FREEPORT-McMoRan
COPPER & GOLD

Sierrita Operations
Environment, Land & Water Department
6200 West Duval Mine Road
PO Box 527
Green Valley, Arizona 85622-0527

December 20, 2013

Via Certified Mail # 7008 2810 0000 0983 7489
Return Receipt Requested

Ms. Marcia Colquitt
Arizona Department of Environmental Quality
Water Quality Compliance Section
1110 West Washington Street
Phoenix, Arizona 85007-2935

Re: Mitigation Order on Consent
Docket No. P-50-06 Mitigation Plan

Dear Ms. Colquitt:

Freeport McMoRan Sierrita Inc. (Sierrita) submits one CD and three copies of the enclosed Mitigation Plan pursuant to Mitigation Order on Consent Docket No. P-50-06.

Sierrita looks forward to Arizona Department of Environmental Quality's review of the Mitigation Plan. Please do not hesitate to contact me at (520) 393-2252 or Martha Mottley at (520) 393-2696 if you have any questions regarding this submittal.

Sincerely,

Kanyembo Katapa
Environmental Engineer

KK:ms
Attachment
20131220_003

xc: David Haag, Arizona Department of Environmental Quality
Mindy Cross, Arizona Department of Environmental Quality
John Broderick, Sierrita
Lana Fretz, Sierrita
Martha Mottley, Sierrita
Stuart Brown, Freeport-McMoRan Copper & Gold
Jim Norris, Clear Creek Associates.

MITIGATION PLAN FOR SULFATE WITH RESPECT TO DRINKING WATER SUPPLIES IN THE VICINITY OF THE FREEPORT-MCMORAN SIERRITA INC. TAILING IMPOUNDMENT

MITIGATION ORDER ON CONSENT DOCKET NO. P-50-06

Prepared for:

FREEPORT-MCMORAN SIERRITA INC.
6200 West Duval Mine Road
Green Valley, Arizona 85614

Prepared by:

CLEAR CREEK ASSOCIATES, P.L.C.
221 North Court Avenue, Suite 101
Tucson, Arizona 85701

December 18, 2013

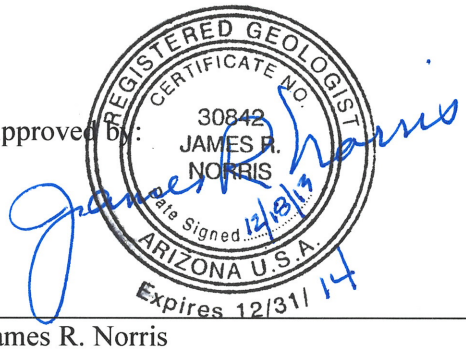
MITIGATION PLAN FOR SULFATE WITH RESPECT TO DRINKING WATER SUPPLIES IN THE VICINITY OF THE FREEPORT-MCMORAN SIERRITA INC. TAILING IMPOUNDMENT

MITIGATION ORDER ON CONSENT DOCKET NO. P-50-06

Prepared for:

FREEPORT-MCMORAN SIERRITA INC.
6200 West Duval Mine Road
Green Valley, Arizona 85614

Approved by:



James R. Norris
Arizona Registered Geologist No. 30842

December 18, 2013

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1.0 INTRODUCTION

This Mitigation Plan describes the process that will be followed to implement the mitigation action[1] for sulfate in groundwater, including its operation, monitoring, evaluation, adaptation, termination, and reporting, in the vicinity of the Freeport-McMoRan Sierrita Inc. (Sierrita) Tailing Impoundment (STI) near Green Valley, south of Tucson, Arizona (Figure 1). The Mitigation Plan is a requirement of Section III.D of Mitigation Order on Consent No. P-50-06 between Arizona Department of Environmental Quality (ADEQ) and Sierrita. The Mitigation Order requires mitigation of existing drinking water supplies exceeding 250 milligrams per liter (mg/L) sulfate, if the sulfate originates from the STI.

Sierrita submitted a Feasibility Study (FS) to ADEQ in October 2008 that recommended a mitigation action of pumping sulfate-affected groundwater in the vicinity of the STI to control additional downgradient movement of the plume and, over time, to reduce the extent of the plume (Hydro Geo Chem, Inc., 2008). Existing drinking water supplies are currently not affected by sulfate in excess of 250 mg/L. The mitigation action will protect existing drinking water supplies by extracting groundwater to limit future plume migration. The recommended mitigation action called for the continuation of pumping at interceptor wells existing at the time of the FS, and the construction of new wells, pipelines, and pumping facilities to allow additional groundwater extraction.

ADEQ approved the recommended mitigation action in March 2009 and requested a Mitigation Plan (ADEQ, 2009). Sierrita submitted a Mitigation Plan in May 2009. ADEQ decided to defer finalization of the Mitigation Plan because it contained several contingencies related to the outcome of land acquisition, construction permitting, and other activities required to implement the mitigation action (Sierrita, 2010). In 2009, Sierrita began implementing the portions of the mitigation action that were not contingent and sought to resolve some of the contingencies. By the end of 2013, Sierrita completed the land acquisition, permitting, design, and construction activities needed for the new pumping and pipeline facilities. The additional groundwater pumping for the mitigation action is scheduled to start in December 2013.

[1] The term mitigation action as used in this document encompasses all actions implemented under the Mitigation Plan at any particular point in time. Initially, the term includes the measures described in Section 2.2.2. If a contingency mitigation measure is implemented or implemented measures are changed due to adaptive management, then the term mitigation action encompasses the contingency or change.

The Mitigation Plan describes the following major project components:

- specifications for groundwater pumping (locations and rates) (Section 2.2.2)
- the operation and maintenance (O&M) plan for monitoring and maintaining the mitigation facilities (wells, pumps, and pipeline) (Section 3.2)
- the groundwater monitoring plan for collecting information on water levels and sulfate concentrations in the aquifer containing the sulfate plume (Section 3.3.2)
- the adaptive management approach that will be used to modify, if necessary, and ultimately terminate the mitigation action (Section 4.1)
- the mitigation performance review process to be used to assess the progress of the mitigation action with respect to the mitigation action objective and other measures (Section 4.2)

The Mitigation Plan also identifies several contingencies that could arise during the mitigation action and outlines Sierrita's approach to respond to the contingencies should they occur (Section 3.4). Reporting (Section 5) and community involvement (Section 6) are also described.

2.0 MITIGATION ACTION

2.1 Mitigation Action Objective

The mitigation action objective defined in the Mitigation Order is to "practically and cost effectively provide a drinking water supply that meets applicable standards and with sulfate concentrations less than 250 mg/L to the owner/operator of an existing drinking water supply determined…to have an average sulfate concentration in excess of 250 mg/L…as a result of the sulfate plume". The FS defines the sulfate plume as consisting of the extent of groundwater, both in a horizontal and vertical context, with sulfate concentrations greater than 250 mg/L. Figure 2 is a map showing the extent of the sulfate plume in the second quarter of 2013.

2.2 Description of the Mitigation Alternative

The mitigation alternative recommended in the FS and approved by ADEQ is Alternative 5. Alternative 5 includes groundwater extraction with three pumping objectives: source control, plume stabilization, and plume reduction. As described in the FS, groundwater extraction for source control and plume stabilization is needed to accomplish the mitigation action objective and limit plume migration to drinking water supply wells. Groundwater extraction for plume reduction will shorten the duration of future pumping, but is not needed to meet the mitigation objective. These pumping objectives are discussed further in Section 2.3.

The volume and duration of groundwater extraction estimated for Alternative 5 was based on the assumption that Sierrita would construct a new tailing impoundment by 2016 so that use of the STI could be discontinued and draindown of the STI initiated while the mine was operating. Initiation of draindown before the end of mining was included in Alternative 5 to reduce the volume of mitigation pumping after the end of mine life to the point that extracted groundwater could be managed through discharge to the Sierrita open pit.

In 2012, Sierrita completed the purchase of 8,307 acres of land from the Arizona State Land Department. These lands were purchased to both enable Sierrita to complete construction of the pumping and piping facilities for the mitigation action, and to provide Sierrita with land necessary to design, permit, and construct a new tailing impoundment in the future.

Sierrita is currently evaluating preliminary designs for the new tailing impoundment as well as analyzing the permitting requirements. Sierrita does not anticipate initiating a feasibility study for the new tailing impoundment earlier than 2015. This timing is later than originally planned for in the

FS and 2009 Mitigation Plan, and precludes implementation of a new tailing impoundment by 2016. Sierrita's continued intent is to construct a new tailing impoundment in the future, thus enabling the STI time to draindown prior to the cessation of mining. However, due to the uncertainties associated with the project, Sierrita is unable to identify if and when a new tailing impoundment would be constructed and brought on-line.

2.2.1 Rationale for Implementation of Alternative 3

At the request of ADEQ (ADEQ, 2009), the 2009 Mitigation Plan identified Alternative 3 as the alternative for implementation if Sierrita determined that a new tailing impoundment could not be implemented by 2016. Sierrita will implement Alternative 3 because a 2016 startup of a new tailing impoundment is infeasible given the current schedule for evaluating a new tailing impoundment. Alternative 3 is identical to Alternative 5 in that it has the same pumping objectives and initial groundwater pumping specifications. The primary differences between Alternatives 3 and 5 are that Alternative 3 does not use a new tailing impoundment and Alternative 3 may have higher pumping requirements at the end of mine life because STI draindown will not start until mining ceases.

The water management action of Alternative 3 is also the same as Alternative 5 during mine life. That is, Sierrita will use the sulfate-affected groundwater pumped under the Mitigation Plan to replace the majority of the fresh groundwater it has historically pumped for mine supply at the Canoa wellfield to the south. After mine closure, Sierrita may be able to manage water through discharge to the pit or through treatment of some or all of the extracted groundwater, depending upon the amount of water that has to be pumped.

A factor that will impact the amount of pumping after mining ceases is the mine life. In 2012, Sierrita announced a larger mine reserve and increased mine life than was recognized at the time the FS and 2009 Mitigation Plan were prepared. The mine life was increased by 46 years, from 2043, as assumed for the FS, to 2089. The longer mine life means that there is a longer time over which Sierrita can consume affected water from mitigation action pumping and potentially implement a new tailing impoundment that would reduce long-term pumping after mining ceases.

Alternative 3 assumes that brine waste from water treatment, if needed, would be placed in the Sierrita open pit after mine closure. A water balance for the Sierrita open pit and an analysis of its ability to operate as a hydraulic sink while receiving solutions after mine closure are provided in the FS (Appendix E of FS). However, because of the increased mine life, the pit would be larger than estimated for the FS and may have greater evaporative capacity due to a larger area.

2.2.2 Description of Alternative 3

A preliminary design for the wellfield, pump facilities, and pipelines required for Alternative 3 was described in the FS. The locations and pumping rates of wells for Alternative 3 are the same as for Alternative 5, except that higher future pumping rates may be needed for Alternative 3 than for Alternative 5.

The final conceptual wellfield design specified the locations and pumping rates for wells based on the preliminary design and on numerical groundwater flow and sulfate transport modeling updated through 2009 (Hydro Geo Chem, Inc. and Clear Creek Associates, 2010). The final conceptual design was constructed by Sierrita. Since 2010, Sierrita acquired land east of the STI, installed and equipped the extraction wells, and completed the engineering design and construction of the pumping stations and pipelines. Figure 3 shows the locations of the groundwater extraction wells, pipelines, and pumping facilities for the mitigation action.

During construction of the mitigation facilities, modification of the design was necessitated by conditions on the ground. First, the locations of three wells (the MC wells) were modified based on land use considerations and discussions with residents near proposed well sites. These wells were relocated to Sierrita property, or private property to which Sierrita secured an easement, after numerical modeling determined the new well locations would meet the mitigation action objective and the design change was discussed with ADEQ (Sierrita, 2011a). Second, testing conducted on two wells (FFS-3 and FFS-4) determined they were unlikely to meet their design pumping rates. Consequently, the pumping rates at wells near the low-producing wells were increased to compensate for their shortfall with respect to the design specifications (Sierrita, 2013).

The groundwater flow and sulfate transport model was updated in 2013 to reflect conditions through 2012, the well locations of the as-built wellfield, the measured pumping capacities of the wells, and STI seepage. The model was run for 100 years into the future to predict sulfate plume movement under Alternative 3 during the increased mine life and after mining. Pumping specifications were modified to meet the source control, plume stabilization, and plume reduction pumping objectives. Table 1 lists the groundwater pumping specifications for Alternative 3 based on the 2013 model results.

Figure 4 shows the predicted 250 mg/L sulfate concentration contour over time for the assumed Alternative 3 pumping rates. The model results indicate that the sulfate plume does not migrate to drinking water supplies and that the areal extent of the plume is reduced over time. The plume control results predicted for Alternative 3 are equivalent to the results that would be expected under Alternative 5.

As described in Section 3, the mitigation action will be monitored over time to verify the pumping rates achieved by the wellfield and the sulfate concentrations resulting in the aquifer. Modifications to the wellfield (well addition or retirement) and pumping specifications may be needed in the future depending on the performance of wells and the future distribution of sulfate concentrations.

2.3 Performance Goal

The pumping specifications for Alternative 3 include groundwater pumping at four groups of wells: interceptor wells (IW), focused feasibility study (FFS) wells, plume stabilization (PS) wells, and mass capture (MC) wells (Figures 3 and 4). As described in the FS, there are different pumping objectives for groundwater extraction at the various well groups. The IW and FFS wells are pumped for source control to capture seepage from the STI before it migrates to the regional aquifer. The PS wells at the northern edge of the plume are pumped in conjunction with the IW and FFS wells for the purpose of plume stabilization to control additional downgradient movement of the plume. The MC wells are pumped primarily to reduce the plume extent by extracting sulfate mass, although some pumping of the MC wells is used for plume stabilization.

The combined pumping for source control and plume stabilization is designed to limit the future migration of the plume so that drinking water supply wells are not affected by the plume. Thus, the mitigation action objective would be met by source control and plume stabilization pumping only. Pumping in excess of source control and plume stabilization pumping is conducted for plume reduction. Plume reduction pumping is not needed to meet the mitigation action objective, but can be used to reduce the volume of future pumping and shorten the duration of the mitigation action.

The objective of groundwater pumping under the Mitigation Order is to meet the mitigation action objective. Thus, the narrative performance goal for pumping is defined to be maintenance of groundwater extraction at locations and rates sufficient to meet the mitigation action objective over time. A numeric performance goal for groundwater pumping is identified to differentiate the minimum pumping required to meet the mitigation action objective (i.e., source control and plume stabilization pumping) from the total pumping (inclusive of plume reduction pumping) for Alternative 3.

The performance goal is determined using the groundwater flow and sulfate transport numerical model to simulate the minimum groundwater extraction needed for source control and plume stabilization (Appendix D of Hydro Geo Chem, Inc. and Clear Creek Associates, 2010). Table 2 lists pumping rates for the performance goal. Pumping at rates greater than the performance goal helps reduce the duration and amount of future pumping, but is not critical to meeting the mitigation action objective.

The performance goal is important because, although not planned at this time, future operating conditions at Sierrita may require the mine to consider periodic reductions in mitigation pumping to accommodate other mine water management needs (e.g., dewatering of the Twin Buttes pit to resume mining, temporary production slow downs, etc.). The performance goal is a useful measure for water management planning because it sets the base level of pumping needed to meet the mitigation action objective in the short-term.

The performance goal is not an absolute lower limit for successful operation of the wellfield over time and should be reassessed as the mitigation progresses. This is because source control and plume stabilization can be accomplished at lower pumping rates over time as the plume becomes smaller (Figure 4) and the STI seepage declines after mining ends.

The performance goal is meant as a planning tool for the beginning of the mitigation during which the plume extent is predicted to decrease. The performance goal will be reassessed during the mitigation performance reviews (Section 4.2). Any subsequent modification of the performance goal recommended by the performance review would supersede the values in Table 2. The long mine life of Sierrita is a benefit for planning mitigation pumping and water management in that there is a long time over which mitigation pumping can be used to accomplish multiple objectives.

The pumping rates at individual wells, groups of wells, and the entire wellfield will vary up and down over time as wells or pumps are cycled on- and off-line for maintenance or repair. Short-term increases and decreases in wellfield pumping rates associated with normal wellfield maintenance are expected in a wellfield this large, and will be tracked and reported as described in Sections 3.3.1 and 5.1.1, respectively. Routine operational decisions, such as taking facilities off-line for maintenance/repair, replacing an existing well, or adding a new well to maintain system pumping capacity, will be reported to ADEQ per the reporting specifications of Section 5.

A change in wellfield or operating conditions that would decrease the total pumpage to the performance goal for a period longer than six months will be reported to ADEQ in a separate notice letter. A change in wellfield or operating conditions that would have the potential to decrease the total pumpage to less than the performance goal is a contingency described in Section 3.4. Any such contingency would be pursued through the adaptive management approach described in Section 4.1.

3.0 MITIGATION FACILITIES OPERATION AND MONITORING

The construction of facilities for Alternative 3 is complete and full startup of the groundwater pumping system is scheduled for December 2013. All facilities are located on property owned or leased by Sierrita. This section describes the O&M Plan (Section 3.2) and the Post-Implementation Groundwater Monitoring Plan (Section 3.3) that will be used to operate the mitigation action and monitor the effects in the aquifer of groundwater extraction. Sierrita also proactively identified hypothetical events that could require contingency measures should they occur during the operation of the mitigation action. These contingencies and Sierrita's responses are described in Section 3.4.

3.1 Mitigation Facilities Operation

The mitigation facilities consist of the groundwater extraction wells, pumping stations, and pipelines required for Alternative 3 (Figure 3). The Sierrita environmental manager or their designee will be responsible for maintaining the operation of the mitigation facilities.

Groundwater pumping under the Mitigation Plan will be a continuous operation except for scheduled downtime for maintenance activities required by the O&M Plan or outages for unscheduled repairs. Groundwater pumping will be conducted initially using the pumping specifications in Table 1, although pumping rate specifications may be changed from time to time based on the mitigation performance reviews described in Section 4.2.

3.2 Operation and Maintenance Plan

Sierrita is knowledgeable and well qualified for operating large scale wellfields and pumping systems. Their experience has been gained through decades of operating the Canoa and interceptor wellfields and the water circuits for the mine. Given the expected duration of the mitigation action, O&M will be a key process for ensuring reliable, long-term operation of the mitigation facilities. The existing O&M plan for the interceptor wells (Sierrita, 2011b) will be updated to encompass all the mitigation facilities operated pursuant to this Mitigation Plan. Sierrita will develop and implement an updated O&M plan for the mitigation facilities. The updated O&M plan will be submitted to ADEQ in December 2013. The goals of the O&M plan are to provide:

- Guidance for operation of the wellfield in a manner that optimizes the pumping of groundwater to meet target yield rates to the degree practicable
- Instructions for monitoring wellfield operational parameters and criteria for planning maintenance reviews for wells

- Information for long-term planning for wellfield operation, maintenance, and monitoring

The O&M plan will specify procedures for collecting operational information on wells, pumps, and pipelines, and will describe protocols for preventative maintenance and equipment replacement. Components of the updated O&M Plan will include information such as:

- Identification of responsibilities and resources
- Schedules for monitoring of dynamic and static water levels, well specific capacity, well saturated thickness, pumping rates, pump run time, and electrical use in pumping wells
- Schedules and procedures for equipment inspections and maintenance; including well cleaning and rehabilitation (mechanical and chemical redevelopment methods), pump equipment, and transmission pipelines (pipe leaks, air release valves, check valves, pressure gauges, manifolds, and flow meters)
- Identification of equipment repair and replacement procedures
- Procedures and forms for systematic record keeping

These data will be collected and used by Sierrita to evaluate pumping capabilities, identify maintenance needs, optimize the electrical and mechanical systems constituting the mitigation facilities, and to document pumping conducted for the mitigation action.

3.3 Monitoring Programs

Monitoring programs will collect information on the operation of the mitigation facilities, and the response of the subsurface aquifer and sulfate plume to groundwater extraction. Mitigation facilities monitoring will track the availability and pumping capacity of the mitigation facilities. Groundwater monitoring will document aquifer conditions and sulfate concentrations throughout the mitigation action. These data will be used to evaluate the mitigation action with respect to the pumping specifications and performance goal.

3.3.1 Mitigation Facilities Monitoring

Mitigation facilities monitoring will be conducted under the O&M Plan to collect information on the availability and operation of the mitigation facilities. The O&M plan will specify collection of the information of interest for mitigation facilities monitoring, including:

- Average monthly pumping rates of individual wells and monthly total mitigation pumping
- Monthly operating availability of well pumps and booster stations
- Static and dynamic water levels at extraction wells

The data from mitigation facilities monitoring will be used to document groundwater pumping under the Mitigation Plan and to assess operating conditions with respect to the Alternative 3 pumping specifications and the performance goal.

The mitigation performance reviews described in Section 4.2 will use mitigation facilities monitoring data to update the numerical model with well-by-well pumping rates attained during the assessment period. The mitigation performance review will also assess the static and dynamic water level data for pumping wells to estimate wellfield drawdown over time for the purposes of evaluating wellfield capture and validating the numerical model.

3.3.2 Post-Implementation Groundwater Monitoring Plan

This section contains the Post-Implementation Groundwater Monitoring Plan. Sierrita will conduct groundwater monitoring pursuant to the Post-Implementation Groundwater Monitoring Plan to document groundwater elevation and water quality conditions in the vicinity of the sulfate plume and mitigation facilities during the mitigation action.

3.3.2.1 Objectives

The objectives of groundwater monitoring after implementation of the mitigation action will be to:

- monitor wells along the plume edge to track the location of the plume over time
- monitor sulfate in sentinel and drinking water supply wells near the plume to verify that sulfate concentrations are less than 250 mg/L
- document water level and sulfate concentrations in the vicinity of the mitigation wellfield to assess mitigation progress

These objectives are similar to those currently used for pre-implementation groundwater monitoring (Sierrita, 2009a and 2009b), except for the inclusion of additional monitoring of the mitigation wellfield.

Post-implementation groundwater monitoring includes quarterly water level measurement and water quality sampling for sulfate at sentinel and drinking water supply wells. Table 3 lists wells and monitoring for the Post-Implementation Groundwater Monitoring Plan. Well locations are shown on Figure 5. The wells for monitoring are the same as those in the Pre-Implementation Groundwater Monitoring Plan that has been in effect since 2009, except for the addition of the new extraction

wells and monitoring wells around the extraction wells. These facilities will be monitored so that the aquifer responses to pumping can be tracked in areas where the largest water level changes are expected.

The methods currently used for water level measurement, water sample collection, and data quality assurance/quality control are described in the Quality Assurance Project Plan (QAPP) for the Mitigation Order (Appendix E of Hydro Geo Chem, Inc., 2006). The post-implementation monitoring will be conducted using the current methods to maintain consistency with procedures used throughout the investigation of the sulfate plume. Sierrita reserves the right to reduce or increase the frequency of monitoring depending on prevailing conditions as determined by the mitigation performance reviews (Section 4.2).

3.3.2.2 Water Level Measurement

Water level measurement will document potentiometric conditions for assessment of groundwater flow directions and hydraulic gradients. These data are used for capture zone analysis, evaluation of capture effectiveness, and groundwater flow modeling.

Water level measurements will be made at every monitoring well from which a water quality sample is collected (Table 3), unless the well does not have access to allow water level sounding. The water level measurements made at operating pumping wells represent dynamic (pumping) conditions. Under the O&M plan, static water level measurements will be made at pumping wells when they are shut down for maintenance or pumping tests.

The startup of the mitigation wellfield presents a unique opportunity to quantify drawdown around the pumping wells and throughout the wellfield. The pumping will serve as a large scale aquifer test that will cause water level changes around the wellfield as pumping progresses. The water level responses can be used to estimate hydraulic properties and further calibrate the groundwater flow model in the wellfield area. Water levels are expected to exhibit the greatest change during the first year or two of wellfield pumping. For this reason, water level measurements at select wells will be collected monthly during the first year of operation. The wells for monthly groundwater monitoring are shown on Figure 6. Water levels will be measured quarterly after the first year.

3.3.2.3 Water Quality Sampling

Water quality sampling will measure sulfate concentrations over time to document water quality trends in the aquifer, delineate the plume, and determine sulfate concentrations in the vicinity of drinking water supply wells. Groundwater sampling and analysis procedures are described in the QAPP. The pH and electrical conductivity of water samples will be analyzed in the field. Sulfate will be the only laboratory analyte. The water samples will be filtered using a 0.45 micron filter and sulfate determinations made on a dissolved basis. Groundwater sample locations are listed in Table 3 and shown on Figure 5.

3.3.2.4 Data Use

During the first five years of operation, groundwater monitoring reports will be prepared and submitted to ADEQ semiannually as is the current frequency of reporting. The frequency of reporting may be reduced in the future as discussed below. Data from groundwater monitoring will be used to identify the location of the sulfate plume, to characterize potentiometric conditions around the plume, and to determine sulfate concentrations at and in the vicinity of drinking water supply wells. The data will be used, in conjunction with numerical analysis, for mitigation performance reviews that assess the progress of the mitigation action (Section 4.2). Ultimately, Sierrita may request termination of the Mitigation Plan and the Mitigation Order upon a demonstration of groundwater monitoring data and technical analysis satisfactory to ADEQ that the mitigation action objective would continue to be met without groundwater pumping.

Groundwater with sulfate concentrations less than 250 mg/L at the extremity of the plume and outside the capture zone of the extraction system will migrate downgradient over time. Groundwater monitoring will be used to verify groundwater concentrations outside the capture zone of mitigation pumping and to monitor the natural attenuation of sulfate over time due to mixing with low-sulfate groundwater on the edge of the plume. At a future point in the mitigation action, the sulfate plume may be small enough to allow monitored natural attenuation of all or a portion of the plume. Groundwater monitoring data, along with groundwater modeling, would be used to support a monitored natural attenuation proposal and verify its performance should future conditions allow it.

The Post-Implementation Groundwater Monitoring Plan, including the frequency of reporting, will be assessed annually for the first five years and every five years thereafter to determine whether modification of the plan is needed to account for changes in conditions, such as changes in well status, pumping rates, plume location, or other factors. The monitoring plan assessment will be part of the mitigation performance review (Section 4.2). Sierrita would submit notice to ADEQ regarding

any modification of the Post-Implementation Groundwater Monitoring Plan prior to implementation, and any such modification would supersede the specifications of Section 3.3.2.

3.4 Contingency Measures

Sierrita identified several hypothetical events as contingencies that, though unexpected, could occur while operating the mitigation action. Sierrita would use the adaptive management approach (Section 4.1) to evaluate and respond to new conditions that could constitute a contingency. The purpose of identifying contingencies is to have a general response approach agreed to in the event the contingency arises. The contingencies and Sierrita's response are described below.

1. Contingency Event: Monitoring Results Trigger Implementation of Mitigation to Address a Threat or Actual Impact to a Drinking Water Supply Well or System

Existing drinking water supply wells are not expected to become affected by excess sulfate under the Mitigation Plan because sulfate plume migration will be controlled. However, in the event groundwater monitoring identifies a drinking water supply well that is threatened to be impacted or that becomes impacted due to the plume from the STI, Sierrita would work cooperatively with the well owner to develop a site-specific plan for mitigation actions to address the well. The FS and the Interim Action Technical Memorandum (Hydro Geo Chem, Inc., 2006) describe the types of potentially applicable mitigation actions for drinking water supply wells.

The Post-Implementation Groundwater Monitoring Plan specifies monitoring for sentinel wells and drinking water supply wells in the vicinity of the plume. Should monitoring results indicate a threat or impact to a drinking water supply, Sierrita would implement contingent mitigation of a drinking water supply well as described in its 2010 proposal for monitoring and response at drinking water supply wells (Sierrita, 2010).

A flow chart summarizing the monitoring and trigger levels for action is shown by Figure 7. If sulfate concentrations are verified as exceeding 135 mg/L at a drinking water supply well due to the plume from the STI, Sierrita would notify ADEQ and the well owner in writing and, in collaboration with the owner/operator of the drinking water supply well, develop a site-specific plan for a mitigation action that could be implemented at the drinking water supply well before it is impacted. If sulfate concentrations are verified as exceeding 250 mg/L at a sentinel well due to the plume from the STI, Sierrita would notify ADEQ and the well owner in writing, increase the sampling frequency at the sentinel well to monthly, and conduct a trend analysis on the sulfate concentrations to determine further actions.

2. Contingency Event: Mining Operations Temporarily Cease Before the Expected End of Mine Life or Mine Use of Water Decreases Below the Level of Mitigation Pumping Required for the Performance Goal

As long as Sierrita remains in operation, groundwater pumped under the Mitigation Plan will be used in mining operations, in lieu of unaffected water that otherwise would have been pumped from other Sierrita water supply locations. If mining operations undergo a temporary stoppage or reduction in water use such that the mining use of water is less than the pumping for the performance goal, Sierrita would implement a plan to maintain pumping at rates sufficient to attain the performance goal. As discussed in Section 2.3, pumping at the performance goal is expected to accomplish the mitigation action objective. In the event of a stoppage or reduction in water use, Sierrita would develop a pumping and water management plan, including a design and implementation schedule, to maintain the performance goal pumping. The plan would be submitted to ADEQ as notice prior to implementation. Water management actions that may be considered include evaporation, water treatment, water placement in the Sierrita open pit, or a combination of methods. Placement of water in the Sierrita open pit, if used, would be monitored for its effect on the pit capture zone per Sierrita's area-wide Aquifer Protection Permit (APP).

3. Contingency Event: Mining Operations Permanently Cease before Expected End of Mine Life

If mining operations were to permanently cease before the expected end of mine life, Sierrita would continue the groundwater pumping required to meet the performance goal. As discussed in Section 2.3, pumping at the performance goal is expected to accomplish the mitigation action objective.

In the event of an early closure of the mine, Sierrita would develop a pumping and water management plan, including a design and implementation schedule, to maintain the performance goal pumping. The plan would be submitted to ADEQ as notice prior to mine closure. At a minimum, Sierrita would reroute pumpage from use in mining operations to placement in the Sierrita open pit and/or to a water treatment facility. Water management actions that may be considered include evaporation, water treatment, water placement in the Sierrita open pit, or a combination of methods. Placement of water in the Sierrita open pit, if used, would be monitored for its effect on the pit capture zone per Sierrita's area-wide APP.

4. Contingency Event: Monitoring of Open Pit Indicates Potential Loss of Hydraulic Capture

Sierrita's area-wide APP requires Sierrita to monitor water levels in the Sierrita open pit to assess the hydraulic capture of groundwater by the pit. If Sierrita places groundwater pumped under the

Mitigation Plan in the Sierrita open pit, Sierrita would monitor water levels in and around the open pit to comply with the area-wide APP. If water levels rise to a point where the loss of hydraulic capture by the open pit is threatened, Sierrita would develop an alternate water management plan that may include designing a water management system to treat and discharge water pumped under the Mitigation Plan, consistent with the potential water treatment and discharge options discussed in the FS. Sierrita would submit a proposed design and implementation schedule for the water management system to ADEQ as notice prior to implementation. The schedule for design and construction would be developed in a timely manner so that Sierrita can both maintain compliance with its APP and avoid disruption of groundwater pumping under this Mitigation Plan.

4.0 ADAPTIVE MANAGEMENT AND MITIGATION PERFORMANCE REVIEWS

Section III.D of the Mitigation Order stipulates "The Mitigation Plan may use an adaptive management approach that allows for the adjustment of mitigation measures from time to time based on information obtained concerning the performance of implemented measures and/or the identification of additional supply wells that could be impacted by sulfate concentrations exceeding 250 mg/L".

The adaptive management approach will be used to evaluate and respond to new information or conditions that may affect the operation of the mitigation action. Mitigation performance reviews will be used to periodically evaluate monitoring data and to assess the progress of the mitigation action over time. The mitigation action would be modified pursuant to the adaptive management approach if the performance reviews identify new information that warrants a change to pumping specifications or new business conditions arise that impose new constraints on the mitigation facilities.

4.1 Adaptive Management

Adaptive management is a process of review, analysis, and adaptation used to manage uncertainty in decision making for environmental projects. Adaptive management relies on an iterative process of data gathering and analysis to improve decision making in an uncertain environment. For purposes of this Mitigation Plan, adaptive management will involve comparing the performance of the mitigation action as determined by groundwater monitoring to the expected performance predicted by numerical modeling, and implementing changes, if needed, based on the results. Adaptive management may also be used should Sierrita need to respond to business or operational changes during the mitigation action.

The processes of monitoring and performance review are integral to adaptive management because these activities will collect data on the effects of the mitigation action and evaluate the effects against the pumping objectives and mitigation action objective. If the expected performance of the mitigation action is not being met, Sierrita would use adaptive management to evaluate the situation and to modify the mitigation action based on operational experience and/or modeling.

The adaptive management process can be triggered by factors internal or external to the mitigation action. Examples of internal factors are a determination by the performance review that the mitigation action is not meeting the mitigation action objective or a determination that pumping exceeds the minimum needed to attain the mitigation action objective based on operations

monitoring, groundwater monitoring, or another analysis. External factors could include administrative (e.g., the development of new environmental quality or water supply laws) or business (e.g., changes in mine life or production rate such as the contingencies described in Section 3.4) developments that may impact the mitigation action. Adaptive management would be used to manage changes in administrative or business conditions that may impact attainment of the mitigation action objective.

New information and/or changing conditions may trigger the need to adjust the mitigation action from time to time. Any triggering event that requires modification of pumping to the level of the performance goal for six months or more would be reported to ADEQ as notice in advance of implementation. Any triggering event that requires modification of pumping to a level less than the performance goal would be described in a plan submitted to ADEQ for approval prior to implementation.

4.2 Mitigation Performance Reviews

Mitigation performance reviews will be conducted and submitted to ADEQ annually for the first five years after full commissioning of the mitigation facilities and every five years thereafter, although Sierrita reserves the right to reduce or increase the frequency of mitigation performance reviews depending on prevailing conditions and notice to ADEQ prior to implementation. Mitigation performance reviews will assess whether the mitigation action is performing as expected with respect to the mitigation action objective and numerical model predictions. The performance reviews will evaluate whether mitigation pumping needs modification (increase, decrease, or relocation) to meet the mitigation action objective or can be terminated.

The mitigation performance review will evaluate the mitigation facilities operation and groundwater monitoring data collected by Sierrita. Operations and groundwater monitoring data will include the following.

- Pumping data for individual wells and the entire system
- Water quality data for drinking water supply wells and sentinel wells located between the plume and the drinking supply wells
- Water quality data from monitoring wells located within and downgradient of the plume
- Water level data from wells positioned to monitor drawdown in the vicinity of mitigation wellfield

Mitigation facilities operation monitoring data will be used to determine whether groundwater pumping met the pumping specifications and for updating of the numerical model. Water quality data will be used to evaluate sulfate trends at downgradient monitoring wells, plume edge monitoring

wells, drinking water supply sentinel wells, and extraction wells. Sulfate concentrations over time will be shown on graphs to illustrate water quality trends. Water level data will be used to assess groundwater flow conditions in the vicinity of the plume and mitigation facilities, identify the capture zone of mitigation pumping, and to update the numerical model.

The numerical model for groundwater flow and sulfate transport will be updated for each mitigation performance review to incorporate the actual pumping and other conditions during the review period. The model will be used to evaluate the sensitivity of the mitigation action to changes in conditions and to predict the future plume migration based on the pumping achieved and any new data on the regional water balance. The numerical model will be used to re-evaluate the performance goal based on conditions during the performance review period.

Water level data in the vicinity of the mitigation facilities will be used to evaluate the degree of drawdown around the wellfields. Capture zone analysis will be conducted based on analysis of field measurements and/or analysis using analytical or finite-difference numerical groundwater flow models. The numerical model used to develop the mitigation pumping scheme will be used to assess the capture predicted for pumping during the review period. The capture zone analysis will consider the methods in the 2008 U.S. Environmental Protection Agency guidance document on evaluation of capture zones (Environmental Protection Agency, 2008).

The adaptive management process (Section 4.1) would be used to evaluate and modify the mitigation action in the event that the performance review determines that the mitigation action objective is not being met. For example, adaptive management would be used to modify pumping if the performance review determines that monitoring data indicate the plume continues to move downgradient (i.e., plume stabilization not attained). Adaptive management would also be used to address modifications to mitigation action necessitated by changes in the mining operation.

4.3 Reduction or Termination of Mitigation Pumping

The mitigation performance review will evaluate when source loading and the plume extent are at a point that mitigation pumping can be reduced or terminated. As described in the FS, mitigation pumping is expected to be reduced over time as the plume extent and STI seepage are reduced. For example, the PS and MC wells could be retired when the plume extent is reduced to the point that the plume can be controlled by source control pumping at the IW and FFS wells only. Source control pumping can be reduced or terminated as the seepage rate from the STI declines over time after its use is discontinued. Sierrita may request termination of the Mitigation Plan and the Mitigation Order upon a demonstration satisfactory to ADEQ that the mitigation action objective would continue to be met without additional groundwater pumping.

The mitigation performance reviews will evaluate water quality and water level data to assess source loading, plume extent, and ambient sulfate concentrations. Numerical analysis of groundwater flow and sulfate transport will be used to evaluate the effects of reducing or terminating pumping in one or more wells. If analysis indicates that the mitigation action objective can be met by reducing or terminating pumping or that monitored natural attenuation would be sufficient to mitigate residual sulfate-impacted groundwater, Sierrita would prepare a recommendation to modify pumping and submit it to ADEQ as notice prior to implementation.

5.0 REPORTING

5.1 Routine Reporting

Mitigation facilities monitoring reports and groundwater monitoring reports will be prepared to document actions taken under the Mitigation Plan. These reports may be prepared as a combined report if practical.

5.1.1 Mitigation Facilities Monitoring Report

The mitigation facilities monitoring reports will document groundwater pumping under the Mitigation Plan and describe wellfield and conveyance operational conditions during the period of interest. Mitigation facilities operation reports will consist of data on pumping system availability, well pumping rates, and total system pumping. The actual system pumping will be compared to design specifications to assess the mitigation facilities with respect to their mechanical capacity to pump and convey the required volumes of water. Conditions that significantly influenced the capacity of the wellfield during the reporting period will be reviewed. Examples of conditions that may influence wellfield capacity include well rehabilitation efforts, well and booster pump maintenance, or pipeline maintenance.

Mitigation facilities monitoring reports will be prepared annually and submitted to ADEQ. The mitigation facilities monitoring reports will be submitted 60 days after the close of the 12-month period of the report.

5.1.2 Groundwater Monitoring Report

The reports will provide tables of the water quality and water level data collected for the period of interest. Water level contour and sulfate concentration contour maps will be prepared to illustrate the monitoring data. Time series graphs of water levels or sulfate data may be used to portray trends at key locations. Laboratory analysis reports and associated quality assurance/quality control documentation will be provided in the groundwater monitoring reports. The groundwater monitoring reports will primarily transmit data to ADEQ with little interpretation. Evaluation of the results with respect to the progress of the mitigation would be provided in the mitigation performance review reports described below.

Groundwater monitoring reports will be prepared and submitted to ADEQ based on the frequency

specified in the Post-Implementation Groundwater Monitoring Plan. The groundwater monitoring report will be submitted 60 days after the close of the period of the report. The reporting frequency for the Post-Implementation Groundwater Monitoring Plan will be assessed, and potentially revised, periodically as discussed in Section 3.3.2.

5.2 Mitigation Performance Review Reports

Mitigation performance review reports will compile and interpret the results of mitigation facilities and groundwater monitoring. The reports will review water level and water quality conditions, the results of numerical model updates, and capture zone modeling. The mitigation performance review report will provide a critical analysis of the progress of the mitigation action with respect to the pumping specifications and mitigation action objective.

Mitigation performance review reports will be prepared annually for the first five years after full startup of the mitigation facility and every five years thereafter. The mitigation performance review report will be submitted to ADEQ 120 days after the close of the period of the report.

6.0 COMMUNITY INVOLVEMENT

6.1 Community Advisory Group

A Community Advisory Group (CAG) was formed for the purpose of improving the public's access and understanding of information regarding the Mitigation Order. A CAG consisting of five persons selected from a cross section of the community will be maintained to meet annually throughout the mitigation or as needed based on community interest.

6.2 Public Information Repository

Sierrita will maintain the information repository at the Joyner Green Valley Public Library in Green Valley. Copies of correspondence and reports submitted to ADEQ for the Mitigation Order will be placed in the library for public access.

6.3 Sierrita Internet Document Repository

Sierrita will maintain the internet document repository at http://www.fcx.com/sierrita/home.htm. Copies of correspondence and reports submitted to ADEQ for the Mitigation Order will be placed on the public access internet website for download.

7.0 REFERENCES

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U.S. Environmental Protection Agency. 2008. A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, Final Project Report. EPA/600/R-08/003. January 2008.

TABLES

TABLE 1
Groundwater Pumping Rates for Alternative 3

Well Name	ADWR Registry Number	2014-2020	2021-2025	2026-2030	2031-2035	2036-2042	2043-2050	2051-2060	2061-2089	2090-2112
IW-01	623129	250	250	250	250	188	80	80	80	80
IW-02A	216464	300	300	300	300	300	200	200	200	200
IW-03A	201732	500	500	500	500	400	400	300	300	300
IW-04	623132	40	40	40	40	40	40	40	40	40
IW-05A	623133	40	40	40	40	40	40	40	40	40
IW-06A	545565	80	80	80	80	40	40	40	40	40
IW-08	508238	350	350	350	350	325	200	200	200	200
IW-09	508236	200	200	200	200	150	150	150	150	150
IW-10	508237	250	250	250	250	250	100	100	100	100
IW-11	508235	325	325	325	250	250	250	150	150	150
IW-12	545555	125	125	125	75	75	50	50	50	50
IW-13	545556	0	0	0	0	0	0	0	0	0
IW-14	545557	60	60	60	60	50	40	40	40	40
IW-15	545558	40	40	40	40	40	40	40	40	40
IW-19	545562	150	150	150	100	100	50	50	50	50
IW-20	545563	0	0	0	0	0	0	0	0	0
IW-21	545564	100	100	100	75	50	50	50	50	50
IW-22	200554	300	300	300	300	300	200	200	200	200
IW-23	200555	120	120	120	120	120	50	50	50	50
IW-24	200556	50	50	50	50	50	40	40	40	40
EXISTING IW WELL TOTAL		**3280**	**3280**	**3280**	**3080**	**2768**	**2020**	**1820**	**1820**	**1820**
IW-25	219596	400	400	350	350	350	300	300	300	300
IW-26	219143	350	350	350	350	350	300	300	300	300
IW-27	219136	100	100	100	100	100	100	100	100	100
IW-28	219137	400	400	400	400	400	350	350	350	350
NEW IW WELL TOTAL		**1250**	**1250**	**1200**	**1200**	**1200**	**1050**	**1050**	**1050**	**1050**
FFS-1	221662	800	800	800	800	800	800	800	800	800
FFS-2	221663	700	700	700	700	700	700	700	700	700
FFS-3	221664	400	400	400	400	400	400	400	400	400
FFS-4	221665	200	200	200	200	200	200	200	200	200
FFS-5	221666	1000	1000	1000	1000	1000	1000	1000	1000	1000
FFS-6	221667	600	600	600	600	600	600	600	600	600
FFS WELL TOTAL		**3700**	**3700**	**3700**	**3700**	**3700**	**3700**	**3700**	**3700**	**3700**
PS-1	999018	700	700	700	700	700	700	700	700	700
PS-2	999019	800	**800**	**800**	**800**	**800**	**800**	**800**	**800**	800
PS-3	999020	800	**800**	**800**	**800**	**800**	**800**	**800**	**800**	800
PS-4	999021	1000	1000	1000	1000	1000	1000	1000	1000	1000
PS WELL TOTAL		**3300**	**3300**	**3300**	**3300**	**3300**	**3300**	**3300**	**3300**	**3300**
MC-1	999014	900	900	900	900	900	900	900	**900**	900
MC-2	221761	700	700	700	700	700	**700**	**700**	**700**	700
MC-3	221661	600	600	600	900	900	**900**	**900**	**900**	900
MC-4	220842	600	600	600	600	600	600	600	**600**	600
MC WELL TOTAL		**2800**	**2800**	**2800**	**3100**	**3100**	**3100**	**3100**	**3100**	**3100**
TOTAL PUMPING		**14,330**	**14,330**	**14,280**	**14,380**	**14,068**	**13,170**	**12,970**	**12,970**	**12,970**

Notes:
ADWR = Arizona Department of Water Resources
FFS = Focused Feasibility Study
IW = Interceptor Wells
PS = Plume Stabilization
MC = Mass Capture

TABLE 2
Performance Goal Pumping Rates

Well Name	ADWR Registry Number	2014-2020	2021-2025	2026-2030	2031-2035	2036-2042
IW-01	623129	250	250	250	250	188
IW-02A	216464	300	300	300	300	300
IW-03A	201732	500	500	500	500	400
IW-04	623132	40	40	40	40	40
IW-05A	623133	40	40	40	40	40
IW-06A	545565	80	80	80	80	40
IW-08	508238	350	350	350	350	325
IW-09	508236	200	200	200	200	150
IW-10	508237	250	250	250	250	250
IW-11	508235	325	325	325	250	250
IW-12	545555	125	125	125	75	75
IW-13	545556	0	0	0	0	0
IW-14	545557	60	60	60	60	50
IW-15	545558	40	40	40	40	40
IW-19	545562	150	150	150	100	100
IW-20	545563	0	0	0	0	0
IW-21	545564	100	100	100	75	50
IW-22	200554	300	300	300	300	300
IW-23	200555	120	120	120	120	120
IW-24	200556	50	50	50	50	50
EXISTING IW WELL TOTAL		**3280**	**3280**	**3280**	**3080**	**2768**
IW-25	219596	400	400	350	350	350
IW-26	219143	350	350	350	350	350
IW-27	219136	100	100	100	100	100
IW-28	219137	400	400	400	400	400
NEW IW WELL TOTAL		**1250**	**1250**	**1200**	**1200**	**1200**
FFS-1	221662	338	338	338	338	488
FFS-2	221663	300	300	300	300	450
FFS-3	221664	225	225	225	225	225
FFS-4	221665	150	150	150	150	113
FFS-5	221666	225	225	225	225	225
FFS-6	221667	225	225	225	225	225
FFS WELL TOTAL		**1463**	**1463**	**1463**	**1463**	**1726**
PS-1	999018	750	750	750	750	750
PS-2	999019	800	800	800	800	800
PS-3	999020	800	800	800	800	800
PS-4	999021	1000	1000	1000	1000	1000
PS WELL TOTAL		**3350**	**3350**	**3350**	**3350**	**3350**
MC-1	999014	0	0	0	0	0
MC-2	221761	0	0	0	0	0
MC-3	221661	750	750	750	750	750
MC-4	220842	600	600	600	600	600
MC WELL TOTAL		**1350**	**1350**	**1350**	**1350**	**1350**
TOTAL PUMPING		**10,693**	**10,693**	**10,643**	**10,443**	**10,394**

Notes:
ADWR = Arizona Department of Water Resources
FFS = Focused Feasibility Study
IW = Interceptor Wells
PS = Plume Stabilization
MC = Mass Capture

TABLE 3
Post-Implementation Groundwater Monitoring Schedule

Well Name	ADWR 55 Well Registry No.	Well Use	Owner	Annual Sampling	Semiannual Sampling	Quarterly Sampling	Monthly Water Level Monitoring*
CC of GV	501760	Monitor	Sierrita	✓			
CW-3	627483	DWS	CWC	✓	✓		✓
CW-6	627485	DWS	CWC	✓	✓	✓	
CW-7	502546	Monitor	CWC	WLO			
CW-8	543600	Monitor	CWC	WLO			
CW-9	588121	DWS	CWC	✓	✓	✓	
CW-10	207982	DWS	CWC	✓	✓	✓	
ESP-1	623102	Monitor	Sierrita	✓	✓		
ESP-2	623103	Monitor	Sierrita	✓	✓		✓
ESP-3	623104	Monitor	Sierrita	✓	✓		
ESP-4	623105	Monitor	Sierrita	✓	✓		
ESP-5	623106	Monitor	Sierrita	WLO			
FFS-1	221662	Extraction	Sierrita	✓			
FFS-2	221663	Extraction	Sierrita	✓			
FFS-3	221664	Extraction	Sierrita	✓			
FFS-4	221665	Extraction	Sierrita	✓			
FFS-5	221666	Extraction	Sierrita	✓			
FFS-6	221667	Extraction	Sierrita	✓			
GV-01-GVDWID	603428	DWS	GVDWID	✓	✓	✓	
GV-02-GVDWID	603429	DWS	GVDWID	✓	✓	✓	
GV-SI-GVDWID	208825	DWS	GVDWID	✓			
HAVEN GOLF	515867	Monitor	Haven Golf	✓			
I-10	608525	Monitor	TBPI	✓			
IW-1	623129	Extraction	Sierrita	✓			
IW-2A	216464	Extraction	Sierrita	✓			
IW-3A	623131	Extraction	Sierrita	✓			
IW-4	623132	Extraction	Sierrita	✓			
IW-5A	623133	Extraction	Sierrita	✓			
IW-6A	545565	Extraction	Sierrita	✓			
IW-8	508236	Extraction	Sierrita	✓			
IW-9	508238	Extraction	Sierrita	✓			
IW-10	508237	Extraction	Sierrita	✓			
IW-11	508235	Extraction	Sierrita	✓			
IW-12	545555	Extraction	Sierrita	✓			
IW-13	545556	Extraction	Sierrita	✓			
IW-14	545557	Extraction	Sierrita	✓			
IW-15	545558	Extraction	Sierrita	✓			
IW-16	545559	Monitor	Sierrita	WLO			
IW-17	545560	Monitor	Sierrita	WLO			
IW-18	545561	Monitor	Sierrita	WLO			
IW-19	545562	Extraction	Sierrita	✓			

TABLE 3
Post-Implementation Groundwater Monitoring Schedule

Well Name	ADWR 55 Well Registry No.	Well Use	Owner	Annual Sampling	Semiannual Sampling	Quarterly Sampling	Monthly Water Level Monitoring*
IW-20	545563	Extraction	Sierrita	✓			
IW-21	545564	Extraction	Sierrita	✓			
IW-22	200554	Extraction	Sierrita	✓			
IW-23	200555	Extraction	Sierrita	✓			
IW-24	200556	Extraction	Sierrita	✓			
IW-25	219596	Extraction	Sierrita	✓			
IW-26	219143	Extraction	Sierrita	✓			
IW-27	219136	Extraction	Sierrita	✓			
IW-28	219137	Extraction	Sierrita	✓			
M-8	87390	Monitor	TBPI	✓	✓		✓
M-9	501652	Monitor	TBPI	✓			✓
M-10	501653	Monitor	TBPI	✓	✓		
M-20	906595	Monitor	TBPI	✓			
MC-1	221660	Extraction	Sierrita	✓			
MC-2	221761	Extraction	Sierrita	✓			
MC-3	221661	Extraction	Sierrita	✓			
MC-4	220842	Extraction	Sierrita	✓			
MH-1	803629	Monitor	Sierrita	WLO			
MH-3	803630	Monitor	Sierrita	WLO			✓
MH-5	803632	Monitor	Sierrita	WLO			
MH-6	803633	Monitor	Sierrita	WLO			
MH-7	803634	Monitor	Sierrita	WLO			
MH-9	803635	Monitor	Sierrita	WLO			✓
MH-10	803636	Monitor	Sierrita	✓			
MH-11	803637	Monitor	Sierrita	✓			✓
MH-12	803638	Monitor	Sierrita				✓
MH-13A	904071	Monitor	Sierrita	✓			✓
MH-13B	904072	Monitor	Sierrita	✓			✓
MH-13C	904073	Monitor	Sierrita	✓			✓
MH-14	528098	Monitor	Sierrita	WLO			✓
MH-15E	528094	Monitor	Sierrita	WLO			✓
MH-15W	528093	Monitor	Sierrita	WLO			✓
MH-16E	528100	Monitor	Sierrita	WLO			✓
MH-16W	528099	Monitor	Sierrita	WLO			✓
MH-24	563799	Monitor	Sierrita	WLO			
MH-25A	201528	Monitor	Sierrita	✓			✓
MH-25B	208429	Monitor	Sierrita	✓			✓
MH-25C	208426	Monitor	Sierrita	✓			✓
MH-26A	201527	Monitor	Sierrita	✓			✓
MH-26B	208427	Monitor	Sierrita	✓			✓
MH-26C	208428	Monitor	Sierrita	✓			✓

TABLE 3
Post-Implementation Groundwater Monitoring Schedule

Well Name	ADWR 55 Well Registry No.	Well Use	Owner	Annual Sampling	Semiannual Sampling	Quarterly Sampling	Monthly Water Level Monitoring*
MH-28	903648	Monitor	Sierrita	✓	✓		✓
MH-29	903649	Monitor	Sierrita	✓	✓		✓
MH-30	903884	Monitor	Sierrita	✓			✓
MO-2007-1A	907342	Monitor	Sierrita	✓	✓		✓
MO-2007-1B	907210	Monitor	Sierrita	✓	✓		✓
MO-2007-1C	907209	Monitor	Sierrita	✓	✓		✓
MO-2007-2	906765	Monitor	Sierrita	✓			✓
MO-2007-3B[1]	906816	Monitor	Sierrita	✓	✓	✓	✓
MO-2007-3C[1]	906817	Monitor	Sierrita	✓	✓	✓	✓
MO-2007-4A[2]	907213	Monitor	Sierrita	✓	✓	✓	✓
MO-2007-4B[2]	907212	Monitor	Sierrita	✓	✓	✓	✓
MO-2007-4C[2]	907211	Monitor	Sierrita	✓	✓	✓	✓
MO-2007-5B	907456	Monitor	Sierrita	✓	✓		✓
MO-2007-5C	907457	Monitor	Sierrita	✓	✓		✓
MO-2007-6A[3]	907607	Monitor	Sierrita	✓	✓	✓	✓
MO-2007-6B[3]	907606	Monitor	Sierrita	✓	✓	✓	✓
MO-2009-1[4]	910458	Monitor	Sierrita	✓	✓	✓	✓
NP-2[1]	605898	Monitor	CWC	✓	✓	✓	✓
PS-1	220861	Extraction	Sierrita	✓			
PS-2	220862	Extraction	Sierrita	✓			
PS-3	220863	Extraction	Sierrita	✓			
PS-4	220864	Extraction	Sierrita	✓			
PZ-7	561870	Monitor	Sierrita	✓			
PZ-8	561866	Monitor	Sierrita	✓			
TMM-1	616156	Monitor	Pima County	✓	✓		
1350	ND	Monitor	TBPI	WLO			

Notes:

ADWR = Arizona Department of Water Resources

CC OF GV = Country Club of Green Valley

CWC = Community Water Company of Green Valley

DWS = Drinking Water Supply

GVDWID = Green Valley Domestic Water Improvement District

ND = No Data

Sierrita = Freeport-McMoRan Sierrita Inc.

TBPI = Twin Buttes Properties, Inc.

WLO = Water Level Only

[1] Sentinel Well for CW-9

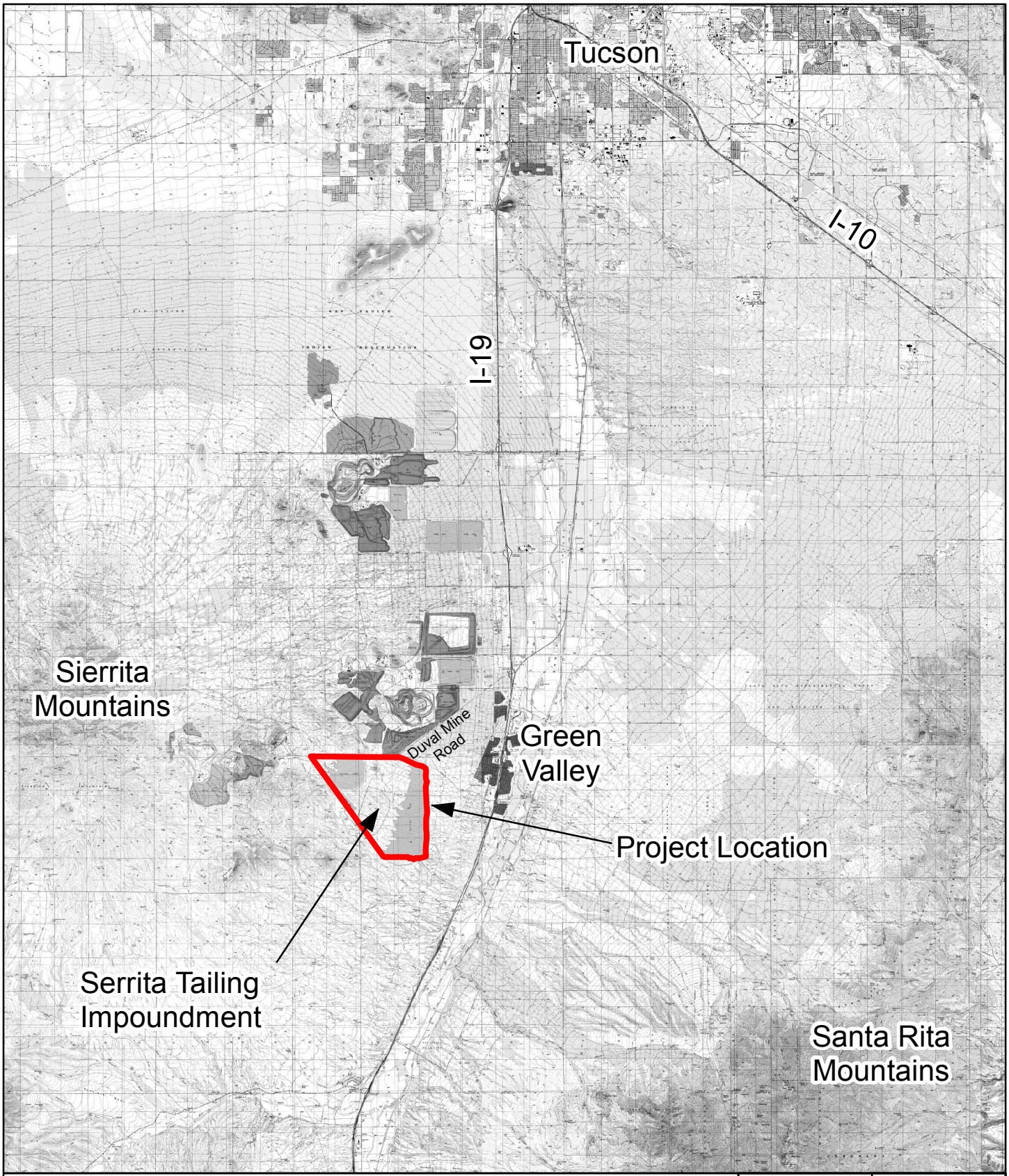
[2] Sentinel Well for CW-6

[3] Sentinel Well for GV-01-GVDWID and GV-02-GVDWID

[4] Sentinel Well for CW-10

* Monthly water level monitoring for first year of operation, quarterly thereafter

FIGURES



0 2 4 8
Miles

PROJECTION: UTM Zone 12N NAD83

CLEAR CREEK ASSOCIATES

File ID 055039-098

Date 10/2/13

FIGURE 1
Project Location Map

M-10 170.32
M-9 66.05
M-8 28.85
TMM-1 1.43
250
MO-2007-1A, 1B, 1C
460-600 17.92
740-900 873.7
1020-1180 416.3
NP-2, MO-2007-3B, 3C
331-500 71.6
740-940 26.96
1160-1320 89.78
MH-26A, 26B, 26C
418-538 8
620-730 1690
780-900 880
M-20 1801.6
CW-9 45.78
CC of GV 147.80
MO-2007-2 455.7
ESP-3 35.87
DUVAL MINE RD
MH-25A, 25B, 25C
410-530 9
580-680 1700
731-901, 951-1081 1270/1290
ESP-2 27.86
Haven Golf 105.13
PZ-7 500
ESP-4 581.6
MH-30 1760/1800
IW-21 1690
IW-20 1900/1800
IW-19 1600
CW-6 91.94
MO-2007-4A, 4B, 4C
360-560 34.69
669-939 33.31
1090-1130 93.24
SIERRITA
TAILING
IMPOUNDMENT
IW-15 1700
IW-14 1870
IW-13 1760
IW-12 1500
IW-6A 1840
IW-11 1730
IW-22 1810
IW-10 1740
IW-23 1800
IW-5A 1760/1740
IW-24 1900
IW-4 1800
IW-9 1730
IW-8 1700
IW-3A 1600
IW-1 980
MH-28 1867.1
MH-11 1480
IW-28 1720
MH-29 1707.1
IW-26 1700
IW-25 390
MH-10 1720
IW-2A 123
PZ-8 380
MH-13A, 13B, 13C
300-650 1760
750-950 1050
1050-1350 45
CW-3, MO-2007-5B, 5C
182-500 70.8
660-960 430
1050-1350 251
MO-2009-1 105.80
CW-10 52.35/52.77
SULFATE PLUME
MO-2007-6A, 6B
310-390, 430-610 32.44/32.94
780-940 54.72
250
GV-SI-GVDWID 6.10

Legend

250 mg/L Sulfate Concentration Contour

IW-10 Well ID
1740 Sulfate Concentration (mg/L)
Duplicate results separated by "/"

Well Symbols
- Well
- Sentinel Well
- Drinking Water Supply Well

Scale
0 2,000 4,000 8,000
Feet

Co-Located Wells
Screened Interval (ft bls):**Sulfate Concentration (mg/L)**

Notes:
Projection:UTM NAD83 Zone 12N

Date	File ID
07/09/13	055039-099

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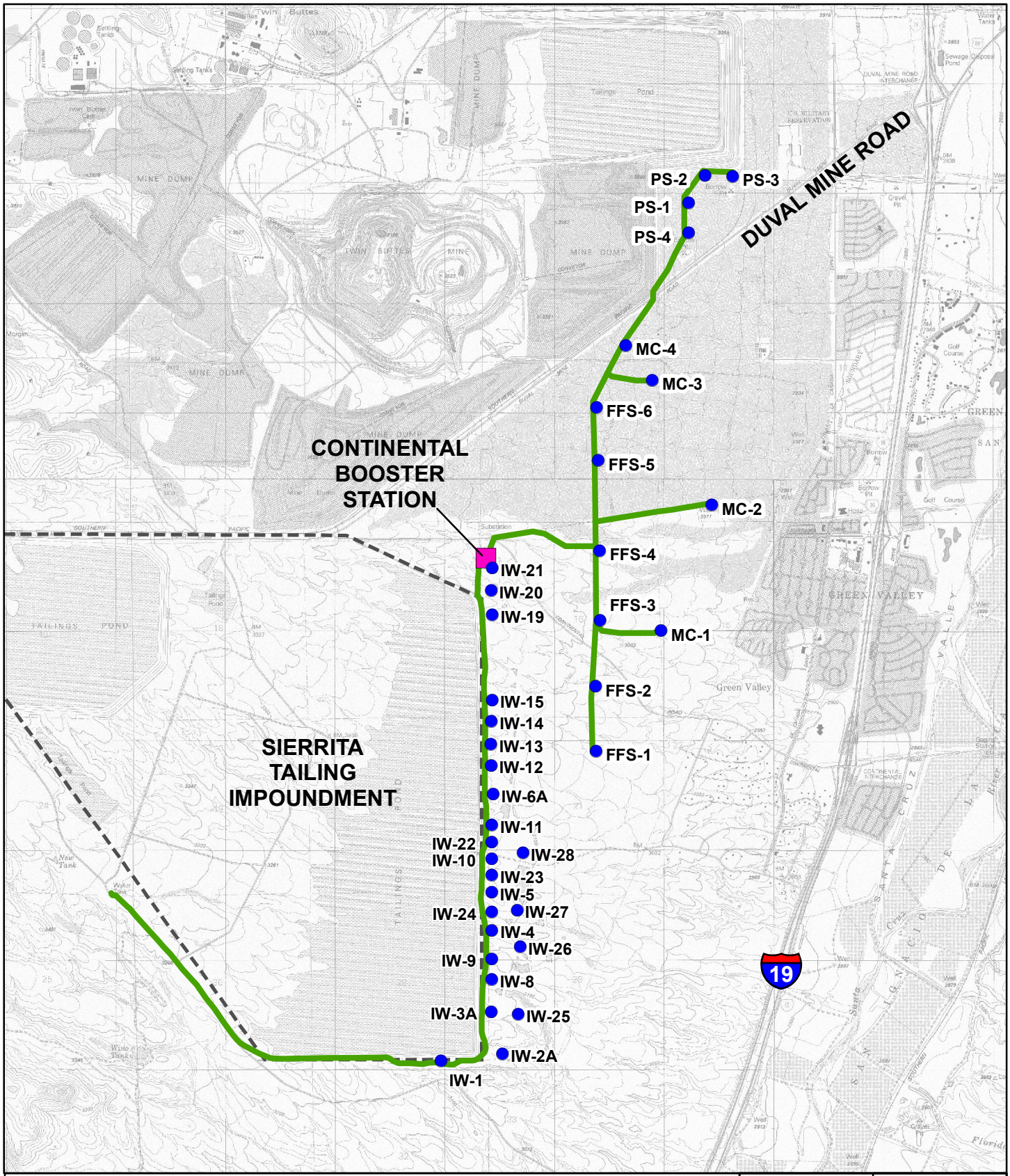
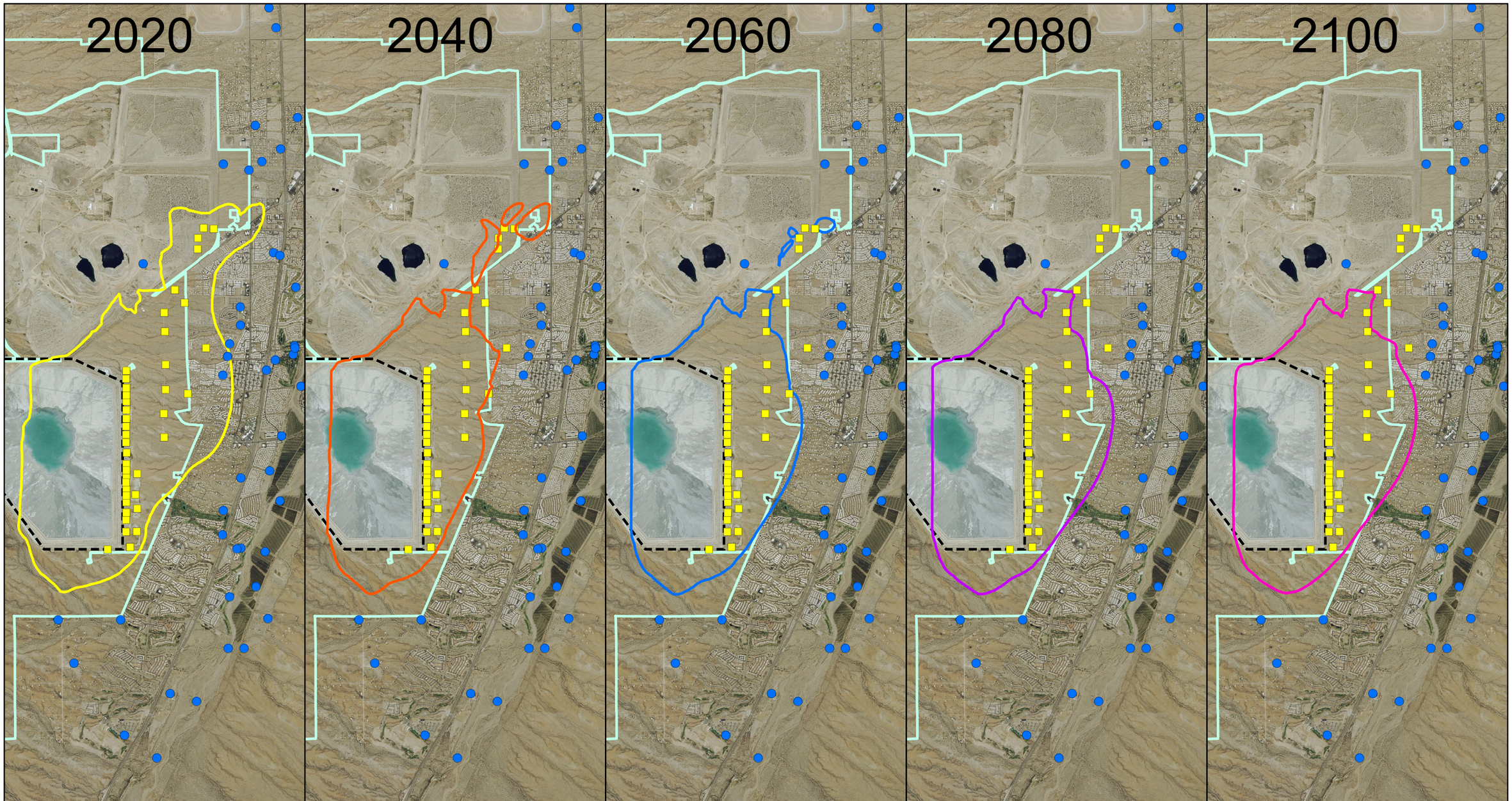
FIGURE 2
Sulfate Concentrations
in Groundwater,
Second Quarter 2013


DUVAL MINE ROAD
PS-2
PS-3
PS-1
PS-4
MC-4
MC-3
FFS-6
FFS-5
MC-2
CONTINENTAL
BOOSTER
STATION
FFS-4
IW-21
IW-20
IW-19
FFS-3
MC-1
FFS-2
IW-15
IW-14
IW-13
IW-12
FFS-1
SIERRITA
TAILING
IMPOUNDMENT
IW-6A
IW-11
IW-22
IW-10
IW-28
IW-23
IW-5
IW-24
IW-27
IW-4
IW-26
IW-9
IW-8
IW-3A
IW-25
IW-2A
IW-1
19
Legend
Extraction Well
Booster Station
Pipeline
Tailing Impoundment
0
2,000
4,000
Feet
CLEAR CREEK ASSOCIATES
File ID 055039-096
Date 10/3/13
FIGURE 3
Extraction Wells
and
Mitigation Facilities



Legend

- Mitigation Extraction Wells
- Other Wells in Model Database
- Tailing Impoundment
- Sierrita Property Boundary
- 250 mg/L Contour in 2020
- 250 mg/L Contour in 2040
- 250 mg/L Contour in 2060
- 250 mg/L Contour in 2080
- 250 mg/L Contour in 2100

Scale (Feet)

0 8,000 16,000

Notes:

Projection: UTM Zone
12N NAD83
mg/L = milligrams per liter
Simulation Run:12/3/13

Date 12/4/13

File ID 055039-106

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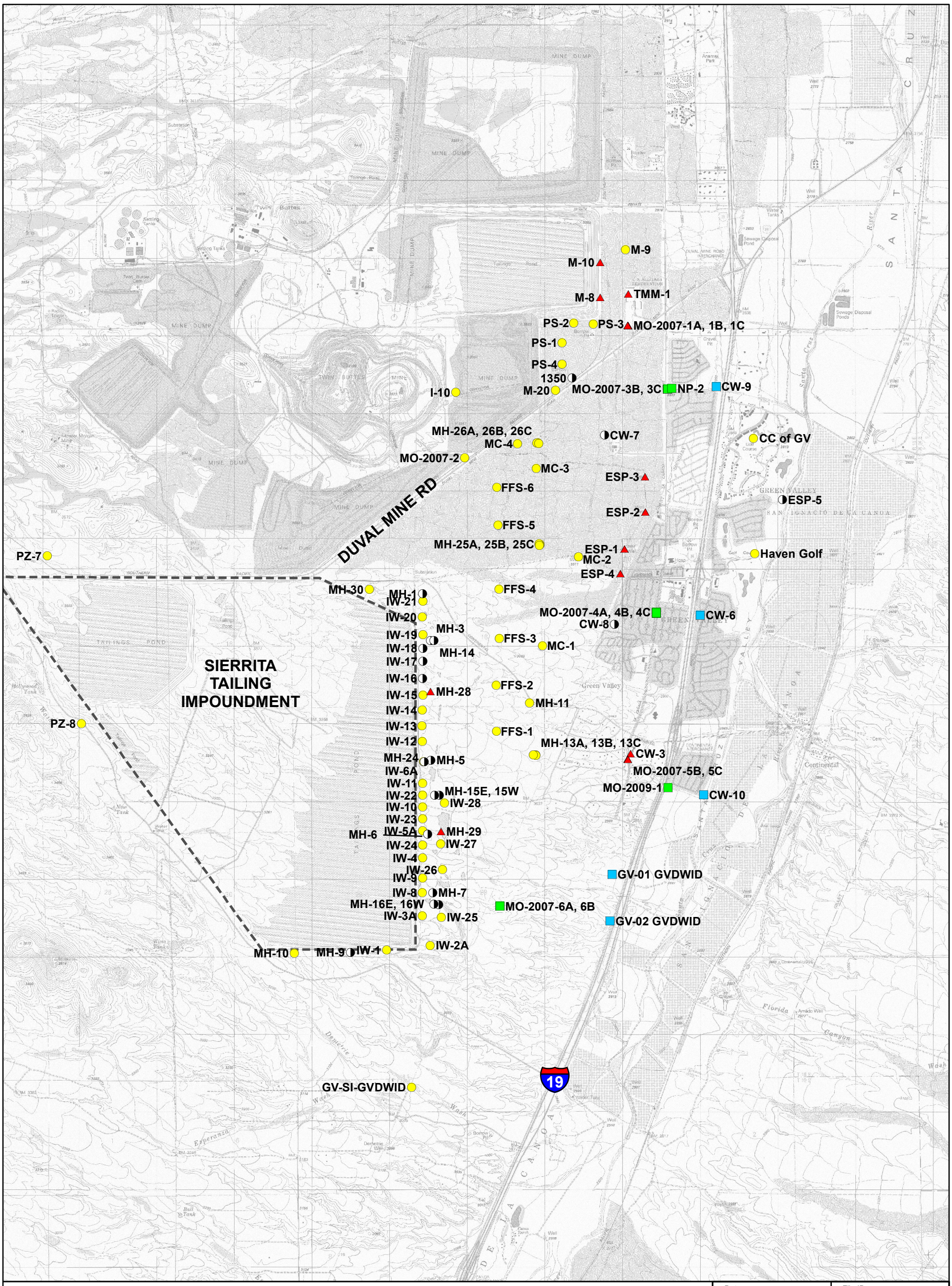
FIGURE 4
Simulated Sulfate Concentration
from 2020 to 2100
for Alternative 3



Legend

- Annual Sampling (Second Quarter)
- Annual Water Level Only (Second Quarter)
- Semi-Annual Sampling (Second and Fourth Quarters)
- Quarterly Sampling - Sentinel Well
- Quarterly Sampling - Drinking Water Supply Well
- Tailing Impoundment

Scale

0 2,000 4,000 8,000

Feet

Date	File ID
10/2/13	055039-092

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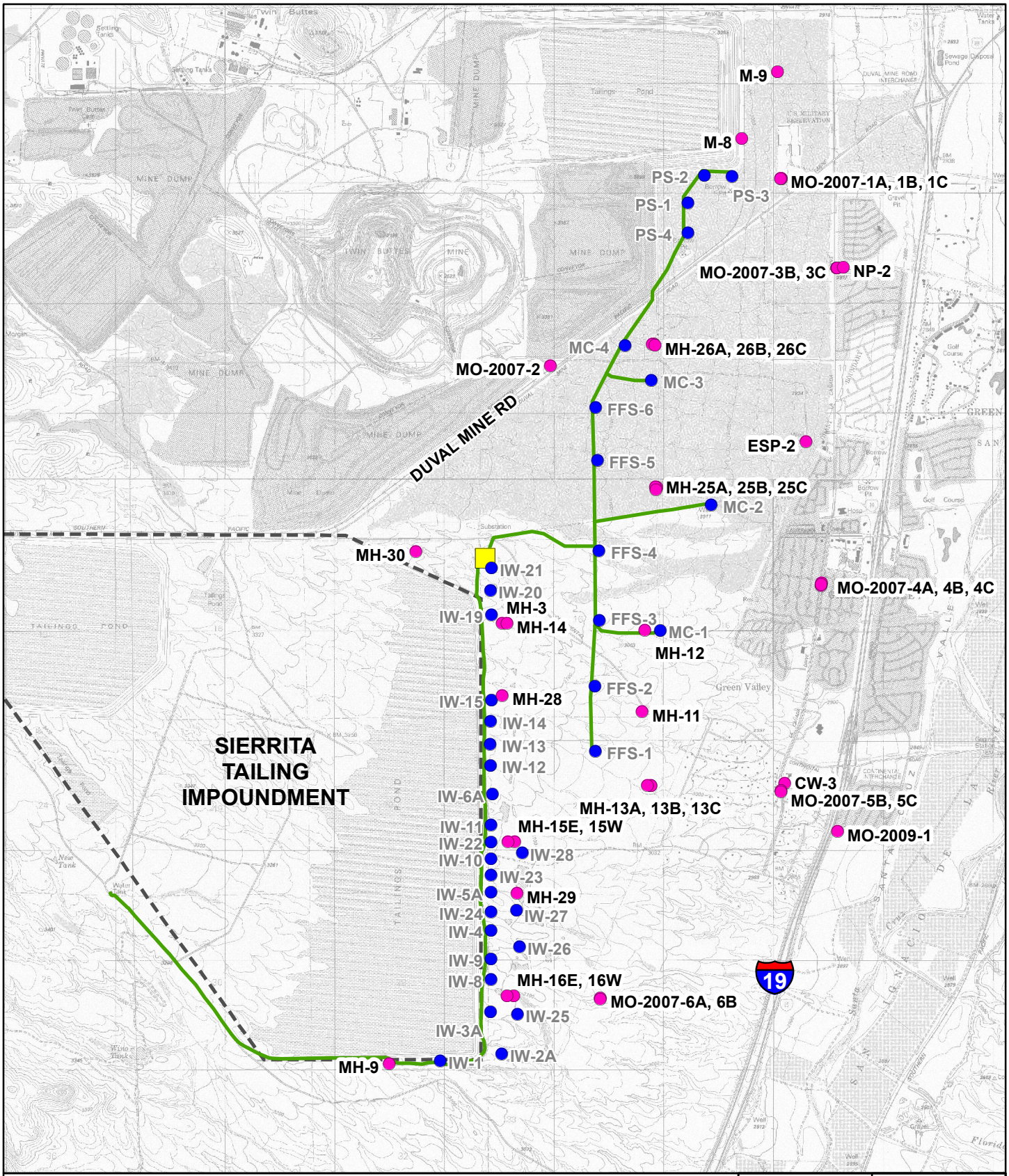
FIGURE 5
Post-Implementation Groundwater Monitoring Locations



Legend

- Monthly Water Level Monitoring Location*
- Extraction Well
- Pipeline
- Booster Station
- Tailing Impoundment

*Monthly for first year of operation, quarterly thereafter.

0 2,000 4,000
Feet

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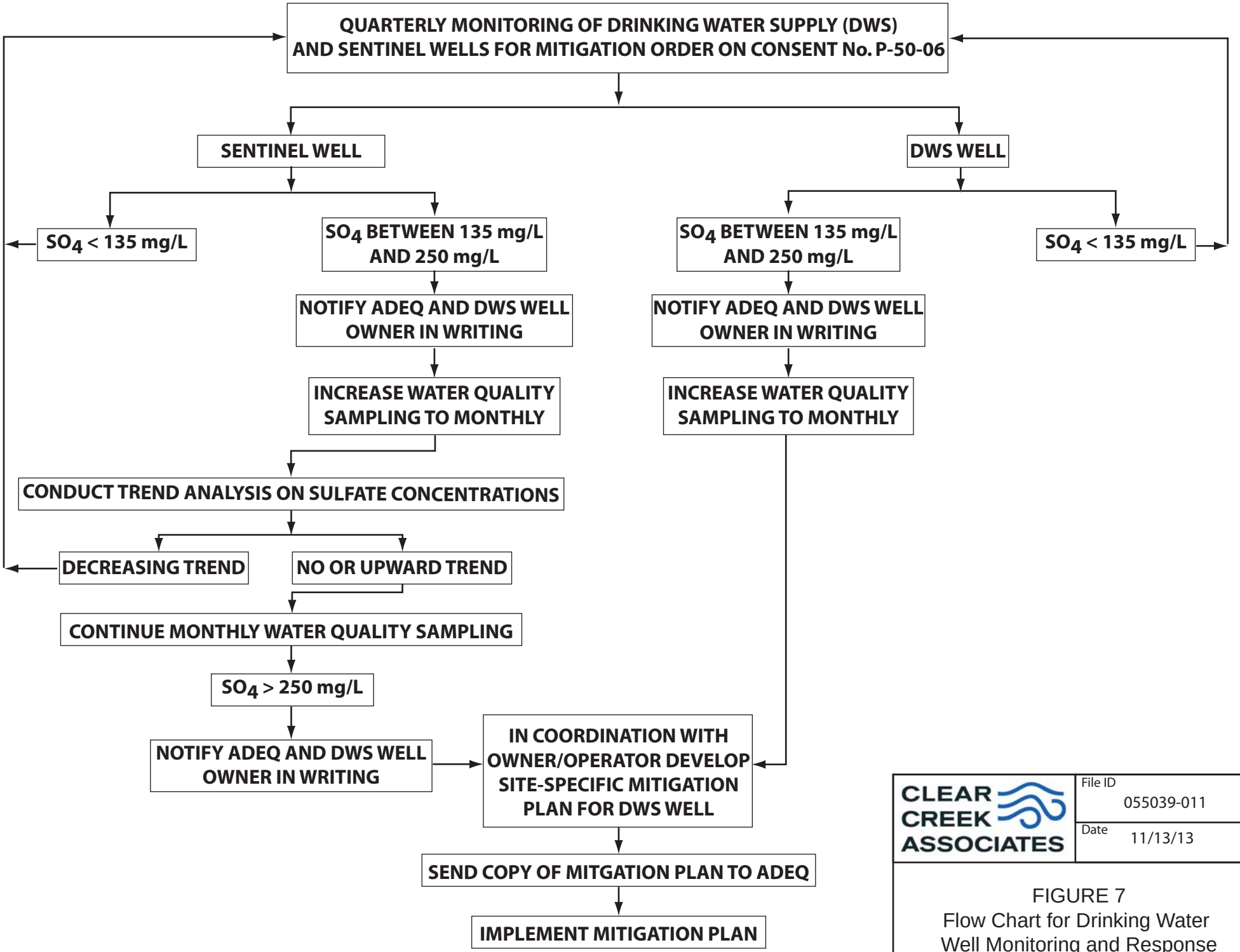
File ID 055039-097

Date 10/3/13

FIGURE 6
Monthly Water
Level Monitoring Locations



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File ID 055039-011

Date 11/13/13

FIGURE 7
Flow Chart for Drinking Water Well Monitoring and Response