FREEPORT-McMoRan

Sierrita Operations
Environment, Land & Water Department
6200 W. Duval Mine Rd.
PO Box 527
Green Valley, AZ 85622-0527

February 17, 2016

Via FedEx #7756 6610 6487

Ms. Mindi Cross, Manager
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
Notice of Contingency Plan, Amendment and Response

Dear Ms. Cross:

In December 2015, Freeport-McMoRan Inc. (FMI) met with the Arizona Department of Environmental Quality (ADEQ) to discuss the placement of mitigation well water in the Twin Buttes Pit as a means of water management under the Sierrita Mitigation Order Notice of Contingency Plan (plan)[1]. ADEQ concurred with FMI and requested an updated plan. In January 2016, ADEQ provided recommendations[2] to Freeport-McMoRan Sierrita Inc. (Sierrita) on the Notice of Contingency Plan. This letter submits an updated plan and contains Sierrita's responses to ADEQ's recommendations.

The updated plan included with this letter supersedes the 2015 plan. Significant changes in the updated plan are the addition of maximum water elevations for water management in the Sierrita and Twin Buttes pits (see Section 2.3 of the plan) and changes made to address ADEQ's recommendations.

In the following responses, ADEQ's complete recommendation is provided in italicized text followed by Sierrita's response in regular font.

ADEQ Recommendation 1

The Contingency Plan indicates that all of the IW wells except for IW-29 and three of the six FSS wells FSS-2, FSS-3 and FSS-4 will cease pumping for the duration of the Contingency Plan. ADEQ has concerns on the potential for migration of sulfate in the southeast portion of the sulfate plume. ADEQ requests that Sierrita include provisions in the Contingency Plan to address potential migration of the sulfate plume.

Sierrita Response:

Some migration of the plume is expected under the plan (see Section 2.2 and Figure 7 of the plan). However, the plume migration under the plan is limited and should not threaten drinking

[1] Clear Creek Associates. 2015. Contingency 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.

[2] Correspondence from Mindi Cross, ADEQ, to Deborah Chismar, Sierrita, Re: Notice of Contingency Plan, dated January 22, 2016.

water supply wells. Section 3.1.4 was added to the plan to describe plume monitoring activities and response actions. These are summarized below.

- Although the current monitor well network and monitoring frequency are sufficient, Sierrita will increase monitoring frequency for wells ESP-2, ESP-3, M-8, M-9, and M-10 on the perimeter of the plume to quarterly during the curtailment from semiannual or annual.
- Additional groundwater monitoring wells will be installed at the north end of the sulfate plume to better delineate sulfate concentrations and water levels in the vicinity of the PS wells. These wells will be sampled quarterly throughout the curtailment.
- Quarterly sulfate sampling at drinking water supply and sentinel wells. Predetermined sulfate action levels and response actions are prescribed for sentinel and drinking water supply wells, provided the sulfate is due to the Sierrita Tailing Impoundment. The action levels would provide early warning of plume migration and cause the implementation of response actions to protect drinking water supply wells from being affected by sulfate at concentrations greater than 250 mg/L at the point of use.
- Monitoring data are compiled and evaluated in annual reports submitted to ADEQ and posted at the public information repositories.

ADEQ Recommendation 2

Figure 2 – Sulfate Concentrations in Groundwater, Second Quarter 2015 – FSS well Fss-1 is missing from the figure. The figure should be revised with the location of FSS-1.

Sierrita Response:

Sierrita concurs with ADEQ, Figure 2 is revised to include FFS-1.

ADEQ Recommendation 3

Figure 3 – Mitigation Action Extraction Wells and Pumping Facilities – ADEQ requests that the Mitigation Action Extraction Wells that will be operational be highlighted in this figure.

Sierrita Response:

Sierrita concurs with ADEQ, Figure 3 is revised to highlight wells that will be operational during the curtailment.

ADEQ Recommendation 4

Mitigation action Extraction Wells and Pumping Facilities – ADEQ requests the location of the drinking water supply wells and the sentinel wells be placed on this figure.

Sierrita Response:

Sierrita concurs with ADEQ, Figure 3 is revised to include the location of the drinking water supply and sentinel wells.

Sierrita appreciates the cooperation of ADEQ regarding this contingency event. Please do not hesitate to contact me at (520) 393-2347 if you have any questions regarding the plan or other mitigation action matters.

Sincerely,

Deborah L. Chismar

Deborah Chismar
Sr. Environmental Specialist
Freeport-McMoRan Sierrita Inc.

DLC: dc
20160217_001

xc: Madeline Keller, Arizona Department of Environmental Quality
David Haag, Arizona Department of Environmental Quality
Chad Fretz, Sierrita
Diana Kelts, Sierrita
Stuart Brown, Freeport-McMoRan Inc.
Jim Norris, Clear Creek Associates

CONTINGENCY 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

February 17, 2016

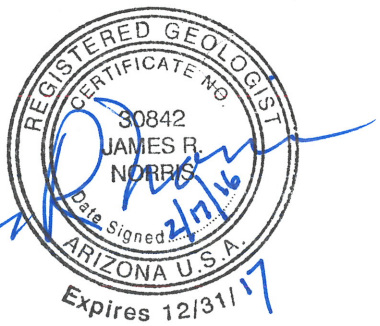
CONTINGENCY PLAN FOR SULFATE WITH RESPECT TO DRINKING WATER SUPPLIES IN THE VICINITY OF THE FREEPORT-MCMORAN SIERRITA INC. TAILING IMPOUNDMENT

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

February 17, 2016

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1.0 INTRODUCTION

This Contingency Plan describes groundwater pumping, water management, and groundwater monitoring that will be conducted for the sulfate mitigation action[1] during a temporary curtailment of production at the Sierrita mine. The mitigation action uses pumping to control a groundwater plume of sulfate in the vicinity of the Freeport-McMoRan Sierrita Inc. (Sierrita) Tailing Impoundment near Green Valley, south of Tucson, Arizona (Figure 1) and is conducted pursuant to 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 if they exceed 250 milligrams per liter (mg/L) sulfate at the point of use, if the sulfate originates from the Sierrita Tailing Impoundment. Drinking water supplies do not contain sulfate in excess of 250 mg/L based on groundwater monitoring data collected under the Mitigation Order. Sulfate concentrations in drinking water supplies currently range from approximately 40 to 90 mg/L. The mitigation action protects existing drinking water supplies by extracting groundwater from the sulfate plume to limit its future migration. The water pumped for mitigation purposes is used for mine processes.

Sierrita submitted the Mitigation Plan (Clear Creek Associates, 2013) to ADEQ in 2013 and implemented groundwater pumping under the plan in 2014. ADEQ approved the Mitigation Plan in 2015 (ADEQ, 2015). The Mitigation Plan contains specifications for pumping rates, groundwater and drinking water supply monitoring, mitigation performance evaluation, adaptive management, and reporting for the mitigation action. Section 3.4 of the Mitigation Plan identifies contingency measures, or potential events that could occur while operating the mitigation action, and actions that would be taken if an event were to occur. One of those events is the temporary curtailment of mining operations which requires Sierrita to notify ADEQ and submit a Contingency Plan. In 2015, Sierrita agreed to provide ADEQ with a written notice 60 days prior to implementing a contingency plan (Sierrita, 2015). Section 2.2 of this Contingency Plan identifies mitigation action pumping rates to be used during the temporary curtailment in lieu of the pumping rates in the Mitigation Plan. Under the Contingency Plan, mitigation action pumping will be reduced because mine processes will use less water during the temporary curtailment. Water management actions for the Contingency Plan are described in Section 2.3.Additional groundwater monitoring will be conducted under the Contingency Plan as described in Section 2.1.

[1] The term mitigation action as used in this document encompasses all actions implemented under the Mitigation Plan at any particular point in time. 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.

1.1 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 sulfate plume is defined as the extent of groundwater, both in a horizontal and vertical context, with sulfate concentrations greater than 250 mg/L due to the Sierrita Tailing Impoundment. Figure 2 shows the extent of the sulfate plume in the second quarter of 2015.

1.2 Mitigation Plan

The Mitigation Plan implements Alternative 3 of the Feasibility Study submitted to ADEQ in October 2008 (Hydro Geo Chem, Inc., 2008). Under the Mitigation Plan, groundwater is pumped from a system of extraction wells within the sulfate plume east of the tailing impoundment (Figure 3). The locations and rates of groundwater extraction are designed to control the future movement of the plume to prevent migration to drinking water supply wells. Water management during mine operation consists of using sulfate-affected groundwater in mine processes as a replacement of the fresh groundwater Sierrita historically pumped at the Canoa Ranch wellfield south of Green Valley. Sierrita has mineable reserves that could sustain mining operations until 2089. After mine closure, Sierrita may manage water through discharge to an inactive mine pit or through treatment of some or all of the extracted groundwater, depending upon the amount of water that has to be pumped.

1.2.1 Mitigation Action Pumping

Pumping specifications in the Mitigation Plan are based on a wellfield design developed using a numerical groundwater flow and sulfate transport model created under the Mitigation Order. The model is used to simulate the future migration of the plume under actual and potential mitigation action pumping conditions.

Figure 3 shows the locations of groundwater extraction wells, pipelines, and pumping facilities for the mitigation action. The Mitigation Plan pumping specifications 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. 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 for the purpose of plume stabilization to control downgradient movement of the plume. The MC wells are pumped primarily to reduce the plume extent by extracting sulfate mass, which contributes to stabilization of the east side of the plume.

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 can 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 Mitigation Plan identified two sets of pumping rates for the mitigation action: target rates for Alternative 3 and performance goal rates. The target rates accomplish the plume stabilization and plume reduction objectives of Alternative 3. The total pumpage under the target rates is 14,330 gpm. A numeric performance goal was identified to meet only the source control and plume stabilization objectives of pumping. The total pumpage under the performance goal rates is 10,643 gpm.

The objective of groundwater pumping under the Mitigation Order is to meet the mitigation action objective. Thus, the narrative performance goal for pumping defined in Section 2.3 of the Mitigation Plan is "maintenance of groundwater extraction at locations and rates sufficient to meet the mitigation action objective over time".

1.2.2 Mitigation Action Monitoring

The mitigation action is monitored over time to verify wellfield pumping rates, sulfate concentrations in the aquifer and drinking water supply wells, and the degree of plume migration. Monitoring programs described by the Mitigation Plan are: the Sulfate Mitigation Action Well Field Operation and Maintenance Plan submitted to ADEQ (BasinWells Associates, 2013) (O&M Plan) for mitigation facilities and the Post-Implementation Groundwater Monitoring Plan.

Sierrita's mine personnel and contractors operate, monitor, and maintain the wells, pumps, pipelines, and other facilities required for groundwater extraction under the Mitigation Plan. Wellfield O&M is conducted pursuant to the O&M Plan. The results of mitigation facilities O&M monitoring are reported to ADEQ annually pursuant to the Mitigation Plan.

Sierrita conducts groundwater monitoring according to the Post-Implementation Groundwater Monitoring Plan. Data collected for groundwater monitoring are reported to ADEQ semiannually. The objectives of groundwater monitoring are 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 and to evaluate sulfate concentrations with respect to sulfate action levels, and

- document water level and sulfate concentrations in the vicinity of the mitigation wellfield to assess mitigation progress.

Figure 4 shows the groundwater monitoring locations. Post-Implementation Groundwater Monitoring Plan includes quarterly water quality sampling for sulfate at sentinel and drinking water supply wells. Throughout the Mitigation Order project, water samples have been collected quarterly from drinking water supply wells for determination of sulfate. In addition, sentinel monitoring wells were positioned between the plume and drinking water supply wells for the purpose of providing advance alert of potential plume migration toward a drinking water supply well.

The Mitigation Plan established action levels for sulfate concentrations at both drinking water supply and sentinel wells. The action levels trigger various responses based on the concentration of sulfate and whether the well is a sentinel well or a drinking water supply well. Figures 5 and 6 show sulfate concentrations at drinking water supply and sentinel wells, respectively, and indicate that concentrations are currently well below the sulfate action levels for each well type.

1.2.3 Performance Review and Adaptive Management

Mitigation performance reviews assess whether the mitigation action is performing as expected with respect to the mitigation action objective and numerical model predictions. The performance reviews evaluate groundwater monitoring data and the results of numerical modeling to assess whether mitigation pumping needs modification (increase, decrease, or relocation) to meet the mitigation action objective or can be terminated. Performance reviews are to be conducted and submitted to ADEQ annually for the first five years after full commissioning of the mitigation facilities and every five years thereafter.

As described in the Mitigation Plan, the adaptive management process is used to evaluate and modify the mitigation action in the event that the mitigation action objective is not being met or a contingency event occurs such as Sierrita needing to respond to business or operational changes. 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 make decisions. Adaptive management involves analysis of site specific conditions, consideration of technical factors, and the use of monitoring data and the results of numerical modeling to recommend and implement changes to the mitigation action, if needed.

1.3 Sierrita Operational Curtailment Triggers Contingency Plan

On October 22, 2015, Freeport-McMoRan announced that it would curtail production at Sierrita by 50% (Freeport-McMoRan, 2015). On January 26, 2016, Freeport-McMoRan announced a shutdown of Sierrita (100% curtailment) due to the continued decline in metals market conditions (Freeport-

McMoRan, 2016). The curtailment decisions were made primarily in response to the deterioration of the molybdenum market as Sierrita's cost structure depends heavily on molybdenum prices. Molybdenum prices have dropped largely because of the reduced consumption of high-grade steel and stainless steel made with molybdenum. The reduced steel consumption is due to global economic conditions that have reduced the demand for products such as pipe for oil and gas drilling and heavy equipment. The duration of the curtailment is uncertain as it will depend on market conditions, but is likely to exceed one year. The production curtailment begins in January 2016 and shutdown is planned to be implemented by the end of June 2016.

Groundwater pumped for the mitigation action is used for mine process water; primarily in Sierrita's mill circuit. The decrease in mine production means the mill will process less ore and use less water than it currently does. No ore will be processed during the 100% curtailment, but solvent extraction and electrowinning (SX/EW) would continue. Consequently, Sierrita will use less water from its mitigation action wellfield during a 50% or 100% curtailment.

Sierrita provisionally determined it can manage approximately 7,750 gallons per minute (gpm) of mitigation water at either 50% or 100% curtailment, as discussed in Section 2.3. The expected mitigation water use in either a 50% or 100% curtailment is less than the 10,643 gpm numeric performance goal of the Mitigation Plan (Section 1.2.1). As described in Section 3.4 of the Mitigation Plan, a change in wellfield or operating conditions that reduces the total pumpage to less than the numeric performance goal is a contingency requiring a plan to maintain pumping at rates sufficient to attain the narrative performance goal. The narrative performance goal is defined as "the maintenance of groundwater extraction at locations and rates sufficient to meet the mitigation action objective." The Contingency Plan describes how the mitigation action will be conducted to meet the narrative performance goal during a 50% or 100% curtailment. The Mitigation Plan indicates that such a contingency such as the curtailment would be pursued through the adaptive management process described in Section 1.2.3.

2.0 CONTINGENCY PLAN DEVELOPMENT

The Contingency Plan was developed by an iterative process of evaluating plume migration under conditions of reduced mitigation pumping and determining Sierrita's water management capacity during curtailment. The groundwater monitoring, reporting and sulfate action level specifications of the Mitigation Plan would be maintained during curtailment because these processes are in place to protect drinking water supplies regardless of the mitigation pumping schedule. Under the Contingency Plan, additional groundwater monitoring will be implemented to augment the plume monitoring program already in place for the Mitigation Plan.

2.1 Mitigation Action Objective Confirmed by Groundwater Monitoring and Performance Review

Groundwater monitoring will be used to monitor for plume migration during the Contingency Plan actions. The mitigation performance reviews will evaluate the monitoring data and report the mitigation progress to ADEQ.

2.1.1 Groundwater Monitoring

Both drinking water supply and sentinel wells are sampled quarterly under the Post-Implementation Groundwater Monitoring Plan. Water sampling data collected under the groundwater monitoring plan documents that sulfate in drinking water supply and sentinel wells is less than the mitigation action objective of 250 mg/L and the 135 mg/L sulfate action level (Figures 5 and 6). The Post-Implementation Groundwater Monitoring Plan, which includes groundwater monitoring at the network of extraction and monitoring wells in the vicinity of the plume (Figure 4), would remain in place during the curtailment to continue determination of the sulfate concentration at drinking water supply and sentinel wells and to track the location of the plume.

During the curtailment, quarterly monitoring of the sentinel and drinking water supply wells would be conducted in accordance with the monitoring plan, and additional quarterly monitoring will be conducted at wells ESP-2, ESP-3, M-8, M-9, and M-10 to track sulfate concentrations on the perimeter of the plume. The groundwater monitoring program will be expanded by installing and monitoring additional groundwater monitoring wells at the north end of the plume in 2016, as described in Section 2.1.2. Groundwater monitoring data would continue to be reported to ADEQ semiannually per the Mitigation Plan.

2.1.2 Mitigation Performance Reviews

Mitigation performance reviews are conducted to evaluate groundwater monitoring results, the progress of the mitigation action, and to verify that the mitigation action objective is being met. The

Mitigation Performance Review for 2014 (Clear Creek Associates, 2015) reviewed the mitigation action progress after the first full year of operation under the Mitigation Plan. The mitigation action was found to meet the mitigation action objective and the monitoring programs were found to be effective, although there was uncertainty in the exact position of the plume edge in the vicinity of the PS wells at the north end of the plume. As part of the Contingency Plan, Sierrita plans to install additional groundwater monitoring wells at the north end of the plume to better identify its location. The additional wells will be monitored quarterly during the curtailment to provide sulfate concentration and water level information for use in evaluating the extraction system capture at the north end of the wellfield. The results of monitoring at the new wells will be evaluated in the annual mitigation performance review. The Annual mitigation performance reviews would continue during the curtailment to provide critical analysis of groundwater monitoring and wellfield pumping data

2.2 Mitigation Pumping Evaluation

A numerical model for groundwater flow and sulfate transport was developed for use in the various evaluations conducted for the Mitigation Order (Clear Creek Associates, 2014 and 2015). The numerical model was used to simulate mitigation pumping options for the curtailment. The goal of the simulations was to identify pumping rates that accomplished the mitigation action objective and narrative performance goal while reducing pumping to the range of Sierrita's water management capacity under the curtailment.

The strategy used to develop a curtailment pumping plan was to reduce pumping at the IW, FFS, and MC wells and to increase pumping at the PS wells. Reducing pumping at the IW, FFS, and MC wells would result in a short term increase of the sulfate mass in the upgradient portion of the plume, but would still prevent migration of sulfate toward drinking water supply wells east of the plume. Increasing pumping at the PS wells at the downgradient edge of the plume would reduce downgradient migration to the north.

The curtailment was assumed to last from 2016 through 2020 for the purpose of the simulations, although its duration is not known at this time. The simulations also assumed that pumping under the 2014 pumping rates would resume in 2021, after the assumed duration of the curtailment. Several simulations were conducted to examine the predicted plume behavior during and after the curtailment. The performance of the simulations was evaluated based on their protectiveness of drinking water supply wells and by comparison of the predicted extent of the plume under the curtailment scenario with the predicted plume extent assuming no curtailment and pumping under the average 2014 pumping rates. The predicted plume for the 2014 average pumping rate of 12,107 gpm is described in the Mitigation Performance Review for 2014. The 2014 average pumping rate is 1,464 gpm more than the numeric performance goal rate.

Initial simulation results indicated that the eastern extent of the plume was relatively insensitive to the reduction of pumping at the IW, FFS, and MC wells; likely due to the short duration of the curtailment compared to the duration of the mitigation action, which is expected to be at least 80 years. The increased pumping at the PS wells reduces northward migration of the plume during the curtailment, and resulted in better long term performance compared to the 2014 average pumping rates.

Curtailment pumping rates that would meet the narrative performance goal were identified after multiple simulations. The pumping rates for the simulated curtailment scenario are listed on Table 1. Under the simulation assumptions, pumping at the IW, FFS, and MC wells was reduced to 4,251 gpm for five years and then returned to their 2014 average pumping rate of 9,523 gpm in 2021. Pumping at the PS wells was increased to 3,500 gpm from their 2014 average pumping rate of 2,584 gpm. The increased pumping at the PS wells was maintained after the curtailment for plume control at the north end of the plume. Under the simulated curtailment pumping scenario the total pumping rate after the curtailment was 1,020 gpm greater than the 2014 average pumping rate.

Figure 7 shows the predicted extent of the plume at the end of the curtailment in 2020 under the curtailment pumping rates assumed in the groundwater model. The edge of the predicted plume for the 2014 average pumping rates is shown for comparison on Figure 7. The plume edge on the east side of the plume under the curtailment scenario is predicted to be 800 feet or less farther east than under the 2014 pumping rates. The northern plume edge is predicted to be the same under both the curtailment scenario and the 2014 pumping rates. The plume edge for the curtailment scenario is west of the sentinel wells and between 1,400 and 4,800 feet from the area drinking water supply wells. Thus, the curtailment pumping scenario would meet the mitigation action objective and the narrative performance goal.

2.3 Assessment of Water Management Options

Sierrita conducted water balance calculations to estimate the amount of mitigation water that could be managed in multiple operating scenarios including up to a 100% curtailment. The water balance indicates that approximately 7,750 gpm of mitigation water could be managed in curtailment scenarios at Sierrita. In any curtailment scenario, mitigation water would be used either in the mill circuits and ultimately transported to the Sierrita Tailing Impoundment as tailing slurry, used in the SX/EW process, used for dust control on roads and tailings, managed by evaporating excess water on the tailing impoundment with an enhanced evaporation system, and/or managed by evaporating or storing excess water in the Twin Buttes or Sierrita pits.

In the curtailment scenarios, water reporting to the reclaim pond on the tailing impoundment would evaporate or infiltrate under ambient conditions. The enhanced evaporation system would be relied

on to manage water in the shutdown. Examples of enhanced evaporation methods that may be used are sprinklers, mechanical evaporators and water atomizers. The enhanced evaporation system would be located on the west end of the tailing impoundment and/or in the leach stockpiles and Sierrita Pit. Depending on the efficacy and maintenance schedule of the enhanced evaporation system, mitigation water may be pumped to the Twin Buttes or Sierrita pits for evaporation and/or storage. For example, in a 100% curtailment mitigation water may be routed to Twin Buttes pit during construction of an enhanced evaporation system. Water may also be routed to Twin Buttes pit when maintenance is performed on the enhance evaporation system or in the event system performance is affected during rainy periods.

2.3.1 Analysis of Water Storage in the Twin Buttes and Sierrita Pits

The Twin Buttes pit consists of two excavations, the East pit and the West pit, that coalesce at their upper elevations. The Sierrita pit contains a smaller excavation called the Esperanza pit. The Esperanza pit coalesces into the Sierrita pit at its upper elevations. Water evaporation and storage can be conducted at the Twin Buttes East, Twin Buttes West, Sierrita, and/or Esperanza pits.

The storage of water in the Twin Buttes or Sierrita pits would be conducted in such a way as to maintain the Passive Containment Capture Zones of the pits that were reported to the Arizona Aquifer Protection Permit (APP) program. The Passive Containment Capture Zone is used by the APP program in making regulatory decisions regarding mine operations.

The Passive Containment Capture Zones of the Twin Buttes and Sierrita pits were estimated using a calibrated numerical model to simulate future groundwater flow and lake water balances after mine closure (Clear Creek Associates, 2012). Model simulation results provided estimates of the steady state hydraulic sink elevation of the pit lakes and the resulting hydraulic capture zone. The numerical modeling indicated that, in a closure scenario, the Twin Buttes and Sierrita pits would perpetually maintain depressions in the water table once the inflow and outflow of the pits are equal and the steady state hydraulic sink elevation is attained. The steady state hydraulic sink elevation is the water elevation at which inflows from precipitation and groundwater equals the outflow due to evaporation from the lake surface such that the lake elevation does not change significantly over time. The Passive Containment Capture Zone consists of the three dimensional envelope encompassing groundwater flow paths that terminate in a pit lake when the steady state hydraulic sink elevation is attained.

If mitigation water is stored in the Twin Buttes and Sierrita pits, the elevation of the pit lakes would be kept below the steady state hydraulic sink elevations on which the Passive Containment Capture Zones are based. In this way, the Contingency Plan actions would not create a capture zone that is smaller than the Passive Containment Capture Zone of the APP.

The following table lists the steady state hydraulic sink elevations for the Twin Buttes and Sierrita pits. The steady state hydraulic sink elevations are the maximum pit lake elevations that will be allowed under the Contingency Plan.

PIT	Steady State Hydraulic Sink Elevation (feet above mean sea level)
Twin Buttes East Pit	**2,454**
Twin Buttes West Pit	**2,462**
Sierrita Pit	**2,844**
Esperanza Pit	**3,001**

3.0 CONTINGENCY PLAN

Contingency Plan components for either a 50% or 100% curtailment are identified in this section. The Contingency Plan is described in a summary fashion to focus on the obligations as prior sections described the need for and development of the plan. Background information on the Mitigation Order, mitigation action objective, and Mitigation Plan is in Section 1. The basis of the Contingency Plan is described in Section 2.

3.1 Groundwater Monitoring and Performance Review to Confirm Mitigation Action Objective

3.1.1 Groundwater Monitoring

- The Post-Implementation Groundwater Monitoring Plan will remain in effect during the curtailment, including:
  - Quarterly sulfate sampling at drinking water supply and sentinel wells.
  - Annual to semiannual sulfate sampling at extraction and monitoring wells
  - Semiannual groundwater monitoring reports to ADEQ.
- The sampling frequency for wells ESP-2, ESP-3, M-8, M-9, and M-10 on the perimeter of the plume will be increased to quarterly during the curtailment from semiannual or annual.
- Additional groundwater monitoring wells will be installed at the north end of the sulfate plume to better delineate sulfate concentrations and water levels in the vicinity of the PS wells. These wells will be sampled quarterly throughout the curtailment. Well installation will be per the schedule in Section 3.5.

3.1.2 Contingency Measure for Drinking Water Supply and Sentinel Wells

- The contingency sulfate action levels and associated actions described in Section 3.4 of the Mitigation Plan will remain in effect during the curtailment.

3.1.3 Mitigation Performance Reviews

- The mitigation performance review will be conducted annually throughout the curtailment and reported to ADEQ 120 days after the end of the calendar year.

3.1.4 Potential Migration of the Sulfate Plume

Some migration of the plume is expected under the Contingency Plan as discussed in Section 2.2 and illustrated on Figure 7. However, the plume migration under the Contingency Plan is estimated to be on the order of 800 feet and should not threaten drinking water supply wells. Groundwater

monitoring and evaluation of sulfate plume migration under the Contingency Plan are provided for by the programs and reporting requirements described in Section 3.1.1, 3.1.2, and 3.1.3.

Groundwater monitoring of the plume edge will be expanded by installing new monitoring wells and adding existing monitoring wells to the regular monitoring program. These actions will collect more information with which to track the location and migration of the plume. These data will be evaluated by annual performance reviews to determine if the degree of migration, if detected, is inconsistent with model predictions or the expected plume migration. The performance review would recommend a modification of the pumping if groundwater monitoring data indicated a risk that the plume would affect drinking water supplies. The performance reviews are reported to ADEQ and posted at the public information repositories (Section 3.4).

The mitigation plan prescribes predetermined action levels and response actions for sentinel and drinking water supply wells, provided the sulfate is due to the Sierrita Tailing Impoundment. The action levels would provide early warning of sulfate plume migration and cause the implementation of response actions to protect drinking water supply wells from being affected by sulfate at concentrations greater than 250 mg/L at the point of use.

A sulfate action level of 135 mg/L is set for drinking water supply wells. If a drinking water supply well exceeds 135 mg/L, written notice would be given to ADEQ and the well owner, water quality sampling would be increased from quarterly to monthly, and a site-specific mitigation plan would be developed for the supply well and implemented prior to its concentration exceeding 250 mg/L. Sulfate action levels of 135 mg/L and 250 mg/L are set at sentinel wells. Exceedance of the 135 mg/L sulfate action level at a sentinel well would trigger written notice to ADEQ and the water company with a supply well monitored by the sentinel well, and water quality sampling would be increased to monthly from quarterly. If the concentration of sulfate at a sentinel well increases above 250 mg/L, a site-specific mitigation plan would be developed for the supply well and implemented prior to the concentration exceeding 250 mg/L.

3.2 Mitigation Pumping

- Section 3.5 describes the implementation schedule for mitigation pumping during the curtailment.
- During the curtailment, mitigation pumping will be conducted at a rate of at least 7,750 gpm according to the “Curtailment Pumping” rates on Table 1.
- Larger pumps will be placed in the PS wells to attain the increased pumping rates prescribed for the curtailment (Table 1).
- Mitigation pumping after the curtailment will resume at rates to be determined by the performance review and adaptive management process.
- The O&M Plan will remain in effect during the curtailment.

3.3 Water Management

Methods for managing water in a curtailment scenario at Sierrita may include:

- Mitigation water will be used for plant processes or managed on the tailing impoundment, consistent with current practice.
- Dust control on roadways and tailings impoundment.
- Enhanced evaporation and storage on the tailings impoundment, leach stockpiles, and/or Twin Buttes and Sierrita pits.
- Enhanced evaporation methods such as sprinklers, mechanical evaporators and/or atomizers may be used to manage any excess water in the event of a curtailment up to 100%. Enhanced evaporation would occur on the west end of the tailings impoundment.
- Storage in the Twin Buttes or Sierrita pits. Water storage in the pits would not exceed the steady state hydraulic sink elevations listed in Section 2.1.3.

3.4 Community Information

- Community Advisory Group meetings will continue according to the current schedule.
- Reports and correspondence submitted to ADEQ will continue to be posted at the Joyner Green Valley Branch Public Library and the online information repository at http://www.fcx.com/sierrita/home.htm.

3.5 Implementation Schedule

CONTINGENCY ACTION	TARGET COMPLETION DATE
Written 60-Day Notice of Contingency Plan	November 9, 2015
Implement Contingency Plan	January 9, 2016
Reduce Pumping at IW, FFS, and MC Wells	January 9, 2016
Replace Pumps in PS Wells	April/May 2016
Increase Pumping in PS Wells	April/May 2016
Install of New Monitoring Wells at North End of Plume	First Quarter 2016

4.0 REFERENCES

Arizona Department of Environmental Quality (ADEQ). 2015. Correspondence from Madeline Keller, ADEQ, to Deborah Chismar, Sierrita, Re: Review of the Response to ADEQ's Review of the 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, Pima County, Arizona dated June 23, 2015. November 20, 2015.

BasinWells Associates. 2013. Freeport-McMoRan Sierrita Inc. Sulfate Mitigation Action Well Field Operation and Maintenance Plan. December 31, 2013.

Clear Creek Associates. 2012. Sierrita and Twin Buttes Mines Passive Containment Capture Zone Analysis. April 2012.

Clear Creek Associates. 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 P-50-06. December 18, 2013.

Clear Creek Associates. 2014. Sierrita Basin Fill Model Update and Predictive As-Built Wellfield Simulation. July 10, 2014.

Clear Creek Associates. 2015. Mitigation Performance Review for 2014, Mitigation Order on Consent Docket P-50-06. April 30, 2015.

Freeport-McMoRan Sierrita Inc. (Sierrita). 2015. Correspondence from Deborah Chismar, Sierrita, to Madeline Keller, ADEQ, Re: ADEQ Review of Mitigation Plan, Mitigation Order on Consent Docket No. P-50-06. June 23, 2015.

Freeport-McMoRan Website. 2015. Freeport-McMoRan Reports Third-Quarter and Nine-Month 2015 Results, http://investors.fcx.com/investor-center/news-releases/news-release-etails/2015/Freeport-McMoRan-Reports-Third-Quarter-and-Nine-Month-2015-Results/default.aspx#sthash.4EmbS9Rl.dpuf. October 26, 2015

Freeport-McMoRan Website. 2016. Freeport-McMoRan Reports Fourth-Quarter and Year Ended December 31, 2016 Results, http://investors.fcx.com/investor-center/news-releases/news-release-details/2016/Freeport-McMoRan-Reports-Fourth-Quarter-and-Year-Ended-December31-2015-Results/default.aspx. January 26, 2016.

Hydro Geo Chem, Inc. 2008. Feasibility Study Report 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. October 22, 2008.

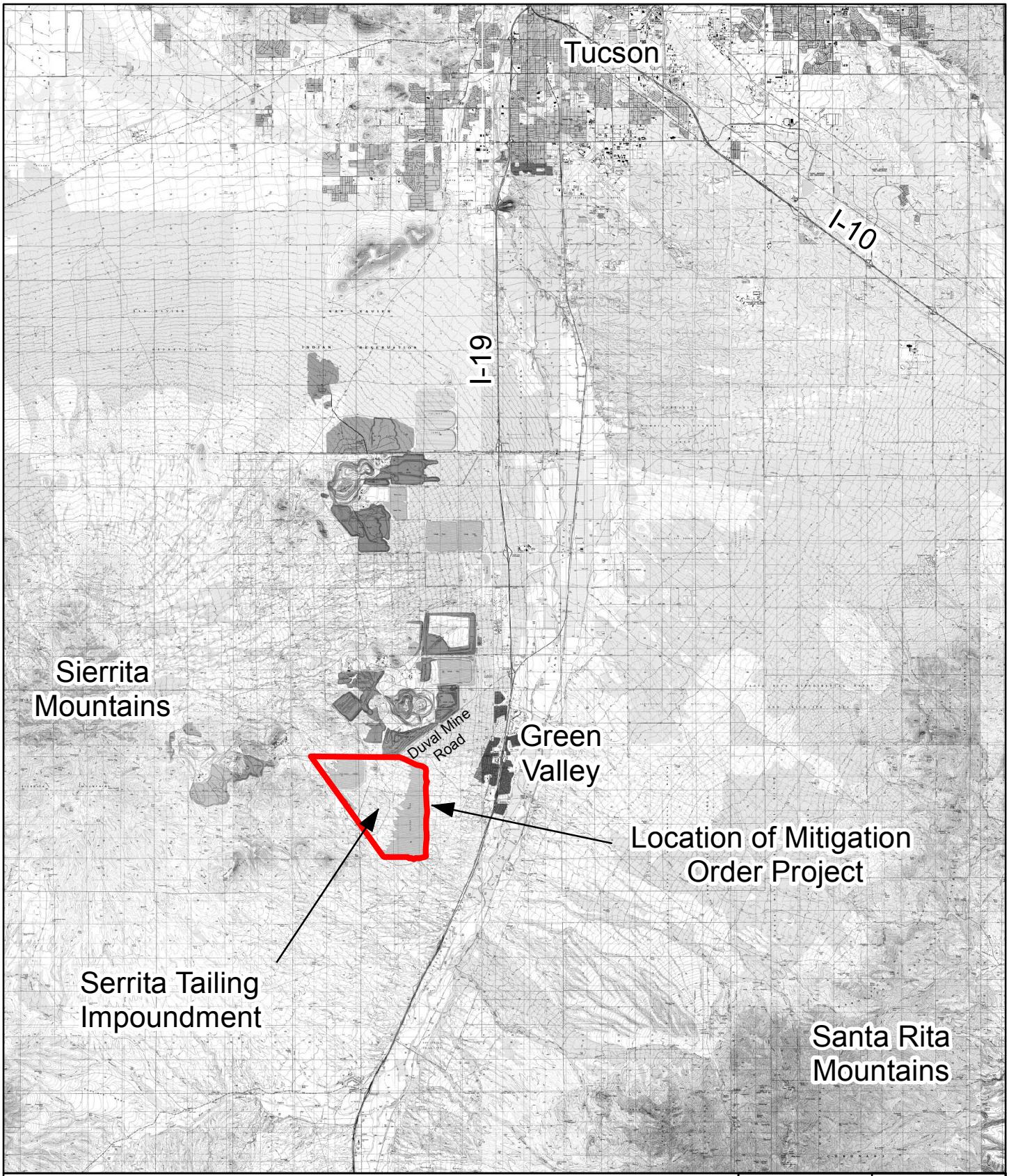
TABLE

TABLE 1
Pumping Rates for Simulated Curtailment Scenario

WELL NAME	ADWR REGISTRY NUMBER	2014 AVERAGE PUMPING RATE (gpm)	CURTAILMENT PUMPING 2016 through 2020 (gpm)	POST-2020 PUMPING (gpm)
IW-01	623129	202	0	202
IW-02A	216464	226	0	226
IW-03A	201732	436	0	436
IW-04	623132	76	0	76
IW-05A	219131	18	0	18
IW-06A	545565	62	0	62
IW-08	508236	225	0	225
IW-09	508238	104	0	104
IW-10	508237	236	0	236
IW-11	508235	119	0	119
IW-12	545555	79	0	79
IW-13	545556	6	0	6
IW-14	545557	45	0	45
IW-15	545558	33	0	33
IW-19	545562	163	0	163
IW-20	545563	23	0	23
IW-21	545564	47	0	47
IW-22	200554	280	0	280
IW-23	200555	137	0	137
IW-24	200556	56	0	56
IW-25	219596	423	0	423
IW-26	219143	0	0	0
IW-27	219136	59	0	59
IW-28	219137	277	0	277
IW-29	222865	145	145	145
IW WELL TOTAL		**3,479**	**145**	**3,479**
FFS-1	221662	853	500	853
FFS-2	221663	782	0	782
FFS-3	221664	244	0	244
FFS-4	221665	178	0	178
FFS-5	221666	956	956	956
FFS-6	221667	553	550	553
FFS WELL TOTAL		**3,565**	**2,006**	**3,565**
PS-1	220861	588	750	750
PS-2	220862	592	750	750
PS-3	220863	591	900	900
PS-4	220864	709	1,100	1,100
PS WELL TOTAL		**2,480**	**3,500**	**3,500**
MC-1	221660	844	500	844
MC-2	221761	619	500	619
MC-3	221661	564	550	564
MC-4	220842	557	550	557
MC WELL TOTAL		**2,584**	**2,100**	**2,584**
TOTAL PUMPING		**12,107**	**7,751**	**13,127**

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

FIGURES



0 2 4 8
Miles

PROJECTION: UTM Zone 12N NAD83

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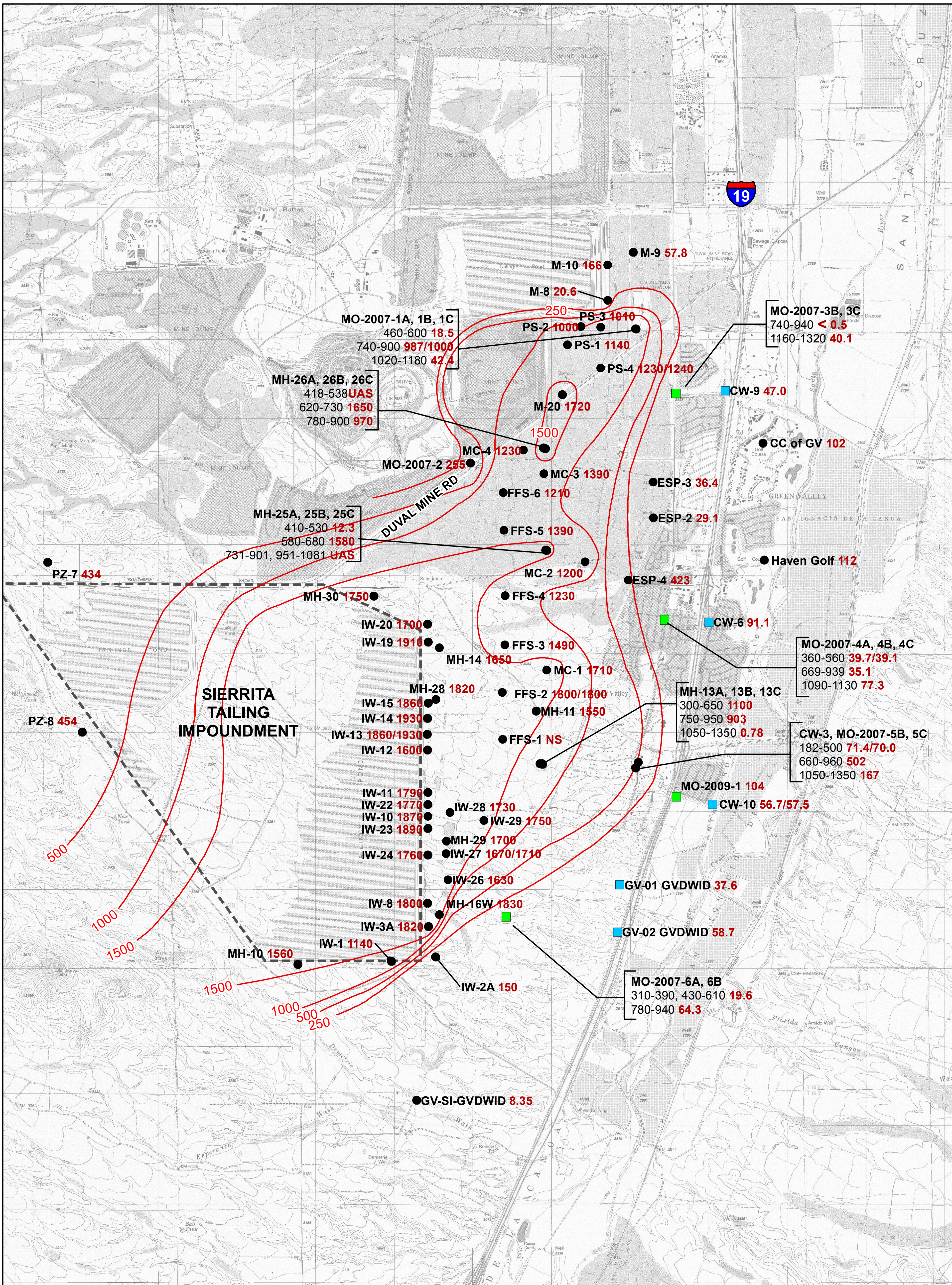
File ID 055039-121

Date 3/12/15

FIGURE 1
Project Location Map


M-9 57.8
M-10 166
M-8 20.6
250
PS-3 1010
PS-2 1000
PS-1 1140
PS-4 1230/1240
MO-2007-1A, 1B, 1C
460-600 18.5
740-900 987/1000
1020-1180 42.4
MO-2007-3B, 3C
740-940 < 0.5
1160-1320 40.1
MH-26A, 26B, 26C
418-538UAS
620-730 1650
780-900 970
M-20 1720
CW-9 47.0
1500
MC-4 1230
MO-2007-2 255
CC of GV 102
MC-3 1390
ESP-3 36.4
FFS-6 1210
DUVAL MINE RD
ESP-2 29.1
MH-25A, 25B, 25C
410-530 12.3
580-680 1580
731-901, 951-1081 UAS
FFS-5 1390
PZ-7 434
Haven Golf 112
MC-2 1200
ESP-4 423
MH-30 1750
FFS-4 1230
CW-6 91.1
IW-20 1700
IW-19 1910
FFS-3 1490
MO-2007-4A, 4B, 4C
360-560 39.7/39.1
669-939 35.1
1090-1130 77.3
MH-14 1650
MC-1 1710
MH-28 1820
FFS-2 1800/1800
MH-13A, 13B, 13C
300-650 1100
750-950 903
1050-1350 0.78
SIERRITA
TAILING
IMPOUNDMENT
IW-15 1860
IW-14 1930
MH-11 1550
PZ-8 454
IW-13 1860/1930
FFS-1 NS
CW-3, MO-2007-5B, 5C
182-500 71.4/70.0
660-960 502
1050-1350 167
IW-12 1600
MO-2009-1 104
IW-11 1790
IW-22 1770
IW-10 1870
IW-23 1890
IW-28 1730
CW-10 56.7/57.5
IW-29 1750
MH-29 1700
500
IW-24 1760
IW-27 1670/1710
IW-26 1630
GV-01 GVDWID 37.6
1000
IW-8 1800
MH-16W 1830
IW-3A 1820
GV-02 GVDWID 58.7
1500
MH-10 1560
IW-1 1140
IW-2A 150
1500
MO-2007-6A, 6B
310-390, 430-610 19.6
780-940 64.3
1000
500
250
GV-SI-GVDWID 8.35
19

Legend

250 mg/L Sulfate Concentration Contour

IW-10 Well ID
1870 Sulfate Concentration (mg/L)
Duplicate results separated by "/"

NS No Sample

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

Well Symbols

- Well
- Sentinel Well
- Drinking Water Supply Well

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

NOTE:
Projection:UTM NAD83 Zone 12N

Date 1/27/16

File ID 055039-147

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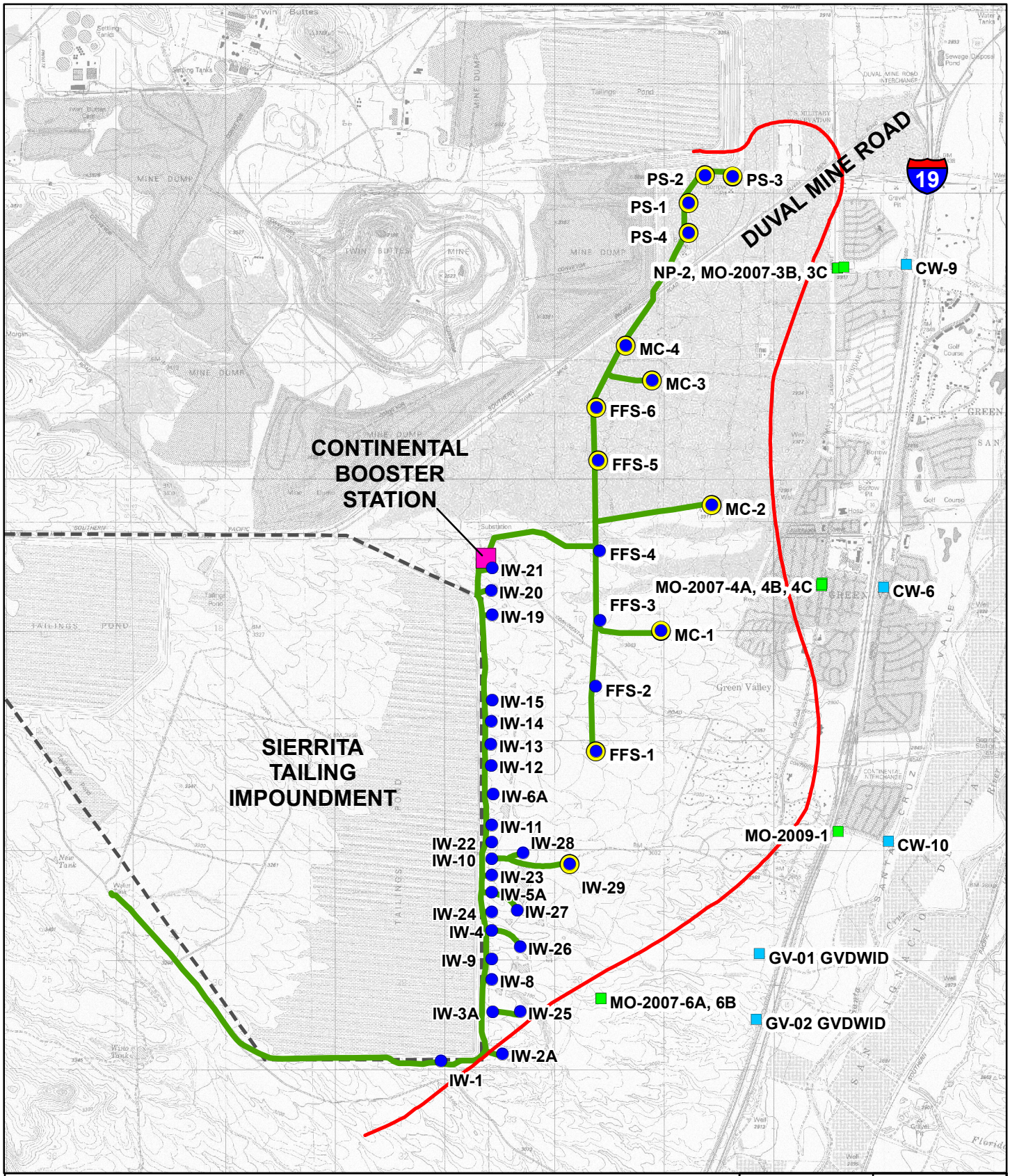
FIGURE 2
Sulfate Concentrations
in Groundwater
Second Quarter 2015



Legend

- Extraction Well
- Operational for Contingency Plan
- Sentinel Well
- Drinking Water Supply Well
- Booster Station
- Pipeline
- Tailing Impoundment
- Second Quarter 2015 250 mg/L Sulfate Concentration Contour

0 2,000 4,000
Feet

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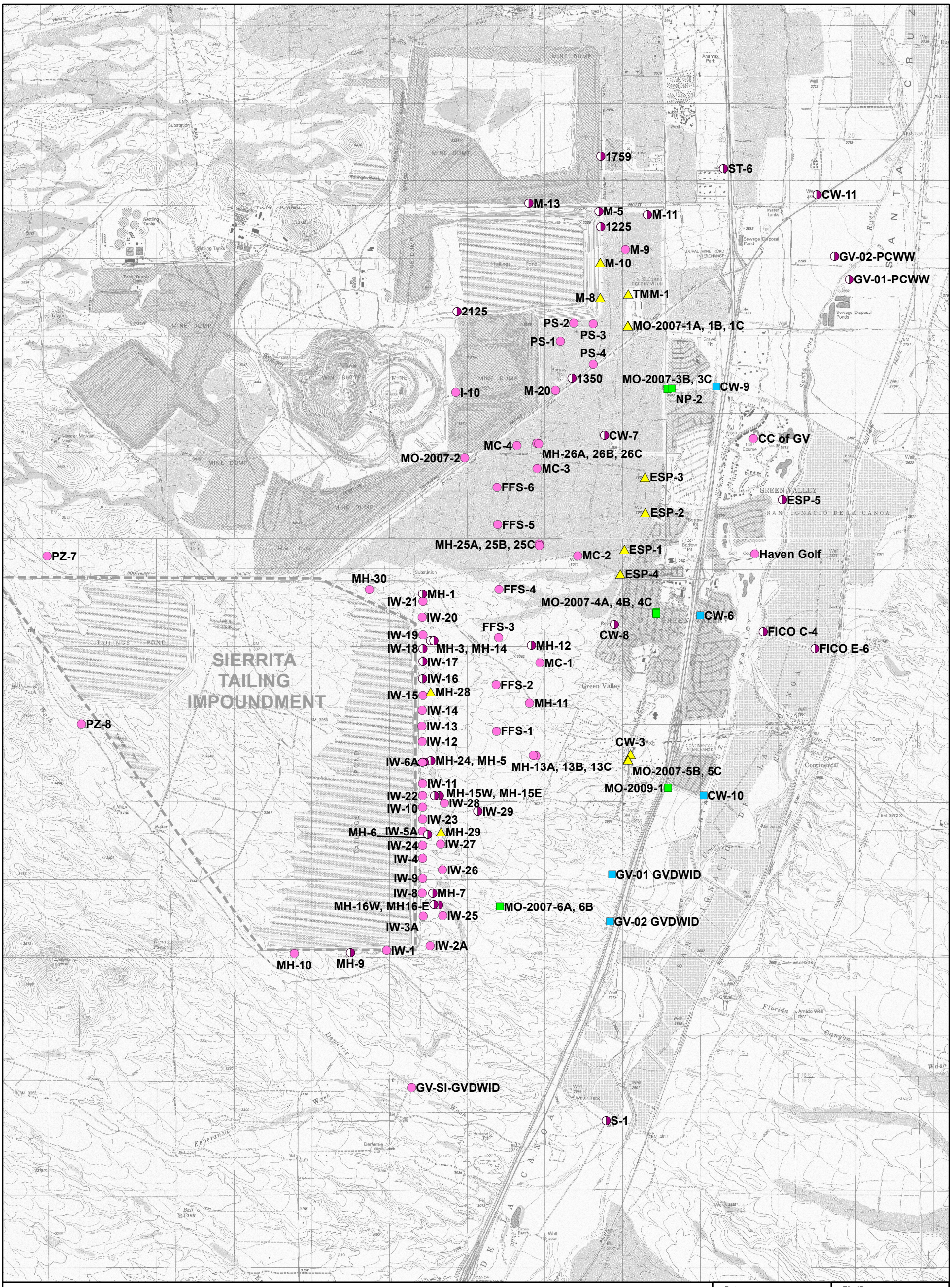
File ID 055039-159
Date 10/30/15

FIGURE 3
Mitigation Action
Extraction Wells
and Pumping Facilities



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

Scale

0 2,000 4,000 8,000

Feet

Date	File ID
10/30/15	055039-006C

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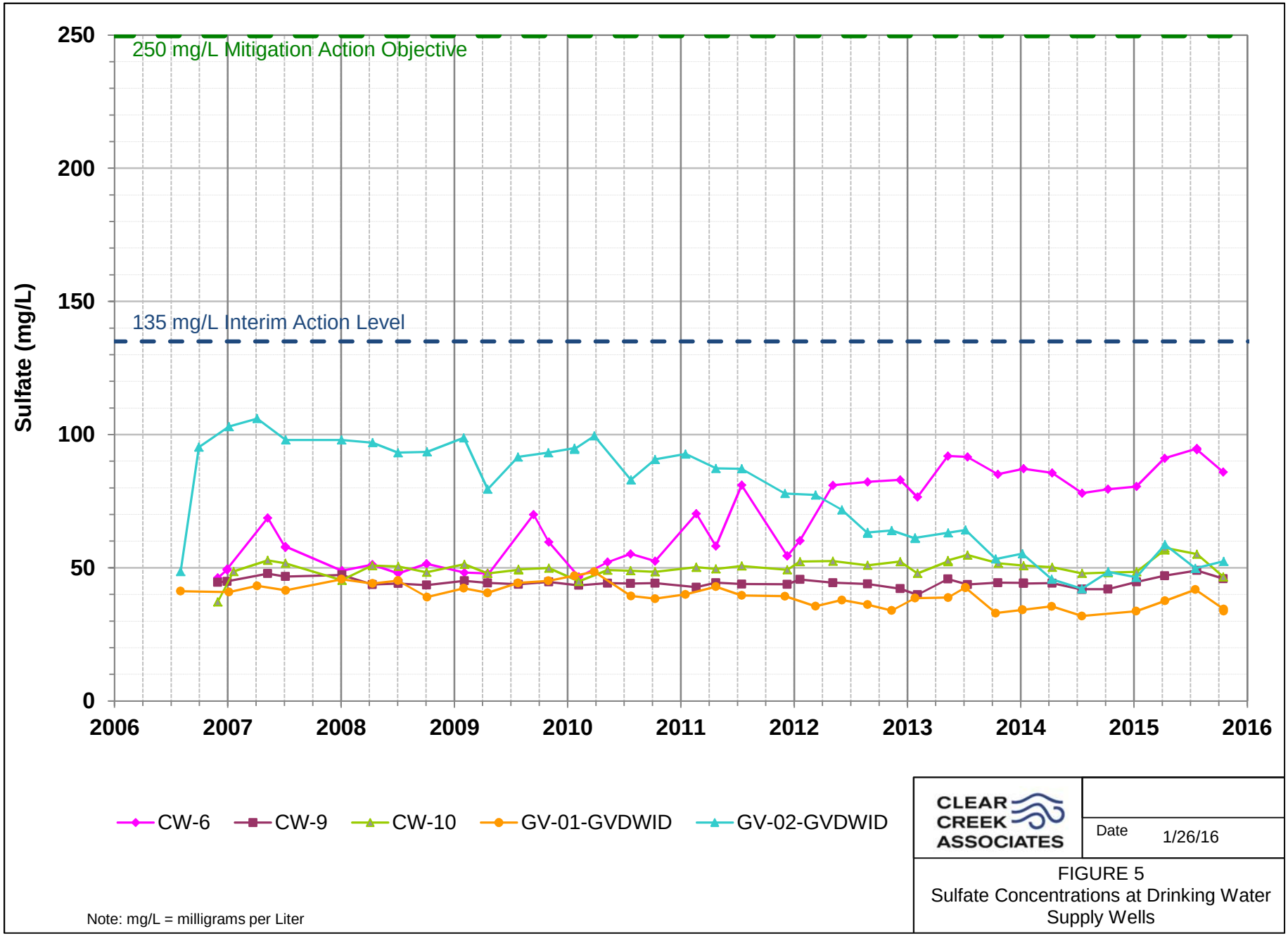
FIGURE 4
Post-Implementation Groundwater Monitoring Locations



Note: mg/L = milligrams per Liter

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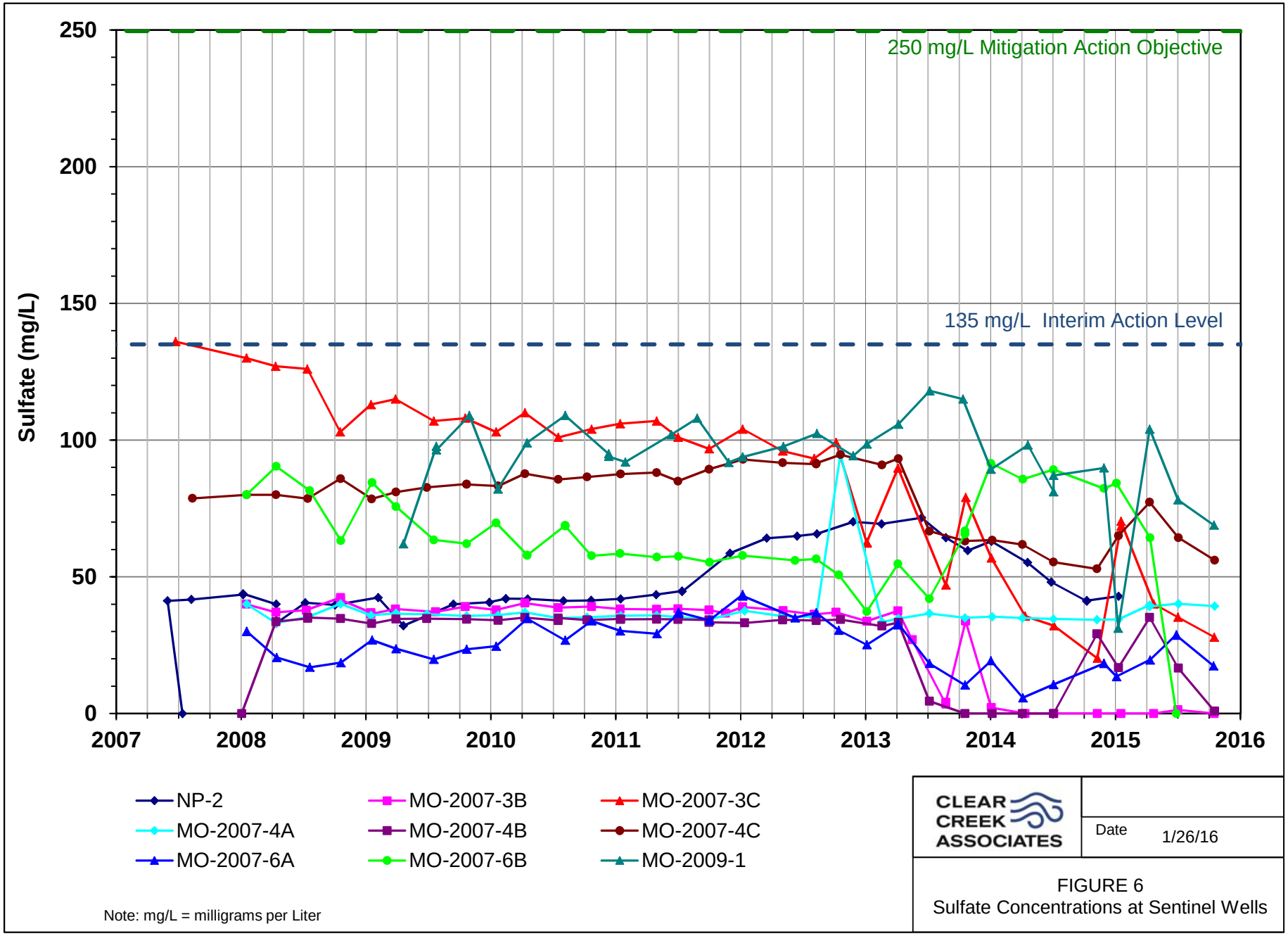
Date 1/26/16

FIGURE 5
Sulfate Concentrations at Drinking Water Supply Wells



Note: mg/L = milligrams per Liter

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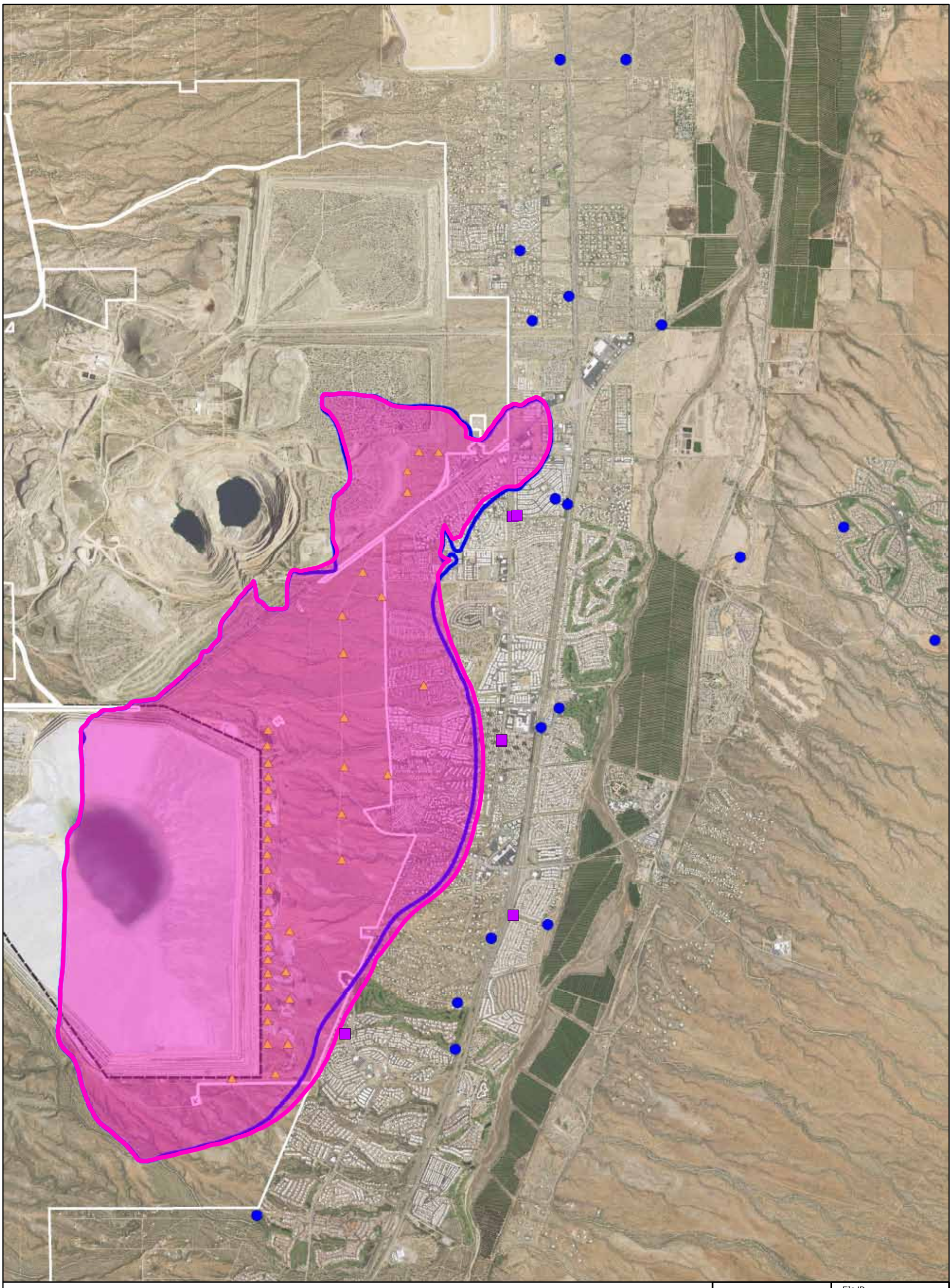
Date 1/26/16

FIGURE 6
Sulfate Concentrations at Sentinel Wells



11/5/15	File ID 055039-158
N	CLEAR CREEK ASSOCIATES

FIGURE 7
Predicted Sulfate Plume for Curtailment Pumping Plan Compared to Plume for 2014 Pumping Rate