plan provides for sampling of tailings according to the frequency described above in Section 2.1. A monthly sample will be submitted for whole rock analysis and quantitative mineralogical analysis (see Sections 3.1.1 and 3.1.2 above for methods). An annual sample collected per Section 2.1 will be submitted for humidity cell testing, according to the same procedures/provisions presented in Section 3.1.3. Parameters to be analyzed in the tailings material whole rock analysis are presented in Table 4; parameters to be analyzed in the tailings material humidity cell test leachates are presented in Table 5. These parameters will be analyzed at detection limits that are equal to or below the AWQS to allow for comparison. However, AWQSs are not applicable to process water or leachate.

Although not specified in Mitigation Measure FS-GW-03, acid-base accounting tests will be conducted on tailings material samples to determine the acid potential (AP) and neutralization potential (NP) of the tailings material. The ABA results will be used in conjunction with the whole rock, quantitative mineralogical analysis, and humidity cell test results.

Waste rock samples will be submitted for ABA testing under Mitigation Measure OA-GW-02- *Waste Rock Handling Plan* (MPO Volume IV-v).

3.2.1 Acid-Base Accounting (ABA)

Static ABA is a screening procedure to predict if a rock material will produce acid-rock drainage. It compares the acid production potential with the acid neutralization potential for a given sample.

A modified Sobek procedure will be used for both the tailings material and waste rock samples to make the determinations of AP and NP (method used previously to assess Rosemont materials). The modified Sobek procedure (Lawrence and Wang, 1997) bases the AP on sulfide sulfur rather than total sulfur.) AP will be determined on the basis of pyritic sulfur until and unless other acid-producing sulfide minerals are identified in quantitative x-ray diffraction analysis. Both Net Neutralization Potential (NNP) and Neutralization Potential Ratio (NPR) will be calculated for each sample using these data.

3.3 TAILINGS PROCESS WATER

Process water will be collected and analyzed quarterly as described in Section 2.1. On a quarterly basis, the tailings process water will be analyzed for the parameters listed in Table 6 (also provided in Table G-1 of Appendix G in the Water Programs QAPP; MPO Volume II-ff). The parameters that will be analyzed quarterly in the tailings process water include:

- pH
- specific conductance
- oxidation-reduction potential (ORP)
- total dissolved solids
- major ions, including sulfate
- selected dissolved metals.

On an annual basis, in addition to the parameters analyzed quarterly, the tailings process water would be analyzed for carbon disulfide and radiochemicals. Details on water sample collection procedures, quality assurance protocols, and criteria and process for data verification are provided in the QAPP.

4.0 QUALITY ASSURANCE

In addition to the sampling and analysis of materials described above, this Plan provides for regular evaluation of the sample collection procedures, sampling frequency, and data verification of the laboratory analyses. Accurate sampling frequency, as well as appropriate sample selection based on the occurrence of the various rock types, will be assured through the use of the mine planning database. The number of samples taken, and their associated rock type, will be summarized monthly and compared with targeted sampling requirements. The number of NAG, PAG and AG rock samples collected, the tonnages of waste rock produced, and the specific analytical work conducted (with laboratory chains of custody) will be documented. A brief technical memorandum regarding the quality assurance procedures will be included with the annual report submitted to the Forest Service.

As described in the *Waste Rock Handling Plan* (MPO Volume IV-v), a series of quality assurance (QA) checks will be made throughout the mining process to ensure consistency between what is indicated in the computer block model against what is observed in the field. Increasing the accuracy of the block model will come from both exploration drilling/sampling and operational sampling, combined with field observations/mapping, etc., of the blast zone and highwalls. Refining the accuracy of the block model/field correlation will translate into refined estimates of the various waste rock types and their locations within the blast zone.

As described in Section 2.2.1 of this Plan, Rosemont has been working on a surrogate method to characterize waste rock into the categories of PAG, AG, and NAG. Sampling of waste rock would be incorporated into the general mine planning/sampling protocol, thereby substantially increasing the number of data points generated for input into the block model. Not only will this streamline the analysis of samples (classification of ore from waste and waste into the categories of PAG/NAG/AG), but adds a key quality assurance component to the process by adding a verification check (quality assurance check) on the required acid-base accounting (ABA), SPLP, and other required testing associated with waste rock in this Plan and in the *Waste Rock Handling Plan*.

With regard to tailings sampling, mill analysis data from the tailings stream will be used as a quality assurance check on the results obtained from the testing outlined in this Plan

As per Mitigation Measure FS-GW-03, quality control (QC) sampling, such as the use of blanks and duplicates, is not required for the geochemical sampling and analysis program at Rosemont, i.e., for waste rock and tailings solids.

With regard to the sampling and analysis of tailings process water, QA/QC related procedures are covered in the Water Programs QAPP; MPO Volume II-ff. Humidity cell testing will be performed at an off-site laboratory and will follow their own in-house protocols and required QA/QC procedures.

5.0 REPORTING

Data collected for Mitigation Measure FS-GW-03 will be compiled and presented in a report for the Forest service annually. The analytical data collected during the previous year will be summarized in the report and will include the following:

- Acid-base accounting data (obtained from Mitigation Measure OA-GW-02);
- Whole rock analysis;
- Quantitative mineralogical analysis,
- Humidity cell leachate analysis (both on-going and terminated during previous year, including discussion of any disassembled cells during the reporting period);
- A summary of mined tonnages, associated range of designations (PAG, NAG, AG) and cumulative tonnages of each material designation; and
- Mapping showing rock placement for the year along with locations of the designed (PAG, NAG, AG) material.

In addition to the annual report, the brief technical memoranda discussed in Section 4 will be provided to the Forest Service.

6.0 CLOSURE AND BOND RELEASE

This section addresses closure activities associated with this Plan as well as the approach for funding of those activities and bond release of those funds. If bonding is set for one year or less (i.e., simply completing testwork or finalizing reporting) no bond release is proposed. For longer periods, the bonding terms and application for bond release, as well as the mechanism for that release, are included.

6.1 INTERIM CLOSURE

Interim closure activities include those activities that are necessary for the Forest Service, or their contractors, to keep the facility current with existing permits. Requirements for transfer of permits or application for new permits issued to the Forest Service, if applicable, would also be included.

This plan requires monitoring only during operations as per FS-GW-04. Because this activity will be stopped, other than any samples in the queue for analysis or testing, bonding for this activity is set to complete the activity within six months. During the six-month period, until closure is started the Forest will need to notify the laboratories to complete work and forward the final analysis. Reports, as detailed above, for the final year will need to be completed as well.

6.2 FINAL CLOSURE

No new testwork will be initiated in the Final Reclamation and Closure Phase (Closure Phase). It is anticipated that testing of up to three (3) humidity cell tests would extend into the Closure Phase, including receipt/payment of miscellaneous testing initiated at the end of the Operations/Active Mining phases. Estimated costs for this work are provided in the *Reclamation and Closure Plan* (Mine Plan of Operations [MPO] Volume III-a).

6.3 BOND RELEASE

Bonding for this activity is set to cover closure of three humidity cell tests and a month of testing in the queue. All work would then need to be accumulated into a report; estimated costs for this are also included.

There is no bond release strategy for this amount; the assumption is that the Forest will expend funds to ensure completion of activities.

7.0 DATA MANAGEMENT

Data generated from activities provided for in the Plan will correspond to either field or laboratory data. Field data will be recorded on a daily sample collection field data sheet. These data sheets will record notes related to the types of material targeted for daily sampling, actual samples taken as well as locations and amounts of material collected. The data sheet will also record the notes of the assigned geologist regarding the description of rock types in cuttings associated with the blast holes. Field data sheets will be scanned and maintained in an electronic file, as well as a corresponding hard copy project file.

Samples submitted for laboratory analysis will be transported under a chain of custody. Copies of all chains of custody will be in both hard copy and electronic form.

Data received from analytical laboratories will be maintained as the original data reports, in both electronic and hardcopy format. Received data will also be entered into a master electronic database (likely an Excel spreadsheet). This electronic database will also maintain a running record of waste rock tonnages, which will be used inform daily sampling needs and targets as well as serving as a quality assurance check on sampling frequency.

All of the data described above will be considered Proprietary; therefore, it will only be summarized in the reporting to the Forest Service. The Forest Service reserves the right to request access to reports that are referenced in the summary report or to review any data used to compile the summary report. Rosemont will collaborate with the Forest Service to ensure that the reporting format used will satisfy reporting requirements and that Forest Service concurs with the format prior to the first reporting deadline. The raw data may be reviewed by the Forest Service at any time during inspections and the proponent will provide access to these reports and associated data. Should data reported demonstrate any exceedances to any water quality standards or other regulatory thresholds, or if the proponent wishes to request changes in level of monitoring, the Forest Service will require the proponent to provide access to review the detailed reports including but not limited to analytical data from reporting laboratories for review by Forest Service Specialists.

8.0 REFERENCES

ASTM D5744-12 (ASTM, 2012), Standard Test Method for Laboratory Weathering of Solid Materials Using a Humidity Cell, ASTM International, West Conshohocken, PA, 2012. www.astm.org

ASTM D6234-13 (ASTM, 2013), Standard Test Method for Shake Extraction of Mining Waste by the Synthetic Precipitation Leaching Procedure, ASTM International, West Conshohocken, PA, 2013. www.astm.org

Lawrence, R.W., and Wang, Y., 1997. Determination of Neutralization Potential in the Prediction of Acid Rock Drainage. Proc. 4th International Conference on Acid Rock Drainage, Vancouver, BC; p449-464.

Raudsepp, M. and Pani, E. (2003) *Application of Reitveld Analysis to Environmental Mineralogy. In Environmental Aspects of Mine Wastes.* Chapter 8. (J.L. Jambor and D.W. Blowes, eds.) Short Course Volume 31, Mineralogical Association of Canada.

Tetra Tech, 2007. *Geochemical Characterization Addendum 1.* Report prepared by Tetra Tech for Rosemont Copper. September 2007.

2010. *Rosemont Tailings Geochemistry Sample Sources*. Technical Memo dated August 30, 2010.

USFS, 2013. *Final Environmental Impact Statement for Rosemont Copper Project, Appendix B Mitigation and Monitoring Plan*. December 2013.

2017a. *Errata – Rosemont Copper Project Final Environmental Impact Statement*. April 26, 2017.

2017b. *Record of Decision – Rosemont Copper Project and Amendment of the Coronado Land and Resource Management Plan*. June 2017.

TABLES

Table 1 - Analytical Tests for Waste Rock and Tailings Material

Permit / Mitigation Measure ID: Mitigation Measure FS-GW-03 [Additional Operational Waste Rock and Tailings Characterization]			
Type of Test	**Specification**	**Objective**	**Type/Number of Samples**
Whole Rock chemical analysis	Method 3050 B digestion plus Method 6010B	To determine which metals are present in a rock sample, and hence, may be present in a leachate under field conditions.	For PAG waste rock: one (1) sample every 250,000 tons For NAG waste rock: one (1) sample every 5,000,000 tons For tailings material: one (1) sample every month
Detailed visual descriptions of mineralogy	In field descriptions by geologist, with hand lens	To identify primary and secondary minerals that could affect acid generation potential and contact water quality.	For PAG waste rock: one (1) sample every 250,000 tons For NAG waste rock: one (1) sample every 5,000,000 tons
Quantitative mineralogical analysis	X-ray diffraction (XRD) (Rietveld)		For PAG waste rock: one (1) sample every 250,000 tons For NAG waste rock: one (1) sample every 5,000,000 tons For tailings material: one (1) sample every month
Acid-base accounting (ABA)	Modified Sobek test [1]	Screening procedure to determine acid generating potential of a rock material.	For tailings material: one (1) sample every month
Kinetic testing	Humidity Cell Testing (HCT; ASTM Method D5744-12, 2012).	To determine long-term weathering rates under oxygenated conditions.	For PAG waste rock: one (1) sample every six (6) months For tailings material: one (1) sample every 12 months (annually)
Process water analyses	See Table 5	To identify chemicals entrained in the tailings pore water (i.e. process water)	For tailings material: one (1) sample every three (3) months (quarterly) for inorganics and dissolved metals. For tailings material: one (1) sample every 12 months (annually) for radiochemicals and organics

[1] Modified Acid-Base Accounting test: Lawrence, R.W. and Wang, Y.(1997), *Determination of Neutralization Potential in the Prediction of Acid Rock Drainage. Proc. 4th International Conference on Acid Rock Drainage, Vancouver, BC; p449-464*.

Table 2 - Parameters to be Analyzed in Whole Rock Analysis for Waste Rock

Permit / Mitigation Measure ID: Mitigation Measure FS-GW-03 [Additional Operational Waste Rock and Tailings Characterization]					
Monitoring Time Frame: Active Mining Phase					
Frequency: **• One sample every approximate 250,000 tons of PAG waste rock excavated** **• One sample every 5,000,000 tons of NAG waste rock excavated**					
Parameter	**Units**	**Analytical Method**	**Acceptable Detection Limits (at or below the listed value)**	**Permit Limits / Thresholds**	**Applicable Water Quality Standard**
Calcium	mg/kg	SW 6010B	NA	NA	NNS
Magnesium	mg/kg	SW 6010B	NA	NA	NNS
Potassium	mg/kg	SW 6010B	NA	NA	NNS
Sodium	mg/kg	SW 6010B	NA	NA	NNS
Sulfate	mg/kg	SW 6010B	NA	NA	NNS
Chloride	mg/kg	SW 6010B	NA	NA	NNS
Fluoride	mg/kg	EPA 340.1	NA	NA	NNS
Aluminum	mg/kg	SW 6010B	NA	NA	NNS
Antimony	mg/kg	SW 6010B	NA	NA	NNS
Arsenic	mg/kg	SW 6010B	NA	NA	NNS
Barium	mg/kg	SW 6010B	NA	NA	NNS
Beryllium	mg/kg	SW 6010B	NA	NA	NNS
Boron	mg/kg	SW 6010B	NA	NA	NNS
Cadmium	mg/kg	SW 6010B	NA	NA	NNS
Chromium	mg/kg	SW 6010B	NA	NA	NNS
Cobalt	mg/kg	SW 6010B	NA	NA	NNS
Copper	mg/kg	SW 6010B	NA	NA	NNS
Iron	mg/kg	SW 6010B	NA	NA	NNS
Lead	mg/kg	SW 6010B	NA	NA	NNS
Manganese	mg/kg	SW 6010B	NA	NA	NNS
Mercury	mg/kg	SW 7471A	NA	NA	NNS
Molybdenum	mg/kg	SW 6010B	NA	NA	NNS
Nickel	mg/kg	SW 6010B	NA	NA	NNS
Selenium	mg/kg	SW 6010B	NA	NA	NNS
Silver	mg/kg	SW 6010B	NA	NA	NNS
Thallium	mg/kg	SW 6010B	NA	NA	NNS
Zinc	mg/kg	SW 6010B	NA	NA	NNS

Units: mg/kg = milligrams per kilogram; NA = not applicable; NNS = no numeric standard

Table 3 - Parameters to be Analyzed in HCT for Waste Rock

Permit / Mitigation Measure ID: Mitigation Measure FS-GW-03 [Additional Operational Waste Rock and Tailings Characterization]					
Monitoring Time Frame: Active Mining Phase (as needed in Closure Phase for wrap-up of long-term humidity cell testing)					
Frequency: One (1) sample every six (6) months					
Parameter	**Units**	**Analytical Method**	**Acceptable Detection Limits (at or below the listed value)**	**Permit Limits / Thresholds**	**Applicable Water Quality Standard [1]**
pH - final	S.U.	E 150.1	NA	NA	NNS
Specific conductance	µS/cm	SM 2510 B	2.0	NA	NNS
Alkalinity	mg/L	SM 2320B	4.0	NA	NNS
Acidity	mg/L	E 305.1	NA	NA	NNS
Aluminum	mg/L	EPA 200.7	0.1	NA	NNS
Antimony	mg/L	EPA 200.8	0.001	NA	0.006
Arsenic	mg/L	EPA 200.7	0.0005	NA	0.05
Barium	mg/L	EPA 200.7	0.01	NA	2.0
Beryllium	mg/L	EPA 200.7	0.001	NA	0.004
Boron	mg/L	EPA 200.7	0.05	NA	NNS
Cadmium	mg/L	EPA 200.7	0.001	NA	0.005
Chromium	mg/L	EPA 200.7	0.01	NA	0.10
Cobalt	mg/L	EPA 200.7	0.01	NA	NNS
Copper	mg/L	EPA 200.7	0.01	NA	NNS
Iron	mg/L	EPA 200.7	0.1	NA	NNS
Lead	mg/L	EPA 200.7	0.0005	NA	0.05
Mercury	mg/L	EPA 245.1	0.0002	NA	0.002
Nickel	mg/L	EPA 200.7	0.01	NA	0.10
Selenium	mg/L	EPA 200.7	0.0005	NA	0.05
Silver	mg/L	EPA 200.8	0.0001	NA	NNS
Sulfate	mg/L	EPA 300.0	0.50	NA	NNS
Thallium	mg/L	EPA 200.8	0.0001	NA	0.002
Zinc	mg/L	EPA 200.7	0.013	NA	NNS
Sulfur	mg/L	EPA 300.0	0.20	NA	NNS

Units: S.U. = Standard units; µS/cm = micro Siemens per centimeter; mV = milliVolts; mg/L= milligrams per liter; NA = not applicable; NNS = no numeric standard

[1] Applicable water quality standard: Water quality standard listed is the Arizona Aquifer Water Quality Standard (AWQS) – for comparison purposes only; AWQSs are applicable to groundwater, not process water or leachate. Additionally, AWQS are applicable to total metals.

All metals will be analyzed as dissolved metals. Contracted analytical laboratory will filter leachate at the lab using a 0.45 micron filter.

Table 4 - Parameters to be Analyzed in Whole Rock Analysis for Tailings Material

Permit / Mitigation Measure ID: Mitigation Measure FS-GW-03 [Additional Operational Waste Rock and Tailings Characterization]					
Monitoring Time Frame: Operations Phase					
Frequency: One sample every month of tailings					
Parameter	**Units**	**Analytical Method**	**Acceptable Detection Limits (at or below the listed value)**	**Permit Limits / Thresholds**	**Applicable Standard**
Calcium	mg/kg	SW 6010B	NA	NA	NNS
Magnesium	mg/kg	SW 6010B	NA	NA	NNS
Potassium	mg/kg	SW 6010B	NA	NA	NNS
Sodium	mg/kg	SW 6010B	NA	NA	NNS
Sulfate	mg/kg	SW 6010B	NA	NA	NNS
Chloride	mg/kg	SW 6010B	NA	NA	NNS
Fluoride	mg/kg	EPA 340.1	NA	NA	NNS
Aluminum	mg/kg	SW 6010B	NA	NA	NNS
Antimony	mg/kg	SW 6010B	NA	NA	NNS
Arsenic	mg/kg	SW 6010B	NA	NA	NNS
Barium	mg/kg	SW 6010B	NA	NA	NNS
Beryllium	mg/kg	SW 6010B	NA	NA	NNS
Boron	mg/kg	SW 6010B	NA	NA	NNS
Cadmium	mg/kg	SW 6010B	NA	NA	NNS
Chromium	mg/kg	SW 6010B	NA	NA	NNS
Cobalt	mg/kg	SW 6010B	NA	NA	NNS
Copper	mg/kg	SW 6010B	NA	NA	NNS
Iron	mg/kg	SW 6010B	NA	NA	NNS
Lead	mg/kg	SW 6010B	NA	NA	NNS
Manganese	mg/kg	SW 6010B	NA	NA	NNS
Mercury	mg/kg	SW 7471A	NA	NA	NNS
Molybdenum	mg/kg	SW 6010B	NA	NA	NNS
Nickel	mg/kg	SW 6010B	NA	NA	NNS
Selenium	mg/kg	SW 6010B	NA	NA	NNS
Silver	mg/kg	SW 6010B	NA	NA	NNS
Thallium	mg/kg	SW 6010B	NA	NA	NNS
Zinc	mg/kg	SW 6010B	NA	NA	NNS

Units: mg/kg = milligrams per kilogram; NA = not applicable; NNS = no numeric standard/no applicable regulatory standard.

Table 5 - Parameters to be Analyzed in HCT for Tailings

Permit / Mitigation Measure ID: Mitigation Measure FS-GW-03 [Additional Operational Waste Rock and Tailings Characterization]					
Monitoring Time Frame: Operations Phase (as needed in Closure Phase for wrap-up of long-term humidity cell testing)					
Frequency: Annually (one (1) sample every twelve (12) months)					
Parameter	**Units**	**Analytical Method**	**Acceptable Detection Limits (at or below the listed value)**	**Permit Limits / Thresholds**	**Applicable Water Quality Standard [1]**
pH - final	S.U.	E 150.1	NA	NA	NNS
Specific conductance	µS/cm	SM 2510 B	2.0	NA	NNS
Alkalinity	mg/L	SM 2320B	4.0	NA	NNS
Acidity	mg/L	E 305.1	NA	NA	NNS
Aluminum	mg/L	EPA 200.7	0.1	NA	NNS
Antimony	mg/L	EPA 200.8	0.001	NA	0.006
Arsenic	mg/L	EPA 200.7	0.0005	NA	0.05
Barium	mg/L	EPA 200.7	0.01	NA	2.0
Beryllium	mg/L	EPA 200.7	0.001	NA	0.004
Boron	mg/L	EPA 200.7	0.05	NA	NNS
Cadmium	mg/L	EPA 200.7	0.001	NA	0.005
Chromium	mg/L	EPA 200.7	0.01	NA	0.10
Cobalt	mg/L	EPA 200.7	0.01	NA	NNS
Copper	mg/L	EPA 200.7	0.01	NA	NNS
Iron	mg/L	EPA 200.7	0.1	NA	NNS
Lead	mg/L	EPA 200.7	0.0005	NA	0.05
Mercury	mg/L	EPA 245.1	0.0002	NA	0.002
Nickel	mg/L	EPA 200.7	0.01	NA	0.10
Selenium	mg/L	EPA 200.7	0.0005	NA	0.05
Silver	mg/L	EPA 200.8	0.0001	NA	NNS
Sulfate	mg/L	EPA 300.0	0.50	NA	NNS
Thallium	mg/L	EPA 200.8	0.0001	NA	0.002
Zinc	mg/L	EPA 200.7	0.013	NA	NNS
Sulfur	mg/L	EPA 300.0	0.20	NA	NNS

Units: S.U. = standard units; mV = milliVolts; µS/cm = micro Siemens per centimeter; mg/L = milligrams per liter; NA = not applicable; NNS = no numeric standard

[1] Applicable water quality standard: Water quality standard listed is the Arizona Aquifer Water Quality Standard (AWQS) – for comparison purposes only; AWQSs are applicable to groundwater, not process water or leachate. Additionally, AWQS are applicable to total metals.

All metals will be analyzed as dissolved metals. Contracted analytical laboratory will filter leachate at the lab using a 0.45 micron filter.

Table 6 - Parameters to be Analyzed in Tailings Process Water

Permit / Mitigation Measure ID: Mitigation Measure FS-GW-03 [Additional Operational Waste Rock and Tailings Characterization]					
Monitoring Time Frame: Operations Phase					
Frequency: Quarterly (inorganics, metals)					
Parameter	Units	Analytical Method	Acceptable Detection Limits (at or below the listed value)	Permit Limits / Thresholds	Applicable Water Quality Standard [1]
Temperature – Lab	° C	SM 4500 H+B	NA	NA	NNS
pH - lab	S.U.	SM 4500 H+B	NA	NA	NNS
Specific conductance	µS/cm	SM 2510 B	2.0	NA	NNS
Acidity	mg/L	EPA 305.1	NA	NA	NNS
Hardness	mg/L	calculation	13.0	NA	NNS
ORP	mV	ASTM D1498-00	NA	NA	NNS
Total dissolved solids	mg/L	SM 2540 C	20	NA	NNS
Calcium	mg/L	EPA 200.7	2.0	NA	NNS
Magnesium	mg/L	EPA 200.7	2.0	NA	NNS
Sulfate	mg/L	EPA 300.0	0.50	NA	NNS
Sulfur	mg/L	EPA 300.0	0.20	NA	NNS
Dissolved Metals					
Aluminum	mg/L	EPA 200.7	0.1	NA	NNS
Antimony	mg/L	EPA 200.8	0.001	NA	0.006
Arsenic	mg/L	EPA 200.7	0.0005	NA	0.05
Barium	mg/L	EPA 200.7	0.01	NA	2.0
Beryllium	mg/L	EPA 200.7	0.001	NA	0.004
Boron	mg/L	EPA 200.7	0.05	NA	NNS
Cadmium	mg/L	EPA 200.7	0.001	NA	0.005
Chromium	mg/L	EPA 200.7	0.01	NA	0.10
Cobalt	mg/l	EPA 200.7	0.01	NA	NNS
Copper	mg/L	EPA 200.7	0.01	NA	NNS

Table 6 – continued Tailings Process Water Monitoring; Mitigation Measure FS-GW-03					
Parameter	Units	Analytical Method	Acceptable Detection Limits (at or below the listed value)	Permit Limits / Thresholds	Applicable Water Quality Standard [1]
Lead	mg/L	EPA 200.7	0.0005	NA	0.05
Manganese	mg/L	EPA 200.7	0.01	NA	NNS
Mercury	mg/L	EPA 245.1	0.001	NA	0.002
Molybdenum	mg/L	EPA 200.7	0.01	NA	NNS
Nickel	mg/L	EPA 200.7	0.01	NA	0.10
Selenium	mg/L	EPA 200.7	0.0005	NA	0.05
Silver	mg/L	EPA 200.8	0.0001	NA	NNS
Thallium	mg/L	EPA 200.8	0.0001	NA	0.002
Zinc	mg/L	EPA 200.8	0.013	NA	NNS
Radiochemicals					
Gross alpha particle activity	pCi/L	EPA 900	3.0	NA	NNS
Radium 226	pCi/L	EPA 903.1 or HPGE-GA	1.0	NA	NNS
Radium 228	pCi/L	EPA 904 or HPGE-GA	1.0	NA	NNS
Uranium – total	µg/L	EPA 200.8	1.0	NA	2.8
Adjusted gross alpha	pCi/L	calculation	3.0	NA	15
Organics					
1,1,1,2-Tetrachloroethane	µg/L	SW 8260B	5.0	NA	NNS
1,1,1-Trichloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,1,2,2-Tetrachloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,1,2-Trichloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,1-Dichloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,1-Dichloroethene	µg/L	SW 8260B	5.0	NA	NNS

Table 6 – continued Tailings Process Water Monitoring; Mitigation Measure FS-GW-03					
Parameter	**Units**	**Analytical Method**	**Acceptable Detection Limits (at or below the listed value)**	**Permit Limits / Thresholds**	**Applicable Water Quality Standard [1]**
1,1,1,2-Tetrachloroethane	µg/L	SW 8260B	5.0	NA	NNS
1,1,1-Trichloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,1,2,2-Tetrachloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,1,2-Trichloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,1-Dichloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,1-Dichloroethene	µg/L	SW 8260B	5.0	NA	NNS
1,1-Dichloropropene	µg/L	SW 8260B	2.0	NA	NNS
1,2,3-Trichlorobenzene	µg/L	SW 8260B	5.0	NA	NNS
1,2,3-Trichloropropane	µg/L	SW 8260B	10.0	NA	NNS
1,2,4-Trichlorobenzene	µg/L	SW 8260B	5.0	NA	NNS
1,2,4-Trimethylbenzene	µg/L	SW 8260B	2.0	NA	NNS
1,2-Dibromo-3-Chloropropane	µg/L	SW 8260B	5.0	NA	NNS
1,2-Dibromoethane (EDB)	µg/L	SW 8260B	2.0	NA	NNS
1,2-Dichlorobenzene	µg/L	SW 8260B	2.0	NA	NNS
1,2-Dichloroethane	µg/L	SW 8260B	2.0	NA	NNS
1,2-Dichloropropane	µg/L	SW 8260B	2.0	NA	NNS
1,3,5-Trimethylbenzene	µg/L	SW 8260B	2.0	NA	NNS
1,3-Dichlorobenzene	µg/L	SW 8260B	2.0	NA	NNS
1,3-Dichloropropane	µg/L	SW 8260B	2.0	NA	NNS
1,4-Dichlorobenzene	µg/L	SW 8260B	2.0	NA	NNS
2,2-Dichloropropane	µg/L	SW 8260B	2.0	NA	NNS
2-Butanone (MEK)	µg/L	SW 8260B	10.0	NA	NNS
2-Chlorotoluene	µg/L	SW 8260B	5.0	NA	NNS
2-Hexanone	µg/L	SW 8260B	10.0	NA	NNS
4-Chlorotoluene	µg/L	SW 8260B	5.0	NA	NNS

Table 6 – continued Tailings Process Water Monitoring; Mitigation Measure FS-GW-03					
Parameter	**Units**	**Analytical Method**	**Acceptable Detection Limits (at or below the listed value)**	**Permit Limits / Thresholds**	**Applicable Water Quality Standard [1]**
4-Methyl-2-pentanone (MBK)	µg/L	SW 8260B	10.0	NA	NNS
Acetone	µg/L	SW 8260B	20.0	NA	NNS
Benzene	µg/L	SW 8260B	2.0	NA	NNS
Bromobenzene	µg/L	SW 8260B	5.0	NA	NNS
Bromochloromethane	µg/L	SW 8260B	5.0	NA	NNS
Bromodichloromethane	µg/L	SW 8260B	2.0	NA	NNS
Bromoform	µg/L	SW 8260B	5.0	NA	NNS
Bromomethane	µg/L	SW 8260B	5.0	NA	NNS
Carbon disulfide	µg/L	SW 8260B	5.0	NA	NNS
Carbon tetrachloride	µg/L	SW 8260B	5.0	NA	NNS
Chlorobenzene	µg/L	SW 8260B	2.0	NA	NNS
Chloroethane	µg/L	SW 8260B	5.0	NA	NNS
Chloroform	µg/L	SW 8260B	2.0	NA	NNS
Chloromethane	µg/L	SW 8260B	5.0	NA	NNS
cis-1,2-Dichloroethene	µg/L	SW 8260B	2.0	NA	NNS
cis-1,3-Dichloropropene	µg/L	SW 8260B	2.0	NA	NNS
Chlorodibromomethane	µg/L	SW 8260B	2.0	NA	NNS
Dibromomethane	µg/L	SW 8260B	2.0	NA	NNS
Dichlorodifluoromethane	µg/L	SW 8260B	5.0	NA	NNS
Ethylbenzene	µg/L	SW 8260B	2.0	NA	NNS
Hexachlorobutadiene	µg/L	SW 8260B	5.0	NA	NNS
Iodomethane	µg/L	SW 8260B	2.0	NA	NNS
Isopropylbenzene	µg/L	SW 8260B	2.0	NA	NNS
m,p-Xylenes	µg/L	SW 8260B	5.0	NA	NNS
Methylene chloride	µg/L	SW 8260B	5.0	NA	NNS

Table 6 – continued Tailings Process Water Monitoring; Mitigation Measure FS-GW-03					
Parameter	**Units**	**Analytical Method**	**Acceptable Detection Limits (at or below the listed value)**	**Permit Limits / Thresholds**	**Applicable Water Quality Standard [1]**
Methyl tert-butyl	µg/L	SW 8260B	1.0	NA	NNS
Naphthalene	µg/L	SW 8260B	5.0	NA	NNS
n-Butylbenzene	µg/L	SW 8260B	5.0	NA	NNS
n-Propylbenzene	µg/L	SW 8260B	2.0	NA	NNS
o-Xylene	µg/L	SW 8260B	5.0	NA	NNS
p-Isopropyltoluene	µg/L	SW 8260B	2.0	NA	NNS
sec-Butylbenzene	µg/L	SW 8260B	5.0	NA	NNS
Styrene	µg/L	SW 8260B	2.0	NA	NNS
tert-Butylbenzene	µg/L	SW 8260B	5.0	NA	NNS
Tetrachloroethene	µg/L	SW 8260B	2.0	NA	NNS
Toluene	µg/L	SW 8260B	2.0	NA	NNS
trans-1,2-Dichloroethene	µg/L	SW 8260B	2.0	NA	NNS
trans-1,3-Dichloropropene	µg/L	SW 8260B	2.0	NA	NNS
Trichloroethene	µg/L	SW 8260B	2.0	NA	NNS
Trichlorofluoromethane	µg/L	SW 8260B	5.0	NA	NNS
Vinyl acetate	µg/L	SW 8260B	25.0	NA	NNS
Vinyl chloride	µg/L	SW 8260B	5.0	NA	NNS
Xylenes, Total	µg/L	SW 8260B	10.0	NA	NNS

Units: S.U. = standard units; NA = not applicable; µS/cm = micro Siemens per centimeter; NNS = no numeric standard; mV = milliVolts; mg/L = milligrams per liter; µg/L = micrograms per liter; pCi/L = picoCuries per liter

[1] Applicable water quality standard: Water quality standard listed is the Arizona Aquifer Water Quality Standard (AWQS) – for comparison purposes only; AWQSs are applicable to groundwater, not process water or leachate.

Additionally, AWQS are applicable to total metals.