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Date:
March 24, 2015

ARCADIS Project No.:
AZ001233.0018.00001

Subject:
Review of Background Well Locations and Groundwater Quality
Freeport-McMoRan Inc. Sierrita Operations
VRP Site Code #100073-03

Introduction

This memorandum is being submitted on behalf of Freeport-McMoRan Inc. Sierrita Operations and describes the results of the Voluntary Remediation Program (VRP) characterization of background groundwater quality at the Sierrita mine and addresses Arizona Department of Environmental Quality (ADEQ) comments regarding the groundwater monitoring wells identified to define background groundwater quality (i.e., background wells). In order to address these comments, Sierrita presented additional supporting information during a meeting held on November 20, 2014 and committed, under separate cover, to submit to the VRP a detailed analysis to document that the selected wells do represent background conditions.

The stated objectives for installation of background wells and subsequent groundwater analysis in the VRP Investigation Work Plan (URS 2008) were to evaluate background uranium concentrations in groundwater through the installation of monitor wells at background locations in mineralized bedrock formations, and assist understanding natural concentrations of uranium and other constituents in groundwater in order to refine the site conceptual model.

There are multiple lines of evidence to show that the location of the background wells were appropriately placed and establish an understanding of background water quality within the major bedrock geologic formations that are relevant to the VRP investigation. The sections below provide detailed information to show that:

- The background wells are screened in the appropriate bedrock geologic formations targeted for the VRP investigation

- The background wells are primarily located hydraulically upgradient or cross gradient of any potential mine operation influences with respect to groundwater flow direction

- The water quality in the background wells are distinct from mine influenced bedrock groundwater, specifically with respect to major cation and anion composition

- Uranium is present in background groundwater at concentrations that reflect the natural abundance of uranium in the geologic formation

The data collected for the VRP, and therefore the focus of this memorandum, was collected between 2008 and 2009. However, background groundwater quality has been at least partially characterized for other programs at the Sierrita mine, including the Aquifer Protection Permit (APP) application process, and other investigations (Conoco 1981). These data were used in the development of the ADEQ approved VRP Investigation Work Plan (URS 2008), and as such, these data are also included in the discussion below.

Purpose and Need

The objective of the VRP investigation activities is to assess potential releases from former and current areas of operation, with a particular focus on former areas of operation, and to develop a concise conceptual site model (CSM) of uranium (and other constituents) in groundwater. Determining whether operations have contributed to uranium concentrations in groundwater and, if so, characterizing uranium distribution and contributions from areas of operation, requires an understanding of natural background conditions. Previous studies, including Conoco (1981), indicated that uranium naturally occurs in bedrock in the area. Dissolution of uranium-bearing minerals from geologic formations in the bedrock aquifer by natural processes can, under certain conditions, contribute to elevated uranium concentrations and affect isotopic signatures in the bedrock hydrostratographic unit. Therefore, the isotopic signatures can assist in determining whether the uranium present in groundwater is naturally occurring or caused by mine related operations.

Further, the contribution of uranium in groundwater from background conditions varies depending on the type of geologic formation. Conoco (1981) reported, for example, that hornblende-biotite granodiorite contained relatively elevated concentrations of uranium with respect to the rest of the Sierrita batholith. Additionally, as described in the Groundwater Investigation Report (ARCADIS 2013), the different geologic formations also contribute to variable concentrations of other constituents, in particular alkalinity and sulfate, which result in enhanced leaching of uranium from bedrock formations. Therefore, geology is key to understanding the naturally occurring uranium (and other constituent) concentrations in groundwater.

Background Wells

There are seven background monitoring wells at Sierrita that were installed in locations that are primarily hydraulically upgradient or cross gradient from current and former mine operations. These wells provide data on background water quality and are detailed in the following table:

Well Identifier	Installation Date	Geologic Formation	Total Depth (ft bgs)	Screened Interval (ft bgs)
MH-17	May 8, 1997	Harris Ranch quartz monzonite	108	58 – 108
MW-2008-15	September 16, 2008	Harris Ranch quartz monzonite	108	57.5 – 107.5
PZ-1	May 14, 1997	Tinaja Peak	190	140 – 190
MW-2008-14	September 10, 2008	Tinaja Peak	80.5	30 – 80
MH-21	June 3, 1997	Ruby Star granodiorite	78	28 - 78
MW-2008-12	September 8, 2008	Ruby Star granodiorite	155.5	100 – 155
MW-2008-13	September 8, 2008	Ruby Star granodiorite	100.5	40 - 100

ft bgs = feet below ground surface

Groundwater monitoring wells MH-17, PZ-1, and MH-21 were installed prior to the implementation of the VRP investigation program. Analytical data were available beginning in 1997 and evaluated during development of the VRP Investigation Work Plan. These data indicated stable concentrations of uranium and other constituents, and were the basis for determining further well placement (URS 2008).

Groundwater monitoring wells MW-2008-12 through -15 were installed in locations near the pre-existing background wells to further characterize background water quality. In the sections below, the hydraulic and geochemical data from the seven background wells are presented and the consistency of data records and differences compared to downgradient groundwater monitoring wells are evaluated to confirm the applicability of these wells as background monitoring locations.

Hydraulic Characteristics

To illustrate the hydraulic position of the background groundwater monitoring wells compared to mining operations, depth to water level information, collected from more than 100 wells regionally, and 50 wells locally within and surrounding the Sierrita mine was evaluated to provide a groundwater flow interpretation. The most recent site and regional data sets that are comprehensive were used to generate the maps shown on Figures 1 and 2. These groundwater flow interpretations are consistent with other studies and monitoring reports for the mine (Clear Creek 2012, APP Reports 2009/2011/2013, and ARCADIS 2013).

The background groundwater monitoring wells to the north of the mine (MH-21, MW-2008-12 and MW-2008-13) are completed in the Ruby Star granodiorite and located hydraulically upgradient of operations for the former Twin Buttes Mine (Figure 2). Background groundwater monitoring well MW-2008-12 is located hydraulically upgradient of the Sierrita Mine leach pad areas and approximately 1,000 feet cross gradient of the waste rock piles (Figure 1). Background groundwater monitoring wells MH-21 and MW-2008-13 are located approximately 5,000 feet hydraulically cross gradient of the active oxide leach areas, and are cross gradient and slightly downgradient of the waste rock areas in the northern portion of the Sierrita Mine. The groundwater in these background wells are not affected by mine processes as described in the geochemical discussions of this document.

The background groundwater monitoring wells that are completed in the Harris Ranch quartz monzonite (MH-17 and MW-2008-15) are located hydraulically upgradient of the Sierrita mine operations, including all waste rock piles and leach pad areas (Figure 1). Groundwater monitoring well MW-2008-15 is located on the western edge of the west waste rock area, but is outside of the area of disturbance, which is approximately 500 feet to the east.

The background wells installed in the Tinaja Peak Formation (PZ-1 and MW-2008-14) are located hydraulically cross gradient of all of the leach pad areas for the Sierrita mine operations (Figure 1). Background well PZ-1 is also located approximately 2,500 feet hydraulically cross gradient of the west waste rock pile area. Background well MW-2008-14 is located downgradient and cross gradient of the west waste rock pile area. The groundwater in these background wells are not affected by mine processes as described in the geochemical discussions of this document.

Groundwater flow conditions on a regional basis have been consistent since the 1940's (Clear Creek 2012). Local changes have occurred at the mine where dewatering has been conducted (i.e., the Sierrita pit and the Sierrita tailing impoundment interceptor well field). Dewatering has not affected regional groundwater gradients (Clear Creek 2012), so the dewatering should not have altered hydrologic characteristics at the background locations over time. These statements are supported by the data collected during the VRP sampling events (Figure 3), which show little variation in groundwater elevations in the background groundwater monitoring wells between 2008 and 2009. Groundwater elevations available for MH-17 and MH-21 collected after the VRP investigation sampling events indicate that groundwater elevations continue to be consistent over time.

The Sierrita mine area contains surface water features and washes that extend from north and west of the mine toward the south and east. Most of the groundwater monitoring wells installed in the West and Central VRP Investigation areas, as well as the background areas, are located near alluvial washes. Surface-water runoff and shallow subsurface flow within these channels will likely reflect drainage from upgradient areas, which then can infiltrate to the underlying bedrock. The degree of influence on the background groundwater chemistry will be controlled by several factors including: well construction, particularly if screened across both alluvium and bedrock materials (well construction factors); the presence of alluvium in the immediate vicinity of the well (surface-groundwater interaction factors); and well location hydraulically downgradient of infiltration areas (bedrock groundwater flow).

Review of the drilling logs and well construction diagrams for the background wells indicate that they are only screened within their respective target bedrock formations, with no screening across other formations. This indicates the wells have been effectively constructed for the purpose of being a background well.

The drilling logs indicate only groundwater monitoring well MW-2008-14 encountered alluvial materials during advancement, from 0 to 8 feet below ground surface (bgs) and was subsequently screened from 30 to 80 feet bgs, with a cement bentonite grout placed adjacent to the alluvial materials during well construction, which prohibits vertical transport of groundwater from the alluvial aquifer to the bedrock formation in this well. Also, MW-2008-14 is not located in a surface water feature that drains a mine feature. This indicates that infiltration from alluvium to bedrock in the immediate vicinity of each of the background groundwater monitoring wells is highly unlikely and that MW-2008-14 only has a small thickness of alluvium and has been constructed to restrict vertical migration in the vicinity of the well.

Background groundwater monitoring wells MH-17, MW-2008-15, PZ-1 and MW-2008-12 are upgradient or cross gradient from surface water features and/or groundwater flow relative to the mine, and therefore would not likely receive mine runoff water directly or by infiltration from the respective surface water features. Background wells MW-2008-13 and MH-21 to the northeast of the mine, are in proximity to a portion of a surface water feature that is downgradient of waste rock piles in this area. Neither well encountered alluvial materials during well installation. This indicates that surface water from the channel will not infiltrate in the immediate vicinity of these two background groundwater monitoring wells.

Uranium in Groundwater at Background Well Locations

The uranium concentrations detected in samples collected from the background groundwater monitoring wells are consistent with the geologic formations in which they were installed and naturally occurring constituents that cause uranium to leach from the formations. As demonstrated in previous reports (Conoco 1981, ELMA & DM 1994), uranium naturally occurs in bedrock and groundwater throughout the region, and particularly in certain geologic formations that are present at the site. The analytical results from the VRP investigation sampling events confirmed the presence of uranium in groundwater at the 7 background well locations at concentrations unique to the geologic formation in which they are completed (Figure 4). The highest concentrations were associated with wells screened in the Ruby Star granodiorite (up to 0.9 mg/L), consistent with findings from Conoco (1981) which had showed elevated uranium concentrations in the area of the hornblende-biotite granodiorite relative to other formations investigated.

Certain constituents naturally present in geologic formations can contribute to leaching of uranium-bearing minerals in the bedrock, and consequently, elevated concentrations of uranium in groundwater. A review of background concentrations of constituents such as alkalinity, sulfate and calcium assists with interpreting the variation in groundwater uranium concentrations within the same geologic formation (see Figures 5 through 7). For example, alkalinity and calcium concentrations in samples collected from groundwater monitoring wells MH-21 and MW-2008-13, within the Ruby Star granodiorite, were almost double the concentration of samples collected from groundwater monitoring MW-2008-12. Correspondingly, concentrations of uranium in groundwater were higher in samples collected from groundwater monitoring wells MH-21 and MW-2008-13 than they were at groundwater monitoring well MW-2008-12, due to the greater stability of the dissolved calcium-uranium-carbonate complex in groundwater at these locations. As discussed below, alkalinity is elevated in groundwater due to natural conditions unaffected by mine processes; calcite minerals have been documented to be abundant in the Ruby Star granodiorite and contribute significant alkalinity to the groundwater system (Golder 2007). Natural sulfate and alkalinity concentrations were higher in samples collected from groundwater monitoring well MW-2008-13 (Figures 5 and 6), leading to enhanced weathering of uranium from the bedrock minerals. Notably, differences in calcium concentrations created clear differences in uranium concentrations in groundwater samples collected from each of these background wells (Figure 7).

Evaluation of the Activity Ratio of Uranium Isotopes

As discussed in Section 3.8.5.1 of the VRP Groundwater Investigation Report (ARCADIS 2013), uranium is comprised of three principal isotopes (uranium-234, uranium-235 and uranium-238). It is expected that these isotopes would be present in bedrock and groundwater at an activity ratio of “1”, a condition known as secular equilibrium. This is the case for mine leaching solutions, where the aggressive chemical nature of the sulfuric acid used to leach copper from the ore results in equal leaching of all of the uranium isotopes such that the uranium-234/uranium-238 activity ratio of these solutions is 1. These mine process solutions also have very high concentrations of anions (sulfate and chloride) as a result of the chemical leaching process. Under certain conditions; however, the lightest isotope, uranium-234, may preferentially dissolve from rock into groundwater leading to a deviation from the expected isotope ratio of 1:1 uranium-234/uranium-238 (Morrison et al. 2012). The uranium-234/uranium-238 activity ratio of groundwater samples collected from the background wells is illustrated in Figure 8. Mean activity ratios ranged from 1.12 in the Ruby Star granodiorite to 1.94 in the Harris Ranch quartz monzonite. The figures demonstrate the variability in the uranium-234/uranium-238 isotopic ratio owing to not only the distinct geologic unit within which the background wells is screened, but also the effect of distinct groundwater chemistry on dissolution of uranium-bearing minerals within each background location. For example, the higher calcium and alkalinity concentrations in groundwater at background groundwater monitoring wells MH-21 and MW-2008-13 have led to more aggressive natural leaching of uranium-bearing minerals in bedrock (as shown in Figures 5 and 7); in these wells, the activity ratio is lowest compared to other background wells.

Background Water Quality: Major Ions

Although the primary objective of the background groundwater well installation was to provide closer examination of naturally occurring uranium concentrations in groundwater, laboratory analytical results for samples collected from these wells also can be used to define background conditions for other constituents.

The seven background groundwater monitoring wells are completed in three distinct geologic formations, each with unique water quality. The interaction of groundwater with minerals in the bedrock formations results in the dissolution of major cations calcium (Ca^{2+}), magnesium (Mg^{2+}), sodium (Na^{+}) and potassium (K^{+}) as well as major anions sulfate (SO_4^{2-}), chloride (Cl^{-}) and bicarbonate (HCO_3^{-}). The major anions are important relative to their role in aiding the dissolution of naturally-occurring uranium contained in minerals that comprise the bedrock (the dissolved calcium-uranium-carbonate complex is the predominant form of soluble uranium in the bedrock system unaffected by mine operations [ARCADIS, 2013]).

The concentration of bicarbonate and carbonate are generally lower in mine-affected water because of the acidity that originates from certain mine processes (acid leaching of copper); elevated alkalinity is therefore a marker of waters unaffected by mine processes. Sulfate and chloride are markers of potential impacts to groundwater quality by former and current mine operations; for example, sulfate concentrations in mine impacted groundwater can be greater than background due to the use of sulfuric acid for copper oxide ore leaching. Chloride concentrations can be higher than background due to the use of chloride brines in mine operations (i.e., in the Former CLEAR Plant Area) and also due to dissolution of chloride-containing minerals in response to intrusion of low pH solutions into groundwater. Low pH solutions will also, in general, dissolve major cations; concentrations of calcium in groundwater, for example, will then increase. Whereas cations tend to sorb to solid rock and soil surfaces in an aquifer, anions such as sulfate and chloride are very soluble and generally travel unretarded in groundwater, making them good indicators of potential other sources besides background. An evaluation of the attenuation capacity of the alluvium and bedrock at the mine showed that most cations are well attenuated and anions such as sulfate and chloride are least attenuated (Golder, 2007). The differentiation between background and non-background water quality is therefore aided by examining major ion concentrations, and anion concentrations in particular.

Waste rock piles are located cross gradient and slightly upgradient to some of the background wells. Waste rock in these piles contains copper at a concentration below that targeted for recovery and is essentially extremely low-grade ore. Any effect that the waste rock might have on bedrock groundwater would be detected as a significant increase in dissolved sulfate (due to dissolution of sulfate- and sulfide-bearing minerals in the waste rock pile), a decrease in pH and alkalinity (due to sulfide oxidation and sulfuric acid release from the pile), and increased metals concentrations in the bedrock groundwater. The Sierrita ore is not generally capable of generating excessive acid upon exposure to air, and abundant acid neutralization capacity is present in the ore in the form of alkaline minerals (waste rock has been shown to contain neutralization potential (NP) of 1.2 – 5.6% as calcium carbonate (Golder, 2007)). Minerals capable of excess acid production would be present in very low concentrations in the waste rock piles (copper is contained in oxide and sulfide minerals, both of which are in low concentrations in the waste rock). The following provides a summary of the major anion composition of groundwater at the background well locations and concludes that evidence of impacts from mine operations is absent in these areas.

Piper and Stiff Diagrams

The differences in groundwater characteristics in each formation can be visually demonstrated by Piper and Stiff diagrams. Piper diagrams display the relative abundances of the major cations and anions of each sample, expressed as percent milliequivalents per liter (meq/L). The Piper diagram not only shows graphically the nature of a given water sample, but also indicates the relationship to other samples.

The Piper diagram shown in Figure 9 demonstrates that background water quality is distinct within each geologic formation, and it also indicates that major ion composition is similar for locations within each formation. Briefly:

- Groundwater in the Ruby Star granodiorite is predominantly comprised of calcium sulfate
- In the Harris Ranch quartz monzonite, the major ion composition shifts toward calcium bicarbonate
- Groundwater in the Tinaja Peak formation is predominantly calcium/sodium bicarbonate

Background groundwater monitoring wells MH-21 and MW-2008-13 are screened in the Ruby Star granodiorite and are located cross gradient and slightly downgradient of an area in the north with a very limited footprint of waste rock, however the Piper diagram shows that their major ion composition is consistent with background groundwater monitoring well MW-2008-12, which is also screened in the Ruby Star granodiorite and located upgradient of mine features.

The two background groundwater monitoring wells in the Tinaja Peak formation are located hydraulically cross gradient and slightly downgradient of the western-most fringe of the western waste rock piles, and have very low major ion concentrations when compared to concentrations in samples collected from groundwater monitoring wells located east of these wells. This indicates that these wells are unaffected by the waste rock piles and is further demonstrated in the Stiff diagrams.

Stiff diagrams show the cation concentrations in meq/L on the left y-axis and anion concentrations in meq/L on the right y-axis. The diagram forms a shape when the data are connected; shapes can then be compared to quickly visualize similarities or differences in water types. The Stiff diagrams for select locations (Figures 10 and 11) show that major ion identity and concentrations in samples collected from background wells is distinct from samples collected in and downgradient of mine activity influenced areas. For example, the shapes of the diagrams for wells screened in the Harris Rach quartz monzonite and Tinaja Peak formation background locations are distinctly different than the West Investigation Area wells (MH-18 and MH-19; groundwater here is predominantly calcium sulfate). The shapes of the diagrams for the Ruby Star granodiorite background locations are smaller (due to the lower concentrations of calcium and sulfate) and reflective of the lower chloride concentration than the diagrams for the former CLEAR Plant area and the majority of the locations near Amargosa Wash. The Stiff diagrams show that the Ruby Star granodorite background locations are unaffected by mine operations.

Box Plots

Sulfate and chloride box plots (Figures 12 through 15) for the Ruby Star granodiorite and Tinaja Peak formation further illustrate consistency in groundwater quality for samples collected from the background groundwater monitoring wells, and differences in groundwater quality for samples collected from background and non-background monitoring wells. As shown, sulfate and chloride concentrations in samples collected from background groundwater monitoring wells are relatively low and fall within a narrow range. This is compared to sulfate and chloride concentrations in samples collected from non-background wells, which are generally higher and fall within a very wide range. Samples from non-background wells show a higher statistical distribution of sulfate and/or chloride suggesting contributions from both natural mineral dissolution and inputs from mine operations.

Conclusions

The data presented above show that the location of the background groundwater monitoring wells are appropriate for establishing an understanding of background water quality and natural uranium concentrations, within the three major bedrock geologic formations. The hydrologic setting and chemical evaluation establish that uranium occurs naturally in groundwater. Specifically, the background wells are adequately located and screened in the bedrock geologic formations, and water quality in the background wells are distinct from each other (owing to the distinct geologic formations) and are distinct from mine influenced bedrock groundwater. Uranium in bedrock groundwater reflects the range in naturally-occurring uranium concentrations in the bedrock, as well as the fact that calcium, sulfate and bicarbonate alkalinity serve to naturally promote the dissolution of uranium out of the bedrock and into groundwater.

The approved VRP workplan stated objectives of the groundwater investigation that included an evaluation of background uranium concentrations in groundwater (through the installation of wells in background locations in mineralized bedrock formations) as well as consideration of background uranium as part of a preliminary site conceptual model for uranium in groundwater. The VRP objectives have been met based upon the lines of evidence that define the suitability of the background well locations for establishing water quality conditions.

References

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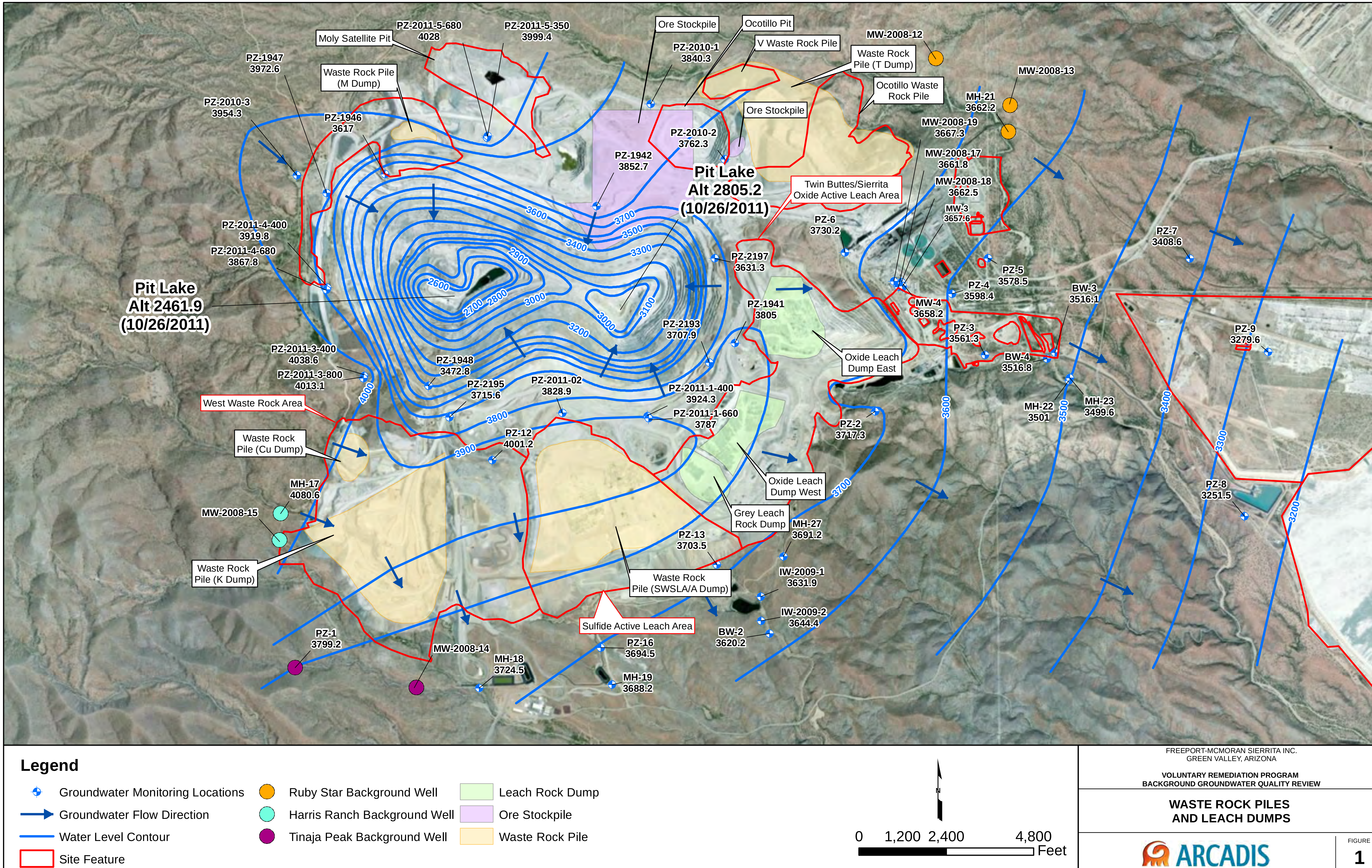
URS 2008. Voluntary Remediation Program (VRP) Investigation Work Plan, Freeport-McMoRan Sierrita Inc., Green Valley, Arizona. Volume I of II, Text, Tables and Figures, April 2008.

Figures:



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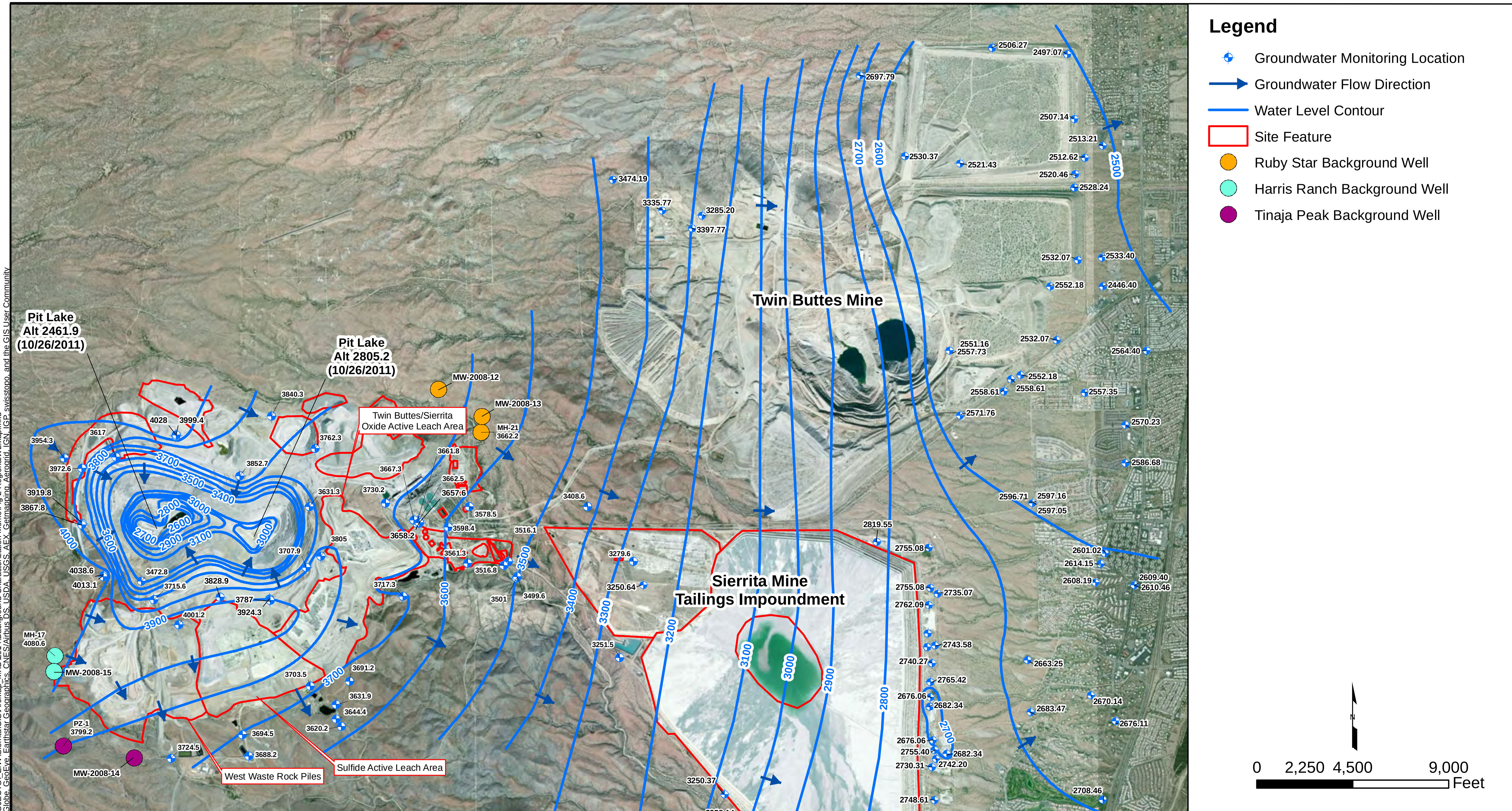

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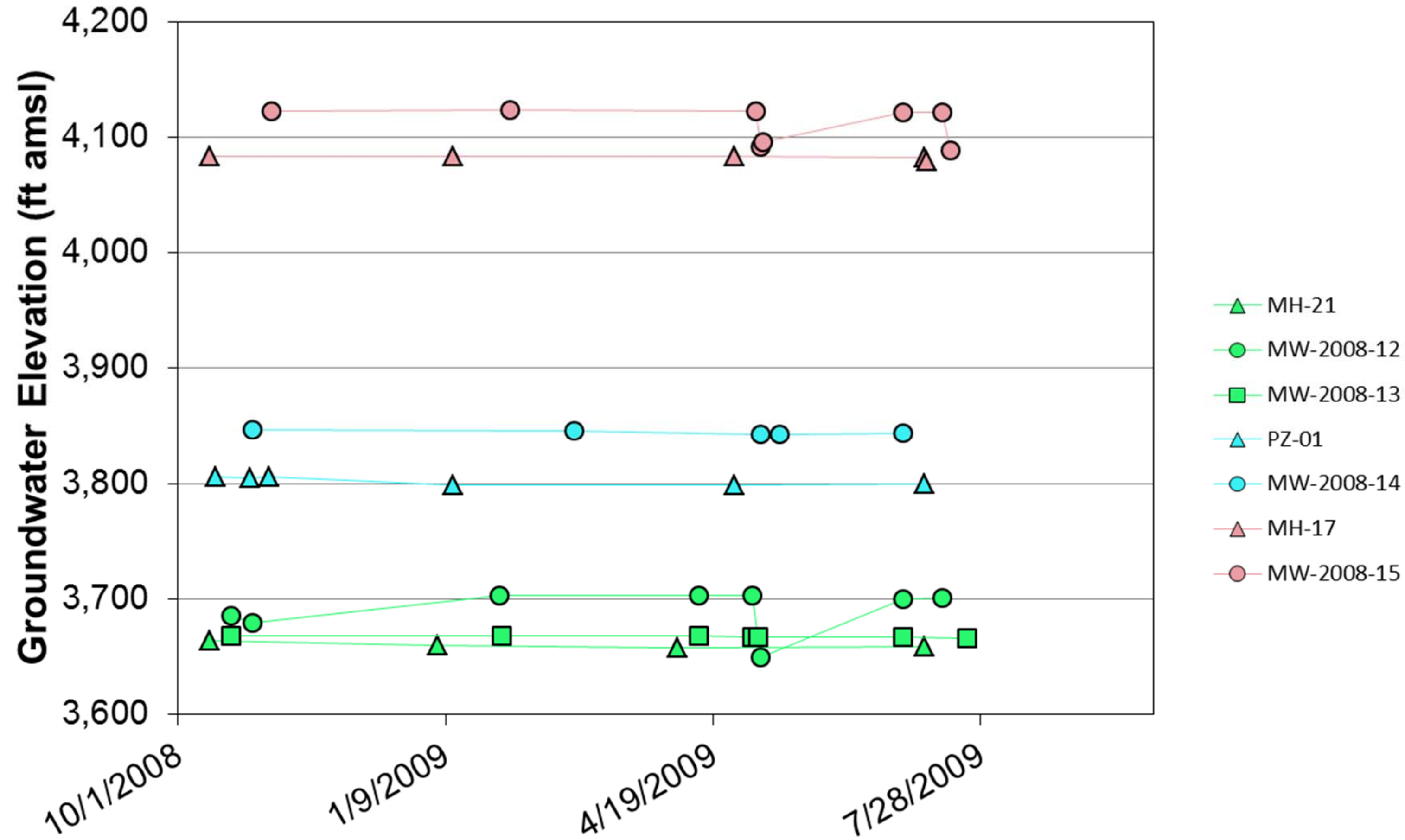
VOLUNTARY REMEDIATION PROGRAM
BACKGROUND GROUNDWATER QUALITY REVIEW

BACKGROUND WELL LOCATIONS AND 2011 REGIONAL POTENTIOMETRIC SURFACE MAP

ARCADIS

FIGURE
2



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Groundwater Elevations in Background Wells

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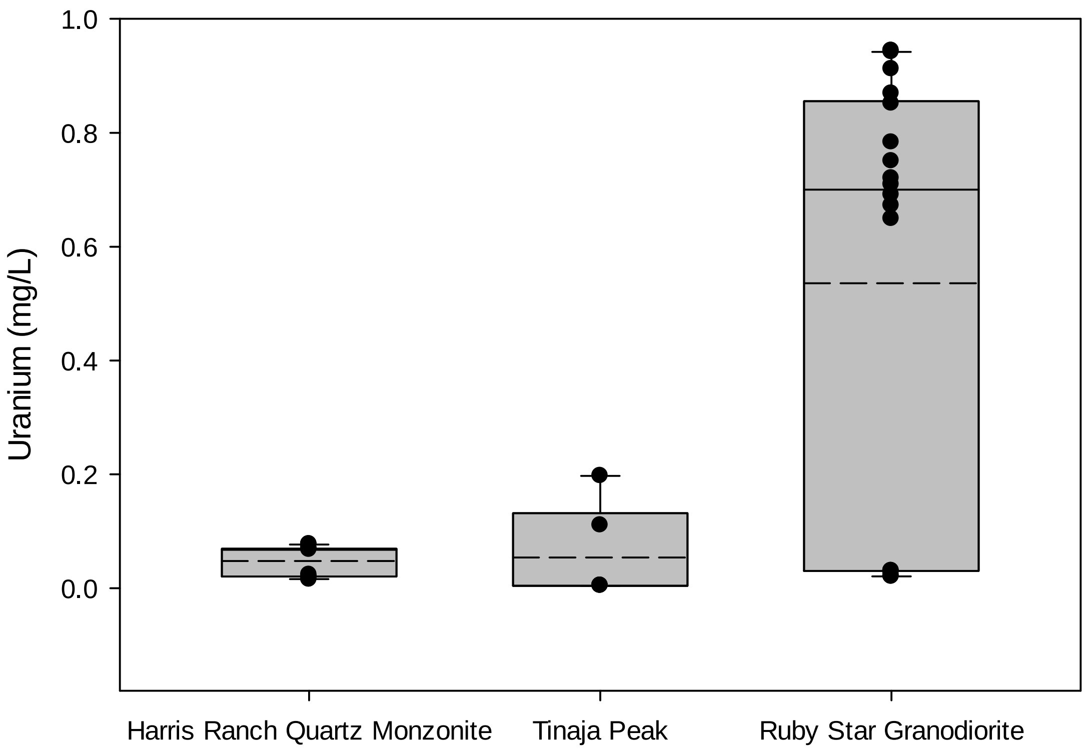
FIGURE
3



Plots depict the upper and lower quartiles of the data (top and bottom of the box); median (horizontal solid line segment within the box) and mean (dashed line). A capped line extends from the rectangle to the upper 90% of the data and lower 10%; values that fall outside of this range are depicted as individual data points above and below the capped line. Individual data points are shown for all of the data on the box plots.

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Background Uranium in Groundwater

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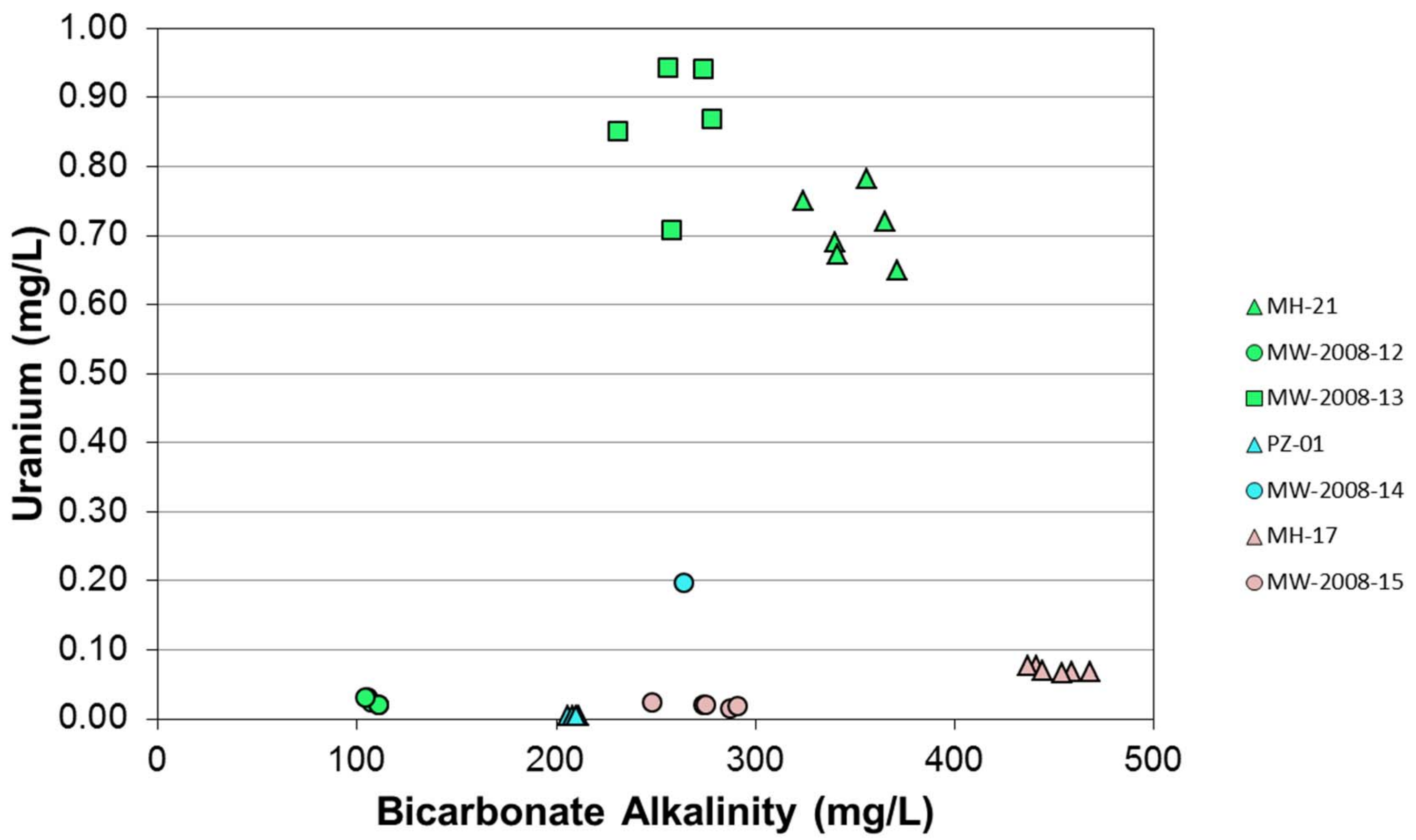
FIGURE
4



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Correlation of Background Uranium and Alkalinity in Groundwater

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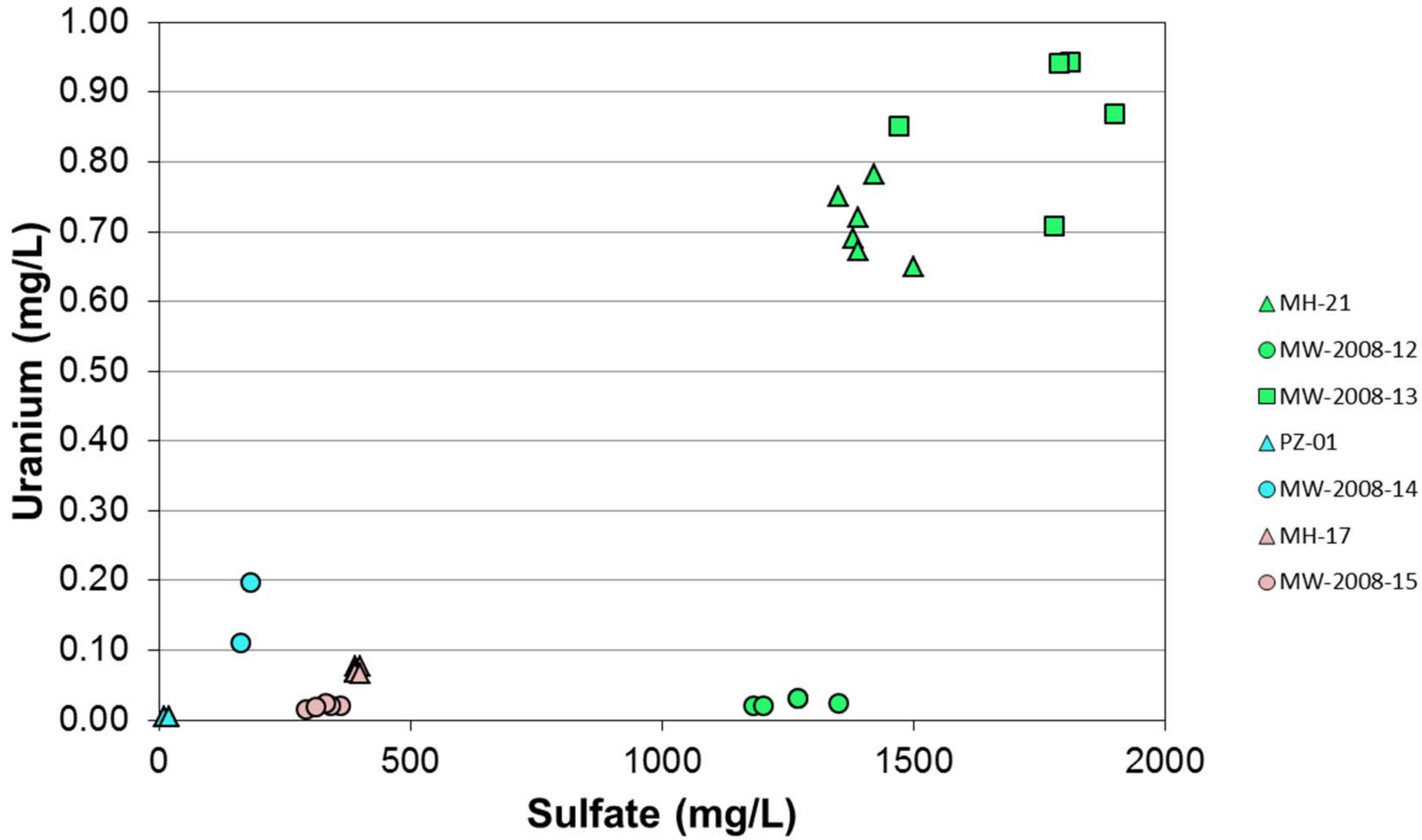
FIGURE **5**



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Correlation of Background Uranium and Sulfate in Groundwater

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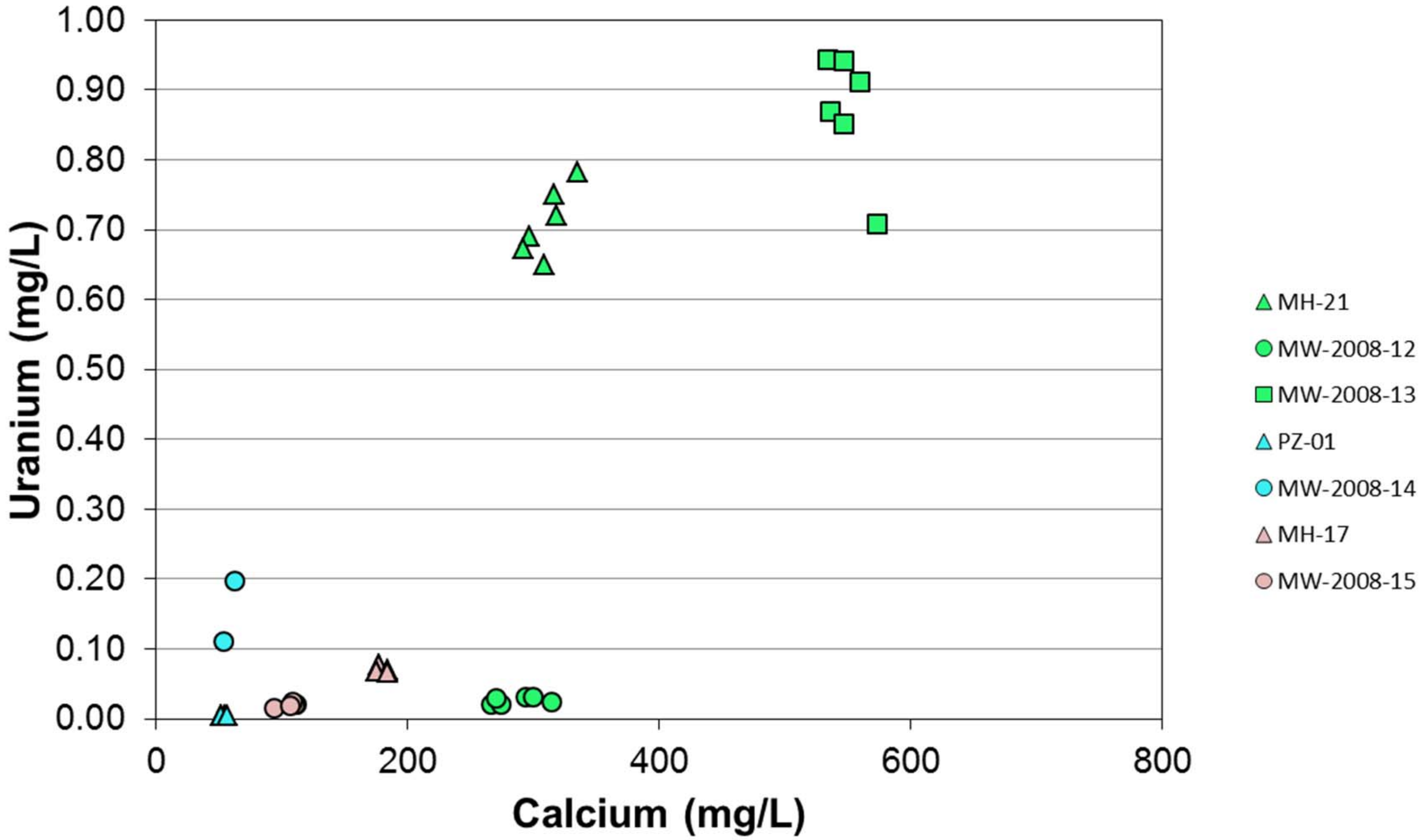
FIGURE
6



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Correlation of Background Uranium and Calcium in Groundwater

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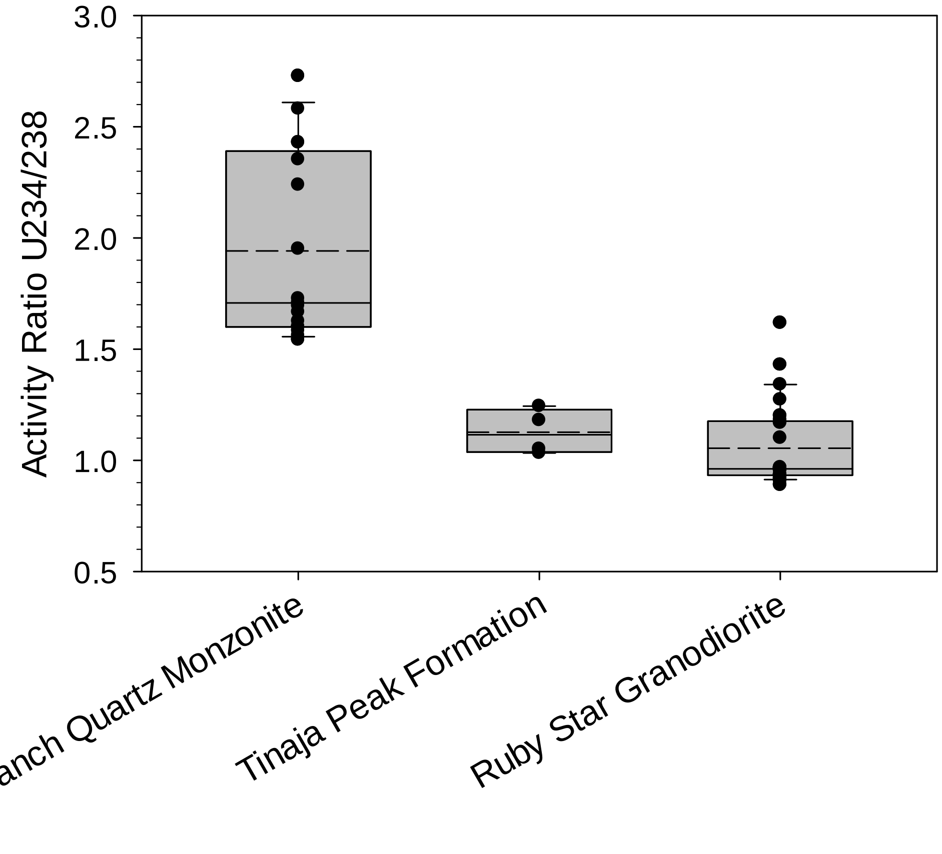
FIGURE **7**



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Background Uranium-234/238 Activity Ratio in Groundwater

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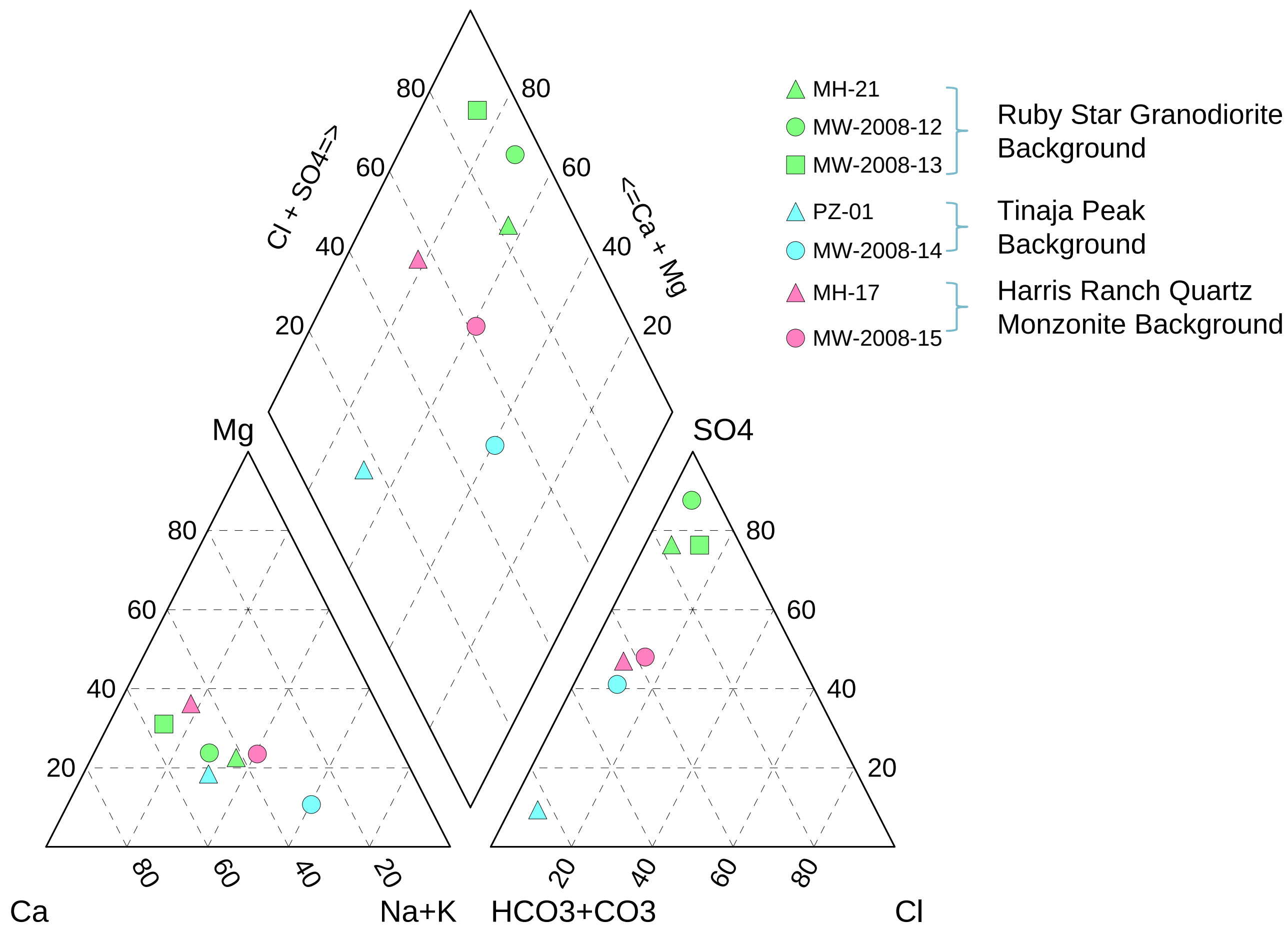
FIGURE
8



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Piper Diagram

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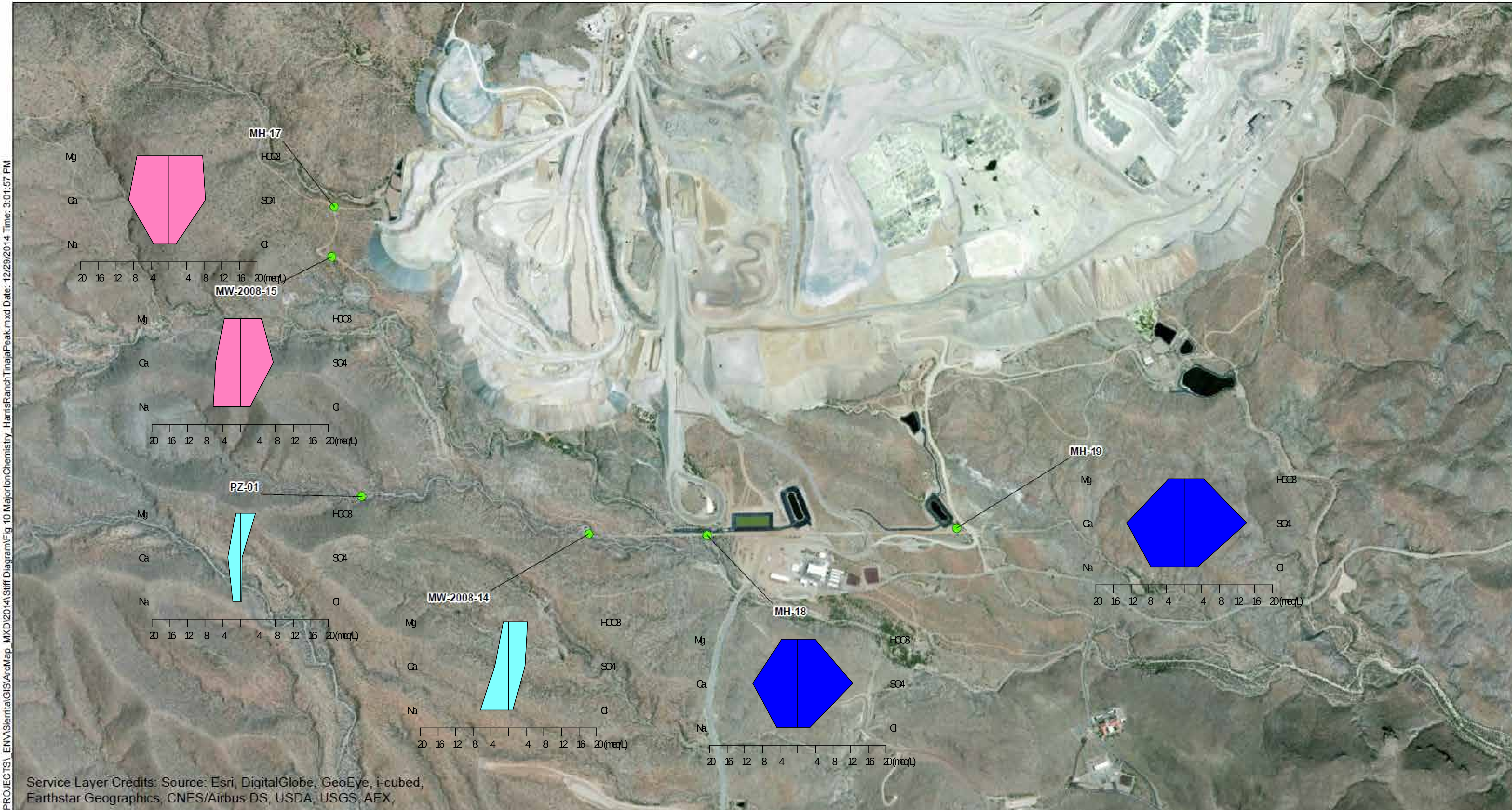
FIGURE
9



Legend

- Groundwater Monitoring Well
- Harris Ranch Quartz Monzonite Background
- Tinaja Peak Formation Background
- Tinaja Peak Formation West Area

0 1,400 2,800 Feet

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GREEN VALLEY, ARIZONA
SIERRITA BACKGROUND GROUNDWATER QUALITY REVIEW

MAJOR ION CHEMISTRY IN THE HARRIS RANCH QUARTZ MONZONITE AND TINAJA PEAK FORMATION

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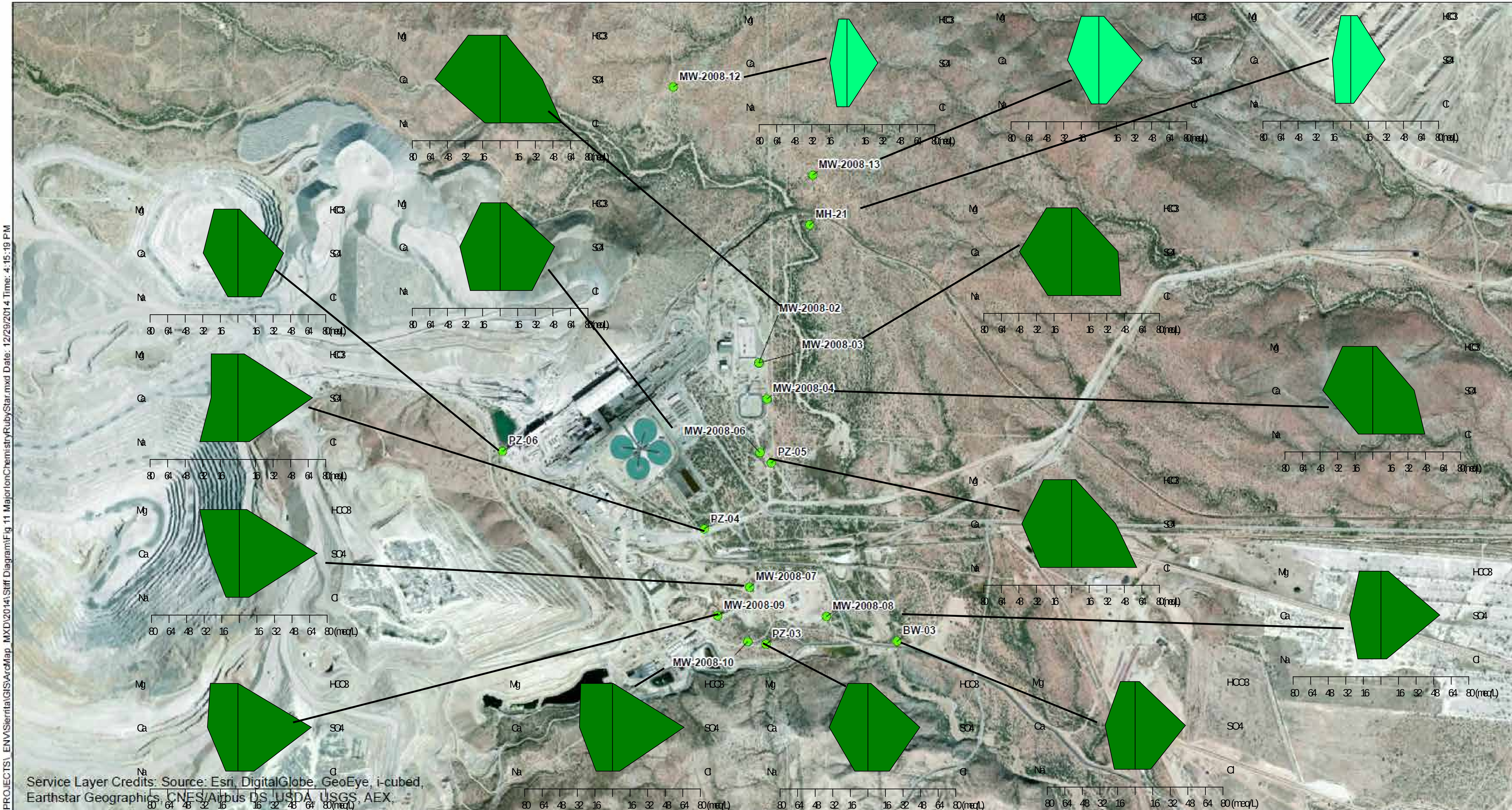
FIGURE
10



Legend

- Groundwater Monitoring Well
- Ruby Star Quartz Monzonite Background
- Ruby Star Granodiorite Central Area

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SIERRITA BACKGROUND GROUNDWATER QUALITY REVIEW

MAJOR ION CHEMISTRY IN THE RUBY STAR GRANODIORITE

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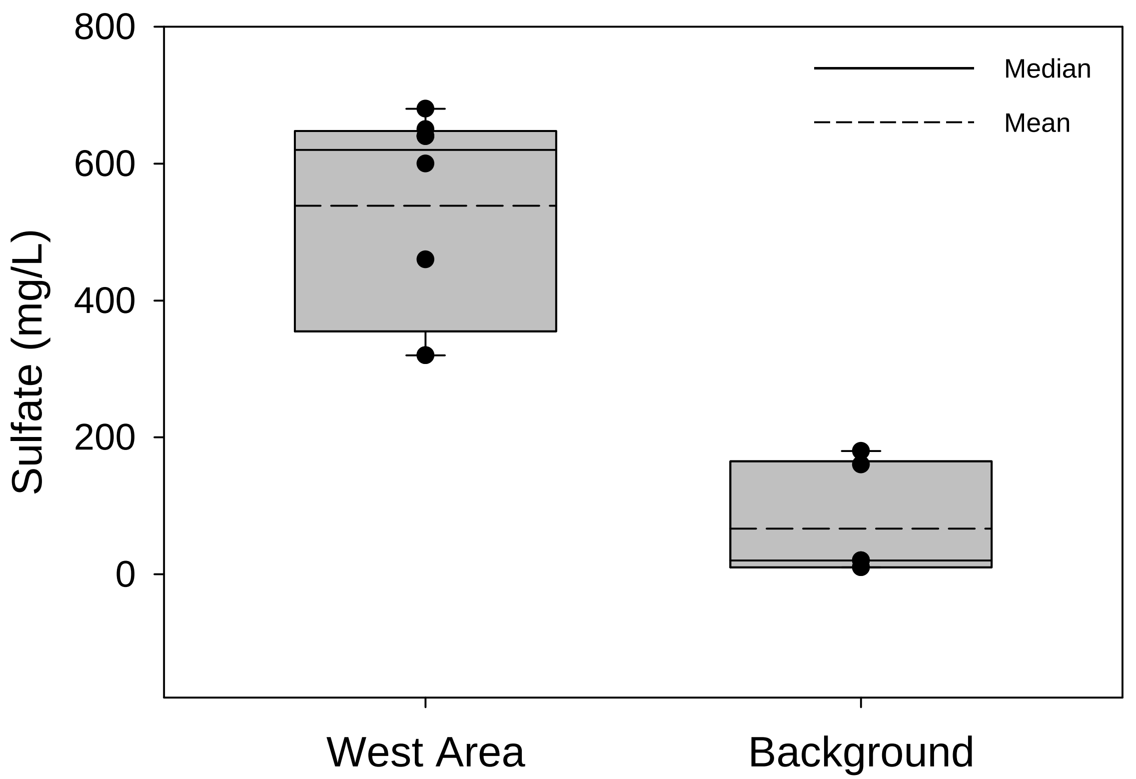
FIGURE 11



Plots depict the upper and lower quartiles of the data (top and bottom of the box); median (horizontal solid line segment within the box) and mean (dashed line). A capped line extends from the rectangle to the upper 90% of the data and lower 10%; values that fall outside of this range are depicted as individual data points above and below the capped line. Individual data points are shown for all of the data on the box plots.

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Tinaja Peak Sulfate Concentrations

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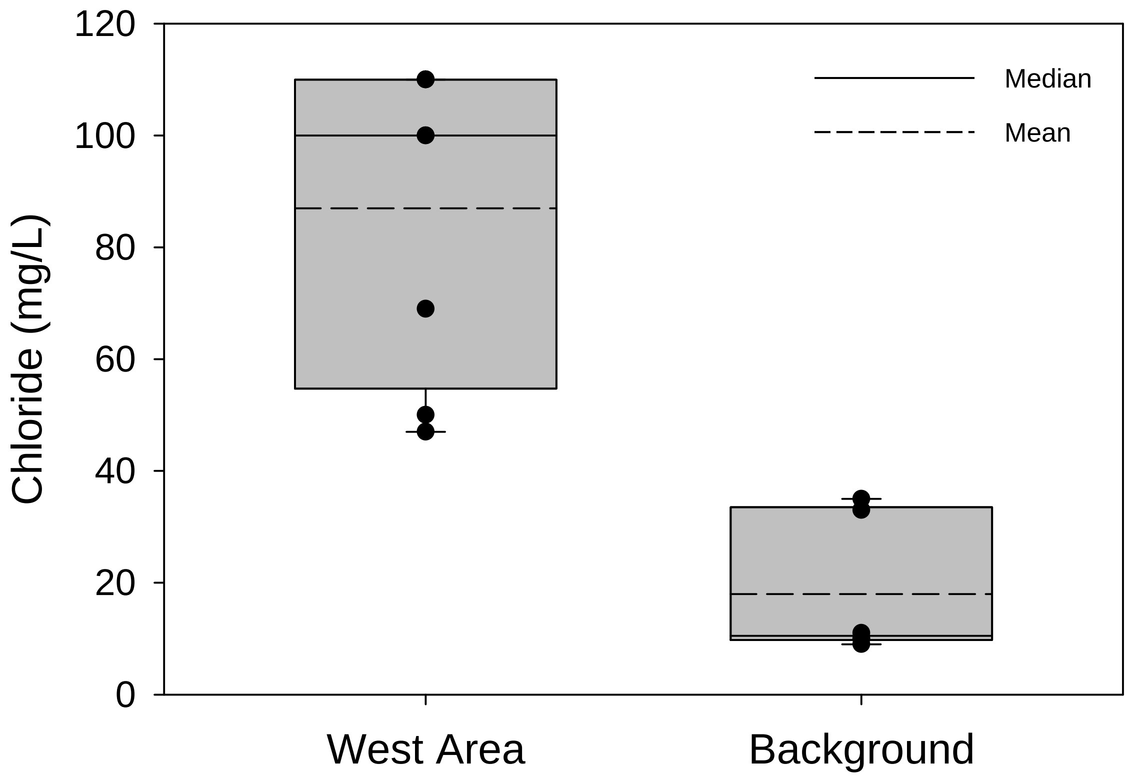
FIGURE
12



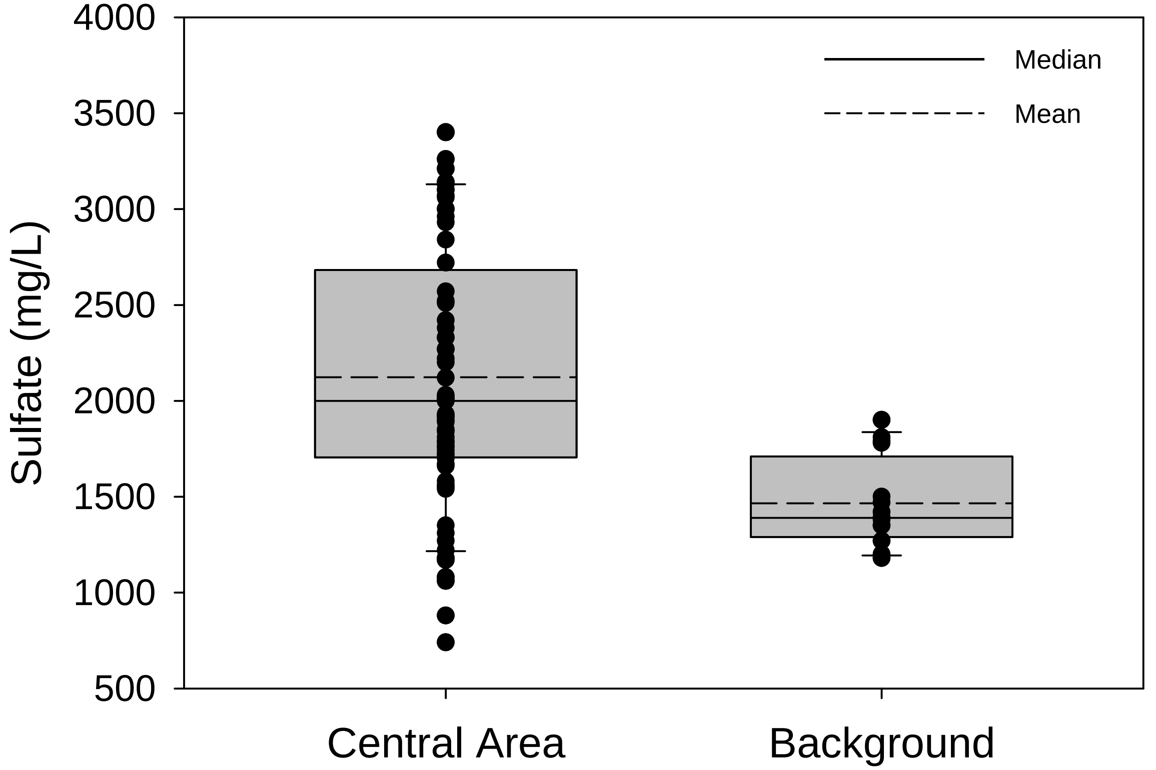
Plots depict the upper and lower quartiles of the data (top and bottom of the box); median (horizontal solid line segment within the box) and mean (dashed line). A capped line extends from the rectangle to the upper 90% of the data and lower 10%; values that fall outside of this range are depicted as individual data points above and below the capped line. Individual data points are shown for all of the data on the box plots.

Freeport McMoRan, Inc.
Sierrita Voluntary Remediation Program

Tinaja Peak Chloride Concentrations

ARCADIS

FIGURE
13



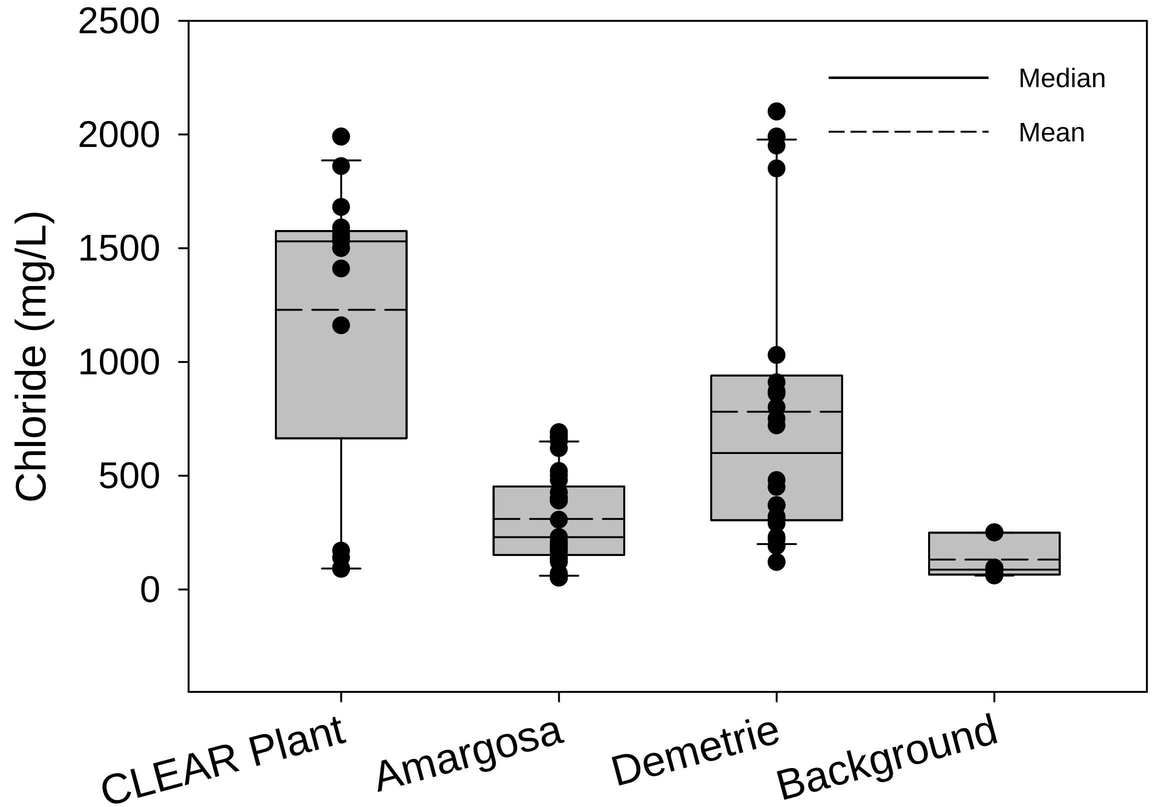
Plots depict the upper and lower quartiles of the data (top and bottom of the box); median (horizontal solid line segment within the box) and mean (dashed line). A capped line extends from the rectangle to the upper 90% of the data and lower 10%; values that fall outside of this range are depicted as individual data points above and below the capped line. Individual data points are shown for all of the data on the box plots.

Freeport McMoRan, Inc.
Sierrita Voluntary Remediation Program

Ruby Star Granodiorite Sulfate Concentrations

ARCADIS

FIGURE
14



Plots depict the upper and lower quartiles of the data (top and bottom of the box); median (horizontal solid line segment within the box) and mean (dashed line). A capped line extends from the rectangle to the upper 90% of the data and lower 10%; values that fall outside of this range are depicted as individual data points above and below the capped line. Individual data points are shown for all of the data on the box plots.

Freeport McMoRan, Inc.
Sierrita Voluntary Remediation Program

Ruby Star Granodiorite Chloride Concentrations

ARCADIS

FIGURE
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