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

Ms. Danielle Taber
Project Manager
Voluntary Remediation Program
Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007

Re: Voluntary Remediation Program Groundwater Investigation Report, Freeport McMoRan Sierrita Inc Green Valley, Arizona; AZ VRP Site Code: 100073-03

Dear Ms. Taber:

Please find enclosed the Voluntary Remediation Program (VRP) Groundwater Investigation Report (Report). The Report presents the results of the groundwater characterization activities conducted between July 2008 and July 2009 at the Sierrita mine located near Green Valley, Arizona. The characterization activities were conducted under the Arizona Voluntary Remediation Program administered by ADEQ.

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, P.E.
Environmental Engineer

KK:ms
Attachment
20131220_004

xc: Julie Hoskins, Arizona Department of Environmental Quality
John Patricki, Arizona Department of Environmental Quality
John Broderick, Sierrita
Lana Fretz, Sierrita
Stuart Brown, Freeport-McMoRan Copper & Gold
Ned Hall, Freeport-McMoRan Copper & Gold

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Freeport-McMoRan Sierrita Inc.

VOLUNTARY REMEDIATION PROGRAM

GROUNDWATER INVESTIGATION REPORT

Sierrita Mine
Green Valley, Arizona

December, 2013

ARCADIS

Loren North, RG
Senior Geologist

REGISTERED GEOLOGIST
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LOREN E.
NORTH
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Exp. 06 / 30 / 16

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Principal Geochemist

Voluntary Remediation Program

Groundwater Investigation Report

Sierrita Mine
Green Valley, Arizona

Prepared for:
Freeport-McMoRan Sierrita Inc.

Prepared by:
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Date:
December, 2013

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Acronyms and Abbreviations

%	percent
ADEQ	Arizona Department of Environmental Quality
APP	Aquifer Protection Permit
amsl	above mean sea level
AWQS	Arizona Aquifer Water Quality Standards
BADCT	Best Available Demonstrated Control Technology
btoc	below top of casing
C	Celsius
cfs	cubic feet per second
CLEAR	Copper Leach Electrowinning and Regeneration
cm/s	centimeters per second
COC	chain of custody
COIs	constituents of interest
CSM	conceptual site model
DO	dissolved oxygen
EDD	electronic data deliverables
E_H	oxidation/reduction potential
ETI	Esperanza Tailings Impoundment
F	Fahrenheit
FCX	Freeport-McMoRan Copper & Gold Inc.
ft	feet
ft/day	feet per day
ft^2/day	square feet per day
ft/ft	foot (or feet) per foot
gpd/ft^2	gallons per day per square foot
gpm	gallons per minute
H(o)	measured initial head displacement
H(o)*	calculated initial head displacement
HDPE	high-density polyethylene
LCRS	leak collection and recovery system
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
LDC	Laboratory Data Consultants, Inc.
MDC	Minimum Detectable Concentration

mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS/MSD	matrix spike/matrix spike duplicate
NAVD	North American Vertical Datum
ORP	oxidation-reduction potential
pCi/L	picocuries per liter
PDSI	Phelps Dodge Sierrita, Inc.
PLS	pregnant leach solution
QAPP	Quality Assurance Project Plan
QL	quantitation limit
RPD	relative percent difference
SAP	Sampling and Analysis Plan
Sierrita	Freeport-McMoRan Sierrita Inc.
Site	Sierrita Mine
SSCR	Soil and Sediment Characterization Report
STI	Sierrita Tailings Impoundment
SX/EW	solution extraction/electrowinning
TDS	total dissolved solids
TPU	total propagated uncertainty
µm	micrometer
URS	URS Corporation
USC	Upper Santa Cruz
VRP	Voluntary Remediation Program

1. Introduction

This report presents the results of groundwater characterization activities at the Sierrita Mine (Site) located near Green Valley, Arizona (Figure 1). These activities were conducted under the Arizona Voluntary Remediation Program (VRP) administered by the Arizona Department of Environmental Quality (ADEQ). Freeport-McMoRan Sierrita Inc. (Sierrita) submitted an application to enter into the VRP on June 19, 2007 to evaluate certain operations and constituents that are not considered by other regulatory programs such as the Mitigation Order on Consent, Docket No. P-50-06, and the Sierrita area-wide Aquifer Protection Permit (APP) No. P-101679.

On August 15, 2007, ADEQ accepted Sierrita into the VRP as site code 100073-03. This document reports the results of the groundwater, facility solution, tailings material, and rock core material samples collected for the groundwater investigation between July 2008 and July 2009. These activities are henceforth referred to in this report as the “groundwater investigation.” Soil and sediment characterization activities have been reported elsewhere (URS Corporation [URS] 2012, ARCADIS 2013). Facility solution, tailings and rock core material analytical results are included in this report because these data were collected to evaluate potential sources of constituents to groundwater.

1.1 Report Objectives

The objectives of this report are to present the results of the groundwater investigation conducted between July 2008 and July 2009, and to update the conceptual site model (CSM) for uranium and other constituents of interest (COIs) in groundwater.

As was discussed in the VRP Investigation Work Plan (Work Plan) (URS 2008a), the groundwater investigation was intended to be the first phase of the site characterization, with the focus on assessing potential releases from former areas of operation and current areas of operation (which may include facilities authorized to discharge by Sierrita’s area-wide APP) and developing a refined CSM for groundwater.

The Work Plan presented the following primary objectives for the groundwater investigation:

1. Assess potential impacts to groundwater from past releases and historical Sierrita operations for COIs. COIs will include: radiological constituents (uranium and radium isotopes) and other trace metals (aluminum, antimony,

arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, sodium, thallium, and zinc).

2. Assess potential impacts to groundwater for COIs at areas downgradient from active Sierrita operations.
3. Evaluate uranium concentrations in groundwater at background locations and in mineralized bedrock formations.
4. Refine the preliminary CSM for uranium in groundwater with respect to sources and migration pathways, including consideration of background conditions.

Following the Work Plan objectives, this report therefore describes general hydrogeological site characteristics (for context) and presents the sampling results and data validation work performed for the groundwater investigation. It also presents an updated CSM describing the nature and extent of constituents in groundwater in the basin fill aquifer and bedrock hydrostratigraphic unit at the Site, including background uranium concentrations, and describes the potential sources and migration pathways at the Site. Following the CSM, this report then provides recommendations for further groundwater investigation to meet the VRP objectives.

1.2 Chronology of Activities and Submittals

The Work Plan was submitted to ADEQ in April 2008, and a revised Quality Assurance Project Plan (QAPP; URS 2008b) was submitted to ADEQ as an addendum in November 2008. Implementation of the Work Plan began in June 2008. URS Corporation implemented the soil and sediment and groundwater characterization activities beginning in June 2008 and finishing in November 2008. Groundwater characterization was conducted between July 2008 and July 2009. Results of the soil and sediment characterization activities are reported in the Soil and Sediment Characterization Report (SSCR) and SSCR Addendum (URS 2012 and ARCADIS 2013, respectively).

1.3 Report Outline

This report is organized into the following sections:

Section 1. Introduction - This section describes the regulatory context, purpose, and contents of the document.

Section 2. Site Background - This section describes the site location, history, and physical and general hydrogeological characteristics.

Section 3. Groundwater Investigation Results - This section describes the groundwater investigation results.

Section 4. Conceptual Site Model - This section presents the CSM for uranium and other COIs at the Site.

Section 5. Data Gaps and Further Data Collection Needs - This section identifies remaining data gaps and recommendations for further investigation to meet the VRP objectives.

Section 6. Summary and Conclusions - This section summarizes the groundwater investigation activities, results and conclusions of the report.

2. Site Background

This section describes the Site setting, climate, regional and site geology and hydrogeology, and a description of current and historical operations.

2.1 Site Location and Description

Sierrita operates an open pit mine and mineral concentration facility located in Pima County, approximately 6 miles northwest of Green Valley, Arizona (Figure 1). Green Valley lies approximately 25 miles south of the City of Tucson, Arizona. Sierrita operations include conventional crushing and flotation followed by differential floatation, leaching and roasting of molybdenum disulfide, rhenium recovery, molybdenum disulfide production and packaging, molybdenum trioxide production and packaging, leach stockpiles, and solution extraction/electrowinning (SX/EW) facilities.

The Site consists of three open pits, a 115,000 ton-per-day concentrator, two molybdenum roasting plants, the rhenium plant, an oxide and low-grade sulfide ore stockpile leaching operation, a copper sulfate plant, and associated support facilities and historical facilities, some of which have been closed and reclaimed. Figure 2 shows the general features and facilities of the Site.

The mine produces copper, molybdenum, and rhenium products. Copper and molybdenum disulfide are produced through conventional milling and froth flotation and pure copper is produced through SX/EW. Copper sulfate is produced through solution extraction and crystallization. Molybdenum trioxide is produced through roasting. Rhenium is also produced as a by-product of the molybdenum roasting operations.

2.2 Climate

The climate at the Site is typical for an arid region, with a wide range in daily temperatures and monsoonal type precipitation patterns. The Western Regional Climate Center reports that the average daily maximum temperature at Green Valley (approximately 2 miles east of Sierrita) is 84 degrees Fahrenheit (F), while the average daily minimum temperature is 54 degrees. Average annual precipitation is 10.86 inches. These statistics were based on a reporting period from 1988 through 2012. The monthly average pan evaporation rates range from 3.25 inches in January to 14.9 inches in June (URS 2008a).

More than one third of the annual precipitation occurs during the months of July and August, and these rain events can produce short, intense downpours; strong winds; and flash floods. Groundwater at Sierrita is derived primarily from mountain front recharge, recharge from ephemeral streamflow, and seepage from the Sierrita Tailings Impoundment (STI) (ELMA and Dames and Moore 1994).

During the four quarters of the groundwater investigation (October 2008 to July 2009), precipitation recorders at Sierrita recorded total precipitation of 12.05 inches, with 7.76 inches of precipitation occurring from May to July 2009. In November 2008, the total precipitation was also high at 2.26 inches. Precipitation recorded during the groundwater investigation included the following:

- The fourth quarter of 2008 reported 2.81 inches.
- The first quarter of 2009 was the driest, at 1.14 inches.
- The second and third quarters of 2009 were the wettest, at 4.09 and 4.01 inches, respectively.

2.3 Site Geology

Sierrita is located in the Basin and Range physiographic province, on the west margin of the Santa Cruz Basin and along the east flank of the Sierrita Mountains (ELMA 2001, ELMA and Dames and Moore 1994). The principal geologic/hydrogeologic units at the Site include the alluvial deposits, the basin fill deposits, and the bedrock complex.

Site geology and hydrogeology have been characterized through several previous studies, and were compiled to summarize site geologic features, with a focus on describing the near surface rock types within the study area and known and inferred structures that may influence groundwater flow and thus migration of COIs. These reports include:

- Aquifer Protection Permit Application Sierrita Operation (ELMA and Dames and Moore 1994)
- Additional Characterization of Hydrogeologic Conditions Aquifer Protection Permit Application No. 101679 (ELMA 2001)
- Supplement to the Aquifer Protection Permit Application BADCT Demonstration Addendum (MWH Americas, Inc. [MWH] 2005)
- VRP Investigation Work Plan (URS 2008a)

- Evolution of Fractures and Alteration in the Sierrita Esperanza Hydrothermal System, Pima County, Arizona (Titley et al. 1986)
- The Sierrita Copper-Molybdenum Deposit: An Updated Report Pima Mining District, Pima County, AZ (Aiken and Baugh 2007)
- Geology of the Sierrita-Esperanza Deposit (West and Aiken 1982)

Figure 3 shows a composite geologic map of the Site obtained from Aiken and Baugh (2007). The sections below describe the lithology of each of the principal geologic units and known and inferred structural subsurface structures.

2.3.1 Alluvial Deposits

Unconsolidated Quaternary and late Tertiary deposits cover most of the eastern base (the piedmont) of the Sierrita Mountains. The term “piedmont” is used in the Esperanza Mill Quadrangle (Spencer et al. 2003) and refers to the area east of the immediate mine area. The alluvium was deposited by larger streams that originated in the mountains and then was reworked by smaller streams that originate on the piedmont. Alluvial deposits at the mine site are limited to natural drainage channels including Demetrie Wash, Amargosa Wash, Esperanza Wash, and Tinaja Wash. The deposits consist of coarse-grained, unconsolidated sand and gravel of Quaternary age. The thickness of the alluvial aquifer at the Site ranges from a few feet up to tens of feet. Based on investigation work from 2001, the thickness of the alluvial deposits ranges from zero up to 30 feet (ELMA 2001).

2.3.2 Basin Fill Deposits

At the Site, basin fill deposits occur generally east of Demetrie Wash, trending from the northwest and extending east below the tailings impoundments, and are not present in the Sierrita pit or plant areas. The basin fill deposits are Tertiary to Quaternary in age and consist of poorly consolidated sand, gravel, silt, and clay in varying proportions. The thickness of the basin fill deposits increases to the east up to more than 1,000 feet near the southeast corner of the STI (ELMA 2001).

2.3.3 Bedrock Complex

The Sierrita-Esperanza deposit is composed of igneous rocks; the oldest in the area are the Ox Frame Volcanics. The Ox Frame Volcanics were intruded by the Harris Ranch Quartz Monzonite, which was overlaid by the Demetrie Volcanics. Later intrusive rocks, including the Ruby Star Granodiorite, intruded the existing volcanic and intrusive rocks and formed a large batholith. The bedrock complex consists of several formations, including:

Tinaja Peak Formation - The Tinaja Peak Formation occurs in the southwest portion of the Site, near CAT Pond 1 and CAT Pond 2. The Formation consists of tuffaceous conglomerates and gravels, volcanic tuffs, and andesite and/or rhyolite flows. Where the formation was observed (PZ-1, MH-18, and MH-19), the Formation is composed of tuffaceous sandy/gravelly conglomerate and tuffaceous sandstone. The Formation includes andesitic, granitic, and rhyolitic clasts as well as interbedded strata of white rhyolite tuff (ELMA 2001).

Pantano Formation - Older Tertiary to Quaternary age sediments are located east of the STI. These are referred to as the Pantano Formation. The Formation is characterized by greater compaction and hardness than the Quaternary alluvium. The Formation consists of arkosic conglomerate and increases in thickness east and south from the STI (ELMA 2001).

Tertiary Intrusives - Tertiary Intrusives occur in the Sierrita and Esperanza pits and in areas north and east of the pits. The Tertiary Intrusives include Ruby Star Granodiorite (discussed in more detail below), Ruby Star Quartz Monzonite porphyry, quartz diorite porphyry, and other dacite porphyry intrusions. The Ruby Star Quartz Monzonite porphyry is associated with the mineralization and alteration of the Sierrita-Esperanza system and is likely the source of the metal-bearing hydrothermal solutions. The contact between the quartz monzonite porphyry and the granodiorite is gradational. The biotite quartz diorite consists of diorite (plagioclase feldspar) with biotite. Previous investigations at Sierrita have generally classified wells that are not in the Ruby Star Granodiorite as completed in the Ruby Star Intrusives. ELMA refers to these rocks as the “Ruby Star intrusives,” and this is commonly seen on boring logs (2001).

Ruby Star Granodiorite - The Ruby Star Granodiorite is a north-northwest trending batholith that makes up most of the eastern side of the Sierra Mountain Range. The biotite granodiorite composition is more characteristic in the west and central portions of the batholith while the hornblende-biotite granodiorite phase occurs on the southeast side of the intrusion, cropping out to the north and east of the Sierrita Mill. Additionally, the hornblende-biotite granodiorite contains higher concentrations of uranium with respect to the rest of the batholith (ELMA 2001). Aiken and Baugh (2007) more completely describe the minerals associated with the Ruby Star Granodiorite.

Demetrie Volcanics - The Demetrie Volcanics are Cretaceous in age and consist of a sequence of andesitic and dacitic breccias and flows located south and east of the Esperanza Mine. This formation is mapped in areas south and east of the Sierrita and Esperanza pits.

Harris Ranch Quartz Monzonite - The Harris Ranch Quartz Monzonite, formerly considered Jurassic in age, has been revised to Cretaceous (Aiken 2007) in age and outcrops in an area west of the Sierrita Mine. It is also found in the Sierrita pit. The Harris Ranch Quartz Monzonite is a coarse-grained intrusive unit with plagioclase in a matrix of coarser-grained quartz and orthoclase.

Ox Frame Volcanics- The Ox Frame Volcanics are considered to be of Jurassic Age, where they were previously considered to be of Triassic-Jurassic. The metamorphism within the formation varies with sandstone having been changed to quartzite. The Ox Frame Volcanics include rhyolite to dacite tuffs, tuff breccia, and volcanic breccias. The Ox Frame Andesite occurs stratigraphically beneath the Ox Frame Rhyolite (Aiken and Baugh 2007). They are estimated to be 2,000 feet thick in the mine area and appear to dip eastward. They are mapped to the south and east of the Site (West and Aiken 1982).

2.3.4 Geologic Structures

At Sierrita, there are two scales of geologic structure that have the potential to affect groundwater movement. The scale of these structures is referred to in terms of macro and micro scale structures. Macro scale structures are the faults located at the Site. These faults influenced alluvial deposition, and can either be a barrier or a conduit for groundwater flow. Micro scale structures, on the other hand, refer to the joints, fractures, and bedding planes that locally influence groundwater flow.

Faulting in the bedrock at the Site has been described as occurring in three sets. Faults in the most prominent set strike northeast and dip either northwest or southeast (Figure 4). Faults in the second set strike northwest and dip to the southwest, identified as low angle thrust faults (Cooper 1973 in ELMA 2001). Faults in the third set are less abundant and strike north-south and dip at high angles. These north-south trending faults occur primarily in the Demetrie Volcanics (ELMA 2001), as do the normal faults that bound the eastern Santa Cruz Basin.

Figures 5 and 6 present hydrogeologic cross sections based on those developed by ELMA (2001). These cross sections depict inferred buried faults and erosional surfaces that bound the lower surface of the basin fill deposits. These estimated faults are presented based on the elevations of the top of bedrock recorded for the wells and boring logs reviewed.

2.4 Hydrogeology

Sierrita is located in the Upper Santa Cruz (USC) Basin and Range Lowlands Hydrogeologic Province. USC Basin is a north-trending alluvial valley drained by the Santa Cruz River (ELMA and Dames and Moore 1994). The Sierrita Mountains are a contributing source of mountain-front recharge to the basin. The Santa Cruz River to the east of the Site is the main surface water drainage. The Santa Cruz River is located approximately 2 miles due east from the eastern boundary of the STI. The principal hydrogeologic units at the Site include the alluvial aquifer, the basin fill aquifer, and the bedrock hydrostratigraphic unit. The hydrogeology of each of the principal units at the Site is described below.

2.4.1 Alluvial Aquifer

Alluvial deposits occur in natural drainage channels. Reported saturated thickness of this aquifer ranges from 4 to 5 feet (ELMA 2001). Groundwater levels generally occur below the base of the alluvial deposits except where the deposits overlie bedrock and saturation of the basal part of the alluvium may occur after ephemeral streamflow (ELMA and Dames and Moore 1994). However, the saturated alluvium is considered highly permeable. Pumping test results were reported for MH-22; the reported transmissivity values ranged from 686 to 781 square feet per day (ft^2/day) with a reported hydraulic conductivity of 151 feet per day (ft/day). The range of transmissivity values is due to analysis by multiple techniques (ELMA 2001).

2.4.2 Basin Fill Aquifer

The basin fill aquifer is the main source of groundwater to water wells in Green Valley (ELMA 2001). The basin fill aquifer occurs east of Demetrie Wash and is not present in the Sierrita pit or plant areas. Transmissivity and hydraulic conductivity values for MH-14, MH-15W, and MH-16W ranged from 320 gallons per day per square foot (gpd/ft^2) (40 ft/day) to 750 gpd/ft^2 (100 ft/day) (ELMA and Dames and Moore 1994).

2.4.3 Bedrock Hydrostratigraphic Unit

The bedrock hydrostratigraphic unit consists of many bedrock formations but is considered one hydrostratigraphic unit. Permeability of the bedrock hydrostratigraphic unit is considered low overall, and groundwater yield to wells is also very small. Both slug test and pumping test results were reported for select wells (ELMA 2001). Hydraulic conductivity values from slug tests ranged from 7 x 10^{-7} ft/day to 3 x 10^{-2} ft/day. Additionally, pumping tests completed in 1994 reported transmissivity values ranging from 1 to 136 ft^2/day with corresponding hydraulic conductivity values of 0.01 to 2.2 ft/day. The wide range of permeabilities within the bedrock hydrostratigraphic unit indicates micro scale structures, such as jointing and fracturing. These zones of higher permeability can act as preferential flow conduits for the migration of constituents in groundwater.

2.5 Surface Water Features

The surface water regime of the Sierrita Mine is divided into four major surface water drainage basins, each associated with one of the four major washes that cross the Site: Demetrie, Amargosa, Esperanza, and Tinaja Washes. An unnamed drainage (Unnamed Wash) connects with the Tinaja Wash south of the Esperanza Wash. The locations of the washes are shown on Figure 2. Amargosa, Esperanza, and Tinaja Washes discharge into Demetrie Wash, which itself is an ephemeral tributary to the Santa Cruz River.

2.5.1 Demetrie Wash

Demetrie Wash is an ephemeral wash originating in the Sierrita Mountains west-northwest of Sierrita. The wash flows along the northern boundary of the mine and turns south near the northeastern portion of the Sierrita Mill Area. Demetrie Wash then flows south along the eastern side of the mill area and trends south-southeast along the southwestern edge of the STI towards the Santa Cruz River. The elevation of Demetrie Wash ranges from 3,700 feet above mean sea level (ft amsl) at the northeast corner of the mill area to 3,200 ft amsl at the southwestern corner of the STI. The average gradient of Demetrie Wash over this segment is approximately 116 feet per mile (URS 2008a).

2.5.2 Amargosa Wash

Amargosa Wash is an ephemeral wash, located in the southern portion of the Sierrita Mill Area, currently originating at the base of the leach stockpiles near Headwall No. 1. The Amargosa watershed flows approximately 6,000 feet east along a narrow corridor to its confluence with Demetrie Wash. Approximately 17 to 20 feet of alluvium fills the wash throughout its length. The bedrock surface is deepest in the center of the wash and becomes shallower to the north and south.

2.5.3 Esperanza Wash

Esperanza Wash is an ephemeral wash currently originating at the base of the leach stockpiles near Headwall No. 3. The wash flows approximately 6 miles south-southeast to its confluence with Demetrie Wash.

2.5.4 Tinaja and Unnamed Wash

Tinaja Wash is an ephemeral drainage located downgradient from the leach stockpiles. Tinaja Wash originates southwest of CAT Pond 2 and flows southeast for approximately 1.3 miles to its confluence with Esperanza Wash. The Unnamed Wash flows east and is present between the Tinaja and Esperanza Washes. The Unnamed Wash connects with the Tinaja Wash about 0.25 mile south of the Esperanza Wash.

2.6 Current and Historical Mine Operations

The current mine operations are summarized below.

<u>Ore Excavation, Crushing, Milling, and Grinding</u> – The ore excavation operations include exploration, drilling, blasting, haul truck loading, and placement of blasted material.

<u>Molybdenum Processing</u> – The filtered molybdenum disulfide is transferred from the flotation process to the Molybdenum Processing Plant, where it is dried and stored in bins for further processing, including leaching and roasting.

<u>Rhenium Recovery</u> – The molybdenum roasting operations include a rhenium recovery circuit where off-gassed steam containing rhenium oxide is condensed, collected, concentrated, and pumped to an ion exchange process for refining and shipment.

Copper Processing – Copper is processed in the following steps:

Flotation – The final grind derived from the crushing and grinding process is advanced to primary flotation, which uses a mix of reagents to physically separate copper- and molybdenum-bearing particles from the remaining rock particles, called tailing. The resulting tailing slurry is thickened through settling and pumped to the STI.

Leaching – Low-grade oxide and sulfide ores are placed onto leach stockpiles located immediately south of the Sierrita Pit. A solution of dilute sulfuric acid is applied to the leach stockpile by either drip emitters or sprinklers. The sulfuric acid is allowed to leach through the stockpiles. As the sulfuric acid comes into contact with the ore, it dissolves the acid-soluble copper, producing a solution called pregnant leach solution (PLS). This PLS is collected at APP-permitted impoundments as described below.

SX/EW Process – The PLS produced during leaching is processed by the SX/EW to produce copper sulfate and copper cathode. In the SX process, an extraction reagent is used to transfer the copper in PLS to electrolyte. The electrolyte is pumped to either the EW tank-house located on the Twin Buttes or the Copper Sulfate Plant.

In addition to the currently active operations, a variety of other historical operations have occurred over the past 50 years. Current and historical operations targeted for this groundwater investigation are described below. These facilities are grouped in terms of locations consistent with the Work Plan descriptions. Close-view maps of the current and former facilities within each wash are shown on Figures 7 through 9. The facilities targeted for the groundwater investigation include:

1. Demetrie Wash:
    a. Former Copper Leach Electrowinning and Regeneration (CLEAR) Plant, a historical process that leached copper using sodium hydroxide and chloride solutions
    b. Former E pond, a process solution and seepage pond
    c. Former Evaporation Pond, a pond associated with the CLEAR Plant operations
    d. Old D pond, a process solution and seepage pond
    e. Former Esperanza Mill, a former process mill
    f. Former C pond, a process solution and seepage pond
    g. Former Raffinate Pond, used to contain copper-depleted process solutions

2. Amargosa Wash:
   a. A series of currently active sump, pond, and interceptor trenches, including Bailey Sump, Amargosa East and West Sumps, Amargosa Pond, Raffinate Pond No. 2, and Bailey Lake
   b. Former A Pond, a stormwater retention pond
   c. B Pond, a process solution impoundment
   d. B and C Seepage Silos
   e. Duval Canal, currently maintained
   f. Decant Solution (Molybdenum) and Launders Facility, both part of the Precipitation Plant
   g. Headwall No. 1, a currently active retention pond that collects PLS from the leach dumps
3. Esperanza Wash:
   a. Headwall No. 2 and Channel No. 2, a currently active leach solution collection facility
   b. Headwall No. 3, a currently active leach solution collection facility
   c. Raffinate Pond No. 3, a currently active leach solution collection facility
   d. SX-3 Plant, currently not operating
   e. SX-3 Stormwater Pond, currently maintained
4. Tinaja Wash and Unnamed Wash:
   f. Headwall No. 5, a currently active leach solution collection facility

In addition to these features, groundwater in the vicinity of, and materials associated with, tailings impoundment areas were investigated in the groundwater investigation. A short description and history of the facilities in each of the washes, as well as a description of additional facilities characterized as part of the groundwater investigation, are provided below.

Note that the current names and descriptions for several features have been updated since finalization of the Work Plan. The former and current names for features that have been updated are provided in Table 1.

2.6.1 Demetrie Wash Features

Historically, Demetrie Wash received all surface water runoff from facilities in and around the former Esperanza Mill area and from Amargosa Wash. Historical documents dating from 1987 indicate that Demetrie Wash has received releases of process fluids and tailing reclaim water. In 1993, the B and C seepage silos were constructed across Amargosa Wash alluvial sediments in an effort to intercept potential underflow that could discharge to Demetrie Wash (URS 2008a).

A majority of the surface water runoff from the Esperanza Mill area is now captured by the Duval Canal Extension, then diverted into Duval Canal and to Duval Canal impoundment, where the runoff is then pumped back into the processing water supply (these facilities are all located in Amargosa Wash).

Former and currently active facilities in Demetrie Wash characterized for the groundwater investigation are described below.

2.6.1.1 Former CLEAR Plant, Former E Pond, and Former Evaporation Pond

The former CLEAR Plant, former E Pond and former Evaporation Pond are closed historical operations and are not regulated under the APP. The former CLEAR Plant was commissioned in 1975. From 1977 to 1983, the former CLEAR Plant produced metallic copper; this process included sodium and potassium chloride brines and sodium hydroxide and ferric chloride reagents.

The former E Pond is an inactive, backfilled pond. This pond was an unlined impoundment historically used to contain surface water runoff and possibly process solutions from upset conditions at the former CLEAR Plant.

The former Evaporation Pond was a lined impoundment that received spent copper solution containing chloride. The former E Pond was located immediately east of the former Evaporation Pond, in a location designated as “Old D Pond” in the APP application documents. Interviews, however, indicate that the facility designated in the APP application documents as Old D Pond was actually the former E Pond, and that the Old D Pond was actually located south of the former CLEAR Plant facilities (URS 2008a).

2.6.1.2 Old D Pond

Old D Pond is regulated under the APP as a facility “to be closed.” Based on Site reconnaissance and historical aerial photograph review, the Old D Pond was found to be located approximately 1,000 feet south of the former CLEAR Plant Area. This pond was reported to have been used into the 1990s (URS 2008a).

The Old D Pond was an unlined pond that reportedly received process solutions from the former CLEAR Plant operation. These solutions were recycled and possibly concentrated various constituents including metals and radionuclides.

Runoff from the closed CLEAR Plant and Copper Sulfate areas is now contained in the New D Pond, an APP-permitted non-stormwater impoundment. The impoundment is single lined with an 80-mil high-density polyethylene (HDPE) liner, has a storage capacity of 14 acre-feet, and a depth of 8 feet. Accumulated fluids are gravity fed into Duval Canal through a 10-inch HDPE pipeline.

2.6.1.3 Former Esperanza Mill Area

The former Esperanza Mill area is located in the central portion of the Sierrita property. Facilities associated with the Mill included a mill, two thickeners, and a raw water pond. The former Esperanza Mill is an inactive area of historical operations that is not an APP-regulated facility. The former Mill processed sulfide ore from 1959 through 1981. A drainage channel (topographic low) extends from near the base of the former thickeners and trends southeast across the former mill area. Tailings from the former Esperanza Mill were conveyed via pipeline to the Esperanza Tailing Impoundment (ETI; URS 2008a).

2.6.1.4 Former C Pond

The former C Pond is a closed historical operation not regulated under the APP. Interviews conducted by URS indicated that this pond was not associated with Esperanza Mill, but instead was an unlined pond used to collect surface runoff from the Sierrita Mill. The former C Pond received surface water runoff from the Sierrita crusher dust collector system (ELMA and Dames and More 1994). The material was reported to be very fine and contained a relatively high concentration of copper. Sumps were located in the pond; however, the sediment would clog the pumps and need to be excavated. The excavated sediment was placed on the ground surface immediately east of the impoundment, in an area (C Pond Spoils) just west of the current Duval Canal Extension. The construction of the Duval Canal Extension in 1994 eliminated the need for surface water collection in the former C Pond (URS 2008a).

2.6.1.5 Former Raffinate Pond

The former Raffinate Pond is a closed historical facility not regulated under the APP. This pond was unlined and was used in association with a Precipitation Plant (now removed), which was located immediately southeast of the former Esperanza Mill. Its use ended when Raffinate Pond No. 3 was constructed.

The former Raffinate Pond collected surface water runoff from the western portion of the former Esperanza Mill and contained some water most of the year. The central portion of the former Raffinate Pond currently supports a cover of vegetation. Granodiorite bedrock outcrops at the surface along the southwest side of the former pond. The north and east sides of the pond are currently bordered by fill material.

2.6.2 Amargosa Wash Features

Amargosa Wash flows through the SX process pond area. Since the early 1960s, Amargosa Wash has contained various process ponds, stormwater impoundments, and sumps between the leach stockpiles and Demetrie Wash. The processing facilities have been upgraded since that time, as permitted through the APP (APP No. P-101679). Former and currently active facilities in Amargosa Wash characterized for the groundwater investigation are described below.

2.6.2.1 Amargosa Pond

Amargosa Pond is an active, APP-permitted non-stormwater impoundment. This facility provides containment for stormwater runoff and upset conditions from Headwall No. 1, Bailey Lake, Raffinate Pond No 2, and Drain Pond No. 2. It has a storage capacity of 49 acre-feet and a depth of 25 feet. It has a single 80-mil HDPE liner, underlain by a compacted subgrade.

2.6.2.2 Headwall No. 1

Headwall No. 1 is an active, APP-permitted PLS Impoundment. This facility provides containment for PLS from the oxide leach area. It is an unlined impoundment created by an earthen dam. The impoundment has a storage capacity of 3 acre-feet and a maximum depth of 22 feet. Accumulated PLS is directed into Bailey Lake through an HDPE-lined channel. The facility is designed to overflow into Bailey Lake.

2.6.2.3 Decant Solution (Molybdenum) facility

Decant solution associated with the Decant Solution (Molybdenum) facility was sampled for the groundwater investigation. The Decant Solution (Molybdenum) facility includes the Moly Decant Tanks and Pad Area and is an active, APP-permitted Process Solution Impoundment. This facility consists of four partially below-ground steel-reinforced concrete walls with an adjacent steel-reinforced concrete drying pad. The adjacent drying pad occupies an area of approximately 60 feet by 110 feet. Each

Moly Decant Tank is 50 feet by 26 feet and 3 to 4 feet deep, with a soil/bentonite admixture bottom. The impoundments contain overflow from the molybdenum processing thickeners. Any excess fluid is pumped to Bailey Lake. The concrete pad is used to further dry the molybdenum concentrate. Once dry, concentrate is moved to the molybdenum roaster. Downgradient, two interceptor trenches, equipped with pump-back systems, capture any potential discharge and pump it back into the SX circuit.

2.6.2.4 B Pond

B Pond is an active, APP-permitted Process Solution Impoundment. This upgraded facility receives a mixture of process solutions, which includes but is not limited to PLS and stormwater from upgradient facilities. It is lined with an 80-mil HDPE upper liner and 60-mil HDPE lower liner, separated by a geonet, and equipped with a leachate collection and removal system (LCRS). It has a storage capacity of approximately 49 acre-feet at a depth of 20 feet, with a minimum freeboard of 2 feet. The facility is designed to overflow into Duval Canal through a concrete-lined spillway.

Historically, B Pond used to contain water flowing along Amargosa Wash due to heavy precipitation or “upset condition” in the leaching operations in Amargosa Wash (ELMA and Dames and Moore 1994).

2.6.2.5 Amargosa Spillway

Amargosa Spillway is an active, APP-permitted facility. It is a solution conveyance channel lined with an 80-mil HDPE geomembrane. It is 860 feet long, 29 feet wide, and 3 to 5 feet deep, with a design flow capacity of 1,762 cubic feet per second (cfs). The facility receives overflow from Amargosa Pond during upset conditions and stormwater runoff from upgradient areas. Fluids are conveyed to B Pond.

2.6.2.6 Duval Canal

Solutions in Duval Canal were not sampled, but this facility is described in this section because it is interconnected with other active facilities in Amargosa Wash. Duval Canal existed as an unlined channel extending from B Pond into the STI until 1992. It is now an active facility permitted under APP. It is a solution conveyance channel lined with an 80-mil HDPE geomembrane. It is 4.25 miles long, 10 feet wide, and 6 feet deep, with a design flow capacity of 31,000 cfs. The facility receives process solutions and surface runoff from the Plant Site, including but not limited to overflow from B Pond; seepage from B and C Seepage Silos, tailings thickeners, and decant pond; bleed from the lime scrubber; dust control water from crushing and conveying; and vehicle wash water. Fluids are conveyed to Duval Canal Impoundment.

2.6.2.7 Bailey Lake

Bailey Lake is an active, APP-permitted PLS Impoundment. The facility is designed to contain overflow and subsurface flow from Headwall No. 1 and excess fluid from the Moly Decant Tanks. It is an unlined impoundment behind an earthen dam with a storage capacity of 135 acre-feet and a maximum depth of 42.1 feet. Accumulated fluid is pumped to SX Plant Nos. 1 and 2. The facility is designed to overflow into Amargosa Pond through a concrete-lined spillway.

2.6.2.8 Sump and Interceptor Trench System

A series of sumps and interceptor trenches is located along Amargosa Wash to collect underflow from the various process solution impoundments. Based on discussion with Sierrita staff and record review, the feature names and descriptions for these facilities were updated from the Work Plan, as described below (see Table 1 for name changes).

The sumps sampled for the groundwater investigation include Bailey Sump, Amargosa East Sump, Amargosa West Sump, SX-Sump 1, SX-Sump 2, and SX-Sump 3.

Bailey Sump is located immediately downstream of Bailey Lake. Subsurface flow captured at Bailey Sump is pumped downstream to Raffinate Pond No. 2.

Raffinate Pond No. 2 is an active, APP-permitted Raffinate Impoundment. This facility provides temporary storage for copper-depleted leakage solution from SX Plants Nos. 1 and 2. It is double-lined (using two 60-mil HDPE liners) with a storage capacity of 6 acre-feet, and a maximum depth of 16 feet. Accumulated solution is pumped to the leach stockpiles for leaching operations. Raffinate Pond No. 2 is equipped with an LCRS. Data from October 2008 to July 2009 (VRP timeframe) indicate that the LCRS was recovering leakage at a rate of approximately 160 gallons per minute (gpm).

To minimize subsurface flows in Amargosa Wash, Amargosa West Sump and Amargosa East Sump have been constructed immediately upstream and downstream of Amargosa Pond, respectively.

Amargosa West Sump is located immediately downstream of Raffinate Pond No. 2 and upstream of Amargosa Pond. Amargosa West Sump collects subsurface flow that may pass Bailey Sump or that may come from Raffinate Pond No. 2. Subsurface flow captured by Amargosa West Sump is pumped back to Raffinate Pond No. 2.

Amargosa East Sump is located immediately downstream of Amargosa Pond and intercepts subsurface flows that pass Bailey Sump or Amargosa West Sump.

2.6.2.9 Former A Pond

The former A Pond was a small, unlined pond located between Amargosa Pond and B Pond in Amargosa Wash. It used to retain stormwater or process solutions that flowed along Amargosa Wash. However, after the completion of Amargosa Pond in 1995, the pond was breached and decommissioned in 1998 (MWH 2005). The sediments that were accumulated in the former A Pond were excavated and stockpiled on the active leach stockpile (URS 2008a).

2.6.2.10 B Seepage Silo and C Seepage Silo

The B Seepage Silo (formerly named C Sump) was installed to drain water that had been observed ponding at the confluence of the Demetrie and Amargosa Washes. The water was thought to be seepage emanating from B Pond. The B Seepage Silo consists of an intercept trench with a sump and dedicated submersible pump excavated through the alluvium and bedrock and extending several feet below the top of bedrock. The water level in the B Seepage Silo is to be maintained below the alluvium/bedrock interface so intended groundwater is directed towards the trench (ELMA and Dames and Moore 1994).

In 1993, the C Seepage Silo was installed downgradient from C Pond and west of Demetrie Wash (URS 2008a) to reduce subsurface flows from the mill area to Demetrie Wash. The C Seepage Silo consists of a seepage interception trench with a sump and dedicated submersible pump. The interception trench was excavated through the alluvium and bedrock extending several feet below the top of bedrock. The water level in the C Seepage Silo is to be maintained below the alluvium/bedrock interface so intended groundwater is directed towards the trench (ELMA and Dames and Moore 1994). The B and C Seepage Silos were upgraded in 2008 and have two pumps each (high and low). The low pumps report to Raffinate Pond 2, and the high pumps report to Duval Canal.

2.6.2.11 Launders Facility

The Launders Facility was constructed in 1958 as part of the Precipitation Plant. Sierrita is no longer using the Launders portion of the Precipitation Plant. It is located in the same area as the Decant Solution (Molybdenum) facility. The former facility consisted of 22 concrete bins filled with iron cans and scrap iron. PLS was pumped into the bins, and copper was precipitated onto the iron surfaces. As part of this process, the iron dissolved and was entrained into the leach solution. The copper precipitate was then transported off site for further processing. This operation was discontinued in 1987 when the SX/EW operations began. The Launders Facility is listed as a “to be closed” facility in the APP; however, the APP reports that the facility will be closed during mine closure at the end of mine life.

2.6.3 Esperanza Wash Features

Current operating facilities located in the Esperanza Wash include leach stockpiles and SX facilities regulated under the APP. Solutions from active facilities in this wash were not sampled for the groundwater investigation; however, groundwater monitoring wells upgradient and downgradient from facilities were sampled. The current APP permit (APP No. P-101679), as amended through March 2013, authorizes the operation of the following discharging facilities in Esperanza Wash Drainage Area:

<u>Non-Stormwater Impoundments:</u>

- SX-3 Stormwater Pond
- CAT Pond 1
- CAT Pond 2
- CAT Pond 3

Process Solution Impoundments:

- Raffinate Pond No. 3
- Headwall No. 2
- Headwall No. 3
- Headwall No. 5

Active Leaching Areas:

- Oxide (Twin Buttes and Sierrita) Active Leach Area

Solution Conveyance Channels:

- Headwall No. 2 Channel

2.6.3.1 Non-stormwater Impoundments

SX-3 Stormwater Pond (Non-Stormwater Impoundment). This impoundment contains stormwater runoff from native, upgradient terrain; upset conditions at Headwall No. 3; Raffinate Pond No. 3; and surface runoff from the Headwall No. 2 Area. The facility has a single 80-mil HDPE liner, a storage capacity of 52 acre-feet, and a depth of 17 feet. Accumulated solutions are pumped to Raffinate Pond No. 3 or, if needed, to Amargosa Pond.

Cat Pond 1 (Non-Stormwater Impoundment). The facility contains drainage from the Sierrita Waste Rock Pile and upgradient native terrain, and upset conditions from Headwall No. 5. It is lined with an 80-mile HDPE liner, has a fluid storage capacity of 25.2 acre-feet, and a depth of 27 feet. Accumulated fluid is pumped into the plant process circuit. The facility is approximately 1,000 feet south and downgradient from Headwall No. 5 in the Unnamed Wash.

Cat Pond 2 (Non-Stormwater Impoundment). The facility contains drainage from the Sierrita Waste Rock Pile and upgradient native terrain. It is lined with an 80-mile HDPE liner, has a fluid storage capacity of 60.1 acre-feet, and a depth of 40 feet. Accumulated fluid is pumped into the plant process circuit. The facility is approximately 1,000 feet south, downgradient from the Sierrita Waste Rock Pile.

Cat Pond 3 (Non-Stormwater Impoundment). The facility contains drainage from the Sierrita Waste Rock Pile and upgradient native terrain. It is lined with an 80-mil HDPE liner, has an operational storage capacity of 53.9 acre-feet, and a depth of 34 feet. Accumulated fluid is pumped into the plant process circuit.

2.6.3.2 Process Solution Impoundments

Raffinate Pond No. 3 (Process Solution Impoundment). This facility contains stormwater runoff during upset conditions from SX-3 Stormwater Pond, Headwall No.3, and Headwall No. 5, and subsurface flows pumped from Interceptor No. 1. It is designed to overflow through a lined spillway into SX-3 Stormwater Pond. It is double-lined with two 60-mil HDPE liners and an LCRS, has a storage capacity of 16 acre-feet, and a maximum depth of 22 feet.

Headwall No. 2 (Process Solution Impoundment). This facility collects PLS from the oxide and sulfide leach areas. The headwall is lined with an 80-mil HDPE liner on the face of the dam, and is keyed into Demetrie Volcanic bedrock. Accumulated fluid is discharged into Raffinate Pond No. 3 through a 10-inch diameter HDPE pipeline. The facility is designed to overflow through Headwall No 2 Channel into SX-3 Stormwater Pond.

Headwall No. 3 (Process Solution Impoundment). This facility collects PLS from the Sierrita Sulfide Active Leach Area, and upgradient stormwater runoff. It is partially lined with 80-mil HDPE liners, with a storage capacity of 15 acre-feet, and a maximum depth of 21 feet. Accumulated fluid is pumped through two 24-inch HDPE pipelines into a concrete vault, and then to Raffinate Pond No. 3. It is designed to overflow through a concrete-lined spillway into Stormwater No. 3 Pond. Headwall No. 3 is underlain by a thin layer of alluvium deposited in Esperanza Wash.

Headwall No. 5 (Process Solution Impoundment). The facility receives potentially impacted stormwater commingled with PLS from the Sierrita Active Leach Area. It is double-lined with two 80-mil HDPE liners and an LCRS underlain by a geocomposite clay liner (GCL), has a storage capacity of 11.44 acre-feet, and a maximum depth of 20 feet. Accumulated fluid is pumped by a barge-mounted pump to Headwall No. 3.

2.6.3.3 Active Leaching Areas

Oxide (Twin Buttes and Sierrita) Active Leach Area (Leach Stockpile). This facility is an oxide leach stockpile, covering a surface area of approximately 570 acres. Dilute sulfuric acid and raffinate is applied to the facility, and the PLS is collected at Headwall

No. 1, Headwall No. 2, and Headwall No. 3. Stormwater overflow and run-on is contained in Amargosa Pond and SW-3 Pond.

2.6.3.4 Solution Conveyance Channels

Headwall No. 2 Channel (Solution Conveyance Channel). This facility conveys stormwater from upgradient native terrain, and during upset conditions from an upgradient booster station. It is 2,500 feet long, 10 feet wide at the base, and 2.5 feet deep. It is lined with a 60-mil HDPE liner, and has a flow capacity of 420 cfs. Accumulated fluid is discharged at the east end of SX-3 Stormwater Pond.

2.6.3.5 Other Features of the Esperanza Wash

2.6.3.6 SX-3 Plant

SX-3 Plant was constructed in 1994 to handle PLS from the sulfide leach stockpiles on the eastern side of the Sierrita property. It was located on Esperanza Wash. The plant operated for 30 days in late 1994, and has not operated since.

2.6.4 Tinaja Wash and Unnamed Wash Features

Currently, operating facilities that may drain into the Unnamed and Tinaja Washes include Headwall No. 5, a leach solution collection facility regulated under the APP, and Tinaja Pond. Tinaja Pond is a non-APP regulated stormwater runoff catchment pond (URS 2008a).

2.6.5 Other Features Characterized in the Groundwater Investigation

The following features are identified on Figure 2:

The Esperanza Tailing Impoundment (ETI). This impoundment was operated continuously from October 1959 through December 1971 and from January 1973 through December 1978, then intermittently from January 1979 through December 1981, when it was closed. The surface of the ETI was subsequently capped with a layer of alluvial material. During 1991 and 1992, tailings from the Twin Buttes Mine were deposited in the west half of the ETI.

Currently, the ETI is used for limited tailing deposition only during emergency cleanouts or when blockages occur in the Sierrita tailing slurry pipeline (URS 2008a).

Rhenium Ponds. These former facilities were constructed in 1981 and consisted of three impoundments excavated side-by-side into the surface of the ETI. The ponds were used for storage and evaporation of process solutions from the Rhenium Plant. Each cell measured 250 feet long, 65 feet wide, and 10 to 12 feet deep completed with a geosynthetic liner. The Rhenium Ponds were used from 1981 through 1991 and were closed in 1998. Closure of these ponds consisted of excavating sediments from the cells and placing the removed sediment in the leach area. The ponds were then backfilled with tailing and graded. The Rhenium Ponds are listed as a “to be closed” facility in the APP.

Sierrita Tailings Impoundment (STI). The STI began operation in 1970 and is currently in use as an operating facility permitted under the APP. This tailings impoundment covers an area of approximately 4,316 acres, with a 2,500-foot divider dam to separate it into north and south sections. Water accumulates toward the west side of the impoundment and is pumped to the Raw Water Reservoir. Tailings are deposited such that the finer-grained tailings slimes provide a low-permeability coating of the floor of the impoundment to minimize infiltration of fluids. Effluent from the wastewater system (Type 1.09 General Permit) is also discharged to the tailings impoundment at a maximum rate of 10,000 gallons per day. Basin fill deposits underlie the STI. Groundwater containing sulfate at concentrations greater than 250 mg/L originating from the impoundment is being addressed under the Mitigation Order on Consent (Docket No. P-50-06).

3. Results of the Groundwater Investigation

3.1 Field Sampling Activities Completed

The groundwater investigation characterized COIs in groundwater, solutions from active facilities, rock core materials, and tailings materials between July 2008 and July 2009. This work consisted of:

- Installation of 15 bedrock monitor wells
- Installation of 14 temporary alluvial monitor wells
- Collection and analysis of 138 samples of solutions from 19 active facilities
- Collection and analysis of 290 samples from 45 bedrock groundwater monitoring wells
- Collection and analysis of 29 samples from seven alluvial groundwater wells
- Collection and analysis of 63 tailings material samples from six borings located within the ETI and STI
- Collection and analysis of 34 rock core samples from four borings (these borings were subsequently converted to monitoring wells screened in bedrock formations)

Locations of all the wells and facilities sampled for the groundwater investigation are shown on Figure 10. Closer-view maps showing sampling locations in each wash are also shown on Figures 7 through 9.

A detailed summary of completed groundwater investigation activities compared to those proposed in the Work Plan is presented in Table 2.

Appendix A contains descriptions of the following procedures and information:

- Permanent, background, and temporary well installation and well development procedures
- Groundwater sampling procedures

- Process solution, tailings material, and rock core sampling procedures
- Slug test procedures
- Equipment decontamination and investigation-derived waste management procedures
- Boring and well construction logs
- Well development logs
- Sampling logs

3.2 Deviations from the Work Plan

Deviations from the Work Plan are summarized in Table 3, with additional descriptions provided in Appendix A. The deviations are consistent with what typically occurs during a field program, and do not affect attainment of program objectives or the ability to use the data for analysis and interpretation.

3.3 Sample Analysis Procedures

COIs (and some additional parameters for purposes of analytical completeness) were measured in groundwater, active facility solutions, tailings materials, and rock core materials. Groundwater and active facility solution samples were analyzed for general chemistry, metals, and radiochemistry COIs. Tailings material samples were analyzed for metals and radiochemistry COIs. Rock core samples were analyzed for radiochemistry COIs. For purposes of results presentation and discussion, the measured parameters are grouped into the following:

1. **Field Parameters**: pH (field), temperature, turbidity, specific conductivity, Dissolved Oxygen (DO), and Oxidation-Reduction Potential (ORP).
2. **General Chemistry**: alkalinity, calcium, chloride, pH (lab), sulfate, and total dissolved solids (TDS), magnesium, potassium, sodium, fluoride, and nitrite/nitrate.
3. **Trace Metal Cations**: aluminum, barium, beryllium, cobalt, cadmium, copper, iron, lead, manganese, mercury, nickel, thallium, and zinc.
4. **Trace Metal Anions**: antimony, arsenic, chromium, molybdenum, and selenium.
5. **Radionuclides**: Uranium, radium-226 (Ra-226), radium-228 (Ra-228), gross alpha, and gross beta.

Note that, although the results for both pH measurements (field and lab) are presented in results tables, reference to and discussion of pH in this report refers to field-measured pH. Field pH measurements are generally always more representative of conditions in the field because pH can change after sampling and during transport of samples to the lab as dissolved carbon dioxide is absorbed or evolved (resulting in a pH change).

Field parameters were measured using a Horiba U22XD water quality instrument owned by Sierrita. The Horiba U22XD was calibrated each morning before use. Calibration data were recorded in the field logbook and on the sampling records (Appendix A). DO, temperature, ORP, specific conductivity, turbidity, and pH were measured during each sample collection event.

Water samples were collected quarterly (except where otherwise noted) and shipped to two analytical laboratories for further analyses: ACZ Laboratories, Inc. in Steamboat Springs, Colorado analyzed samples for general chemistry, trace metal cations, and trace metal anions; and ALS Laboratory Group in Fort Collins, Colorado analyzed samples for radionuclides. Specific laboratory analytical methods used are identified in the laboratory reports in Appendix B.

3.4 Data Quality Assessment Results

3.4.1 Analytical Data Packages

The analytical data packages for groundwater, active facility solutions, tailings materials, and rock core samples are provided in Appendix B. Electronic Data Deliverables (EDDs) were provided in spreadsheet format. However, while populating the EDD in the spreadsheet format, it was noted that, in some cases, the number of significant figures differed from the analytical data reports. For example, results in the laboratory reports that contained trailing zeroes did not have those trailing zeroes included in the EDD. The significant figures in the results tables reflect those provided in the EDDs.

3.4.2 Data Verification

All data underwent Level II data verification in accordance with the criteria specified in the QAPP (URS 2008b). The Level II verification included a review of the chain of custody (COC) and sample receipt, holding times, method blanks, matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent difference (RPD), laboratory duplicate RPD, laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries and RPD, and package completeness. The Level II verification also included a review of reporting limits, method detection limits, serial dilutions, field blanks, field duplicates, equipment/rinsate blanks, and trip blanks as applicable. In addition to the parameters listed above, Level II data verification of metals and general chemistry parameters included a review of calibration blanks and internal standards, and for radiochemistry parameters, the validation included a review of implied detection limits and sample-specific chemical recovery (chemical yield). Data verification summaries are included in Appendix B.

At the Level II validation stage, the data were determined to be useable without qualification. Issues noted in the laboratory case narratives potentially affecting data quality were noted in the verification reports. Independent review flags were assigned to the data as required by Appendix E in the QAPP (URS 2008b).

3.4.3 Data Validation

Ten percent of the data packages underwent a Level IV validation in accordance with the criteria specified in the QAPP (URS 2008b). Level IV validation of water sample data was performed by ALS Paragon and included a review of initial calibration, continuing calibration, tuning, target compound identification, transcription errors, and recalculation as applicable. Level IV validation of data collected from tailings and rock core samples was performed by Laboratory Data Consultants, Inc. (LDC) and included a review of initial calibration, continuing calibration, minimum detectable activity, carrier recoveries, sample result verification, recalculation, and overall data assessment. Data validation summaries are included in Appendix B.

Quality control criteria were met on the samples. Results were acceptable according to the standard operating procedures, and were submitted without further qualification. Where requested minimal detectable concentrations (MDCs) were not achieved, the samples were identified with an “M3” flag on the final reports. In very few samples, potentially low bias (<10%) to the reported result may have occurred based on the observed efficiency of the detectors used for analysis of radionuclides, and due to concentration of the carrier for metal analyses. Samples with potentially low bias were identified in the validation summary reports.

3.4.4 Data Qualifiers

To determine ultimate usability of the data, laboratory reports were submitted to LDC for review. Data qualifiers were applied to analytical results associated with quality control parameters outside of the established data quality objectives. The data qualifiers added by LDC are defined below:

- J The analyte was positively identified; however, the result should be considered an estimated value.
- UJ The analyte was not positively identified. The reporting limit is considered an estimated value.
- U The analyte was not positively identified above the MDC or the analyte was not identified above the listed method quantitation limit (QL).

All data were considered usable and met project data quality objectives.

3.4.5 Field Quality Control Samples

3.4.5.1 Equipment Blanks

Equipment blanks were not collected for groundwater, solution pond water, or STI pore water, because samples were collected using dedicated equipment (URS 2010). Equipment blanks were not collected for solid media according to the QAPP/Sampling and Analysis Plan (SAP) Addendum (URS 2008b). The requirements of the QAPP were met.

3.4.5.2 Field Duplicate Sample Evaluation

Field duplicates are collected to assess how conditions in the field affect the precision of sample analytical results and provide information about heterogeneity of a particular sample location. Field duplicates were collected in succession from the same sample source and device as the original sample, and the field duplicates were not homogenized, consistent with the QAPP (URS 2008b).

A total of 89 duplicate water samples were collected and analyzed. For filtered non-solid samples, the following duplicates were collected: four for surface water (i.e., solution pond) radiochemistry, seven for solution pond general chemistry, six for solution pond metals, 12 for groundwater radiochemistry, 19 for groundwater general chemistry, and 19 for groundwater. For unfiltered non-solid samples, the following duplicates were collected: five for solution pond radiochemistry and 17 for groundwater radiochemistry. The 89 duplicates analyzed represent 41 unique sample locations. The 41 sample locations were collected to represent 457 primary samples. Therefore, one duplicate was collected for approximately every 20 primary samples. This satisfies the Work Plan requirement of one duplicate sample collected and analyzed for every 20 primary samples of a given matrix.

A total of six duplicate tailings solid material samples were collected and analyzed: one for radiochemistry and five for metals. The six duplicates analyzed represent five unique sample locations. The five duplicates were collected to represent 58 primary samples. Therefore, one duplicate was collected for approximately every 20 primary samples. This satisfies the Work Plan requirement of one duplicate sample collected and analyzed for every 20 primary samples of a given matrix.

The RPDs between each field duplicate and its associated sample were calculated and are presented in Appendix B. The RPD is a measure of precision calculated by the following formula:

$$RPD\ (\%) = (| X_1 - X_2 | / X_{avg}) * 100$$

Where:

X_1 and X_2 are the observed concentration values,

X_{avg} is the average concentration, and

$X_1 - X_2$ is the absolute value of the difference between observed values.

Field duplicate evaluation procedures were not specified in the Work Plan (URS 2008a) or QAPP/SAP addendum (URS 2008b). The field duplicates were evaluated by the following criteria for water samples:

- If an analyte was detected in the parent sample and duplicate samples at a concentration greater than or equal to five times the method QL, the RPD should be less than or equal to 20 percent. Results were qualified for a RPD greater than 20 percent.

- If an analyte was detected in the parent sample and/or the duplicate sample at a concentration that is less than five times the method reporting limit, then the difference between the sample and the field duplicate should not exceed two times the QL. Results for qualified for a difference greater than the QL.

The field duplicates were evaluated by the following criteria for tailings samples and for radiochemistry analyses:

- If an analyte was detected in the parent sample and duplicate samples at a concentration greater than or equal to five times the method QL, the RPD should be less than or equal to 50 percent. Results were qualified for a RPD greater than 50 percent.

- If an analyte was detected in the parent sample and/or the duplicate sample at a concentration that is less than five times the method reporting limit, then the difference between the sample and the field duplicate should not exceed four times the QL. Results were qualified for a difference greater than four times the QL.

Field duplicate RPDs were generally within acceptance limits; exceptions are listed in Appendix B.

3.5 Hydrogeology Results

Depth to water data collected between 2008 and 2009 included existing monitoring wells and newly installed wells for the groundwater investigation. Well construction details for the wells evaluated during the groundwater investigation are presented in Table 4. Depth to water measurements were converted to groundwater elevation measurements and are presented in Table 5. At times, multiple readings per quarter at the same well were collected, and these are also presented in Table 5.

Wells installed in the alluvial aquifer for the groundwater investigation indicated a range in saturated thickness from less than 1 foot up to 12 feet, and occasionally, wells were dry during the investigation time period. Depths to water measured during this period ranged from approximately 5 feet below top of casing (btoc) to 16 ft btoc. The groundwater elevations ranged from approximately 3,496 ft North American Vertical Datum (NAVD) to 3,693 ft NAVD, with an average of 3,584 ft NAVD. The following wells were dry for at least one quarter during the groundwater investigation: MH-22, TW-2008-02, TW-2008-03, TW-2008-04, TW-2008-05 (reported dry for the two quarters it was gauged), TW-2008-07, TW-2008-08 (only gauged one quarter), TW-2008-12, TW-2008-14, and TW-2008-15. Both TW-2008-14 and TW-2008-15 were reported dry for the three quarters they were gauged.

The basin fill aquifer occurs generally east of Demetrie Wash, and previous investigations indicate that the saturated aquifer thickness increases along the east from north to south. The saturated thickness of the basin fill aquifer measured during the groundwater investigation ranged from 43 to 100 feet. Depth to water measured during the groundwater investigation ranged from approximately 246 ft btoc to 426 ft btoc. The groundwater elevations ranged from approximately 2,722 ft NAVD to 3,195 ft NAVD with an average of 2,816 ft NAVD.

The bedrock hydrostratigraphic unit consists of many formations, and it is interpreted as one hydrostratigraphic unit. Samples from the following formations were collected during the groundwater investigation: Demetrie Volcanics, Ruby Star Granodiorite, Tinaja Peak Formation, and Harris Ranch Quartz Monzonite. The saturated thickness of the bedrock hydrostratigraphic unit, as measured during the groundwater investigation, ranged from less than 1 foot to 67 feet (or more; the saturated thickness recorded here is a function of the depth to which borings were drilled and the wells installed). Depth to water measured during the groundwater investigation ranged from approximately 6 ft btoc to 417 ft btoc. The groundwater elevations ranged from approximately 2,815 ft NAVD to 4,123 ft NAVD, with an average of 3,629 ft NAVD.

Groundwater contour maps for the bedrock hydrostratigraphic unit were prepared using groundwater elevation data from wells screened in the bedrock formations (i.e., “bedrock wells”) for each quarter of the groundwater investigation. Alluvial wells were often dry (reflecting the discontinuous presence of this groundwater system); hence, groundwater contour maps were not generated for these aquifers.

Bedrock groundwater contour maps are presented on Figures 11 through 14 for fourth quarter 2008, first quarter 2009, second quarter 2009, and third quarter 2009, respectively. The following wells are not classified into a specific bedrock formation (based on review of the boring logs) and were not included in the below calculations presented in Table 5 and contouring shown on Figures 11 through 15: MH-30 is screened across both the basin fill deposits and Mesozoic sedimentary rocks; and PZ-07 is screened across the basin fill deposits and Ruby Star Intrusives. The groundwater contours indicate that bedrock groundwater flows generally from west to east across the Site.

Horizontal hydraulic gradients were calculated to evaluate the flow direction (gradient angle and magnitude) in the bedrock hydrostratigraphic unit using water level data from the same three bedrock wells for all four quarters. The method used is described in Devlin (2003). Wells MW-2008-12, MW-2008-15, and MH-23 were used to calculate the horizontal gradient for all four quarters. The horizontal gradient was consistently 0.03 foot per foot (ft/ft) for all four quarters with flow towards the southeast.

Vertical gradients were calculated using groundwater elevations in shallow alluvial wells and deeper bedrock wells located in close proximity to one another. While there were multiple shallow alluvial and bedrock well pairs, only a few could be analyzed for gradient because alluvial wells were dry for one or more of the quarters. Vertical gradient calculations are presented in Table 6 and ranged from 0.01 ft/ft to 0.99 ft/ft downward. Two well pairs indicated an upward vertical gradient. These were at MH-27 and TW-2008-07 (Q4 2008) with a vertical upward gradient of 0.03 ft/ft, and at MW-2008-08 and TW-2008-13 (Q1 2009) with a vertical upward gradient of less than 0.01 ft/ft. It should be noted that vertical gradients close to 0.01 ft/ft are likely within the combined range of error for the field instruments used and the field instrumented error was not quantitatively defined during the groundwater investigation. In addition, one single comprehensive gauging event was not completed at the start of each quarter, and some depth to water measurements were collected days apart from one another. Therefore, the vertical gradients should be considered estimates.

3.6 Slug Test Results

Response data (i.e., elapsed time and corresponding changes in water levels) collected during each test were converted to displacement data and analyzed using AQTESOLV for Windows® (Duffield 2007) to estimate near-well hydraulic conductivity. Initial analyses of slug test data were conducted by URS; upon additional review, 13 tests were re-analyzed by ARCADIS. Appropriate and applicable analytical solutions, based on well construction and aquifer characteristics and as available in AQTESOLV, were applied following the guidelines presented in The Design, Performance, and Analysis of Slug Tests (Butler 1998). The Bouwer and Rice (1976) straight-line solution was selected for analysis of slug test data. The Bouwer-Rice recommended head range for the best curve fit was employed for tests that did not exhibit effects of filterpack drainage (MW-2008-07 falling head test, MW-2008-09 falling head test, and the MW-2008-11 rising head test).

AQTESOLV solution plots are provided in Appendix C. Slug test data collected at wells MW-2008-15, PZ-2008-19, and PZ-2008-20 were not analyzed due to insufficient quality data, water level data collected at MW-2008-15 did not include sufficient recovery data, and the test data collected at PZ-2008-19 and PZ-2008-20 were rejected due to implausibly high measured displacements (i.e., displacement exceeded available water column). Three total tests were recorded for MW-2008-11, and each of the three tests was analyzed separately.

As summarized in Table 7, estimated near-well hydraulic conductivities for the bedrock hydrostratigraphic formation ranged from 0.0003 ft/day (1.1×10^{-7} centimeters per second [cm/s]) to 1.49 ft/day (5.3×10^{-4} cm/s), with a geometric mean value of 0.05 ft/day.

There were a number of uncertainties associated with calculating hydraulic conductivities. First, the slug tests would have likely been impacted by drilling-induced disturbances (i.e., well skin effects and/or borehole damage) and insufficient well development. The impacts and effects caused by these near-well disturbances are difficult to avoid when performing and analyzing slug test results. Additionally, during the tests, the size of the slug used was not measured. Because the slug size is unknown, the theoretical displacement H(o)* cannot be determined, which adds uncertainty to the analysis, in terms of calculating effective casing radius for wells screened across the water table, or determining correction factors for effective casing radius or filter pack drainage. Finally, initial displacement values are less precise because the transducers were recording every second rather than every tenth of a second

Due to these uncertainties, the hydraulic conductivity estimates derived from slug tests should be considered approximate, potentially representing the lower bound of hydraulic conductivities of the formation in the vicinity of the well (Butler 1998).

Based on the response data (and the geology), the results are consistent with the lithology (bedrock) that is a relatively low transmissivity formation. Due to the numerous uncertainties in the tests, the results could vary by a factor of two or three; therefore, results are presented in ranges. However, overall, these results reflect a low hydraulic conductivity for the bedrock hydrostratigraphic unit, with some locations showing high permeabilities, potentially indicating fracturing.

3.7 Laboratory Results

Results of laboratory analysis for general chemistry, trace metals, and radionuclide COIs are presented in Tables 8 through 16 (field pH is included with the general chemistry results). The laboratory reports are included in Appendix B. The results are presented in a series of tables according to the type of material sampled, specifically:

- Sample results from solutions collected from various active facilities are presented in Tables 8 through 10.
- Tailings material sample results are shown in Tables 11 and 12.
- Rock core material sample results are shown in Table 13.
- Groundwater sample results are shown in Tables 14 through 16.

A summary of sampling location information, including screened interval lithology of the wells and Work Plan objectives, is shown in Table 17.

The groundwater sample results were compared to Arizona Aquifer Water Quality Standards (AWQS; ADEQ 2007), as shown in the tables; results that were above the AWQS are indicated in the tables. Results below AWQS indicate that the level of a COI is not a concern at a particular sample location, but results above AWQS does not necessarily indicate a need for further investigation or action. Remediation levels for groundwater have not yet been established for this project. Therefore, any exceedances of the AWQS indicated by the table do not necessary indicate that any action is needed under the VRP program. In accordance with A.R.S. § 49-175(B), remediation levels for groundwater are to be established in accordance with the rules adopted pursuant to A.R.S. § 49-282.06, unless A.R.S. § 49-175(B)(4) applies. Under A.R.S. § 49-175(B)(4), Sierrita may demonstrate that a source will not cause or contribute to an exceedance of aquifer water quality standards beyond the boundary of the facility where the source is located. All of the groundwater samples presented were taken from within the boundary of the Sierrita facility. Moreover, some of the samples were collected upgradient from “points of compliance” established under Sierrita’s individual APP, and AWQS apply at these points of compliance as defined by Sierrita’s area-wide APP, not upgradient from points of compliance. Most importantly, groundwater within the facility is not being withdrawn for drinking water or other use and is not accessible to third parties for any use.

The results for radiochemistry isotopes include the result, the MDC, and the total propagated uncertainty (TPU). A non-detect value is reported as a result that will be lower than the detection limit for the given analyte. For results that are non-detects, the TPU applies to the result, not the MDC. Results can be reported as negative values. This is because, to determine the result, a background (alpha or beta particle activity) is determined, which is then subtracted from the observed particle count at the time of analysis. Because the number of observable particles fluctuates through time, sometimes that observed number is lower than the background level, resulting in a value less than zero.

3.8 Nature and Extent

This section describes the nature and extent of COIs in groundwater across the Site.

For purposes of data presentation and discussion, data at the Site were grouped into four spatial areas, referred to as “investigation areas”. These investigation areas also reflect the different relative contributions of COIs from naturally occurring background, current operations, and historical operations. The wells and surface feature sampling locations associated with each investigation area are detailed in Table 17. Investigation areas are as follows:

- Background Areas
- West Investigation Area
- Central Investigation Area
- East Investigation Area

In the data presentation and discussion, groundwater quality is further distinguished among different formations because the type of formation has significant bearing on understanding the effect of the different bedrock lithologies on the distribution of groundwater COIs.

Finally, representative COIs were selected for discussion, and the distributions of those COIs are presented on Figures 15 through 35 (showing the entire Site) and Figures 36 through 56 (showing a closer view of the former Esperanza Mill area). Note that the concentrations presented on the figures show only the maximum concentration detected (or the reporting limit, if the constituent was not detected) at each location measured from all four quarters of sampling.

3.8.1 Investigation Area Descriptions

Background Areas

Three previously existing monitoring wells (MH-17, PZ-01, and MH-21) and four monitoring wells completed for the groundwater investigation (MW-2008-12, MW-2008-13, MW-2008-14, and MW-2008-15) are hydraulically upgradient from mining activities and therefore provide information about bedrock groundwater characteristic of background conditions.

The background wells are screened in one of three bedrock formations:

1. Harris Ranch Quartz Monzonite
2. Ruby Star Granodiorite
3. Tinaja Peak Formation

There are two background areas identified on the Site referred to in tables and text as "Background (north)" and "Background (west)": Monitoring wells MW-2008-12, MW-2008-13, and MH-21 are screened in the Ruby Star Granodiorite and are located to the north of the Central Investigation Area. MW-17 and MW-2008-15 are screened in the Harris Ranch Quartz Monzonite, and PZ-01 and MW-2008-14 are screened in the Tinaja Peak Formation. These wells are located west of the West Investigation Area. The background monitoring wells provide information about the water quality in three distinct bedrock lithologies outside of the influence of historical or current mining activities.

West Investigation Area

The West Investigation Area represents an area with few former operations. This area is where current leaching operations take place that result in the generation of process solutions with acidic pH, elevated concentrations of major cations (calcium, magnesium, sodium, and potassium), major anions (sulfate, chloride, and fluoride), and trace metals, relative to background bedrock groundwater. The West Investigation Area encompasses Tinaja Wash, Unnamed Wash, and Esperanza Wash.

West Investigation Area wells are screened in alluvium or one of two bedrock formations (Demetrie Volcanics or Tinaja Peak Formation). The alluvial and bedrock wells located within the West Investigation Area are adjacent to the current active leach facility and associated solution ponds.

Central Investigation Area

The Central Investigation Area represents an area with a mix of current and former operations. The sample locations in this area include all of the wells from the western edge at PZ-06 and PZ-02, extending east to MH-22 and MH-23, characterizing active facility solutions and groundwater in the vicinity of Amargosa Wash and Demetrie Wash. Mine process solutions from current operations are managed in this area, including raffinate collection ponds and active solution ponds that collect acidic leach solutions or alkaline process waters from the flotation processes. This area is also where most former operations were located, including the former CLEAR Plant area. Further detail regarding the former operations in these areas is described in Section 2.

Central Investigation Area wells are screened in alluvium within Amargosa Wash, or they are screened in bedrock formations. The majority of bedrock wells in this area were screened in the Ruby Star Granodiorite.

East Investigation Area

The East Investigation Area includes the former ETI, former Rhenium ponds, STI, and the wells located downgradient from the STI. This area is defined by PZ-07 to the northwest and PZ-08 to the southwest, and continues east to the line of wells at the easternmost edge of the STI. This area overlies the basin fill aquifer on the eastern side of the mine and is generally downgradient from ore processing operations. The major mining activity associated with this area includes the prior deposition of flotation process tailings into the former ETI and current deposition of tailings into the STI. The tailings materials and solutions deposited in the STI are predominantly from alkaline processes and possess moderate alkalinity and lower concentrations of TDS compared to process solutions from the other investigation areas.

East Investigation Area wells are screened for the most part in the basin fill aquifer. Two wells to the west of the STI (PZ-07 and PZ-09) were screened across both the basin fill aquifer and bedrock hydrostratigraphic unit (Ruby Star Intrusives). PZ-08, located west of the STI, was screened in the bedrock hydrostratigraphic unit (Demetrie Volcanics). Temporary piezometers were also placed in the STI to measure tailings pore water concentrations. These included PZ-2008-16, PZ-2008-19, and PZ-2008-20, which were sampled only in Q4 2008. Samples discussed in the remainder of the document represent “tailings pore water.”

3.8.2 General Chemistry

General chemistry discussed in this section includes field pH, nitrate/nitrite, fluoride, and the major cations and anions.

3.8.2.1 General Chemistry in Background Areas

pH in the bedrock hydrostratigraphic unit measured in the Background Areas is circumneutral (Figure 15). The field pH in Background Area wells measured over four quarters ranged from 5.39 to 7.58.

Concentrations of general chemistry COIs were generally low in the Background Area wells but varied among bedrock formations (see Figures 16 through 20, noting that concentrations shown on the figures reflect the maximum concentration observed during the four quarters of monitoring). Groundwater samples from wells screened in the Tinaja Peak Formation generally exhibited the lowest concentrations of most major cations/anions. Samples collected from wells screened in Harris Ranch Quartz Monzonite contained slightly higher concentrations of sodium and magnesium, and samples from wells screened in Ruby Star Granodiorite yielded the highest concentrations of major cations. These differences are reflected in overall TDS concentrations among formations, with TDS highest in Ruby Star Granodiorite, ranging from ~2,000 to ~3,500 milligrams per liter (mg/L); TDS in Harris Ranch Quartz Monzonite ranging from ~800 to 1,200 mg/L; and the lowest TDS in the Tinaja Peak Formation, ranging from ~250 to 600 mg/L. Note that the TDS values discussed in this section refers to measured TDS (solid residue recovered after filtration and dried at 180°C).

Calcium concentrations were more variable, ranging from less than 50 mg/L in samples from wells screened in the Tinaja Peak Formation, to greater than 300 mg/L in the Ruby Star Granodiorite (and >500 mg/L at MW-2008-13). Chloride was present at less than 250 mg/L in samples from wells screened in Harris Ranch Quartz Monzonite and Ruby Star Granodiorite.

Sulfate concentrations were lowest samples from wells screened in the Tinaja Peak Formation (<200 mg/L), followed by Harris Ranch Quartz Monzonite (<500 mg/L), and were highest in wells screened in Ruby Star Granodiorite (≥1,000 mg/L). Concentrations of sulfate, up to 1,900 mg/L at MW-2008-13, in the Background Area [North], can promote the dissolution of trace elements from the bedrock, including uranium (Bernhard et al. 1998).

Alkalinity varied widely; in samples from wells screened in the Tinaja Peak Formation, alkalinity was less than 270 mg/L, whereas, in the Harris Ranch Quartz Monzonite and Ruby Star Granodiorite, alkalinity was double. For example, MH-17 (in Harris Ranch Quartz Monzonite) was reported at greater than 400 mg/L. Alkalinity can leach uranium out of bedrock due to the complexation of uranium by the carbonate anion and the formation of soluble uranium carbonate and calcium uranium carbonate complexes (Bernhard et al. 2001). Higher concentrations of alkalinity in samples screened in the Harris Ranch Quartz Monzonite and Ruby Star Granodiorite (both formations contain uranium and are located in the Background Area [North]) may contribute to higher uranium concentrations detected in the bedrock hydrostratigraphic unit in this area.

3.8.2.2 General Chemistry in the West Investigation Area

pH in the alluvial aquifer and bedrock hydrostratigraphic unit of this investigation area is circumneutral (Figure 15). General chemistry COIs in wells screened in the Tinaja Peak formation were similar in concentrations from the Background Area (West), with overall low concentrations of calcium, chloride, magnesium, potassium, sodium, nitrate/nitrite, and fluoride (see Figures 16 through 20, noting that concentrations shown on the figures reflect the maximum concentration observed during the four quarters of monitoring).

In the bedrock hydrostratigraphic unit, higher cation, sulfate, chloride (greater than 1,000 mg/L chloride at PZ-16 and BW-02), and TDS (up to 8,390 mg/L) concentrations were observed in wells screened in the Demetrie Volcanics compared to the Tinaja Peak formation. Alkalinity was also highest in samples from wells screened in the Demetrie Volcanics compared to wells screened in the Tinaja Peak formation (184 to 272 mg/L). The exception to this was the lower alkalinity at BW-02 (less than 2 mg/L) and MH-20 (56 mg/L).

3.8.2.3 General Chemistry in the Central Investigation Area

The pH measured in the alluvial wells was low, generally <4, whereas the pH of the bedrock hydrostratigraphic unit in this investigation area was generally circumneutral (Figure 36); however, there were a few exceptions in bedrock within Amargosa Wash:

1) MW-2008-09 had a pH that ranged from 3.71 (Q4 2008) to 4.03 (Q2 2009). This well is located immediately downgradient from the former Raffinate Pond.

2) MW-2008-11 had a pH of about 4.8 for the first two quarters of monitoring, and a pH of about 6.2 for the latter two quarters of monitoring. This well is located upgradient from former operations in the former Esperanza Mill area.

3) During the third quarter monitoring event, MW-2008-10, screened in Ruby Star Granodiorite/Intrusives, had a pH of 4.78. During other monitoring events, the pH ranged from 5.03 to 5.69. This well is located between the former Laydown Yard and former Raffinate Pond.

Each of these wells is screened in Ruby Star Granodiorite/Intrusives; as such, the low pH may reflect the lithology of the formation, and, in the case of MW-2008-09 and MW-2008-10, the pH could also indicate some impacts from former facilities.

Concentrations of other general chemistry COIs is shown on Figures 36 through 41, noting that concentrations shown on the figures reflect the maximum concentration observed during the four quarters of monitoring. The concentration of calcium in the bedrock hydrostratigraphic unit within Amargosa Wash was typically less than 700 mg/L, with the exception of PZ-02 (875 to 1,040 mg/L). Within Demetrie Wash, calcium concentrations in bedrock were markedly higher on average, up to 1,190 mg/L. Groundwater at MW-2008-02 and PZ-03, which were both screened in the Ruby Star Granodiorite, showed different major cation chemistry than Background Area samples from wells screened in Ruby Star Granodiorite. Monitoring well MW-2008-02 is downgradient from the former CLEAR Plant tanks, and PZ-03 is downgradient from the former Raffinate Pond and former Laydown Yard.

Sulfate concentrations in samples from wells screened in bedrock varied by formation, as expected due to variation in natural mineral dissolution from the formations, although samples from wells screened in Ruby Star Granodiorite were generally consistent with Background Area (North) sulfate concentrations for the same formation. Conversely, the alluvial wells showed very high sulfate concentrations (up to 25,600 mg/L at TW-2008-10 [downgradient from Raffinate Pond No. 2] and 11,200 mg/L at TW-2008-11 [downgradient of the former A Pond]). The higher concentrations of sulfate in the alluvial wells indicate that solutions from facilities in this area, which contain very high concentrations of sulfate, have affected the alluvial groundwater quality; however, the bedrock hydrostratigraphic unit shows very little indication of effects. The concentration of sulfate is considerably lower in the alluvial wells farthest downgradient from the Central Investigation Area in Demetrie Wash, as shown by MH-22 where sulfate was at 2,400 mg/L in Q4 2008 (this well was dry during other monitoring events).

Alkalinity from samples screened in bedrock was generally greater than 200 mg/L within the Central Investigation Area. These higher alkalinity concentrations compared to concentrations from alluvial wells confirm that any impacts from the low pH facility process solutions have had little effect on the bedrock hydrostratigraphic unit in this area. Fluoride concentrations are higher in alluvial wells in Amargosa Wash (2.1 to 190 mg/L), but not in bedrock wells (<10 mg/L). Fluoride, like chloride and sulfate, is generally conservative in groundwater. However, calcium can react with fluoride to form the mineral fluorite (CaF_2), and this may play some role in limiting fluoride movement from the alluvial aquifer to the bedrock hydrostratigraphic unit.

Variation in TDS concentrations among different hydrogeologic units was consistent with the variability of chloride concentrations observed upgradient, within, and downgradient from Amargosa Wash. TDS was highest at alluvial well TW-2008-10 (54, 200 mg/L). Facility process solution ponds and sumps in Amargosa Wash generally had TDS concentrations greater than 25,000 mg/L. TW-2008-11, located downgradient from Amargosa Pond and former A Pond, shows TDS as high as 20,300 mg/L (Q4 2008). Bedrock wells in Amargosa Wash generally show TDS less than 10,000 mg/L. Within Demetrie Wash, TDS was lowest upgradient from the former CLEAR Plant Area (1,930 mg/L at MW-2008-01) and increased up to 6,380 mg/L at MW-2008-03, within the former CLEAR Plant area. Downgradient from the former CLEAR Plant, TDS begins to decline once more, to 5,500 mg/L at MW-2008-02 and 1,530 mg/L at MW-2008-05 (downgradient from the Old D Pond).

3.8.2.4 General Chemistry in the East Investigation Area

The field pH in samples measured from wells screened in the basin fill aquifer ranged from 6.00 to 7.34, including well PZ-2007-05, located directly beneath the STI (Figure 15). Tailings pore water in the STI had a pH ranging between 6.09 and 8.55. The Reclaim Pond Settling Basin showed variable pH, ranging from pH 5.9 (Q1 2009) to 10.43 (Q4 2008). The alkaline nature of the tailings pore water pH and Reclaim Pond Settling Basin solution is as expected, reflecting lime additions to raise the pH of the water in the copper flotation process. However, the alkaline pH signature does not persist in the basin fill aquifer as shown by the circumneutral pH of the wells screened in this formation.

As a result of lime additions, calcium concentrations are elevated in the Reclaim Pond Settling Basin (up to 754 mg/L). Magnesium (up to 144 mg/L), sodium (up to 320 mg/L), potassium (up to 60.2 mg/L), and TDS concentrations were also elevated. In the tailings pore water, cation concentrations are somewhat lower (521 mg/L calcium, 27.9 mg/L magnesium, 532 mg/L sodium, 66.2 mg/L potassium, and 3,660 mg/L TDS).

Potassium concentrations in the Reclaim Pond Settling Basin are the highest of all process solutions. The concentrations of calcium and magnesium are lower in the tailings pore water compared to the Reclaim Pond Settling Basin. The lower concentrations in the pore water compared to the Reclaim Pond Settling Basin are likely due to a combination of processes, including evapoconcentration of solutes in the Reclaim Pond Settling Basin, and chemical reactions in the STI that result in precipitation of secondary mineral phases (for example, gypsum [$CaSO_4 \cdot 2H_2O$]), resulting in the removal of calcium from solution. The concentration of potassium remains unchanged between the Reclaim Pond Settling Basin and tailings pore water, whereas sodium concentrations are generally higher in tailings pore water due to dissolution of minerals from the tailings solids once they are deposited in the STI.

In the basin fill aquifer east of the STI, cation concentrations (except for potassium) are generally similar to the tailings pore water, but, at MW-16W (in the southeastern corner of the STI), cation concentrations are considerably lower than in other wells screened in the basin fill aquifer.

Chloride, sulfate, and nitrate are all present at slightly higher concentrations in the Reclaim Pond Settling Basin compared to the tailings pore water. Sulfate is present in the Reclaim Pond Settling Basin as high as 2,480 mg/L, and in the tailings pore water as high as 2,320 mg/L (at PZ-2008-19). In samples from wells screened in the basin fill aquifer, however, general chemistry concentrations are all lower. Sulfate concentrations decrease to below 250 mg/L east of the STI, indicating that the basin fill aquifer is not contributing additional sulfate to groundwater east of the Site.

Total alkalinity in samples from wells screened in the basin fill aquifer was higher than concentrations in the Reclaim Pond Settling Basin. The higher concentrations are reflective of the natural conditions in the basin fill aquifer.

3.8.3 Trace Metal Cations

The following representative trace metal cations are discussed for each investigation area (all are naturally occurring):

Beryllium - typically present at appreciable dissolved concentrations (concentrations above the reporting limit) in groundwater systems (as the Be^{3+} ion) under extremely low pH. This element is rare to find under natural groundwater conditions at near-neutral pH, and it is liberated from ore under the acidic conditions created by the copper leaching process. Beryllium may be present in groundwater systems due to the influence of acidic pH.

Cadmium and copper - typically present as the Cd^{2+} or Cu^{2+} ions in groundwater under acidic conditions, or in association with natural-organic matter as dissolved metals complexes.

Iron and manganese - generally present at relatively higher concentrations in the mineral formations at the Site. These cations are generally not soluble at circumneutral pH. They exist as iron- and manganese-hydroxide or oxide minerals (i.e., Fe_2O_3 [hematite] or MnO_2 [pyrolusite]); however, they will dissolve in acid and can dissolve at neutral pH if geochemically reducing conditions are present. Under reducing conditions, iron and manganese will dissolve as Fe^{2+} or Mn^{2+}. The concentration of dissolved iron and manganese, at neutral pH, is a good indicator of the ORP (E_H) of an environment.

Nickel and zinc - relatively more soluble than other trace metal cations, and typically present as Ni^{2+} and Zn^{2+} ions. These trace metal cations tend to be dissolved at acidic pH, and will precipitate from the aqueous phase at high pH (>8 [Ni] and >10 [Zn]) These elements are not directly affected by ORP; however, they will dissolve in environments where iron is actively dissolving (under reducing conditions) due to their close association with iron minerals.

3.8.3.1 Trace Metal Cation Chemistry in Background Areas

Trace metal cations were low to non-detect in the bedrock hydrostratigraphic unit in the Background Areas, with wells screened in Harris Ranch Quartz Monzonite and Ruby Star Granodiorite having slightly higher concentrations than other formations. See Figures 21 through 27 showing concentrations in this investigation unit for the various trace metal cations, noting that concentrations shown on the figures reflect the maximum concentration observed during the four quarters of monitoring. All of the wells in the Background Areas were non-detect for beryllium, except for MH-17 (Harris Ranch Quartz Monzonite) where 0.0001 mg/L (a concentration at the reporting limit) was detected during each quarter. Cadmium, copper, iron, and manganese were detected at low concentrations throughout. Nickel was generally not detected except in the wells screened in Harris Ranch Quartz Monzonite (MH-17 and MW-2008-15). Zinc was present in samples from wells screened in Harris Ranch Quartz Monzonite (MH-17) and Ruby Star Granodiorite (MH-21).

These data demonstrate the very low solubility of cadmium and copper at circumneutral pH and under the geochemical conditions in the Background Areas. As with general chemistry results, the effect of naturally mineralized Ruby Star Granodiorite on groundwater quality is apparent.

3.8.3.2 Trace Metal Cation Chemistry in the West Investigation Area

The concentration of dissolved phase trace metal cations will increase in an acidic environment, and this is reflected by the beryllium (Figure 21), copper (Figure 22), cadmium (Figure 23), iron (Figure 24), manganese (Figure 25), nickel (Figure 26), and zinc (Figure 27) concentrations of the acidic process solution samples collected at Headwall No. 2, Headwall No. 3, and Headwall No. 5. Concentrations of cation metals were low to non-detect in the bedrock stratigraphic unit throughout the West Investigation Area, with the exception of BW-02 (screened in Demetrie Volcanics). The SX-3 Stormwater Pond is upgradient from BW-02, and relatively high concentrations of cations were measured in solutions from this facility. This suggests that the SX-3 Stormwater Pond has impacted groundwater at BW-02. At MH-20 (also screened in Demetrie Volcanics), downgradient from the BW-02, low or non-detect concentrations of these constituents were observed, indicating the metals concentrations attenuate over the short distance between BW-02 and MH-20.

3.8.3.3 Trace Metal Cation Chemistry in the Central Investigation Area

Facility process solution ponds, sumps, and silos in the Amargosa Wash portion of the Central Investigation Area contain relatively high concentrations of trace metal cations, owing to the acidic nature of solutions from these surface features. Beryllium (Figure 42), cadmium (Figure 43), copper (Figure 44), iron (Figure 45), manganese (Figure 46), nickel (Figure 47), and zinc (Figure 48) were all detected in the solutions from active facilities, with the exception of the solution sample representing the Decant Solution (Molybdenum) facility. The Decant Solution (Molybdenum) samples had low to non-detect levels of most cation metals as a result of the alkaline pH at this location.

These trace metal cations were also observed in alluvial and bedrock wells at concentrations that at times exceeded AWQS. The highest concentrations of most trace metal cations were typically observed in the alluvial well TW-2008-10 (compared to other alluvial wells), and in bedrock at wells downgradient from the former Raffinate

Pond. In the vicinity of the former CLEAR Plant, trace metal cations in the bedrock hydrostratigraphic unit were low to non-detect.

However, in alluvial groundwater from the well farthest downgradient from Amargosa Wash (MH-22), the trace metal cations are low or not detected, suggesting that trace metal cation impacts to groundwater are localized in the alluvial aquifer, and indicating that these COIs are not migrating from Amargosa Wash.

3.8.3.4 Trace Metal Cation Chemistry in the East Investigation Area

Trace metal cations in samples from the tailings materials and Reclaim Settling Basin Pond solution were generally detectable. Figures 21 through 27 show concentrations in this investigation unit for the various trace metal cations, noting that concentrations shown on the figures reflect the maximum concentration observed during the four quarters of monitoring. However, trace metal cations were low to non-detect in the basin fill aquifer throughout this investigation area, and groundwater quality met AWQS at the eastern edge of the Site boundary. This confirms that the STI and ETI are not sources of trace metal cations to the basin fill aquifer.

Nickel and zinc were detected in groundwater samples collected from wells screened in the basin fill aquifer, at concentrations up to 0.04 mg/L nickel and up to 1.79 mg/L zinc, as measured at MH-15W. These concentrations reflect the natural groundwater conditions of this aquifer system. Neither nickel nor zinc were detected in the tailings pore water; however, the nickel concentration at PZ-2008-16 in Q4 2008 was non-detect with a reporting limit greater than the AWQS. Nickel and zinc were present in the tailings solids at a concentration up to 31 milligrams per kilogram (mg/kg) nickel and 147 mg/kg zinc and have very low mobility under the geochemical conditions in the tailings.

3.8.4 Trace Metal Anions

The following representative trace metal anions are discussed for each investigation area (all are naturally occurring):

Arsenic - soluble across a range of pH (acid to alkaline) and typically present as a mix of the arsenate anions ($H_2AsO_4^-$ and $HAsO_4^{2-}$) at pH 7, with arsenic in the +5 oxidation state (As(V)) under oxic conditions, or the arsenite anion (H_3AsO_3) at pH 7, with arsenic in the +3 oxidation state (As(III)) under anoxic conditions.

Chromium - soluble across a range of pH and exists as the chromate anion (CrO_4^{2-}) at pH 7, with chromium in the +6 oxidation state (Cr(VI)) under oxic conditions. The trivalent form of chromium (Cr(III)) is less soluble and can form under anoxic conditions, resulting in the precipitation of chromium-bearing solids such as chromium hydroxide ($Cr(OH)_3$) and iron chromium hydroxide ($Fe_{0.75}Cr_{0.25}(OH)_3$). Both of these forms of Cr(III) have low solubility, with the iron chromium hydroxide particularly resistant to re-oxidation and re-dissolution.

Molybdenum - can exist as the molybdate anion (MoO_4^{2-}) at pH 7, with molybdenum in the +6 oxidation state (Mo(VI)). Under anoxic conditions, molybdenum can transform to the +4 oxidation state (Mo(IV)) with lower solubility.

Selenium - soluble across a range of pH, predominantly in the +6 oxidation state (Se(VI)) under oxic conditions as the selenate anion (SeO_4^{2-}) at pH 7. Under anoxic conditions, selenium exists in the +4 oxidation state (Se(IV)) as the selenite anion ($HSeO_3^{2-}$). The selenite anion is more readily sorbed to aquifer soil surfaces.

3.8.4.1 Trace Metal Anion Chemistry in Background Areas

Trace metal anions were detected at low or non-detect concentrations in the bedrock hydrostratigraphic unit in the Background Areas. Arsenic tended to be highest in wells screened in Tinaja Peak formation compared to other formations, whereas molybdenum and selenium concentrations were higher in the Ruby Star Granodiorite. See Figures 28 through 31 showing concentrations in this investigation unit for the various trace metal anions, noting that concentrations shown on the figures reflect the maximum concentration observed during the four quarters of monitoring.

3.8.4.2 Trace Metal Anion Chemistry in the West Investigation Area

Arsenic and selenium concentrations in the solutions from active facilities were low to non-detect (Figures 28 and 31). A higher frequency of detection of chromium and molybdenum was observed in the facility solutions (Figures 29 and 30), reflecting the chemistry of PLS. The generally low concentrations in process solutions are consistent with acidic pH at these locations that reduces the solubility of trace metal oxyanions. Low concentrations of arsenic are also present in the host rock. Trace metal anions in groundwater in this investigation area were low to non-detect.

3.8.4.3 Trace Metal Anion Chemistry in the Central Investigation Area

Trace metal anions in the alluvial aquifer and bedrock hydrostratigraphic unit throughout the Central Investigation Area were generally low, as seen in particular for arsenic (Figure 49), chromium (Figure 50), and selenium (Figure 52). However, concentrations of trace metal anions were consistently observed at TW-2008-10, an alluvial well downgradient from Raffinate Pond No. 2, with concentrations of arsenic, chromium, and selenium observed above AWQS. Chromium concentrations at TW-2008-09, an alluvial well downgradient from SX-Sump-2, were also above the AWQS, and at TW-2008-11, selenium concentrations in this alluvial well were above the AWQS. TW-2008-11 is immediately downgradient from the former A Pond, and would also reflect any migration from Amargosa Pond and Amargosa East Sump.

Molybdenum concentrations were more variable (note there is no AWQS for this COI) and did not follow the same pattern of relative concentrations as other trace metal anions. Molybdenum concentrations were higher in wells throughout the former CLEAR Plant area compared to wells within the former Esperanza Mill area. The highest observed concentrations were in PZ-04 (up to 14.7 mg/L). PZ-04 is downgradient from the Decant Solution (Copper) facility. PZ-04 is also screened in the Ruby Star Granodiorite. Therefore, one or more potential sources of molybdenum could be impacting groundwater at this location, i.e., a combination of natural background and/or former facility operations.

Where molybdenum concentrations in facility solutions are expected to be the highest, i.e., those associated with the Decant Solution (Molybdenum) facility, the corresponding alluvial well downgradient from this facility shows low concentrations of molybdenum (0.13 mg/L measured in TW-2008-10, Q4 2008) compared to other alluvial and bedrock wells in this investigation area. Therefore, it appears that the higher concentration of molybdenum at Decant Solution (Molybdenum) facility is not affecting groundwater quality.

3.8.4.4 Trace Metal Anion Chemistry in the East Investigation Area

Similar to trace metal cation results in this investigation area, trace metal anion concentrations were detected in the tailings materials and Reclaim Settling Basin Pond solution; however, constituent concentrations in groundwater are low to non-detect throughout this investigation area, and groundwater quality met AWQS at the eastern edge of the Site boundary. This indicates that the STI and ETI are not sources of trace metal anions to groundwater.

For example, molybdenum concentrations in the Reclaim Pond Settling Basin ranged from 2.05 mg/L to 3.22 mg/L, and molybdenum concentrations in the tailings pore water ranged from 1.88 mg/L to 3.94 mg/L. Molybdenum concentrations ranged from 8 mg/kg to 129 mg/kg in the tailings solids, and concentrations measured in tailings pore water indicate that this trace element is fairly soluble under the geochemical conditions in the impoundment. However, these relatively higher concentrations are not reflected in the groundwater quality in the East Investigation Area, where groundwater samples from wells screened in the basin fill aquifer and bedrock hydrostratigraphic unit ranged from non-detect to 0.15 mg/L.

3.8.5 Radionuclides

Radiochemical COIs, including uranium isotopes, thorium, radium isotopes, and gross alpha and gross beta, were evaluated in the groundwater investigation; uranium and radium are principally discussed here, as representative radionuclides, based upon the following:

<u>Uranium</u> - including its isotopes uranium-234, uranium-235, and uranium-238, is a naturally occurring radionuclide that predominantly emits alpha particles, although some decay products (daughters) are beta-emitters such as protactinium-234. Uranium is present in the soil and rock at the Site, specifically in association with the rock-forming minerals of Ruby Star Granodiorite and Harris Ranch Quartz Monzonite. Previous investigations have shown that uranium occurs naturally in bedrock at levels as high as 10 mg/kg, specifically in the Ruby Star Granodiorite. Uranium can leach from these minerals under conditions of low pH, as well as in the presence of chloride, sulfate, and bicarbonate (alkalinity).

<u>Radium</u> – including the isotopes Ra-226, an alpha-emitting radionuclide with a half-life of 1,600 years, and Ra-228, a beta-emitting radionuclide with a half-life of 5.8 years. Radium is produced from the decay of uranium (Ra-226) and thorium (Ra-228). These radionuclides are also naturally occurring, and will dissolve under conditions of low pH and react with sulfate (to precipitate radium sulfate) or chloride (to dissolve radium chloride).

Radionuclides were analyzed (using radiochemical methods) in water samples that were filtered and unfiltered during Q4 2008, Q1 2009, and Q2 2009 and unfiltered only during Q3 2009, to determine whether they were particle-bound. Results of the radiochemical analyses showed that there was little difference between filtered and unfiltered samples. Therefore, the radiochemistry data (radium and uranium isotopes) are discussed here in terms of the entire data set, and no distinction is made between filtered and unfiltered samples (the radionuclides do not appear to be particle-bound, and are all dissolved (they pass through a 0.45 micrometer [µm] filter). The uranium concentration data (reported ass mass/volume) are for samples that were filtered.

3.8.5.1 Radionuclide Chemistry in Background Areas

The concentration of uranium in groundwater samples from wells screened in the Harris Ranch Quartz Monzonite ranged from 0.0233 mg/L at MW-2008-15 to 0.0672 mg/L at MH-17 (Figure 35); these wells are only a few hundred feet apart. The concentration of uranium in rock core material recovered from samples of the same boring at MW-2008-15 ranged from 2.5 to 35 mg/kg. These data show that the distribution of uranium-bearing minerals in the bedrock is heterogeneous. Variability in groundwater may be driven by the concentrations in bedrock, and bicarbonates, sulfates, and TDS may also contribute to uranium leaching from rock material.

Natural uranium is comprised predominantly of the isotopes uranium-234, uranium-235, and uranium-238 (isotopes have the same atomic number [number of protons] but vary in terms of the number of neutrons). The isotopic abundance of natural uranium is as follows: uranium-234 (0.0054%), uranium-235 (0.72%), and uranium-238 (99.275%) (Meinrath et al. 2003). Other isotopes such as uranium-233 are less routinely analyzed. Variation in the isotopic composition of uranium in groundwater can occur due to enrichment of lighter isotopes through chemical processes, such as enhanced dissolution of U-234 from mineral phases in rock due to the high specific activity (alpha decay) of this isotope and alpha recoil effects (Kigoshi 1971; Osmond and Cowart 1976; Morrison et al. 2012). Lighter isotopes of uranium can also be depleted in groundwater due to selective reduction (Rademacher et al. 2006). Isotopic uranium abundance in the groundwater was typical of natural uranium concentrations; for example, for Ruby Star Granodiorite, natural uranium abundance is 0.005% uranium-234, 0.7% uranium-235, and 99.2% uranium-238, with an activity ratio (uranium-234/uranium-238) close to 1; these ratios were similar to ratios observed at MW-2008-12.

At MH-17, uranium-234 is slightly enriched (0.008 to 0.009%) compared to the typical isotopic abundance of uranium; similarly, at MW-2008-15, uranium-234 is enriched (0.010 to 0.014%). Uranium in the bedrock samples was consistent with the typical isotopic composition of natural uranium. The activity ratio of uranium-234 to uranium-238 is also a useful fingerprint for uranium from different sources; where uranium-234 isotopic composition is elevated relative to typical abundances, this activity ratio can be

2 or higher. In the Harris Ranch Quartz Monzonite (MH-1 and MW-2008-15), the uranium-234/uranium-238 activity ratio was close to 2 and reflects the natural isotopic abundance of uranium in this formation.

Ra-226 and Ra-228 showed less variability between wells (Figures 32, 33, and 34). The AWQS for combined Ra-226 and Ra-228 is 5 picocuries per liter (pCi/L); note that groundwater samples from wells screened in the Harris Ranch Quartz Monzonite contained a combined radium level of 1.7 to 15.3 pCi/L. Radium is generally only slightly soluble in groundwater systems. Radium solubility is controlled by the incorporation of uranium (the parent radionuclide) and radium disintegration products into minerals present in the bedrock as well as the precipitation of radium sulfate ($RaSO_4$), a secondary mineral phase that can form upon reaction of radium with sulfate. Ra-228 is a disintegration production of thorium-232; thorium is much less soluble than uranium. Thorium is likely present in mineral phases in the bedrock at the Site; however, its distribution is not uniform in the bedrock, as shown by the variability in Ra-228 concentrations in the groundwater.

3.8.5.2 Radionuclide Chemistry in the West Investigation Area

Uranium was detected in groundwater samples from all wells and in solutions from active facilities throughout this investigation area (Figure 35). The solutions from active facilities had uranium concentrations ranging from 1.11 mg/L (at Headwall No. 5) to 8.77 mg/L (at Headwall No. 2). Conversely, uranium concentrations measured in groundwater within this investigation area were similar to concentrations measured in the Background Area (West). The uranium isotopic composition of the facility solutions and groundwater wells was similar to the composition that is typical for uranium, and the activity ratio of uranium-234/uranium-238 was close to 1 or less.

Ra-226 was detected in solutions from the active facilities, whereas Ra-228 was not (Figures 32, 33, and 34). However, very low Ra-226 activities were detected in the bedrock groundwater and Ra-228 was not detected in the groundwater.

3.8.5.3 Radionuclide Chemistry in the Central Investigation Area

Uranium concentrations in solutions from active facilities were consistent with other facilities at the Site; the Decant Solution (Molybdenum) sample exhibited lower concentrations than other facility solutions in this investigation area. Uranium concentrations in groundwater were mostly above detection, with higher concentrations observed in the alluvium in Amargosa Wash (Figure 56). The highest uranium concentrations measured in the alluvial wells were at TW-2008-10 (4.08 to 6.38 mg/L), located downgradient from Raffinate Pond No. 2. The uranium concentrations at TW-2008-10 may represent input from this facility, which had concentrations of uranium ranging from 6.68 to 7.23 mg/L. Downgradient at MH-22 and MH-23, uranium concentrations decrease to levels consistent with background.

Concentrations of uranium observed in alluvium are not reflected in bedrock. Uranium concentrations in bedrock wells were consistent with concentrations measured in background wells. For example, uranium concentrations in wells screened in the Ruby Star Granodiorite within Amargosa Wash ranged from 0.0058 mg/L (at MW-2008-11) to 0.805 mg/L (at MW-2008-09) within the Esperanza Mill Area, consistent with Ruby Star Granodiorite in the North Background Area (0.0205 to 0.944 mg/L). Isotopic uranium abundance is also consistent with Background Area uranium at all locations within the Central Investigation Area except at PZ-02 (screened in the Demetrie Volcanics); uranium-234 at this location was enriched up to 0.010%. Enrichment of uranium-234 in groundwater is reflective of natural background conditions as shown for the Harris Ranch Quartz Monzonite in the Background Area (West).

Alluvial and bedrock wells exceeded the AWQS for Ra-226+Ra-228 at a number of locations; this is likely due to naturally occurring radionuclides in the Ruby Star Granodiorite (Figures 53, 54, and 55). Combined radium in the process solutions was less than 5 pCi/L.

As discussed above, radium is generated from the radioactive decay of thorium-232 and it has a relatively short (5.8 year) half-life. Its presence in groundwater at high activities relative to the Background Area is most likely due to natural conditions and an elevated concentration of thorium-232 in this area. The presence of higher activities of Ra-226 concomitant with Ra-228 is also indicative of natural conditions, with mineralization in this area likely enriched in radioactive minerals. At MH-23, farthest downgradient in the Central Investigation Area, the maximum concentration of combined radium was 2.86 pCi/L (Q1 2009).

3.8.5.4 Radionuclide Chemistry in the East Investigation Area

Uranium concentrations in the East Investigation Area reflect natural geochemistry of the basin fill aquifer and bedrock hydrostratigraphic unit, with concentrations ranging from 0.0031 to 0.0513 mg/L. Locations upgradient from the STI showed uranium at concentrations of 0.0114 to 0.0134 mg/L (PZ-07, screened in basin fill and Ruby Star Intrusives) and 0.0093 to 0.0136 mg/L (PZ-08, screened in the Demetrie Volcanics).

Downgradient from the STI, uranium concentrations are also low, with concentrations along the easternmost boundary of the Sierrita property (at MH-11, MH-12, MH-13A, MH-13B, and MH-13C) exhibiting the lowest uranium concentrations, ranging from 0.001 to 0.014 mg/L (Figure 35).

Uranium concentrations are also low in STI materials: tailings pore water concentrations ranged from 0.0006 to 0.01 mg/L, and in the Reclaim Pond Settling Basin, concentrations were 0.0068 to 0.0424 mg/L. Tailings solids showed uranium isotopic abundance consistent with natural conditions.

In the wells screened in the basin fill aquifer, uranium-234 is slightly enriched (0.008 to 0.009%) relative to typical natural abundance uranium-234 (0.005%). The uranium-234/uranium-238 activity ratio here was also closer to 2 in many cases. The unique isotopic signature, and slightly higher uranium concentration in the basin fill aquifer, indicates that the source of uranium is likely not the STI but instead is naturally occurring. Uranium-234 is also enriched in the easternmost well locations (up to 0.015% at MH-12), and the uranium-234/uranium-238 activity ratio is 2.7, consistent with natural conditions observed in the basin fill aquifer. Isotopic uranium in the Reclaim Pond Settling Basin was consistent with natural uranium (uranium-234/uranium-238 activity ratio close to 1).

Radium was present in both tailings materials and the Reclaim Settling Pond Basin. Combined radium showed very low activity in the basin fill aquifer, with the majority of the wells non-detect and a maximum activity of 1.79 pCi/L at MH-14. This provides additional indication that the radionuclide content of the basin fill aquifer is different than the upgradient groundwater and reclaim/tailing waters. At the downgradient monitoring locations (MH-11 through MH-13C), radium was generally not detected except for up to 0.6 pCi/L Ra-226 at MH-11 and up to 2.6 pCi/L Ra-228 at MH-13A (combined radium was less than 5 pCi/L at all locations).

4. Conceptual Site Model

The focus of this investigation was to assess potential releases from current and former areas of operation. This groundwater CSM describes the potential sources of COIs to groundwater in each of the areas that was investigated under the VRP, and updates what is known about the major controls on the distribution of COIs in groundwater.

4.1 Sources of COIs

Sources of COIs to groundwater at the Site can include natural background, contributions from former operations, and contributions from current operations. Contributions from current operations can be ongoing or could have occurred only in the past. Contributions from natural background were characterized by the installation of wells, and the collection of bedrock rock core samples, in the Background Areas. As presented in Section 3.8, natural background has contributed to the general chemistry, trace metal, and radionuclide concentrations observed in groundwater at the Site, which varies further depending on the specific lithology where the groundwater resides.

Sierrita has been actively leaching ore from the rock piles along the headwalls in the West Investigation Area. Molybdenum, rhenium, and copper processing operations are currently ongoing at the Site. The general chemical characteristics of the various solutions from former and active facilities reflect these processes: for example, the low pH, high concentrations of sulfate and other major cations and anions, and concentrations of certain trace metals are observed in facility solutions associated with leaching processes. The flotation process for copper and molybdenum uses an alkaline process, on the other hand, and the solutions from operations associated with the management of tailings from these milling operations have comparatively higher pH, alkalinity, and lower TDS.

The following chemical characteristics are summarized below for the mine process solutions. These signatures were used to assist in the interpretation of COIs in groundwater in the investigation areas. The mine process typically contain the following depending upon milling process:

Acid Leaching Solutions:

- Acidic pH

- Elevated concentrations of major cations and anions (calcium, sodium, chloride and sulfate) due to dissolution of these elements from the ore
- Moderate concentrations of fluoride due to dissolution of this element from the ore
- Low alkalinity
- Detectable concentrations of most trace metal and radionuclide COIs as product or by-product of processing

Flotation Solutions:

- Neutral to alkaline pH associated with flotation processes
- Elevated concentrations of calcium (due to lime addition)
- High concentrations of potassium associated with the Reclaim Pond Settling Basin compared to other facility solutions
- Elevated alkalinity at the locations that manage flotation process tailings
- Elevated concentrations of molybdenum (a trace metal anion)

4.2 Controls on COI distribution

Distribution of COIs from facility solutions is controlled and managed at the Site by a number of engineering controls. A series of sumps and intercept systems have been put in place along the Headwall Nos. 2, 3, and 5, and the active facilities within the Central Investigation Area, to prevent and control migration of constituents from active facility processing ponds and impoundments. Many of these controls have been recently upgraded, some since sampling began for the groundwater investigation. Sierrita operates a wellfield to capture and control tailings seepage water that enters the aquifer beneath the tailings impoundment. Water pumped from the wellfield is used to augment the water supply for mining operations. Interceptor wells IW-1 through IW-11 were installed between 1978 and 1984; interceptor wells IW-6A, and IW-12 through IW-21 were installed in 1994 and 1995; interceptor wells IW-3A, and IW-22 through IW-24 were installed in 2003 and 2004; interceptor wells IW-25 through IW-28 were installed in 2012; and extraction wells FFS-1 through FSS-6, MC-1 through MC-4 and PS-1 through PS-4 were installed in 2013.

Local hydrology controls also affect the distribution of COIs in groundwater. For example, the alluvium is only periodically saturated, as numerous wells installed in this unit were recorded as dry during quarterly sampling events. Thus, migration of COIs within the alluvial aquifer and from the alluvial aquifer to the bedrock hydrostratigraphic unit is likely to largely occur during short precipitation events, during which rapid pulses of water move into and out of the alluvium.

In the bedrock hydrostratigraphic unit, the mobility of COIs in bedrock is controlled predominantly by fracture-flow. COIs can move both laterally downgradient and vertically into fractures within the bedrock hydrostratigraphic unit. The vertical migration of COIs within this environment is typically limited to the depth of the predominant fracture system. Analysis of slug test data indicates that there are localized areas where the bedrock is several orders of magnitude more permeable than surrounding rock, suggesting zones of more intense rock fracturing. These fractured zones may form conduits for flow of COIs. Migration of COIs along these fracture zones could further be limited due to chemical reactions along flow paths.

Distribution of COIs in the basin fill aquifer will disperse horizontally and vertically preferentially along coarse sand and gravel deposits in former wash channel fills. The basin fill aquifer is characterized as having a relatively thick saturated zone, and COIs will likely migrate more readily in this system compared to the bedrock hydrostratigraphic unit. Comparatively, limited migration of COIs was observed in the Central Investigation Area in the bedrock hydrostratigraphic unit and appears localized. Additionally, the limited extent of COIs in groundwater in the Central Investigation Area reflects the existing controls in place for the active facilities.

4.3 Sources and Migration Paths of COIs in Groundwater

4.3.1 Background Contribution

The geochemistry of the basin fill aquifer and bedrock hydrostratigraphic unit is conducive to dissolution of major cation and anion, trace metal, and radionuclide COIs that may occur naturally in the mineralized system. The different mineralized bedrock formations and the basin fill deposits also contribute directly to the variability in groundwater COI concentrations. This phenomenon is reflected, for example, by the natural variation of TDS in the Background Areas. The TDS ranged from~800 to 1,000 mg/L in the Harris Ranch Quartz Monzonite and ~2,000 to 3,000 mg/L in the Ruby Star Granodiorite compared to 250 to 600 mg/L in the Tinaja Peak. Of significance is the high alkalinity in the Harris Ranch Quartz Monzonite and basin fill deposits and high sulfate concentration in the Ruby Star Granodiorite. These natural geochemical conditions, primarily the higher alkalinity and sulfate concentrations, result in natural leaching of uranium from the minerals from bedrock formations, leading to the detectable concentrations of uranium measured in the bedrock hydrostratigraphic unit and, likely, the basin fill aquifer.

Uranium concentrations and isotopic composition in the bedrock hydrostratigraphic unit reflect naturally occurring mineralization processes. Subsequently, radionuclides present in the bedrock hydrostratigraphic unit within the other investigation areas are detectable but, with few exceptions, consistent with levels of radionuclides measured in the Background Areas. The easternmost area of the Sierrita property exhibits some of the lowest uranium concentrations compared to other areas at the Site.

4.3.2 West Investigation Area: Headwalls Nos. 2, 3, and 5

Headwall No. 3 and the SX-3 Stormwater Pond have likely contributed to groundwater impacts, as observed in the bedrock hydrostratigraphic unit at BW-02. Additionally, higher chloride levels compared to background were observed in samples from PZ-16, a bedrock well downgradient from Headwall No. 5, and MH-27, a bedrock well downgradient from Headwall No. 2. However, metal and radionuclide COIs in samples from these wells were less than AWQS and/or consistent with background. Chloride is present at high concentrations (up to 4,500 mg/L) in the processing solutions at Headwall Nos. 2, 3, and 5, and higher chloride levels were observed at BW-02. The higher chloride locations at PZ-16 and MH-27 could indicate potential impacts to groundwater from these currently active facilities.

4.3.3 Former Facilities in the Central Investigation Area

COI concentrations in the bedrock hydrostratigraphic unit downgradient from most former facilities in the Central Investigation Area were generally below AWQS and/or consistent with background. Alluvial wells were often dry at the time of sampling, but the data collected indicate that alluvial aquifer water quality was also less than AWQS. The farthest downgradient monitoring wells screened in the alluvial aquifer and bedrock hydrostratigraphic unit, MH-22 and MH-23, respectively, suggest that COIs contributed to groundwater by operations in the Central Investigation Area have not migrated from Amargosa Wash. Collectively, these data indicate that impacts from former operations in the Central Investigation Area appear limited in areal extent. Additionally, the limited extent of COIs in groundwater in the Central Investigation Area reflects the existing controls in place for the active facilities. However, as discussed further in Section 5 (data gaps), this conclusion should be regarded as preliminary because there are limitations on the extent of the monitoring well network and the hydrological understanding of groundwater flow paths in this area.

Higher chloride concentrations (greater than 1,000 mg/L) compared to background are apparent in groundwater within Demetrie Wash near the former CLEAR Plant. From 1977 to 1983, the former CLEAR Plant produced metallic copper and this process used sodium and potassium chloride brines and sodium hydroxide and ferric chloride reagents. Chloride concentrations were highest in samples from wells adjacent to the former E Pond and former Evaporation Pond, where CLEAR Plant process solutions were managed. This suggests that impacts to groundwater occurred from the former CLEAR Plant. Conversely, at MW-2008-10 (directly to the south), chloride concentrations were much lower at less than 230 mg/L. Additionally, lower chloride concentrations, less than 300 mg/L, are observed in farther downgradient bedrock well samples, specifically within Amargosa Wash, indicating groundwater impacts from former operations remain highly localized in the bedrock hydrostratigraphic unit.

Although the relatively higher chloride concentrations are present in the vicinity of the former CLEAR Plant, with few exceptions, the concentrations of metal and radionuclide COIs in groundwater downgradient from the former CLEAR Plant are below AWQS and/or consistent with background.

Trace metal cation concentrations in groundwater were greater than AWQS in the area where the former Raffinate Pond was located, which may reflect a combination of natural background contribution (the downgradient monitoring well is screened in Ruby Star Granodiorite) and potential contribution of former operations. Acidic solutions from the former Raffinate Pond may have affected bedrock groundwater (pH is currently as low as 3.71 at this location). However, containment of past solution releases to the alluvium is now provided by the seepage control features.

4.3.4 Active Facilities in the Central Investigation Area

Impacts to alluvial groundwater is apparent in the Central Investigation Area beginning in the vicinity SX-Sump-2, extending east beyond Amargosa Pond. Low pH, high concentrations of sulfate and other general chemistry parameters, as well as intermittently detected metal COIs above AWQS and/or background, indicate that current facility processes have likely affected the groundwater quality in this area. There are insufficient data to determine whether the impacts are due to former releases or current releases from current operations. There are no bedrock wells installed in this immediate area; therefore, impacts to the bedrock hydrostratigraphic unit cannot be ascertained at this time. There are also no wells installed in the alluvial aquifer immediately downgradient from the wells showing impacts, such that delineation of the full nature and extent in this area is limited. Samples from wells installed in the alluvial aquifer and bedrock hydrostratigraphic unit downgradient from Amargosa Wash (MH-22 and MH-23, respectively) indicate little to no impact to groundwater, supported both by the low concentrations of metal and radionuclide COIs and by the high alkalinity concentrations, which indicate that acidic leaching solutions would not have impacted these areas. Therefore, the extent of any groundwater COI impacts from this area appears limited. Engineering controls in place for active facilities in the Central Investigation Area also limit the extent of COI migration in groundwater.

Molybdenum concentrations in groundwater had a slightly different distribution than other COIs; in particular, concentrations were highest in the Decant Solution (Copper) facility, at PZ-04. Concentrations of other COIs in this area, however, were consistent with background and/or below AWQS.

Most radionuclide concentrations in the bedrock hydrostratigraphic unit are consistent with the Background Areas. Uranium concentrations in samples screened in the alluvial aquifer in the Central Investigation Area were greater than samples from wells screened in the bedrock hydrostratigraphic unit, particularly in wells surrounding the SX-Pump-2, Raffinate Pond No. 2, and Amargosa Pond. The concentrations in samples from the alluvial aquifer were similar to uranium concentrations found in the solutions from the active facilities. The highest uranium concentrations measured in the alluvial well samples were at TW-2008-10 (4.08 to 6.38 mg/L). TW-2008-10 is located downgradient from Raffinate Pond No. 2. Elevated uranium concentrations at TW-2008-10 may indicate input from this pond, which had concentrations of uranium ranging from 6.68 mg/L to 7.23 mg/L. The concentrations observed in the alluvial aquifer were not reflected in the downgradient bedrock hydrostratigraphic unit at BW-04 and MH-23, indicating that uranium is not migrating beyond the alluvial aquifer within this investigation area.

4.3.5 East Investigation Area

Groundwater samples collected from wells throughout the East Investigation Area show low concentrations of metal and radionuclide COIs, assumed to represent the natural background concentrations of the basin fill aquifer. The concentrations observed in wells in the East Investigation Area confirm that any metal or radionuclide COIs detected in other investigation areas have not migrated to the East Investigation Area. In addition, past and current seepage from the STI and ETI has not resulted in increases in metal or radionuclide COI concentrations.

5. Data Gaps and Recommended Data Collection

This report presented the results of the first phase of groundwater investigation completed under the VRP. The focus of this investigation was to assess potential releases from current and former areas of operation and to provide an update to the CSM for groundwater. The data gathered during this investigation met these objectives and helped to define background contributions to groundwater quality. The data gaps that remain are associated with understanding the hydrogeological controls to COI distribution in groundwater within West and Central Investigation Areas, with emphasis on connectivity between surface water, alluvial aquifer, and bedrock stratigraphic unit hydrology.

The following recommended data collection activities were identified for each area through the course of data analysis:

Area of Current Processing Activities in the Central Investigation Area

Groundwater COIs greater than background and/or AWQS were observed in samples from wells screened in the alluvial aquifer in Amargosa Wash, near SX-Sump-2, Raffinate Pond No. 2, and Amargosa Pond. There are no wells installed in the bedrock hydrostratigraphic unit in this immediate area, so the extent of impacts to the bedrock hydrostratigraphic unit cannot be ascertained. Additionally, limited alluvial wells are installed in this area, such that characterization of the nature and extent in the alluvial aquifer is also limited. MH-22 and MH-23 were identified in the Work Plan as downgradient monitoring wells, in the alluvial aquifer and bedrock hydrostratigraphic unit, respectively, for Amargosa Wash and Demetrie Wash. Further characterization of the extent of potential downgradient effects is recommended.

Overall, controls on COI migration in the alluvial aquifer, and from the alluvial aquifer to the bedrock hydrostratigraphic unit, is not well understood. Controls on COI distribution in groundwater identified in the CSM included engineering controls on the current facility operations, structural geologic controls governing transport in the bedrock hydrostratigraphic unit, and connectivity between surface water, alluvial aquifer, and bedrock hydrostratigraphic unit hydrology.

During groundwater quality sampling events, it was noted that rainfall patterns varied substantially between quarters, as did, at times, groundwater quality concentrations of COIs. Additionally, wells installed in the alluvial aquifer were often dry, suggesting that movement of COIs within the alluvial aquifer and from the alluvial aquifer into the bedrock hydrostratigraphic unit may occur only over short durations, driven by high precipitation events. Therefore, a hydrological investigation of surface water-groundwater system interaction, particularly with respect to response to precipitation events, would aid in further interpretation of source-distribution dynamics of groundwater COIs and connectivity (or lack thereof) between facility operations, alluvial groundwater quality, and bedrock groundwater quality. Concurrent measurements of precipitation, groundwater elevation, and solution pond pump/seepage rates are recommended to facilitate further interpretation.

Additionally, the potential influence of fracturing in the bedrock on COI distribution is not well understood throughout the Central Investigation Area. Geophysics analysis and/or aquifer testing in this area is suggested as a means to measure fracturing influence on groundwater COI distribution in areas of interest. Deployment of this type of instrumentation, will aid in the analysis of other transient hydraulic conditions, such as storm events, and also support interpretation of subsequent aquifer tests (i.e., pumping tests) in this area.

Former Operations in Central Investigation Area

Available data indicate that groundwater impacts from former operations in the Central Investigation Area appear limited in aerial extent. However, this conclusion should be regarded as preliminary because there are limitations on the extent of the bedrock well network in some areas. These areas include, in particular, the former CLEAR Plant area, and the area downgradient from the former Raffinate Pond.

The nature and extent of groundwater COI impacts of former operations needs additional characterization. The current hydraulic conductivity estimates for the bedrock hydrostratigraphic unit are subject to uncertainties, due to potential micro and macro structural controls on groundwater flow, and limitations of the current slug test data set. Therefore, hydraulic conductivity estimates should be viewed at this time as preliminary estimates, and further refinements in these areas of interest would be warranted to assist with further interpretation of controls on COI distribution in the alluvial aquifer and bedrock hydrostratigraphic unit. Longer term aquifer performance tests would assist in understanding the transmissivity of the bedrock and connectedness of the fractures, and provide more than a “near well” estimate of hydraulic conductivity.

Understanding the hydrologic regime in the bedrock hydrostratigraphic unit in the vicinity of former CLEAR Plant area, and in the interface between the bedrock hydrostratigraphic unit and the basin fill aquifer, is recommended to help interpret COI impacts to groundwater in this area.

West Investigation Area

Headwall No. 3 and the SX-3 Stormwater Pond have likely contributed to groundwater COI impacts, as observed in the bedrock hydrostratigraphic unit at BW-02. Additionally, higher chloride levels compared to background were observed in PZ-16, a bedrock well downgradient from Headwall No. 5, and MH-27, a bedrock well downgradient from Headwall No. 2. However, metal and radionuclide COIs at PZ-16 were less than AWQS and/or consistent with background. Chloride is present at high concentrations (up to 4,500 mg/L) in the processing solutions at Headwall Nos. 2, 3, and 5, and higher chloride levels were observed at BW-02. The higher chloride locations at PZ-16 and MH-27 could indicate potential impacts to groundwater from operations.

Data collection recommendations include additional monitoring of the bedrock hydrostratigraphic unit in the vicinity of each of the active facilities in this area to assess potential impacts of the active facilities to groundwater COI concentrations. Existing engineering controls are in place for these facilities, suggesting that impacts to groundwater are reflective of former activities and/or former operations (such as at the former SX-3 Plant).

6. Summary and Conclusions

This report presents the results of groundwater characterization activities at the Site. These activities were conducted under the Arizona VRP administered by the ADEQ. Groundwater, tailings material, and rock core material samples were collected for the groundwater investigation between July 2008 and July 2009. Following the Work Plan objectives, this report describes the general hydrogeological Site characteristics (for context); presents the sampling results and data validation work performed for the groundwater investigation; presents an updated CSM describing the nature and extent of constituents in groundwater in the bedrock hydrostratigraphic unit, basin fill aquifer, and alluvial aquifer at the Site, including background uranium concentrations; and describes the potential sources and migration pathways of COIs at the Site. Following the CSM, this report then provides recommendations for additional groundwater characterization.

As discussed above, comparison of any specific sample results to AWQS should be made in consideration that sample locations are within the Sierrita facility and/or upgradient from “points of compliance” established under Sierrita’s individual APP and that remediation levels for groundwater have not yet been established. Results below AWQS indicate that the level of a COI is not a concern at a particular sample location, but results above AWQS do not necessarily indicate a need for further investigation or action. In accordance with A.R.S. § 49-175(B), remediation levels for groundwater are to be established in accordance with the rules adopted pursuant to A.R.S. § 49-282.06, unless A.R.S. § 49-175(B)(4) applies. Under A.R.S. § 49-175(B)(4), Sierrita may demonstrate that a source will not cause or contribute to an exceedance of aquifer water quality standards beyond the boundary of the facility where the source is located. All of the groundwater samples presented were taken from within the boundary of the Sierrita facility. Moreover, some of the samples were collected upgradient from “points of compliance” established under Sierrita’s individual APP, and AWQS apply at these points of compliance as defined by Sierrita’s area-wide APP, not upgradient from points of compliance. Most importantly, groundwater within the facility is not being withdrawn for drinking water or other use and is not accessible to third parties for any use.

6.1 Site Background

The Site consists of three open pits, a 115,000 ton-per-day concentrator, two molybdenum roasting plants, the rhenium plant, an oxide and low-grade sulfide ore stockpile leaching operation, a copper sulfate plant, and associated support facilities and historical facilities, some of which have been closed and reclaimed.

The Site is located in the Basin and Range physiographic province and in the USC Basin and Range Lowlands Hydrogeologic Province. The Sierrita Mountains are a contributing source of mountain-front recharge to the basin. The principal hydrogeologic units at the Site include the alluvial aquifer, the basin fill aquifer, and the bedrock hydrostratigraphic unit. The surface water regime of the Site is divided into four major surface water drainage basins, each associated with one of the four major washes that drain the Site: Demetrie, Amargosa, Esperanza, and Tinaja Washes.

6.2 Summary of VRP Investigation Activities

The groundwater investigation characterized COIs in groundwater, solutions from active facilities, rock core materials, and tailings materials between July 2008 and July 2009. This work consisted of:

- Installation of 15 bedrock monitoring wells
- Installation of 14 temporary alluvial monitoring wells
- Collection and analysis of 138 samples of solutions from 19 active facilities
- Collection and analysis of 290 samples from 45 bedrock groundwater monitoring wells
- Collection and analysis of 29 samples from seven alluvial groundwater wells
- Collection and analysis of 63 tailings material samples from six borings located within the ETI and STI
- Collection and analysis of 34 rock core samples from four borings (these borings were subsequently converted to monitoring wells screened in bedrock formations).

For purposes of data presentation and discussion, data at the Site were grouped into four spatial areas, referred to as “investigation areas.” These areas also reflect the different relative contributions of COIs from naturally occurring background, current operations, and historical operations. In the data presentation and discussion, further distinction is made between groundwater quality among different bedrock formations, because the type of formation has significant bearing on understanding the effect of the different bedrock lithologies to groundwater COIs.

6.3 Nature and Extent

The general chemistry of the basin fill aquifer and background bedrock hydrostratigraphic unit is conducive to the dissolution of trace metals that may occur naturally in the mineralized system. Of significance is the high alkalinity in the Harris Ranch Quartz Monzonite (in background) and basin fill deposits, and high sulfate concentration in the Ruby Star Granodiorite. Specifically, uranium dissolution may be promoted by elevated alkalinity (Harris Ranch Quartz Monzonite) and elevated sulfate (Ruby Star Granodiorite). Elevated concentrations of alkalinity in the Harris Ranch Quartz Monzonite and Ruby Star Granodiorite (both bedrock units contain uranium) contribute to higher uranium concentrations detected in the background monitoring wells.

Trace metals were low to non-detect in wells in the Background Areas, with wells screened in Harris Ranch Quartz Monzonite and Ruby Star Granodiorite having slightly higher concentrations than other formations. These data demonstrate the very low solubility of cadmium and copper at circumneutral pH and under the geochemical conditions in the Background Areas. As with general chemistry results, the effect of naturally mineralized Ruby Star Granodiorite on groundwater trace metal cations from wells screened in this formation is apparent.

Concentrations of metal COIs above AWQS and/or background were observed in wells screened in the bedrock hydrostratigraphic unit in the West Investigation Area, and in bedrock and alluvial wells in the Central Investigation Area. Trace metals were low to non-detect in the basin fill aquifer throughout the East Investigation Area, and basin fill aquifer groundwater quality met AWQS at the eastern edge of the Site boundary. This confirms that the STI and ETI are not sources of trace metal cations to groundwater.

Radionuclide COIs in the bedrock hydrostratigraphic unit are consistent with the Background Areas. Uranium concentrations in samples from alluvial wells in the Central Investigation Area were greater than the bedrock hydrostratigraphic unit, particularly in wells surrounding the SX-Pump-2, Raffinate Pond No. 2, and Amargosa Pond. Concentrations in samples from alluvial wells were similar to uranium concentrations found in the solutions from the active facilities. The highest uranium concentrations measured in the alluvial wells were at TW-2008-10 (4.08 to 6.38 mg/L), located downgradient from Raffinate Pond No. 2. The concentrations observed in the alluvial aquifer were not reflected in the downgradient bedrock hydrostratigraphic unit at BW-04 and MH-23, indicating that uranium is not migrating within the alluvial aquifer or from the alluvial aquifer to the underlying bedrock within this investigation area.

6.4 Sources and Migration Paths

In the former CLEAR Plant area, elevated chloride concentrations compared to background are apparent in the bedrock hydrostratigraphic unit, indicating that impacts to groundwater occurred from the former CLEAR Plant. Although the elevated chloride concentrations are present in bedrock groundwater in the vicinity of the former CLEAR Plant, with few exceptions, the concentrations of metal and radionuclide COIs in groundwater downgradient from the former CLEAR Plant are below AWQS and/or consistent with background. Monitoring wells farther downgradient indicate impacts from the former CLEAR Plant are highly localized.

In the West Investigation Area, concentrations of cation metals were low to non-detect in the bedrock hydrostratigraphic unit, with the exception of BW-02, downgradient from the SX-3 Stormwater Pond. This suggests that the SX-3 Stormwater Pond has impacted groundwater at BW-02. The extent of those impacts appears to be limited as MH-20, downgradient from the BW-02, shows low or non-detect concentrations of these constituents.

The data collected in the Central Investigation Area so far indicate that impacts from former operations in this investigation area appear limited in areal extent. Groundwater COI concentrations in the bedrock hydrostratigraphic unit downgradient from most former facilities in the Central Investigation Area were generally below AWQS and/or consistent with background. Alluvial wells were often dry at the time of sampling, but of the data collected, alluvial aquifer quality was also less than AWQS. The farthest downgradient monitoring wells, MH-23 and MH-22, further confirm that any COIs contributed to groundwater by former operations have not migrated from Amargosa Wash. However, this conclusion should be regarded as preliminary because there are limitations on the extent of the monitoring well network in some areas and the hydrological understanding of groundwater flow paths throughout this area generally.

Elevated trace metal cations in groundwater were observed at the former Raffinate Pond, which may be a combination of natural background contribution (the downgradient monitoring well is screened in Ruby Star Granodiorite) and potential contribution of former operations. Acidic solutions from the former Raffinate Pond may have affected the bedrock hydrostratigraphic unit locally (pH is currently as low as 3.71 at this location). However, containment of past solution releases to the alluvium is now provided by the seepage control features.

Current facility operations have likely affected the groundwater quality in the Central Investigation Area, particularly near SX-Sump-2, Raffinate Pond No. 2, and Amargosa Pond; however, there are insufficient data to determine whether the impacts are due to former releases or current releases from current operations. Alluvial groundwater in this area shows low pH, high concentrations of sulfate and other general chemistry COIs, as well as intermittently detected metal COIs above AWQS and/or background. There are no bedrock wells installed in this immediate area; therefore, impacts to the bedrock hydrostratigraphic unit cannot be ascertained at this time. However, bedrock wells downgradient from this immediate area (at MH-22 and MH-23) show little indication of impacts, supported both by the low concentrations of metal and radionuclide COIs and by the high alkalinity concentrations, which indicate that acidic leaching solutions would not have impacted these areas.

6.5 Data Gaps and Recommendations for Further Data Collection

The major data gaps in West and Central Investigation Areas are associated with limited hydrological understanding; additionally, characterization of the extent of potential downgradient effects in groundwater is recommended in the Central Investigation Area. Areas recommended for further investigation, and recommended data collection needs, include the following:

1. Current processing activity area in the Central Investigation Area – data collection recommendations include gaining a better understanding of controls on COI migration in the alluvial aquifer, and from the alluvial aquifer to the bedrock hydrostratigraphic unit. Further, additional characterization of the nature and extent of COIs in the bedrock hydrostratigraphic unit and alluvial aquifer is recommended.

2. Former facilities in the Central Investigation Area – further investigation is recommended to supplement information at the Former CLEAR Plant and former Raffinate Pond areas, specifically. Additional investigation activities may include the installation of additional monitoring wells to further the interpretation of controls on COI distribution in the alluvial aquifer (where present) and bedrock hydrostratigraphic units. Longer term aquifer performance tests would assist in understanding the transmissivity of the bedrock and connectedness of the fractures, and provide more than a “near well” estimate of hydraulic conductivity. Understanding the hydrogeologic regime in the bedrock hydrostratigraphic unit in the vicinity of former CLEAR Plant area, and in the interface between the bedrock hydrostratigraphic unit and the basin fill aquifer, is recommended to help interpret COI impacts to groundwater in this area.

3. West Investigation Area – data collection recommendations include: additional monitoring of the bedrock hydrostratigraphic unit in the vicinity of each of the active facilities in this area to understand migration of COIs in groundwater in these areas.

7. References

Aiken, D.M., and G.A. Baugh. 2007. The Sierrita Copper-Molybdenum Deposit: An Updated Report Pima Mining District, Pima County, AZ. Arizona Geological Society Field Trip #8. October.

ARCADIS. 2013. Voluntary Remediation Program (VRP) Addendum to the Soil and Sediment Characterization Report, Freeport Sierrita Mine Green Valley, Arizona. August 14.

Arizona Department of Environmental Quality. 1996. A Screening Method to Determine Soil Concentrations Protective of Groundwater Quality. September. 35 pp and appendices.

Arizona Department of Environmental Quality. 2007. Arizona Administrative Code, Title 18 Environmental Quality, Chapter 7 Department of Environmental Quality Remedial Action, Article 2 Soil Remediation Standards, Appendix A Soil Remediation Levels (SRLs).

Bernhard, G., Geipel, G., Brendler, V., Nitsche, H. 1998. Uranium speciation in waters of different mining areas. Journal of Alloys and Compounds 271-273: 201-205.

Bernhard, G., Geipel, G., Reich, T., Brendler, V., Amayri, S., Nitsche, H. 2001. Uranyl(VI) carbonate complex formation: validation of the $Ca_2UO_2(CO_3)_3(aq)$ species. Radiochimica Acta 89: 511-518.

Bouwer, H. and R.C. Rice, 1976. A slug test method for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, vol. 12, no. 3, pp. 423-428.

Butler, J.J., Jr. 1998. The Design, Performance, and Analysis of Slug Tests, Lewis Publishers, Boca Raton, 252p.

Devlin, J. F. 2003. A Spreadsheet Method For Estimating Hydraulic Gradient With Heads From Multiple Wells Ground Water, vol. 41, no. 3, pp. 316-320.

Duffield, G. 2007. AQTESOLV® Professional Version 4.5. Hydrosolve, Inc.

Errol L. Montgomery and Associates (ELMA) and Dames and Moore. 1994. Aquifer Protection Permit Application, Sierrita Operation, Cyprus Sierrita Corporation, Pima County, AZ, Volume I. September.

Errol L. Montgomery and Associates (ELMA). 2001. Additional Characterization of Hydrogeologic Conditions Aquifer Protection Permit Application No. 101679, Sierrita Mine, Phelps Dodge Sierrita, Inc. Pima County, Arizona. January.

Kigoshi, K. 1971. Alpha-recoil: recoil ^{234}Th dissolution into water and the $^{234}U/^{238}U$ disequilibrium in nature. Science v. 173, pp. 47-48.

Meinrath, A., P. Schneider, and G. Meinrath. 2003. Uranium ores and depleted uranium in the environment, with a reference to uranium in the biosphere from the Erzgebirge/Sachsen, Germany. Journal of Environmental Radioactivity 64:175-193.

Morrison, S., C.S. Goodnight, A.D. Tigar, R.P. Bush, and A. Gill. 2012. Naturally occurring contamination in the Mancos Shale. Environmental Science and Technology, 46: 1379-1387.

MWH Americas, Inc. (MWH). 2005. Supplement to the Aquifer Protection Permit Application BADCT Demonstration Addendum, Sierrita Mine, Phelps Dodge Sierrita, Volume I. March.

Osmond, J.K., and J.B. Cowart. 1976. The theory and uses of natural uranium isotopic variations in hydrology. Atomic Energy Reviews, v. 14, pp. 621-679.

Rademacher, L., C.C. Lundstrom, T.M. Johnson, R.A. Sandord, J. Zhao, and Z. Zhang. 2006. Experimentally determined uranium isotope fractionation during reduction of hexavalent U by bacteria and zero valent iron. Environmental Science and Technology, 40: 6943-6948.

Spencer, Jon E., Charles A. Ferguson, Stephen Richard, and A. Youberg. 2003. Geologic Map of the Esperanza Mill 7 W Quadrangle, Pima County, Arizona: Arizona Geological Survey Digital Geologic Map DGM -33, scale 1:24,000.

Titley, S.R., et al. 1986. Evolution of Fractures and Alteration in the Sierrita-Esperanza Hydrothermal System, Pima County, Arizona. Economic Geology. Vol. 81 pp. 343-370.

URS Corporation (URS). 2008a. Voluntary Remediation Program (VRP) Investigation Work Plan, Freeport-McMoRan Sierrita Inc., Green Valley, Arizona. Volumes I and II. Prepared for Freeport-McMoRan Sierrita Inc. April.

URS Corporation (URS). 2008b. Addendum to Sampling & Analyses Plan (SAP) & Quality Assurance Project Plan (QAPP), Voluntary Remediation Program (VRP), Freeport-McMoRan Sierrita Green Valley, Arizona. Prepared for Freeport-McMoRan Sierrita Inc. September.

URS Corporation (URS). 2012. Final Voluntary Remediation Program (VRP) Soil and Sediment Characterization Report, Freeport-McMoRan Sierrita Inc., Green Valley, Arizona. December.

West, R.J., and D.M. Aiken. 1982. Geology of the Sierrita-Esperanza deposit, Pima mining district, Pima County, Arizona, in Titley, S.R., ed., Advances in geology of the porphyry copper deposits, southwestern North America: Tucson, University of Arizona Press: 433-465.

Tables

Table 1
Summary of Revised Feature Names
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Naming Convention in the Work Plan	Sampling Location ID as Appears in Chains of Custody	Revised Naming Convention - Referred to in VRP Groundwater Report
Intercept No. 1	Intercept No. 1	Bailey Sump
Former B Pond	Former B Pond	B Pond
Headwall No. 4 (SX-3 Stormwater Pond)	SX-3 Stormwater Pond	SX-3 Stormwater Pond
Amargosa Intercept	Amargosa Intercept	Amargosa East Sump
Intercept No. 2	Intercept No. 2	Amargosa West Sump
Decant Solution	Decant Solution or Decant Pond	Decant Solution (Molybdenum)
Decant Solution	Not Sampled Under VRP	Decant Solution (Copper)
Reclaim Pond	Reclaim Pond	Reclaim Pond (Settling Basin)
B Sump/Sump B	B Sump/Sump B	B Seepage Silo
C Sump/Sump C	C Sump/Sump C	C Seepage Silo

Table 2
Summary of Proposed and Completed Groundwater Investigation Activities
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Area of Interest	Work Plan Objective	Proposed Sampling	Investigation Activity Summary
Demetrie Wash			
		Proposed Wells	
Former CLEAR Plant	Evaluate groundwater quality upgradient of the Former CLEAR Plant Area.	MW-2008-01	installed and sampled
	Evaluate groundwater quality immediately downgradient of the Former CLEAR Plant.	MW-2008-02	installed and sampled
		Proposed Wells	
Former E Pond	Evaluate groundwater quality immediately downgradient of the Former E Pond.	MW-2008-03	installed and sampled
		Proposed Wells	
Former Evaporation Pond	Evaluate groundwater quality immediately downgradient of the Former Evaporation Pond.	MW-2008-04	installed and sampled
		Proposed Wells	
Old D Pond	Evaluate groundwater quality immediately downgradient of the Old D Pond.	MW-2008-05	installed and sampled
	Evaluate groundwater quality upgradient of the Old D Pond.	MW-2008-06	installed and sampled
		Existing Wells	
Former Esperanza Mill	Evaluate bedrock groundwater quality in Amargosa Wash and possibly part of the Esperanza Mill area. Provides an additional Ruby Star Granodiorite monitoring point.	PZ-03	sampled
	Evaluate bedrock groundwater quality in the general mill area and provides an additional Ruby Star Granodiorite monitoring point.	PZ-04	sampled
	Evaluate bedrock groundwater quality in the general mill area and provides an additional Ruby Star Granodiorite monitoring point.	PZ-05	sampled
	Evaluate bedrock groundwater quality upgradient of the mill area.	PZ-06	sampled
		Proposed Wells	
Former C Pond	Evaluate groundwater quality immediately upgradient of the Former C Pond.	MW-2008-07	installed and sampled
	Evaluate groundwater quality immediately downgradient of the Former C Pond.	MW-2008-08	installed and sampled
		Proposed Wells	
Former Raffinate Pond	Evaluate groundwater quality immediately downgradient of the Former Raffinate Pond.	MW-2008-09	installed and sampled
	Evaluate groundwater quality immediately downgradient of the Former Raffinate Pond.	MW-2008-10	installed (though not immediately downgradient)
	Evaluate groundwater quality upgradient of the Former Raffinate Pond.	MW-2008-11	installed and sampled
NOT IN WORK PLAN			
Former C Pond Spoils	NP	NP	TW-2008-13
Former Laydown Yard	NP	NP	TW-2008-14
Former Esperanza Mill	NP	NP	TW-2008-15
Amargosa Wash			
Headwall No. 1 and Bailey Lake	Characterize COIs in process solution.	Collect one sample from each Headwall No. 1 and Bailey Lake for four consecutive quarters.	sampled
	Confirm that the ponds have not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample two temporary alluvial wells immediately downgradient of the ponds. Collect groundwater samples from the wells for four quarterly sampling events.	TW-2008-09
		Existing Wells	
	Evaluate quality of bedrock groundwater downgradient of sulfide leach stockpile and in vicinity of Headwall No. 1 and Bailey Lake.	PZ-02	sampled
Raffinate Pond No. 2	Characterize COIs in process solution.	Collect one sample from Raffinate Pond No. 2 for four consecutive quarters.	sampled
	Confirm that the pond has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of Raffinate Pond No.2. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-10
Former A Pond	Confirm that the pond has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of Former A Pond. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-11
B Pond	Confirm that the pond has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of Former B Pond. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-12
		Existing wells	
	Evaluate potential releases from B pond and Amargosa Wash area in general. May assist with determining effectiveness of B Sump.	BW-04	sampled
Launders Facility	Confirm that the pond has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of the Launders Facility. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-08
NOT IN WORK PLAN			
Amargosa Pond	NP	NP	sampled
SX-Sump 1	NP	NP	sampled
SX-Sump 2	NP	NP	sampled
SX-Sump 3	NP	NP	sampled
Amargosa East Sump	NP	NP	sampled
Amargosa West Sump	NP	NP	sampled
B Seepage Silo	NP	NP	sampled
C Seepage Silo	NP	NP	sampled
B Pond	NP	NP	sampled
Bailey Sump	NP	NP	sampled
Esperanza Wash			
Headwall No. 2	Characterize COIs in process solution.	Collect one sample from Headwall No. 2 for four consecutive quarters.	sampled
	Confirm that the pond has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of Headwall No. 2. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-07
		Existing Wells	
	Evaluate quality of bedrock groundwater in vicinity of Headwall No. 2.	MH-27	sampled
Headwall No. 3	Characterize COIs in process solution.	Collect one sample from Headwall No. 3 for four consecutive quarters.	sampled
	Confirm that the pond has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of the pond. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-03
Raffinate Pond No. 3	Characterize COIs in process solution.	Collect one sample from Raffinate Pond No. 3 for four consecutive quarters.	sampled as Headwall No. 3
	Confirm that the pond has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of Raffinate Pond No. 3. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-04
SX Plant No. 3	Confirm that the plant has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of SX Plant No. 3. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-02
SX-3 Stormwater Pond	Characterize COIs in process solution.	Collect one sample from SX-3 Stormwater Pond for four consecutive quarters.	sampled
	Confirm that the pond has not released elevated concentrations of COIs from process solutions to groundwater.	Install and sample one temporary alluvial well immediately downgradient of SX-3 Stormwater Pond. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-05
		Existing Wells	
	Confirm no releases have occurred from process solution ponds located in Esperanza Wash.	BW-02	sampled
	This well is screened at a deeper elevation than well BW-02. Evalulate deeper aquifer impacts.	MH-20	sampled

Table 2
Summary of Proposed and Completed Groundwater Investigation Activities
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Area of Interest	Work Plan Objective	Proposed Sampling	Investigation Activity Summary
Tinaja and Unnamed Washes			
Headwall No. 5	Characterize COIs in process solution.	Collect one sample from Headwall No. 5 for four consecutive quarters.	sampled
	Characterize immediately underlying alluvial groundwater	Install and sample one temporary alluvial well immediately downgradient of Headwall No. 5. Collect groundwater samples from the well for four quarterly sampling events.	TW-2008-01 (instaeld then abandonend, not part of VRP)
		Existing Wells	
	Evalulate shallower aquifer impacts from sulfide leach area and Headwall No. 5.	MH-19	sampled
	Evaluate quality of bedrock groundwater in vicinity of Headwall No. 5.	PZ-16	sampled
Tailing Impoundments			
Esperanza Tailing Impoundment	Gather data to characterize COI concentrations and leachability of the tailing constituents.	Collect tailing samples every 10 feet (composite 2 samples each 20 foot) from 2 soil borings drilled through the Esperanza Tailing Impoundment into underlying basin and fill deposits.	2 borings installed and sampled
Sierrita Tailing Impoundment	Gather data to characterize COI concentrations in reclaim water.	Collect monthly samples from the reclaim pond to evaluate temporal and seasonal variation of solution quality.	sampled
	Gather data to characterize COI concentrations and leachability of the tailing constituents.	Collect tailing samples every 10 feet (composite 5 samples each 50 foot) from 4 soil borings drilled through the Sierrita Tailing Impoundment into underlying basin and fill deposits.	4 borings installed and sampled
		Existing Wells	
	Evaluate groundwater quality on southern edge of STI in vicinity of Demetrie Wash.	MH-10	not sampled
	Evaluate basin fill groundwater quality in northern portion of well field.	MH-14	sampled
	Evaluate basin fill groundwater quality in central portion of well field.	MH-15W	sampled
	Evaluate basin fill groundwater quality in southern portion of well field.	MH-16W	sampled
	Evaluate basin fill groundwater quality in northern portion of well field.	MH-28	sampled
	Evaluate basin fill groundwater quality in southern portion of well field.	MH-29	sampled
	Evaluate basin fill groundwater quality in northern portion of well field.	MH-30	sampled
	Evaluate groundwater quality at northern edge of basin fill and northern Sierrita property boundary.	PZ-07	sampled
	Evaluate southern portion Sierrita property boundary and groundwater quality before it flows beneath Sierrita Tailing Impoundment.	PZ-08	sampled
	Evaluate basin fill groundwater quality immediately downgradient of the Esperanza Tailing Impoundment and near the Sierrita Tailing Impoundment reclaim pond.	PZ-2007-05	sampled
Background Locations			
		Proposed Wells	
	Evaluate background concentrations in hornblende rich Ruby Star Granodiorite.	MW-2008-12	installed and sampled
	Evaluate background concentrations in hornblende rich Ruby Star Granodiorite.	MW-2008-13	installed and sampled
	Evaluate background concentrations in Tinaja Peak Formation.	MW-2008-14	installed and sampled
	Evaluate background concentrations in Harris Ranch Quartz Monzonite.	MW-2008-15	installed and sampled
		Existing Wells	
	Represents background groundwater conditions in the Harris Ranch Quartz Monzonite.	MH-17	sampled
	Verify background COI concentrations in the Ruby Star Granodiorite and compare results to newly installed background wells.	MH-21	sampled
	Represents background conditions in the Tinaja Peak Formation.	PZ-1	sampled
Other Locations			
		Existing Wells	
	Evalulate impacts from waste rock stockpile and possibly represents groundwater conditions generally upgradient of Sierrita.	MH-18	sampled
	Evaluate potential releases from upgradient process areas along the west side of Demetrie Wash and potential influence from Amargosa	BW-03	sampled
	Evaluate alluvial groundwater in Demetrie Wash to identify potential releases from Demetrie and Amargosa washes.	MH-22	sampled
	Evaluate potential influence of alluvial water with underlying bedrock groundwater. (co-located with MH-22)	MH-23	sampled

Notes
NP = not provided
COIs = constituents of interest
Table compiled from:
VRP Work Plan (April 2008):
Table 4-1
Table 4-2
Table 4-3
Addendum to Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP), September 2008
Sampling and analysis plan same as submitted under work plan (April 2008)

Table 3
Summary of Deviations from the Work Plan
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Type of Deviation or Location	Description
Sample Locations / Intervals	
ET-SB02	The 40 to 60 foot interval was split into two depths: 40 to 50 ft bgs and 50 to 60 ft bgs. This was done because native soil was encountered at 48 ft bgs, and the samplers sought to avoid mixing tailings materials with native soil. This is the only instance a 20 foot sample was split into 10 foot intervals.
ST-SB02	Location ST-SB02 was renamed ST-SB05 and the samples were not submitted to the laboratory for analysis. Four borings had samples collected and submitted for analysis – ST-SB01, -03, -04, and -06.
Raffinate Pond No. 3 / Headwall No. 3	Raffinate Pond No. 3 and Headwall No. 3 were both planned to be sampled in the Work Plan; however, Headwall No. 3 and Raffinate Pond No. 3 are contiguous and are considered the same facility as far as the solution they carry. Therefore only Headwall No. 3 was sampled.
Reclaim Pond Settling Basin	In the Work Plan, sampling at the STI was described as sampling the reclaim pond water and the tailing decant solution. Based on discussions with Sierrita staff, there is only one process solution feature in the STI that was sampled and it was the Reclaim Pond Settling Basin. The decant solution that was sampled is in the vicinity of Amargosa Wash (“Decant Solution Pond (Molybdenum)”).
Additional solutions from active facilities were sampled compared to what was originally planned.	The additional facilities included: • Amargosa East Sump (formerly referred to as Amargosa Sump or Intercept) • Amargosa Pond • B Seepage Silo (formerly referred to as B Sump) • C Seepage Silo (formerly referred to as C Sump) • B Pond • Bailey Sump (formerly referred to as Intercept No. 1) • Amargosa West Sump (formerly referred to as Intercept No. 2) • SX-Sump 1 • SX-Sump 2 • SX-Sump 3
Laboratory Analyses	
SB03 – 0 to 20 ft bgs	This sample was not analyzed for radiochemistry.
Filtered / Unfiltered sample pairs	Both filtered and unfiltered samples were collected for the first three quarters of the groundwater investigation, however only unfiltered samples were collected during the fourth quarter of the groundwater investigation.
Temporary well analytes	Some wells and temporary wells did not have full sets of analyses completed. This was usually due to broken bottles received at the lab and/or lack of enough volume in the sample bottles for the analyses.

Table 3
Summary of Deviations from the Work Plan
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Type of Deviation or Location	Description
Sample Timing (General)	
Reclaim Pond Settling Basin	The Reclaim Pond Settling Basin was planned to be sampled monthly, but was not sampled in October 2008, January 2009, and June 2009.
Decant Solution (Molybdenum)	This facility was to be sampled monthly; however, it was not sampled in October 2008.
Groundwater wells (general)	The primary sampling months were the first months of each quarter: October 2008, January 2009, April 2009, and July 2009, however some wells were sampled during the following month.
MW-2008-01 through MW-2008-13	Samples for MW-2008-01 through MW-2008-13 were collected in October 2008, but not all the parameters were measured in those samples. Additional samples were collected in November 2008 for sulfate, fluoride, chloride, alkalinity, carbonate and hydroxide analyses that were missed in October.
Slug Testing	Slug testing was not originally in the Work Plan. This testing was completed at wells MW-2008-01 through MW-2008-15 (omitting MW-2008-14) and piezometers PZ-2008-19 and PZ-2008-20.
Samples for the following features were collected for the Q3 2009 sampling event in October, were resampled in November for reanalysis of TDS. Samples submitted on 11/17/08 were only submitted for TDS and anions.	• Amargosa Pond • B Seepage Silo (formerly referred to as B Sump) • Bailey Lake • C Seepage Silo (formerly referred to as C Sump) • Bailey Sump (formerly referred to as Intercept No. 1) • Raffinate Pond No. 2 • SX-Sump 1 • SX-Sump 2 • SX-Sump 3
	• Amargosa East Sump (formerly referred to as Amargosa Sump or Intercept) • Decant Solution Pond • B Pond • Headwall No. 1 • Headwall No. 2 • Headwall No. 3 • Headwall No. 5 • Amargosa West Sump (formerly referred to as Intercept No. 2) • Reclaim Pond Settling Basin • SX-3 Stormwater Pond

Table 3
Summary of Deviations from the Work Plan
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Type of Deviation or Location	Description
Dry Wells / Wells Not Sampled	
TW-2008-12	Well was dry in October-November 2008, April 2009
MH-22	On 1/8/09 the field team attempted to sample the well, but the well did not produce water
PZ-2008-16, PZ-2008-19, PZ-2008-20	These wells were added during the groundwater investigation. They were sampled in the first quarter of the groundwater investigation
TW-2008-04, TW-2008-07	These wells were dry on 1/29/09
MW-2008-14	This well was not sampled in the second quarter of 2009
MH-22	This well was dry on 4/8/09.
TW-2008-04, TW-2008-07, TW-2008-12	These wells were dry on 5/14/09.
TW-2008-09	Well was gauged on 5/21/09, but not enough water could be collected for a sample.
MH-22	The well was gauged on 7/21/09, but team could not draw water from the well.
TW-2008-04, TW-2008-07, TW-2008-09, TW-2008-12	These wells were either dry or did not contain sufficient water to collect a sample in the third quarter of 2009
MW-2008-14	This well was not sampled during the third quarter of 2009
TW-2008-02	Temporary well TW-2008-02 was installed but destroyed by equipment and was measured dry during the first quarter 2009 event
TW-2008-03, TW-2008-05, TW-2008-14 and TW-2008-15	Temporary wells TW-2008-03, TW-2008-05, TW-2008-14 and TW-2008-15 were installed but were not sampled because they were either dry or did not contain sufficient water for sample collection
TW-2008-08	Temporary well TW-2008-08 was reported dry in the fourth quarter 2008 sampling event and the well was subsequently damaged (casing reported as “bent”), so the well was not revisited

Notes:
ft bgs - feet below ground surface
Additional deviations related to groundwater investigation activities are provided as Appendix A.

Table 4
Well Construction Details
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Well ID	Top of casing elevation (ft amsl)	Ground surface elevation (ft amsl)	Total depth (ft bgs)	Top of screen depth (ft bgs)	Bottom of screen depth (ft bgs)	Boring diameter (in)	Casing diameter (in)	Installation date	Status
BW-02	3633.10	3636.47	95	15	95	6.75	4	NP	Active
BW-03	3540.29	3540.29	93	13	93	6.75	4	NP	Active
BW-04	3530.04	3530.04	19	6	19	6	2	NP	Active
MH-14	3150.74	3150.74	501	376	501	9.875	6	NP	Active
MH-15W	3116.12	3116.12	465	320	445	9.875	6	NP	Active
MH-16W	3098.37	3098.37	450	315	440	9.875	6	NP	Active
MH-17	4137.29	4137.55	108	58	108	6	4	5/18/1997	Active
MH-18	3784.09	3784.09	180	60	180	6	4	5/20/1997	Active
MH-19	3689.09	3689.09	70	40	70	6	4	5/22/1997	Active
MH-20	3609.39	3609.39	180	120	180	6	4	5/23/1997	Active
MH-21	3693.67	3693.67	78	28	78	6	4	6/3/1997	Active
MH-22	3511.65	3511.65	16.5	6.5	16.5	9.875	4	6/3/1997	Active
MH-23	3515.28	3515.28	78	20	78	6	4	6/17/1997	Active
MH-27	3700.88	3700.14	83	23	83	5.5	4.5	7/27/2004	Active
MH-28	3142.18	3141.51	490	355	490	9.875	4	12/1/2005	Active
MH-29	3123.15	3122.24	475	340	475	9.875	4	12/1/2005	Active
MH-30	3232.45	3231.92	535	426	535	9.875	5	1/7/2006	Active
MW-2008-01	3716.67	3714.29	85.5	60	85	10	4	7/17/2008	Active
MW-2008-02	3669.00	3666.41	62.5	22	62	10	4	7/25/2008	Active
MW-2008-03	3661.45	3658.97	62.5	22	62	8.5	4	7/28/2008	Active
MW-2008-04	3652.26	3649.76	62.5	22	62	8.5	4	7/27/2008	Active
MW-2008-05	3609.05	3606.48	49.5	19	49	8.5	4	7/30/2008	Active
MW-2008-06	3609.61	3607.31	39.5	9	39	8.5	4	8/1/2008	Active
MW-2008-07	3605.19	3602.64	45.5	25	45	8.5	4	8/7/2008	Active
MW-2008-08	3569.27	3566.59	47.25	36.75	46.75	8.5	4	8/10/2008	Active
MW-2008-09	3619.02	3616.46	50.5	15	50	8.5	4	8/12/2008	Active
MW-2008-10	3604.33	3601.77	50.5	15	50	8.5	4	8/14/2008	Active
MW-2008-11	3667.13	3664.77	52	26.5	51.5	8.5	4	8/14/2008	Active
MW-2008-12	3778.18	3775.80	155.5	100	155	8.5	4	9/8/2008	Active
MW-2008-13	3726.36	3723.79	100.5	40	100	8.5	4	9/8/2008	Active
MW-2008-14	3925.47	3923.23	80.5	30	80	8.5	4	9/10/2008	Active
MW-2008-15	4174.93	4172.52	108	57.5	107.5	8.5	4	9/16/2008	Active
PZ-01	3949.32	3948.68	190	140	190	6	4	5/14/1997	Active
PZ-02	3759.69	3758.53	109	49	109	6	4	5/28/1997	Active
PZ-03	3592.89	3592.13	80	20	80	6	4	5/29/1997	Active
PZ-04	3612.68	3612.00	70	20	70	6	4	5/30/1997	Active
PZ-05	3602.31	3601.62	69	19	69	6	4	6/2/1997	Active
PZ-06	3765.56	3764.90	78	20	78	6	4	6/4/1997	Active
PZ-07	3546.22	3545.30	152	102	152	6	4	6/5/1997	Active
PZ-08	3477.14	3476.64	275	185	275	6	4	6/6/1997	Active

Table 4
Well Construction Details
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Well ID	Top of casing elevation (ft amsl)	Ground surface elevation (ft amsl)	Total depth (ft bgs)	Top of screen depth (ft bgs)	Bottom of screen depth (ft bgs)	Boring diameter (in)	Casing diameter (in)	Installation date	Status
PZ-09	3504.66	3504.18	228	128	228	6	4	6/13/1997	Active
PZ-16	3722.10	3721.18	80	20	80	5	4	5/31/2000	Active
PZ-2007-05	3440.93	3438.60	288	238	288	10	2	3/7/2007	Abandoned 7/26/2012
PZ-2008-16	NA	NA	280	275	280	9	2	10/14/2008	Buried 7/1/2009
PZ-2008-19	NA	NA	110	105	110	9	2	10/7/2008	Buried 7/1/2009
PZ-2008-20	NA	NA	150	145	150	9	2	10/5/2008	Buried 7/1/2009
TW-2008-02	3728.10	3725.64	7	2	7	3.75	1	8/21/2008	Destroyed by construction 5/14/2009
TW-2008-03	3681.79	3679.36	16	6	16	3.75	1	8/26/2008	Active
TW-2008-04	3668.59	3666.11	16	6	16	3.75	1	8/22/2008	Active
TW-2008-05	3637.88	3635.27	12	7	12	3.75	1	8/25/2008	Active
TW-2008-07	3704.00	3701.28	9	4	9	3.75	1	8/25/2008	Active
TW-2008-08	3628.48	3626.01	14	4	14	3.75	1	8/20/2008	Active
TW-2008-09	3615.03	3612.44	7	2	7	3.75	1	8/19/2008	Active
TW-2008-10	3608.10	3605.57	12	2	12	3.75	1	8/18/2008	Active
TW-2008-11	3567.69	3565.11	12	2	12	3.75	1	8/20/2008	Active
TW-2008-12	3533.92	3531.63	9	4	9	3.75	1	8/20/2008	Active
TW-2008-13	3569.57	3567.06	20	10	20	3.75	1	8/20/2008	Active
TW-2008-14	3578.47	3575.99	5.5	0.5	5.5	3.75	1	8/20/2008	Active
TW-2008-15	3667.68	3665.14	10	5	10	3.75	1	8/28/2008	Active

Notes:
ft amsl = feet above mean sea level
ft bgs = feet below ground surface
in = inches
NA = not available; top of casing of wells was not surveyed
NP = not provided on original boring logs/well construction logs

Table 5
Groundwater Elevation Data
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Well ID	Date	Top of casing elevation (ft amsl)	Depth to water (ft btoc)	Groundwater elevation (ft amsl)
BW-02	10/9/2008	3633.10	14.87	3618.23
BW-02	1/9/2009	3633.10	15.88	3617.22
BW-02	4/8/2009	3633.10	12.70	3620.40
BW-02	4/24/2009	3633.10	15.87	3617.23
BW-02	7/10/2009	3633.10	16.12	3616.98
BW-03	10/14/2008	3540.29	27.01	3513.28
BW-03	1/6/2009	3540.29	25.90	3514.39
BW-03	4/28/2009	3540.29	28.13	3512.16
BW-03	7/7/2009	3540.29	26.90	3513.39
BW-04	10/7/2008	3530.04	17.02	3513.02
BW-04	10/9/2008	3530.04	17.01	3513.03
BW-04	1/6/2009	3530.04	18.20	3511.84
BW-04	4/6/2009	3530.04	16.00	3514.04
BW-04	4/14/2009	3530.04	16.05	3513.99
BW-04	7/21/2009	3530.04	16.02	3514.02
MH-14	10/6/2008	3150.74	426.03	2724.71
MH-14	1/7/2009	3150.74	426.00	2724.74
MH-14	2/13/2009	3150.74	425.90	2724.84
MH-14	4/7/2009	3150.74	424.90	2725.84
MH-14	7/20/2009	3150.74	424.70	2726.04
MH-14	7/21/2009	3150.74	424.80	2725.94
MH-15W	10/6/2008	3116.12	394.00	2722.12
MH-15W	1/7/2009	3116.12	392.55	2723.57
MH-15W	4/7/2009	3116.12	392.00	2724.12
MH-15W	7/28/2009	3116.12	393.01	2723.11
MH-16W	10/7/2008	3098.37	359.99	2738.38
MH-16W	10/8/2008	3098.37	360.03	2738.34
MH-16W	1/9/2009	3098.37	359.71	2738.66
MH-16W	4/7/2009	3098.37	358.60	2739.77
MH-16W	7/28/2009	3098.37	359.31	2739.06
MH-17	10/13/2008	4137.29	54.00	4083.29
MH-17	1/12/2009	4137.29	54.18	4083.11
MH-17	4/27/2009	4137.29	54.00	4083.29
MH-17	7/7/2009	4137.29	54.60	4082.69
MH-17	7/8/2009	4137.29	58.20	4079.09
MH-18	10/13/2008	3784.09	64.96	3719.13
MH-18	1/12/2009	3784.09	63.30	3720.79
MH-18	4/27/2009	3784.09	63.10	3720.99
MH-18	5/20/2009	3784.09	63.43	3720.66
MH-18	7/13/2009	3784.09	61.00	3723.09
MH-19	10/15/2008	3689.09	5.77	3683.32
MH-19	Q1 2009	3689.09	NM	NM
MH-19	4/9/2009	3689.09	11.07	3678.02
MH-19	7/13/2009	3689.09	11.00	3678.09
MH-20	10/15/2008	3609.39	13.22	3596.17
MH-20	1/13/2009	3609.39	13.99	3595.40
MH-20	1/19/2009	3609.39	14.42	3594.97
MH-20	1/26/2009	3609.39	15.11	3594.28
MH-20	4/27/2009	3609.39	53.05	3556.34
MH-20	7/10/2009	3609.39	77.60	3531.79
MH-20	7/13/2009	3609.39	147.50	3461.89
MH-21	10/13/2008	3693.67	30.08	3663.59
MH-21	1/6/2009	3693.67	34.10	3659.57
MH-21	4/6/2009	3693.67	35.80	3657.87
MH-21	7/7/2009	3693.67	35.20	3658.47
MH-22	10/10/2008	3511.65	14.01	3497.64
MH-22	Q1 2009	3511.65	NM	NM
MH-22	4/8/2009	3511.65	Dry	Dry
MH-22	7/21/2009	3511.65	15.55	3496.10
MH-22	7/28/2009	3511.65	Dry	Dry
MH-23	10/10/2008	3515.28	18.53	3496.75
MH-23	1/6/2009	3515.28	20.40	3494.88
MH-23	4/6/2009	3515.28	20.05	3495.23
MH-23	7/7/2009	3515.28	20.70	3494.58
MH-27	10/10/2008	3700.88	6.23	3694.65
MH-27	1/9/2009	3700.88	14.97	3685.91
MH-27	4/8/2009	3700.88	18.92	3681.96
MH-27	7/13/2009	3700.88	19.90	3680.98
MH-28	10/6/2008	3142.18	402.17	2740.01
MH-28	1/7/2009	3142.18	402.00	2740.18
MH-28	4/7/2009	3142.18	401.06	2741.12
MH-28	7/20/2009	3142.18	401.00	2741.18
MH-29	10/7/2008	3123.15	381.52	2741.63
MH-29	1/9/2009	3123.15	380.25	2742.90
MH-29	4/7/2009	3123.15	379.90	2743.25
MH-29	8/6/2009	3123.15	376.40	2746.75
MH-30	10/6/2008	3232.45	417.11	2815.34
MH-30	1/7/2009	3232.45	416.37	2816.08
MH-30	4/7/2009	3232.45	415.10	2817.35
MH-30	7/20/2009	3232.45	413.40	2819.05

Table 5
Groundwater Elevation Data
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Well ID	Date	Top of casing elevation (ft amsl)	Depth to water (ft btoc)	Groundwater elevation (ft amsl)
MW-2008-01	10/17/2008	3716.67	67.25	3649.42
MW-2008-01	1/14/2009	3716.67	63.93	3652.74
MW-2008-01	1/15/2009	3716.67	64.05	3652.62
MW-2008-01	4/14/2009	3716.67	63.35	3653.32
MW-2008-01	4/17/2009	3716.67	63.47	3653.20
MW-2008-01	4/20/2009	3716.67	63.53	3653.14
MW-2008-01	6/29/2009	3716.67	64.07	3652.60
MW-2008-01	7/1/2009	3716.67	64.11	3652.56
MW-2008-01	7/2/2009	3716.67	64.21	3652.46
MW-2008-02	10/18/2008	3669.00	30.63	3638.37
MW-2008-02	1/16/2009	3669.00	31.82	3637.18
MW-2008-02	4/17/2009	3669.00	32.52	3636.48
MW-2008-02	4/20/2009	3669.00	32.54	3636.46
MW-2008-02	6/29/2009	3669.00	33.14	3635.86
MW-2008-02	7/1/2009	3669.00	33.17	3635.83
MW-2008-02	7/2/2009	3669.00	33.83	3635.17
MW-2008-03	10/18/2008	3661.45	33.32	3628.13
MW-2008-03	1/16/2009	3661.45	34.42	3627.03
MW-2008-03	4/14/2009	3661.45	35.46	3625.99
MW-2008-03	4/17/2009	3661.45	35.56	3625.89
MW-2008-03	4/20/2009	3661.45	35.65	3625.80
MW-2008-03	6/29/2009	3661.45	36.01	3625.44
MW-2008-03	7/1/2009	3661.45	36.02	3625.43
MW-2008-03	7/22/2009	3661.45	36.10	3625.35
MW-2008-04	10/18/2008	3652.26	33.38	3618.88
MW-2008-04	1/19/2009	3652.26	34.04	3618.22
MW-2008-04	4/14/2009	3652.26	34.35	3617.91
MW-2008-04	4/17/2009	3652.26	34.39	3617.87
MW-2008-04	4/20/2009	3652.26	34.42	3617.84
MW-2008-04	5/5/2009	3652.26	80.82	3571.44
MW-2008-04	6/29/2009	3652.26	35.24	3617.02
MW-2008-04	7/1/2009	3652.26	35.26	3617.00
MW-2008-04	7/2/2009	3652.26	35.36	3616.90
MW-2008-05	10/18/2008	3609.05	27.21	3581.84
MW-2008-05	1/20/2009	3609.05	29.69	3579.36
MW-2008-05	4/14/2009	3609.05	30.76	3578.29
MW-2008-05	4/17/2009	3609.05	30.80	3578.25
MW-2008-05	4/20/2009	3609.05	30.86	3578.19
MW-2008-05	6/29/2009	3609.05	33.07	3575.98
MW-2008-05	7/22/2009	3609.05	33.60	3575.45
MW-2008-06	10/19/2008	3609.61	15.06	3594.55
MW-2008-06	1/20/2009	3609.61	18.69	3590.92
MW-2008-06	4/14/2009	3609.61	18.29	3591.32
MW-2008-06	4/21/2009	3609.61	18.41	3591.20
MW-2008-06	4/22/2009	3609.61	18.52	3591.09
MW-2008-06	6/29/2009	3609.61	21.19	3588.42
MW-2008-06	7/22/2009	3609.61	21.69	3587.92
MW-2008-07	10/19/2008	3605.19	24.83	3580.36
MW-2008-07	1/21/2009	3605.19	24.89	3580.30
MW-2008-07	4/14/2009	3605.19	25.20	3579.99
MW-2008-07	4/21/2009	3605.19	25.24	3579.95
MW-2008-07	4/22/2009	3605.19	25.30	3579.89
MW-2008-07	6/29/2009	3605.19	26.24	3578.95
MW-2008-07	7/23/2009	3605.19	26.49	3578.70
MW-2008-08	10/19/2008	3569.27	22.23	3547.04
MW-2008-08	1/22/2009	3569.27	11.90	3557.37
MW-2008-08	1/23/2009	3569.27	12.11	3557.16
MW-2008-08	4/14/2009	3569.27	12.45	3556.82
MW-2008-08	4/21/2009	3569.27	12.49	3556.78
MW-2008-08	4/24/2009	3569.27	18.39	3550.88
MW-2008-08	6/29/2009	3569.27	11.71	3557.56
MW-2008-08	7/14/2009	3569.27	11.91	3557.36
MW-2008-08	7/17/2009	3569.27	16.03	3553.24
MW-2008-09	10/19/2008	3619.02	30.12	3588.90
MW-2008-09	1/22/2009	3619.02	33.13	3585.89
MW-2008-09	4/14/2009	3619.02	34.03	3584.99
MW-2008-09	4/21/2009	3619.02	34.13	3584.89
MW-2008-09	4/24/2009	3619.02	37.02	3582.00
MW-2008-09	7/14/2009	3619.02	34.76	3584.26
MW-2008-09	7/17/2009	3619.02	37.41	3581.61
MW-2008-10	10/19/2008	3604.33	29.25	3575.08
MW-2008-10	10/20/2008	3604.33	29.30	3575.03
MW-2008-10	1/27/2009	3604.33	31.11	3573.22
MW-2008-10	4/14/2009	3604.33	32.31	3572.02
MW-2008-10	4/21/2009	3604.33	32.41	3571.92
MW-2008-10	4/22/2009	3604.33	32.46	3571.87
MW-2008-10	6/29/2009	3604.33	33.86	3570.47
MW-2008-10	7/23/2009	3604.33	33.89	3570.44
MW-2008-11	10/20/2008	3667.13	13.67	3653.46
MW-2008-11	1/28/2009	3667.13	16.06	3651.07
MW-2008-11	4/14/2009	3667.13	17.17	3649.96
MW-2008-11	4/21/2009	3667.13	17.21	3649.92
MW-2008-11	4/23/2009	3667.13	17.26	3649.87
MW-2008-11	6/29/2009	3667.13	17.71	3649.42
MW-2008-11	7/23/2009	3667.13	17.58	3649.55

Table 5
Groundwater Elevation Data
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Well ID	Date	Top of casing elevation (ft amsl)	Depth to water (ft btoc)	Groundwater elevation (ft amsl)
MW-2008-12	10/21/2008	3778.18	92.89	3685.29
MW-2008-12	10/29/2008	3778.18	98.51	3679.67
MW-2008-12	1/29/2009	3778.18	75.32	3702.86
MW-2008-12	4/14/2009	3778.18	75.16	3703.02
MW-2008-12	5/4/2009	3778.18	75.13	3703.05
MW-2008-12	5/7/2009	3778.18	128.28	3649.90
MW-2008-12	6/29/2009	3778.18	78.07	3700.11
MW-2008-12	7/14/2009	3778.18	76.94	3701.24
MW-2008-13	10/21/2008	3726.36	58.40	3667.96
MW-2008-13	1/30/2009	3726.36	58.09	3668.27
MW-2008-13	4/14/2009	3726.36	58.70	3667.66
MW-2008-13	5/4/2009	3726.36	58.91	3667.45
MW-2008-13	5/6/2009	3726.36	59.50	3666.86
MW-2008-13	6/29/2009	3726.36	59.72	3666.64
MW-2008-13	7/23/2009	3726.36	60.15	3666.21
MW-2008-14	10/29/2008	3925.47	78.93	3846.54
MW-2008-14	2/26/2009	3925.47	79.86	3845.61
MW-2008-14	5/7/2009	3925.47	82.57	3842.90
MW-2008-14	5/14/2009	3925.47	82.58	3842.89
MW-2008-14	6/29/2009	3925.47	81.52	3843.95
MW-2008-14	Q3 2009	3925.47	NM	NM
MW-2008-15	11/5/2008	4174.93	52.31	4122.62
MW-2008-15	2/2/2009	4174.93	51.86	4123.07
MW-2008-15	5/5/2009	4174.93	52.66	4122.27
MW-2008-15	5/7/2009	4174.93	83.26	4091.67
MW-2008-15	5/8/2009	4174.93	78.68	4096.25
MW-2008-15	6/29/2009	4174.93	53.30	4121.63
MW-2008-15	7/14/2009	4174.93	53.25	4121.68
MW-2008-15	7/17/2009	4174.93	86.15	4088.78
PZ-01	10/15/2008	3949.32	143.75	3805.57
PZ-01	10/28/2008	3949.32	144.74	3804.58
PZ-01	11/4/2008	3949.32	142.95	3806.37
PZ-01	1/12/2009	3949.32	150.99	3798.33
PZ-01	4/27/2009	3949.32	150.90	3798.42
PZ-01	7/7/2009	3949.32	149.60	3799.72
PZ-02	10/7/2008	3759.69	45.06	3714.63
PZ-02	10/10/2008	3759.69	46.01	3713.68
PZ-02	1/9/2009	3759.69	44.70	3714.99
PZ-02	4/9/2009	3759.69	45.25	3714.44
PZ-02	4/28/2009	3759.69	45.85	3713.84
PZ-02	7/10/2009	3759.69	46.45	3713.24
PZ-02	7/13/2009	3759.69	54.80	3704.89
PZ-03	10/7/2008	3592.89	31.10	3561.79
PZ-03	1/6/2009	3592.89	36.68	3556.21
PZ-03	4/28/2009	3592.89	33.20	3559.69
PZ-03	7/8/2009	3592.89	34.00	3558.89
PZ-04	10/10/2008	3612.68	16.78	3595.90
PZ-04	1/6/2009	3612.68	15.85	3596.83
PZ-04	4/28/2009	3612.68	15.17	3597.51
PZ-04	7/7/2009	3612.68	18.00	3594.68
PZ-05	10/7/2008	3602.31	22.28	3580.03
PZ-05	1/6/2009	3602.31	25.57	3576.74
PZ-05	4/28/2009	3602.31	26.50	3575.81
PZ-05	7/10/2009	3602.31	28.65	3573.66
PZ-05	7/13/2009	3602.31	42.00	3560.31
PZ-06	10/7/2008	3765.56	34.25	3731.31
PZ-06	1/6/2009	3765.56	38.20	3727.36
PZ-06	4/28/2009	3765.56	38.60	3726.96
PZ-06	7/7/2009	3765.56	39.00	3726.56
PZ-07	10/14/2008	3546.22	139.73	3406.49
PZ-07	1/13/2009	3546.22	139.79	3406.43
PZ-07	4/6/2009	3546.22	139.85	3406.37
PZ-07	7/21/2009	3546.22	140.22	3406.00
PZ-08	10/8/2008	3477.14	222.49	3254.65
PZ-08	1/6/2009	3477.14	223.55	3253.59
PZ-08	4/6/2009	3477.14	224.81	3252.33
PZ-08	7/7/2009	3477.14	224.80	3252.34
PZ-16	10/7/2008	3722.10	15.70	3706.40
PZ-16	1/12/2009	3722.10	19.25	3702.85
PZ-16	4/27/2009	3722.10	20.91	3701.19
PZ-16	7/10/2009	3722.10	21.85	3700.25
PZ-16	7/13/2009	3722.10	35.85	3686.25
PZ-2007-05	10/8/2008	3440.93	246.69	3194.24
PZ-2007-05	1/9/2009	3440.93	246.30	3194.63
PZ-2007-05	4/8/2009	3440.93	246.12	3194.81
PZ-2007-05	4/28/2009	3440.93	246.38	3194.55
PZ-2007-05	7/21/2009	3440.93	247.15	3193.78
PZ-2008-16	Q4 2008	NS	NM	NM
PZ-2008-16	1/20/2009	NS	279.98	NS
PZ-2008-16	5/18/2009	NS	285.70	NS
PZ-2008-16	Q3 2009	NS	NA	NA

Table 5
Groundwater Elevation Data
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Well ID	Date	Top of casing elevation (ft amsl)	Depth to water (ft btoc)	Groundwater elevation (ft amsl)
PZ-2008-19	11/12/2008	NS	109.35	NS
PZ-2008-19	Q1 2009	NS	NM	NM
PZ-2008-19	5/18/2009	NS	113.30	NS
PZ-2008-19	6/8/2009	NS	113.02	NS
PZ-2008-19	Q3 2009	NS	NA	NA
PZ-2008-20	11/12/2008	NS	144.02	NS
PZ-2008-20	1/20/2009	NS	143.47	NS
PZ-2008-20	6/8/2009	NS	147.38	NS
PZ-2008-20	Q3 2009	NS	NA	NA
TW-2008-02	Q4 2008	3728.10	NM	NM
TW-2008-02	1/29/2009	3728.10	Dry	Dry
TW-2008-02	Q2 2009	3728.10	NA	NA
TW-2008-02	Q2 2009	3728.10	NA	NA
TW-2008-02	Q3 2009	3728.10	NA	NA
TW-2008-03	Q4 2008	3681.79	NM	NM
TW-2008-03	1/29/2009	3681.79	18.84	3662.95
TW-2008-03	5/21/2009	3681.79	Dry	Dry
TW-2008-03	6/29/2009	3681.79	Dry	Dry
TW-2008-03	Q3 2009	3681.79	NM	NM
TW-2008-04	11/4/2008	3668.59	15.35	3653.24
TW-2008-04	1/29/2009	3668.59	15.78	3652.81
TW-2008-04	5/14/2009	3668.59	Dry	Dry
TW-2008-04	6/29/2009	3668.59	15.85	3652.74
TW-2008-04	Q3 2009	3668.59	NM	NM
TW-2008-05	Q4 2008	3637.88	NM	NM
TW-2008-05	1/29/2009	3637.88	Dry	Dry
TW-2008-05	5/14/2009	3637.88	Dry	Dry
TW-2008-05	6/29/2009	3637.88	Dry	Dry
TW-2008-05	Q3 2009	3637.88	NM	NM
TW-2008-07	11/4/2008	3704.00	10.59	3693.41
TW-2008-07	1/29/2009	3704.00	Dry	Dry
TW-2008-07	5/14/2009	3704.00	Dry	Dry
TW-2008-07	6/29/2009	3704.00	Dry	Dry
TW-2008-07	Q3 2009	3704.00	NM	NM
TW-2008-08	11/3/2008	3628.48	Dry	Dry
TW-2008-08	Q1 2009	3628.48	NM	NM
TW-2008-08	Q2 2009	3628.48	NM	NM
TW-2008-08	Q3 2009	3628.48	NM	NM
TW-2008-09	11/3/2008	3615.03	6.68	3608.35
TW-2008-09	1/27/2009	3615.03	7.29	3607.74
TW-2008-09	4/14/2009	3615.03	8.06	3606.97
TW-2008-09	5/21/2009	3615.03	8.50	3606.53
TW-2008-09	6/29/2009	3615.03	9.50	3605.53
TW-2008-09	Q3 2009	3615.03	NM	NM
TW-2008-10	11/3/2008	3608.10	7.22	3600.88
TW-2008-10	1/28/2009	3608.10	7.24	3600.86
TW-2008-10	4/14/2009	3608.10	7.19	3600.91
TW-2008-10	4/23/2009	3608.10	7.55	3600.55
TW-2008-10	6/29/2009	3608.10	9.05	3599.05
TW-2008-10	7/15/2009	3608.10	8.50	3599.60
TW-2008-11	11/3/2008	3567.69	9.11	3558.58
TW-2008-11	1/26/2009	3567.69	9.11	3558.58
TW-2008-11	4/14/2009	3567.69	9.24	3558.45
TW-2008-11	6/29/2009	3567.69	9.60	3558.09
TW-2008-11	7/15/2009	3567.69	10.10	3557.59
TW-2008-12	Q4 2008	3533.92	NM	NM
TW-2008-12	1/23/2009	3533.92	10.71	3523.21
TW-2008-12	4/14/2009	3533.92	Dry	Dry
TW-2008-12	5/14/2009	3533.92	Dry	Dry
TW-2008-12	6/29/2009	3533.92	Dry	Dry
TW-2008-12	Q3 2009	3533.92	NM	NM
TW-2008-13	11/3/2008	3569.57	10.49	3559.08
TW-2008-13	1/22/2009	3569.57	12.31	3557.26
TW-2008-13	4/14/2009	3569.57	12.49	3557.08
TW-2008-13	5/21/2009	3569.57	12.50	3557.07
TW-2008-13	6/29/2009	3569.57	11.80	3557.77
TW-2008-13	7/15/2009	3569.57	12.07	3557.50
TW-2008-14	11/3/2008	3578.47	Dry	Dry
TW-2008-14	1/27/2009	3578.47	Dry	Dry
TW-2008-14	4/14/2009	3578.47	Dry	Dry
TW-2008-14	6/29/2009	3578.47	Dry	Dry
TW-2008-14	Q3 2009	3578.47	NM	NM
TW-2008-15	11/3/2008	3667.68	Dry	Dry
TW-2008-15	1/23/2009	3667.68	Dry	Dry
TW-2008-15	4/14/2009	3667.68	Dry	Dry
TW-2008-15	6/29/2009	3667.68	Dry	Dry
TW-2008-15	Q3 2009	3667.68	NM	NM

Notes :
ft amsl = feet above mean sea level
ft btoc = feet below top of casing
NM = not measured
NA = not available

Table 6
Vertical Gradients
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Well ID	Groundwater Elevation Date	Screened Interval Lithology	Groundwater Elevation (ft amsl)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Top of Screen Elevation (ft amsl)	Bottom of Screen Elevation (ft amsl)	Screen Midpoint Elevation (ft amsl)	Gradient (ft/ft)	Gradient Direction
TW-2008-12	1/23/2009	Alluvium	3523.21	4	9	3527.63	3522.63	3522.92	0.99	downward
BW-04	1/6/2009	Bedrock Complex	3511.84	6	19	3524.04	3511.04	3511.44		
MH-22	10/10/2008	Alluvium	3497.64	6.5	16.5	3505.15	3495.15	3496.40	0.03	downward
MH-23	10/10/2008	Demetrie Volcanics	3496.75	20	78	3495.28	3437.28	3466.28		
MH-22	7/21/2009	Alluvium	3496.1	6.5	16.5	3505.15	3495.15	3495.63	0.05	downward
MH-23	7/7/2009	Demetrie Volcanics	3494.58	20	78	3495.28	3437.28	3465.93		
TW-2008-07	11/4/2008	Alluvium	3693.41	4	9	3697.28	3692.28	3692.85	-0.03	upward
MH-27	10/10/2008	Demetrie Volcanics	3694.65	23	83	3677.14	3617.14	3647.14		
TW-2008-13	11/3/2008	Alluvium	3559.08	10	20	3557.06	3547.06	3552.06	0.44	downward
MW-2008-08	10/19/2008	Ruby Star Granodiorite	3547.04	36.75	46.75	3529.84	3519.84	3524.84		
TW-2008-13	1/22/2009	Alluvium	3557.26	10	20	3557.06	3547.06	3552.06	-0.004	upward
MW-2008-08	1/22/2009	Ruby Star Granodiorite	3557.37	36.75	46.75	3529.84	3519.84	3524.84		
TW-2008-13	4/14/2009	Alluvium	3557.08	10	20	3557.06	3547.06	3552.06	0.01	downward
MW-2008-08	4/14/2009	Ruby Star Granodiorite	3556.82	36.75	46.75	3529.84	3519.84	3524.84		
TW-2008-13	6/29/2009	Alluvium	3557.77	10	20	3557.06	3547.06	3552.06	0.01	downward
MW-2008-08	6/29/2009	Ruby Star Granodiorite	3557.56	36.75	46.75	3529.84	3519.84	3524.84		

Notes:
ft amsl = feet above mean sea level
ft/ft = feet per foot

Table 7
Summary of Slug Test Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Well ID	Length of Saturated Screen (feet)	Depth to Top of Screen Below Water Level (feet)	Test Type[1]	Observed Initial Displacement (Ho, feet)[3]	Estimated Hydraulic Conductivity, K (feet/day)
MW-2008-01	20.87	0.00[2]	Falling Head	1.30	0.85
			Rising Head	3.94	0.39
MW-2008-02	31.22	0.00	Falling Head	1.94	0.02
			Rising Head	4.09	0.018
MW-2008-03	31.68	0.00	Falling Head	*2.1*	0.029
			Rising Head	*3.4*	0.016
MW-2008-04	31.37	0.00	Falling Head	*2.3*	0.16
			Rising Head	*5.0*	0.092
MW-2008-05	24.05	0.00	Falling Head	1.95	0.29
			Rising Head	3.17	0.22
MW-2008-06	25.05	0.00	Falling Head	*2.8*	0.18
			Rising Head	*3.8*	0.15
MW-2008-07	20.45	2.79	Falling Head	2.80	0.043
			Rising Head	2.83	0.11
MW-2008-08	10.7	27.62	Falling Head	3.19	0.0051
			Rising Head	3.29	0.0014
MW-2008-09	21.35	0.00	Falling Head	1.30	0.0073
			Rising Head	3.92	0.0035
MW-2008-10	23.3	0.00	Falling Head	*2.1*	0.28
			Rising Head	*2.5*	0.14
MW-2008-11	25.64	14.15	Falling Head	*3.9*	1.35
			Falling Head	*3.9*	1.49
			Rising Head	3.27	0.66
MW-2008-12	56.12	16.87	Falling Head	*4.0*	0.0003
			Rising Head	*3.3*	0.00077
MW-2008-13	44.41	0.00	Falling Head	*2.0*	0.028
			Rising Head	*1.9*	0.011

Notes:
[1] Test type indicates slug in (falling head) or slug out (rising head) tests.
[2] Depth to top of water below top of screen of 0 feet indicates that well is screened across water table.
[3] Italicized Ho entries are approximate, as estimated from plots generated by URS.

Table 8
Active Facility General Chemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Bicarbonate as CaCO3 (mg/L)	Calcium (mg/L)	Carbonate as CaCO3 (mg/L)	Cation-Anion Balance (%)	Chloride (mg/L)	Conductivity @25C (µmhos/cm)	Fluoride (mg/L)	Hardness as CaCO3 (mg/L)	Magnesium (mg/L)	Nitrate/Nitrite as N (mg/L)	pH (lab) (S.U.)	pH (field) (S.U.)	Potassium (mg/L)	Residue, Filterable (TDS) @180C (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	TDS (calculated) (mg/L)	Total Alkalinity (mg/L)
Central Investigation Area																				
Amargosa East Sump		Q4 2008	<2	544	<2	NA	3100	NA	80	NA	2260	0.3	NA	3.44	14	22700	430	13700	NA	<2
Amargosa East Sump		Q1 2009	<2	503	<2	-3.2	2950	NA	NA	9850	2090	<2	NA	3.89	18	22800 J	349	14400	22200	<2
Amargosa East Sump		Q2 2009	<2	551	<2	-2.1	3010	NA	NA	10600	2240	<0.4	NA	3.35	13	24300	422	14800	22900	<2
Amargosa East Sump	Duplicate	Q2 2009	<2	551	<2	-3	3090	NA	NA	10500	2230	<0.4	NA	NA	12	23500	395	14900	23000	<2
Amargosa East Sump		Q3 2009	<2	645	<2	13.3	3000	NA	NA	11500	2410	0.15	NA	3.59	21	24200	386	13900	23800	<2
Amargosa Pond		Q4 2008	<2	532	<2	NA	4300	NA	167	NA	4350	1	NA	2.50	10	43700	332	27000	NA	<2
Amargosa Pond		Q1 2009	<2	538	<2	2.8	4300	NA	NA	19600	4430	1	NA	2.31	12	40900	328	27000	39900	<2
Amargosa Pond		Q2 2009	<2	505	<2	-5.4	4600	NA	NA	20300	4620	1.7	NA	2.46	12	54100 J	71.7	33500	46700	<2
Amargosa West Sump		Q4 2008	143	58.1	<2	NA	20	NA	2	NA	11.6	1.55	NA	6.92	3.2	370 J	62.8	130	NA	143
Amargosa West Sump		Q1 2009	91	71.5	<2	2.5	120	NA	NA	330	36.7	1.56	NA	6.27	3.5	640	73.7	220	587	91
Amargosa West Sump		Q2 2009	149	54.6	<2	2.7	16	NA	NA	168	7.7	1.69	NA	6.05	2.9	380	55.1	100	326	149
Amargosa West Sump		Q3 2009	155	56	<2	-0.8	21	NA	NA	174	8.3	1.89	NA	6.55	3.2	380	57	120	359	155
B Pond		Q4 2008	<2	550	<2	NA	3420	NA	83	NA	2380	0.4	NA	3.28	21	22600	1170	13700	NA	<2
B Pond		Q1 2009	<2	522	<2	0	3700	NA	NA	12800	2790	<1	NA	3.65	21	24300	1240	14400	23800	<2
B Pond		Q2 2009	<2	477	<2	1.7	3800	NA	NA	14000	3110	<0.4	NA	3.53	8.1	24600 J	1270	14700	24500	<2
B Pond		Q3 2009	<2	553	<2	-8	4700	NA	NA	15400	3420	0.04	NA	3.29	17	32400	1410	20000	31300	<2
B Seepage Silo		Q4 2008	<2	538	<2	NA	1800	NA	45	NA	911	<1	NA	3.30	17.7	11400	382	6400	NA	<2
B Seepage Silo		Q1 2009	<2	588	<2	1.1	1930	NA	NA	5560	994	0.07	NA	3.95	16	10900	376	6050	10700	<2
B Seepage Silo		Q3 2009	<2	580	<2	1.8	1590	NA	NA	5360	952	0.18	NA	3.21	15	10500	376	5500	9580	<2
Bailey Lake		Q4 2008	<2	498	<2	NA	4400	NA	164	NA	4190	1	NA	2.19	15	43800 J	320	27700	NA	<2
Bailey Lake		Q1 2009	<2	497	<2	1	3580	NA	NA	18300	4160	1.3	NA	2.51	11	43500 J	287	29800	42300	<2
Bailey Lake		Q2 2009	<2	523	<2	-9.5	4300	NA	NA	19200	4360	1.7	NA	2.56	6	45400	247	30900	43000	<2
Bailey Lake		Q3 2009	<2	477	<2	-7.1	4600	NA	NA	17900	4070	1.05	NA	2.54	21	48700	283	30000	42600	<2
Bailey Sump		Q4 2008	<2	646	<2	NA	3400	NA	152	NA	2600	3	NA	3.19	14	32700	428	20700	NA	<2
Bailey Sump		Q1 2009	<2	629	<2	-6.8	5800	NA	NA	12700	2710	2.5	NA	3.56	13	32300 J	390	21300	34500	<2
Bailey Sump		Q2 2009	<2	609	<2	-7.9	3800	NA	NA	13500	2910	2.8	NA	3.40	10	36100	346	24000	34900	<2
Bailey Sump		Q3 2009	<2	513	<2	-19.4	4200	NA	NA	9790	2070	2.51	NA	3.37	22	34100	390	20000	29100	<2
C Seepage Silo		Q4 2008	163	572	<2	NA	360	NA	4	NA	282	0.46	NA	6.04	17.4	4550	399	2590	NA	163
C Seepage Silo		Q1 2009	170	572	<2	1.4	350	NA	NA	2450	248	0.61	NA	5.93	15	4590	385	2500	4200	170
Decant Solution (Molybdenum)		11/10/2008	20 J	180	7 J	NA	740	NA	<1	NA	12	1.6 J	NA	NA	16	1800	533	460	NA	27 J
Decant Solution (Molybdenum)	Duplicate	11/10/2008	66 J	181	16 J	NA	620	NA	<1	NA	11	2.1 J	NA	NA	16	1790	535	540	NA	83 J
Decant Solution (Molybdenum)		12/19/2008	NA	142	NA	NA	NA	NA	NA	404	12	0.12	NA	NA	10	NA	490	NA	NA	NA
Decant Solution (Molybdenum)		1/29/2009	7	136	112	-1.2	490	NA	NA	389	12	1.9	NA	9.60	14.4	2080	449	600	1820	119
Decant Solution (Molybdenum)		2/26/2009	NA	356	NA	NA	NA	NA	NA	911	5	NA	NA	11.14	16	NA	567	NA	NA	NA
Decant Solution (Molybdenum)		3/26/2009	NA	121	NA	NA	NA	NA	NA	309	1.5	NA	NA	NA	15.2	NA	463	NA	NA	NA
Decant Solution (Molybdenum)		5/14/2009	107	133	48	-12.3	610	NA	NA	346	3.3	2.7	NA	9.58	15	2020	448	690	2010	156
Decant Solution (Molybdenum)		6/15/2009	118	85	131	-17.3	560 J	NA	NA	213	<1	2.4	NA	NA	9	1670	397	500	1750	249
Decant Solution (Molybdenum)		7/15/2009	92	192	61	-10.4	450	NA	NA	497	4.1	2.1	NA	NA	16.1	2200	442	1000	2220	153
Headwall No. 1		Q4 2008	<2	504	<2	NA	4500	NA	164	NA	4330	1.39	NA	2.34	13	42600 J	339	12600	NA	<2
Headwall No. 1		Q1 2009	<2	510	<2	-4.5	3900	NA	NA	18200	4110	2.8	NA	2.65	10	44100 J	292	29100	41000	<2
Headwall No. 1		Q2 2009	<2	518	<2	-7.1	4300	NA	NA	18800	4250	1.6	NA	2.65	4	45300	245	28500	40400	<2
Headwall No. 1		Q3 2009	<2	476	<2	-6.6	4600	NA	NA	17800	4040	1.03	NA	2.52	15	48000	282	29300	41800	<2
Raffinate Pond No. 2		Q4 2008	<2	310 J	<2	NA	4000	NA	106 J	NA	2560	1	NA	1.96	13.1	43200	322	28200	NA	<2
Raffinate Pond No. 2		Q1 2009	<2	481	<2	-3.7	4300	NA	NA	16900	3830	1.44	NA	2.07	10	41900 J	281	28600	40700	<2
Raffinate Pond No. 2		Q2 2009	<2	452	<2	-6.7	4100	NA	NA	17300	3940	1.4	NA	2.44	9	48000 J	69.1	29000	40400	<2
Raffinate Pond No. 2		Q3 2009	<2	485	<2	-7.3	4400	NA	NA	17900	4060	1.07	NA	2.47	20	47300	292	30000	42100	<2

Table 8
Active Facility General Chemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Bicarbonate as CaCO3 (mg/L)	Calcium (mg/L)	Carbonate as CaCO3 (mg/L)	Cation-Anion Balance (%)	Chloride (mg/L)	Conductivity @25C (µmhos/cm)	Fluoride (mg/L)	Hardness as CaCO3 (mg/L)	Magnesium (mg/L)	Nitrate/Nitrite as N (mg/L)	pH (lab) (S.U.)	pH (field) (S.U.)	Potassium (mg/L)	Residue, Filterable (TDS) @180C (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	TDS (calculated) (mg/L)	Total Alkalinity (mg/L)
Central Investigation Area (continued)																				
SX-Sump 1		Q4 2008	<2	635	<2	NA	3800	NA	81	NA	1710	<1	NA	3.01	3	18500	469	9900	NA	<2
SX-Sump 1	Duplicate	Q4 2008	NA	628	NA	NA	NA	NA	NA	NA	1690	<1	NA	NA	3	NA	460	NA	NA	NA
SX-Sump 1		Q1 2009	<2	578	<2	-2.5	3900	NA	NA	7860	1560	<2	NA	3.04	5	17900	428	9600	17900	<2
SX-Sump 1		Q2 2009	<2	694	<2	3.5	3600	NA	NA	8430	1630	0.5	NA	3.24	<3	17100	448	8500	16500	<2
SX-Sump 1		Q3 2009	<2	617	<2	-1	3670	NA	NA	8780	1760	0.21	NA	3.13	10	21300	520	12200	21000	<2
SX-Sump 2		Q4 2008	<2	857	<2	NA	5000	NA	48	NA	804	<1	NA	2.66	<3	15100	434	5900	NA	<2
SX-Sump 2		Q1 2009	<2	657	<2	-2.1	5100	NA	NA	7360	1390	2	NA	2.71	4	19600	362	9600	19700	<2
SX-Sump 2		Q2 2009	<2	851	<2	3.7	5000	NA	NA	7720	1360	1.6	NA	2.76	<3	17600	395	7100	16900	<2
SX-Sump 2		Q3 2009	<2	795	<2	0.9	4740	NA	NA	6760	1160	1.24	NA	2.79	<3	16800	436	7000	16300	<2
SX-Sump 3		Q4 2008	<2	612	<2	NA	3500	NA	113	NA	2400	<1	NA	3.06	<3	24100	455	14200	NA	<2
SX-Sump 3		Q1 2009	<2	555	<2	-1.2	4500	NA	NA	12900	2800	<2	NA	3.98	8	25200 J	459	14400	24600	<2
SX-Sump 3		Q2 2009	<2	724	<2	2.6	4000	NA	NA	9740	1930	0.8	NA	3.19	<3	18300	442	9000	17600	<2
SX-Sump 3		Q3 2009	<2	827	<2	0.9	3710	NA	NA	5570	851	1.2	NA	2.98	<3	13300	458	5400	12800	<2
East Investigation Area																				
Reclaim Pond Settling Basin		11/10/2008	30	709	<2	NA	350	NA	4	NA	144	1.88	NA	10.43	60.2	4070	297	2440	NA	30
Reclaim Pond Settling Basin		12/19/2008	30	680	<2	2.4	292	4220	3	2060	87.7	3.09	7.4 J	NA	55.5	3700 J	286	2090	3510	30
Reclaim Pond Settling Basin	Duplicate	12/19/2008	28	686	<2	0.8	274	4230	4	2080	88.6	3.1	7.4 J	NA	57.5	3250 J	289	2220	3640	28
Reclaim Pond Settling Basin		2/3/2009	27	639	<2	-4.2	239	NA	NA	1810	52.2	2.22	NA	5.90	50.6	3570	257	2190	3450	27
Reclaim Pond Settling Basin		2/26/2009	NA	655	NA	NA	NA	NA	NA	1830	45.9	NA	NA	9.15	55.8	NA	282	NA	NA	NA
Reclaim Pond Settling Basin		3/26/2009	NA	687	NA	NA	NA	NA	NA	1840	29.7 J	NA	NA	NA	59.2	NA	285	NA	NA	NA
Reclaim Pond Settling Basin		5/14/2009	27	754	6	-3.4	210	NA	NA	1960	18.1	2.63	NA	8.15	63	4010	316	2480	3860	33
Reclaim Pond Settling Basin		7/15/2009	26	664	<2	-2.7	165	NA	NA	1730	18.1	2.12	NA	6.94	55.8	3630	320	2280	3520	26
West Investigation Area																				
Headwall No. 2		Q4 2008	<2	525	<2	NA	3500	NA	159	NA	4100	2.9	NA	2.61	14	41300 J	352	26400	NA	<2
Headwall No. 2		Q1 2009	<2	475	<2	0	4300	NA	NA	19200	4380	2.05	NA	2.96	11	40100 J	305	28100	40900	<2
Headwall No. 2		Q2 2009	<2	559	<2	-5.3	4400	NA	NA	19700	4450	1.8	NA	2.78	9	43800 J	268	28400	40700	<2
Headwall No. 2		Q3 2009	<2	514	<2	-4	4500	NA	NA	18800	4270	1.68	NA	2.80	10	47500	348	30000	42900	<2
Headwall No. 2	Duplicate	Q3 2009	<2	514	<2	-0.6	4300	NA	NA	18900	4280	1.48	NA	NA	10	47600	350	28000	40700	<2
Headwall No. 3		Q4 2008	<2	556	<2	NA	3900	NA	110	NA	4420	1.5	NA	2.84	6	42300 J	310	28000	NA	<2
Headwall No. 3		Q1 2009	<2	481	<2	-6.8	4490	NA	NA	18000	4090	0.8	NA	2.97	13	38200	251	28600	40800	<2
Headwall No. 3	Duplicate	Q1 2009	<2	487	<2	-3.7	4450	NA	NA	18200	4130	0.8	NA	NA	14	39200	257	27800	40500	<2
Headwall No. 3		Q2 2009	<2	583	<2	-7.9	4400	NA	NA	20800	4700	1.6	NA	2.95	<2	45300 J	188	28300	40300	<2
Headwall No. 3		Q3 2009	<2	505	<2	-5.5	4500	NA	NA	18300	4150	1.05	NA	3.04	<8	49700	273	29000	41400	<2
Headwall No. 5		Q4 2008	<2	529	<2	NA	680	NA	70	NA	1230	8.3	NA	4.37	13.7	11700	274	7530	NA	<2
Headwall No. 5		Q1 2009	<2	493	<2	2.1	900	NA	NA	5420	1020	24.9	NA	4.68	18	9120	218	5500	8530	<2
Headwall No. 5		Q2 2009	<2	596	<2	-8.8	1340	NA	NA	8720	1760	91	NA	3.83	6.5	18500	273	11200	15800	<2
Headwall No. 5		Q3 2009	<2	555	<2	-0.3	2800	NA	NA	16600	3690	37.8	NA	3.60	13	37400	356	24100	34300	<2
SX-3 Stormwater Pond		Q4 2008	<2	630	<2	NA	4300	NA	111	NA	4020	2	NA	3.44	12	37400 J	458	22400	NA	<2
SX-3 Stormwater Pond		Q1 2009	<2	554	<2	-3.4	4720	NA	NA	19000	4290	0.8	NA	3.54	17	37900	606	24200	36500	<2

NOTES
· mg/L= milligrams per liter.
· % = percent.
· µmhos/cm = micromhos per centimeter.
· S.U. = standard units.
· < = the analyte was not detected above the indicated reporting limit.
· J = the analyte was positively identified; however, the result is considered an estimated value.
· NA = not analyzed.

Table 9
Active Facility Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Zinc (mg/L)
Central Investigation Area																					
Amargosa East Sump		Q4 2008	960	<0.0004	<0.0005	<0.02	0.382	0.738	0.218	5.55	355	168	0.006	304	<0.0002	0.06	3.7	0.0842	0.0008	3.42	69.4
Amargosa East Sump		Q1 2009	929	<0.008	<0.01	<0.06	0.372	0.72	0.236	5.5	327	221	0.019	294	<0.0002	<0.2	4.6	0.041	<0.002	2.72	79.4
Amargosa East Sump		Q2 2009	908	<0.008	<0.01	<0.06	0.384	0.796	0.24	6.2	314	273	0.022	292	<0.0002	<0.2	4.7	0.061	0.003	3.1	81.3
Amargosa East Sump	Duplicate	Q2 2009	906	<0.008	<0.01	<0.06	0.39	0.805	0.23	6.2	312	271	0.022	291	<0.0002	0.2	4.7	0.061	0.003	3.15	81.3
Amargosa East Sump		Q3 2009	1370	<0.01	<0.01	<0.06	0.385	0.788	0.24	7.4	1070	481	0.019	396	<0.0002	<0.2	6.5	0.055	<0.003	3.34	135
Amargosa Pond		Q4 2008	1560	<0.04	<0.05	<0.003	0.56	1	1.13	8.1	294	94.3	0.07	357	<0.0002	0.2	5.7	0.16	<0.01	7.05	93.4
Amargosa Pond		Q1 2009	2410	<0.02	<0.03	<0.08	0.623	1.05	1.84	11.2	75.7	189	0.166	505	0.0005	<0.3	7.6	0.154	<0.005	7.82	125
Amargosa Pond		Q2 2009	2570	<0.04	<0.05	<0.2	0.72	1.21	1.95	10.8	9.74	164	0.13	561	0.0006	0.55	1.71	0.16	<0.01	8.26	126
Amargosa West Sump		Q4 2008	0.06	<0.0004	0.0047	0.021	<0.0001	0.0017	<0.0001	<0.01	0.34	<0.02	<0.0001	0.571	<0.0002	<0.01	0.01	0.0005	<0.0001	0.0065	0.12
Amargosa West Sump		Q1 2009	0.06	<0.0008	<0.001	0.022	0.0008	0.0095	<0.0002	0.06	2.5	<0.02	<0.0002	3.27	<0.0002	<0.01	0.12	0.0009	<0.0002	0.0036	0.91
Amargosa West Sump		Q2 2009	<0.03	<0.0004	0.0102	0.019	<0.0001	<0.0001	<0.0005	<0.01	0.08	<0.02	<0.0001	0.013	<0.0002	<0.01	<0.01	0.0005	<0.0001	0.0066	<0.01
Amargosa West Sump		Q3 2009	0.3	<0.0004	0.0058	0.019	0.0001	0.0007	0.0009	0.01	0.16	0.03	<0.0001	0.205	<0.0002	<0.01	0.03	0.0006	<0.0001	0.0091	0.04
B Pond		Q4 2008	500	<0.0004	<0.0005	<0.006	0.143	0.61	0.049	3.9	208	44.2	<0.001	252	<0.0002	<0.1	2.8	0.0457	0.0017	1.74	67.9
B Pond		Q1 2009	528	<0.008	<0.01	<0.06	0.209	0.6	0.042	4.7	62.4	214	<0.002	296	<0.0002	<0.2	3.2	0.035	<0.002	1.38	74.7
B Pond		Q2 2009	514	<0.02	<0.03	<0.003	0.226	0.618	<0.03	4.51	14.2	225	<0.005	303	<0.0002	0.02	1.53	0.033	<0.005	1.14	74.1
B Pond		Q3 2009	576	<0.004	0.006	<0.06	0.225	0.641	0.068	5.6	27.2	130	<0.001	350	0.0006	<0.2	3.7	0.049	<0.001	1.46	84.1
B Seepage Silo		Q4 2008	250	<0.004	<0.005	0.005	0.122	0.333	<0.001	2.2	70.5	256	0.006	159	<0.0002	<0.1	1.3	0.021	0.001	0.791	43.6
B Seepage Silo		Q1 2009	265	0.0006	<0.005	0.04	0.148	0.401	0.0161	2.3	78.5	219	0.0513	167	<0.0002	<0.2	1.4	0.021	0.0009	0.825	45.6
B Seepage Silo		Q3 2009	189	<0.02	<0.03	<0.03	0.107	0.389	5.96	2.3	71.2	92.2	0.049	169	0.0015	0.2	6.6	0.022	<0.005	0.6	41.6
Bailey Lake		Q4 2008	2200	0.01	<0.05	<0.03	0.57	1.01	1.59	10.1 J	365	191	0.22	455	<0.0002	0.6	5.9 J	0.16	0.0045	7	94.3
Bailey Lake		Q1 2009	2570	<0.008	<0.01	<0.08	0.459	0.997	1.34	10.5	351	218	0.079	659	<0.0002	<0.3	7	0.161	0.003	9.2	172
Bailey Lake		Q2 2009	1750	<0.04	<0.05	<0.06	0.695	0.946	1.89	11.3	292	132	0.233	379	<0.0002	0.6	6.1	0.111	0.004	8.14	97.4
Bailey Lake		Q3 2009	2100	<0.01	0.06	<0.08	0.568	1.07	1.4	10.5	317	150	0.239	452	0.0002	0.5	7.1	0.135	0.006	7.25	114
Bailey Sump		Q4 2008	1310	<0.002	<0.03	<0.03	0.517	1.1	0.771	7	954	385	0.0024	389	0.0012	<0.1	6	0.098	0.0011	4.54	126
Bailey Sump		Q1 2009	1480	<0.008	<0.01	<0.06	0.516	1.2	1.3	8.3	1170	453	0.004	447	0.0009 J	<0.2	7.1	0.095	<0.002	6.05	129
Bailey Sump		Q2 2009	1370	<0.04	<0.005	<0.03	0.694	1.28	1.66	8.7	941	422	<0.005	396	0.0003	0.2	5.4	0.058	<0.005	5.76	128
Bailey Sump		Q3 2009	907	<0.01	<0.05	<0.06	0.548	1.23	1.89	5.7	316	297	0.006	294	0.0004	<0.2	5	0.077	<0.003	4.78	82
C Seepage Silo		Q4 2008	2.55	<0.0008	0.001	0.015	0.0109	0.0581	<0.0002	0.15	9.56	0.04	0.0013	15.5	<0.0002	0.66	0.12	0.006	<0.0002	0.149	7.42
C Seepage Silo		Q1 2009	1.4	<0.002	<0.003	<0.02	0.0136	0.0464	<0.0005	0.12	5.85	<0.1	<0.0005	11.3	<0.0002	0.88	0.08	0.0026	<0.0005	0.142	6.85
Decant Solution (Molybdenum)		11/10/2008	1.2	<0.008	<0.01	<0.06	<0.002	<0.002	<0.002	<0.2	0.7 J	<0.4	<0.002	0.5 J	0.0002	0.6	<0.2	0.015	<0.002	<0.002	<0.2
Decant Solution (Molybdenum)	Duplicate	11/10/2008	<0.6	<0.008	<0.01	<0.06	<0.002	<0.002	<0.002	<0.2	<0.2 UJ	<0.4	<0.002	<0.1 UJ	<0.0002	0.7	<0.2	0.014	<0.002	<0.002	<0.2
Decant Solution (Molybdenum)		12/19/2008	<0.6	<0.02	<0.03	<0.06	<0.005	<0.005	<0.2	<0.2	<0.2	<0.4	<0.005	<0.1	0.0009	4	<0.2	<0.005	<0.005	<0.005	<0.2
Decant Solution (Molybdenum)		1/29/2009	0.4	<0.0008	<0.001	0.023	<0.0002	0.0004	<0.0002	<0.02	0.03	0.07	<0.0002	0.32	<0.0002	0.05	<0.02	0.004	0.0003	0.0012	0.13
Decant Solution (Molybdenum)		2/26/2009	0.4	<0.008	<0.01	0.03	<0.002	0.0008	<0.002	<0.05	<0.05	<0.1	0.0006	0.05	<0.0002	<0.05	<0.05	0.075	<0.0001	0.003	0.26
Decant Solution (Molybdenum)		3/26/2009	0.07	<0.004	0.008	0.02	<0.001	<0.001	<0.001	<0.01	<0.01	<0.02	<0.001	<0.005	<0.0002	0.28	<0.01	0.05	<0.001	<0.001	<0.01
Decant Solution (Molybdenum)		5/14/2009	1 J	<0.008	0.0015	<0.02	<0.002	<0.002	<0.0005	<0.05	0.13	<0.1	<0.002	0.08	<0.0002	0.11	<0.05	0.011	<0.002	<0.002	0.18
Decant Solution (Molybdenum)		6/15/2009	<0.2	<0.02	0.04	<0.02	<0.005	<0.005	<0.03	<0.05	<0.05	<0.1	<0.005	<0.03	<0.0002	0.14	<0.05	2.1	<0.005	<0.005	<0.05
Decant Solution (Molybdenum)		7/15/2009	<0.03	<0.004	<0.01	0.028	<0.003	<0.003	<0.01	<0.01	<0.01	<0.02	<0.003	<0.005	<0.0002	0.36	0.02	0.006	<0.003	<0.003	0.02
Headwall No. 1		Q4 2008	2170	0.0126	<0.05	<0.03	0.56	1	1.64	10	347	213	0.366	454	0.0003	0.9	6	0.16	0.0045	6.83	94.9
Headwall No. 1		Q1 2009	2110	<0.01	<0.01	<0.08	0.485	1	1.3	10.6	333	117	0.119	388	0.0002	<0.3	7.1	0.139	<0.003	8.45	102
Headwall No. 1		Q2 2009	1750	<0.04	0.07	<0.06	0.682	0.933	1.94	11	231	128	0.296	381	<0.0002	0.6	6.2	0.11	0.004	8.06	97.8
Headwall No. 1		Q3 2009	2080	0.01	0.08	<0.08	0.56	1.07	1.52	10.4	261	160	0.369	450	<0.0002	0.3	7.1	0.136	<0.003	7.3	113
Raffinate Pond No. 2		Q4 2008	1680	<0.04	<0.05	<0.003	0.55	0.97	2.21	8.3	49.1	179	0.7	359	0.0002	0.6	6.3	0.16	<0.01	6.68	95.1
Raffinate Pond No. 2		Q1 2009	2470	<0.02	<0.03	<0.08	0.661	1.12	2.74	9.4	40.8	162	0.861	417	0.0002	0.4	8.3	0.159	0.006	8.04	127
Raffinate Pond No. 2		Q2 2009	2160	<0.02	0.05	<0.08	0.614	1.06	2.38	9.69	9.02	163	0.75	437	0.0002	0.52	1.74	0.156	<0.005	7.23	109
Raffinate Pond No. 2		Q3 2009	2100	0.02	0.1	<0.08	0.582	1.02	1.99	10.5	43.1	167	0.888	456	<0.0002	0.5	7.6	0.137	0.009	7.14	116

Table 9
Active Facility Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Zinc (mg/L)
Central Investigation Area (continued)																					
SX-Sump 1		Q4 2008	630	<0.008	<0.01	<0.03	0.213	0.737	2.55	3.4	546	355	<0.002	211	<0.0002	<0.1	6.9	0.07	<0.002	2.03	68.9
SX-Sump 1	Duplicate	Q4 2008	618	<0.008	<0.01	<0.03	0.218	0.76	2.65	3.4	544	355	<0.002	211	<0.0002	<0.1	6.8	0.07	<0.002	2.09	67.3
SX-Sump 1		Q1 2009	596	<0.004	<0.005	<0.06	0.26	0.9	2.06	3.5	540	366	0.001	212	<0.0002	<0.1	6.5	0.07	0.002	1.85	66.7
SX-Sump 1		Q2 2009	534	<0.008	<0.01	<0.03	0.248	0.881	1.53	3.6	467	386	<0.002	208	<0.0002	0.1	6.4	0.057	<0.002	1.73	65.5
SX-Sump 1		Q3 2009	782	<0.008	<0.01	<0.03	0.379	0.99	1.18	4.5	601	476	<0.002	276	0.0006	<0.2	6.7	0.05	<0.002	2.81	85.5
SX-Sump 2		Q4 2008	420	<0.004	0.017	<0.03	0.149	0.565	8.92	2	856	593	0.003	109	0.0002	0.5	10.6	0.097	0.001	1.15	57.4
SX-Sump 2		Q1 2009	775	<0.004	0.012	<0.06 UJ	0.319	0.697	7.23	3.8	898	679	0.003	196	0.0004	<0.2	10.1	0.094	0.002	2.05	83.5
SX-Sump 2		Q2 2009	683	<0.008	0.01	<0.03	0.278	0.693	6.23	3.7	841	402	0.002	192	0.0002	0.2	10.3	0.082	<0.002	1.59	86.3
SX-Sump 2		Q3 2009	611	<0.004	0.011	<0.03	0.285	0.735	4.65	3.4	990	317	0.006	177	0.004	<0.1	9.5	0.073	<0.001	1.74	80.7
SX-Sump 3		Q4 2008	655	<0.02	<0.03	<0.03	0.28	1.23	3.38	4.2	490	164	0.005	281	<0.0002	<0.1	6.4	0.098	<0.005	2.88	89.5
SX-Sump 3		Q1 2009	818	<0.004	<0.005	<0.1	0.38	1.7	2.61	5.4	507	69.5	0.003	360	<0.0002	<0.2	6.6	0.111	0.001	3.3	111
SX-Sump 3		Q2 2009	520	<0.008	<0.01	<0.03	0.251	1.18	2.05	3.8	488	198	<0.002	242	<0.0002	<0.1	6.5	0.066	<0.002	1.75	78.4
SX-Sump 3		Q3 2009	360	<0.004	0.007	<0.03	0.207	0.656	2.14	2.1	774	280	0.001	132	0.001	0.1	7.7	0.046	<0.001	1.32	51.4
East Investigation Area																					
Reclaim Pond Settling Basin		11/10/2008	0.04	0.0016	0.002	0.051	<0.0001	0.0073	<0.0001	0.05	0.02	<0.02	<0.0001	6.86	<0.0002	2.05	0.02	0.0171	<0.0001	0.0424	0.15
Reclaim Pond Settling Basin		12/19/2008	<0.06	0.0012	0.002	0.054	<0.0002	0.0008	<0.02	<0.02	0.04	<0.04	<0.0002	2.47	<0.0002	2.27	<0.02	0.0148	<0.0002	0.0264	<0.02
Reclaim Pond Settling Basin	Duplicate	12/19/2008	<0.06	0.0012	0.002	0.056	<0.0002	0.0007	<0.02	<0.02	0.04	<0.04	<0.0002	2.5	<0.0002	2.31	<0.02	0.0153	<0.0002	0.0265	<0.02
Reclaim Pond Settling Basin		2/3/2009	<0.06	0.002	<0.003	0.039	<0.0005	<0.0005	<0.0005	<0.02	0.04	<0.04	<0.0005	1.02	<0.0002	2.23	<0.02	0.0137	<0.0005	0.0172	<0.02
Reclaim Pond Settling Basin		2/26/2009	<0.06	0.005	<0.005	0.048	<0.001	0.0002	<0.001	<0.01	0.01	<0.02	<0.0001	0.566	<0.0002	2.29	<0.02	0.016	<0.0001	0.016	<0.02
Reclaim Pond Settling Basin		3/26/2009	<0.03	0.0017	0.0037	0.05	<0.0001	0.0004	<0.0002	<0.01	<0.01	<0.02	0.0003	0.217	<0.0002	2.42	<0.01	0.021	<0.0001	0.0095	<0.01
Reclaim Pond Settling Basin		5/14/2009	<0.03	0.0028	0.0051	0.054	<0.0001	0.0005	<0.0005	<0.01	0.01	<0.02	<0.0001	0.02	<0.0002	3.22	<0.01	0.029	<0.0001	0.0068	<0.02
Reclaim Pond Settling Basin		7/15/2009	0.04	0.0029	0.0046	0.05	0.0001	0.0004	<0.0005	<0.01	0.02	<0.02	<0.0001	0.079	<0.0002	2.73	<0.01	0.0145	<0.0001	0.0085	<0.01
West Investigation Area																					
Headwall No. 2		Q4 2008	2150	0.0008	<0.0005	<0.02	0.542	0.955	1.14	9.41	408	134	<0.005	433	<0.0002	0.42	4.16	0.131	0.003	7.27	71.9
Headwall No. 2		Q1 2009	2390	<0.02	<0.03	<0.08	0.67	1.08	1.42	9.5	280	107	0.005	421	<0.0002	<0.3	7.5	0.158	0.006	7.58	121
Headwall No. 2		Q2 2009	1730	<0.02	<0.03	<0.03	0.654	1.2	1.45	11.7	184	129	<0.005	461	<0.0002	0.3	5.6	0.142	<0.005	8.77	113
Headwall No. 2		Q3 2009	2310	<0.04	<0.05	<0.08	0.59	1.08	1.15	10.6	217	103	<0.01	479	0.0016 J	<0.3	7.3	0.15	<0.01	7.05	109
Headwall No. 2	Duplicate	Q3 2009	2310	<0.04	<0.05	<0.08	0.59	1.06	1.14	10.9	217	104	<0.01	477	0.0011 J	<0.3	7.1	0.15	<0.01	7.01	109
Headwall No. 3		Q4 2008	2150	0.0016	<0.0005	<0.03	0.576	1.01	0.819	10.4	374	102	<0.005	481	<0.0002	0.4	5.4	0.132	<0.005	8.15	93.3
Headwall No. 3		Q1 2009	1900	<0.02	<0.03	<0.1	0.635	1.05	0.913	9.6	301	154 J	0.006	429	<0.0002	<0.2	6.5	0.157	0.011	7.61	108
Headwall No. 3	Duplicate	Q1 2009	1840	<0.02	<0.03	<0.1	0.653	1.04	0.909	9.8	308	632 J	0.005	435	<0.0002	<0.2	6.4	0.154	0.011	7.6	109
Headwall No. 3		Q2 2009	1260	<0.02	<0.0005	<0.03	0.629	1.14	0.81	11.9	194	126	<0.005	465	<0.0002	0.31	4.31	0.151	<0.005	8.49	116
Headwall No. 3		Q3 2009	2080	<0.04	<0.05	<0.08	0.63	1.14	0.72	10.4	270	83.5	<0.01	464	0.001	<0.3	6.9	0.16	<0.01	7.74	119
Headwall No. 5		Q4 2008	283	<0.008	0.01	0.026	0.114	0.205	0.005	2.5	146	0.3	0.003	108	<0.0002	<0.1	1.4	0.033	<0.002	1.55	25.1
Headwall No. 5		Q1 2009	164	<0.004	<0.005	0.04	0.072	0.177	0.011	1.94	101	0.2	0.005	93	<0.0002	0.11	1.01	0.042	<0.001	1.11	19.6
Headwall No. 5		Q2 2009	214	<0.008	0.0015	0.015	0.181	0.311	0.021	4.47	264	0.59	0.003	137	<0.0002	0.12	1.11	0.103	0.0005	2.59	31.5
Headwall No. 5		Q3 2009	1640	<0.04	<0.05	<0.06	0.5	0.83	<0.05	10.5	715	6.1	<0.01	375	0.0006	0.3	6.1	0.12	<0.01	6.1	90.1
SX-3 Stormwater Pond		Q4 2008	1170	<0.02	<0.03	<0.02	0.384	0.798	0.197	7.54	237	56	0.02	457	<0.0002	0.06	3.09	0.094	<0.005	4.11	62
SX-3 Stormwater Pond		Q1 2009	1300	<0.02	<0.03	<0.06	0.471	0.946	0.176	8.5	257	21.4	<0.005	481	<0.0002	<0.2	4.8	0.135	0.008	4.59	95.6

NOTES
· Displayed results represent dissolved metals concentrations.
· mg/L= milligrams per liter.
· < = the analyte was not detected above the indicated reporting limit.
· J = the analyte was positively identified; however, the result is considered an estimated value.
· UJ = the analyte was not positively identified; the reporting limit is considered an estimated value.

Table 10
Active Facility Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
Central Investigation Area																										
Amargosa East Sump			Q4 2008	1400	140	300	-851.00	1500	160	270	0.026 U	0.34	0.17	1.6	0.75	0.64	1.6	1100	1.2	170	51	1.4	11	1100	1.4	180
Amargosa East Sump	Filtered		Q4 2008	1400	100	290	-855.00	1400	160	260	0.51	0.36	0.31	1.3	0.75	0.55	1.81	1100	1.5	170	55	2	12	1100	1.5	180
Amargosa East Sump			Q1 2009	1400	100	300	-641.00	980	180	200	2.6	0.48	0.99	2.9	0.95	1	5.5	980	1.7	170	61	2.8	14	1000	2.8	180
Amargosa East Sump	Filtered		Q1 2009	1300	120	280	-715.00	830	180	180	1.9	0.42	0.75	3	1.1	1.1	4.9	970	1.1	170	45	1.4	9.7	1000	0.88	180
Amargosa East Sump			Q2 2009	1600 J	120	330	-521.00	570	190	150	1.5	0.38	0.64	3.5	0.79	1.1	5	970	1.4	150	51	1	9.5	1100	1.4	170
Amargosa East Sump		Duplicate	Q2 2009	1200 J	110	270	-815.00	560	190	140	1.8	0.33	0.7	3.1	0.8	1	4.9	970	1.4	150	45	0.93	8.8	1000	1.2	160
Amargosa East Sump	Filtered		Q2 2009	1300 J	130	290	-708.00	580	240	170	2.1	0.35	0.77	3.3	0.9	1.1	5.4	960	2	160	48	0.66	10	1000	1.6	170
Amargosa East Sump	Filtered	Duplicate	Q2 2009	1600 J	140	350	-552.00	570	190	140	1.8	0.37	0.7	3.5	0.82	1.2	5.3	1000	1.6	160	52	0.66	10	1100	1.8	170
Amargosa East Sump			Q3 2009	1500	100	320	-746.00	670	180	160	2.1	0.37	0.8	4.4 J	0.85	1.4	6.5	1100	1.3	190	46	1.3	10	1100	1.1	200
Amargosa Pond			Q4 2008	3700	220	730	-1630.00	3300	380	610	0.17 U	0.36	0.23	1.5	0.79	0.63	1.5	2500	5.1	410	130	0.66	26	2700	3.2	430
Amargosa Pond	Filtered		Q4 2008	3600	270	740	-1830.00	2900	380	550	0.054 U	0.94	0.5	1.5	0.87	0.65	1.5	2600	4	410	130	0.66	26	2700	3.8	430
Amargosa Pond			Q1 2009	3000	370	750	-2110.00	3100	450	630	2.6	0.45	0.95	0.78 U	0.93	0.52	2.6	2400	3.4	430	110	0.66	25	2600	2.5	460
Amargosa Pond	Filtered		Q1 2009	3000	370	770	-2220.00	2900	460	590	2.7	0.46	1	1.3	0.79	0.57	4	2500	3.3	440	120	3.6	27	2600	2.8	460
Amargosa Pond			Q2 2009	3000	260	640	-2520.00	3000	360	560	2.4	0.44	0.9	1.6	0.94	0.69	4	2600	2.4	460	120 U	120	26	2800	1.1	490
Amargosa Pond	Filtered		Q2 2009	3400	310	730	-2630.00	3400	370	630	2.5	0.38	0.89	1	0.94	0.57	3.5	2900	2.2	510	130 U	130	29	3000	2.7	550
Amargosa West Sump			Q4 2008	8.4	2.2	2.7	-1.88	6.6	3.4	2.2	-0.14 U	0.44	0.2	0.2 U	0.79	0.38	ND	6.8	0.12	1.3	0.18	0.14	0.15	3.3	0.15	0.75
Amargosa West Sump	Filtered		Q4 2008	6.3	2.2	2.4	-1.36	7.8	4.8	2.9	0.15 U	0.43	0.25	0.15 U	0.76	0.37	ND	5.1	0.11	1	0.061 U	0.16	0.092	2.5	0.14	0.6
Amargosa West Sump			Q1 2009	4 U	4.9	3.2	NA	3.3 U	8.2	3.8	-0.014 U	0.41	0.14	0.5 U	0.73	0.39	ND	2.9	0.22	0.71	-0.012 U	0.17	0.098	1.5	0.2	0.45
Amargosa West Sump	Filtered		Q1 2009	3 U	5.5	3.1	NA	4.8 U	8.5	4.1	0.1 U	0.34	0.17	0.23 U	0.85	0.42	ND	2.7	0.03	0.54	0.092	0.036	0.071	1.2	0.087	0.3
Amargosa West Sump			Q2 2009	5	2.2	2	-4.00	3.1 U	3.5	1.8	0.071 U	0.36	0.15	-0.2 U	1.1	0.5	ND	6.4	0.12	1.3	0.1 U	0.15	0.11	2.5	0.12	0.64
Amargosa West Sump	Filtered		Q2 2009	7.2	2.1	2.5	-1.53	3.3	3.3	1.7	-0.06 U	0.33	0.14	-0.25 U	0.92	0.43	ND	6.6	0.15	1.3	0.027 U	0.18	0.09	2.1	0.057	0.55
Amargosa West Sump			Q3 2009	7.9	2.5	2.8	-2.09	3.7 U	5.5	2.8	-0.017 U	0.36	0.15	0.059 U	0.95	0.45	ND	7.2	0.2	1.4	0.086 U	0.2	0.12	2.7	0.24	0.69
B Pond			Q4 2008	630	120	170	-508.00	770	160	160	0.096 U	0.21	0.13	0.2 U	0.65	0.32	ND	540	1.1	85	38	0.9	7.5	560	1	89
B Pond	Filtered		Q4 2008	410	130	140	-728.00	720	160	160	0.3 U	0.4	0.27	0.74	0.66	0.4	0.74	530	1.1	84	38	0.91	7.5	570	1	89
B Pond			Q1 2009	330	230	180	-592.00	430	270	160	0.29 U	0.5	0.3	0.71 U	0.73	0.43	ND	440	0.71	75	62	0.56	12	420	0.47	73
B Pond	Filtered		Q1 2009	670	220	260	-332.00	750	270	210	0.24 U	0.41	0.25	0.49 U	0.75	0.4	ND	480	0.59	83	22	0.62	4.9	500	0.7	88
B Pond			Q2 2009	430	190	170	-389.00	370	350	190	0.37	0.35	0.28	0.33 U	0.89	0.44	0.37	390	0.17	65	19 U	19	3.5	410	0.17	70
B Pond	Filtered		Q2 2009	450	170	170	-422.00	480	350	200	0.2 U	0.39	0.23	0.16 U	0.82	0.39	ND	410	0.37	69	22 U	22	4.5	440	0.37	74
B Pond			Q3 2009	880	170	240	-73.00	560	230	160	0.21 U	0.46	0.25	0.24 U	1.3	0.61	ND	460	0.5	80	23	0.49	4.8	470	0.66	81
B Seepage Silo			Q4 2008	320	51	83	-201.00	380	59	75	0.26 U	0.46	0.3	1.8	0.58	0.64	1.8	240	0.54	38	11	0.48	2.5	270	0.48	42
B Seepage Silo	Filtered		Q4 2008	370	47	93	-184.00	380	58	75	0.18 U	0.37	0.23	3	0.67	0.99	3	270	0.93	43	14	0.73	3.5	270	0.85	43
B Seepage Silo			Q1 2009	290	60	83	-204.00	230	98	67	0.7	0.45	0.41	1.7	1	0.76	2.4	230	0.47	39	14	0.37	3	250	0.47	42
B Seepage Silo	Filtered		Q1 2009	320	53	88	-193.00	200	96	62	1.5	0.4	0.65	1.8	0.85	0.72	3.3	240	0.38	41	13	0.37	2.8	260	0.32	44
B Seepage Silo			Q3 2009	370	50	92	-18.60	250	85	65	0.63	0.39	0.39	0.42 U	0.87	0.44	0.63	190	0.16	32	8.6	0.099	1.8	190	0.084	34
Bailey Lake			Q4 2008	3100	280	660	-2230.00	3300	380	600	0.17 U	0.31	0.21	1.3	0.74	0.56	1.3	2500	4.1	410	130	1.4	26	2700	3.9	430
Bailey Lake	Filtered		Q4 2008	3500	260	720	-1720.00	3200	380	600	0.23 U	0.24	0.2	1.5	0.64	0.56	1.5	2500	3	400	120	2.6	25	2600	3.2	410
Bailey Lake			Q1 2009	3800	250	780	-1330.00	2600	380	500	2.6 J	0.34	0.92	0.57 U	0.78	0.43	2.6	2400 J	3.6	470	130 J	3.3	30	2600 J	2.3	510
Bailey Lake	Filtered		Q1 2009	3300	220	680	-2120.00	2600	370	490	2.7 J	0.38	0.95	0.68 U	0.71	0.41	2.7	2600	3.2	460	120	3	27	2700	2.6	490
Bailey Lake			Q2 2009	2800	240	610	-2530.00	2000	330	400	3.4	0.37	1.2	0.11 U	0.76	0.36	3.4	2500	3.8	450	130	3.6	27	2700	3.7	480
Bailey Lake	Filtered		Q2 2009	2400	260	540	-2720.00	1800	320	370	3.1	0.38	1.1	0.23 U	0.8	0.39	3.1	2400 J	0.28	390	120 J	0.33	21	2600 J	0.95	420
Bailey Lake			Q3 2009	3300	220	670	-2020.00	2200	370	440	3.3	0.42	1.1	0.56 U	0.79	0.43	3.3	2500	2.9	450	120	1.3	26	2700	2.1	480
Bailey Sump			Q4 2008	1800	190	410	-1583.00	1700	330	360	-0.46 U	0.75	0.35	0.95	0.72	0.47	0.95	1600	0.8	250	83	1.8	17	1700	0.8	260
Bailey Sump	Filtered		Q4 2008	2100	240	470	-1083.00	1900	340	400	-0.36 U	1.1	0.48	1	0.73	0.49	1	1500	2.1	240	83	1	17	1600	2.1	260
Bailey Sump			Q1 2009	2000	220	460	-1400.00	1500	370	340	1 J	0.51	0.53	0.95	0.71	0.47	1.95	1600	2.2	300	100	2.1	22	1700	1.8	320
Bailey Sump	Filtered		Q1 2009	2100	190	470	-1379.00	1300	370	310	0.69 J	0.44	0.42	1	0.81	0.52	1.69	1700	1.7	310	79	2	18	1700	2.1	320
Bailey Sump			Q2 2009	1800	220	410	-2100.00	930	320	250	1.5	0.4	0.67	0.71	0.68	0.41	2.21	1800	3.8	320	100	1.2	22	2000	1.9	350
Bailey Sump	Filtered		Q2 2009	1900	200	430	-1680.00	960	320	250	0.87	0.38	0.44	1.5	0.77	0.61	2.37	1700	2.1	290	80	0.96	17	1800	2.5	310
Bailey Sump			Q3 2009	2000	140	420	-1270.00	1000	250	230	0.86	0.46	0.48	0.98 J	0.74	0.48	1.84	1600	1.7	280	70	1.7	15	1600	1.2	300

Table 10
Active Facility Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
Central Investigation Area (continued)																										
C Seepage Silo			Q4 2008	47 J	33	24	-52.50	90	61	36	-0.1 U	0.56	0.26	1.9	0.72	0.69	1.9	49	0.061	7.7	2.5	0.037	0.54	48	0.074	7.6
C Seepage Silo	Filtered		Q4 2008	58	34	27	-35.50	89	63	36	0.38	0.12	0.27	1.9	0.67	0.69	2.28	45	0.12	7.1	2.5	0.04	0.54	46	0.09	7.3
C Seepage Silo			Q1 2009	130	27	36	28.40	45	36	20	0.79	0.49	0.46	1.3	0.79	0.58	2.09	49	0.15	8.3	2.6	0.2	0.69	50	0.17	8.6
C Seepage Silo	Filtered		Q1 2009	130 J	26	37	34.90	59	35	21	0.15 U	0.48	0.23	1.5	0.79	0.61	1.5	46	0.18	8	2.1	0.15	0.59	47	0.17	8.1
Decant Solution (Molybdenum)			11/10/2008	0.062 U	14	5.6	NA	13 U	20	9.9	0.58 U	0.6	0.45	0.26 U	0.72	0.36	ND	0.32 J	0.087	0.13	0.016 U	0.12	0.053	0.18 U	0.18	0.1
Decant Solution (Molybdenum)		Duplicate	11/10/2008	-1.1 U	12	4	NA	28	20	11	0.41	0.4	0.31	0.54 U	0.82	0.44	0.41	0.71 J	0.21	0.29	-0.025 U	0.2	0.1	0.51 U	0.51	0.24
Decant Solution (Molybdenum)	Filtered		11/10/2008	4.8 U	14	6.8	NA	9.7 U	20	9.6	0.2 U	0.37	0.24	-0.096 U	0.7	0.32	ND	0.096 U	0.17	0.11	0.027 U	0.074	0.099	0.14 U	0.17	0.13
Decant Solution (Molybdenum)	Filtered	Duplicate	11/10/2008	-2 U	11	3.6	NA	15 U	21	10	0.23 U	0.46	0.25	0.56 U	0.85	0.45	ND	0.019 U	0.16	0.076	0.025 U	0.11	0.056	0.088 U	0.14	0.087
Decant Solution (Molybdenum)			12/19/2008	-1.5 UJ	14	4.9	NA	16 U	19	9.8	0.2 U	0.41	0.25	1.4	1.2	0.72	1.4	0.56	0.21	0.2	0.031 U	0.083	0.053	0.29 U	0.29	0.13
Decant Solution (Molybdenum)	Filtered		12/19/2008	4.4 U	14	6.7	NA	15 U	20	10	0.14 U	0.66	0.37	0.42 U	1.3	0.64	ND	0.52	0.13	0.24	0 U	0.077	0.1	0.22 U	0.22	0.15
Decant Solution (Molybdenum)			1/29/2009	4.2 U	11	5.4	NA	13 U	15	7.7	0.29 U	0.42	0.27	0.055 U	1	0.49	ND	0.66 U	0.66	0.26	0.025 U	0.068	0.09	0.67	0.11	0.26
Decant Solution (Molybdenum)	Filtered		1/29/2009	0.17 U	12	4.5	NA	14 U	20	9.8	0.41	0.36	0.31	0.71 U	1	0.55	0.41	0.59 U	0.59	0.25	0.056 U	0.19	0.098	0.28	0.14	0.17
Decant Solution (Molybdenum)			2/26/2009	13 U	31	15	NA	21 U	59	28	0.25 U	0.35	0.23	0.21 U	1	0.48	ND	0.35	0.2	0.21	0.048 U	0.15	0.1	0.35	0.15	0.2
Decant Solution (Molybdenum)	Filtered		2/26/2009	-0.43 U	32	12	NA	16 U	59	27	0.29 U	0.38	0.25	-0.27 U	1.1	0.51	ND	0.35	0.2	0.21	0.03 U	0.081	0.11	0.23	0.068	0.16
Decant Solution (Molybdenum)			3/26/2009	-4.2 U	15	4.7	NA	13 U	21	10	0.28 U	0.47	0.29	0.63 U	1	0.54	ND	0.24 U	0.24	0.091	0.04 U	0.059	0.043	0.14	0.089	0.077
Decant Solution (Molybdenum)	Filtered		3/26/2009	0.79 U	13	5.1	NA	14 U	20	10	0.54	0.52	0.42	0.54 U	0.91	0.48	0.54	0.15 U	0.16	0.11	0.038 U	0.15	0.074	0.025 U	0.18	0.085
Decant Solution (Molybdenum)			5/14/2009	-1.7 U	12	4	NA	16 U	21	11	0.53	0.34	0.34	0.2 U	0.9	0.43	0.53	0.47 U	0.47	0.17	0.021 U	0.095	0.061	0.47 U	0.47	0.17
Decant Solution (Molybdenum)	Filtered		5/14/2009	1.1 U	10	4.3	NA	15 U	16	8.1	0.58	0.39	0.37	-0.1 U	0.79	0.37	0.58	0.25 U	0.25	0.17	0.028 U	0.075	0.1	0.13 U	0.13	0.12
Decant Solution (Molybdenum)			6/15/2009	0.16 U	3	1.7	NA	9.3	5.2	3.6	0.63	0.49	0.42	0.17 U	0.74	0.36	0.63	0.5	0.12	0.23	-0.016 U	0.16	0.095	0.39	0.12	0.2
Decant Solution (Molybdenum)	Filtered		6/15/2009	1 U	3.1	1.8	NA	3.9 U	5.5	3.4	0.39 U	0.45	0.33	-0.1 U	0.77	0.36	ND	0.067 U	0.19	0.1	-0.0084 U	0.15	0.1	0.041 U	0.13	0.086
Decant Solution (Molybdenum)			7/15/2009	11 U	20	10	NA	38	32	17	0.72	0.41	0.42	0.39 U	0.79	0.4	0.72	2.9	0.2	0.71	0.15 U	0.17	0.14	1.4	0.17	0.43
Headwall No. 1			Q4 2008	2800	210	590	-2530.00	3100	370	570	0.021 U	0.41	0.22	1.4	0.63	0.54	1.4	2500	1.1	400	130	2.6	25	2700	2.2	440
Headwall No. 1	Filtered		Q4 2008	3700	270	760	-1420.00	3000	380	570	0.6	0.22	0.32	1.4	0.66	0.56	2	2400	1.1	390	120	2.4	24	2600	1.1	410
Headwall No. 1			Q1 2009	2700	210	580	-2880.00	2400	350	470	2.9 J	0.48	1.1	0.49 U	0.76	0.4	2.9	2500	2.3	450	180	2.7	35	2900	2.7	510
Headwall No. 1	Filtered		Q1 2009	3300	220	670	-1310.00	2300	360	460	2.3 J	0.43	0.85	0.63 U	0.78	0.43	2.3	2200 J	1.7	420	110 J	2	26	2300 J	2.3	450
Headwall No. 1			Q2 2009	2700	220	580	-2220.00	1700	320	360	3.4	0.36	1.1	0.15 U	0.76	0.36	3.4	2300	2.3	400	120	2.8	26	2500	2.3	440
Headwall No. 1	Filtered		Q2 2009	3200	230	660	-2440.00	1800	320	370	3.6	0.38	1.2	-0.082 U	0.77	0.36	3.6	2700	1.1	470	140	2.5	29	2800	2.8	500
Headwall No. 1			Q3 2009	3900	280	800	-1520.00	2200	370	440	2.9	0.36	1	0.4 U	0.82	0.42	2.9	2600	3.2	460	120	3.4	26	2700	2.6	480
Raffinate Pond No. 2			Q4 2008	2600	230	560	-2720.00	3200	350	590	0.42 U	0.5	0.38	1	0.77	0.51	1	2500	2.9	390	120	2.5	24	2700	3.2	430
Raffinate Pond No. 2	Filtered		Q4 2008	3200	230	670	-2010.00	3000	350	560	0.43	0.078	0.25	1.3	0.74	0.56	1.73	2500	1.1	390	110	2.5	22	2600	2.1	410
Raffinate Pond No. 2			Q1 2009	3500	230	710	-1410.00	2600	350	490	3	0.35	1	0.95 J	0.93	0.55	3.95	2300	3	410	110	3.8	25	2500	2.2	440
Raffinate Pond No. 2	Filtered		Q1 2009	3300	210	660	-1320.00	2500	330	480	3.4	0.35	1.1	0.46 U	0.9	0.46	3.4	2200	3.7	380	120	1.1	25	2300	1.9	400
Raffinate Pond No. 2			Q2 2009	2300	220	510	-2830.00	2400	350	460	3	0.34	1	0.59 U	0.89	0.48	3	2400	2.4	420	130 U	130	28	2600	1	460
Raffinate Pond No. 2	Filtered		Q2 2009	2600	230	570	-2620.00	2400	340	460	2.6	0.4	0.95	0.65 U	0.85	0.47	2.6	2500	1.2	430	120 U	120	27	2600	2.4	460
Raffinate Pond No. 2			Q3 2009	2600	200	550	-2730.00	2600	340	490	3.7	0.37	1.2	0.64 U	0.81	0.45	3.7	2500	4.2	440	130	2.5	27	2700	3.6	480
SX-Sump 1			Q4 2008	1100 J	94	230	-485.00	1100	170	210	0.088 U	0.7	0.37	0.59 U	0.68	0.38	ND	750	1.1	120	35	0.47	7.3	800	0.93	130
SX-Sump 1		Duplicate	Q4 2008	890 J	100	210	-702.00	1000	170	200	-0.033 U	0.7	0.36	0.58 U	0.72	0.4	ND	760	1.6	120	32	1.1	6.9	800	1	130
SX-Sump 1	Filtered		Q4 2008	1100	110	240	-439.00	910	180	190	0 U	0.96	0.48	0.55 U	0.71	0.39	ND	720	1.5	110	39 J	1.4	7.8	780	0.95	120
SX-Sump 1	Filtered	Duplicate	Q4 2008	1000	100	230	-662.00	970	170	200	-0.26 U	0.77	0.38	0.27 U	0.83	0.41	ND	790	1.2	130	52 J	0.95	10	820	1.2	130
SX-Sump 1			Q1 2009	900	100	210	-332.00	520	170	130	0.033 U	0.35	0.13	0.079 U	0.9	0.42	ND	590	2.1	100	32	1.6	8.2	610	1.6	100
SX-Sump 1	Filtered		Q1 2009	680	88	170	-479.00	610	160	140	0.53	0.35	0.34	0.15 U	0.9	0.43	0.53	540	4.1	93	29	3	8	590	1.8	100
SX-Sump 1			Q2 2009	830	91	190	-391.00	260	150	91	0.089 U	0.44	0.19	0.023 U	0.87	0.41	ND	570	0.63	97	31 U	31	6.7	620	0.76	100
SX-Sump 1	Filtered		Q2 2009	690	85	170	-515.00	370	150	100	0.33 U	0.38	0.27	0.0065 U	0.82	0.38	ND	580	1.1	98	25 U	25	5.7	600	0.99	100
SX-Sump 1			Q3 2009	1000	110	230	-763.00	420	150	110	0.25 U	0.45	0.26	0.16 U	0.68	0.33	ND	830	1.2	140	43	0.93	9.2	890	1.2	150
SX-Sump 2			Q4 2008	540	84	130	-186.00	520	120	110	0.064 U	0.28	0.16	0.53 U	0.91	0.48	ND	350	0.53	55	16	0.42	3.4	360	0.53	57
SX-Sump 2	Filtered		Q4 2008	490	78	120	-289.00	450	120	100	0 U	0.42	0.21	0.31 U	0.83	0.41	ND	370	0.52	59	19	0.23	4	390	0.46	63
SX-Sump 2			Q1 2009	1000	120	240	-282.00	770	220	180	0.85	0.35	0.43	0.11 U	0.96	0.46	0.85	610	0.96	100	32	1.1	6.8	640	0.64	110
SX-Sump 2	Filtered		Q1 2009	810	88	190	-528.00	800	160	170	0.27 U	0.36	0.24	0.078 U	0.94	0.44	ND	610	12	110	38	7	16	690	11	130
SX-Sump 2			Q2 2009	680	81	160	-292.00	590	140	130	0.42	0.34	0.3	0.097 U	0.81	0.38	0.42	460	0.67	80	22 U	22	4.8	490	0.63	85
SX-Sump 2	Filtered		Q2 2009	650	83	160	-456.00	590	130	130	0.67	0.42	0.39	0.18 U	0.8	0.38	0.67	520	0.75	92	26 U	26	5.6	560	0.84	99
SX-Sump 2			Q3 2009	570	85	140	-9260.00	530	140	120	0.45	0.37	0.32	0.42 U	0.82	0.42	0.45	4700	5.5	810	230	4.8	48	4900	5.5	840

Table 10
Active Facility Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
Central Investigation Area (continued)																										
SX-Sump 3			Q4 2008	1300	100	280	-849.00	1300	170	250	0 U	0.56	0.27	0.65 U	0.85	0.47	ND	1000	1.4	180	49	0.49	10	1100	1.1	180
SX-Sump 3	Filtered		Q4 2008	1500	120	320	-855.00	1300	180	250	0.094 U	0.23	0.16	0.065 U	1.1	0.5	ND	1100	1.7	200	55	1.1	12	1200	1.2	200
SX-Sump 3			Q1 2009	1500	140	330	-863.00	1200	230	250	0.37 U	0.39	0.29	0.71 U	1	0.56	ND	1100	5.3	190	63	2.2	18	1200	1.8	200
SX-Sump 3	Filtered		Q1 2009	1300	150	290	-861.00	1100	230	240	0.39	0.37	0.29	0.15 U	0.86	0.41	0.39	1000	2.1	170	61	1.5	13	1100	1.9	180
SX-Sump 3			Q2 2009	840	86	190	-386.00	490	140	120	0.26 U	0.32	0.23	0.4 U	0.81	0.41	ND	590	1.1	100	26 U	26	5.9	610	0.8	100
SX-Sump 3	Filtered		Q2 2009	850	100	200	-338.00	440	140	110	0.35 U	0.41	0.29	0.11 U	0.83	0.39	ND	560	0.99	100	28 U	28	6.2	600	0.3	110
SX-Sump 3			Q3 2009	450	74	120	-316.00	220	140	84	0.1 U	0.4	0.18	0.36 U	0.73	0.37	ND	360	0.16	64	16	0.19	3.5	390	0.38	68
East Investigation Area																										
Reclaim Pond Settling Basin			11/10/2008	26 U	31	19	NA	54 U	58	30	1.6	0.37	0.66	0.8 U	0.91	0.52	1.6	13	0.21	2.4	1.3	0.15	0.45	15	0.18	2.8
Reclaim Pond Settling Basin	Filtered		11/10/2008	35 J	27	20	8.47	43 U	59	30	1	0.37	0.5	1.3	0.85	0.6	2.3	13	0.16	2.1	0.53	0.12	0.2	13	0.15	2.1
Reclaim Pond Settling Basin			12/19/2008	9.6 U	18	9.7	NA	44	30	17	0.62	0.18	0.28	1.6	0.97	0.69	2.22	8.3	0.22	1.7	0.36	0.11	0.25	8	0.22	1.6
Reclaim Pond Settling Basin		Duplicate	12/19/2008	15 U	21	12	NA	67	30	20	0.77	0.27	0.36	NA	NA	NA	NA	8.3	0.12	1.5	0.49	0.14	0.24	8.4	0.061	1.6
Reclaim Pond Settling Basin	Filtered		12/19/2008	9.8 U	22	11	NA	45	32	18	0.62	0.18	0.27	NA	NA	NA	NA	8.5	0.15	1.6	0.46	0.14	0.24	7.7	0.063	1.5
Reclaim Pond Settling Basin	Filtered	Duplicate	12/19/2008	19 U	21	13	NA	46	30	17	0.89	0.28	0.39	0.82 U	0.88	0.51	0.89	8.4	0.18	1.5	0.48	0.16	0.24	7.5	0.13	1.4
Reclaim Pond Settling Basin			2/3/2009	12 U	21	12	NA	70	30	21	1.9	0.49	0.77	1.2 J	1.1	0.69	3.1	5.8	0.06	1.2	0.17	0.14	0.14	6.4	0.16	1.3
Reclaim Pond Settling Basin	Filtered		2/3/2009	13 U	18	10	NA	42	30	17	1.2	0.49	0.61	0.98 J	0.9	0.55	2.18	6.1	0.19	1.3	0.28	0.2	0.19	5.5	0.25	1.2
Reclaim Pond Settling Basin			2/26/2009	15 U	30	15	NA	53 U	58	30	1.3	0.36	0.55	0.74 U	0.94	0.52	1.3	4.9	0.27	1.1	0.35	0.087	0.22	5.3	0.26	1.2
Reclaim Pond Settling Basin	Filtered		2/26/2009	20 U	31	17	NA	40 U	59	29	0.88	0.35	0.44	0.56 U	0.9	0.48	0.88	5	0.12	0.92	0.21	0.11	0.12	4.6	0.12	0.86
Reclaim Pond Settling Basin			3/26/2009	3.2 U	21	9.1	NA	45	30	18	1.7	0.41	0.7	1.2	0.81	0.55	2.9	3	0.33	0.75	0.04 U	0.18	0.1	3.4	0.23	0.81
Reclaim Pond Settling Basin	Filtered		3/26/2009	2.6 U	23	9.5	NA	29 U	32	16	1.5	0.46	0.64	1.4	0.87	0.63	2.9	2.6	0.19	0.65	0.068 U	0.18	0.1	2.7	0.19	0.69
Reclaim Pond Settling Basin			5/14/2009	7.8 U	23	11	NA	39	35	19	2.4	0.44	0.88	1.7	0.86	0.7	4.1	2.3 U	2.3	0.59	0.053 U	0.072	0.097	2.1 U	2.1	0.56
Reclaim Pond Settling Basin	Filtered		5/14/2009	4.5 U	21	9.5	NA	35	33	17	2	0.39	0.77	1.5	0.75	0.6	3.5	2.2 U	2.2	0.59	0.19	0.075	0.15	2.2 U	2.2	0.59
Reclaim Pond Settling Basin			7/15/2009	6 U	23	10	NA	47	32	18	1.8	0.46	0.74	1.4	0.69	0.57	3.2	3.4	0.23	0.82	0.092 U	0.16	0.11	2.5	0.16	0.66
West Investigation Area																										
Headwall No. 2			Q4 2008	2900	220	600	-2130.00	3000	340	550	2.7 J	0.92	1.1	0.5 U	0.65	0.36	2.7	2400	2	390	130	1.2	25	2500	1	410
Headwall No. 2	Filtered		Q4 2008	2800	200	600	-2220.00	3200	330	580	-0.027 U	0.38	0.18	0.51 U	0.66	0.36	ND	2400	2.3	380	120	1.2	24	2500	2.3	400
Headwall No. 2			Q1 2009	2900	190	590	-2230.00	2100	350	420	2.8	0.35	0.95	-0.057 U	1	0.48	2.8	2400	3.6	430	130	1.3	28	2600	3.4	470
Headwall No. 2	Filtered		Q1 2009	3400	190	690	-1620.00	2200	350	430	3	0.38	1	0.92 U	0.98	0.57	3	2300	2.9	410	120	2.3	25	2600	2.9	450
Headwall No. 2			Q2 2009	2000	230	470	-3010.00	1500	350	330	2.2	0.39	0.83	0.61 U	0.8	0.44	2.2	2400	2.9	420	110	2.3	25	2500	3.7	430
Headwall No. 2	Filtered		Q2 2009	2500	220	560	-2630.00	1600	350	340	1.7	0.37	0.68	0.74 U	0.85	0.48	1.7	2500	4.7	440	130	3.5	28	2500	4.1	450
Headwall No. 2			Q3 2009	3100	210	640	-1910.00	1600	380	360	3.4 J	0.37	1.1	0.19 U	0.7	0.34	3.4	2400	3.3	420	110	3.3	24	2500	2.8	450
Headwall No. 2		Duplicate	Q3 2009	3200	240	660	-1400.00	1600	380	360	2.2 J	0.4	0.85	0.19 U	0.77	0.37	2.2	2200	1.8	390	100	2.5	21	2300	0.92	410
Headwall No. 3			Q4 2008	3700	210	740	-1610.00	3700	350	660	0.5 U	0.87	0.56	1.8	0.81	0.69	1.8	2500	4.2	400	110	3.7	24	2700	4.2	430
Headwall No. 3	Filtered		Q4 2008	3400	220	690	-2220.00	3400	340	620	-0.09 U	0.87	0.47	2	0.7	0.72	2	2700	4	450	120	1.5	26	2800	3	460
Headwall No. 3			Q1 2009	3200	220	660	-2230.00	2800	340	520	4.6	0.46	1.5	1.9 J	1.2	0.85	6.5	2600	2.1	460	130	1.2	28	2700	2.5	480
Headwall No. 3	Filtered		Q1 2009	4000	230	790	-1540.00	2500	330	470	3.7	0.47	1.3	2 J	1.1	0.84	5.7	2600	1.2	470	140	1.4	31	2800	1.2	500
Headwall No. 3			Q2 2009	2800	250	610	-1710.00	1600	380	350	4.2	0.37	1.3	0.33 U	0.9	0.45	4.2	2100	3.2	370	110	3	24	2300	3.5	400
Headwall No. 3	Filtered		Q2 2009	2800	230	600	-2410.00	1600	380	360	4.8	0.34	1.5	0.49 U	0.84	0.44	4.8	2400	3.2	430	110	2.9	24	2700	3	470
Headwall No. 3			Q3 2009	2100	210	480	-3430.00	1700	340	350	4	0.46	1.3	0.1 U	0.81	0.39	4	2600	1.1	460	130	3	29	2800	1.1	500
Headwall No. 5			Q4 2008	750	64	160	-301.00	790	96	150	0.32 U	0.38	0.28	0.95	0.73	0.48	0.95	510	0.95	80	21	0.7	4.6	520	0.72	82
Headwall No. 5	Filtered		Q4 2008	770	66	160	-340.00	750	100	140	0.45 J	0.29	0.26	1.4	0.73	0.57	1.85	530	1.1	84	30	0.41	6.3	550	1.1	88
Headwall No. 5			Q1 2009	510	40	110	-209.00	410	73	84	1	0.47	0.51	2.3 J	1	0.89	3.3	340	0.32	57	29	0.19	5.6	350	0.32	58
Headwall No. 5	Filtered		Q1 2009	460	47	100	-307.00	480	73	94	1	0.42	0.51	2.2 J	1.1	0.88	3.2	370	0.41	62	17	0.4	3.6	380	0.17	64
Headwall No. 5			Q2 2009	1100	90	240	-364.00	590	140	130	0.83	0.46	0.46	2.3	0.74	0.81	3.13	700	1.3	120	34	0.77	7.1	730	0.34	120
Headwall No. 5	Filtered		Q2 2009	1200	110	260	-545.00	660	150	140	1	0.38	0.5	1.8	0.74	0.68	2.8	820	1.4	140	45	0.48	9.5	880	0.41	150
Headwall No. 5			Q3 2009	1900	200	430	-2400.00	1900	340	380	3.5	0.39	1.2	3.9	0.79	1.3	7.4	2100	0.87	360	100	2	22	2100	2.5	370

Table 10
Active Facility Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
West Investigation Area (continued)																										
SX-3 Stormwater Pond			Q4 2008	1500	180	340	-1472.00	1900	220	350	0.23 U	0.38	0.25	0.67 U	0.72	0.42	ND	1400	3.2	230	72	2	15	1500	1.7	230
SX-3 Stormwater Pond	Filtered		Q4 2008	1400	170	330	-1572.00	1900	230	350	0.28 U	0.41	0.28	1.4	0.79	0.6	1.4	1400	3.8	220	72	2.9	15	1500	2.1	240
SX-3 Stormwater Pond			Q1 2009	1900	200	440	-1072.00	1800	320	370	0.62	0.38	0.38	1 U	1.2	0.69	0.62	1400	1.5	240	72	0.78	15	1500	0.66	250
SX-3 Stormwater Pond	Filtered		Q1 2009	1800	200	420	-1574.00	1800	310	370	0.56	0.39	0.36	0.52 U	1.1	0.58	0.56	1600	0.72	270	74	1.6	16	1700	1.4	280

NOTES
· pCi/L= picocuries per liter.
· MDC = Minimum Detectable Concentration.
· TPU = Total Propagated Uncertainty.
· J = the analyte was positively identified; however, the result is considered an estimated value.
· U = the analyte was not positively identified above the MDC.
· UJ = the analyte was not positively identified; the reporting limit is considered an estimated value.
· ND = non-detect; neither the Ra-226 nor the Ra-228 concentration was positively identified above its respective MDC.
· NA = not analyzed.

Table 11
Tailings Material Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Sample ID	Depth (ft bgs)		Duplicate	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Solids, Percent	Thallium	Uranium	Zinc
	Top	Bottom			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(%)	(mg/kg)	(mg/kg)	(mg/kg)
Esperanza Tailings Impoundment																						
ET-SB01-0-20	0	20		9/17/2008	<1	4.6	46.2	0.6	<2	5	8	307	44.3	366	<0.2	59 J	3	1.08	90.1	0.3	4.68	56
ET-SB01-20-40	20	40		9/18/2008	0.5 J	6.3	53.5	0.7	<2	7	10	647	15.2	367	<0.2	54	5	1.24	90	0.26	5.28	82
ET-SB01-40-60	40	60		9/18/2008	0.5	5.3	59.8	0.7	<2	10	10	966	22.7	333	<0.2	81	7	1.52	86.3	0.39	5.86	52
ET-SB01-60-80	60	80		9/18/2008	<1	2.5	67.2	0.5	<2	7	5	258	6.03	188	<0.2	9	4	0.15	96.1	0.18	1.33	24
ET-SB01-80-100	80	100		9/18/2008	<1	2	43.6	0.3	<2	5	4	213	4.17	157	<0.2	7	3	0.09	94.7	0.14	1.36	20
ET-SB02-0-20	0	20		9/19/2008	0.3	3.4	51	0.6	<2	6	6	299	8.17	331	<0.2	61	3	0.83	88.7	0.2	5.34	72
ET-SB02-20-40	20	40		9/19/2008	0.3	5.6	53.3	0.7	<2	7	9	772	20.1	428	<0.2	72	5	1.16	91.3	0.2	4.93	61
ET-SB02-40-50	40	50		9/19/2008	0.2	5.9	48.6	0.8	<2	15	10	745	16.8	319	<0.2	88	10	1.22	83	0.33	6.16	65
ET-SB02-50-60	50	60		9/19/2008	0.4	6.1	161	0.8	<2	7	8	721	35.6	526	<0.2	22	5	0.3	92.2	0.13	1.69	77
ET-SB02-60-80	60	80		9/19/2008	0.5	5.3	78.3	0.5	<2	35 J	6	428	18.1 J	302	<0.2	22	5 J	0.33	97.7	0.09	1.38	61
ET-SB02-60-80D	60	80	Duplicate	9/18/2008	0.5	4.8	74.7	0.5	<2	11 J	4	392	40.3 J	304	<0.2 UJ	28	29 J	0.29	94.7	0.13	1.45	58
ET-SB02-80-100	80	100		9/19/2008	0.7	14.9	53.7	0.6	<2	8	5	434	20.6	223	<0.2	30	3	0.45	93.9	0.08	1.34	74
Sierrita Tailings Impoundment																						
ST-SB01-0-20	0	20		9/24/2008	0.3	1.2	64.2	0.3	<2	4	7	348	3.08	203	<0.2	35 J	3	0.72	86	0.41	5.7	31
ST-SB01-20-40	20	40		9/24/2008	0.4 J	1.9	77.9	<1	<2	3	5	322	3.13	158	<0.2	54	2	0.53	87	0.21	5.15	25
ST-SB01-40-60	40	60		9/24/2008	1.2	7.1	89.8	0.4	<2	6	6	342	4.94	218	<0.2	77	4	0.79	84.3	0.49	5.61	31
ST-SB01-60-80	60	80		9/24/2008	0.2	2.4	79.1	0.4	<2	7	7	336	6.59	270	<0.2	50	4	0.99	83.4	0.33	5.49	41
ST-SB01-80-100	80	100		9/24/2008	0.6	3	80.4	0.5	<2	7	9	599	7.75	310	<0.2	94	5	1.15	84.2	0.29	5.13	66
ST-SB01-100-120	100	120		9/25/2008	0.3	3.8	73.7	0.6	<2	6	7	610	11.7	428	<0.2	65	4	1.21	83.5	0.2	4.64	113
ST-SB01-120-140	120	140		9/25/2008	0.2	1.7	108	0.5	<2	7	7	262	5.14	305	<0.2	49	3	0.82	84.6	0.24	7.23	58
ST-SB01-140-160	140	160		9/25/2008	<1	1.4	117	0.4	<2	16	11	451	4.7	280	<0.2	69	10	0.97	85.2	0.31	3.92	46
ST-SB01-160-180	160	180		9/25/2008	0.2	1.7	92.4	0.4	<2	12	10	264	3.69	278	<0.2	57	9	0.82	79.1	0.3	5.41	45
ST-SB01-180-200	180	200		9/25/2008	0.2	1.4	98.2	0.4	<2	12	8	125	7.38	264	<0.2	28	8	0.74	82.7	0.39	3.37	49
ST-SB01-200-220	200	220		9/26/2008	<1	2.1	107	0.4	<2	12	10	291	4.96	342	<0.2	55	9	1.01	86.9	0.31	3.43	62
ST-SB01-220-235.5	220	235.5		9/26/2008	0.2	2.4	126	0.6	<2	21	11	245	11.7	400	<0.2	35	13	1.1	89.4	0.38	4.81	83
ST-SB01-237-255.5	237	255.5		9/26/2008	0.4	7	91.2	0.8	<2	10	8	378	24.5	413	<0.2	12	7	0.26	87.5	0.16	1.4	75
ST-SB03-0-20	0	20		10/2/2008	0.2	1.9	71.7	0.3	<2	5	6	258	3.4	211	0.07	40	3	0.65	86.1	0.14	4.6	34
ST-SB03-20-40	20	40		10/2/2008	0.2	1.6	91	0.4	<2	6	7	289	4.44	223	0.06	34	3	0.8	81.8	0.15	5.23	31
ST-SB03-40-60	40	60		10/2/2008	0.3	2.3	71.1	0.4	<2	6	7	325	4	208	<0.2	41	3	0.78	86.2	0.13	4.77	26
ST-SB03-60-80	60	80		10/2/2008	<1	2.7	79.8	0.5	<2	7	7	398	6.28	277	0.05	47	3	0.79	87.2	0.16	4.73	36
ST-SB03-80-100	80	100		10/2/2008	<1	2.4	77.1	0.6	<2	12	9	477	9.33	360	0.05	54	7	1.09	84.8	0.18	4.78	80
ST-SB03-100-120	100	120		10/3/2008	<1	3	89.6	0.8	<2	10	8	443	12.1	476	<0.2	75	5	1.3	78.1	0.19	6.71	147
ST-SB03-120-140	120	140		10/3/2008	<1	1.8	114	0.5	<2	8	8	373	5.46	272	<0.2	45	4	0.92	81.1	0.17	5.42	47
ST-SB03-140-160	140	160		10/3/2008	<1	2	103	0.6	<2	11	9	277	8.17	314	<0.2	44	6	0.97	79.5	0.21	4.38	52
ST-SB03-160-180	160	180		10/3/2008	<1	2.4	114	0.5	<2	14	17	279	6.79 J	325	<0.2	38 J	10	1.62	86.1	0.26	4.07	66
ST-SB03-160-180D	160	180	Duplicate	10/3/2008	0.3	2.2	128	0.4	<2	11	11	457	11.8 J	332	<0.2 UJ	90 J	7	1.06	92.8	0.32	4.73	74 J
ST-SB03-180-200	180	200		10/3/2008	<1	1.8	28.5	0.4	<2	3	3	111	6.47	113	<0.2	8	2	0.09	95.7	0.06	1.22	20
ST-SB03-200-210	200	210		10/3/2008	0.2	3.1	72.2	0.7	<2	7	5	306 J	23.2	217 J	<0.2	12	4	0.16	92.9	0.27	1.83	46
ST-SB04-0-20	0	20		10/5/2008	2.4 J	3.2	69.3	0.4	<2	5	6	311	3.53	240	0.06	34	3	0.59	85	0.2	5.39	33
ST-SB04-20-40	20	40		10/5/2008	<1	1.3	90.2	0.3	<2	6	6	392	2.91	192	<0.2	82	3	0.6	85.7	0.19	4.12	32
ST-SB04-40-60	40	60		10/5/2008	<1	2.1	67.2	0.4	<2	6	7	376	4.14	223	0.05	34	3	1.31	85.1	0.18	6	32
ST-SB04-60-80	60	80		10/5/2008	0.3	3.5	70.7	0.4	<2	6	7	437	5.33	258	0.05	47	3	0.86	86.4	0.21	5.13	39
ST-SB04-80-100	80	100		10/5/2008	<1	4.4	88.8	0.7	<2	12	9	368	12.7	463	<0.2	120	6	1.2	83.8	0.21	5.37	85
ST-SB04-100-120	100	120		10/6/2008	0.2	4.2	78.8	0.8	<2	9	8	654	11.7	508	0.06	104	4	1.29	83.6	0.2	5.95	119
ST-SB04-100-120D	100	120	Duplicate	10/6/2008	0.4	4.1	77.7	0.7	<2	8	8	482	13.2	438	<0.2 UJ	75	3	1.1	95.8	0.19	6.14	93
ST-SB04-120-140	120	140		10/6/2008	<1	2	63.6	0.5	<2	5	4	156	6.24	208	<0.2	9	4	0.1	91.5	0.11	1.3	26
ST-SB06-0-20	0	20		10/21/2008	0.3	1.2	83.6	0.3	<2	5	5	303	2.45 J	187	<0.2	48 J	3	0.55	93.3	0.27	4.64	28
ST-SB06-20-40	20	40		10/21/2008	0.3	1.3	91.7	0.3	<2	5	6	454	3.16 J	174	<0.2	47	3	0.71	87.1	0.14	3.56	37
ST-SB06-40-60	40	60		10/22/2008	<1	2.1	73.8	0.4	<2	6	9	387	3.66 J	225	<0.2	63	5	0.98	80.9	0.21	4.54	50
ST-SB06-60-80	60	80		10/22/2008	0.6	3.8	51.1	0.3	<2	4	14	788	8.75 J	237	<0.2	46	4	1.87	93.9	0.16	18.4	51
ST-SB06-80-100	80	100		10/23/2008	0.3	2.9	64.3	0.6	<2	7	8	844	11 J	341	<0.2	102	3	1.4	93.6	0.14	3.86	92
ST-SB06-100-120	100	120		10/23/2008	0.6	2.8	70.5	0.5	<2	6	7	509	6.22 J	327	<0.2	59	4	1.22	85.1	0.14	5.13	53
ST-SB06-120-140	120	140		10/23/2008	<1	1.6	98.2	0.5	<2	7	10	447	4.55 J	433	<0.2	46	4	0.98	85.2	0.19	4.1	55
ST-SB06-140-160	140	160		10/23/2008	<1	1.6	95.4	0.4	<2	11	13	530	12.6 J	297	<0.2	43	9	1.44	89.1	0.22	2.58	50

Table 11
Tailings Material Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Sample ID	Depth (ft bgs)		Duplicate	Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Mercury	Molybdenum	Nickel	Selenium	Solids, Percent	Thallium	Uranium	Zinc
	Top	Bottom			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(%)	(mg/kg)	(mg/kg)	(mg/kg)
Sierrita Tailings Impoundment - Continued																						
ST-SB06-160-180	160	180		10/23/2008	<1	1.6	104	0.4	<2	14	14	579	4.24 J	315	<0.2	124	9	1.32	87.4	0.28	2.99	70
ST-SB06-180-200	180	200		10/24/2008	0.5	2.2	97.5	0.4	<2	10	12	561	7.79 J	291	<0.2	60	8	1.27	92	0.21	3.01	76
ST-SB06-200-220	200	220		10/24/2008	<1	1.7	107	0.4	<2	12	13	642	36.9 J	301	<0.2	129	9	1.47	91.3	0.23	2.5	82
ST-SB06-220-240	220	240		10/24/2008	0.2	2.1	127	0.5	<2	24	15	318	4.17 J	369	<0.2	38	16	1.18	91	0.34	4.53	76
ST-SB06-240-260	240	260		10/25/2008	0.3	1.9	137	0.5	<2	34	14	230	4.3 J	412	<0.2	32	22	1.01	88.8	0.44	2.72	73
ST-SB06-260-280	260	280		10/26/2008	0.3	1.7	126	0.5	<2	33	14	392	6.83 J	386	<0.2	42	21	1.13	89.2	0.42	2.94	73
ST-SB06-260-280D	260	280	Duplicate	10/26/2008	0.2 J	2 J	117	0.5	<2	30	14	372	6.12 J	374	<0.2	66	20	1.26	95.6	0.39	2.52	68
ST-SB06-280-300	280	300		10/28/2008	<1	1.5	171	0.6	<2	49	17	280	7.5 J	456	<0.2	42	31	1.3	89.7	0.63	2.42	91
ST-SB06-300-320	300	320		10/28/2008	0.3	3.2	78.5	0.7	<2	9	5	223	9.16 J	212	<0.2	12	6	0.26	78.4	0.15	1.08	48
ST-SB06-300-320D	300	320	Duplicate	10/28/2008	0.3	2.9	52.6	0.6	<2	9	6	223	9.05 J	227	<0.2	11	6	0.22	90.3	0.14	1.04	41

Notes:
% = percent
< = analyte not detected. The reporting limit is shown in these cases.
AWQS = Arizona Water Quality Standards
ft bgs - feet below ground surface
J = The analyte was positively identified; however, the result should be considered an estimated value.
mg/kg = milligrams per kilogram
NE = Not Established
UJ = The analyte was not positively identified. The reporting limit is considered an estimated value.

Table 12
Tailings Material Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Sample ID	Depth (ft bgs)		Duplicate	Date	Ra-226 (pCi/g)			Ra-228 (pCi/g)			U-234 (pCi/g)			U-235 (pCi/g)			U-238 (pCi/g)		
	Top	Bottom			Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
Esperanza Tailings Impoundment																			
ET-SB01-0-20	0	20		9/17/2008	1.5	0.41	0.51	1.6 J	1.2	0.72	1.8	0.09	0.37	0.085	0.054	0.055	1.8	0.061	0.37
ET-SB01-20-40	20	40		9/18/2008	2.2	0.47	0.74	1.8 J	1.1	0.75	2.2	0.015	0.42	0.12	0.034	0.06	2.2	0.029	0.43
ET-SB01-40-60	40	60		9/18/2008	2	0.33	0.57	1.6 J	1.4	0.75	1.9	0.073	0.42	0.13	0.079	0.083	2.4	0.098	0.52
ET-SB01-60-80	60	80		9/18/2008	0.87	0.31	0.33	1.3 J	0.75	0.53	0.84	0.075	0.22	0.00089 U	0.063	0.032	0.8	0.048	0.21
ET-SB01-80-100	80	100		9/18/2008	0.94	0.36	0.38	1.2 J	1.1	0.57	0.8	0.014	0.18	0.029 U	0.032	0.028	0.87	0.037	0.2
ET-SB02-0-20	0	20		9/19/2008	1.1	0.46	0.44	1.5 J	1.1	0.84	2.1	0.061	0.43	0.1	0.059	0.062	2.1	0.041	0.43
ET-SB02-20-40	20	40		9/19/2008	2.5	0.099	0.75	1.9 J	1.4	0.78	2.1	0.042	0.41	0.11	0.043	0.058	1.8	0.031	0.36
ET-SB02-40-50	40	50		9/19/2008	1.9	0.25	0.51	1.6 J	1.1	0.68	2.1	0.018	0.42	0.096	0.049	0.059	2	0.042	0.4
ET-SB02-50-60	50	60		9/19/2008	0.65	0.22	0.29	1.5 U	3	1.5	1.2	0.045	0.26	0.16	0.039	0.074	1	0.039	0.23
ET-SB02-60-80	60	80		9/19/2008	1.1	0.3	0.38	1.5 J	1	0.63	0.93	0.034	0.22	0.026 U	0.048	0.031	1.1	0.05	0.25
ET-SB02-80-100	80	100		9/19/2008	1.1	0.38	0.41	1.9 J	1.1	0.65	0.96	0.045	0.22	0.075	0.048	0.049	0.91	0.041	0.21
Sierrita Tailings Impoundment																			
ST-SB01-0-20	0	20		9/24/2008	1	0.74	0.57	1.5 J	1.2	0.86	2.4	0.05	0.45	0.17	0.051	0.074	2.2	0.035	0.42
ST-SB01-20-40	20	40		9/24/2008	1.9	0.3	0.54	1.6 J	1.2	0.99	1.9	0.059	0.39	0.14	0.07	0.075	1.9	0.069	0.39
ST-SB01-40-60	40	60		9/24/2008	0.65	0.45	0.34	1.3 J	0.79	0.69	2	0.043	0.39	0.099	0.047	0.055	1.9	0.043	0.37
ST-SB01-60-80	60	80		9/24/2008	2.3	0.44	0.66	1.7 J	0.95	0.58	1.9	0.048	0.39	0.11	0.038	0.058	1.9	0.043	0.38
ST-SB01-80-100	80	100		9/24/2008	1.5	0.34	0.5	1.4 J	1.3	0.68	1.9	0.051	0.37	0.11	0.06	0.06	1.9	0.059	0.38
ST-SB01-100-120	100	120		9/25/2008	1.6	0.71	0.69	1.4 J	0.79	0.51	1.9	0.059	0.37	0.18	0.039	0.075	2	0.044	0.38
ST-SB01-120-140	120	140		9/25/2008	3.8	0.56	1.1	1.9 J	1.2	0.83	2.2	0.065	0.46	0.11	0.065	0.069	2.3	0.055	0.48
ST-SB01-140-160	140	160		9/25/2008	1.9 J	0.33	0.52	1.7 J	1.2	0.79	1.6	0.054	0.33	0.08	0.064	0.054	1.9	0.063	0.38
ST-SB01-160-180	160	180		9/25/2008	0.76	0.17	0.3	1.3 J	1.2	0.88	1.5	0.041	0.31	0.12	0.043	0.061	1.5	0.036	0.3
ST-SB01-180-200	180	200		9/25/2008	2.2 J	0.52	0.43	1.2 J	0.88	0.53	1.7	0.045	0.35	0.2	0.039	0.085	1.6	0.017	0.34
ST-SB01-200-220	200	220		9/26/2008	0.12 U	0.3	0.18	1.3 J	0.86	0.46	1.5	0.043	0.32	0.065	0.051	0.047	1.8	0.032	0.36
ST-SB01-220-235.5	220	235.5		9/26/2008	1.6	0.24	0.44	1.3 J	1	0.75	1.8	0.069	0.39	0.1	0.051	0.067	1.9	0.058	0.41
ST-SB01-237-255.5	237	255.5		9/26/2008	0.94	0.33	0.35	1.6 J	0.89	0.65	0.99	0.055	0.22	0.036 U	0.062	0.038	1	0.049	0.23
ST-SB03-20-40	20	40		10/2/2008	1.9	0.41	0.64	1.2 J	1.2	0.62	2.2	0.058	0.43	0.1	0.068	0.062	1.9	0.072	0.4
ST-SB03-40-60	40	60		10/2/2008	2.4 J	0.53	0.44	1.2 J	0.86	0.51	1.7	0.04	0.35	0.078	0.047	0.052	1.9	0.05	0.38
ST-SB03-60-80	60	80		10/2/2008	2.2 J	0.56	0.44	1.5 J	1.2	0.58	2.3	0.074	0.48	0.14	0.087	0.082	2.3	0.085	0.48
ST-SB03-80-100	80	100		10/2/2008	2.2 J	0.46	0.42	1.4 J	1.1	0.64	1.9	0.05	0.39	0.058	0.04	0.044	1.9	0.05	0.38
ST-SB03-100-120	100	120		10/3/2008	3.2 J	0.63	0.55	1.6 J	1.2	0.92	2.6	0.039	0.49	0.2	0.034	0.08	2.4	0.015	0.45
ST-SB03-120-140	120	140		10/3/2008	2.5 J	0.49	0.44	1.1 J	0.75	0.49	2.1	0.035	0.42	0.14	0.035	0.066	2.1	0.044	0.41
ST-SB03-140-160	140	160		10/3/2008	2.5 J	0.5	0.47	1.1 J	1.1	0.78	1.6	0.048	0.33	0.082	0.048	0.051	1.9	0.041	0.38
ST-SB03-160-180	160	180		10/3/2008	2.4 J	0.44	0.45	1.7 J	1.2	0.73	1.6	0.065	0.33	0.22	0.049	0.088	1.8	0.046	0.36
ST-SB03-180-200	180	200		10/3/2008	1.2	0.38	0.28	1.6 J	0.87	0.57	1.2	0.019	0.21	0.045	0.008	0.022	1.3	0.005	0.23
ST-SB03-200-210	200	210		10/3/2008	1.1	0.64	0.55	1.7 J	1.1	0.68	1.1	0.041	0.25	0.09	0.041	0.056	1.3	0.051	0.28
ST-SB04-0-20	0	20		10/5/2008	2.7 J	0.48	0.47	1.4 J	0.88	0.58	2.1	0.047	0.43	0.25	0.041	0.099	2.4	0.018	0.48
ST-SB04-20-40	20	40		10/5/2008	1.9	0.42	0.59	2 J	1.3	1	1.7	0.062	0.35	0.21	0.041	0.082	2	0.047	0.39
ST-SB04-40-60	40	60		10/5/2008	2.7 J	0.59	0.5	1.3 J	1.2	0.69	2.9 J	0.059	0.56	0.2	0.07	0.09	2.7 J	0.074	0.53
ST-SB04-60-80	60	80		10/5/2008	2.8 J	0.51	0.48	1.5 J	1.1	0.7	1.8	0.037	0.35	0.13	0.039	0.06	1.9	0.033	0.37
ST-SB04-80-100	80	100		10/5/2008	3 J	0.56	0.52	1.5 J	1.1	0.62	1.9	0.054	0.38	0.17	0.063	0.078	1.8	0.067	0.36
ST-SB04-100-120	100	120		10/6/2008	3.2 J	0.44	0.52	1.7 J	0.95	0.78	1.9	0.042	0.38	0.26	0.043	0.096	2	0.037	0.39
ST-SB04-120-140	120	140		10/6/2008	2.4 J	0.52	0.72	1.3 J	1	0.56	0.69	0.037	0.17	0.065	0.044	0.046	0.75	0.042	0.18
ST-SB06-0-20	0	20		10/21/2008	2.3	0.4	0.69	1.3 J	1.1	0.57	1.5	0.06	0.31	0.044 U	0.051	0.039	1.5	0.038	0.31
ST-SB06-20-40	20	40		10/21/2008	1.4	0.32	0.48	0.82 UJ	0.88	0.6	1.8	0.035	0.36	0.06	0.025	0.041	1.7	0.015	0.34
ST-SB06-40-60	40	60		10/22/2008	2.3 J	0.39	0.4	1.4 J	0.84	0.53	2	0.047	0.41	0.26	0.05	0.1	2.2	0.042	0.44
ST-SB06-60-80	60	80		10/22/2008	1.6	0.35	0.55	1.6	0.98	0.62	2.9 J	0.038	0.53	0.13	0.039	0.061	2.6	0.044	0.49
ST-SB06-80-100	80	100		10/23/2008	1.3	0.32	0.4	1.2 U	2.4	1.2	1.7	0.039	0.36	0.12	0.038	0.064	1.7	0.017	0.35
ST-SB06-100-120	100	120		10/23/2008	1.2	0.56	0.48	1.3 J	1.1	0.84	1.7	0.045	0.34	0.12	0.049	0.062	1.8	0.041	0.36
ST-SB06-120-140	120	140		10/23/2008	1.8	0.26	0.5	1.1 J	0.89	0.56	1.8	0.028	0.35	0.094	0.017	0.051	1.9	0.028	0.38
ST-SB06-140-160	140	160		10/23/2008	1.9	0.38	0.53	1.7 J	1.4	0.67	1.8	0.016	0.37	0.094	0.044	0.055	1.8	0.038	0.36
ST-SB06-160-180	160	180		10/23/2008	1.5	0.4	0.53	1 J	0.78	0.47	1.9	0.065	0.43	0.1	0.087	0.077	1.6	0.065	0.37
ST-SB06-180-200	180	200		10/24/2008	1.4	0.37	0.47	1.5 J	1.2	0.91	1.6	0.046	0.34	0.095	0.064	0.06	1.7	0.041	0.35
ST-SB06-200-220	200	220		10/24/2008	2.4 J	0.47	0.44	1.2 J	0.93	0.52	1.7	0.039	0.34	0.13	0.046	0.066	1.6	0.048	0.33
ST-SB06-220-240	220	240		10/24/2008	1.3	0.46	0.46	1.6 J	0.9	0.81	1.7	0.056	0.34	0.071	0.062	0.05	1.6	0.049	0.32
ST-SB06-240-260	240	260		10/25/2008	1.4	0.36	0.48	1.2 J	0.88	0.45	2	0.016	0.4	0.2	0.018	0.081	2.1	0.016	0.41
ST-SB06-260-280	260	280		10/28/2008	2.1	0.4	0.39	1.2 J	0.93	0.53	1.8	0.054	0.36	0.092	0.035	0.053	1.8	0.036	0.35
ST-SB06-280-300	280	300		10/28/2008	2 J	0.41	0.37	1.5 J	0.86	0.7	1.2	0.065	0.25	0.077	0.035	0.048	1.4	0.044	0.29
ST-SB06-300-320	300	320		10/28/2008	0.58	0.27	0.25	0.87 J	0.82	0.39	0.75	0.034	0.19	0.053	0.02	0.041	0.91	0.034	0.22
ST-SB06-300-320D	300	320	Duplicate	10/28/2008	0.1 U	0.43	0.25	1.5 J	1	0.66	0.86	0.052	0.22	0.023 U	0.062	0.035	1	0.065	0.26

Notes:
ft bgs - feet below ground surface
pCi/g = picocuries per gram
MDC = Minimum Detectable Concentration
TPU = Total Propagated Uncertainty

Table 13
Rock Core Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Boring ID	Depth	Core integrity	Date	Gross alpha (pCi/g)			Gross beta (pCi/g)			Ra-226 (pCi/g)			Ra-228 (pCi/g)			U-234 (pCi/g)			U-235 (pCi/g)			U-238 (pCi/g)			Total uranium
	(ft bgs)			Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU	(mg/kg)
MW-2008-12	13	Fractured	9/1/2008	11	1	2.8	11	1.5	2.2	1.8	0.38	0.32	2	0.9	0.52	1.6	0.048	0.33	0.075	0.045	0.05	1.9	0.061	0.38	3.9
MW-2008-12	22	Competent	9/1/2008	12	1.1	2.9	12	1.5	2.4	2.4	0.41	0.39	1.9	0.78	0.5	1.8	0.054	0.37	0.047	0.037	0.039	1.7	0.043	0.36	4.2
MW-2008-12	27	Fractured	9/1/2008	18	1.1	4	16	1.6	3	2.8	0.44	0.42	2.2	0.7	0.55	3.7	0.068	0.69	0.3	0.047	0.11	3.9	0.062	0.72	7.8
MW-2008-12	39	Fractured	9/1/2008	19	1.8	5	13	3	3.1	2.8	0.41	0.42	1.8	0.71	0.47	1.6	0.053	0.34	0.16	0.039	0.075	1.7	0.062	0.34	4.8
MW-2008-12	40	Competent	9/1/2008	18	1.4	4.3	14	1.6	2.8	3.1	0.4	0.47	1.9	0.78	0.48	2.7	0.054	0.51	0.099	0.05	0.057	2.7	0.047	0.52	5.1
MW-2008-12	58	Fractured	9/1/2008	16	0.97	3.6	8.9	1.6	2	3.1	0.47	0.47	1.8	0.83	0.51	2.5	0.059	0.48	0.15	0.02	0.07	2.7	0.045	0.51	5.1
MW-2008-12	63	Competent	9/1/2008	14	0.87	3.2	6.1	1.7	1.6	2.6	0.4	0.39	2.6	0.85	0.58	2.3	0.044	0.45	0.093	0.038	0.055	2.3	0.064	0.45	5
MW-2008-12	80	Unknown	9/1/2008	7.4	0.95	2	11	1.4	2.2	2.4	0.47	0.42	1.2	0.76	0.49	2.3	0.077	0.5	0.069 U	0.08	0.064	2.3	0.068	0.49	2.8
MW-2008-12	115	Unknown	9/1/2008	12	1.1	3.1	8.9	1.5	1.9	2.7	0.42	0.45	1.6	0.7	0.49	2.2	0.055	0.47	0.086	0.033	0.067	2.1	0.028	0.45	5.6
MW-2008-12	145	Unknown	9/1/2008	17	1.3	4	11	1.6	2.3	3.1	0.44	0.48	2	0.83	0.6	2.5	0.07	0.52	0.11	0.069	0.081	2.6	0.094	0.55	6.1
MW-2008-13	11	Competent	9/1/2008	17	0.94	3.8	14	1.7	2.8	1.4	0.54	0.33	2.2	0.98	0.65	1.5	0.079	0.34	0.14	0.084	0.09	1.6	0.095	0.37	2.6
MW-2008-13	18	Fractured	9/1/2008	16	0.94	3.5	15	1.6	2.9	1.5	0.49	0.33	1.8	0.85	0.57	2.2	0.086	0.47	0.12	0.086	0.083	2	0.11	0.44	2.8
MW-2008-13	28	Competent	9/1/2008	15	0.89	3.4	13	1.6	2.6	2.5	0.4	0.4	2.6	0.86	0.62	1.9	0.083	0.37	0.063	0.062	0.048	1.9	0.063	0.37	4.9
MW-2008-13	37	Fractured	9/1/2008	13	0.93	3.1	11	1.5	2.2	2.7	0.43	0.43	2.1	0.82	0.56	1.8	0.042	0.36	0.088	0.037	0.052	2.1	0.05	0.41	5.2
MW-2008-13	51	Competent	9/1/2008	18	0.9	3.9	13	1.7	2.6	3.3	0.51	0.51	2.5	0.94	0.62	2.9	0.044	0.54	0.19	0.018	0.078	3.2	0.04	0.6	7.5
MW-2008-13	52	Fractured	9/1/2008	26	1.2	5.3	17	1.8	3.2	5.8	0.54	0.8	2.9	1.1	0.75	6.4	0.047	1.1	0.32	0.019	0.11	6.7	0.016	1.2	19
MW-2008-13	58	Fractured	9/1/2008	20	0.99	4.1	14	1.7	2.8	4.3	0.57	0.63	2.3	1.3	0.67	3.6	0.05	0.66	0.14	0.055	0.069	3.7	0.05	0.68	8.7
MW-2008-13	69	Competent	9/1/2008	18	1	3.8	14	1.7	2.8	3	0.42	0.46	2	0.85	0.53	3	0.044	0.56	0.15	0.038	0.072	3.1	0.064	0.59	6.8
MW-2008-13	85	Unknown	9/1/2008	17	0.78	3.4	11	1.2	2.1	4.3	0.47	0.63	1.9	0.98	0.56	3.2	0.055	0.64	0.23	0.078	0.11	3.6	0.029	0.71	8.5
MW-2008-13	100	Unknown	9/1/2008	12	0.96	2.8	11	1.5	2.3	2.5	0.41	0.41	1.5	0.94	0.59	1.8	0.11	0.41	0.083	0.065	0.068	1.7	0.094	0.39	4.5
MW-2008-14	48	Unknown	8/1/2008	2.4	1.2	1.2	2.1	1.2	0.8	1.5	0.4	0.3	2.7	0.77	0.59	1.5	0.044	0.31	0.079	0.033	0.047	1.6	0.055	0.33	5.1
MW-2008-14	63	Unknown	8/1/2008	10	0.95	2.6	5.8	1.4	1.4	1.7	0.47	0.36	4.5	1.1	0.91	1.4	0.034	0.29	0.044	0.017	0.034	1.5	0.015	0.31	2.8
MW-2008-14	124	Unknown	8/1/2008	10	0.76	2.5	7.5	1.5	1.7	1.1	0.39	0.27	3	0.95	0.69	0.77	0.041	0.18	0.043	0.017	0.034	0.88	0.041	0.2	2.7
MW-2008-14	159	Unknown	8/1/2008	11	1.2	2.9	6.3	1.5	1.5	1.8	0.52	0.36	1.8	1	0.55	1.6	0.056	0.32	0.056	0.042	0.041	1.5	0.051	0.3	4
MW-2008-15	4	Fractured	8/1/2008	15	0.81	3.4	8.1	1.6	1.8	4.8	0.52	0.67	2.6	0.95	0.64	4.3	0.076	0.76	0.18	0.056	0.076	4	0.058	0.72	9.2
MW-2008-15	16	Competent	8/1/2008	12	0.82	2.8	5.6	1.5	1.5	2.5	0.48	0.41	2.1	1.1	0.62	1.5	0.048	0.31	0.12	0.042	0.06	1.6	0.048	0.32	2.8
MW-2008-15	29	Fractured	8/1/2008	12	0.93	3	5	1.5	1.4	1.4	0.45	0.29	2.1	0.94	0.59	1.2	0.049	0.26	0.052	0.02	0.04	1.3	0.045	0.28	2.5
MW-2008-15	30	Competent	8/1/2008	13	0.99	3.1	5.2	1.5	1.4	2	0.37	0.33	2.2	0.72	0.52	1.5	0.047	0.31	0.091	0.019	0.053	1.5	0.016	0.31	4.3
MW-2008-15	40	Fractured	8/1/2008	16	0.9	3.5	8.7	1.6	1.9	2.7	0.41	0.42	2.8	0.78	0.61	2	0.05	0.4	0.12	0.054	0.063	2.1	0.05	0.41	5
MW-2008-15	42	Competent	8/1/2008	50	1.1	9	28	2.1	4.9	11	0.57	1.4	2.7	1.3	0.66	9.7	0.045	1.7	0.55	0.018	0.15	10	0.03	1.8	35
MW-2008-15	52	Fractured	8/1/2008	13	0.87	3	6.5	1.5	1.6	2.1	0.34	0.35	2.4	0.78	0.6	1.5	0.015	0.32	0.084	0.035	0.05	1.5	0.04	0.3	3.8
MW-2008-15	55	Competent	8/1/2008	16	1	3.5	7.3	1.6	1.7	2	0.29	0.33	2.3	0.68	0.56	1.9	0.042	0.39	0.052	0.041	0.042	2	0.035	0.4	4.6
MW-2008-15	85	Unknown	8/1/2008	10	1.1	2.6	5.3	1.5	1.4	2.7	0.51	0.44	1.5	0.9	0.52	2.5	0.04	0.44	0.094	0.06	0.055	2.2	0.04	0.4	3.5
MW-2008-15	110	Unknown	8/1/2008	13	0.65	2.7	5.4	1.1	1.3	2.2	0.35	0.37	2	0.71	0.52	1.7	0.047	0.32	0.088	0.039	0.05	1.7	0.033	0.32	3.5

Notes:
ft bgs - feet below ground surface
pCi/g = picocuries per gram
mg/kg = milligrams per kilogram
MDC = Minimum Detectable Concentration
TPU = Total Propagated Uncertainty

Table 14
Groundwater General Chemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Bicarbonate as CaCO3 (mg/L)	Calcium (mg/L)	Carbonate as CaCO3 (mg/L)	Cation-Anion Balance (%)	Chloride (mg/L)	Conductivity @25C (µmhos/cm)	Fluoride (mg/L)	Hardness as CaCO3 (mg/L)	Magnesium (mg/L)	Nitrate/Nitrite as N (mg/L)	pH (lab) (S.U.)	pH (field) (S.U.)	Potassium (mg/L)	Residue, Filterable (TDS) @180C (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	TDS (calculated) (mg/L)	Total Alkalinity (mg/L)
Background Area (North)																				
MH-21		Q4 2008	356	335	<2	0.8	87	3030	1.6	1290	110	0.27	8.1	6.66	11.8	2550	318	1420	2500	356
MH-21		Q1 2009	340	297	<2	-2.1	85	2880	1.8	1140	97.2	0.34	7.9	NA	11	2550	309	1380	2390	340
MH-21	Duplicate	Q1 2009	341	292	<2	-2.3	82	2850	1.8	1110	93.2	0.34	7.7	NA	11.2	2510	323	1390	2400	341
MH-21		Q2 2009	324	316	26	-0.9	87	3180	1.6	1200	99.8	0.35	7.7 J	6.36	10.6	2570	294	1350	2380	350
MH-21		Q3 2009	365	318	<2	-1.7	95	2970	1.7	1210	100	0.29	8.1	6.26	10.9	2680	307	1390	2440	365
MH-21	Duplicate	Q3 2009	371	309	<2	-6.2	95	2940	1.7	1170	96.8	0.3	8.1	NA	10.5	2690	299	1500	2530	371
MW-2008-12		Q4 2008	104 J	300	<2 UJ	NA	65	NA	1.9	NA	82.1	0.06 J	NA	7.52	7.2	2110 J	202	1270	NA	104 J
MW-2008-12	Duplicate	Q4 2008	NA	270	NA	NA	NA	NA	NA	NA	80.9	0.17 J	NA	NA	7.1	NA	203	NA	NA	NA
MW-2008-12		Q1 2009	107	315	<2	0.5	68	NA	NA	1180	95	0.05	NA	7.31	7.1	2300	203	1350	2100	107
MW-2008-12		Q2 2009	105	294	7	0.6	61	NA	NA	1070	82.3	<0.02	NA	6.59	5.8	2090	212	1270	2000	112
MW-2008-12		Q3 2009	111	266	<2	0.5	61	NA	NA	1000	81.7	0.06	NA	6.52	5.1	2050	201	1180	1860	111
MW-2008-12	Duplicate	Q3 2009	111	274	<2	1.2	61	NA	NA	1040	86.1	0.03	NA	NA	5.3	2050	202	1200	1900	111
MW-2008-13		Q4 2008	231	547	<2	NA	250	NA	0.7	NA	177	0.14 J	NA	6.72	11.2	2900	140	1470	NA	231
MW-2008-13	Duplicate	Q4 2008	NA	560	NA	NA	NA	NA	NA	NA	164	0.08 J	NA	NA	11.1	NA	140	NA	NA	NA
MW-2008-13		Q1 2009	258	573	<2	1.6	250	NA	NA	2210	190	0.03	NA	6.54	11.8	3360	148	1780	3110	258
MW-2008-13		Q2 2009	256	534	17 J	-1.4	250	NA	NA	2110	188	0.07	NA	5.39	11.1	3380	153	1810	3120	273
MW-2008-13	Duplicate	Q2 2009	274	547	21 J	0	250	NA	NA	2170	195	0.07	NA	NA	11.5	3270	155	1790	3130	295
MW-2008-13		Q3 2009	278	536	<2	-3.3	250	NA	NA	2120	190	0.05	NA	6.11	10.9	3510	146	1900	3200	278
Background (West)																				
MH-17		Q4 2008	454	184	<2	2.3	57	1550	1.1	820	87.7	<0.02	8.1	6.78	3.6	1170	79.1	400	1090	454
MH-17		Q1 2009	441	177	<2	0.8	59	1570	1.2	789	84.4	0.06	8.1	6.96	3.3	1120	74.9	400	1060	441
MH-17	Duplicate	Q1 2009	437	177	<2	1.8	59	1590	1.2	793	85.2	0.06	8.1	NA	3.2	1130	75.9	390	1050	437
MH-17		Q2 2009	444	184	<2	2.9	56	1640	1.2	815	86.4	<0.02	8.2 J	6.73	3.2	1160	78	390	1070	444
MH-17		Q3 2009	459	175	<2	0.3	56	1500	1.2	780	83.3	<0.02	8.2	6.26	3.2	1190	77.8	390	1060	459
MH-17	Duplicate	Q3 2009	468	175	<2	-0.8	56	1490	1.2	777	82.5	<0.02	8.1	NA	3.1	1190	75.6	390	1060	468
MW-2008-14		Q4 2008	NA	53.6	NA	NA	35	NA	10	182	11.7	0.25	NA	7.43	4.6	630	147	160	NA	NA
MW-2008-14		Q1 2009	264 J	62.7	<2	4.3	33	NA	NA	214	14	0.41	NA	7.58	4.8	660	144	180	598	264 J
MW-2008-15		Q4 2008	291	107	<2	NA	76	NA	0.9	NA	42	0.1	NA	7.16	5.2	900	142	310	NA	291
MW-2008-15		Q1 2009	274 J	112	<2 UJ	1.6	70	NA	NA	462	44.4	<0.02	NA	6.68	5	900	138	360	894	274 J
MW-2008-15	Duplicate	Q1 2009	275	111	6	1	79	NA	NA	458	43.9	0.03	NA	NA	4.9	910	136	340	886	281
MW-2008-15		Q2 2009	248	109	34	1.4	72	NA	NA	440	40.8	0.02	NA	6.62	4.3	880	138	330	877	282
MW-2008-15		Q3 2009	287	94	<2	0.4	68	NA	NA	397	39.4	<0.02	NA	6.82	3.4	820	131	290	798	287
PZ-01		Q4 2008	210	57	<2	6.7	10	409	1.2	194	12.6	3.54	7.9	7.45	2.7	290	38.4	20	268	210
PZ-01		Q1 2009	211	52.2	<2	1	11	456	1.1	178	11.5	3.15	8.2	7.31	2.5	300 J	35.3	20	260	211
PZ-01		Q2 2009	206	55.1	5	6.9	9	489	1.3	187	12	2.99	8.4 J	6.7	2.6	300	37	10	256	211
PZ-01		Q3 2009	208	51.6	8	2	10	440	1.1	175	11.1	2.98	8.3	6.44	2.4	320	34.1	10	253	217
Central Investigation Area																				
BW-03		Q4 2008	128	442	<2	-1.3	500	4270	1.4	1660	134	0.07	7.9	7.39	8.1	3510	400	1720	3290	128
BW-03		Q1 2009	192	502	<2	2.8	426	4130	2.5	1900	156	0.03	7.9	7.13	8.7	3580	432	1850	3510	192
BW-03		Q2 2009	230	545	<2	4.4	400	3770	1.7 J	2030	162	<0.02	8.1 J	6.35	9.4	3760	435	1900	3610	230
BW-03	Duplicate	Q2 2009	234	528	<2	2	400	3780	2.6 J	1960	156	0.06	8.1 J	NA	8.9	3730	415	1920	3590	234
BW-03		Q3 2009	216	549	<2	-1.4	400	4260	2.5	2030	159	<0.02	8	6.68	8	4060 J	421	2200	3890	216
BW-04		Q4 2008	318	689	<2	1.2	490	4390	3.9	2800	262	0.35	7.9	6.09	19	4140	183	2070	3920	318
BW-04		Q1 2009	317	647	<2	-2.7	530	4540	3.8	2600	239	0.28	7.8	6.90	16	4080 J	167	2040	3850	317
BW-04		Q2 2009	77	702	<2	1.8	1260	6100	0.8	3400	400	2.18	7.9 J	4.40	25.8	5000 J	223	2000	4710	77
BW-04		Q3 2009	190	660	<2	2.2	910	5260	1	3170	371	1.73	7.5	5.60	22.5	4850 J	203	2030	4340	190
MH-22		Q4 2008	240	615	<2	-1.3	441	4730	2.5	2340	196	0.05	7.8	6.60	12.3	4320	426	2400	4240	240
MH-23		Q4 2008	249	425	<2	-2.3	450	4140	0.4	1850	192	0.39	8	6.92	6.6	3540	326	1730	3280	249
MH-23		Q1 2009	259	420	<2	-2	450	4050	0.4	1840	193	0.04	7.8	6.89	7	3510	344	1740	3310	259
MH-23		Q2 2009	228	431	22	-3.1	450	4420	0.4	1870	193	<0.02	7.9 J	6.76	6.6	3540	317 J	1770	3330	250
MH-23		Q3 2009	278	420	<2	-7.4	430	3980	0.5	1800	183	<0.02	8.1	6.57	6.3	3620	305	1900	3410	278

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Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Bicarbonate as CaCO3 (mg/L)	Calcium (mg/L)	Carbonate as CaCO3 (mg/L)	Cation-Anion Balance (%)	Chloride (mg/L)	Conductivity @25C (µmhos/cm)	Fluoride (mg/L)	Hardness as CaCO3 (mg/L)	Magnesium (mg/L)	Nitrate/Nitrite as N (mg/L)	pH (lab) (S.U.)	pH (field) (S.U.)	Potassium (mg/L)	Residue, Filterable (TDS) @180C (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	TDS (calculated) (mg/L)	Total Alkalinity (mg/L)
Central Investigation Area (continued)																				
MW-2008-01		Q4 2008	137 J	396	3 J	NA	90	NA	1.1	NA	89.3	1.3	NA	6.38	21.7	1930	125 J	1060	NA	139 J
MW-2008-01		Q1 2009	144	390	<2	-1.2	93	NA	NA	1340	88	1.12	NA	6.61	25	2370	126	1350	2160	144
MW-2008-01		Q2 2009	127	362	<2	-3.1	140	NA	NA	1250	84	2.91	NA	5.89	20.1	2140	126	1270	2080	127
MW-2008-01		Q3 2009	125	371	<2	-0.9	170	NA	NA	1290	88.9	3.55	NA	5.92	22.3	2250	133	1220	2080	125
MW-2008-02		Q4 2008	269 J	925	<2 UJ	NA	1560	NA	0.5	NA	353	0.23	NA	6.57	29.4	6030	239	1790	NA	269 J
MW-2008-02		Q1 2009	296	1190	<2	-0.3	1990	NA	NA	4310	325	0.14	NA	6.78	28	6190	252	1760	5730	296
MW-2008-02		Q2 2009	301	1090	<2	-2.7	1860	NA	NA	3930	294	0.58	NA	6.26	31	6260	249	1780	5490	301
MW-2008-02		Q3 2009	359	908	<2	-3.8	1500	NA	NA	3310	254	2.22	NA	6.29	36.9	5500	319	1840	5070	359
MW-2008-03		Q4 2008	300 J	810	<2 UJ	NA	1550	NA	1	NA	270	8.9	NA	6.68	40.7	5910	497	1890	NA	300 J
MW-2008-03		Q1 2009	316	953	<2	-0.4	1590	NA	NA	3440	257	51.5	NA	6.73	38	5630	477	1930	5430	316
MW-2008-03		Q2 2009	313	919	<2	-1.5	1500	NA	NA	3340	253	9.64	NA	6.48	39.4	5430	461	2020	5380	313
MW-2008-03		Q3 2009	318	897	<2	-1.9	1540	NA	NA	3380	277	8.8	NA	6.19	38.8	6380	448	2010	5400	318
MW-2008-03	Duplicate	Q3 2009	319	904	<2	-2.1	1530	NA	NA	3380	273	9	NA	NA	38.9	6240	444	2030	5410	319
MW-2008-04		Q4 2008	180 J	757	30 J	NA	1160	NA	1.8	NA	320	0.33	NA	6.72	25.2	4900	269	1810	NA	211 J
MW-2008-04		Q1 2009	178	914	<2	0.6	1680	NA	NA	3660	334	0.03	NA	6.86	24	4950	238	1560	4860	178
MW-2008-04		Q2 2009	209	750	<2	-3.2	1410	NA	NA	3050	286	0.56	NA	6.45	25.9	4760	302	1720	4620	209
MW-2008-04		Q3 2009	203	757	<2	-5.5	1530	NA	NA	3080	289	0.45	NA	6.32	28.1	5040	251	1670	4650	203
MW-2008-05		Q4 2008	200 J	214	8 J	NA	120	NA	1.5	NA	52.9	0.73	NA	6.67	12.1	1530	197	740	NA	208 J
MW-2008-05		Q1 2009	206	254 J	<2	-0.5	191	NA	NA	895	63.3	0.85	NA	6.76	12.9	1870	211	880	1740	206
MW-2008-05		Q2 2009	211	328	<2	-1.9	310	NA	NA	1170	85.7	0.79	NA	6.42	15.8	2230	236	1080	2180	211
MW-2008-05		Q3 2009	214	400	<2	-0.8	450	NA	NA	1430	105	0.58	NA	6.06	16	2850	269	1180	2550	214
MW-2008-06		Q4 2008	216 J	637	<2 UJ	NA	800	NA	1	NA	199	2.44	NA	6.96	27.6	4850	592	2270	NA	216 J
MW-2008-06		Q1 2009	319	703	<2	-3.7	1030	NA	NA	2580	200	1.19	NA	6.94	26	5220	537	2220	4910	319
MW-2008-06		Q2 2009	346	735	<2	0.2	870	NA	NA	2670	203	0.63	NA	6.24	24.6	5220	600	2330	4970	346
MW-2008-06	Duplicate	Q2 2009	348	667	<2	-2.4	910	NA	NA	2520	207	0.63	NA	NA	25.4	5210	626	2380	5030	348
MW-2008-06		Q3 2009	356	693	<2	-2	860	NA	NA	2600	212	0.68	NA	6.29	25.7	5300	548	2330	4880	356
MW-2008-07		Q4 2008	326 J	555	20 J	NA	140	NA	7.5	NA	401	0.16	NA	6.21	21.7	5160	272	3070	NA	346 J
MW-2008-07		Q1 2009	417	548	<2	-3	306	NA	NA	2850	359	0.08	NA	6.37	19	4750	249	2840	4620	417
MW-2008-07		Q2 2009	344	548	<2	0	120	NA	NA	3170	439	<0.02	NA	5.76	22.1	5390	279	3400	5090	344
MW-2008-07		Q3 2009	365	539	<2	-2	130	NA	NA	3100	427	0.03	NA	5.65	21.5	5350	272	3400	5070	365
MW-2008-08		Q4 2008	262 J	498	<2 UJ	NA	180	NA	1	NA	225	0.6	NA	6.77	10.6	4400	434	2520	NA	262 J
MW-2008-08		Q1 2009	401	569	<2	4.7	165	NA	NA	2410	240	0.57	NA	6.51	11	4210	483	2420	4130	401
MW-2008-08		Q2 2009	404	493	<2	-3.1	170	NA	NA	2120	216	0.42	NA	6.37	9.8	4490 J	458	2570	4160	404
MW-2008-08		Q3 2009	414	485	<2	-1.1	180	NA	NA	2160	231	0.22	NA	6.33	10.9	4490	480	2510	4150	414
MW-2008-09		Q4 2008	<2 UJ	513	<2 UJ	NA	390	NA	2.6	NA	274	0.7	NA	3.71	16.9	4460	251	2720	NA	<2 UJ
MW-2008-09		Q1 2009	<2	530	<2	-1.4	390	NA	NA	2380	257	0.2	NA	3.77	17	5080	244	3130	4820	<2
MW-2008-09		Q2 2009	<2	557	<2	-0.6	480	NA	NA	2520	275	0.03	NA	4.03	17	5380 J	254	3210	5080	<2
MW-2008-09		Q3 2009	<2	525	<2	-1	520	NA	NA	2570	305	<0.02	NA	3.94	17.9	5520	256	3140	5020	<2
MW-2008-10		Q4 2008	21 J	518	<2 UJ	NA	200	NA	4.9	NA	320	0.15	NA	5.69	19.9	4720	315	3060	NA	21 J
MW-2008-10		Q1 2009	37	603	<2	4.7	192	NA	NA	2950	352	0.09	NA	5.42	20	4650	345	3130	4730	37
MW-2008-10		Q2 2009	14	485	<2	-0.7	210	NA	NA	2600	337	0.03	NA	5.03	20.2	4810	307	3100	4540	14
MW-2008-10		Q3 2009	12	485	<2	-1.6	230	NA	NA	2580	332	0.08	NA	4.78	19.4	4820	302	3100	4540	12
MW-2008-11		Q4 2008	5 J	407	<2 UJ	NA	51	NA	1.5	NA	86.3	1.91	NA	6.18	14	2170	150	1310	NA	5 J
MW-2008-11		Q1 2009	210	503	<2	3.8	52	NA	NA	1690	105	2.81	NA	6.19	14.7	2640	165	1580	2560	210
MW-2008-11		Q2 2009	27	381	<2	-1.2	60	NA	NA	1300	84.8	3.14	NA	4.82	12.6	2450	135	1540	2270	27
MW-2008-11		Q3 2009	37	375	<2	-5.5	70	NA	NA	1310	91.8	4	NA	4.81	13.3	2510	141	1700	2460	37
PZ-02		Q4 2008	285	963	<2	-1.2	1690	7250	1.2	3340	226	5.66	7.6	6.45	6	6110	544	1910	5520	285
PZ-02		Q1 2009	280	1040	<2	4.4	1690	7530	0.8	3610	246	5.7	7.6	6.23	6	5560 J	603	1800	5560	280
PZ-02	Duplicate	Q1 2009	281	919	<2	-2.1	1680	7420	0.8	3180	215	5.77	7.6	NA	5	5650 J	518	1800	5310	281
PZ-02		Q2 2009	303	940	<2	-1.7	1670	7200	0.8	3260	221	6.35	8.1 J	6.15	5.4	5740 J	539	1880	5440	303
PZ-02		Q3 2009	310	875	<2	-1.7	1570	7510	0.7	3060	213	5.45	8.1	6.26	5.6	6000 J	522	1770	5150	310

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Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Bicarbonate as CaCO3 (mg/L)	Calcium (mg/L)	Carbonate as CaCO3 (mg/L)	Cation-Anion Balance (%)	Chloride (mg/L)	Conductivity @25C (µmhos/cm)	Fluoride (mg/L)	Hardness as CaCO3 (mg/L)	Magnesium (mg/L)	Nitrate/Nitrite as N (mg/L)	pH (lab) (S.U.)	pH (field) (S.U.)	Potassium (mg/L)	Residue, Filterable (TDS) @180C (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	TDS (calculated) (mg/L)	Total Alkalinity (mg/L)
Central Investigation Area (continued)																				
PZ-03		Q4 2008	155	654	<2	-4.4	620	4480	0.2	2500	211	0.06	7.9	6.96	11	4110	274	2270	4130	155
PZ-03		Q1 2009	165	706	<2	1.2	650	4610	0.5	2660	217	0.03	7.7	6.73	11	4060 J	270	2010	3960	165
PZ-03		Q2 2009	163	698	<2	-1.4	670	5080	0.4 J	2650	219	<0.02	8 J	6.02	11.1	4250 J	261	2120	4080	163
PZ-03		Q3 2009	168	686	<2	-2.1	690	4630	0.4	2590	213	<0.02	7.9	6.53	9	4400 J	229	2000	3930	168
PZ-04		Q4 2008	339	489	<2	2	370	6110	3.2	2430	294	0.05	8	6.06	13	5750	739	2930	5050	339
PZ-04	Duplicate	Q4 2008	327	489	<2	-2	370	6080	3.6	2430	295	0.06	8	NA	12	5740	741	3260	5380	327
PZ-04		Q1 2009	322	478	<2	2.9	320	5560	3.8	2350	281	<0.02	7.9	6.74	13	5300 J	795	2960	5050	322
PZ-04		Q2 2009	337	464	<2	0.8	290	4920	3.7	2280	273	<0.02	8.2 J	6.71	13.6	5360 J	748	3000	5000	337
PZ-04		Q3 2009	348	426	<2	-2.7	230	5310	3.8	2060	243	<0.02	8.1	6.60	12	5080 J	699	3000	4830	348
PZ-05		Q4 2008	203	904	<2	0.9	1990	8040	2.4	3490	300	1.65	7.9	7.00	28	6680	636	1760	5740	203
PZ-05		Q1 2009	218	908	<2	1.5	2100	8430	2.3	3540	309	0.25	7.9	6.06	29	6020 J	657	1660	5810	218
PZ-05		Q2 2009	205	776	7	-3	1850	7220	1.5	2980	252	<0.02	8.3 J	6.43	26.6	5380 J	529	1550	5120	212
PZ-05		Q3 2009	220	823	<2	-4.4	1950	8270	2.3	3250	289	0.62	8.2	6.61	29.9	6610 J	578	1920	5720	220
PZ-06		Q4 2008	99	301	<2	0.3	220	2590	1.2	1270	126	1.57	7.4	6.60	11.8	2230	163	1170	2060	99
PZ-06		Q1 2009	46	511	<2	1.5	480	3800	1.5	2160	214	2.14	6.9	6.28	17.7	3350	196	1740	3200	46
PZ-06		Q2 2009	35	634	<2	1.8	720	5010	1.8	2670	263	2.71	7 J	5.63	20.3	4160 J	209	1920	3810	35
PZ-06		Q3 2009	32	624	<2	-1.5	750	4700	2	2600	252	3.25	6.9	5.98	19	4550 J	200	2000	3880	32
TW-2008-09		Q4 2008	<2	695	<2	NA	3700	NA	59	NA	1690	<2	NA	4.20	28	15800	642	6370	NA	<2
TW-2008-09		Q1 2009	<2	687	<2	2.7	4060	NA	NA	9490	1890	0.07	NA	4.13	23	14200	593	7560	15900	<2
TW-2008-10		Q4 2008	<2		<2	NA	3600	NA	102	NA	NA	<1	NA	3.85	NA	35300 J	NA	23300	NA	<2
TW-2008-10		Q1 2009	<2	510	<2	0.6	3600	NA	NA	15200	3390	1.3	NA	3.99	20	54200 J	410	24900	36800	<2
TW-2008-10		Q2 2009	<2	523	<2	4.8	4100	NA	NA	15400	3440	<0.2	NA	3.83	10	36600 J	431	22200	34600	<2
TW-2008-10		Q3 2009	<2	484	<2	-2.4	3770	NA	NA	15600	3500	<0.02	NA	3.53	8	43000	369	25600	37200	<2
TW-2008-11		Q4 2008	<2		<2	NA	2800	NA	190	NA	NA	0.2	NA	3.68	NA	20300 J	NA	10300	NA	<2
TW-2008-11		Q1 2009	<2	563	<2	2.3	2950	NA	NA	10000	2090	0.03	NA	3.94	6	18400	424	11200	18600	<2
TW-2008-11		Q2 2009	<2	569	<2	1	3100	NA	NA	9110	1870	<0.2	NA	3.63	8	18700	411	10000	17200	<2
TW-2008-11		Q3 2009	<2	532	<2	-1.1	2820	NA	NA	8560	1760	0.03	NA	3.40	7	18400	381	9800	16400	<2
TW-2008-12		Q1 2009	<2	729	<2	1.9	1730	NA	NA	5470	888	0.75	NA	4.13	33	8950	334	5000	9140	<2
TW-2008-13		Q4 2008	297		<2	NA	220	NA	2.1	NA	NA	0.4	NA	6.64	NA	4010	NA	2140	NA	297
TW-2008-13		Q1 2009	288	591	<2	-1	221	NA	NA	2120	156	<0.02	NA	6.49	17	4050	316	2280	3780	288
TW-2008-13		Q2 2009	260	620	<2	-0.3	240	NA	NA	2240	167	0.05	NA	6.07	16	4110	341	2400	3970	260
TW-2008-13		Q3 2009	282	587	<2	-0.7	235	NA	NA	2140	164	<0.02	NA	6.32	17.5	4120	356	2350	3910	282
East Investigation Area																				
MH-14		Q4 2008	138	522	<2	2.7	140	2950	<0.1	1840	130	2.27	8	6.95	8.5	2820	140	1630	2650	138
MH-14		Q1 2009	130	465	<2	-3.9	144	3050	0.3	1630	114	1.69	8.1	6.65	7.4	2760	121	1650	2580	130
MH-14		Q2 2009	148	481	5	-1.8	140	3180	0.1	1680	115	1.86	7.8 J	6.76	7.4	2820	124	1600	2560	153
MH-14		Q3 2009	145	471	<2	-5.5	140	3000	0.2	1630	110	1.61	8 J	6.35	7.3	2810	121	1700	2640	145
MH-15W		Q4 2008	123	501	<2	0.8	150	3180	<0.1	1690	106	0.75	8	6.97	13.6	2980	255	1820	2930	123
MH-15W	Duplicate	Q4 2008	125	496	<2	-1.6	160	3210	<0.1	1670	105	0.77	7.9	NA	13.5	2970	252	1890	3000	125
MH-15W		Q1 2009	105	437	<2	-1.6	150	3180	0.1	1490	97.5	0.5	7.7	7.17	12.2	2950	260	1760	2790	105
MH-15W		Q2 2009	133	468	4	-1.9	140	3250	0.3	1600	105	0.7	8.3 J	6.00	12.3	3070	249	1830	2890	136
MH-15W		Q3 2009	117	503	<2	4.5	140	NA	NA	NA	113	0.51	NA	6.39	17	3090	281	1770	NA	117
MH-16W		Q4 2008	133	138	<2	3.3	38	1040	0.1	470	30.4	1.64	8.1	7.34	9.4	790	65.5	380	742	133
MH-16W		Q1 2009	140	112	<2	3.5	29	914	0.3	384	25.2	1.15	8.1	7.33	7.7	670	57.5	290	606	140
MH-16W		Q2 2009	147	93	5	-2.8	24	872	0.2	316	20.2	1.33	8 J	7.01	6.5	580	48.4	260	546	153
MH-16W		Q3 2009	160	79.4	10	2	18	NA	NA	NA	18.4	1.22	NA	6.50	6.6	500	48.3	170	NA	170
MH-28		Q4 2008	124	636	<2	1.5	130	3280	0.1	1990	98.4	1.62	7.9	6.97	7	3220	171	1910	3030	124
MH-28		Q1 2009	118	556	<2	-4.4	140	3230	0.2	1740	85.7	1.38	7.7	7.03	6.9	3210	169	1910	2940	118
MH-28		Q2 2009	122	599	<2	-0.4	130	3580	0.1	1880	92.2	1.35	7.8 J	6.84	6.6	3260	159	1860	2920	122
MH-28		Q3 2009	122	577	<2	-4.6	130	3350	0.2	1790	85.5	1.16	7.9 J	6.42	6.5	3230	151	1940	2960	122

Table 14
Groundwater General Chemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Bicarbonate as CaCO3 (mg/L)	Calcium (mg/L)	Carbonate as CaCO3 (mg/L)	Cation-Anion Balance (%)	Chloride (mg/L)	Conductivity @25C (µmhos/cm)	Fluoride (mg/L)	Hardness as CaCO3 (mg/L)	Magnesium (mg/L)	Nitrate/Nitrite as N (mg/L)	pH (lab) (S.U.)	pH (field) (S.U.)	Potassium (mg/L)	Residue, Filterable (TDS) @180C (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	TDS (calculated) (mg/L)	Total Alkalinity (mg/L)
East Investigation Area (continued)																				
MH-29		Q4 2008	156	578	<2	1.8	160	3220	<0.1	1870	103	0.8	8	6.95	11	3050	181	1740	2870	156
MH-29		Q1 2009	149	549	<2	-0.9	170	3200	0.2	1770	97.5	0.63	7.9	7.03	10.3	2790	169	1730	2820	149
MH-29		Q2 2009	140	539	6	-2.1	160	3410	<0.1	1720	91.7	0.63	7.7 J	6.80	9.5	3050	156	1720	2770	146
MH-29	Duplicate	Q2 2009	145	553	4	-0.3	160	3550	<0.1	1770	94.8	0.63	7.7 J	NA	9.9	3040	163	1700	2770	149
MH-29		Q3 2009	154	559	<2	-2.7	149	3310	0.1	1800	97.4	0.52	8 J	6.39	10	3020 J	168	1850	2930	154
MH-30		Q4 2008	126	454	<2	-0.6	140	3290	0.2	1660	128	2.45	8.1	6.95	10.7	3120	237	1810	2860	126
MH-30		Q1 2009	123	431	<2	-3.1	150	3250	0.1	1570	120	2.28	7.8	7.12	11	3170	246	1840	2870	123
MH-30		Q2 2009	113	476	19	2	140	3560	0.2	1730	131	2.11	7.8 J	6.81	11.8	3040	252	1790	2890	132
MH-30	Duplicate	Q2 2009	117	455	18	-1.4	140	3550	0.2	1640	122	2.16	7.9 J	NA	11	3060	230	1800	2850	135
MH-30		Q3 2009	135 J	442	<2	-4.8	140	3110	0.2	1590	118	1.44	7.8	6.50	11.1	3030	227	1900	2920	135 J
PZ-07		Q4 2008	97	164	<2	0.4	90	1220	0.3	593	44.5	1.16	8.4	8.31	3.8	900	32	420	813	97
PZ-07		Q1 2009	94	176	<2	1.1	100 J	1220	0.3	633	47	1.25	8.1	7.46	4	940	32.5	440	856	94
PZ-07		Q2 2009	90	184	8	2.1	93	1340	0.2	660	48.7	1.33	8 J	9.60	4	950	34.5	460	886	98
PZ-07		Q3 2009	102 J	170	<2	-1.4	93	1210	0.2	617	46.6	1.08	7.9	6.55	3.9	990	33	460	868	102 J
PZ-08		Q4 2008	176	147	<2	1.3	65	1240	0.7	555	45.5	1.57	8.1	7.22	7.2	980	93.6	460	925	176
PZ-08		Q1 2009	186	107	<2	0.4	56	983	0.7	404	33.1	<0.02	8	7.05	6.8	760	94.8	330	740	186
PZ-08		Q2 2009	167	92.3	15	-0.5	53	1090	0.9	345	27.9 J	0.12	8.1 J	6.54	6.2	680	88.5	280	665	182
PZ-08		Q3 2009	179	109	<2	0.8	57	1060	0.9	411	33.8	<0.02	8.2	6.61	6.9	840	96.7	350	765	179
PZ-2007-05		Q4 2008	181	387	<2	0.3	91	2260	0.2	1360	95.7	1.93	8.1	7.11	6.6	2130	80.6	1170	1940	181
PZ-2007-05		Q1 2009	181	376	<2	-1.5	91	2310	0.3	1330	93.8	1.51	8	7.05	6.9	1740	82.5	1190	1950	181
PZ-2007-05		Q2 2009	186	401	<2	2.6	86	2460	0.2	1400	96.8	1.39	8.2 J	6.49	7	2130	84.7	1150	1940	186
PZ-2007-05		Q3 2009	194	397	<2	1.1	86	2300	0.3	1420	104	1.45	8	6.29	7	2170	79.2	1190	1980	194
PZ-2008-16		Q4 2008	NA	513	NA	NA	140	NA	4	1290	2.1	0.12	NA	8.55	42.4	3460	480	2030	NA	NA
PZ-2008-19		Q4 2008	NA	474	NA	NA	160	NA	3.2	1220	9.6	0.18	NA	8.41	48.5	3660	532	2320	NA	NA
PZ-2008-20		Q4 2008	NA	521	NA	NA	130	NA	4.1	1420	27.9	0.07	NA	6.09	66.2	3410	420	1980	NA	NA
West Investigation Area																				
BW-02		Q4 2008	5	615	<2	0	1320	8010	13.8	5340	924	13.9	6.1	6.99	23	7980	255	4200	7470	5
BW-02		Q1 2009	<2	580	<2	1.2	1400	8300	2	5210	915	<0.02	5.4	6.77	20	7470 J	253	3900	7200	<2
BW-02		Q2 2009	6	643	<2	3.4	1500	9300	12.4	5760	1010	12.9	6.5 J	5.75	23.4	8390 J	282	3970	7560	6
BW-02		Q3 2009	24	578	<2	-1.6	1430	8480	12	5100	890	11.5	6.9	6.07	23.6	8090 J	267	4000	7310	24
MH-18		Q4 2008	215	181	<2	3	69	1410	0.5	602	36.3	3.59	8.2	7.27	3.5	1060	109	460	988	215
MH-18		Q1 2009	184	204	<2	-0.8	100	1720	0.6	691	44.1	3.95	8.1	7.14	3.9	1320	110	600	1170	184
MH-18		Q2 2009	239	139	<2	1.9	50	1180	0.6	475	31.1	3.49	8.6 J	6.31	3.4	870	86.8	320	774	239
MH-18		Q3 2009	223	134	<2	3.5	47	1140	0.5	464	31.4	2.82	8.2	6.34	3.9	850	90.9	320	762	223
MH-19		Q4 2008	272	261	<2	3.2	110	2010	0.4	829	42.9	9.7	8.2	7.00	6	1560	173	680	1440	272
MH-19		Q1 2009	258	228	<2	-0.7	110	1960	0.4	722	37.1	9.9	8.1	6.89	5.4	1510	160	650	1350	258
MH-19		Q2 2009	239	243	32	2	100	2060	0.3	769	39.3	8.75	8.1 J	6.09	5.2	1460	160	640	1360	271
MH-19		Q3 2009	268	247	<2	3.3	110	1870	0.4	786	40.9	8.29	8.1	6.24	6	1540	172	640	1380	268
MH-20		Q4 2008	84	96.9	<2	0	36	1640	0.2	271	6.9	0.1	8.3	7.72	2.3	1140	276 J	710	1180	86
MH-20		Q1 2009	81	89.8	3	-0.3	37	1550	0.2	251	6.5	0.11	8.4	NA	2	1140	268	680	1140	84
MH-20		Q2 2009	68 J	88.2	<2	3	36	1400	0.2	245	6	0.35	8.3 J	6.54	2	1120	278	660	1110	68 J
MH-20		Q3 2009	56	71.2	<2	1	39	1440	0.3	197	4.7	0.34	8.1	6.98	1.6	1030	252	600	1000	56
MH-27		Q4 2008	159	422	<2	-2	910	4400	0.2	1730	164	0.05	7.8	7.36	4.5	3130	337	1120	3070	159
MH-27		Q1 2009	237	458	<2	-2.8	960	4520	0.3	1860	174	0.02	8	6.85	4.6	3140	336	1120	3200	237
MH-27		Q2 2009	219	471	45	-0.8	880	4650	0.2	1890	174	<0.02	8.2 J	6.89	3.7	3060	298	1040	3040	264
MH-27		Q3 2009	253	457	<2	-0.1	880	4280	0.3	1900	185	0.03	8.1	6.50	4.3	3290	309	1050	3040	253
MH-27	Duplicate	Q3 2009	254	458	<2	-1	900	4260	0.3	1910	185	0.03	8.1	NA	5.1	3260	310	1080	3090	254

Table 14
Groundwater General Chemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Bicarbonate as CaCO3 (mg/L)	Calcium (mg/L)	Carbonate as CaCO3 (mg/L)	Cation-Anion Balance (%)	Chloride (mg/L)	Conductivity @25C (µmhos/cm)	Fluoride (mg/L)	Hardness as CaCO3 (mg/L)	Magnesium (mg/L)	Nitrate/Nitrite as N (mg/L)	pH (lab) (S.U.)	pH (field) (S.U.)	Potassium (mg/L)	Residue, Filterable (TDS) @180C (mg/L)	Sodium (mg/L)	Sulfate (mg/L)	TDS (calculated) (mg/L)	Total Alkalinity (mg/L)
West Investigation Area (continued)																				
PZ-16		Q4 2008	397	738	<2	-0.2	1500	6590	<0.1	3290	351	9.1	7.9	6.54	8	5240	462	1740	5040	397
PZ-16	Duplicate	Q4 2008	445	745	<2	0.2	1500	6670	<0.1	3320	355	8.8	7.8	NA	8	5270	468	1710	5050	445
PZ-16		Q1 2009	452	718	<2	0.2	1360	6600	0.2	3200	343	9.23	7.9	6.63	6	4950 J	428	1690	4820	452
PZ-16		Q2 2009	446	714	<2	1.6	1350	7010	0.2	3250	356	7.05	7.9 J	6.13	6	4960 J	444	1680	4820	446
PZ-16		Q3 2009	452	675	<2	-3	1360	6720	0.2	3070	337	6.8	8.2	6.04	5.8	5310 J	401	1760	4810	452
TW-2008-04		Q4 2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.12	NA	NA	NA	NA	NA	NA	NA	NA
TW-2008-07		Q4 2008	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.02	NA	6.96	NA	NA	NA	NA	NA	NA

NOTES
· There are no Arizona Aquifer Water Quality Standards (AWQS) associated with these constituents.
· mg/L= milligrams per liter.
· % = percent.
· µmhos/cm = micromhos per centimeter.
· S.U. = standard units.
· < = the analyte was not detected above the indicated reporting limit.
· J = the analyte was positively identified; however, the result is considered an estimated value.
· UJ = the analyte was not positively identified; the reporting limit is considered an estimated value.
· NA = not analyzed.

Table 15
Groundwater Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Zinc (mg/L)
		AWQS	**NE**	**0.006**	**0.01**	**2.0**	**0.004**	**0.005**	**0.1**	**NE**	**NE**	**NE**	**0.05**	**NE**	**0.002**	**NE**	**0.1**	**0.05**	**NE**	**NE**	**NE**
Background Area (North)																					
MH-21**		Q4 2008	<0.03	<0.0008	0.002	0.013	<0.0002	0.0003	<0.01	<0.01	<0.01	0.13	0.0003	0.066	<0.0002	2.74	<0.01	0.0101	<0.0002	0.783	0.11
MH-21**		Q1 2009	0.1	<0.0004	0.0011	<0.02	<0.0001	0.0002	<0.02	<0.02	<0.05	<0.04	0.0002	<0.01	<0.0002	2.35	<0.02	0.0115	<0.0001	0.691	0.07
MH-21**	Duplicate	Q1 2009	<0.06	<0.0004	0.0011	0.031	<0.0001	0.0002	<0.02	<0.02	<0.02	<0.04	0.0002	<0.01	<0.0002	2.46	<0.02	0.0111	<0.0001	0.672	0.05
MH-21**		Q2 2009	<0.03	<0.0008	0.001	0.016	<0.0002	0.0002	<0.01	<0.01	<0.01	0.05	0.0019	0.042	<0.0002	2.5	<0.01	0.0081	<0.0002	0.75	0.12
MH-21**		Q3 2009	<0.06	<0.002	0.001	0.015	<0.0002	0.0004	<0.02	<0.02	<0.02	0.04	0.0003	0.03	<0.0002	2.53	<0.02	0.0068	<0.0002	0.72	0.09
MH-21**	Duplicate	Q3 2009	<0.06	<0.004	0.002	0.015	<0.0002	0.0002	<0.02	<0.02	<0.02	<0.04	0.0005	0.04	<0.0002	2.66	<0.02	0.0064	<0.0002	0.649	0.13
MW-2008-12		Q4 2008	0.05	<0.0004	0.0019	0.066	<0.0001	0.0035	<0.0001	<0.01	0.02	<0.02	<0.0001	0.118	<0.0002	0.18	<0.01	0.0001	<0.0001	0.0302	0.02
MW-2008-12	Duplicate	Q4 2008	0.05	<0.0004	0.0015	0.066	<0.0001	0.0035	<0.0001	<0.01	0.01	<0.02	<0.0001	0.12	<0.0002	0.18	<0.01	<0.0001	<0.0001	0.03	0.03
MW-2008-12		Q1 2009	0.21	<0.0008	0.001	0.066	<0.0002	<0.0002	<0.0002	<0.02	0.03	0.09	<0.0002	0.67	<0.0002	0.14	<0.02	0.0018	0.0003	0.0247	<0.02
MW-2008-12		Q2 2009	<0.03	<0.0004	0.0023	0.059	<0.0002	0.0002	<0.0005	<0.01	<0.01	<0.02	<0.0001	0.594	<0.0002	0.13	<0.01	0.0001	<0.0001	0.0303	<0.01
MW-2008-12		Q3 2009	<0.06	<0.0008	0.002	0.053	<0.0002	0.0016	<0.001	<0.01	<0.01	0.02	<0.0002	0.119	<0.0002	0.17	<0.01	0.0003	<0.0002	0.0205	<0.01
MW-2008-12	Duplicate	Q3 2009	<0.03	<0.0008	0.002	0.053	<0.0002	0.0015	<0.001	<0.01	<0.01	<0.02	<0.0002	0.119	<0.0002	0.18	<0.01	<0.0002	<0.0002	0.0207	<0.01
MW-2008-13		Q4 2008	<0.03	<0.0004	0.003	0.05	<0.0005	0.0006	<0.0005	<0.01	<0.01	<0.02	<0.0001	0.319	<0.0002	0.11	<0.01	0.0005	<0.0001	0.851	<0.01
MW-2008-13	Duplicate	Q4 2008	<0.03	<0.0004	0.0036	0.048	<0.0005	0.0007	<0.0005	0.01	<0.01	<0.02	<0.0001	0.315	<0.0002	0.11	<0.01	0.0005	<0.0001	0.912	<0.01
MW-2008-13		Q1 2009	0.36	<0.002	<0.003	0.059	<0.0005	<0.0005	<0.0005	<0.02	0.03	0.18	<0.0005	0.53	<0.0002	0.09	<0.02	0.0015	0.001	0.709	<0.02
MW-2008-13		Q2 2009	<0.03	<0.0004	0.0023	0.041	<0.0001 UJ	0.0003	<0.0005	<0.01	<0.01	<0.02	<0.0001	0.116	<0.0002	0.15	<0.01	0.0006	<0.0001	0.944	<0.01
MW-2008-13	Duplicate	Q2 2009	<0.03	<0.0004	0.0026	0.044	<0.001 UJ	0.0003	<0.0005	<0.01	<0.01	<0.02	<0.0001	0.115	<0.0002	0.16	<0.01	0.0005	<0.0001	0.942	<0.01
MW-2008-13		Q3 2009	<0.03	<0.0004	0.0026	0.039	<0.0001	0.0004	<0.0005	<0.01	0.02	<0.02	<0.0001	0.108	<0.0002	0.15	0.05	0.0006	<0.0001	0.869	<0.01
Background Area (West)																					
MH-17		Q4 2008	<0.03	<0.0004	0.0008	0.007	0.0001	<0.0001	<0.01	<0.01	<0.01	0.04	0.001	0.1	<0.0002	<0.01	<0.01	<0.0001	<0.0001	0.0672	0.08
MH-17		Q1 2009	<0.03	<0.0004	0.0019	0.02	0.0001	<0.0001	<0.01	<0.01	<0.01	0.08	0.0001	0.121	<0.0002	<0.01	0.03	<0.0001	<0.0001	0.0762	0.07
MH-17	Duplicate	Q1 2009	<0.03	<0.0004	0.0017	0.021	<0.0001	<0.0001	<0.01	<0.01	<0.01	0.08	0.0001	0.121	<0.0002	0.01	0.03	<0.0001	<0.0001	0.077	0.07
MH-17		Q2 2009	<0.06	<0.0004	0.0015	0.023	0.0001	<0.0001	<0.02	0.02	<0.02	<0.04	0.0004	0.14	<0.0002	0.01	<0.02	0.0001	<0.0001	0.0692	0.07
MH-17		Q3 2009	<0.03	<0.0004	0.0018	0.021	0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.0008 J	0.12	<0.0002	<0.01	<0.01	<0.0001	<0.0001	0.0687	0.04
MH-17	Duplicate	Q3 2009	<0.03	<0.0004	0.0015	0.021	0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.001 J	0.121	<0.0002	<0.01	<0.01	<0.0001	<0.0001	0.0689	0.04
MW-2008-14		Q4 2008	<0.03	0.0014	0.0053	0.02	<0.003	<0.003	<0.01	<0.01	<0.01	<0.02	<0.003	1.11	<0.0002	0.09	*<0.3*	0.0029	<0.003	0.11	0.4
MW-2008-14		Q1 2009	0.06	0.0016	0.0066	0.017	<0.0005	0.0012	0.0006	<0.01	<0.01	<0.02	0.0001	0.594	<0.0002	0.1	<0.01	0.0038	<0.0001	0.197	<0.01
MW-2008-15		Q4 2008	<0.03	0.0004	0.0024	0.117	<0.0001	0.0012	<0.0001	<0.01	<0.01	0.03	<0.0001	0.243	<0.0002	0.03	<0.01	0.0003	<0.0001	0.0193	<0.01
MW-2008-15		Q1 2009	<0.03	<0.0008	<0.001	0.11	<0.0002	0.0003	0.0005	<0.01	<0.01	<0.02	<0.0002	0.545	<0.0002	0.02	0.02	<0.0002	<0.0002	0.0203	<0.01
MW-2008-15	Duplicate	Q1 2009	<0.03	<0.0008	<0.001	0.11	<0.0002	0.0006	0.0004	<0.01	<0.01	<0.02	<0.0002	0.544	<0.0002	0.01	0.03	<0.0002	<0.0002	0.0204	0.01
MW-2008-15		Q2 2009	<0.03	<0.0004	0.0021	0.077	<0.0001	0.0009	<0.0005	<0.01	0.01	<0.02	<0.0001	0.165	<0.0002	<0.01	<0.01	0.0002	<0.0001	0.0233	<0.01
MW-2008-15		Q3 2009	<0.03	<0.0004	0.0016	0.047	<0.0001	0.0011	<0.0005	<0.01	<0.01	<0.02	<0.0001	0.045	<0.0002	0.02	<0.01	0.0001	<0.0001	0.0153	<0.01
PZ-01		Q4 2008	0.07	<0.0004	0.0021	0.008	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	<0.0001	<0.005	<0.0002	0.01	<0.01	0.0002	<0.0001	0.0043	<0.01
PZ-01		Q1 2009	0.07	<0.0004	0.0041	<0.003	<0.0001	0.0001	<0.01	<0.01	<0.01	<0.02	<0.0001	<0.005	<0.0002	<0.01	0.03	0.0003	<0.0001	0.004	0.01
PZ-01		Q2 2009	<0.03	<0.0004	0.0049	<0.003	<0.0001	<0.0001	<0.01	0.01	<0.01	<0.02	0.0001	<0.005	<0.0002	<0.01	<0.01	0.0004	<0.0001	0.0042	<0.01
PZ-01		Q3 2009	<0.03	<0.0004	0.0039	<0.003	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.0001	<0.005	<0.0002	<0.01	<0.01	0.0003	<0.0001	0.0042	<0.01
Central Investigation Area																					
BW-03		Q4 2008	<0.06	<0.0008	0.004	0.015	<0.0002	0.0002	<0.02	<0.02	0.02	8.26	<0.0002	0.48	<0.0002	1.28	<0.02	0.001	<0.0002	0.0591	0.06
BW-03		Q1 2009	<0.06	<0.0004	0.002	0.016	<0.0001	0.0002	<0.02	<0.02	<0.02	14.4	<0.0001	0.33	<0.0002	1.93	<0.02	0.0012	<0.0001	0.065	0.06
BW-03		Q2 2009	<0.03	<0.0004	0.0024	0.019	<0.0001	<0.0001	<0.01	<0.01	<0.01	17.9	<0.0001	0.343	<0.0002	2.06	<0.01	0.0011	<0.0001	0.0778	0.07
BW-03	Duplicate	Q2 2009	<0.03	0.0005	0.0024	0.016	<0.0001	0.0002	<0.01	0.02	<0.01	16	<0.0001	0.361	<0.0002	2.13	<0.01	0.0013	<0.0001	0.0924	0.06
BW-03		Q3 2009	<0.2	<0.002	<0.003	<0.02	<0.0005	<0.0005	<0.05	0.05	<0.05	18.5	0.0128	0.41	<0.0002	2.12	<0.05	0.0006	0.0013	0.0831	<0.05
BW-04		Q4 2008	<0.2	0.0011	<0.0005	<0.02	0.0008	**0.0103**	<0.05	<0.05	<0.05	0.2	0.0012	12.6	<0.0002	0.15	<0.05	0.0003	<0.0001	0.0969	0.62
BW-04		Q1 2009	<0.2	<0.0004	0.0008	0.02	0.0007	**0.0125**	<0.05	<0.05	<0.05	0.7	0.0003	14.4	<0.0002	0.11	<0.05	0.0002	0.0001	0.0853	0.45
BW-04		Q2 2009	0.76	<0.002	<0.003	0.014	0.0022	**0.0781**	<0.01	0.08	1.39	0.4	0.0028	42.9	<0.0002	<0.01	**0.17**	<0.003	<0.0005	0.0252	3.28
BW-04		Q3 2009	<0.06	0.0004	0.0018	0.007	0.0005	**0.0331**	0.02	0.04	0.12	0.13	0.0006	31.3	<0.0002	0.08	0.03	0.0008	0.0002	0.083	0.64
MH-22**		Q4 2008	<0.06	<0.0004	0.0016	0.011	<0.0005	0.0018	<0.02	<0.02	0.04	0.1	0.0003	<0.01	<0.0002	3.14	<0.02	0.0112	<0.0001	0.272	0.09

Table 15
Groundwater Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Zinc (mg/L)
		AWQS	**NE**	**0.006**	**0.01**	**2.0**	**0.004**	**0.005**	**0.1**	**NE**	**NE**	**NE**	**0.05**	**NE**	**0.002**	**NE**	**0.1**	**0.05**	**NE**	**NE**	**NE**
Central Investigation Area (continued)																					
MH-23**		Q4 2008	<0.06	<0.0008	0.003	0.017	<0.0002	0.0004	<0.02	<0.02	<0.02	0.07	0.0006	0.25	<0.0002	0.43	<0.02	0.001	<0.0002	0.107	0.1
MH-23**		Q1 2009	0.15	<0.0004	0.0013	<0.006	<0.0001	0.0002	<0.02	<0.02	<0.02	0.12	0.0001	0.21	<0.0002	0.39	<0.02	0.0008	<0.0001	0.117	0.09
MH-23**		Q2 2009	<0.03	<0.0008	0.002	0.017	<0.0002	<0.0002	<0.01	0.01	<0.01	<0.02	0.001	0.343	<0.0002	0.36	<0.01	0.0008	<0.0002	0.106	0.4
MH-23**		Q3 2009	<0.06	<0.0008	0.002	0.017	<0.0002	<0.0002	<0.02	0.02	<0.02	0.07	0.0006	0.19	<0.0002	0.38	<0.02	0.0005	<0.0002	0.106	0.07
MW-2008-01		Q4 2008	<0.03	<0.0004	0.0017	0.048	<0.0001	0.0002	<0.0001	<0.01	0.01	0.03	<0.0001	0.12	<0.0002	0.81	<0.01	0.0113	<0.0001	0.05	<0.01
MW-2008-01		Q1 2009	<0.06	<0.0008	0.002	0.043	<0.0002	0.0009	<0.0002	0.02	0.03	<0.04	<0.0002	0.41	<0.0002	0.83	0.05	0.0097	<0.0002	0.061	0.44
MW-2008-01		Q2 2009	<0.03	0.0006	0.0026	0.036	<0.0001	0.0002	<0.0001	<0.01	<0.01	<0.02	<0.0001	0.057	<0.0002	0.93	<0.01	0.0106	<0.0001	0.0653	<0.01
MW-2008-01		Q3 2009	<0.03	<0.0008	0.002	0.018	<0.0002	0.0004	<0.001	<0.01	0.04	0.04	<0.0002	0.051	<0.0002	0.91	<0.01	0.0088	<0.0002	0.0535	<0.01
MW-2008-02		Q4 2008	0.04	<0.0004	0.0034	0.06	<0.0001	0.0001	<0.0005	<0.01	<0.01	2.89	<0.0001	0.763	<0.0002	0.46	<0.01	0.0007	<0.0001	0.75	<0.01
MW-2008-02		Q1 2009	<0.2	<0.002	0.005	0.05	<0.0005	<0.0005	<0.0005	<0.05	<0.05	2.3	<0.0005	0.6	<0.0002	0.52	<0.05	0.0007	<0.0005	0.769	<0.05
MW-2008-02		Q2 2009	<0.2	<0.0004	0.0023	0.05	<0.0001	<0.0001	<0.0005	<0.01	<0.05	0.4	0.0002	0.411	<0.0002	0.67	<0.01	0.0024	<0.0001	0.767	<0.01
MW-2008-02		Q3 2009	<0.2	<0.002	<0.003	0.015	<0.0005	<0.0005	<0.003	<0.01	0.02	0.08	<0.0005	0.37	<0.0002	0.86	<0.02	0.0063	<0.0005	1.01	<0.02
MW-2008-03		Q4 2008	<0.03	<0.0004	0.0038	0.07	<0.0001	0.0006	<0.0005	<0.01	0.05	<0.02	<0.0001	0.243	<0.0002	0.75	<0.01	0.0412	0.0001	0.324	<0.01
MW-2008-03		Q1 2009	<0.2	<0.002	0.005	0.07	<0.0005	0.0006	<0.0005	<0.05	<0.05	<0.1	<0.0005	0.31	<0.0002	0.87	0.1	0.04	<0.0005	0.301	<0.05
MW-2008-03		Q2 2009	<0.2	<0.0004	0.0032	0.05	<0.0001	0.0007	<0.0002	<0.01	0.02	<0.02	<0.0001	0.184	<0.0002	0.94	<0.01	0.0499	<0.0001	0.292	<0.01
MW-2008-03		Q3 2009	<0.06	<0.002	0.003	0.044	<0.0005	0.0006	<0.003	<0.01	0.09	<0.02	<0.0005	0.101	<0.0002	0.93	<0.01	0.0453	<0.0005	0.27	0.01
MW-2008-03	Duplicate	Q3 2009	<0.06	<0.002	0.003	0.043	<0.0005	0.0006	<0.003	<0.01	0.09	<0.02	<0.0005	0.096	<0.0002	0.92	<0.01	0.0442	<0.0005	0.269	<0.01
MW-2008-04		Q4 2008	0.03	<0.0004	0.0033	0.067	<0.0001	0.0006	<0.0001	0.01	0.01	<0.02	<0.0001	0.686	<0.0002	0.68	<0.01	0.002	<0.0001	0.125	0.01
MW-2008-04		Q1 2009	<0.2	<0.002	0.006	0.06	<0.0005	<0.0005	<0.0005	0.06	<0.05	2.8	<0.0005	0.66	<0.0002	0.6	**0.13**	<0.0005	<0.0005	0.0855	0.18
MW-2008-04		Q2 2009	<0.2	0.0004	0.0034	0.05	<0.0002	0.0007	<0.0002	<0.01	<0.01	<0.02	<0.0001	0.498	<0.0002	1.01	<0.01	0.0061	<0.0001	0.208	<0.01
MW-2008-04		Q3 2009	<0.2	<0.002	0.003	0.024	<0.0005	<0.0005	<0.003	<0.01	0.02	0.32	<0.0005	0.498	<0.0002	0.81	<0.02	0.0026	<0.0005	0.145	<0.02
MW-2008-05		Q4 2008	<0.03	<0.0004	0.0047	0.012	0.0003	0.0016	<0.0001	<0.01	0.38	0.03	<0.0001	0.678	<0.0002	0.9	<0.01	**0.0732**	<0.0001	0.0564	0.12
MW-2008-05		Q1 2009	0.15	<0.0004	0.0028	0.011	0.0002	0.0019	<0.0001	<0.01	0.36	<0.02	<0.0001	0.953	<0.0002	0.93	<0.01	0.0258	<0.0001	0.0761	0.12
MW-2008-05		Q2 2009	<0.06	<0.0004	0.0026	0.018	0.0002	0.0023	<0.0001	<0.01	0.36	<0.02	<0.0001	0.972	<0.0002	0.88	<0.01	0.0179	<0.0001	0.0911	0.13
MW-2008-05		Q3 2009	<0.06	<0.0008	0.003	0.021	0.0002	0.0034	<0.001	<0.01	0.5	<0.02	<0.0002	1.15	<0.0002	0.87	<0.01	0.0127	<0.0002	0.107	0.19
MW-2008-06		Q4 2008	0.03	0.0005	0.0052	0.061	<0.0005	0.0007	<0.0005	<0.01	0.02	<0.02	<0.0001	0.798	<0.0002	2.77	<0.01	**0.0592**	<0.0001	0.546	<0.01
MW-2008-06		Q1 2009	0.4	0.002	0.004	0.06	<0.0005	0.0008	<0.0005	0.05	<0.05	<0.1	<0.0005	1.44	<0.0002	2.44	<0.05	0.0397	<0.0005	0.552	<0.05
MW-2008-06		Q2 2009	<0.03	<0.002	0.005	0.036	<0.0001	0.0007	0.0001	<0.01	<0.01	<0.02	<0.0001	0.988	<0.0002	2.35	<0.01	**0.0585**	<0.0001	0.586	<0.01
MW-2008-06	Duplicate	Q2 2009	<0.03	<0.002	0.005	0.036	<0.0001	0.0006	0.0002	<0.01	<0.01	<0.02	<0.0001	1.02	<0.0002	2.43	<0.01	**0.0591**	<0.0001	0.584	<0.01
MW-2008-06		Q3 2009	<0.06	<0.002	0.004	0.041	<0.0005	0.0007	<0.003	<0.01	0.02	<0.02	<0.0005	0.537	<0.0002	2.42	<0.01	0.0461	<0.0005	0.58	<0.01
MW-2008-07		Q4 2008	0.53	<0.0004	0.001	0.029	**0.028**	**0.0978**	<0.0005	0.58	0.45	<0.02	0.0001	66.7	<0.0002	0.05	**0.21**	0.0012	0.0001	0.668	5.18
MW-2008-07		Q1 2009	1.8	<0.002	<0.003	<0.02	**0.0133**	**0.0675**	<0.0005	0.28	0.24	<0.1	<0.0005	47	<0.0002	<0.05	0.1	<0.0005	<0.0005	0.576	1.9
MW-2008-07		Q2 2009	0.86	<0.002	<0.003	0.023	**0.0175**	**0.0885**	<0.0001	0.47	0.3	0.02	<0.0001	69.6	<0.0002	0.06	**0.18**	<0.0005	0.0001	0.524	4.29
MW-2008-07		Q3 2009	0.37	<0.0004	0.0009	0.026	**0.0172**	**0.0784**	0.0011	0.36	0.22	0.02	<0.0001	60.8	<0.0002	0.04	**0.2**	0.0008	<0.0001	0.523	3.42
MW-2008-08		Q4 2008	<0.03	0.0013	0.0025	0.043	<0.0005	0.0007	<0.0005	<0.01	0.01	<0.02	<0.0001	0.545	<0.0002	0.38	<0.01	0.0052	0.0001	0.586	0.01
MW-2008-08		Q1 2009	<0.2	<0.002	<0.003	0.07	<0.0005	0.0006	<0.0005	0.05	0.07	<0.1	<0.0005	0.56	<0.0002	0.31 J	<0.05	0.0036	<0.0005	0.642	0.06
MW-2008-08		Q2 2009	<0.03	<0.004	<0.005	0.03	<0.0001	0.0004	0.0018	<0.01	0.02	<0.02	<0.0001	0.241	<0.0002	0.45	<0.01	0.0028	0.0001	0.598	0.01 J
MW-2008-08		Q3 2009	<0.06	<0.002	0.004	0.031	<0.0005	0.0008	<0.003	<0.01	0.02	<0.02	<0.0005	0.108	<0.0002	0.42	<0.01	0.0028	<0.0005	0.55	<0.01
MW-2008-09		Q4 2008	63.8	<0.0004	0.003	0.029	**0.0727**	**0.132**	<0.0005	0.7	22.7	120	**0.167**	49.2	<0.0002	0.01	**0.37**	0.0038	0.0004	0.805	22.2
MW-2008-09		Q1 2009	40.8	<0.002	<0.003	<0.02	**0.0488**	**0.135**	0.0048	0.7	16.7	124	**0.1**	49	<0.0002	<0.05	**0.34**	0.0025	<0.0005	0.715	20.2
MW-2008-09		Q2 2009	41.1	<0.004	<0.005	0.018	**0.0606**	**0.134**	0.0029	0.73	20	154	**0.17**	52.8	<0.0002	0.01	**0.34**	0.0016	0.0003	0.619	21.6
MW-2008-09		Q3 2009	39.4	<0.002	0.004	0.024	**0.0599**	**0.162**	<0.003	0.73	19.4	123	**0.149**	52	<0.0002	<0.01	**0.33**	0.0027	<0.0005	0.682	21.2
MW-2008-10		Q4 2008	2.95	<0.0004	0.002	0.034	**0.0163**	**0.185**	<0.0001	0.25	3.8	<0.02	0.0158	37.4	<0.0002	0.01	**0.21**	0.0017	0.0001	0.0297	16.1
MW-2008-10		Q1 2009	3.1	<0.002	<0.003	0.06	**0.0196**	**0.209**	<0.0005	0.34	4.47	<0.1	0.0072	43.3	<0.0002	<0.05	**0.21**	<0.0005	<0.0005	0.0357	18.3
MW-2008-10		Q2 2009	4.94	<0.0004	0.0015	0.024	**0.0183**	**0.198**	<0.0001	0.31	6.29	<0.02	0.0348	42.2	<0.0002	<0.01	**0.24**	0.0013	0.0001	0.0487	17.7
MW-2008-10		Q3 2009	4.49	<0.0004	0.0023	0.025	**0.018**	**0.191**	<0.0005	0.29	5.56	0.03	0.0248	40.9	<0.0002	<0.01	**0.28**	0.0013	<0.0001	0.0431	17.8

Table 15
Groundwater Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Zinc (mg/L)
		AWQS	**NE**	**0.006**	**0.01**	**2.0**	**0.004**	**0.005**	**0.1**	**NE**	**NE**	**NE**	**0.05**	**NE**	**0.002**	**NE**	**0.1**	**0.05**	**NE**	**NE**	**NE**
Central Investigation Area (continued)																					
MW-2008-11		Q4 2008	0.19	<0.0004	0.0015	0.03	0.0035	**0.0373**	<0.0001	0.03	17.5	<0.02	0.0002	4.24	<0.0002	<0.01	0.08	0.0078	0.0001	0.0082	2.58
MW-2008-11		Q1 2009	0.27	<0.0008	<0.001	0.042	0.0008	**0.0231**	<0.0002	0.05	4.5	<0.04	<0.0002	4.54	<0.0002	<0.02	0.08	0.006	<0.0002	0.0542	1.33
MW-2008-11		Q2 2009	0.56	<0.0004	0.0014	0.023	**0.0068**	**0.0446**	<0.0005	0.04	34.3	<0.04	0.0004	4.2	<0.0002	<0.02	0.07	0.0073	0.0001	0.0058	3.05
MW-2008-11		Q3 2009	0.53	<0.0004	0.0023	0.021	**0.0068**	**0.0428**	<0.0005	0.03	35.7	<0.02	0.0004	4.44	<0.0002	<0.01	**0.2**	0.0076	<0.0001	0.0064	3.12
PZ-02		Q4 2008	<0.2	<0.0004	0.0012	<0.02	<0.0005	**0.121**	<0.05	<0.05	0.19	<0.1	0.0038	0.16	<0.0002	<0.05	0.09	0.0157	<0.0001	0.0185	6.38
PZ-02		Q1 2009	0.5	<0.002	0.006	<0.02	<0.0005	**0.622**	<0.05	<0.05	0.25	<0.1	0.0154	0.16	<0.0002	<0.05	<0.05	**0.0781**	<0.0005	0.0786	6.83
PZ-02	Duplicate	Q1 2009	0.2	<0.002	0.007	<0.02	<0.0005	**0.623**	<0.05	<0.05	0.21	<0.1	0.0157	0.15	<0.0002	<0.05	**0.11**	**0.0791**	<0.0005	0.0785	5.95
PZ-02		Q2 2009	<0.03	<0.002	0.006	0.018	<0.0005	**0.125**	0.01	<0.01	0.11	0.28	0.0018	0.161	<0.0002	<0.01	**0.23**	0.0154	<0.0005	0.0181	6.12
PZ-02		Q3 2009	0.04	<0.002	<0.003	0.017	<0.0005	**0.12**	<0.02	<0.01	0.16	<0.02	0.0028	0.15	<0.0002	<0.05	0.07	0.0136	<0.0005	0.0188	6.11
PZ-03		Q4 2008	<0.2	<0.0004	0.0013	0.011	<0.0001	0.0048	<0.01	<0.01	0.01	0.22	0.0012	0.172	<0.0002	<0.05	<0.01	0.0009	<0.0001	0.0601	0.36
PZ-03		Q1 2009	<0.2	<0.0004	0.0011	<0.02	<0.0001	0.0027	<0.05	<0.05	<0.05	<0.1	0.001	0.19	<0.0002	<0.05	<0.05	0.0005	<0.0001	0.0603	0.26
PZ-03		Q2 2009	<0.03	<0.0004	0.0011	0.02	<0.0001	0.0021	<0.01	<0.01	<0.01	0.09	0.0007	0.18	<0.0002	0.05	<0.01	0.0004	<0.0001	0.0708	0.22
PZ-03		Q3 2009	<0.2	<0.002	<0.003	0.02	<0.0005	0.0029	<0.05	<0.05	<0.05	0.1	0.0122	0.24	<0.0002	<0.05	<0.05	<0.0005	0.0011	0.0668	0.15
PZ-04		Q4 2008	<0.2	<0.002	0.005	0.02	<0.0005	0.0014	<0.05	<0.05	<0.05	6.8	<0.0005	3.21	<0.0002	14.7	<0.05	0.0079	<0.0005	0.567	0.09
PZ-04	Duplicate	Q4 2008	<0.2	<0.002	0.004	0.02	<0.0005	0.0006	<0.05	<0.05	<0.05	6.8	<0.0005	3.22	<0.0002	14.7	<0.05	0.0089	<0.0005	0.55	0.12
PZ-04		Q1 2009	<0.2	0.001	0.0039	0.02	<0.0001	0.0005	<0.05	<0.05	<0.05	1.2	0.0002	2.74	<0.0002	8.57	<0.05	0.0202	<0.0001	0.292	0.2
PZ-04		Q2 2009	<0.03	0.0006	0.0034	0.021	<0.0001	0.0003	<0.01	<0.01	<0.01	6.46	0.0001	2.78	<0.0002	6.38	<0.01	0.0027	<0.0001	0.399	0.12
PZ-04		Q3 2009	<0.2	<0.002	<0.003	0.02	<0.0005	<0.0005	<0.05	0.06	<0.05	2.2	0.0136	2.58	<0.0002	5	<0.05	0.0035	0.0015	0.211	0.21
PZ-05		Q4 2008	<0.2	<0.0004	0.0022	0.02	<0.0005	0.0007	<0.05	<0.05	<0.05	1.3	0.0003	0.05	<0.0002	0.72	<0.05	0.0168	<0.0001	0.688	0.1
PZ-05		Q1 2009	0.4	<0.002	**0.012**	0.02	<0.002	0.0023	<0.05	<0.05	<0.05	10.6	<0.0005	0.21	<0.0002	0.62	0.05	0.0477	<0.0005	0.587	0.19
PZ-05		Q2 2009	<0.03	<0.002	0.008	0.022	<0.0005	0.0005	0.01	<0.01	0.05	0.16	0.0007	0.053	<0.0002	0.67	0.01	0.0071	<0.0005	0.535	1.18
PZ-05		Q3 2009	0.05	<0.002	<0.003	0.022	<0.0005	<0.0005	<0.02	<0.01	<0.02	<0.02	<0.0005	<0.03	<0.0002	0.81	<0.01	0.0106	<0.0005	0.622	0.64
PZ-06		Q4 2008	<0.06	<0.0004	0.004	0.015	0.0006	**0.0128**	<0.01	<0.01	0.42	0.34	0.0007	0.007	<0.0002	0.1	0.07	0.0033	<0.0001	0.008	1.93
PZ-06		Q1 2009	0.12	<0.0004	0.0049	0.03	0.0025	**0.0486**	**0.17**	0.02	1.86	1.84	0.0008	0.18	<0.0002	<0.02	**0.36**	0.0037	<0.0001	0.0041	7.91
PZ-06		Q2 2009	0.32	<0.0004	0.009	0.034	**0.006**	**0.0817**	0.07	<0.01	4.35	0.92	0.0014	0.413	<0.0002	<0.05	**0.28**	0.0044	<0.0001	0.0072	10.1
PZ-06		Q3 2009	0.4	<0.002	**0.016**	0.03	**0.0082**	**0.109**	<0.05	0.07	5.34	0.9	0.0021	0.56	<0.0002	<0.05	**0.2**	0.0047	<0.0005	0.0066	11.4
TW-2008-09		Q4 2008	250	<0.004	0.006	<0.03	**0.237**	**1.53**	**0.941**	2.9	365	173	<0.001	231	<0.0002	<0.1	**4.9**	**0.066**	<0.001	1.14	70
TW-2008-09		Q1 2009	304	<0.004	<0.005	<0.03	**0.224**	**1.96**	**1.29**	2.7	354	137	<0.001	233	<0.0002	<0.1	**5.9**	**0.075**	<0.001	1.1	69.1
TW-2008-10		Q4 2008	1370	**0.0109**	**0.05**	<0.02	**0.521**	**0.344**	**25.9**	6.81	3.58	2280	**0.068**	386	0.0003	0.13	**2.61**	0.03	<0.005	4.41	73.8
TW-2008-10		Q1 2009	1600	*<0.04*	*<0.05*	<0.2	**0.54**	**0.46**	**22.7**	8.4	2.7	1860	**0.06**	412	<0.0002	<0.5	**9.8**	0.05	0.02	4.08	97
TW-2008-10		Q2 2009	1730	**0.01**	**0.04**	<0.08	**0.515**	**0.537**	**26.6**	8.4	1	1630	0.046	425	<0.0002	<0.3	**8.8**	**0.069**	<0.002	4.35	91.3
TW-2008-10		Q3 2009	1690	*<0.04*	0.0086	<0.08	**0.67**	**0.32**	**23.9**	8.3	0.7	1240	0.0254	402	<0.0002	<0.3	**13.7**	0.013	<0.0001	6.38	87.5
TW-2008-11		Q4 2008	976	*<0.01*	<0.01	<0.02	**0.421**	**0.885**	0.059	5.83	285	48.9	<0.003	366	<0.0002	<0.05	**1.6**	**0.053**	<0.003	3.14	94.9
TW-2008-11		Q1 2009	700	<0.004	<0.005	<0.03	**0.322**	**0.806**	0.073	4.9	213	85.4	0.001	315	<0.0002	<0.1	**3.5**	**0.058**	<0.001	1.96	80.9
TW-2008-11		Q2 2009	611	<0.002	0.003	<0.03	**0.275**	**0.735**	0.067	4.5	186	78.8	0.0029	308	<0.0002	<0.1	**2.8**	**0.0606**	0.0006	1.64	77.8
TW-2008-11		Q3 2009	526	*<0.008*	<0.01	<0.03	**0.355**	**0.849**	**0.124**	4	160	102	0.0018	279	<0.0002	<0.1	**3**	0.0389	0.0008	2.29	69.1
TW-2008-12		Q1 2009	190	<0.002	<0.003	<0.02	**0.106**	**0.37**	0.0262	1.83	57.2	3.8	0.0134	140	<0.0002	<0.05	**1.14**	0.0187	0.001	0.632	37.5
TW-2008-13		Q4 2008	0.08	<0.0004	0.0058	0.03	<0.0001	0.0007	<0.0001	0.02	<0.01	3.31	<0.0001	17.8	<0.0002	2.29	<0.01	0.0002	<0.0001	0.0427	0.02
TW-2008-13		Q1 2009	0.6	<0.002	0.007	0.02	<0.0005	<0.0005	<0.0005	0.05	0.07	12.3	<0.0005	16.4	<0.0002	2.23	<0.05	<0.0005	<0.0005	0.0517	<0.05
TW-2008-13		Q2 2009	<0.2	<0.002	0.005	<0.02	<0.0005	0.0005	<0.003	<0.05	<0.05	12.5	0.0006	15.4	<0.0002	2.28	<0.05	<0.0005	0.0011	0.0569	<0.05
TW-2008-13		Q3 2009	0.09	<0.0004	0.0084	0.036	0.0002	0.0004	<0.0005	<0.01	0.02	12.2	0.0001	15	<0.0002	2.34	0.02	0.0002	<0.0001	0.0633	0.01
East Investigation Area																					
MH-14**		Q4 2008	<0.06	<0.0004	0.0024	0.054	<0.0001	<0.0001	<0.02	<0.02	<0.02	<0.04	0.0002	<0.01	<0.0002	0.06	0.04	0.0013	<0.0001	0.0317	1.45
MH-14**		Q1 2009	<0.06	<0.0008	0.002	0.052	<0.0002	<0.0002	0.02	<0.02	<0.02	0.1	0.0005	0.28	<0.0002	<0.02	<0.02	0.0011	<0.001	0.0343	0.61
MH-14**		Q2 2009	<0.03	<0.0008	0.002	0.052	<0.0002	<0.0002	<0.01	<0.01	<0.01	0.04	<0.0002	0.018	<0.0002	<0.02	<0.01	0.001	<0.0002	0.0318	1.49
MH-14**		Q3 2009	<0.03	<0.0008	0.003	0.048	<0.0002	<0.0002	<0.02	<0.01	<0.01	0.02	0.0002	<0.01	<0.0002	<0.02	<0.01	0.0012	<0.0002	0.0326	1.33

Table 15
Groundwater Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Zinc (mg/L)
		AWQS	**NE**	**0.006**	**0.01**	**2.0**	**0.004**	**0.005**	**0.1**	**NE**	**NE**	**NE**	**0.05**	**NE**	**0.002**	**NE**	**0.1**	**0.05**	**NE**	**NE**	**NE**
East Investigation Area (continued)																					
MH-15W**		Q4 2008	<0.06	<0.0004	0.0008	0.044 J	<0.0001	<0.0001	<0.02	0.03	<0.02	3.23	<0.0001	1.47	<0.0002	0.15	0.02	0.0017	<0.0001	0.0337	1.79
MH-15W**	Duplicate	Q4 2008	<0.06	<0.0004	0.0006	0.035 J	<0.0001	<0.0001	<0.02	0.03	<0.02	3.21	<0.0001	1.45	<0.0002	0.14	0.02	0.0017	<0.0001	0.0334	1.76
MH-15W**		Q1 2009	<0.06	<0.0004	0.0006	0.024	<0.0001	<0.0001	<0.02	<0.02	<0.02	3.25	<0.0001	0.72	<0.0002	0.05	<0.02	0.0014	<0.0001	0.0245	1.37
MH-15W**		Q2 2009	<0.03	<0.0004	<0.004	0.039	<0.0002	<0.0001	<0.01	<0.01	<0.01	1.2	<0.0001	0.462	<0.0002	0.11	<0.01	0.002	<0.0001	0.0409	0.42
MH-15W**		Q3 2009	<0.3	<0.0008	<0.001	0.03	<0.0002	<0.0002	<0.1	<0.1	<0.1	2.6	<0.0002	0.92	<0.0002	<0.1	<0.1	0.0013	<0.0002	0.0253	0.8
MH-16W**		Q4 2008	<0.03	<0.0004	0.0024	0.031	<0.0001	<0.0001	<0.01	0.01	<0.01	<0.02	0.0003	0.013	<0.0002	0.02	0.04	0.0009	<0.0001	0.0032	0.46
MH-16W**		Q1 2009	0.07 J	<0.0004	0.0019	0.026	<0.0001	<0.0001	<0.01	<0.01	0.02	<0.02	0.0001	0.024	<0.0002	<0.01	0.04	0.0008	<0.0001	0.0032	0.4 J
MH-16W**		Q2 2009	<0.03	<0.0008	0.003	0.028	<0.0002	<0.0002	<0.01	<0.01	<0.01	<0.02	<0.0002	0.009	<0.0002	<0.01	<0.01	0.0007	<0.0002	0.0031	0.24
MH-16W**		Q3 2009	<0.03	<0.0004	0.0026	0.03	<0.0001	<0.0001	<0.01	<0.01	<0.01	0.03	0.0003	0.01	<0.0002	<0.01	0.04	0.0005	<0.0001	0.0033	0.23
MH-28**		Q4 2008	<0.06	<0.0004	0.0009	0.033	<0.0001	<0.0001	<0.01	<0.01	<0.01	0.26	0.0003	0.06	<0.0002	0.03	0.04	0.0011	<0.0001	0.0289	0.99
MH-28**		Q1 2009	0.14	<0.0004	0.0009	0.017	<0.0001	<0.0001	<0.02	<0.02	<0.02	0.23	0.0001	0.04	<0.0002	<0.02	<0.02	0.0006	<0.0001	0.0289	0.79
MH-28**		Q2 2009	<0.03	<0.0008	0.001	0.036	<0.0002	<0.0002	<0.01	<0.01	<0.01	0.37	<0.0002	0.053	<0.0002	0.05	<0.01	0.0009	<0.0002	0.028	0.85
MH-28**		Q3 2009	<0.03	<0.0008	0.002	0.031	<0.0002	<0.0002	<0.02	<0.01	<0.01	0.39	0.0011	0.06	<0.0002	0.03	<0.01	0.0006	<0.0002	0.0274	1.05
MH-29**		Q4 2008	<0.06	<0.0004	0.0016	0.041	<0.0001	0.0001	<0.01	<0.01	<0.01	0.43	0.0008	0.05	<0.0002	0.02	0.04	0.0014	<0.0001	0.0248	1.5
MH-29**		Q1 2009	0.28	<0.0008	0.003	0.044	<0.0002	0.0002	<0.02	<0.02	<0.02	0.45	0.0042	0.06	<0.0002	<0.02	0.02	0.0025	<0.0002	0.0464	1.64
MH-29**		Q2 2009	0.06	<0.0008	0.002	0.042	<0.0002	<0.0002	<0.01	<0.01	<0.01	0.94	0.0006	0.141	<0.0002	<0.02	<0.01	0.0012	<0.0002	0.025	1.02
MH-29**	Duplicate	Q2 2009	<0.03	<0.0008	0.002	0.044	<0.0002	<0.0002	<0.01	<0.01	<0.01	0.96	0.0006	0.144	<0.0002	<0.02	<0.01	0.0011	<0.0002	0.0249	1.04
MH-29**		Q3 2009	<0.03	<0.0004	0.0013	0.045	<0.0001	<0.0001	<0.01	<0.01	<0.01	1.18	0.0005	0.144	<0.0002	0.02	<0.01	0.0011	<0.0001	0.0244	0.98
MH-30		Q4 2008	<0.06	<0.0004	0.002	0.033	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.0018	0.009	<0.0002	<0.02	0.03	0.0007	<0.0001	0.0321	2.48
MH-30		Q1 2009	0.32	<0.0004	0.0019	0.034	<0.0001	<0.0001	<0.02	<0.02	<0.05	<0.04	0.003	<0.03	<0.0002	<0.02	<0.02	0.0006	<0.0001	0.0372	1.17
MH-30		Q2 2009	0.03	<0.0008	0.002	0.053	<0.0002	<0.0002	<0.01	0.01	<0.01	<0.02	0.0022 J	<0.005	<0.0002	<0.02	<0.01	0.0006	<0.0002	0.0358	1.57
MH-30	Duplicate	Q2 2009	<0.03	<0.0008	0.002	0.047	<0.0002	<0.0002	<0.01	<0.01	<0.01	<0.02	0.0037 J	<0.005	<0.0002	0.03	<0.01	0.0006	<0.0002	0.0357	1.52
MH-30		Q3 2009	<0.2	<0.0004	0.0016	0.037	<0.0001	<0.0001	<0.01	<0.01	<0.01	0.09	0.0028	0.038	<0.0002	<0.01	<0.01	0.0008	<0.0001	0.0342	3.2
PZ-07		Q4 2008	<0.03	0.0005	0.002	0.064	<0.0001	0.0002	<0.01	<0.01	<0.01	<0.02	0.0019	0.006	<0.0002	0.03	0.03	0.0056	<0.0001	0.0114	<0.01
PZ-07		Q1 2009	<0.03	<0.0004	0.0048	0.064	<0.0001	0.0001	<0.01	<0.01	<0.01	<0.02	<0.0001	0.005	<0.0002	0.02	0.04	0.0062	<0.0001	0.0134	<0.01
PZ-07		Q2 2009	<0.03	<0.0008	0.002	0.068	<0.0002	<0.0002	<0.01	0.03	<0.01	0.03	<0.0002	0.029	<0.0002	0.03	<0.01	0.0062	<0.0002	0.0134	<0.01
PZ-07		Q3 2009	<0.03	<0.0004 UJ	0.0016	0.065	<0.0001	0.0001	<0.01	<0.01	<0.01	<0.02	<0.0001	<0.005	<0.0002	0.02	<0.01	0.0058	<0.0001	0.0122	<0.01
PZ-08		Q4 2008	0.03	<0.0004	0.0012	0.019	<0.0001	<0.0001	<0.01	<0.01	<0.01	0.06	<0.0001	0.15	<0.0002	0.08	0.02	0.0078	<0.0001	0.0136	<0.01
PZ-08		Q1 2009	0.08	<0.0004	0.0014	0.025	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.0003	0.221	<0.0002	0.09	0.02	0.0048	<0.0001	0.0109	0.04
PZ-08		Q2 2009	<0.03	<0.0008	<0.001	0.026	<0.0002	<0.0002	<0.01	0.03	<0.01	0.53	0.0021	0.11	<0.0002	0.14	0.02	0.0059	<0.0002	0.0093	0.16
PZ-08		Q3 2009	<0.03	<0.0004	<0.0005	0.027	<0.0001	<0.0001	<0.01	0.01	<0.01	2.75	0.0011	0.238	<0.0002	0.12	<0.01	0.0042	<0.0001	0.0131	0.04
PZ-2007-05		Q4 2008	<0.06	<0.0004	0.0014	0.02	<0.0001	0.0002	<0.01	<0.01	0.01	<0.02	<0.0001	<0.005	<0.0002	0.08	0.02	0.002	<0.0001	0.0513	<0.01
PZ-2007-05		Q1 2009	0.24	<0.0004	0.001	0.028	<0.0001	0.0002	<0.01	<0.01	0.03	<0.02	0.0001	<0.005	<0.0002	0.07	0.02	0.002	<0.0001	0.048	<0.01
PZ-2007-05		Q2 2009	<0.03	<0.0004	0.0024	0.028	<0.0001	0.0001	<0.01	0.01	<0.01	<0.02	<0.0001	<0.005	<0.0002	0.08	<0.01	0.0022	<0.0001	0.0484	<0.01
PZ-2007-05		Q3 2009	<0.03	<0.0004	0.0019	0.03	<0.0001	0.0001	<0.01	<0.01	0.01	<0.02	<0.0001	<0.005	<0.0002	0.09	<0.01	0.0021	<0.0001	0.0485	<0.01
PZ-2008-16		Q4 2008	<0.03	*<0.01*	<0.01	0.026	<0.003	<0.003	<0.01	0.01	<0.01	0.04	<0.003	0.017	<0.0002	1.88	*<0.3*	0.0013	<0.003	<0.003	<0.3
PZ-2008-19		Q4 2008	<0.03	<0.0008	0.006	0.034	<0.0002	0.0005	<0.01	<0.01	<0.01	<0.02	<0.0002	0.31	<0.0002	2.96	<0.01	0.0004	<0.0002	0.01	<0.01
PZ-2008-20		Q4 2008	<0.03	<0.0008	0.001	0.014	<0.0002	0.0008	<0.01	<0.01	<0.01	0.06	<0.0002	0.397	<0.0002	3.94	<0.01	0.0003	<0.0002	0.0006	<0.01
West Investigation Area																					
BW-02		Q4 2008	11.4	<0.0004	0.0006	0.03	**0.064**	**0.303**	<0.05	0.08	13.2	17.3	0.0011	61.4	<0.0002	<0.05	**1.03**	0.0151	0.0003	0.0051	17.8
BW-02		Q1 2009	0.4	<0.002	<0.003	0.02	0.004	**0.294**	<0.05	<0.05	0.08	91.3	<0.0005	40.3	<0.0002	<0.05	0.06	0.0031	<0.0005	0.0056	2.19
BW-02		Q2 2009	7.1	<0.004	<0.005	0.023	**0.066**	**0.326**	<0.02	0.07	5.77	20.1	0.001	67.5	<0.0002	<0.05	**1.08**	0.011	<0.001	0.006	16.6
BW-02		Q3 2009	3.95	<0.002	<0.003	0.02	**0.0397**	**0.29**	<0.02	0.04	5.04	14.7	<0.0005	61.6	<0.0002	<0.05	**0.79**	0.0128	0.0006	0.0037	13.1
MH-18**		Q4 2008	<0.03	<0.0004	0.0074	0.009	<0.0001	<0.0001	<0.01	<0.01	<0.01	0.04	0.0002	<0.005	<0.0002	0.02	<0.01	0.0021	<0.0001	0.015	0.02
MH-18**		Q1 2009	<0.03	<0.0004	0.0097	0.015	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.0002	0.01	<0.0002	0.02 J	0.04	0.0027	<0.0001	0.0167	0.09
MH-18**		Q2 2009	<0.03	<0.0004	0.006	0.013	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.0005	<0.005	<0.0002	<0.01	<0.01	0.0013	<0.0001	0.0181	0.03
MH-18**		Q3 2009	<0.03	<0.0004	0.0072	0.021	<0.0001	<0.0001	<0.01	0.01	0.02	<0.02	0.0004	<0.005	<0.0002	0.02	<0.01	0.0016	<0.0001	0.0162	0.02

Table 15
Groundwater Metals Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Duplicate	Sample Date	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Thallium (mg/L)	Uranium (mg/L)	Zinc (mg/L)
		AWQS	**NE**	**0.006**	**0.01**	**2.0**	**0.004**	**0.005**	**0.1**	**NE**	**NE**	**NE**	**0.05**	**NE**	**0.002**	**NE**	**0.1**	**0.05**	**NE**	**NE**	**NE**
West Investigation Area (continued)																					
MH-19**		Q4 2008	<0.03	<0.0004	0.0061	0.054	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.0019	0.009	<0.0002	0.02	<0.01	0.0047	<0.0001	0.0242	0.05
MH-19**		Q1 2009	<0.03	<0.0004	0.0079	0.06	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	0.0009	<0.005	<0.0002	0.02	0.05	0.0051	<0.0001	0.0271	0.03
MH-19**		Q2 2009	<0.03	0.0009	0.0056	0.063	<0.0001	<0.0001	<0.01	0.03	0.01	<0.02	0.002	0.029	<0.0002	0.04	<0.01	0.0045	<0.0001	0.0255	0.07
MH-19**		Q3 2009	<0.03	<0.0004	0.0083	0.071	<0.0001	<0.0001	<0.01	<0.01	0.02	<0.02	0.0006	<0.005	<0.0002	0.02	<0.01	0.0045	<0.0001	0.0238	0.03
MH-20**		Q4 2008	<0.03	0.0004	0.0007	0.041	<0.0001	0.0002	<0.01	<0.01	<0.01	<0.02	0.0013	0.036	<0.0002	0.03	<0.01	0.0001	<0.0001	0.0036	0.01
MH-20**		Q1 2009	0.05	<0.0004	<0.0005	0.039	<0.0001	<0.0001	<0.01	<0.01	<0.01	0.14	<0.0001	0.088	<0.0002	0.03 J	<0.01	<0.0001	<0.0001	0.0043	<0.01
MH-20**		Q2 2009	<0.03	<0.0004	0.0015	0.036	<0.0001	<0.0001	<0.01	0.01	<0.01	<0.02	<0.0001	<0.005	<0.0002	0.06 J	<0.01	0.0001	<0.0001	0.0036	<0.01
MH-20**		Q3 2009	<0.03	<0.0004	0.0032	0.031	<0.0001	<0.0001	<0.01	<0.01	<0.01	<0.02	<0.0001	<0.005	<0.0002	0.08	<0.01	<0.0001	<0.0001	0.0022	<0.01
MH-27**		Q4 2008	<0.06	<0.0008	0.006	0.079	<0.0002	0.0003	<0.02	0.02	<0.02	9.49	<0.0002	1.85	<0.0002	0.04	<0.02	0.0002	<0.0002	0.0006	1.29
MH-27**		Q1 2009	0.27	<0.0008	0.005	0.071	<0.0002	0.0002	<0.02	0.02	0.06	<0.04	0.0003	0.6	<0.0002	<0.02	<0.02	0.0002	<0.0002	0.0005	0.97
MH-27**		Q2 2009	<0.06	<0.0008	0.007	0.074	<0.0002	<0.0002	<0.02	0.03	<0.02	0.05	<0.0002	0.03	<0.0002	0.03	<0.02	<0.0002	<0.0002	0.0004	0.16
MH-27**		Q3 2009	<0.03	<0.0008	0.01	0.078	<0.0002	<0.0002	<0.02	<0.01	0.03 J	0.06	0.0002	0.01 J	<0.0002	<0.01	<0.01	<0.0002	<0.0002	0.0004 J	0.21
MH-27**	Duplicate	Q3 2009	<0.03	<0.0008	0.009	0.078	<0.0002	0.0006	<0.02	0.01	0.23 J	<0.02	<0.0002	0.141 J	<0.0002	<0.01	<0.01	<0.0002	<0.0002	0.0013 J	0.18
PZ-16		Q4 2008	<0.2	<0.0004	0.0017	<0.02	<0.0001	<0.0001	<0.05	<0.05	<0.05	0.1	0.0116	0.26	<0.0002	<0.05	<0.05	0.004	<0.0001	0.0498	<0.05 UJ
PZ-16	Duplicate	Q4 2008	<0.2	<0.0004	0.0017	<0.02	<0.0001	<0.0001	<0.05	<0.05	<0.05	<0.1	0.0105	0.26	<0.0002	<0.05	<0.05	0.0041	<0.0001	0.0505	0.16 J
PZ-16		Q1 2009	<0.2	<0.002	**0.026**	0.02	<0.0005	0.0015	<0.05	<0.05	<0.05	<0.1	0.0211	0.06	<0.0002	0.07	<0.05	0.0228	<0.0005	0.292	<0.05
PZ-16		Q2 2009	<0.03	<0.0004	0.0015	0.02	<0.0001	<0.0001	<0.01	<0.01	0.02	0.08	0.006	0.018	<0.0002	<0.05	<0.01	0.0031	<0.0001	0.0571	0.04
PZ-16		Q3 2009	<0.03	<0.002	<0.003	0.019	<0.0005	<0.0005	<0.01	<0.01	0.02	0.11	0.0042	<0.03	<0.0002	<0.05	0.01	0.0031	<0.0005	0.0521	0.07

NOTES

· Displayed results represent dissolved metals concentrations.
· AWQS = Arizona Aquifer Water Quality Standard for drinking water.
· ** = well is a Point of Compliance (POC) well; the APP establishes specific Action Levels for constituents in groundwater for these wells.
Comparisons of water quality in these wells to AWQS levels were made for characterization purposes only for the VRP; however, bolded and italicized results do not indicate exceedences as regulated under the APP.
· mg/L= milligrams per liter.
· < = the analyte was not detected above the indicated reporting limit.
· J = the analyte was positively identified; however, the result is considered an estimated value.
· UJ = the analyte was not positively identified; the reporting limit is considered an estimated value.
· NE = AWQS not established.
· Results displayed in **bold** exceed the AWQS.
· Results displayed in *italics* were not detected above the indicated reporting limit, but the reporting limit exceeds the AWQS.

Table 16
Groundwater Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
			AWQS	**15**			**NE**	**4 millirem/year***			**NE**			**NE**			**5**	**NE**			**NE**			**NE**		
Background Area (North)																										
MH-21**			Q4 2008	**270**	14	54	-252.00	**340**	23	58	7.9 J	0.31	2.1	5.3	0.74	1.7	**13.2**	250	0.6	43	12	0.31	3.1	260	0.46	44
MH-21**	Filtered		Q4 2008	**240**	13	48	-282.00	**290**	24	52	10 J	0.52	2.8	5.8	0.75	1.8	**15.8**	250	0.72	41	12	0.6	3.1	260	0.6	44
MH-21**			Q1 2009	**390**	15	73	-49.80	**270**	25	48	6.9	0.36	2	7.5 J	0.92	2.3	**14.4**	210	0.56	35	9.8 J	0.18	2.3	220	0.54	37
MH-21**		Duplicate	Q1 2009	**420**	15	77	-33.00	**280**	26	51	6.5	0.41	1.9	6.1 J	1.1	2	**12.6**	210	0.38	36	13 J	0.5	2.9	230	0.38	38
MH-21**	Filtered		Q1 2009	**340**	17	64	-153.00	**290**	25	51	7	0.39	2.1	6.3	0.99	2	**13.3**	230	0.91	39	13 J	0.62	3	250	0.4	42
MH-21**	Filtered	Duplicate	Q1 2009	**350**	19	69	-79.50	**280**	36	53	6.1	0.38	1.8	6.5	1.2	2.1	**12.6**	200	0.41	34	9.5 J	0.43	2.3	220	0.41	36
MH-21**			Q2 2009	**420**	47	80	-40.00	**240**	39	47	7.5	0.34	2.2	6.3	0.98	2	**13.8**	220	0.31	39	10	0.23	2.2	230	0.19	41
MH-21**	Filtered		Q2 2009	**500**	20	93	-2.00	**260**	41	51	8	0.39	2.3	6.5	0.89	2	**14.5**	240	0.45	40	12	0.47	2.8	250	0.17	43
MH-21**			Q3 2009	**480 J**	19	88	-112.00	**320 J**	30	58	12 J	0.38	3.4	5.7 J	0.69	1.8	**17.7**	280	0.61	47	12	0.38	2.7	300	0.39	50
MH-21**		Duplicate	Q3 2009	**390 J**	14	74	-133.00	**260 J**	24	46	7.9 J	0.43	2.3	3.7 J	0.7	1.2	**11.6**	240 J	0.37	41	13 J	0.19	2.8	270 J	0.31	45
MW-2008-12			Q4 2008	**17**	12	8.8	-4.29	25	21	11	2.3 J	0.66	0.86	2	0.73	0.72	4.3	11	0.12	2	0.29 J	0.071	0.14	10	0.12	1.8
MW-2008-12		Duplicate	Q4 2008	**21**	14	10	-2.16	20 U	20	11	1.2 J	0.28	0.43	2	0.81	0.76	3.2	13	0.11	2.2	0.46 J	0.088	0.18	9.7	0.11	1.7
MW-2008-12	Filtered		Q4 2008	**31**	12	12	6.54	25	20	11	1.3 J	0.74	0.68	1.6	0.67	0.61	2.9	13	0.11	2.2	0.46	0.078	0.18	11	0.09	2
MW-2008-12	Filtered	Duplicate	Q4 2008	**23**	13	10	0.51	31	20	12	2.2 J	0.31	0.73	2.2	0.78	0.79	4.4	12	0.15	2.2	0.49	0.076	0.19	10	0.096	1.8
MW-2008-12			Q1 2009	**16**	13	9.4	-4.98	22	20	11	1.7	0.52	0.74	2.6	1	0.97	4.3	11	0.2	2.1	0.58	0.15	0.28	9.4	0.15	1.8
MW-2008-12	Filtered		Q1 2009	*17 U*	20	13	NA	18 U	28	14	1.9	0.4	0.76	1.5	0.98	0.69	3.4	12	0.26	2.3	0.6	0.085	0.29	10	0.14	2
MW-2008-12			Q2 2009	**25**	13	11	-1.18	11 U	22	10	2.8	0.32	0.96	2.7	0.91	0.95	**5.5**	14	0.24	2.5	0.18 J	0.08	0.15	12	0.25	2.3
MW-2008-12	Filtered		Q2 2009	**21**	13	10	-4.61	11 U	21	10	2.1	0.38	0.8	2.1	0.77	0.77	4.2	14	0.21	2.5	0.61	0.16	0.29	11	0.068	2.1
MW-2008-12			Q3 2009	**24**	9.7	9.8	5.79	18 U	22	11	2.2	0.4	0.83	2.6 J	0.8	0.9	4.8	11	0.22	2.1	0.41	0.07	0.22	6.8	0.18	1.3
MW-2008-12		Duplicate	Q3 2009	**31**	13	12	13.60	20 U	21	11	2.2	0.37	0.81	3 J	0.85	1	**5.2**	10	0.13	1.9	0.4	0.068	0.21	7	0.11	1.4
MW-2008-13			Q4 2008	**560**	18	100	-56.00	**390**	38	70	7.4 J	0.25	2	10	0.75	3.1	**17.4**	290	0.57	46	16	0.55	3.3	310	0.43	48
MW-2008-13	Filtered		Q4 2008	**560 J**	28	100	-15.00	**350**	37	63	3.1	0.71	1.1	8.5	0.71	2.6	**11.6**	270	0.16	42	15	0.43	3	290	0.41	46
MW-2008-13			Q1 2009	**410**	18	79	-52.00	**200**	36	42	4.7	0.54	1.5	4.2	0.95	1.4	**8.9**	220	0.43	37	12	0.41	2.6	230	0.29	39
MW-2008-13	Filtered		Q1 2009	**330**	19	64	-162.00	**230**	35	46	4.5	0.42	1.4	4.5	1	1.5	**9**	230	0.15	39	12	0.35	2.7	250	0.3	42
MW-2008-13			Q2 2009	**360 J**	22	71	-266.00	**190**	38	40	6.1	0.35	1.8	11	0.82	3.4	**17.1**	300	0.88	52	16	0.92	4.1	310	1.2	54
MW-2008-13		Duplicate	Q2 2009	**280 J**	17	57	-307.00	**200**	34	40	6.3	0.4	1.9	13	0.86	3.8	**19.3**	280	0.31	47	17	0.36	3.5	290	0.45	48
MW-2008-13	Filtered		Q2 2009	**300**	20	60	-284.00	**170**	36	36	7.7 J	0.39	2.2	13	0.74	3.9	**20.7**	280	0.44	47	14 J	0.2	3	290	0.39	48
MW-2008-13	Filtered	Duplicate	Q2 2009	**320**	21	66	-258.00	**170**	36	36	6.2 J	0.37	1.9	13	0.8	3.8	**19.2**	270	0.51	45	18 J	0.38	3.7	290	0.47	49
MW-2008-13			Q3 2009	**230**	18	50	-357.00	**82**	31	23	7	0.32	2	13	0.83	4	**20**	280	0.51	47	17	0.65	3.7	290	0.47	50
Background Area (West)																										
MH-17			Q4 2008	**79**	6.8	17	15.60	43	11	10	3.8	1	1.4	5.7	0.68	1.8	**9.5**	38	0.063	6.2	1.4	0.2	0.44	24	0.18	4
MH-17	Filtered		Q4 2008	**86**	6.8	18	20.60	48	11	11	5.3	0.57	1.6	5.5	0.66	1.7	**10.8**	40	0.18	6.4	1.4	0.21	0.44	24	0.23	4
MH-17			Q1 2009	**70**	5.9	15	7.90	30	9.5	7.6	4.7 J	0.32	1.4	6.7	0.94	2.1	**11.4**	37	0.085	6.6	1.1	0.19	0.44	24	0.17	4.5
MH-17		Duplicate	Q1 2009	**63**	7.5	14	2.10	37	11	9.2	3.3 J	0.38	1.1	7.1	1	2.2	**10.4**	38	0.062	6.5	0.9	0.17	0.35	22	0.14	3.9
MH-17	Filtered		Q1 2009	**70**	7	15	5.90	42	11	10	5.3 J	0.32	1.6	10	1	3.1	**15.3**	39	0.14	6.7	1.1	0.07	0.39	24	0.059	4.3
MH-17	Filtered	Duplicate	Q1 2009	**67**	6.4	15	0.80	37	11	9	2.5 J	0.4	0.92	8.3	1.1	2.6	**10.8**	40	0.064	6.8	1.2	0.075	0.41	25	0.12	4.3
MH-17			Q2 2009	**38**	5.8	9.6	-28.50	16	11	6.3	4.4	0.38	1.4	7.8	0.8	2.4	**12.2**	41 U	41	7.8	1.5	0.39	0.6	24	0.31	4.7
MH-17	Filtered		Q2 2009	**46**	5.9	11	-20.10	21	11	7	5.2	0.38	1.6	9.6	0.78	2.9	**14.8**	40 U	40	6.8	1.1	0.21	0.41	25	0.22	4.4
MH-17			Q3 2009	**55**	6.5	13	-9.88	32	10	8.1	5.1	0.42	1.6	6.6	0.66	2	**11.7**	39	0.2	6.7	0.88 J	0.17	0.34	25	0.19	4.4
MH-17		Duplicate	Q3 2009	**61**	6.4	14	-2.20	42	8.9	9.1	5.7	0.41	1.8	6.6	0.68	2	**12.3**	39	0.14	6.7	1.2 J	0.07	0.4	23	0.12	4
MW-2008-14			Q4 2008	**320**	63	94	234.80	**350**	120	94	0.49	0.39	0.34	1.2	0.94	0.61	1.69	46	0.16	7.8	2.2	0.14	0.61	37	0.062	6.3
MW-2008-14	Filtered		Q4 2008	**56**	4.6	12	-30.90	47	7.7	9.4	0.047 U	0.41	0.16	0.68 U	0.86	0.48	ND	46	0.29	8.1	1.9	0.47	0.79	39	0.35	7
MW-2008-14			Q1 2009	**150**	11	32	23.10	**92**	21	21	0.31 U	0.36	0.26	1.1 J	0.76	0.52	1.1	63	0.14	11	2.9	0.24	0.78	61	0.2	10
MW-2008-14	Filtered		Q1 2009	**80**	4.8	16	-45.90	50	6.1	9.4	0.17 U	0.35	0.2	0.17 U	0.83	0.4	ND	63	0.18	11	2.9	0.14	0.73	60	0.18	10

Table 16
Groundwater Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
			AWQS	15			NE	4 millirem/year***			NE			NE			5	NE			NE			NE		
Background Area (West) (continued)																										
MW-2008-15			Q4 2008	**41**	5.3	10	18.05	16	8.2	5.3	0.26 U	0.29	0.21	1.7	0.63	0.62	1.7	16	0.2	2.8	0.75	0.075	0.31	6.2	0.12	1.2
MW-2008-15	Filtered		Q4 2008	**17**	4.9	5.8	-7.47	19	8.6	5.8	0.99	0.31	0.39	1.9	0.65	0.68	2.89	17	0.16	2.9	0.47	0.24	0.25	7	0.15	1.3
MW-2008-15			Q1 2009	**19**	7.9	8.3	-3.05	8.9 U	12	6	2	0.42	0.82	2.7	1.1	1	4.7	15	0.17	2.8	0.35	0.18	0.21	6.7	0.17	1.4
MW-2008-15	Filtered		Q1 2009	**19**	8.9	8.5	-5.56	9.8 U	12	6.2	1.9	0.42	0.74	2.3	1	0.9	4.2	16	0.18	3	0.36	0.2	0.22	8.2	0.24	1.6
MW-2008-15			Q2 2009	**21**	6.5	7.1	-3.34	7.2 U	12	5.8	2.8	0.44	0.99	3	0.81	1	**5.8**	17	0.21	3.1	0.34	0.15	0.21	7	0.067	1.4
MW-2008-15	Filtered		Q2 2009	**23**	5	7	-0.32	10	9.7	5.2	2	0.42	0.8	3	0.84	1	5	16	0.21	2.9	0.52	0.15	0.26	6.8	0.17	1.4
MW-2008-15			Q3 2009	**26**	5.8	7.7	5.10	12	9.5	5.4	3.6	0.37	1.2	6.3 J	0.8	1.9	**9.9**	15	0.2	2.8	0.4	0.069	0.21	5.5	0.16	1.1
PZ-01			Q4 2008	**33**	3.5	7.4	24.01	34	5.4	6.7	0.099 U	0.26	0.16	0.64 U	0.82	0.45	ND	7.2	0.079	1.3	0.092	0.035	0.071	1.7	0.07	0.39
PZ-01	Filtered		Q4 2008	4.8	2.5	2	-4.45	4.1	3.5	1.9	0.25	0.22	0.18	0.42 U	0.84	0.43	0.25	7.4	0.034	1.4	0.15	0.039	0.095	1.7	0.065	0.4
PZ-01			Q1 2009	9.8	2.1	2.9	0.72	12	3.3	2.9	0.23 U	0.38	0.23	0.23 U	0.66	0.33	ND	7.3	0.19	1.5	0.18	0.18	0.15	1.6	0.13	0.47
PZ-01	Filtered		Q1 2009	4.7	2.3	2	-4.59	2.9 U	4.2	2.1	0.0074 U	0.43	0.14	0.027 U	0.7	0.33	ND	7.8	0.13	1.3	0.091	0.03	0.062	1.4	0.06	0.3
PZ-01			Q2 2009	9.9	2.7	3.2	1.28	6.7	5	2.8	0.072 U	0.41	0.17	0.41 U	0.85	0.43	ND	7.2	0.065	1.4	0.02 U	0.15	0.1	1.4	0.15	0.43
PZ-01	Filtered		Q2 2009	5.6 J	3.1	2.5	-4.03	0.84 U	5.8	2.6	-0.0041 U	0.39	0.14	-0.038 U	0.76	0.35	ND	7.9	0.094	1.3	0.23	0.027	0.1	1.5	0.074	0.32
PZ-01			Q3 2009	6.1	1.6	1.9	-3.34	4	2.8	1.6	-0.00046 U	0.43	0.16	-0.2 U	0.78	0.36	ND	7.8	0.11	1.4	0.14	0.085	0.093	1.5	0.089	0.36
Central Investigation Area																										
BW-03			Q4 2008	**44**	21	18	5.03	**55**	31	19	0.17	0.092	0.17	2.6	0.68	0.87	2.77	19	0.08	3.2	0.97	0.036	0.28	19	0.059	3.2
BW-03	Filtered		Q4 2008	**20**	20	13	NA	**51**	31	18	0.26 U	0.5	0.31	2.3	0.68	0.8	2.3	16	0.056	2.7	0.75	0.034	0.23	16	0.076	2.7
BW-03			Q1 2009	*6.6 U*	19	9.4	NA	**54**	30	18	2.9	0.39	0.99	5.1	0.88	1.6	**8**	12	0.22	2.3	0.62	0.22	0.29	12	0.2	2.3
BW-03	Filtered		Q1 2009	**34**	18	15	-7.60	17 U	29	14	2.8	0.43	0.98	4.6	0.7	1.5	**7.4**	20	0.31	3.6	1.6	0.19	0.51	20	0.24	3.7
BW-03			Q2 2009	**80 J**	24	27	16.60	**68**	35	22	2.7	0.38	0.95	4.8	0.63	1.5	**7.5**	30	0.25	5.1	1.4	0.21	0.46	32	0.18	5.5
BW-03		Duplicate	Q2 2009	*20 UJ*	22	14	NA	38	32	18	2.3 J	0.37	0.84	5.6 J	0.73	1.7	**7.9**	30 U	30	5.3	1.5	0.14	0.47	32 J	0.14	5.5
BW-03	Filtered		Q2 2009	**72**	23	25	21.60	36	36	19	4.2 J	0.41	1.3	4.8 J	0.81	1.5	**9**	23 J	0.22	4.1	1.4	0.21	0.45	26 J	0.21	4.5
BW-03	Filtered	Duplicate	Q2 2009	**44**	21	18	-22.40	45	33	19	2.6 J	0.39	0.92	6.1 J	0.82	1.9	**8.7**	31 UJ	31	5.5	1.4	0.19	0.48	34 J	0.18	6
BW-03			Q3 2009	**59 J**	20	22	18.70	50 J	31	18	2.1 J	0.38	0.79	2.9	0.7	0.96	5	19 J	0.17	3.4	1.3 J	0.14	0.43	20 J	0.15	3.6
BW-04			Q4 2008	**41**	28	20	-31.50	**72**	32	22	1.4	0.4	0.56	0.36 U	0.73	0.37	1.4	35	0.1	5.9	1.5	0.039	0.39	36	0.095	6
BW-04	Filtered		Q4 2008	**58**	21	21	-14.60	**63**	32	21	0.25	0.23	0.21	0.47 U	0.71	0.38	0.25	35	0.058	5.8	1.6	0.035	0.39	36	0.078	6
BW-04			Q1 2009	*12 U*	21	11	NA	40	30	17	0.57	0.34	0.35	0.61 U	0.79	0.43	0.57	25	0.31	4.4	1.1	0.17	0.42	25	0.21	4.5
BW-04	Filtered		Q1 2009	*18 U*	20	13	NA	35	31	17	-0.0026 U	0.35	0.13	0.67 U	0.87	0.48	ND	16	0.32	3.1	0.71	0.21	0.36	14	0.21	2.8
BW-04			Q2 2009	*13 U*	39	19	NA	*51 U*	68	34	0.69	0.36	0.4	0.8	0.73	0.44	1.49	10	0.21	2.1	0.97	0.094	0.4	12	0.26	2.3
BW-04	Filtered		Q2 2009	*14 U*	33	17	NA	*43 U*	62	31	0.34 U	0.39	0.27	1.2	0.79	0.55	1.2	11	0.26	2.1	0.94	0.082	0.37	12	0.16	2.3
BW-04			Q3 2009	**28**	20	15	0.34	**51**	28	17	0.13 U	0.43	0.21	0.25 U	0.69	0.34	ND	13	0.21	2.4	0.66	0.18	0.3	14	0.19	2.6
MH-22**			Q4 2008	**110**	47	36	-73.40	**110**	63	38	-0.029 U	0.4	0.19	1.3	0.85	0.6	1.3	87	0.11	15	5.4	0.095	1.1	91	0.14	15
MH-22**	Filtered		Q4 2008	**72**	34	30	-116.30	**150**	61	43	0.05 U	0.53	0.26	1.4	0.8	0.6	1.4	93	0.42	15	4.3	0.13	1.1	91	0.29	15
MH-23**			Q4 2008	**49**	20	19	-21.50	**58**	31	19	0.27 U	0.47	0.3	1.5	0.7	0.6	1.5	34	0.12	5.7	1.5	0.073	0.38	35	0.11	5.8
MH-23**	Filtered		Q4 2008	**43**	26	20	-26.00	**57**	32	20	0.78	0.49	0.48	1.8	0.74	0.68	2.58	32	0.085	5.4	2	0.038	0.47	35	0.076	5.9
MH-23**			Q1 2009	**110**	20	30	36.40	40	30	17	0.56	0.37	0.35	2.3	0.91	0.87	2.86	35	0.21	6.1	1.6	0.15	0.51	37	0.19	6.4
MH-23**	Filtered		Q1 2009	**39**	15	14	-40.10	28	21	12	0.55	0.36	0.35	2.1	0.99	0.82	2.65	37	0.2	6.5	2.1	0.16	0.6	40	0.2	6.9
MH-23**			Q2 2009	**76**	21	25	10.80	47	32	19	0.28 U	0.41	0.26	2	0.92	0.78	2	30	0.12	5.3	2.2	0.15	0.61	33	0.12	5.7
MH-23**	Filtered		Q2 2009	**74**	20	24	3.50	47	33	19	0.51	0.4	0.34	1.9	1.1	0.8	2.41	33	0.063	5.7	1.5	0.17	0.48	36	0.063	6.3
MH-23**			Q3 2009	**60**	21	21	-11.70	46	26	16	0.62	0.41	0.38	0.99	0.65	0.45	1.61	33	0.24	5.8	1.7	0.073	0.5	37	0.12	6.3
MW-2008-01			Q4 2008	**33**	13	12	-1.95	47	23	15	0.61	0.29	0.31	3.1	0.7	1	3.71	17	0.082	3	0.95	0.08	0.29	17	0.035	3
MW-2008-01	Filtered		Q4 2008	**65**	14	19	31.24	37	24	14	1.7	0.31	0.61	3.2	0.67	1.1	4.9	16	0.13	2.8	0.76	0.14	0.25	17	0.12	3
MW-2008-01			Q1 2009	**45**	16	16	3.60	**51**	23	15	1.6 J	0.28	0.59	2.5	0.65	0.83	4.1	19	0.98	4.4	1.4	0.85	1	21	0.87	4.8
MW-2008-01	Filtered		Q1 2009	15	14	9.2	-30.10	46	22	14	2.5 J	0.32	0.81	2.8	0.7	0.93	**5.3**	21	0.13	3.7	1.1	0.079	0.4	23	0.067	4
MW-2008-01			Q2 2009	**24**	14	11	-18.00	45	23	14	2.8	0.2	0.85	3.1	0.84	1	**5.9**	20	0.13	3.1	1	0.075	0.24	21	0.074	3.3
MW-2008-01	Filtered		Q2 2009	**30**	15	13	-16.10	30	23	13	2.4	0.19	0.74	3.2	1.1	1.1	**5.6**	22	0.12	3.5	1.1	0.073	0.27	23	0.078	3.6
MW-2008-01			Q3 2009	**40**	4.4	7.9	-2.30	37	5.8	7.2	2.5	0.42	0.92	3.3 J	0.83	1.1	**5.8**	20	0.2	3.5	1.3	0.16	0.42	21	0.13	3.7

Table 16
Groundwater Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample	Gross alpha (pCi/L)			Gross alpha - adjusted	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
			Date	Result	MDC	TPU	(pCi/L)	Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU	(pCi/L)	Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
			AWQS	15			NE	4 millirem/year***			NE			NE			5	NE			NE			NE		
Central Investigation Area (continued)																										
MW-2008-02			Q4 2008	**330**	44	78	-231.00	**410**	72	83	9.4	0.41	2.5	40	0.76	12	**49.4**	270 J	0.24	49	11 J	0.35	2.1	280 J	0.26	49
MW-2008-02	Filtered		Q4 2008	**310**	41	75	-219.80	**420**	73	85	7.3	0.25	1.9	30	0.67	9	**37.3**	260	0.24	42	9.8	0.15	2.1	260	0.29	42
MW-2008-02			Q1 2009	**290**	44	72	-234.00	**250**	73	60	12 J	0.34	3.3	28	0.68	8.2	**40**	250	0.31	40	14	0.71	3.5	260	0.73	42
MW-2008-02	Filtered		Q1 2009	**370**	43	85	-173.00	**270**	72	63	14 J	0.35	3.8	32	0.77	9.5	**46**	260	0.76	41	13	0.75	3.3	270	0.76	44
MW-2008-02			Q2 2009	**390**	39	89	-81.00	**190**	67	51	15	0.21	3.8	35	0.85	10	**50**	230	0.2	36	11	0.3	2.1	230	0.25	36
MW-2008-02	Filtered		Q2 2009	**380**	38	85	-163.00	**170**	74	50	16	0.2	4.1	47	0.94	14	**63**	260	0.2	40	13	0.2	2.3	270	0.13	42
MW-2008-02			Q3 2009	**560**	10	93	15.00	**210**	17	35	15	0.45	4.1	38 J	0.81	11	**53**	260	1.1	44	15	0.83	3.7	270	1	46
MW-2008-03			Q4 2008	**140**	38	43	-68.70	**180**	63	48	0.088 U	0.24	0.14	5.9	0.76	1.9	**5.9**	100	0.2	18	8.7	0.14	1.8	100	0.15	18
MW-2008-03	Filtered		Q4 2008	**120**	33	38	-75.40	**170**	63	46	-0.14 U	0.4	0.15	5.6	0.78	1.8	**5.6**	94	0.13	16	4.4	0.15	0.96	97	0.16	17
MW-2008-03			Q1 2009	**150**	47	46	-51.40	**120**	66	41	2.7 J	0.33	0.89	5.8	0.88	1.8	**8.5**	98	0.071	16	5.4	0.19	1.2	98	0.16	16
MW-2008-03	Filtered		Q1 2009	**120**	28	38	-82.70	**120**	62	40	3.4 J	0.34	1.1	5.7	0.79	1.8	**9.1**	98	0.19	16	4.7	0.073	1	100	0.062	17
MW-2008-03			Q2 2009	**120**	35	39	-76.00	*64 U*	64	34	3	0.17	0.89	7.7	0.84	2.4	**10.7**	94	0.074	15	5	0.022	0.86	97	0.05	15
MW-2008-03	Filtered		Q2 2009	**85**	32	31	-99.30	**69**	63	34	2.7	0.19	0.82	7.1	0.89	2.2	**9.8**	88	0.073	14	4.3	0.074	0.76	92	0.018	14
MW-2008-03			Q3 2009	**110**	38	39	-73.50	**75**	67	36	2.7	0.43	0.97	7.2 J	0.65	2.2	**9.9**	88	0.19	15	4.5 J	0.073	1	91	0.18	15
MW-2008-03		Duplicate	Q3 2009	**110**	32	38	-89.00	**78**	65	36	3	0.37	1	7.7 J	0.87	2.4	**10.7**	96	0.27	16	6 J	0.16	1.3	97	0.2	17
MW-2008-04			Q4 2008	**57**	31	25	-28.00	**100**	62	37	6.7	0.3	1.8	10	0.91	3.1	**16.7**	42	0.1	7.1	2	0.091	0.47	41	0.087	6.8
MW-2008-04	Filtered		Q4 2008	**53**	34	26	-21.90	**100**	63	37	4.3	0.29	1.3	10	0.86	3.2	**14.3**	38	0.084	6.4	1.9	0.038	0.45	35	0.062	5.9
MW-2008-04			Q1 2009	**59**	24	22	-2.80	**80**	33	23	16 J	0.41	4.3	14	0.86	4.2	**30**	32	0.2	5.5	1.8 U	1.8	0.54	28	0.24	4.8
MW-2008-04	Filtered		Q1 2009	**110**	26	34	51.00	**65**	35	22	15 J	0.38	4	14	0.83	4.4	**29**	32	0.2	5.6	1 U	1	0.38	26	0.17	4.6
MW-2008-04			Q2 2009	**110**	38	39	6.70	**94**	68	39	17	0.2	4.4	18	0.69	5.3	**35**	51	0.054	7.9	2.3	0.063	0.46	50	0.054	7.7
MW-2008-04	Filtered		Q2 2009	**86**	36	32	-85.00	**78**	66	36	14	0.2	3.6	17	0.76	5	**31**	81	0.019	12	5	0.059	0.86	85	0.064	13
MW-2008-04			Q3 2009	**94**	7.8	18	24.90	**60**	16	14	19	0.39	5.1	23 J	0.99	7	**42**	36	0.061	6.2	1.1	0.21	0.4	32	0.12	5.6
MW-2008-05			Q4 2008	**49**	11	15	12.25	48	14	12	0.59	0.38	0.33	2	0.77	0.74	2.59	18	0.1	3.1	0.75	0.13	0.24	18	0.12	3.1
MW-2008-05	Filtered		Q4 2008	**74**	11	19	35.02	**51**	17	13	0.63	0.61	0.46	1.5	0.84	0.64	2.13	19	0.11	3.2	0.98	0.088	0.28	19	0.075	3.2
MW-2008-05			Q1 2009	**38**	12	12	-10.10	33	18	11	1.5 J	0.48	0.66	2	0.69	0.72	3.5	22	0.29	3.9	1.1 U	1.1	0.4	25	0.24	4.4
MW-2008-05	Filtered		Q1 2009	**33**	10	11	-12.68	32	17	11	1.1 J	0.4	0.52	1.6	0.78	0.63	2.7	21	0.15	3.7	0.68 U	0.68	0.31	24	0.15	4.2
MW-2008-05			Q2 2009	**36**	15	14	-32.60	33	23	13	1.3	0.2	0.48	2.8	0.8	0.95	4.1	33	0.065	5.1	1.6	0.076	0.34	34	0.051	5.3
MW-2008-05	Filtered		Q2 2009	**45**	12	14	-13.30	39	23	14	1.3	0.2	0.48	2.5	0.72	0.86	3.8	27	0.018	4.3	1.3	0.058	0.28	30	0.018	4.6
MW-2008-05			Q3 2009	**53**	19	19	-22.80	38	31	17	1.9	0.31	0.72	3.2 J	0.77	1.1	**5.1**	35	0.21	6.1	1.8	0.21	0.55	39	0.2	6.8
MW-2008-06			Q4 2008	**250**	34	61	-107.00	**270**	69	62	0.47	0.27	0.26	3.9	0.99	1.3	4.37	170	0.22	30	7	0.2	1.5	180	0.24	32
MW-2008-06	Filtered		Q4 2008	**230**	37	59	-107.60	**280**	65	62	0.92	0.5	0.46	3.7	0.89	1.2	4.62	160	0.34	27	7.6	0.21	1.5	170	0.2	30
MW-2008-06			Q1 2009	**250**	29	60	-110.00	**200**	64	51	1.9 J	0.39	0.74	3.1	0.74	1	5	170	0.28	28	10	0.33	2.2	180	0.21	30
MW-2008-06	Filtered		Q1 2009	**230**	31	60	-150.00	**210**	66	53	2.1 J	0.46	0.83	3.4	0.79	1.1	**5.5**	180	0.25	29	10	0.29	2.2	190	0.31	32
MW-2008-06			Q2 2009	**270**	35	67	-119.20	**110**	66	40	0.81	0.38	0.43	1.6	0.69	0.61	2.41	190	0.26	32	9.2	0.26	1.9	190	0.26	34
MW-2008-06		Duplicate	Q2 2009	**270**	39	69	-141.00	**82**	70	39	0.93	0.44	0.48	1.4	0.81	0.59	2.33	190	0.31	32	11	0.27	2.3	210	0.28	35
MW-2008-06	Filtered		Q2 2009	**240**	36	61	-159.50	**75**	72	38	0.78	0.41	0.43	1.5	0.73	0.6	2.28	190	0.32	33	9.5	0.2	2	200	0.25	35
MW-2008-06	Filtered	Duplicate	Q2 2009	**240**	37	60	-129.80	**82**	68	38	0.78	0.39	0.43	1.3	0.75	0.57	2.08	170	0.28	29	9.8	0.29	2.1	190	0.11	31
MW-2008-06			Q3 2009	**240**	31	62	-159.40	**80**	62	35	0.9	0.41	0.47	2.8 J	0.76	0.95	3.7	190	0.4	34	9.4	0.3	2.1	200	0.28	35
MW-2008-07			Q4 2008	**210**	38	56	-218.40	**230**	72	57	0.79	0.24	0.36	6.1	1.2	2	**6.89**	210	0.22	36	8.4	0.25	1.7	210	0.21	36
MW-2008-07	Filtered		Q4 2008	**260**	37	66	-170.00	**270**	72	62	0.023 U	0.17	0.11	5.3	1.1	1.7	**5.3**	210	0.27	33	10	0.14	2.1	210	0.36	33
MW-2008-07	Filtered		Q1 2009	**170**	35	49	-188.30	**170**	66	48	2.5 J	0.43	0.93	4.7	0.74	1.5	**7.2**	180	0.12	30	8.3	0.32	1.9	170	0.27	29
MW-2008-07			Q1 2009	**250**	36	62	-131.00	**170**	60	45	1.5 J	0.32	0.59	3.5	0.74	1.2	5	190	1.1	30	11	0.4	3.1	180	0.99	30
MW-2008-07			Q2 2009	**200**	39	54	-138.10	**100**	70	40	2.2	0.41	0.83	4.8	0.83	1.5	**7**	170	0.33	28	8.1	0.26	1.8	160	0.35	28
MW-2008-07	Filtered		Q2 2009	**190**	31	52	-168.10	*63 U*	69	36	2.3	0.38	0.84	4.3	0.76	1.4	**6.6**	170	0.25	30	8.1	0.29	1.8	180	0.3	31
MW-2008-07			Q3 2009	**150**	24	38	-188.80	**80**	55	32	2.8	0.35	0.97	5.9	0.91	1.9	**8.7**	160	0.28	28	8.8	0.29	1.9	170	0.25	29

Table 16
Groundwater Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
			AWQS	15			NE	4 millirem/year***			NE			NE			5	NE			NE			NE		
Central Investigation Area (continued)																										
MW-2008-08			Q4 2008	**250**	36	62	-149.20	**240**	65	56	1.3	0.079	0.5	12	0.94	3.5	**13.3**	210	0.48	33	9.2	0.26	1.8	180	0.29	28
MW-2008-08	Filtered		Q4 2008	**260**	31	61	-159.00	**250**	66	58	3.9	0.25	1.1	12	0.91	3.6	**15.9**	230	0.46	36	9	0.48	2.2	180	0.58	28
MW-2008-08			Q1 2009	**250**	35	61	-117.50	**200**	62	50	6.5 J	0.31	1.8	8	0.62	2.4	**14.5**	190	0.53	30	7.5	0.47	1.8	170	0.53	26
MW-2008-08	Filtered		Q1 2009	**270 J**	31	63	-129.10	**190**	65	50	7.2 J	0.3	2	12	0.74	3.5	**19.2**	210	0.18	36	9.1	0.26	1.9	180	0.22	30
MW-2008-08			Q2 2009	**240**	42	59	-168.70	**180**	60	47	6.7	0.41	2	10	0.77	3.2	**16.7**	220 U	220	38	8.7	0.41	2.1	180	0.4	30
MW-2008-08	Filtered		Q2 2009	**310**	33	72	-128.30	**170**	60	46	6.4	0.35	1.9	11	0.84	3.4	**17.4**	240	0.081	41	8.3	0.096	1.8	190	0.19	33
MW-2008-08			Q3 2009	**330**	29	74	-60.00	**85**	65	37	5.6	0.4	1.7	15 J	0.86	4.6	**20.6**	210	0.38	35	10	0.4	2.3	170	0.38	28
MW-2008-09			Q4 2008	**360**	38	83	-194.00	**420**	67	83	0.7	0.25	0.29	11	0.94	3.4	**11.7**	260	0.3	42	14	0.39	2.7	280	0.22	44
MW-2008-09	Filtered		Q4 2008	**350**	42	80	-152.00	**350**	72	74	0.97	0.28	0.38	12	0.98	3.7	**12.97**	240	0.2	38	12	0.24	2.5	250	0.1	39
MW-2008-09			Q1 2009	**300**	37	73	-174.00	**270**	71	63	4.2 J	0.5	1.5	9.4	0.76	2.9	**13.6**	230	0.65	38	14	0.56	3	230	0.59	38
MW-2008-09	Filtered		Q1 2009	**290**	33	69	-150.00	**280**	69	63	4.2 J	0.44	1.4	8.7	0.68	2.7	**12.9**	210	0.42	36	10	0.59	2.4	220	0.37	37
MW-2008-09			Q2 2009	**280**	29	67	-101.00	**240**	66	57	4.2	0.39	1.3	15	0.9	4.5	**19.2**	180 U	180	31	11	0.09	2.2	190	0.077	32
MW-2008-09	Filtered		Q2 2009	**230**	38	58	-159.50	**230**	57	53	4.4	0.35	1.4	15	0.87	4.7	**19.4**	190 U	190	31	9.5	0.46	2.2	190	0.15	32
MW-2008-09			Q3 2009	**360**	30	81	-102.00	**200**	64	51	5.3	0.37	1.6	20 J	0.82	6.1	**25.3**	220	0.48	37	12	0.38	2.7	230	0.44	39
MW-2008-10			Q4 2008	*23 U*	39	21	NA	*21 U*	68	31	0.35	0.32	0.26	8	0.9	2.5	**8.35**	9.7	0.098	1.7	0.37	0.037	0.15	9.5	0.083	1.7
MW-2008-10	Filtered		Q4 2008	**34**	33	21	12.51	*29 U*	67	31	0.49	0.34	0.29	5.3	0.75	1.7	**5.79**	11	0.14	2	0.49	0.1	0.19	10	0.12	1.8
MW-2008-10			Q1 2009	*20 U*	31	18	NA	*47 U*	56	29	1.1 J	0.32	0.47	5.3	0.68	1.7	**6.4**	12	0.26	2.3	0.81	0.26	0.35	10	0.23	1.9
MW-2008-10	Filtered		Q1 2009	*18 U*	33	18	NA	*53 U*	57	30	1.2 J	0.34	0.48	5.4	0.73	1.7	**6.6**	11	0.15	2	0.59	0.18	0.28	11	0.13	2
MW-2008-10			Q2 2009	*23 U*	34	19	NA	*49 U*	63	31	2.1	0.39	0.8	7.3	0.84	2.3	**9.4**	17	0.31	3.1	0.64	0.2	0.29	16	0.22	2.9
MW-2008-10	Filtered		Q2 2009	**63**	36	29	31.30	*24 U*	69	32	2.5	0.41	0.91	8.8	0.96	2.7	**11.3**	16	0.22	2.9	0.7	0.23	0.32	15	0.18	2.8
MW-2008-10			Q3 2009	**37**	20	17	7.26	**56**	52	28	1.5	0.38	0.65	7.8	1.1	2.4	**9.3**	15	0.25	2.8	0.74	0.23	0.33	14	0.24	2.6
MW-2008-11			Q4 2008	8.6 U	14	7.5	NA	8.1 U	19	9	0.72	0.62	0.49	1.3	0.72	0.55	2.02	2	0.13	0.47	0.12	0.1	0.097	2.1	0.089	0.49
MW-2008-11	Filtered		Q4 2008	3.4 U	15	6.9	NA	9.7 U	20	9.4	0.3 U	0.36	0.27	1.2	0.7	0.51	1.2	4.3	0.13	0.85	0.12	0.11	0.095	4.1	0.1	0.81
MW-2008-11			Q1 2009	*17 U*	20	12	NA	18 U	30	14	1.3 J	0.33	0.51	1.3	0.71	0.55	2.6	21	0.06	3.6	1.1	0.17	0.38	21	0.12	3.7
MW-2008-11	Filtered		Q1 2009	*0.51 U*	19	7.4	NA	17 U	29	14	1.1 J	0.28	0.43	1.3	0.7	0.53	2.4	17	0.12	3.1	0.61	0.072	0.27	17	0.061	3.1
MW-2008-11			Q2 2009	**20**	13	10	15.94	25	21	11	1.2	0.41	0.55	1.9	0.65	0.69	3.1	2	0.21	0.54	0.056 U	0.075	0.1	2	0.12	0.55
MW-2008-11	Filtered		Q2 2009	15 J	14	9.1	11.22	23	20	11	0.98	0.4	0.49	2.3	0.68	0.79	3.28	2.2	0.18	0.57	0.084 U	0.19	0.11	1.5	0.18	0.44
MW-2008-11			Q3 2009	5.7 U	15	7.3	NA	23	20	11	1.5	0.38	0.63	2.9	0.94	1	4.4	2	0.29	0.54	0.23	0.18	0.17	2.2	0.22	0.56
PZ-02			Q4 2008	*14 U*	35	17	NA	*19 U*	60	28	1.1	0.077	0.45	6.3	0.77	2	**7.4**	11	0.33	2	0.37 U	0.37	0.22	5.5	0.21	1.1
PZ-02	Filtered		Q4 2008	*31 U*	42	24	NA	*2.4 U*	62	27	1.5	0.57	0.64	5.6	0.75	1.8	**7.1**	11	0.29	1.9	0.49 U	0.49	0.26	6.4	0.26	1.3
PZ-02			Q1 2009	*1.3 U*	31	12	NA	*15 U*	58	26	1.5 J	0.34	0.63	4 J	0.76	1.3	**5.5**	9.7	0.27	1.9	0.41 J	0.16	0.23	5	0.23	1.1
PZ-02		Duplicate	Q1 2009	*23 U*	33	19	NA	*44 U*	57	29	2.5 J	0.49	0.97	5.7 J	0.68	1.8	**8.2**	10	0.022	1.7	0.25 J	0.026	0.1	5.4	0.057	0.93
PZ-02	Filtered		Q1 2009	*9.4 U*	36	16	NA	*8 U*	60	27	2	0.37	0.76	6.4	0.74	2	**8.4**	9.8	0.19	1.9	0.26	0.21	0.19	5.1	0.16	1.1
PZ-02	Filtered	Duplicate	Q1 2009	*8.4 U*	35	16	NA	*11 U*	59	27	1.3	0.39	0.56	5.4	0.63	1.7	**6.7**	11	0.089	1.8	0.28	0.12	0.13	5.9	0.077	1
PZ-02			Q2 2009	*17 U*	34	18	NA	*18 U*	62	29	2.3	0.37	0.84	8.8	0.98	2.7	**11.1**	12	0.034	2	0.38	0.1	0.16	6.4	0.085	1.1
PZ-02	Filtered		Q2 2009	*25 U*	34	20	NA	*6.8 U*	65	29	1.9	0.4	0.75	6.1	0.96	1.9	**8**	10	0.096	1.7	0.28	0.036	0.13	4.9	0.03	0.9
PZ-02			Q3 2009	*21 U*	30	18	NA	*22 U*	60	28	1.5	0.46	0.66	6.8	0.88	2.1	**8.3**	13	0.28	2.5	0.24	0.082	0.18	6.9	0.23	1.4
PZ-03			Q4 2008	**39**	22	18	-10.92	**53**	31	19	2	0.6	0.75	16	0.78	4.7	**18**	28	0.03	4.6	0.92	0.069	0.27	21	0.058	3.5
PZ-03	Filtered		Q4 2008	**56**	25	22	4.26	**60**	32	20	2.4	0.41	0.8	17	0.8	5.1	**19.4**	31	0.25	5.5	0.74	0.17	0.29	20	0.13	3.7
PZ-03			Q1 2009	**30**	21	16	-24.20	**60**	31	20	5.3	0.39	1.6	20	0.75	5.9	**25.3**	31	0.22	5.4	1.2	0.22	0.43	22	0.15	3.9
PZ-03	Filtered		Q1 2009	**42**	19	18	-9.92	**55**	31	19	5.2	0.4	1.6	18	0.72	5.3	**23.2**	30	0.19	5.2	0.92	0.2	0.36	21	0.17	3.8
PZ-03			Q2 2009	**41**	38	25	-9.89	*41 U*	69	33	4.2	0.4	1.4	18	0.84	5.6	**22.2**	30	0.3	5.2	0.89	0.21	0.35	20	0.22	3.6
PZ-03	Filtered		Q2 2009	**46**	20	19	-4.99	**64**	32	21	4.3	0.34	1.4	17	0.81	5.1	**21.3**	29	0.28	5	0.99	0.25	0.38	21	0.21	3.7
PZ-03			Q3 2009	**68**	24	23	19.60	**64**	30	20	4.9	0.44	1.6	16	0.9	4.7	**20.9**	27	0.2	4.8	1.4	0.17	0.45	20	0.17	3.6

Table 16
Groundwater Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
			AWQS	15			NE	4 millirem/year***			NE			NE			5	NE			NE			NE		
Central Investigation Area (continued)																										
PZ-04			Q4 2008	**290**	36	68	-123.00	**220**	61	53	0.68	0.37	0.38	2.8	0.67	0.94	3.48	200	0.32	31	13 J	0.13	2.5	200	0.36	32
PZ-04		Duplicate	Q4 2008	**310**	37	73	-89.30	**290**	66	64	0.56	0.42	0.35	2.9	0.9	1	3.46	190	0.11	33	9.3 J	0.06	1.8	200	0.13	34
PZ-04	Filtered		Q4 2008	**290**	36	70	-79.60	**240**	62	56	0.85 J	0.38	0.39	6.4 J	0.7	2	**7.25**	180	0.49	28	9.6	0.19	2.2	180	0.37	29
PZ-04	Filtered	Duplicate	Q4 2008	**270**	34	65	-98.00	**240**	64	57	0.63 J	0.049	0.27	3 J	0.97	1.1	3.63	180	0.13	32	8	0.061	1.6	180	0.16	32
PZ-04			Q1 2009	**180**	31	49	-18.10	**140**	59	41	1.4	0.38	0.61	2.8	0.64	0.92	4.2	98	0.19	17	5.1	0.15	1.1	95	0.15	16
PZ-04	Filtered		Q1 2009	**140**	32	43	-66.50	**140**	61	42	1.5	0.42	0.64	2.7	0.77	0.94	4.2	100	0.064	17	6.5	0.15	1.4	100	0.17	17
PZ-04			Q2 2009	**120**	35	39	-95.30	**160**	63	44	1.5	0.37	0.62	2.7	0.77	0.92	4.2	100	0.43	18	5.3	0.37	1.5	110	0.32	18
PZ-04	Filtered		Q2 2009	**120**	33	39	-95.60	**120**	63	39	0.77	0.43	0.42	2.8	0.78	0.96	3.57	110	0.5	18	5.6	0.37	1.6	100	0.31	18
PZ-04			Q3 2009	**94**	25	31	-62.40	**100**	41	29	1.3	0.4	0.6	2.5	0.74	0.86	3.8	74	0.34	13	3.4	0.11	0.92	79	0.38	14
PZ-05			Q4 2008	**250**	37	62	-169.70	**310**	67	67	1.5	0.53	0.6	3.4	0.79	1.1	4.9	200	0.053	35	9.7	0.13	1.9	210	0.053	36
PZ-05	Filtered		Q4 2008	**180**	36	51	-229.40	**290**	64	62	1.4	0.49	0.58	4.1	0.91	1.4	**5.5**	200	0.29	31	9.4	0.1	1.9	200	0.29	32
PZ-05			Q1 2009	**210**	34	57	-212.00	**260**	63	59	2.5	0.39	0.9	4.7	0.86	1.5	**7.2**	200	0.37	34	12	0.36	2.7	210	0.16	36
PZ-05	Filtered		Q1 2009	**250**	41	66	-140.00	**210**	65	52	2.3	0.4	0.84	3.6	0.66	1.2	**5.9**	190	0.16	33	10	0.36	2.4	190	0.31	32
PZ-05			Q2 2009	**260**	36	65	-139.80	**270**	68	61	8.6	0.4	2.5	15	0.78	4.5	**23.6**	190	0.42	32	9.8	0.43	2.3	200	0.16	35
PZ-05	Filtered		Q2 2009	**200**	34	52	-137.70	**150**	64	45	1.6	0.34	0.66	4.2	0.82	1.4	**5.8**	160	0.24	28	7.7	0.17	1.6	170	0.18	30
PZ-05			Q3 2009	**330**	24	70	-59.80	**250**	46	51	3.6	0.49	1.2	4.2	0.79	1.3	**7.8**	190	0.53	32	9.8	0.4	2.1	190	0.4	32
PZ-06			Q4 2008	11 U	14	8.3	NA	28	20	11	0.55	0.41	0.34	0.9	0.81	0.49	1.45	2.9	0.085	0.6	0.15	0.088	0.097	2.8	0.085	0.58
PZ-06	Filtered		Q4 2008	12 U	15	8.7	NA	18 U	21	11	0.19 U	0.44	0.27	0.8 U	0.82	0.48	ND	3	0.087	0.63	0.12	0.091	0.09	2.3	0.077	0.51
PZ-06			Q1 2009	*16 U*	18	11	NA	33	29	16	2	0.42	0.77	3.5	0.79	1.1	**5.5**	2	0.096	0.45	0.026 U	0.11	0.059	1.7	0.078	0.39
PZ-06	Filtered		Q1 2009	**21**	17	12	18.18	22 U	30	15	1.3	0.37	0.57	3.6	0.83	1.2	4.9	1.3	0.21	0.42	0.12 U	0.18	0.13	1.4	0.17	0.44
PZ-06			Q2 2009	*2.1 U*	20	8.2	NA	37	32	17	2.5	0.38	0.9	3.8	0.73	1.2	**6.3**	2.5	0.018	0.46	0.11	0.058	0.066	2.3	0.05	0.43
PZ-06	Filtered		Q2 2009	**42**	38	25	37.49	*18 U*	68	31	3	0.45	1	3.6	0.7	1.2	**6.6**	2.2	0.061	0.41	0.11	0.021	0.06	2.2	0.018	0.41
PZ-06			Q3 2009	**36**	19	17	24.13	**66**	32	21	3.4	0.41	1.2	4.6	0.8	1.5	**8**	6	0.24	1.3	0.37	0.19	0.23	5.5	0.23	1.2
TW-2008-09			Q4 2008	**500**	80	130	-114.00	**510**	130	120	-0.049 U	0.56	0.29	2.2	0.63	0.75	2.2	290	0.55	46	14	0.21	3.1	310	0.34	49
TW-2008-09	Filtered		Q4 2008	**390**	76	110	-288.00	**550**	120	120	0.32 U	0.38	0.28	1.9	0.6	0.67	1.9	320	0.75	50	18	0.72	3.6	340	0.48	54
TW-2008-09			Q1 2009	**480**	110	140	-104.00	**320**	160	100	0.75 J	0.36	0.38	0.65	0.65	0.38	1.4	280	1	46	14	1	3.9	290	1.2	48
TW-2008-09	Filtered		Q1 2009	**200**	98	83	-436.00	**240**	150	90	0.62 J	0.38	0.35	2.1	0.68	0.75	2.72	300	0.43	47	16	0.51	3.2	320	0.58	50
TW-2008-10			Q4 2008	**1700**	190	410	-1289.00	**2100**	320	420	0.17 U	0.4	0.25	-0.037 U	0.68	0.31	ND	1400	1.8	210	89	1.9	17	1500	1.6	230
TW-2008-10	Filtered		Q4 2008	**1800**	180	420	-964.00	**1500**	300	320	-0.09 U	0.62	0.31	0.2 U	0.63	0.31	ND	1300	2.2	210	64	1.6	13	1400	2.1	220
TW-2008-10			Q1 2009	**2000**	220	480	-1179.00	**1700**	340	360	0.26 U	0.37	0.25	0.26 U	0.97	0.47	ND	1500	2.4	270	79	1.7	17	1600	2	280
TW-2008-10	Filtered		Q1 2009	**1600**	220	390	-1571.00	**1800**	330	370	0.4 U	0.44	0.32	0.49 U	0.86	0.45	ND	1500	2.2	260	71	2.4	16	1600	2	290
TW-2008-10			Q2 2009	**2100**	190	470	-1285.00	**990**	330	260	0.46	0.41	0.33	0.28 U	0.73	0.36	0.46	1600 J	1.4	270	85 J	0.58	17	1700 J	1.4	300
TW-2008-10	Filtered		Q2 2009	**2200**	200	490	-1282.00	**910**	300	240	0.41	0.35	0.29	0.33 U	0.73	0.37	0.41	1700	2.7	280	82	1	18	1700	2.5	290
TW-2008-10			Q3 2009	**1500**	250	390	-2374.00	**910**	360	260	0.29 U	0.36	0.26	0.29 U	0.73	0.37	ND	1800	6.8	310	74	3	22	2000	6.3	330
TW-2008-11			Q4 2008	**1200**	86	260	-801.00	**1200**	160	230	0 U	0.26	0.12	0.77	0.69	0.42	0.77	960	2.3	150	41	2.6	9.5	1000	2.8	160
TW-2008-11	Filtered		Q4 2008	**1200**	94	270	-826.00	**1200**	160	230	-0.073 U	0.3	0.14	0.51 U	0.67	0.37	ND	980	2.1	160	46	1.5	10	1000	2.1	170
TW-2008-11			Q1 2009	**1200**	110	260	-81.00	**570**	170	140	0.38 J	0.32	0.25	1.1	0.79	0.52	1.48	600	0.81	94	31	0.71	6.3	650	0.72	100
TW-2008-11	Filtered		Q1 2009	**760**	100	190	-567.00	**570**	160	140	0.084 U	0.39	0.17	0.51 U	0.74	0.4	ND	610	1.9	100	37	1.9	9.4	680	1.6	110
TW-2008-11			Q2 2009	**860**	100	200	-275.00	**180**	120	73	0.38 U	0.39	0.3	0.23 U	0.77	0.38	ND	530	0.92	89	25	0.87	5.5	580	0.84	98
TW-2008-11	Filtered		Q2 2009	**880**	88	200	-320.00	**160**	120	70	0.2 U	0.43	0.24	0.39 U	0.69	0.36	ND	560	0.64	95	30	0.39	6.5	610	0.77	100
TW-2008-11			Q3 2009	**620**	98	160	-640.00	**350**	160	110	0.69	0.37	0.4	0.89	0.74	0.47	1.58	590	1.6	100	30	1.4	7.4	640	1.5	110
TW-2008-12			Q1 2009	**210**	47	62	-149.40	**190**	63	49	0.44 J	0.37	0.28	0.95	0.68	0.46	1.39	170	0.95	27	9.4	0.52	2.2	180	0.67	29
TW-2008-12	Filtered		Q1 2009	**160**	52	53	-188.40	**200**	62	50	0.64 J	0.32	0.34	1.2	0.63	0.5	1.84	160	0.25	27	8.4	0.27	1.8	180	0.31	30
TW-2008-13			Q4 2008	**54**	34	26	19.18	**58**	57	31	0.93	0.28	0.38	2.7	0.57	0.89	3.63	17	0.24	2.9	0.82	0.21	0.34	17	0.26	2.9
TW-2008-13	Filtered		Q4 2008	**32**	26	19	2.36	*49 U*	56	29	0.8	0.61	0.5	2.4	0.63	0.81	3.2	14	0.16	2.5	0.64	0.079	0.29	15	0.16	2.6
TW-2008-13			Q1 2009	**41**	23	19	5.70	48	33	19	1.4 J	0.39	0.6	3.1	0.74	1	4.5	16	0.26	2.9	1.3 U	1.3	0.43	18	0.19	3.2
TW-2008-13	Filtered		Q1 2009	**30**	17	14	-10.90	34	31	16	0.9 J	0.4	0.47	2.2	0.75	0.8	3.1	20	0.15	3.6	1.9 U	1.9	0.57	19	0.19	3.5
TW-2008-13			Q2 2009	**65**	21	23	23.00	32 U	32	17	1.7	0.44	0.68	4.7	0.76	1.5	**6.4**	20	0.16	3.4	1	0.087	0.29	21	0.032	3.4
TW-2008-13	Filtered		Q2 2009	**41**	24	19	3.90	24 U	35	17	1.2	0.39	0.55	3.3	0.82	1.1	4.5	18	0.14	3	1.1	0.039	0.3	18	0.033	3
TW-2008-13			Q3 2009	**32**	30	20	-5.10	*46 U*	61	31	1.3	0.36	0.59	4.4	0.79	1.4	**5.7**	18	0.24	3.4	1.1	0.1	0.45	18	0.22	3.5

Table 16
Groundwater Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
			AWQS	15			NE	4 millirem/year***			NE			NE			5	NE			NE			NE		
East Investigation Area																										
MH-14**			Q4 2008	**21**	18	13	-13.95	36	29	16	0.034 U	0.45	0.23	0.8	0.66	0.42	0.8	22	0.18	3.9	0.95	0.12	0.44	12	0.26	2.4
MH-14**	Filtered		Q4 2008	**20**	17	12	-9.34	21 U	31	15	0.19 U	0.35	0.22	0.21 U	0.67	0.33	ND	17	0.23	3.4	0.34	0.27	0.29	12	0.13	2.5
MH-14**			Q1 2009	**70**	21	23	23.17	25 U	32	16	0.69	0.36	0.39	1.1	0.7	0.5	1.79	28	0.2	5	0.83	0.16	0.35	18	0.2	3.3
MH-14**	Filtered		Q1 2009	15 J	15	9.6	NA	21	20	11	0.16 U	0.44	0.22	0.46 U	0.66	0.36	ND	18	0.15	3.2	0.62	0.2	0.29	12	0.13	2.3
MH-14**			Q2 2009	*15 U*	21	12	4.37	20 U	34	16	0.21 U	0.38	0.23	0.89	0.8	0.49	0.89	20	0.18	3.6	0.63	0.19	0.3	13	0.068	2.4
MH-14**	Filtered		Q2 2009	**24**	18	13	-6.66	23 U	35	17	0.072 U	0.43	0.18	0.24 U	0.78	0.38	ND	19	0.22	3.4	0.66	0.16	0.31	11	0.16	2.1
MH-14**			Q3 2009	**22**	16	12	-10.54	9.6 U	25	12	0.089 U	0.42	0.18	0.87 U	0.89	0.52	ND	19	0.2	3.4	0.54	0.19	0.27	13	0.18	2.4
MH-15W**			Q4 2008	**20**	18	12	-11.74	40	31	17	0.26 J	0.24	0.22	0.23 U	0.68	0.34	0.26	18	0.28	3.4	0.74	0.12	0.39	13	0.18	2.4
MH-15W**		Duplicate	Q4 2008	**21**	14	11	-10.88	23 U	31	15	0.18 U	0.45	0.27	0.32 U	0.7	0.35	ND	18	0.38	3.4	0.88	0.35	0.45	13	0.38	2.6
MH-15W**	Filtered		Q4 2008	*12 U*	19	10	NA	23 U	31	15	0.15 U	0.18	0.14	0.44 U	0.65	0.35	ND	17	0.25	3.1	0.65	0.2	0.35	12	0.2	2.3
MH-15W**	Filtered	Duplicate	Q4 2008	*10 U*	21	11	NA	28 U	31	16	0.17 U	0.64	0.36	0.48 U	0.7	0.38	ND	16	0.37	3	0.73	0.29	0.4	13	0.27	2.5
MH-15W**			Q1 2009	**21**	17	12	1.65	23	21	11	0.49	0.35	0.32	0.73 U	1	0.55	0.49	11	0.18	2.1	0.35	0.21	0.22	8	0.15	1.6
MH-15W**	Filtered		Q1 2009	14 U	15	9.6	NA	20	20	11	0.077 U	0.37	0.16	0.77 U	1.2	0.64	ND	11	0.24	2.1	0.42	0.076	0.23	7.5	0.12	1.5
MH-15W**			Q2 2009	**19**	18	12	-15.69	14 U	31	15	0.26 U	0.32	0.23	0.12 U	0.76	0.36	ND	20	0.22	3.6	0.69	0.15	0.31	14	0.18	2.6
MH-15W**	Filtered		Q2 2009	**32**	20	15	0.33	26 U	32	16	0.28 U	0.37	0.25	-0.19 U	0.82	0.38	ND	19	0.12	3.4	0.67	0.075	0.29	12	0.2	2.3
MH-15W**			Q3 2009	**27**	17	13	5.42	21 U	26	13	0.19 U	0.43	0.23	0.74 U	0.83	0.47	ND	12	0.25	2.2	0.48	0.076	0.24	9.1	0.27	1.8
MH-16W**			Q4 2008	*3.1 U*	47	2.5	NA	7.9	7.7	4.1	-0.12 U	0.39	0.18	0.13 U	0.64	0.31	ND	2.9	0.18	0.81	0.14	0.12	0.16	1.3	0.26	0.5
MH-16W**	Filtered		Q4 2008	6.5	4.4	3.4	2.80	8.7	7.8	4.2	0.089 U	0.66	0.35	-0.11 U	0.67	0.31	ND	2.7	0.11	0.53	0.12	0.1	0.089	0.88	0.088	0.24
MH-16W**			Q1 2009	8.9	4.4	3.8	5.30	7	6.2	3.4	0.21 U	0.36	0.22	0.52 U	0.9	0.47	ND	2.2	0.19	0.58	0.099 U	0.14	0.11	1.3	0.14	0.4
MH-16W**	Filtered		Q1 2009	5.8 J	4.3	3	2.00	10	6.2	3.7	0.16 U	0.36	0.2	0.54 U	1	0.54	ND	2.6	0.19	0.66	0 U	0.077	0.1	1.2	0.065	0.39
MH-16W**			Q2 2009	3.5 U	4	2.5	NA	8.9	6.4	3.6	0.14 U	0.36	0.19	0.38 U	0.8	0.41	ND	3	0.05	0.54	0.048 U	0.059	0.046	1.3	0.063	0.28
MH-16W**			Q3 2009	0.8 U	3.1	1.4	NA	7.1	5	2.9	0.18 U	0.43	0.23	0.25 U	0.98	0.48	ND	2.5	0.24	0.66	0.1 U	0.19	0.12	1	0.23	0.37
MH-28**			Q4 2008	**26**	16	13	0.22	13 U	29	14	0.096 U	0.63	0.33	0.59 U	0.7	0.39	ND	16	0.27	3	0.48	0.12	0.3	9.3	0.17	1.9
MH-28**	Filtered		Q4 2008	*17 U*	18	11	NA	17 U	30	14	0 U	0.36	0.17	0.94	0.92	0.54	0.94	15	0.26	2.8	0.63	0.21	0.35	10	0.21	2.1
MH-28**			Q1 2009	**41**	22	17	15.71	16 U	31	15	0.43	0.37	0.31	0.85 U	0.94	0.54	0.43	15	0.12	2.7	0.69	0.072	0.29	9.6	0.16	1.8
MH-28**	Filtered		Q1 2009	**37**	19	15	12.29	14 U	22	11	0.24 U	0.36	0.23	0.64 U	0.91	0.49	ND	14	0.059	2.6	0.81	0.069	0.32	9.9	0.14	1.9
MH-28**			Q2 2009	*18 U*	20	12	NA	21 U	35	17	0.1 U	0.36	0.17	0.85	0.78	0.47	0.85	14	0.2	2.5	0.38	0.074	0.21	9.2	0.2	1.8
MH-28**	Filtered		Q2 2009	*13 U*	22	12	NA	20 U	34	17	0.37	0.36	0.28	0.67 U	0.88	0.48	0.37	15	0.25	2.9	0.49	0.16	0.26	8.8	0.22	1.8
MH-28**			Q3 2009	**24**	19	13	-1.28	7.9 U	28	13	0.19 U	0.45	0.24	0.67 U	0.93	0.5	ND	15	0.17	2.8	0.28	0.22	0.2	10	0.22	2
MH-29**			Q4 2008	*9.7 U*	18	9.9	NA	27 U	31	16	-0.068 U	0.38	0.18	0.42 U	0.78	0.4	ND	13	0.15	2.2	0.56	0.11	0.21	8.7	0.081	1.5
MH-29**	Filtered		Q4 2008	*14 U*	18	11	NA	16 U	30	14	-0.058 U	0.37	0.18	0.51 U	0.83	0.44	ND	11	0.07	1.9	0.43	0.035	0.16	7.6	0.07	1.3
MH-29**			Q1 2009	**28**	16	13	6.99	22	20	11	0.038 U	0.37	0.14	0.67 U	0.93	0.5	ND	12	0.15	2.2	0.61	0.2	0.29	8.4	0.12	1.6
MH-29**	Filtered		Q1 2009	**29**	15	13	9.48	19 U	20	11	0.29 U	0.36	0.25	0.54 U	0.98	0.51	ND	12	0.19	2.3	0.42	0.15	0.23	7.1	0.19	1.4
MH-29**			Q2 2009	*12 U*	21	11	NA	16 U	34	16	0.31 U	0.37	0.27	0.73	0.7	0.42	0.73	12	0.068	2.4	0.58 J	0.16	0.28	8.9 J	0.16	1.8
MH-29**		Duplicate	Q2 2009	**32**	22	16	12.54	-3.4 U	35	15	0.19 U	0.37	0.21	0.17 U	0.77	0.37	ND	12	0.23	2.3	0.26 J	0.079	0.18	7.2 J	0.23	1.5
MH-29**	Filtered		Q2 2009	*15 U*	16	10	NA	17 U	33	16	0.12 U	0.44	0.21	0.51 U	0.81	0.43	ND	12	0.27	2.3	0.39	0.26	0.24	8.5	0.18	1.7
MH-29**	Filtered	Duplicate	Q2 2009	*16 U*	20	12	NA	20 U	32	16	0.16 U	0.38	0.2	0.59 U	0.73	0.41	ND	12	0.22	2.2	0.34	0.077	0.2	8.1	0.17	1.6
MH-29**			Q3 2009	*14 U*	16	9.8	NA	4.8 U	26	12	0.15 U	0.43	0.22	0.81 U	0.86	0.5	ND	11	0.19	2.1	0.42	0.21	0.23	8.6	0.22	1.7
MH-30			Q4 2008	*17 U*	21	12	NA	19 U	30	15	0.28 U	0.85	0.5	0.85	0.72	0.45	0.85	18	0.13	3	0.65 U	0.65	0.29	9.7	0.15	1.8
MH-30	Filtered		Q4 2008	*8 U*	20	9.9	NA	19 U	30	15	0.069 U	0.25	0.17	0.9	0.74	0.47	0.9	19	0.27	3.2	0.52 U	0.52	0.26	11	0.17	2
MH-30			Q1 2009	**30**	18	14	-2.70	12 U	32	15	0.089 U	0.42	0.18	0.63 U	0.9	0.48	ND	20	0.12	3.5	0.7	0.073	0.3	12	0.14	2.3
MH-30	Filtered		Q1 2009	**35**	16	15	5.27	25 U	30	15	0.07 U	0.37	0.16	0.6 U	0.95	0.5	ND	18	0.058	3.2	0.73	0.068	0.3	11	0.13	2
MH-30			Q2 2009	**39**	19	17	6.54	26 U	33	17	0.13 U	0.36	0.19	0.61 U	0.74	0.41	ND	20	0.22	3.6	0.46	0.083	0.25	12	0.22	2.3
MH-30		Duplicate	Q2 2009	**21**	20	13	-11.36	22 U	35	17	0.19 U	0.4	0.22	0.38 U	0.79	0.4	ND	20 U	20	3.6	0.36	0.088	0.22	12	0.23	2.4
MH-30	Filtered		Q2 2009	**42**	19	17	12.59	18 U	33	16	0.082 U	0.39	0.17	0.26 U	0.7	0.35	ND	18 J	0.2	3.2	0.41	0.14	0.22	11	0.18	2.1
MH-30	Filtered	Duplicate	Q2 2009	**20**	16	11	-12.59	41	31	17	0.32 U	0.38	0.27	0.39 U	0.72	0.37	ND	20 UJ	20	3.6	0.59	0.16	0.28	12	0.2	2.2
MH-30			Q3 2009	**29**	17	14	-2.76	11 U	28	13	0.2 U	0.4	0.22	0.46 U	0.7	0.37	ND	19	0.22	3.4	0.76	0.14	0.31	12	0.23	2.2

Table 16
Groundwater Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
			AWQS	**15**			**NE**	**4 millirem/year*** **			**NE**			**NE**			**5**	**NE**			**NE**			**NE**		
East Investigation Area (continued)																										
PZ-07			Q4 2008	14 J	5.9	5.3	3.91	17	8.7	5.5	1.1	0.17	0.37	1.3	0.78	0.57	2.4	5.8	0.11	1.1	0.19	0.042	0.11	4.1	0.093	0.82
PZ-07	Filtered		Q4 2008	**23**	5.1	6.8	10.85	7.8 U	8.6	4.5	2.4	0.31	0.75	1.3	0.76	0.57	3.7	7.2	0.14	1.3	0.15	0.1	0.1	4.8	0.12	0.93
PZ-07			Q1 2009	**17**	6.2	6	7.25	12	10	5.7	2.7	0.33	0.94	1.1	0.73	0.51	3.8	5.9	0.18	1.2	0.15 U	0.17	0.14	3.7	0.18	0.84
PZ-07	Filtered		Q1 2009	**16**	7	6.1	4.09	9.1 U	10	5.4	3.2	0.33	1.1	1.7	0.79	0.66	4.9	6.8	0.15	1.4	0.21	0.18	0.16	4.9	0.12	1.1
PZ-07			Q2 2009	**23**	5.4	6.9	11.08	19	9.7	6.2	3.4	0.38	1.1	1.1	0.83	0.55	4.5	7.3	0.26	1.5	0.32	0.23	0.21	4.3	0.22	0.96
PZ-07	Filtered		Q2 2009	**25**	5.5	7.3	12.61	17	10	6.1	3.4	0.41	1.1	1.2	0.71	0.53	4.6	7	0.19	1.5	0.19	0.086	0.16	5.2	0.17	1.1
PZ-07			Q3 2009	**27**	4.5	7.6	16.06	14	8.2	5.1	4	0.44	1.3	1.7	0.83	0.67	**5.7**	6.5	0.14	1.3	0.24	0.073	0.17	4.2	0.16	0.92
PZ-08			Q4 2008	12	10	7	2.69	45	15	12	-0.035 U	0.42	0.19	0.25 U	0.85	0.41	ND	4.7	0.22	0.99	0.21 U	0.21	0.16	4.4	0.17	0.93
PZ-08	Filtered		Q4 2008	7.1	5.2	3.7	-3.16	11	6.5	3.9	0.043 U	0.12	0.21	0.6 U	0.82	0.44	ND	5.6	0.21	1.2	0.36 U	0.36	0.22	4.3	0.21	0.96
PZ-08			Q1 2009	7.1	5.4	3.7	-1.04	12	7.9	4.6	0.18 U	0.38	0.21	0.34 U	0.87	0.43	ND	4.4	0.088	0.99	0.24	0.22	0.19	3.5	0.2	0.83
PZ-08	Filtered		Q1 2009	11	5.2	4.5	3.41	7.9	7.1	3.8	0.13 U	0.36	0.18	0.33 U	0.98	0.48	ND	4.4	0.16	0.97	0.39	0.14	0.22	2.8	0.18	0.7
PZ-08			Q2 2009	6.2	4.6	3.3	-0.67	9.8	7	4	0.0058 U	0.37	0.14	0.2 U	0.78	0.38	ND	3.9	0.22	0.89	0.17	0.15	0.15	2.8	0.13	0.7
PZ-08			Q3 2009	7.1	4.7	3.6	0.06	12	8.2	4.8	0.21 U	0.47	0.26	-0.027 U	0.74	0.34	ND	3.4	0.21	0.79	0.14	0.074	0.12	3.5	0.17	0.82
PZ-2007-05			Q4 2008	**40**	14	14	-6.83	25	20	11	-0.071 U	0.67	0.33	0.5 U	0.75	0.4	ND	29	0.17	4.9	0.83 U	0.83	0.34	17	0.15	2.9
PZ-2007-05	Filtered		Q4 2008	**57**	13	17	12.20	20 U	20	11	0.22 U	0.44	0.28	0.83	0.81	0.48	0.83	28	0.26	4.7	0.8 U	0.8	0.33	16	0.16	2.8
PZ-2007-05			Q1 2009	**41**	12	14	-5.99	33	20	12	0.12 U	0.41	0.2	0.76 U	0.76	0.45	ND	28	0.19	5	0.99	0.079	0.38	18	0.067	3.2
PZ-2007-05	Filtered		Q1 2009	**48**	15	15	-2.10	27	21	12	0.11 U	0.38	0.18	0.54 U	0.76	0.41	ND	30	0.26	5.3	1.1	0.082	0.41	19	0.24	3.5
PZ-2007-05			Q2 2009	**24**	13	11	-22.20	19 U	23	12	0.7	0.39	0.4	0.62 U	0.86	0.47	0.7	28 U	28	4.9	1.2	0.14	0.41	17	0.16	3.1
PZ-2007-05	Filtered		Q2 2009	**28**	13	12	-18.95	9.5 U	22	10	0.32 U	0.4	0.27	0.33 U	0.84	0.42	ND	28 U	28	5	0.95	0.18	0.37	18	0.16	3.3
PZ-2007-05			Q3 2009	**39**	10	13	-9.84	21	16	8.8	0.37 U	0.41	0.3	0.49 U	0.84	0.44	ND	31	0.26	5.4	0.84	0.079	0.34	17	0.13	3.2
PZ-2008-16			Q4 2008	**110**	39	42	99.05	**170**	63	46	1.6	0.42	0.68	1.4	1	0.67	3	5.6	0.23	1.2	0.35	0.21	0.21	5	0.27	1.1
PZ-2008-16	Filtered		Q4 2008	*1.6 U*	19	7.9	NA	22 U	31	15	0.2 U	0.43	0.24	0.49 U	0.94	0.48	ND	0.56	0.2	0.26	0.021 U	0.16	0.11	0.25 U	0.25	0.18
PZ-2008-19			Q4 2008	**56**	36	28	42.20	**180**	59	46	0.4 U	0.48	0.33	0.76 U	0.93	0.52	ND	6.6	0.11	31	0.2	0.18	0.16	7	0.13	31
PZ-2008-19	Filtered		Q4 2008	*0.21 U*	18	6.9	NA	25 U	30	15	0.43	0.42	0.33	0.81	0.81	0.48	1.24	2.9	0.15	0.71	0.16	0.14	0.14	3.4	0.063	0.78
PZ-2008-20			Q4 2008	**74**	39	32	67.98	**110**	62	38	1.2	0.53	0.6	0.84	0.77	0.47	2.04	3.1	0.056	0.71	0.12	0.066	0.11	2.8	0.056	0.66
PZ-2008-20	Filtered		Q4 2008	*6.8 U*	20	9.6	NA	**67**	30	20	0.23 U	0.49	0.27	1.1	0.71	0.5	1.1	0.22	0.14	0.15	-0.015 U	0.16	0.092	0.15 U	0.15	0.12
West Investigation Area																										
BW-02			Q4 2008	*-11 U*	49	16	NA	*38 U*	60	29	0.24 U	0.75	0.44	0.63 U	0.64	0.38	ND	2.1	0.22	0.56	0.11 U	0.15	0.12	1.9	0.13	0.52
BW-02	Filtered		Q4 2008	*-4.8 U*	44	16	NA	*19 U*	60	27	0.35 U	0.52	0.36	0.83	0.68	0.43	0.83	1.8 U	1.8	0.42	0.16 U	0.16	0.11	1.9	0.12	0.45
BW-02			Q1 2009	*26 U*	35	21	NA	*25 U*	60	28	0.12 U	0.39	0.19	0.11 U	0.68	0.33	ND	0.88	0.25	0.35	0.1 U	0.19	0.13	0.6	0.23	0.28
BW-02	Filtered		Q1 2009	*15 U*	40	20	NA	*5.4 U*	62	28	0.27 U	0.4	0.25	0.45 U	0.8	0.41	ND	0.52	0.21	0.26	-0.009 U	0.16	0.11	0.31	0.18	0.19
BW-02			Q2 2009	*8.3 U*	49	21	NA	*21 U*	68	31	0.67	0.41	0.4	0.27 U	0.71	0.35	0.67	2.6	0.068	0.66	0.079 U	0.15	0.11	2.6	0.17	0.66
BW-02	Filtered		Q2 2009	*-3.7 U*	40	14	NA	*37 U*	66	32	0.28 U	0.39	0.26	0.13 U	0.75	0.36	ND	1.6	0.14	0.47	0.12 U	0.17	0.12	1.3	0.14	0.42
BW-02			Q3 2009	*-1.3 U*	39	15	NA	*1.2 U*	57	25	0.18 U	0.44	0.23	0.52 U	0.7	0.38	ND	3.1 J	0.18	0.81	0.1 U	0.16	0.13	2.6 J	0.22	0.72
MH-18**			Q4 2008	12	7.5	5.6	-0.43	13	10	5.7	-0.11 U	0.46	0.23	0.32 U	0.69	0.35	ND	6.4	0.1	1.2	0.93	0.074	0.28	5.1	0.032	0.97
MH-18**	Filtered		Q4 2008	12	6.3	5.3	-2.30	13	10	5.7	0 U	0.34	0.15	0.38 U	0.69	0.36	ND	7.8	0.14	1.5	0.1 U	0.11	0.099	6.4	0.096	1.3
MH-18**			Q1 2009	12	7.9	6.1	-0.18	21	9.8	6.6	0.12 U	0.38	0.18	1.2 U	1.2	0.71	ND	6.6	0.06	1.3	0.28	0.14	0.18	5.3	0.12	1.1
MH-18**	Filtered		Q1 2009	13	7.2	5.8	1.05	9.6 U	10	5.3	0.09 U	0.35	0.16	0.68 U	1.2	0.64	ND	6.4	0.14	1.3	0.25	0.069	0.17	5.3	0.059	1.1
MH-18**			Q2 2009	7.2	4.7	3.5	-6.99	3.1 U	7	3.3	0.17 U	0.4	0.22	0.22 U	0.83	0.4	ND	7.6	0.069	1.3	0.39	0.082	0.16	6.2	0.086	1.1
MH-18**	Filtered		Q2 2009	8.3	4.8	3.9	-6.25	6.5 U	7.3	3.8	0.066 U	0.34	0.14	0.32 U	0.81	0.4	ND	7.9	0.19	1.6	0.25	0.15	0.18	6.4	0.24	1.3
MH-18**			Q3 2009	4.7 U	5.7	3.5	NA	10	9.8	5.2	0.19 U	0.46	0.24	-0.13 U	0.93	0.43	ND	6.2	0.14	1.3	0.46	0.07	0.23	4.8	0.16	1
MH-19**			Q4 2008	**24**	8.3	8.7	2.41	16	13	7.1	0.18 U	0.19	0.15	0.24 U	0.7	0.35	ND	12	0.33	2.3	0.39	0.13	0.28	9.2	0.25	1.9
MH-19**	Filtered		Q4 2008	**23**	7.3	8.4	1.48	14	12	6.6	-0.072 U	0.31	0.13	0.29 U	0.73	0.36	ND	12	0.3	2.4	0.42	0.22	0.29	9.1	0.3	1.9
MH-19**			Q1 2009	**31**	9.7	11	6.89	19	13	7.5	-0.076 U	0.36	0.14	0.65 U	1.3	0.66	ND	14	0.067	2.5	0.61	0.21	0.29	9.5	0.16	1.8
MH-19**	Filtered		Q1 2009	**18**	11	8.3	-3.44	17	16	8.4	0.11 U	0.36	0.17	1.3 UJ	1.6	0.87	ND	12	0.18	2.3	0.64	0.2	0.29	8.8	0.24	1.7
MH-19**			Q2 2009	**20**	8.5	7.8	-0.88	26	11	7.8	0.013 U	0.36	0.14	0.63 U	0.76	0.42	ND	12	0.14	2.2	0.68	0.071	0.29	8.2	0.06	1.6
MH-19**	Filtered		Q2 2009	**16**	8.1	6.6	-4.31	11	11	6	0.029 U	0.4	0.14	0.3 U	0.89	0.44	ND	12	0.15	2.2	0.21	0.18	0.17	8.1	0.15	1.6
MH-19**			Q3 2009	**28**	11	10	6.80	19	18	9.5	0.17 U	0.37	0.21	0.15 U	0.96	0.46	ND	12	0.22	2.3	0.4	0.077	0.22	8.8	0.17	1.7

Table 16
Groundwater Radiochemistry Results
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Filtered	Duplicate	Sample Date	Gross alpha (pCi/L)			Gross alpha - adjusted (pCi/L)	Gross beta (pCi/L)			Ra-226 (pCi/L)			Ra-228 (pCi/L)			Ra-226 + Ra-228 (pCi/L)	U-234 (pCi/L)			U-235 (pCi/L)			U-238 (pCi/L)		
				Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU		Result	MDC	TPU	Result	MDC	TPU	Result	MDC	TPU
			AWQS	**15**			**NE**	**4 millirem/year*** **			**NE**			**NE**			**5**	**NE**			**NE**			**NE**		
West Investigation Area (continued)																										
MH-20**			Q4 2008	3.8 U	7.4	3.9	NA	8.2 U	12	6	0.17 U	0.57	0.33	-0.22 U	0.68	0.31	ND	3.3	0.11	0.64	0.14	0.038	0.092	1.2	0.075	0.3
MH-20**	Filtered		Q4 2008	6.7 U	7.2	4.5	NA	1.1 U	10	4.6	0.074 U	0.23	0.13	-0.0049 U	0.62	0.29	ND	3.9	0.25	1	0.012 U	0.13	0.17	1.3	0.23	0.51
MH-20**			Q1 2009	7.1 U	7.3	4.5	NA	2.1 U	7.9	3.6	0.37 U	0.39	0.29	1 U	1.1	0.62	ND	4.8	0.15	1	0.14 U	0.2	0.14	1.8	0.15	0.51
MH-20**	Filtered		Q1 2009	9.3	7.3	5	4.08	3.1 U	9.2	4.3	0.16 U	0.37	0.2	0.72 U	1.1	0.57	ND	3.6	0.17	0.84	0.12 U	0.18	0.13	1.5	0.17	0.46
MH-20**			Q2 2009	8.8 U	8.8	5.6	NA	6.4 U	14	6.5	0.13 U	0.33	0.17	0.49 U	1.2	0.62	ND	3.5	0.18	0.83	0.11 U	0.15	0.12	1.5	0.13	0.47
MH-20**	Filtered		Q2 2009	4.6 U	7.1	4	NA	5.3 U	13	6.2	0.065 U	0.4	0.16	0.35 U	0.97	0.48	ND	2.8	0.18	0.71	0.089	0.08	0.11	1.4	0.16	0.44
MH-20**			Q3 2009	4.9 U	6.6	3.9	NA	7 U	11	5.2	0.096 U	0.46	0.2	0.17 U	1	0.49	ND	2.2	0.22	0.59	0.086	0.078	0.1	1.3	0.17	0.42
MH-27**			Q4 2008	*12 U*	18	10	NA	17 U	30	15	0.15 U	0.45	0.27	0.38 U	0.83	0.42	ND	0.33	0.093	0.14	0.048 U	0.11	0.064	0.3	0.1	0.14
MH-27**	Filtered		Q4 2008	*6.1 U*	19	8.9	NA	20 U	31	15	0.25 U	0.54	0.34	0.54 U	0.76	0.41	ND	0.63	0.088	0.21	0.025 U	0.077	0.053	0.26	0.097	0.12
MH-27**			Q1 2009	*4.4 U*	47	9.4	NA	16 U	31	15	0.56	0.37	0.36	0.37 U	1.1	0.54	0.56	4.5	0.13	0.87	0.2	0.1	0.12	4.9	0.12	0.93
MH-27**	Filtered		Q1 2009	-1.3 U	14	4.9	NA	-5.1 U	20	8.6	0.39	0.37	0.29	0.59 U	1.2	0.6	0.39	0.35	0.15	0.2	0.02 U	0.15	0.1	0.19	0.12	0.14
MH-27**			Q2 2009	*2.8 U*	21	8.9	NA	7.6 U	34	15	0.31 U	0.39	0.27	0.78 U	0.92	0.52	ND	0.5	0.074	0.14	0.016 U	0.022	0.04	0.16 U	0.16	0.076
MH-27**	Filtered		Q2 2009	*3.9 U*	16	7.2	NA	10 U	33	15	0.16 U	0.42	0.22	0.13 U	0.83	0.4	ND	0.59	0.2	0.27	0.011 U	0.18	0.1	0.14 U	0.19	0.13
MH-27**			Q3 2009	*-2.5 U*	18	6.1	NA	5.7 U	26	12	0.17 U	0.42	0.22	0.4 U	0.81	0.41	ND	0.48	0.19	0.24	0 U	0.077	0.1	0.17 U	0.17	0.14
MH-27**		Duplicate	Q3 2009	7.2 U	15	7.9	NA	8.4 U	19	9.1	0.33 U	0.41	0.28	0.64 U	0.73	0.42	ND	0.43 J	0.2	0.22	0.066 U	0.17	0.099	0.36 UJ	0.36	0.2
PZ-16			Q4 2008	*23 U*	29	17	NA	*19 U*	61	28	0.16 U	0.47	0.27	0.85	0.69	0.44	0.85	19	0.17	3.3	0.84 U	0.84	0.33	17	0.065	2.9
PZ-16		Duplicate	Q4 2008	*20 U*	37	19	NA	*34 U*	59	29	0.13 U	0.45	0.26	-0.039 U	0.84	0.39	ND	22	0.12	3.8	0.92	0.11	0.28	18	0.13	3
PZ-16	Filtered		Q4 2008	*-0.94 U*	47	19	NA	*18 U*	61	28	-0.05 U	0.4	0.19	0.37 U	0.7	0.36	ND	19	0.14	3.3	0.85 U	0.85	0.32	17	0.17	2.9
PZ-16	Filtered	Duplicate	Q4 2008	*31 U*	36	21	NA	*40 U*	59	29	0.1 U	0.56	0.31	0.21 U	0.8	0.39	ND	20	0.062	3.4	0.82	0.073	0.25	17	0.099	3
PZ-16			Q1 2009	*31 U*	34	21	NA	*13 U*	60	27	0.0047 U	0.41	0.14	0.45 U	0.82	0.43	ND	18	0.15	3.3	1.5	0.17	0.48	15	0.16	2.8
PZ-16	Filtered		Q1 2009	*12 U*	34	16	NA	*35 U*	61	29	-0.047 U	0.38	0.14	-0.0098 U	0.93	0.44	ND	19	0.14	3.4	1.2	0.13	0.4	16	0.11	2.9
PZ-16			Q2 2009	**32**	27	19	-6.93	23 U	35	17	0.099 UJ	0.35	0.17	0.29 UJ	0.83	0.41	ND	21 U	21	3.7	0.93	0.072	0.35	17 J	0.14	3
PZ-16	Filtered		Q2 2009	*20 U*	20	13	NA	32 U	33	17	0.087 UJ	0.35	0.16	0.26 UJ	0.87	0.42	ND	20 U	20	3.5	0.93	0.07	0.35	16 J	0.06	2.9
PZ-16			Q3 2009	**38**	21	17	-2.20	32	29	16	0.04 U	0.44	0.16	-0.28 U	0.84	0.39	ND	22	0.26	4	1.2	0.15	0.42	17	0.16	3.2
TW-2008-04			Q4 2008	**480**	81	130	-243.00	**520**	120	110	0.07 U	0.42	0.22	NA	NA	NA	NA	340	0.83	54	23	0.97	5.1	360	0.32	57
TW-2008-07			Q4 2008	**16**	8.1	7	NA	2.9 U	11	5.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Eastern Sentinel Wells																										
MH-11			1/4/2008	NA	NA	NA	NA	NA	NA	NA	-0.2	NA	NA	-1	NA	NA	NA	3.3	NA	NA	-0.2	NA	NA	1.8	NA	NA
MH-12			1/2/2008	NA	NA	NA	NA	NA	NA	NA	-0.2	NA	NA	1.9	NA	NA	NA	2	NA	NA	-0.2	NA	NA	1.2	NA	NA
MH-13A			1/4/2008	NA	NA	NA	NA	NA	NA	NA	-0.2	NA	NA	5	NA	NA	NA	9.9	NA	NA	0.3	NA	NA	3.5	NA	NA
MH-13A			5/23/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11	NA	NA	0.35	NA	NA	4.6	NA	NA
MH-13B			1/4/2008	NA	NA	NA	NA	NA	NA	NA	-0.2	NA	NA	3.9	NA	NA	NA	3.2	NA	NA	-0.2	NA	NA	1.5	NA	NA
MH-13B			5/23/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.1	NA	NA	0.11	NA	NA	1.7	NA	NA
MH-13B		Duplicate	5/23/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.1	NA	NA	0.063	NA	NA	1.6	NA	NA
MH-13C			1/4/2008	NA	NA	NA	NA	NA	NA	NA	-0.2	NA	NA	2.4	NA	NA	NA	-0.2	NA	NA	-0.2	NA	NA	0.5	NA	NA
MH-13C			5/23/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.6	NA	NA	0.059	NA	NA	1.1	NA	NA

NOTES

· Displayed results represent dissolved metals concentrations.
· AWQS = Arizona Aquifer Water Quality Standard for drinking water.
· ** = well is a Point of Compliance (POC) well; the APP establishes specific Action Levels for constituents in groundwater for these wells. Comparisons of water quality in these wells to AWQS levels were made for characterization purposes only for the VRP; however, bolded and italicized results do not indicate exceedences as regulated under the APP.
· *** = 4 millirem/year ≈ 50 pCi/L.
· pCi/L= picocuries per liter.
· MDC = Minimum Detectable Concentration.
· TPU = Total Propagated Uncertainty.
· J = the analyte was positively identified; however, the result is considered an estimated value.
· U = the analyte was not positively identified above the MDC.
· UJ = the analyte was not positively identified; the reporting limit is considered an estimated value.
· ND = non-detect; neither the Ra-226 nor the Ra-228 concentration was positively identified above its respective MDC.
· NA = not analyzed.
· NE = AWQS not established.
· Results displayed in **bold** exceed the AWQS.
· Results displayed in *italics* were not positively identified above the indicated MDC, but the MDC exceeds the AWQS.

Table 17
Summary of Sampling Location Information - by Investigation Area
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Type of Feature	Screened Interval Lithology	Associated Wash	Work Plan Objective
Background Areas				
MH-17	Permanent Monitoring Well	Harris Ranch Quartz Monzonite	N/A - Background areas	Represents background groundwater conditions in the Harris Ranch Quartz Monzonite.
MH-21	Permanent Monitoring Well	Ruby Star Intrusives	N/A - Background areas	Verify background COI concentrations in the Ruby Star Granodiorite and compare results to newly installed background wells.
MW-2008-12	Permanent Monitoring Well	Ruby Star Granodiorite	N/A - Background areas	Evaluate background concentrations in hornblende rich Ruby Star Granodiorite.
MW-2008-13	Permanent Monitoring Well	Ruby Star Granodiorite	N/A - Background areas	Evaluate background concentrations in hornblende rich Ruby Star Granodiorite.
MW-2008-14	Permanent Monitoring Well	Tinaja Peak Formation	N/A - Background areas	Evaluate background concentrations in Tinaja Peak Formation.
MW-2008-15	Permanent Monitoring Well	Harris Ranch Quartz Monzonite	N/A - Background areas	Evaluate background concentrations in Harris Ranch Quartz Monzonite.
PZ-01	Permanent Monitoring Well	Tinaja Peak Formation	N/A - Background areas	Represents background conditions in the Tinaja Peak Formation.
Central Investigation Area				
Amargosa East Sump	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
Amargosa Pond	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
Amargosa West Sump	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
B Pond	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
B Seepage Silo	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
Bailey Lake	Active Facility	N/A - Not a well	Amargosa Wash	Characterize COIs in process solution.
Bailey Sump	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
C Seepage Silo	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
Decant Solution (Molybdenum)	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
Headwall No. 1	Active Facility	N/A - Not a well	Amargosa Wash	Characterize COIs in process solution.
Raffinate Pond No. 2	Active Facility	N/A - Not a well	Amargosa Wash	Characterize COIs in process solution.
SX-Sump 1	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
SX-Sump 2	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
SX-Sump 3	Active Facility	N/A - Not a well	Amargosa Wash	Not specified
BW-03	Permanent Monitoring Well	Ruby Star Granodiorite	Amargosa Wash	Evaluate potential releases from upgradient process areas along the west side of Demetrie Wash and potential influence from Amargosa Wash.
BW-04	Permanent Monitoring Well	Bedrock Complex	Amargosa Wash	Evaluate potential releases from B pond and Amargosa Wash area in general. May assist with determining effectiveness of B Sump.
MH-22	Permanent Monitoring Well	Alluvium	Amargosa Wash	Evaluate alluvial groundwater in Demetrie Wash to identify potential releases from Demetrie and Amargosa washes.
MH-23	Permanent Monitoring Well	Demetrie Volcanics	Amargosa Wash	Evaluate potential influence of alluvial water with underlying bedrock groundwater. (co-located with MH-22)
MW-2008-01	Permanent Monitoring Well	Ruby Star Granodiorite	Demetrie Wash	Evaluate groundwater quality upgradient of the Former CLEAR Plant Area.
MW-2008-02	Permanent Monitoring Well	Ruby Star Granodiorite	Demetrie Wash	Evaluate groundwater quality immediately downgradient of the Former CLEAR Plant.
MW-2008-03	Permanent Monitoring Well	Ruby Star Granodiorite	Demetrie Wash	Evaluate groundwater quality immediately downgradient of the Former E Pond.

Table 17
Summary of Sampling Location Information - by Investigation Area
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Type of Feature	Screened Interval Lithology	Associated Wash	Work Plan Objective
MW-2008-04	Permanent Monitoring Well	Ruby Star Granodiorite	Demetrie Wash	Evaluate groundwater quality immediately downgradient of the Former Evaporation Pond.
MW-2008-05	Permanent Monitoring Well	Ruby Star Granodiorite	Demetrie Wash	Evaluate groundwater quality immediately downgradient of the Old D Pond.
MW-2008-06	Permanent Monitoring Well	Ruby Star Granodiorite	Demetrie Wash	Evaluate groundwater quality upgradient of the Old D Pond.
MW-2008-07	Permanent Monitoring Well	Ruby Star Intrusives	Amargosa Wash	Evaluate groundwater quality immediately upgradient of the Former C Pond.
MW-2008-08	Permanent Monitoring Well	Ruby Star Granodiorite	Amargosa Wash	Evaluate groundwater quality immediately downgradient of the Former C Pond.
MW-2008-09	Permanent Monitoring Well	Ruby Star Intrusives	Amargosa Wash	Evaluate groundwater quality immediately downgradient of the Former Raffinate Pond.
MW-2008-10	Permanent Monitoring Well	Ruby Star Granodiorite	Amargosa Wash	Evaluate groundwater quality immediately downgradient of the Former Raffinate Pond.
MW-2008-11	Permanent Monitoring Well	Ruby Star Granodiorite	Amargosa Wash	Evaluate groundwater quality upgradient of the Former Raffinate Pond.
PZ-02	Permanent Monitoring Well	Demetrie Volcanics	Amargosa Wash	Evaluate quality of bedrock groundwater downgradient of sulfide leach stockpile and in vicinity of Headwall No. 1 and Bailey Lake.
PZ-03	Permanent Monitoring Well	Ruby Star Intrusives	Amargosa Wash	Evaluate bedrock groundwater quality in Amargosa Wash and possibly part of the Esperanza Mill area. Provides an additional Ruby Star Granodiorite monitoring point.
PZ-04	Permanent Monitoring Well	Ruby Star Intrusives	Demetrie Wash	Evaluate bedrock groundwater quality in the general mill area and provides an additional Ruby Star Granodiorite monitoring point.
PZ-05	Permanent Monitoring Well	Ruby Star Intrusives	Demetrie Wash	Evaluate bedrock groundwater quality in the general mill area and provides an additional Ruby Star Granodiorite monitoring point.
PZ-06	Permanent Monitoring Well	Ruby Star Intrusives	Demetrie Wash	Evaluate bedrock groundwater quality upgradient of the mill area.
TW-2008-09	Temporary Monitoring Well	Alluvium	Amargosa Wash	Confirm that the ponds (Headwall No. 1 and Bailey Lake) have not released elevated concentrations of COIs from process solutions to groundwater.
TW-2008-10	Temporary Monitoring Well	Alluvium	Amargosa Wash	Confirm that the pond (Raffinate Pond No. 2) has not released elevated concentrations of COIs from process solutions to groundwater.
TW-2008-11	Temporary Monitoring Well	Alluvium	Amargosa Wash	Confirm that the pond (former A Pond) has not released elevated concentrations of COIs from process solutions to groundwater.
TW-2008-12	Temporary Monitoring Well	Alluvium	Amargosa Wash	Confirm that the pond (B Pond) has not released elevated concentrations of COIs from process solutions to groundwater.
TW-2008-13	Temporary Monitoring Well	Alluvium	Amargosa Wash	Not specified
West Investigation Area				
Headwall No. 2	Active Facility	N/A - Not a well	Esperanza Wash	Characterize COIs in process solution.
Headwall No. 3	Active Facility	N/A - Not a well	Esperanza Wash	Characterize COIs in process solution.
Headwall No. 5	Active Facility	N/A - Not a well	Esperanza Wash / Unnamed Wash	Characterize COIs in process solution.

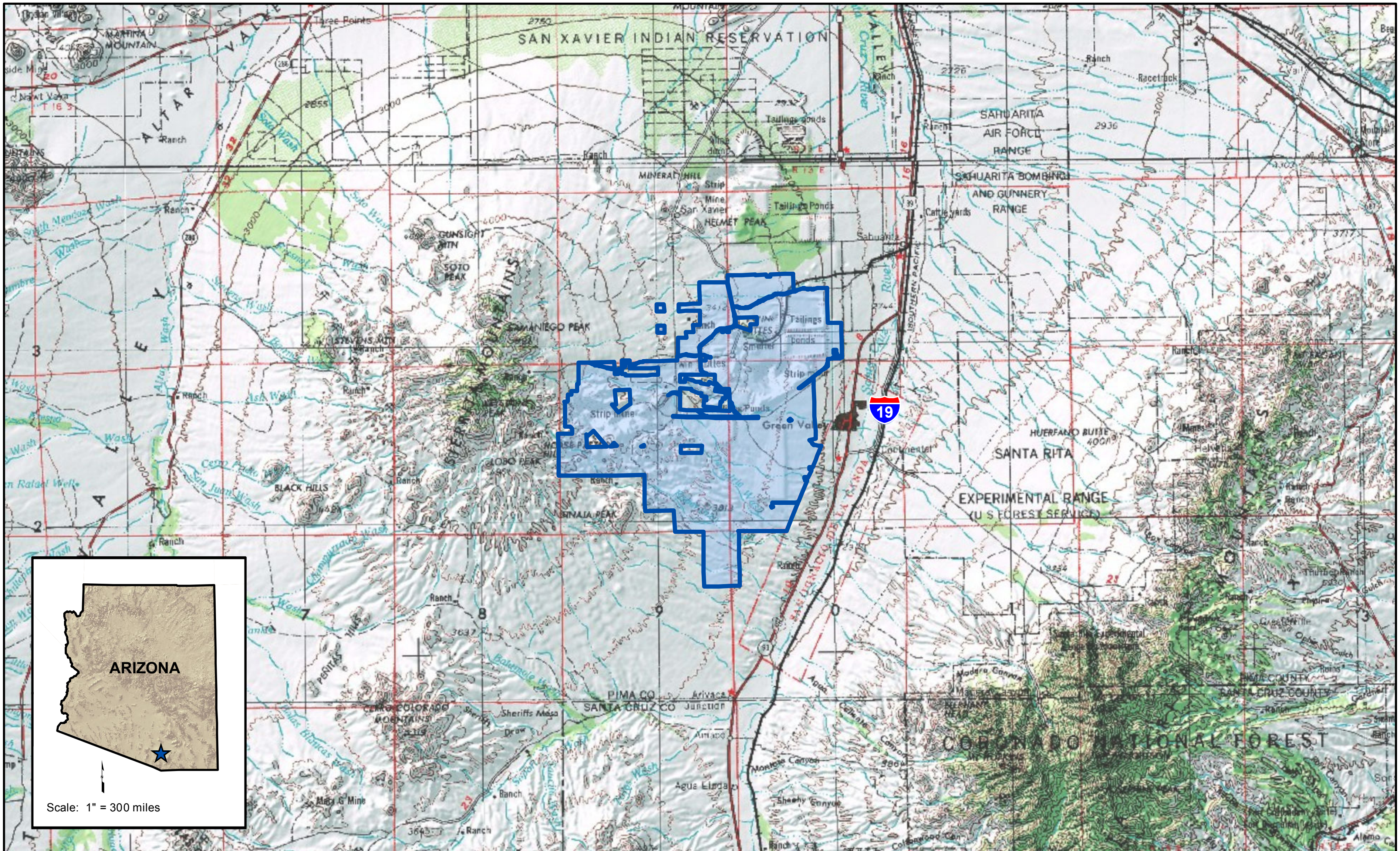
Table 17
Summary of Sampling Location Information - by Investigation Area
Freeport-McMoRan Sierrita Inc.
Green Valley, Arizona

Feature ID	Type of Feature	Screened Interval Lithology	Associated Wash	Work Plan Objective
SX-3 Stormwater Pond	Active Facility	N/A - Not a well	Esperanza Wash	Characterize COIs in process solution
BW-02	Permanent Monitoring Well	Demetrie Volcanics	Esperanza Wash	Confirm no releases have occurred from process solution ponds located in Esperanza Wash.
MH-18	Permanent Monitoring Well	Tinaja Peak Formation	Tinaja Wash	Evalulate impacts from waste rock stockpile and possibly represents groundwater conditions generally upgradient of Sierrita.
MH-19	Permanent Monitoring Well	Tinaja Peak Formation	Esperanza Wash	Evalulate shallower aquifer impacts from sulfide leach area and Headwall No. 5.
MH-20	Permanent Monitoring Well	Demetrie Volcanics	Esperanza Wash	This well is screened at a deeper elevation than well BW-02. Evalulate deeper aquifer impacts.
MH-27	Permanent Monitoring Well	Demetrie Volcanics	Esperanza Wash	Evaluate quality of bedrock groundwater in vicinity of Headwall No. 2.
PZ-16	Permanent Monitoring Well	Demetrie Volcanics	Esperanza Wash	Evaluate quality of bedrock groundwater in vicinity of Headwall No. 5.
East Investigation Area				
Reclaim Pond Settling Basin	Active Facility	N/A - Not a well	N/A - East of washes	Gather data to characterize COI concentrations in reclaim water.
MH-14	Permanent Monitoring Well	Basin Fill Deposits	N/A - East of washes	Evaluate basin fill deposits groundwater quality in northern portion of well field.
MH-15W	Permanent Monitoring Well	Basin Fill Deposits	N/A - East of washes	Evaluate basin fill deposits groundwater quality in central portion of well field.
MH-16W	Permanent Monitoring Well	Basin Fill Deposits	N/A - East of washes	Evaluate basin fill deposits groundwater quality in southern portion of well field.
MH-28	Permanent Monitoring Well	Basin Fill Deposits	N/A - East of washes	Evaluate basin fill deposits groundwater quality in northern portion of well field.
MH-29	Permanent Monitoring Well	Basin Fill Deposits	N/A - East of washes	Evaluate basin fill deposits groundwater quality in southern portion of well field.
MH-30	Permanent Monitoring Well	Basin Fill Deposits (20 ft), Mesozoic Sedimentary Rocks (80 ft)	N/A - East of washes	Evaluate basin fill deposits groundwater quality in northern portion of well field.
PZ-07	Permanent Monitoring Well	Basin Fill Deposits (8 feet), Ruby Star Intrusives (42 feet)	Demetrie Wash	Evaluate groundwater quality at northern edge of basin fill deposits and northern Sierrita property boundary.
PZ-08	Permanent Monitoring Well	Demetrie Volcanics	Demetrie Wash	Evaluate southern portion Sierrita property boundary and groundwater quality before it flows beneath Sierrita Tailing Impoundment.
PZ-2007-05	Permanent Monitoring Well	Basin Fill Deposits	N/A - East of washes	Evaluate basin fill deposits groundwater quality immediately downgradient of the Esperanza Tailing Impoundment and near the Sierrita Tailing Impoundment reclaim pond.
PZ-2008-16	Permanent Monitoring Well	Tailings	N/A - East of washes	Not specified
PZ-2008-19	Permanent Monitoring Well	Tailings	N/A - East of washes	Not specified
PZ-2008-20	Permanent Monitoring Well	Tailings	N/A - East of washes	Not specified

Notes:
N/A = not applicable
* - denotes that well construction diagrams unavailable; assumed lithology

Figures

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 01 site location map.mxd 11/20/2013



LEGEND

Approximate property boundary

NOTES

· Topographic map source:
ESRI USA Topo Maps.

Miles
0 2.5 5
Scale: 1" = 5 mi

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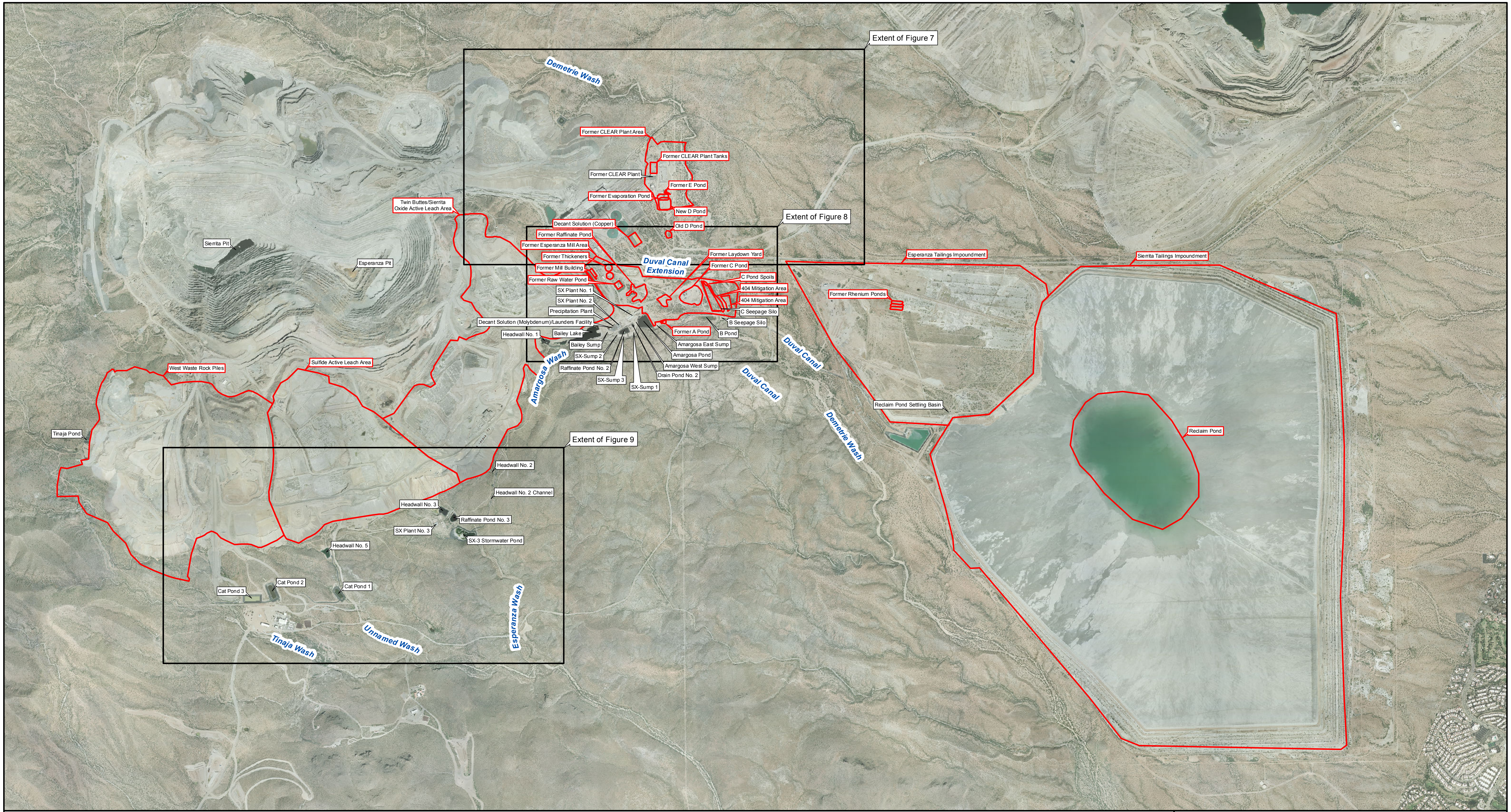
GROUNDWATER INVESTIGATION REPORT

SITE LOCATION MAP

ARCADIS

FIGURE
1



LEGEND

Site feature

Figure extent

NOTES

· Aerial photo source: Kenney, 2010.

Feet

0 1,500 3,000

Scale: 1" = 3,000'

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GROUNDWATER INVESTIGATION REPORT

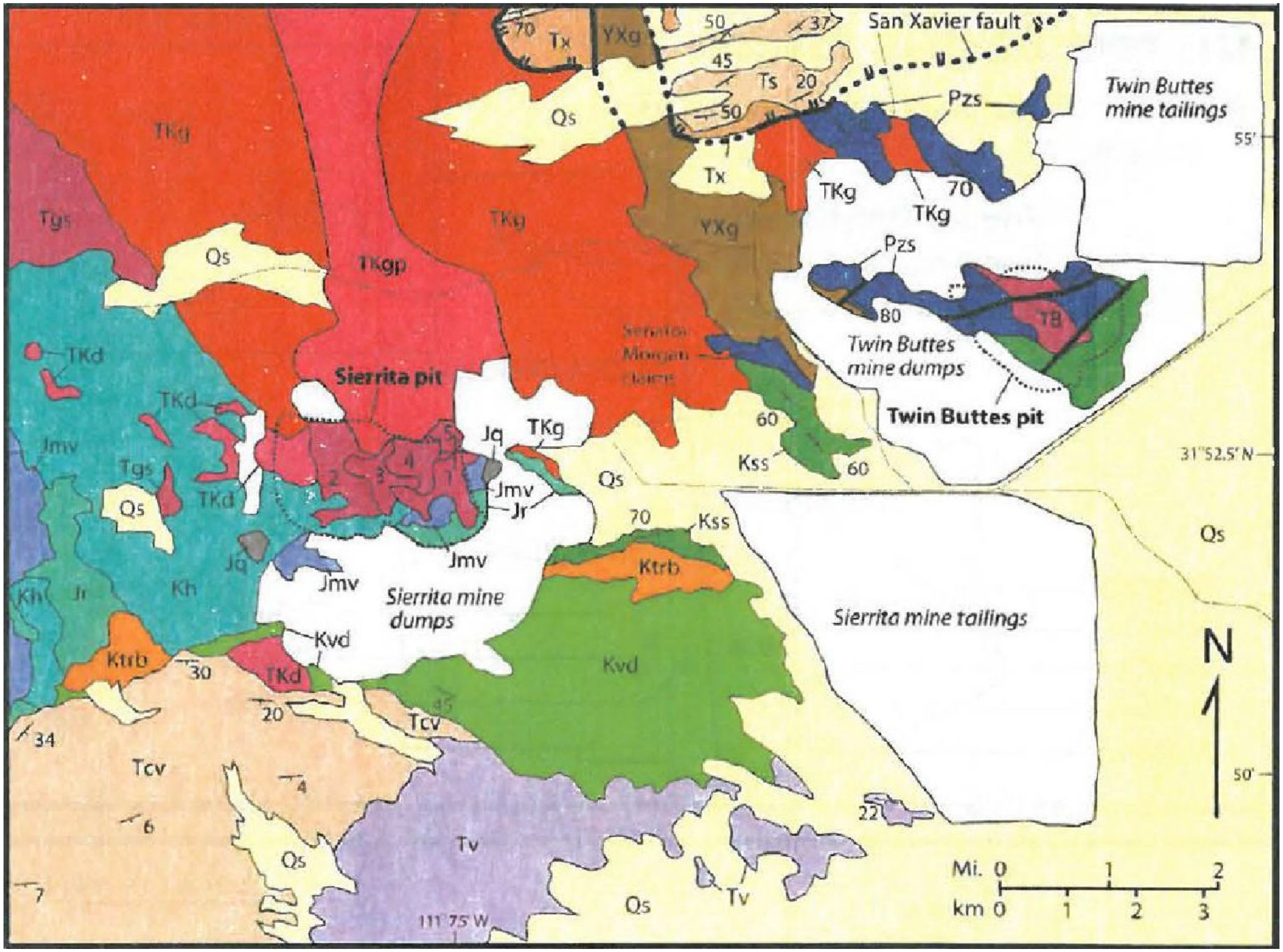
SITE FEATURES MAP

ARCADIS

FIGURE
2

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 02 site features map.mxd 12/17/2013

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 03 Sierrita deposit and surrounding features.mxd 11/20/2013



Source: Aiken and Baugh, 2007

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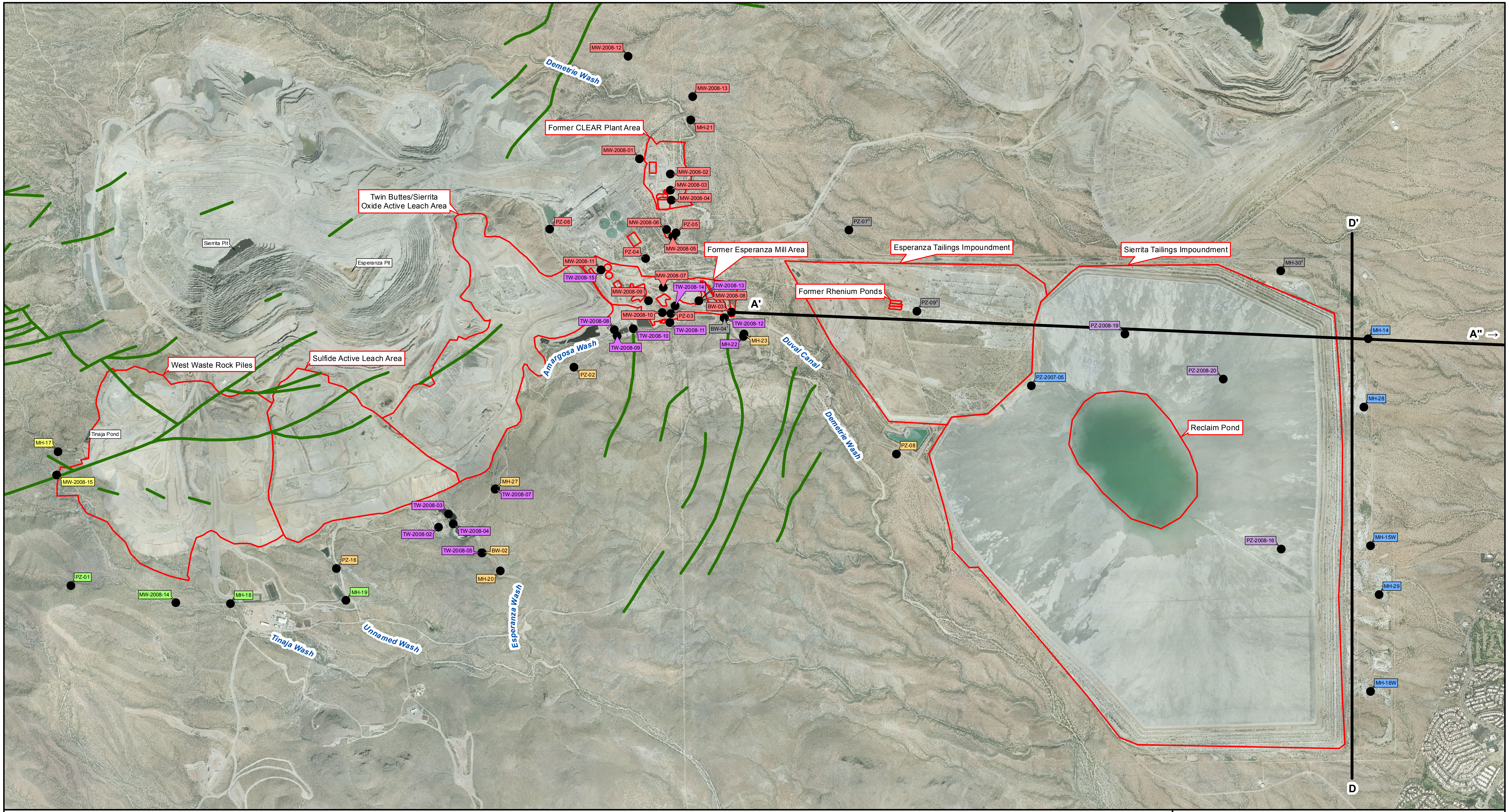
AREA MAP OF SIERRITA DEPOSIT AND SURROUNDING FEATURES

ARCADIS

FIGURE
3

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 04 faults and cross-section locations.mxd 11/20/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

LEGEND

- Site feature
- Groundwater well
- Inferred fault (source: Titley, et al (1986), adapted from Cooper (1973))
- Cross-section location (source: E.L. Montgomery & Associates (2000))

NOTES

- Aerial photo source: Kenney, 2010.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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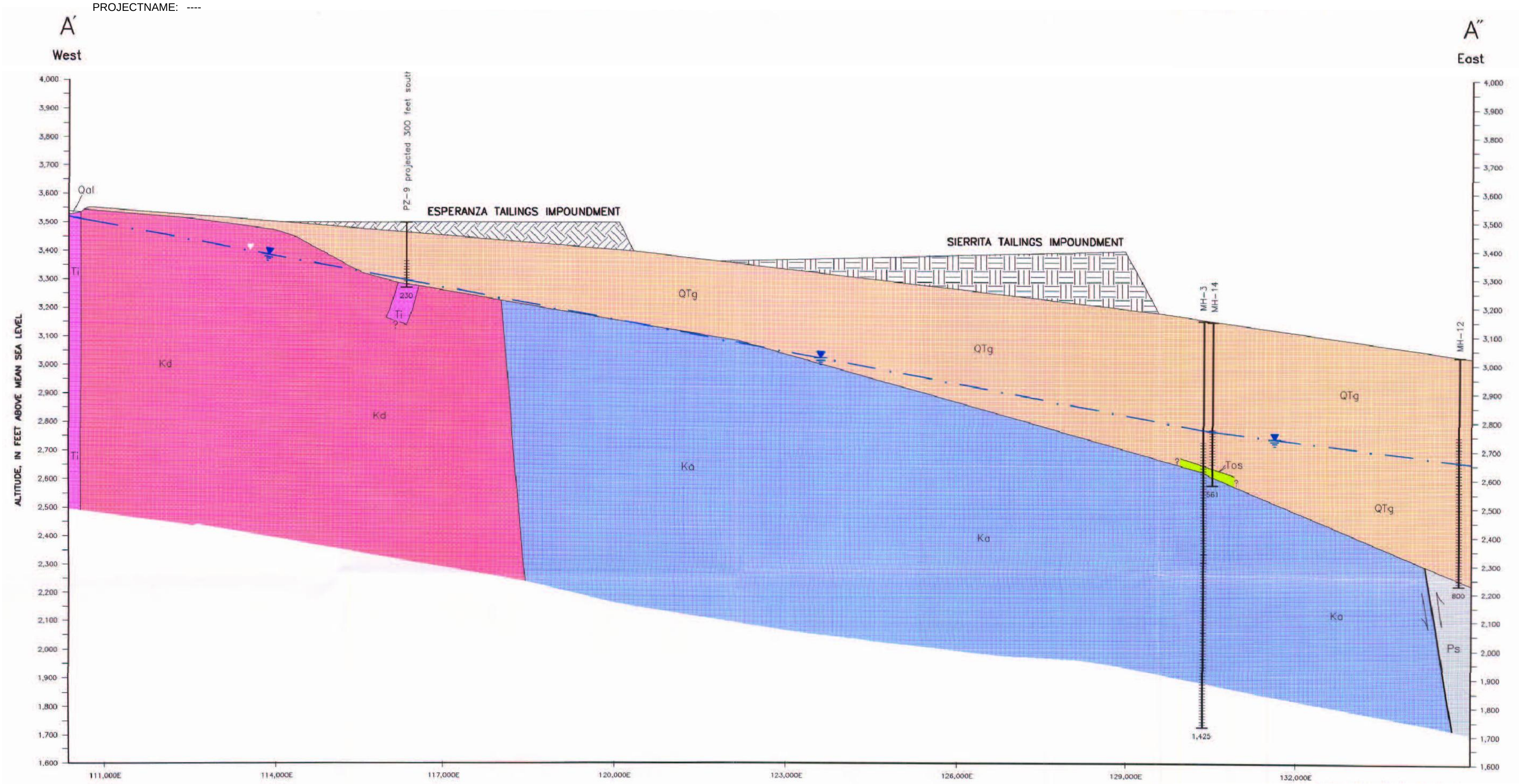
GREEN VALLEY, ARIZONA
VOLUNTARY REMEDIATION PROGRAM
GROUNDWATER INVESTIGATION REPORT

INFERRED FAULTS AND CROSS-SECTION LOCATIONS

ARCADIS

FIGURE
4

CITY: PETALUMA, CA DIV/GROUP: ENVCAD DB: J. HARRIS
C:\Users\jharris\Desktop\ENVCAD\AZ001233\0008\00001\GW Investigation Report\DWG\AZ1233V01.dwg LAYOUT: 5 SAVED: 5/21/2013 7:03 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: SETUP1 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 11/21/2013 2:53 PM BY: HARRIS, JESSICA
XREFS: PROJECTNAME: ----



HORIZONTAL SCALE
0 1,000 2,000 3,000 4,000
FEET
VERTICAL EXAGGERATION 5:1

EXPLANATION

- Qal — RECENT ALLUVIAL DEPOSITS
- QTg — BASIN-FILL DEPOSITS
- Tos — PANTANO FORMATION
- Ti — TERTIARY INTRUSIVES
- Kd — DEMETRIE VOLCANICS
- Ka — ANGELICA ARKOSE
- Ps — PALEOZOIC SEDIMENTS
- Jhr — HARRIS RANCH QUARTZ MONZONITE
- To — OXFRAME VOLCANICS
- GROUNDWATER LEVEL, 1998
- GEOLOGIC CONTACT, approximately located
- FAULT; arrows show relative direction of movement;

PZ-9 projected 300 feet south
- INDICATES DIRECTION AND DISTANCE OF PROJECTION ONTO SECTION
- WELL, BOREHOLE, OR PIEZOMETER IDENTIFIER
- PERFORATED INTERVAL
- 230 — TOTAL DEPTH, IN FEET

SOURCE: Errol L. Montgomery and Associates (ELMA). 2001. Additional Characterization of Hydrogeologic Conditions Aquifer Protection Permit Application No. 101679, Sierrita Mine, Phelps Dodge Sierrita, Inc. Pima County, Arizona. January.

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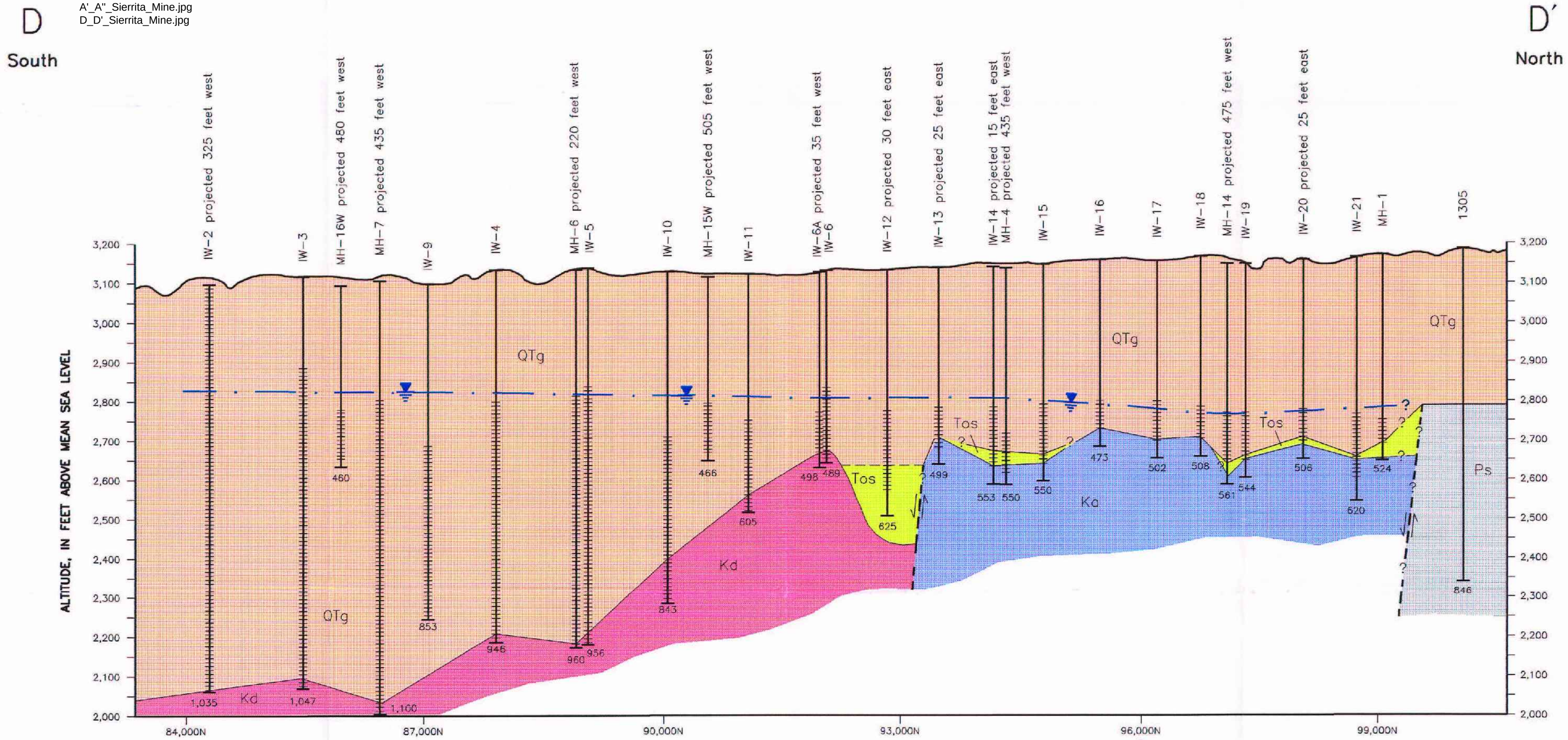
CROSS-SECTION A'-A"

ARCADIS

FIGURE
5



EXPLANATION

QTg	BASIN-FILL DEPOSITS
Tos	PANTANO FORMATION
Kd	DEMETRIE VOLCANICS
Ka	ANGELICA ARKOSE
Ps	PALEOZOIC SEDIMENTARY ROCKS

GEOLOGIC CONTACT, approximately located; dashed where uncertain

FAULT; arrows show relative direction of movement; dashed where uncertain

GROUNDWATER LEVEL, 1998

IW-12 projected 30 feet east — INDICATES DIRECTION AND DISTANCE OF PROJECTION ONTO SECTION IF MORE THAN 10 FEET FROM SECTION LINE; WELL IDENTIFIER

PERFORATED INTERVAL

625 — TOTAL DEPTH, IN FEET

HORIZONTAL SCALE
0 1,000 2,000 3,000 4,000
FEET
VERTICAL EXAGGERATION 5:1

SOURCE: Errol L. Montgomery and Associates (ELMA). 2001. Additional Characterization of Hydrogeologic Conditions Aquifer Protection Permit Application No. 101679, Sierrita Mine, Phelps Dodge Sierrita, Inc. Pima County, Arizona. January.

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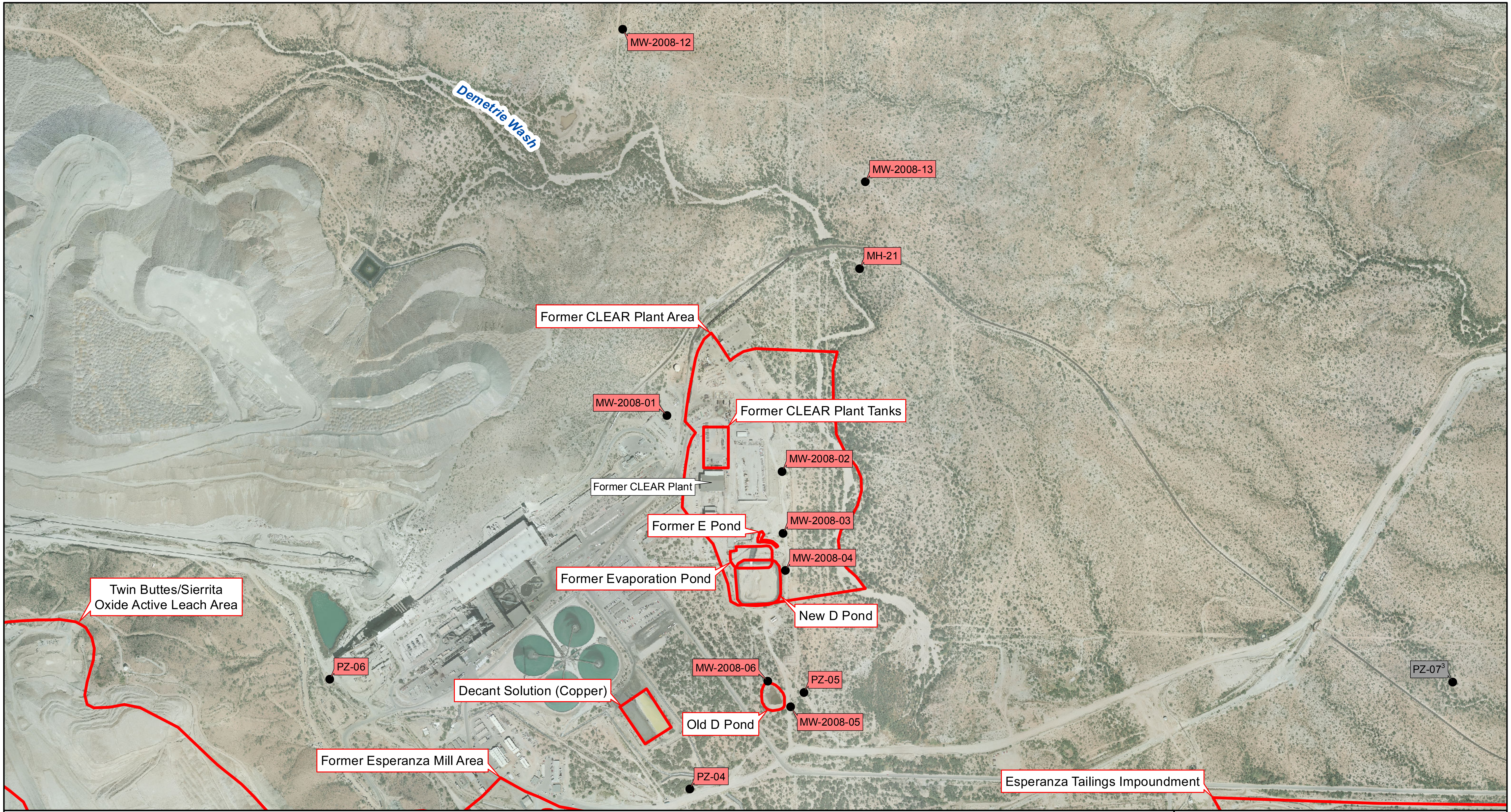
GROUNDWATER INVESTIGATION REPORT

CROSS-SECTION D-D'

ARCADIS

FIGURE
6



GROUNDWATER WELL LITHOLOGIC UNITS

- Basin Fill Deposits
- Tinaja Peak Formation
- Harris Ranch Quartz Monzonite
- Demetrie Volcanics
- Ruby Star Granodiorite/Intrusives
- Alluvium
- Tailings
- Other

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- [3] = PZ-07 is screened across both basin fill and Ruby Star Intrusives.

N

0 400 800 Feet

Scale: 1" = 800'

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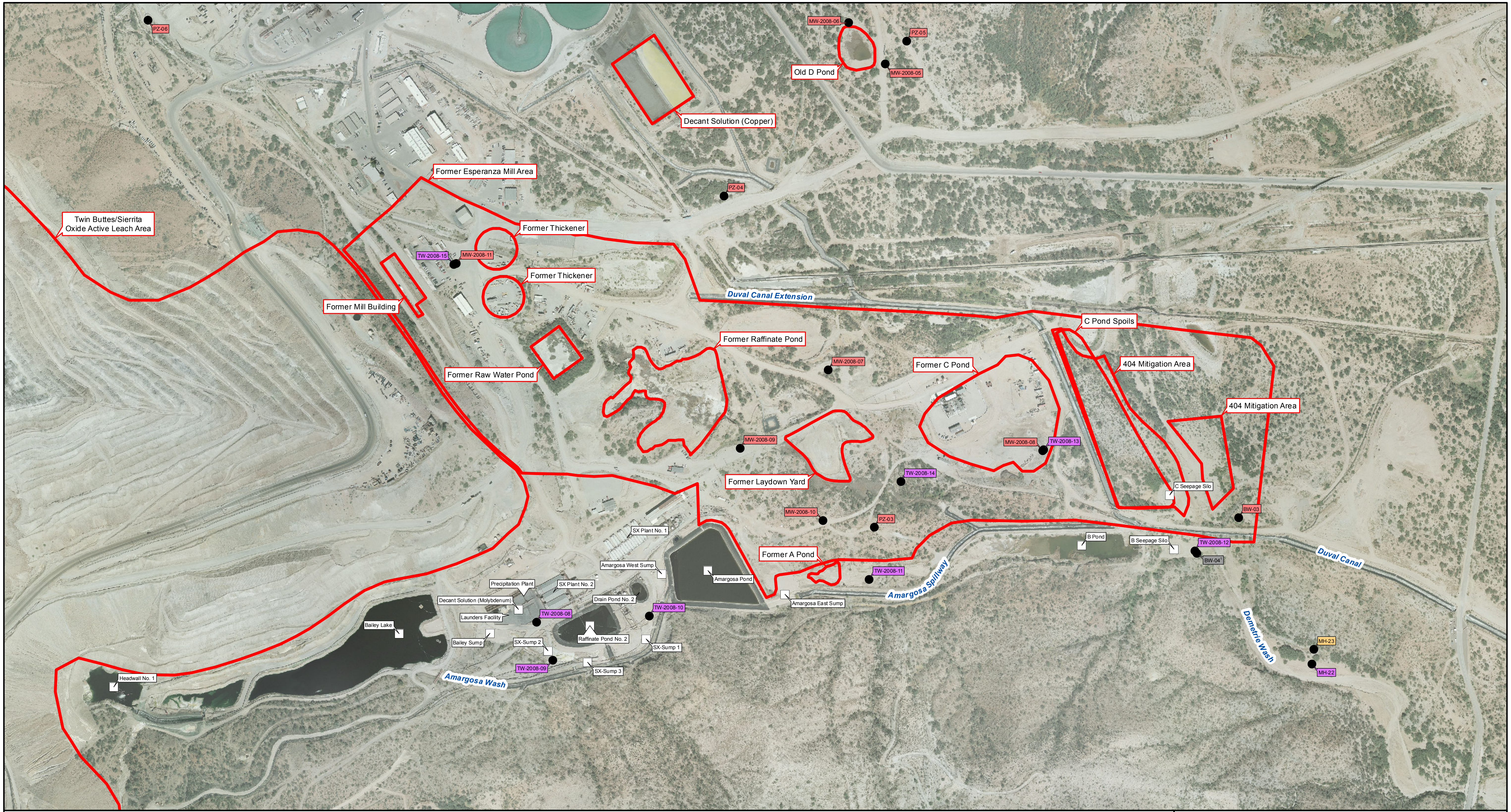
GREEN VALLEY, ARIZONA
VOLUNTARY REMEDIATION PROGRAM
GROUNDWATER INVESTIGATION REPORT

FACILITIES AND SAMPLING LOCATIONS
UPPER DEMETRIE WASH

ARCADIS

FIGURE
7

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 07 facility locations upper Demetrie Wash.mxd 11/20/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

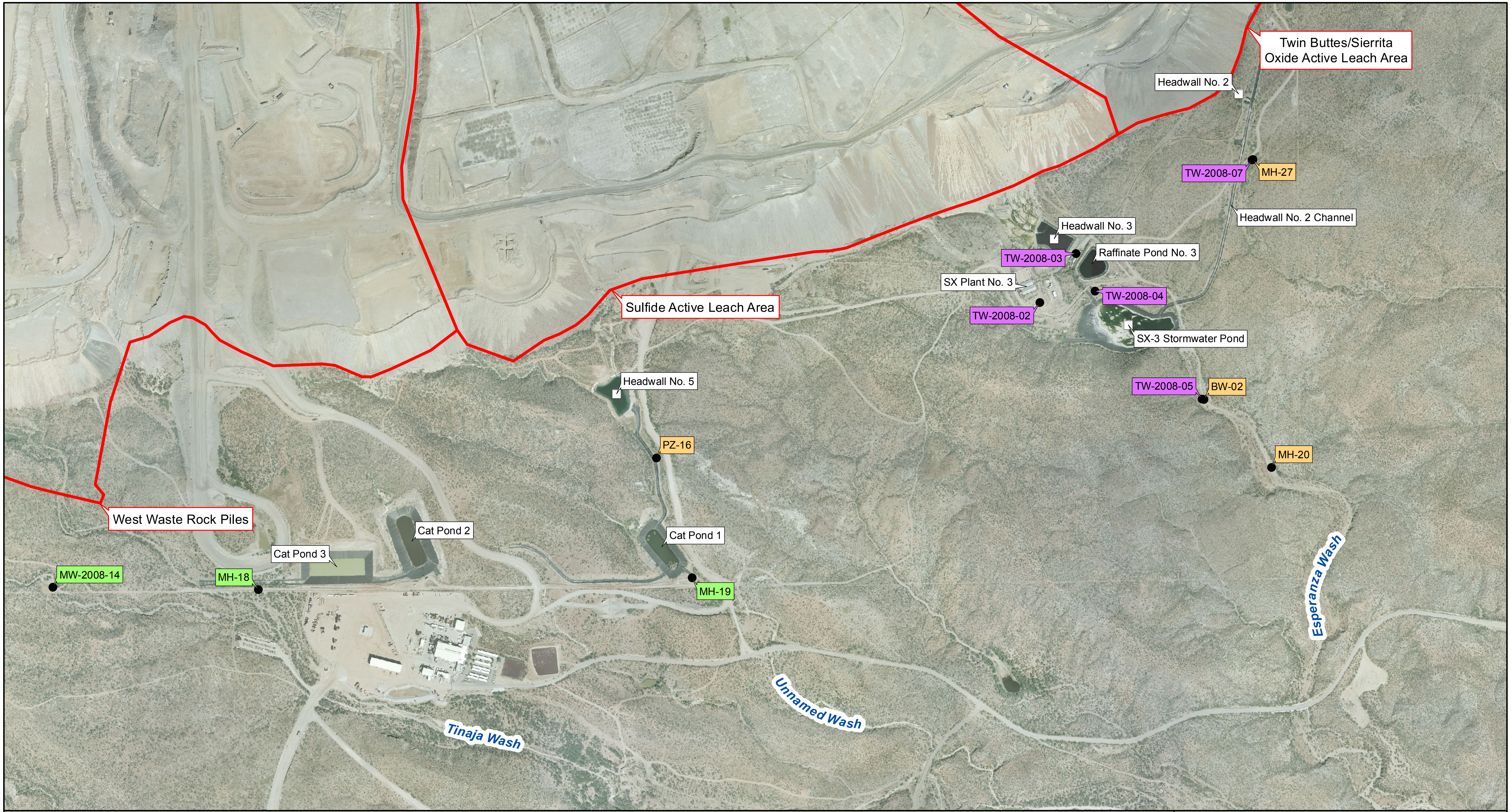
FREEPORT-MCMORAN SIERRITA INC.
GREEN VALLEY, ARIZONA
VOLUNTARY REMEDIATION PROGRAM
GROUNDWATER INVESTIGATION REPORT

FACILITIES AND SAMPLING LOCATIONS
LOWER DEMETRIE WASH AND AMARGOSA WASH

ARCADIS

FIGURE
8

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 08 facility locations lower Demetrie Wash.mxd 11/20/2013



G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 09 facility locations Esperanza Wash.mxd 12/17/2013

GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits	BW-03	Ruby Star Granodiorite/Intrusives
MH-18	Tinaja Peak Formation	MH-22	Alluvium
MH-17	Harris Ranch Quartz Monzonite	PZ-2008-16	Tailings
BW-02	Demetrie Volcanics	BW-04	Other

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.

N

0 400 800 Feet

Scale: 1" = 800'

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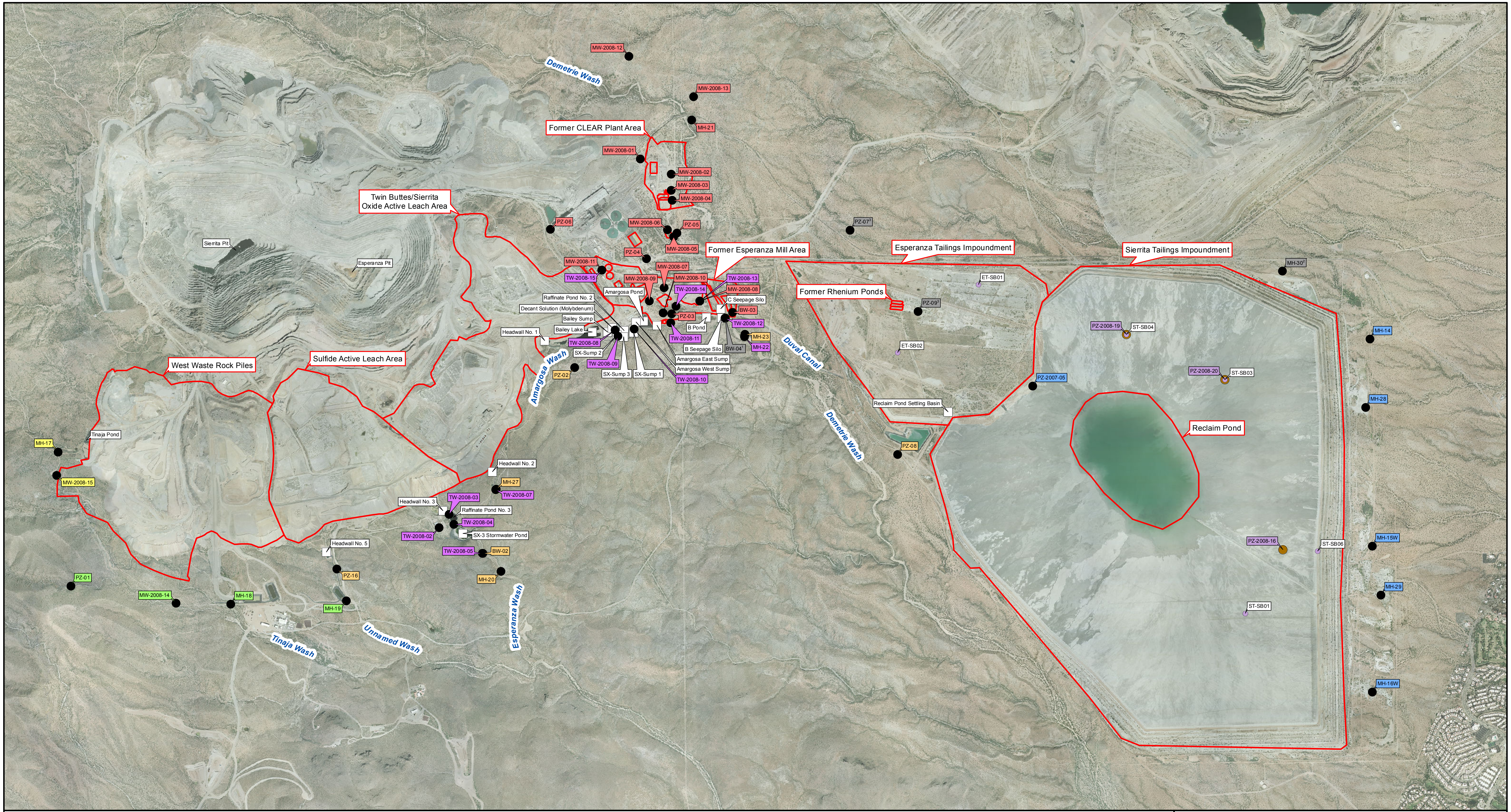
VOLUNTARY REMEDIATION PROGRAM
GROUNDWATER INVESTIGATION REPORT

FACILITIES AND SAMPLING LOCATIONS
ESPERANZA WASH, TINAJA WASH, AND UNNAMED WASH

ARCADIS

FIGURE
9



G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 10 sampling locations.mxd 12/17/2013

GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location
- Tailings pore water sampling location
- Tailings sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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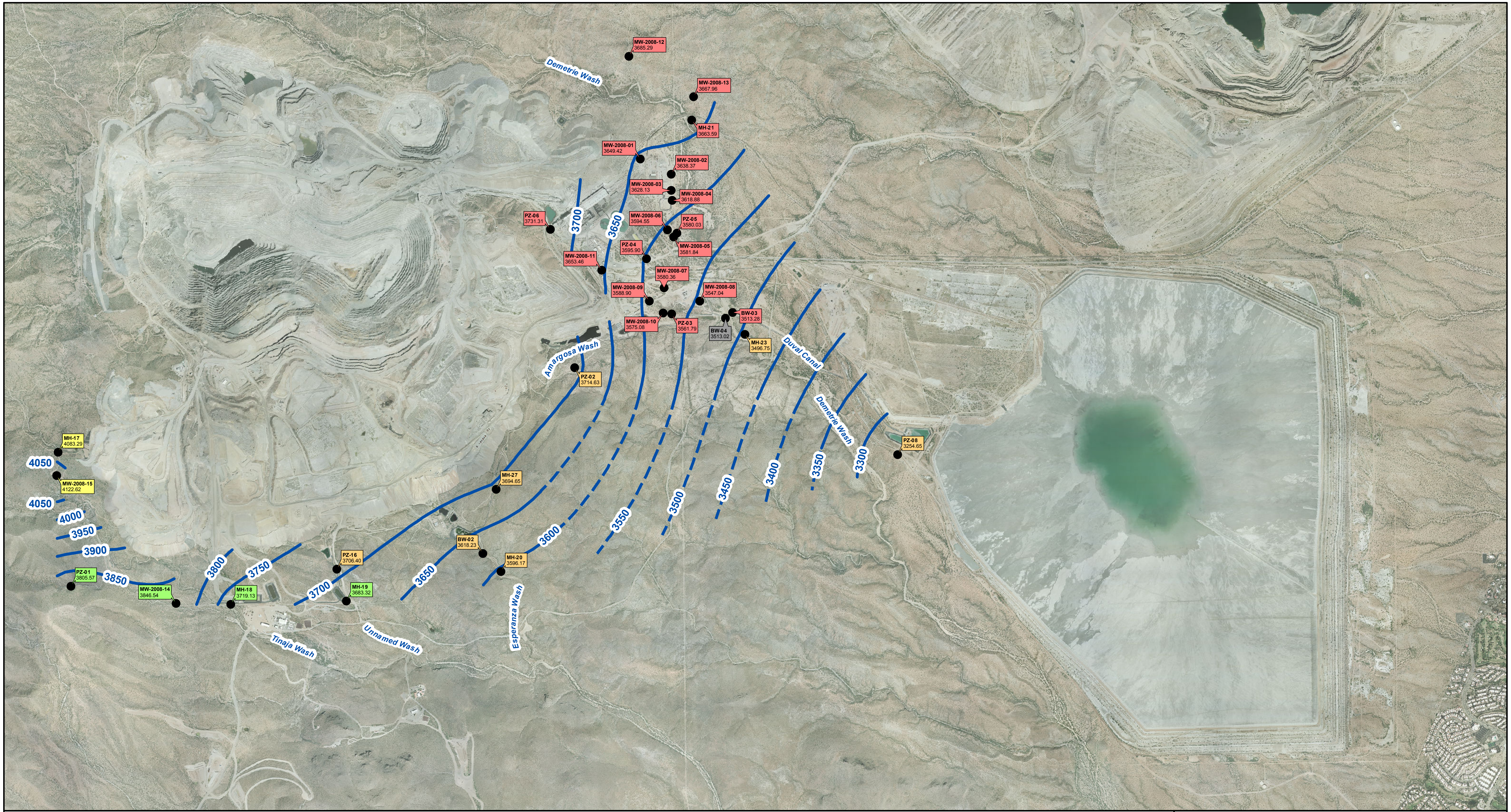
GREEN VALLEY, ARIZONA
VOLUNTARY REMEDIATION PROGRAM
GROUNDWATER INVESTIGATION REPORT

SAMPLING LOCATIONS FOR THE VRP GROUNDWATER INVESTIGATION

ARCADIS

FIGURE
10



G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 11 bedrock GWECs Q4-2008.mxd   11/20/2013

GROUNDWATER WELL LITHOLOGIC UNITS

- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- BW-04 — Bedrock Complex

LEGEND

- ● Groundwater well
- Groundwater elevation contour

NOTES

· Aerial photo source: Kenney, 2010.
· Groundwater elevations are expressed in feet amsl.
· Wells screened in basin fill, alluvium, and tailings are not contoured; only wells used in contouring are displayed.
· NM = well not measured.
· NA = well abandoned or destroyed; unable to be measured.

N

Feet
0 1,500 3,000
Scale: 1" = 3,000'

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GROUNDWATER INVESTIGATION REPORT

BEDROCK GROUNDWATER ELEVATION CONTOURS
FOURTH QUARTER 2008

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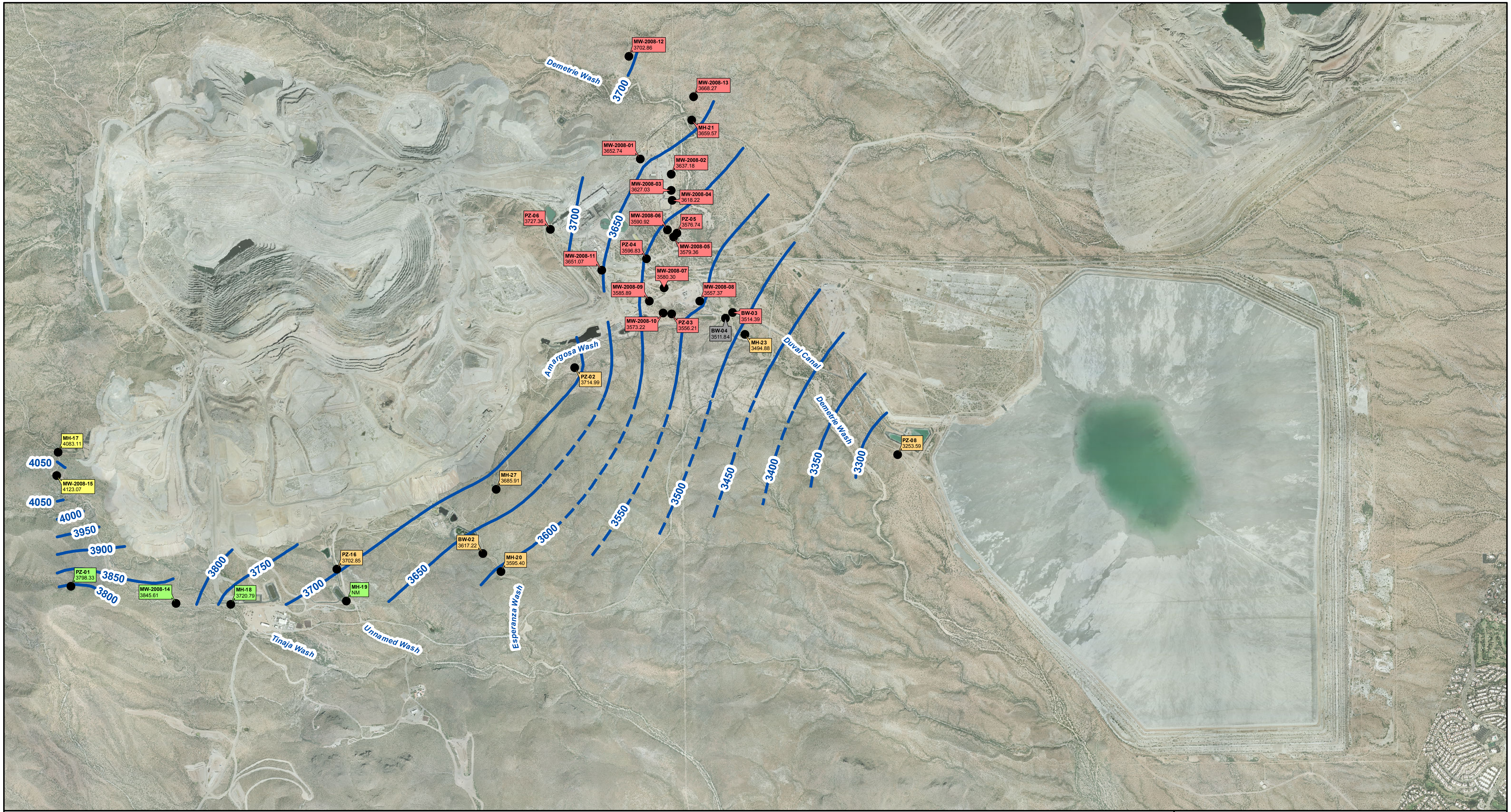
FIGURE
11



G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 12 bedrock GWECs Q1-2009.mxd 11/20/2013

GROUNDWATER WELL LITHOLOGIC UNITS

- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- BW-04 Bedrock Complex

LEGEND

- ● Groundwater well
- Groundwater elevation contour

NOTES

· Aerial photo source: Kenney, 2010.
· Groundwater elevations are expressed in feet amsl.
· Wells screened in basin fill, alluvium, and tailings are not contoured; only wells used in contouring are displayed.
· NM = well not measured.
· NA = well abandoned or destroyed; unable to be measured.

N

Feet
0 1,500 3,000
Scale: 1" = 3,000'

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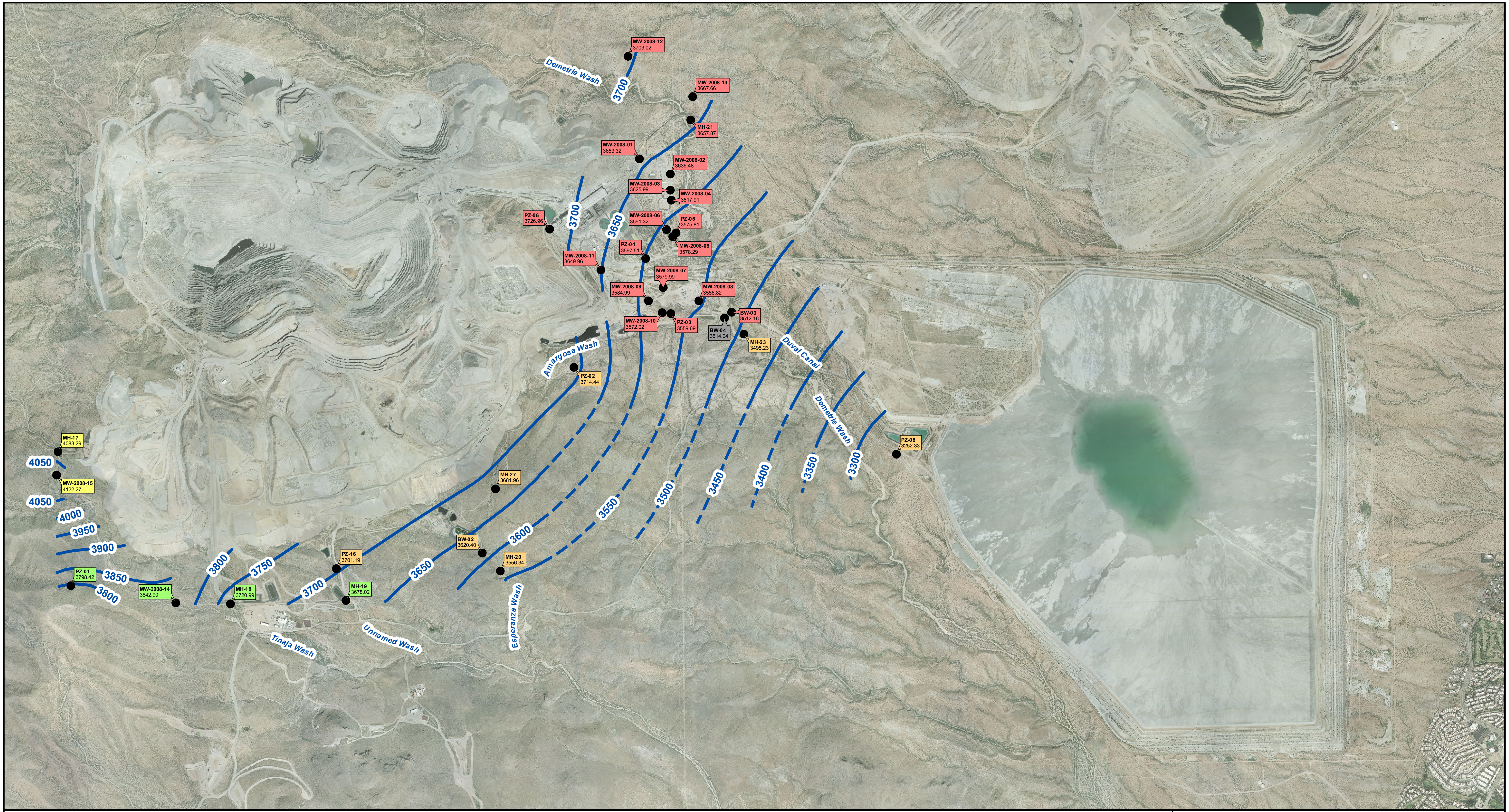
GROUNDWATER INVESTIGATION REPORT

BEDROCK GROUNDWATER ELEVATION CONTOURS FIRST QUARTER 2009

ARCADIS

FIGURE
12



G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 13 bedrock GWECs Q2-2009.mxd 11/20/2013

GROUNDWATER WELL LITHOLOGIC UNITS

- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- BW-04 — Bedrock Complex

LEGEND

- ● Groundwater well
- Groundwater elevation contour

NOTES

- Aerial photo source: Kenney, 2010.
- Groundwater elevations are expressed in feet amsl.
- Wells screened in basin fill, alluvium, and tailings are not contoured; only wells used in contouring are displayed.
- NM = well not measured.
- NA = well abandoned or destroyed; unable to be measured.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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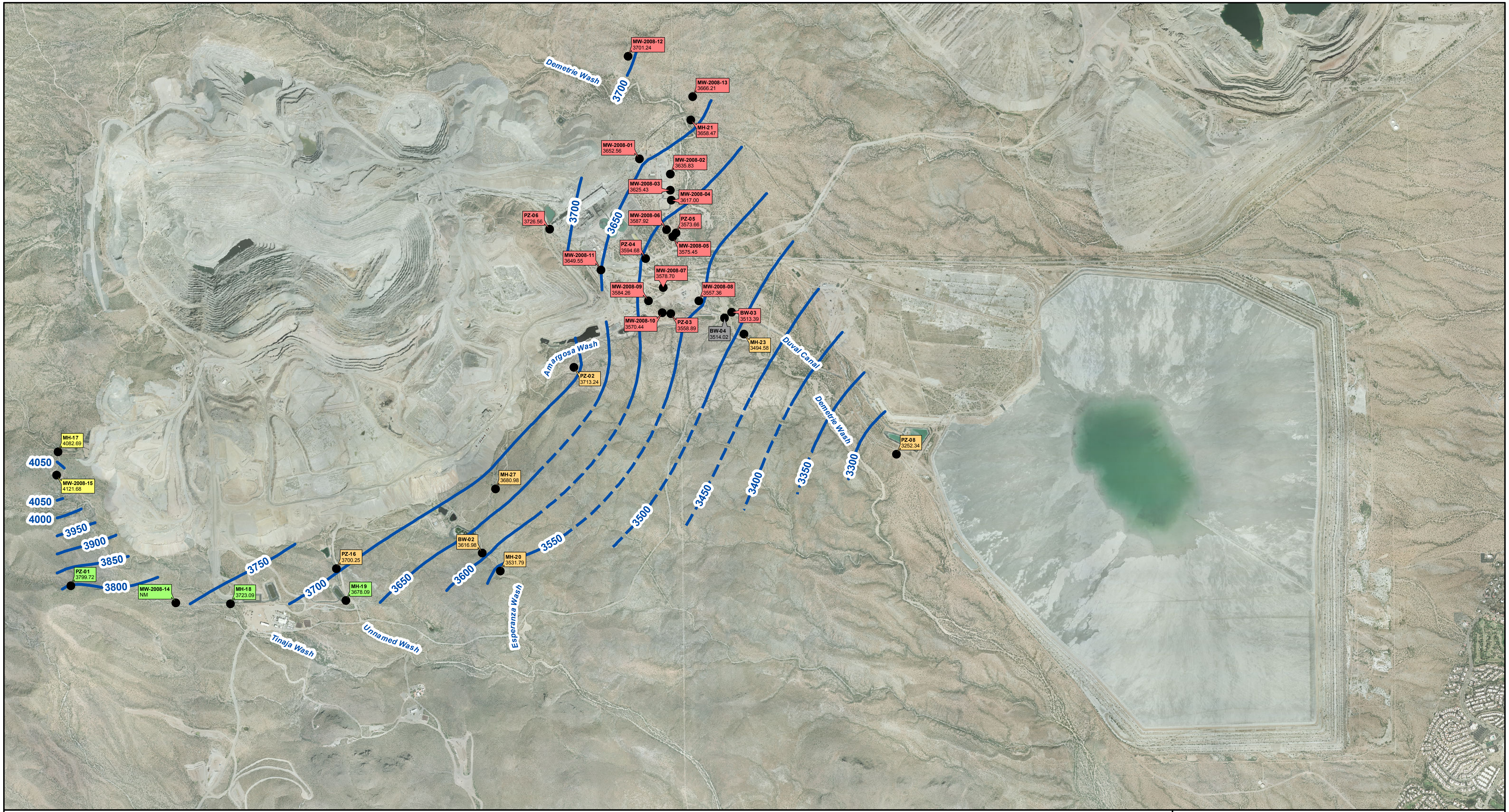
GROUNDWATER INVESTIGATION REPORT

BEDROCK GROUNDWATER ELEVATION CONTOURS
SECOND QUARTER 2009

ARCADIS

FIGURE
13



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- BW-04 Bedrock Complex

LEGEND

- ● Groundwater well
- Groundwater elevation contour

NOTES

- Aerial photo source: Kenney, 2010.
- Groundwater elevations are expressed in feet amsl.
- Wells screened in basin fill, alluvium, and tailings are not contoured; only wells used in contouring are displayed.
- NM = well not measured.
- NA = well abandoned or destroyed; unable to be measured.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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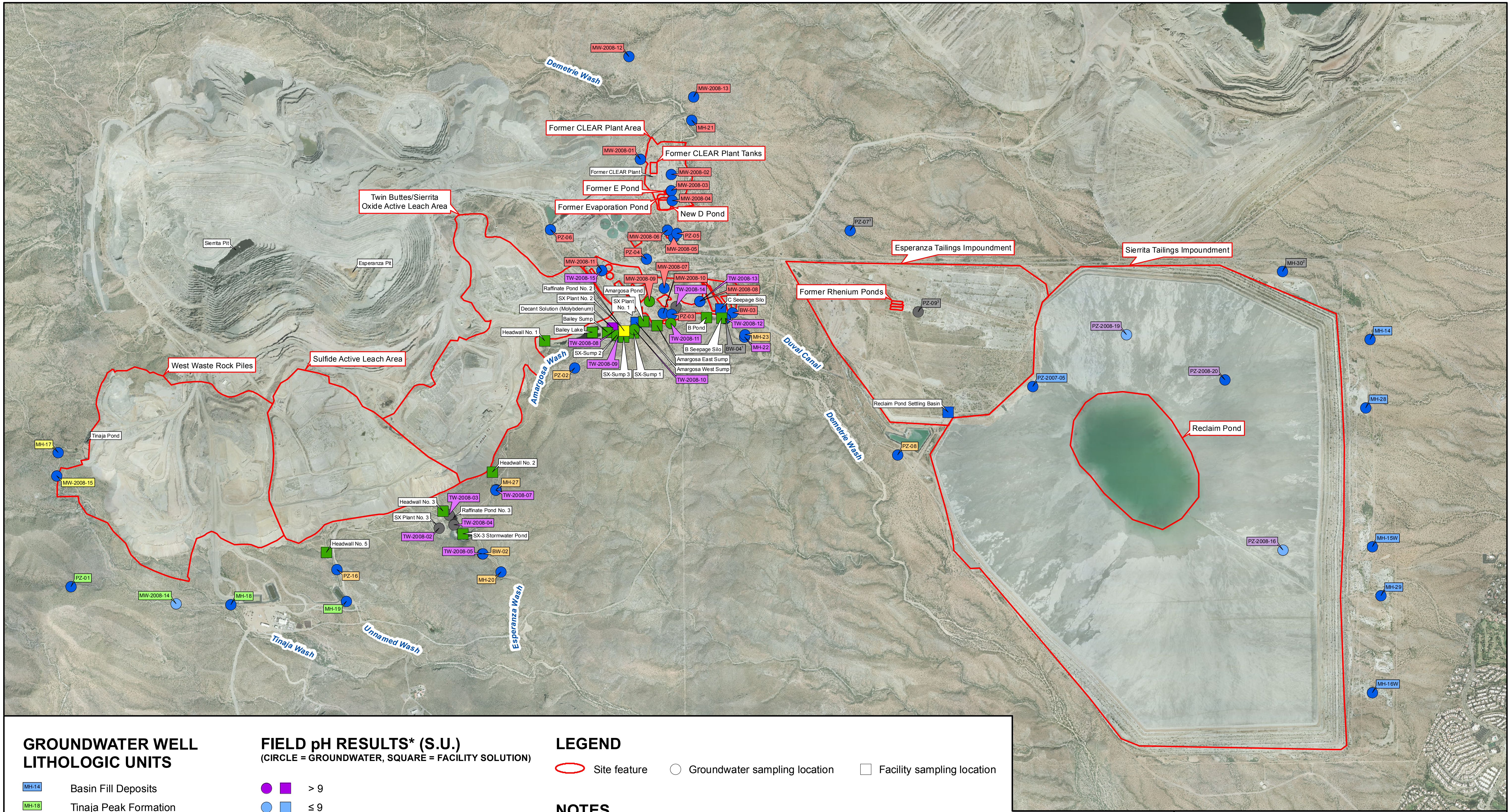
GROUNDWATER INVESTIGATION REPORT

BEDROCK GROUNDWATER ELEVATION CONTOURS
THIRD QUARTER 2009

ARCADIS

FIGURE
14

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 14 bedrock GWECs Q3-2009.mxd 11/20/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

FIELD pH RESULTS* (S.U.)

(CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- > 9
- ≤ 9
- ≤ 7
- ≤ 4
- ≤ 2
- Not sampled/not measured for pH

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- * = pH results represent the lowest value measured in the field at each location during the Voluntary Remediation Program (VRP) time period.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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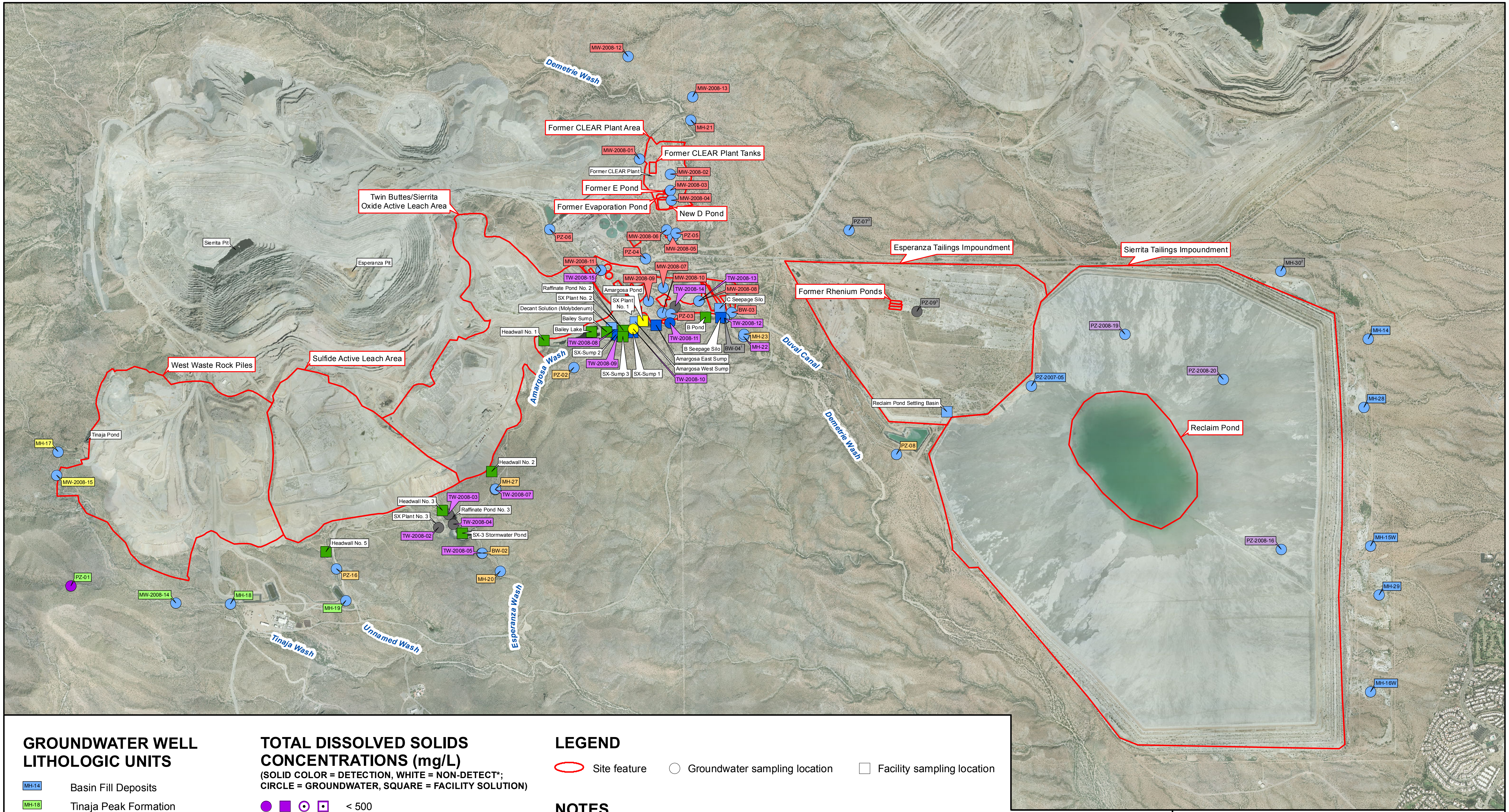
FIELD pH RESULTS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE **15**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 15 pH results (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

TOTAL DISSOLVED SOLIDS CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- Purple: < 500
- Light blue: ≥ 500
- Blue: ≥ 10,000
- Green: ≥ 25,000
- Yellow: ≥ 50,000
- Grey: Not sampled/not analyzed for total dissolved solids

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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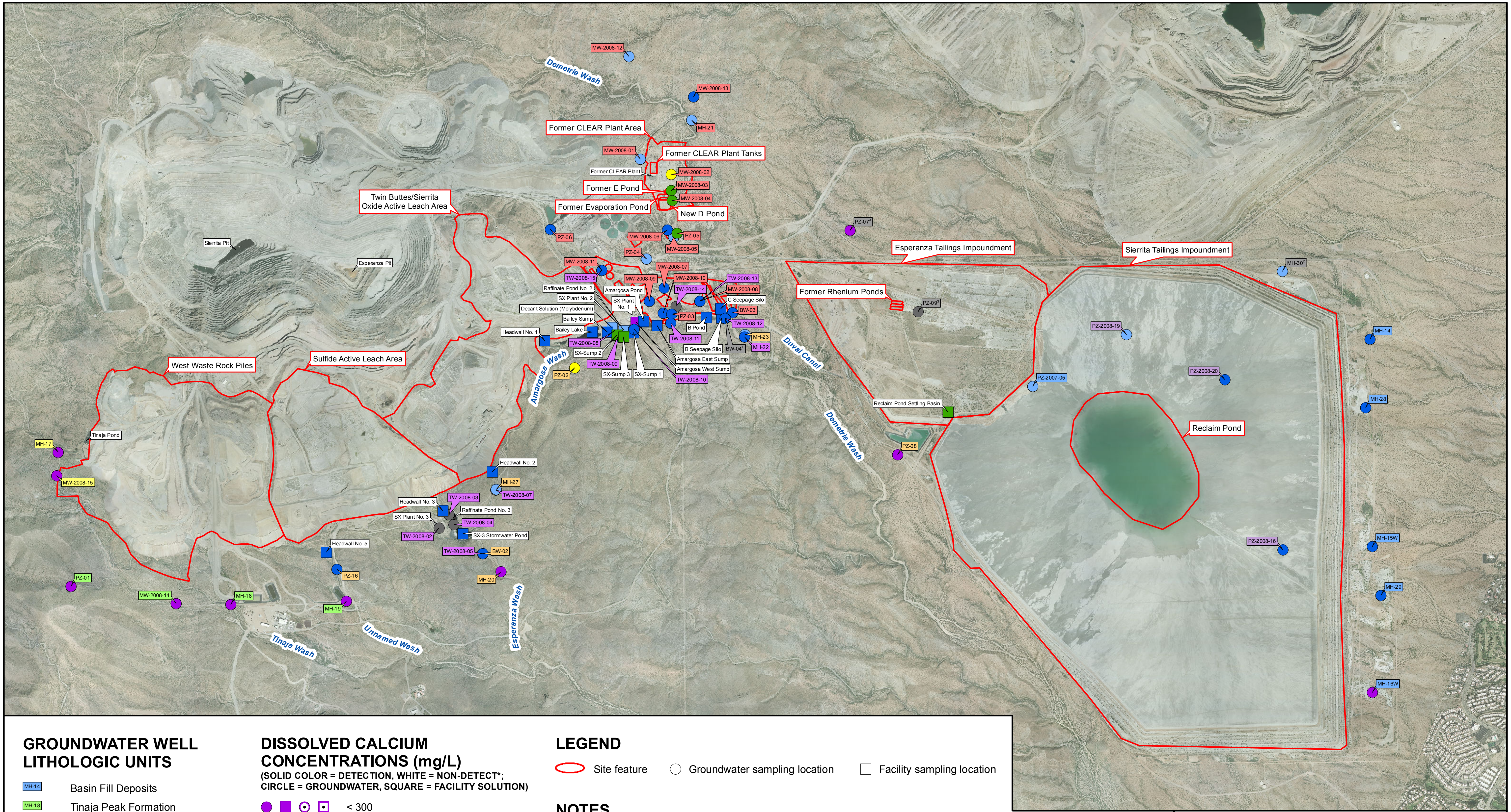
GROUNDWATER INVESTIGATION REPORT

TOTAL DISSOLVED SOLIDS CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE **16**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 16 TDS concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED CALCIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

Purple	< 300
Light blue	≥ 300
Blue	≥ 500
Green	≥ 750
Yellow	≥ 1,000
Gray	Not sampled/not analyzed for dissolved calcium

LEGEND

Site feature
Groundwater sampling location
Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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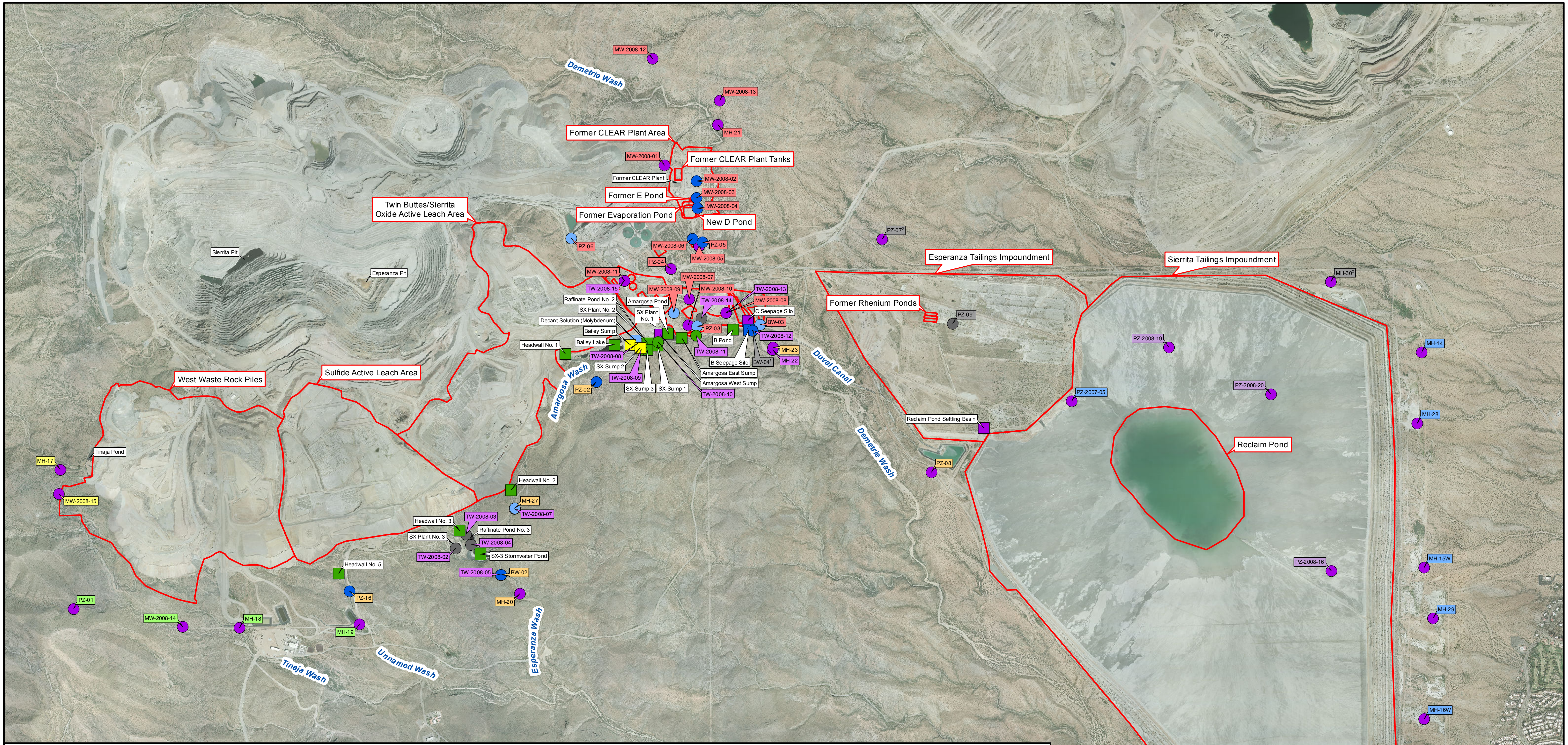
GROUNDWATER INVESTIGATION REPORT

DISSOLVED CALCIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
17

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 17 calcium concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

CHLORIDE CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 500
- ≥ 500
- ≥ 1,000
- ≥ 2,500
- ≥ 5,000
- Not sampled/not analyzed for chloride

LEGEND

Site feature
Groundwater sampling location
Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
· * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
· [1] = BW-04 is screened in the bedrock complex.
· [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
· [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

0 1,500 3,000 Feet
Scale: 1" = 3,000'

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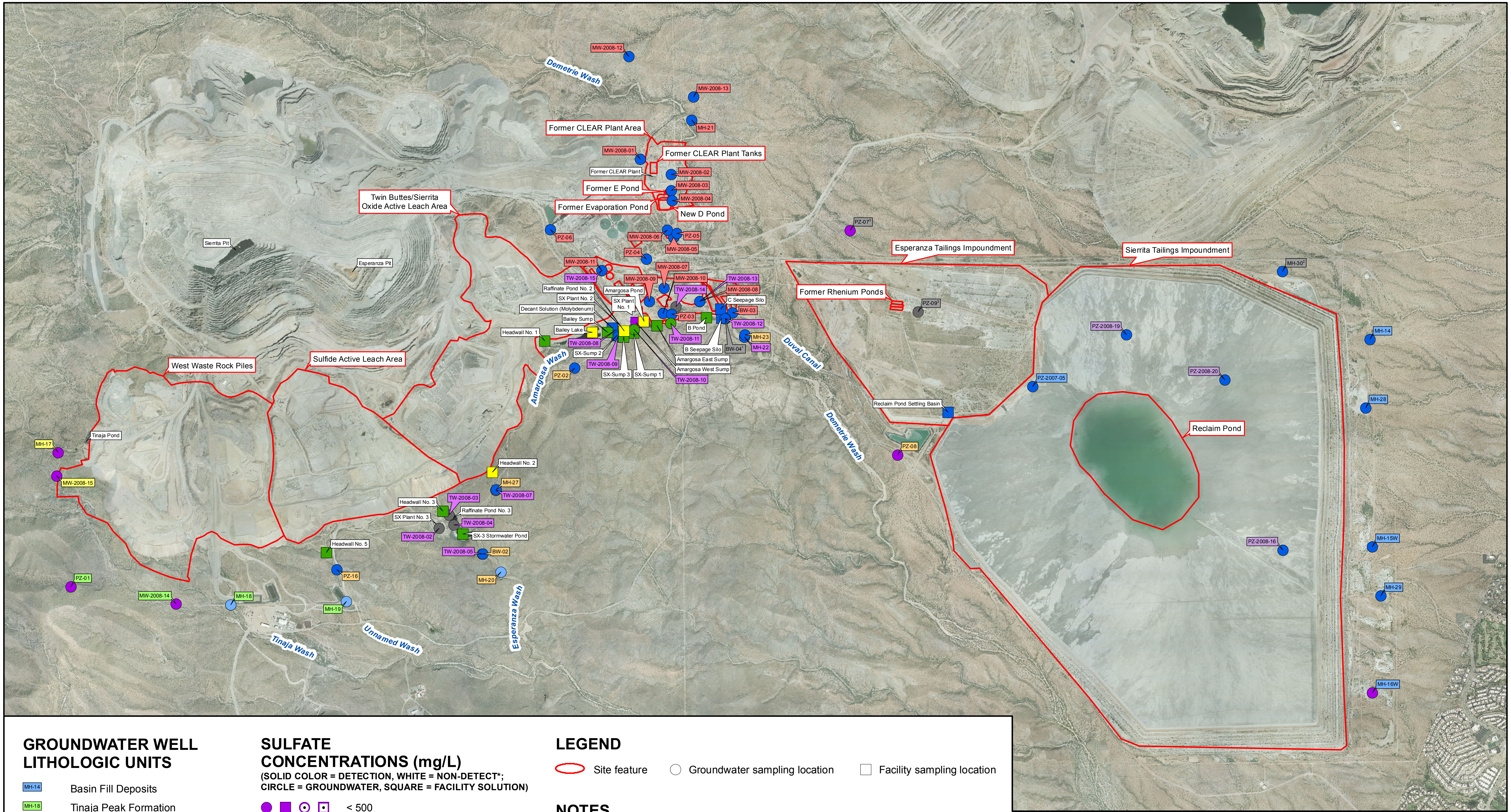
GROUNDWATER INVESTIGATION REPORT

CHLORIDE CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
18

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 18 chloride concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

SULFATE CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 500
- ≥ 500
- ≥ 1,000
- ≥ 10,000
- ≥ 30,000
- Not sampled/not analyzed for sulfate

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

Feet
0 1,500 3,000
Scale: 1" = 3,000'

FREEPORT-MCMORAN SIERRITA INC.
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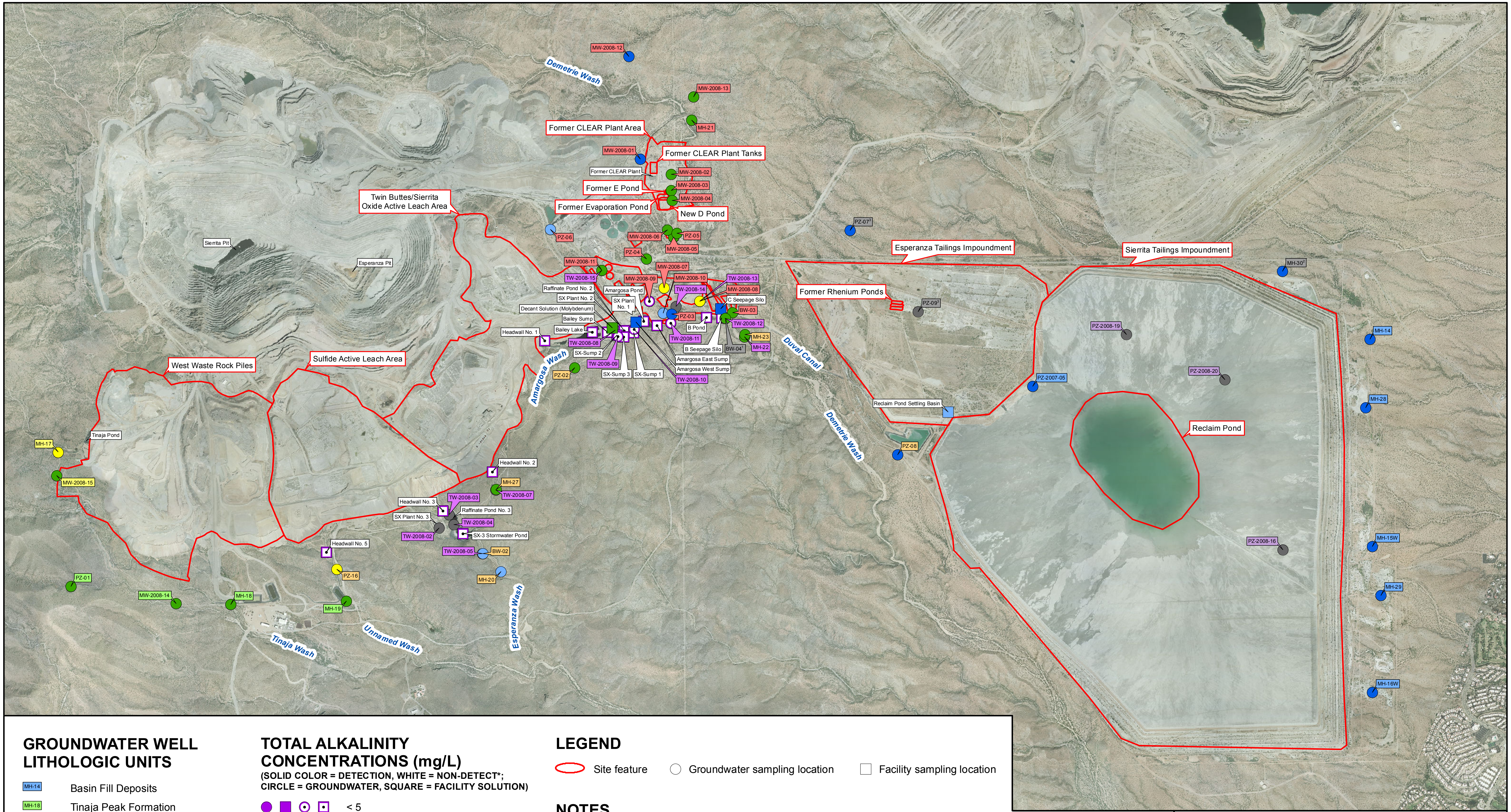
VOLUNTARY REMEDIATION PROGRAM GROUNDWATER INVESTIGATION REPORT

SULFATE CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
19

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 19 sulfate concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

TOTAL ALKALINITY CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 5
- ≥ 5
- ≥ 100
- ≥ 200
- ≥ 400
- Not sampled/not analyzed for total alkalinity

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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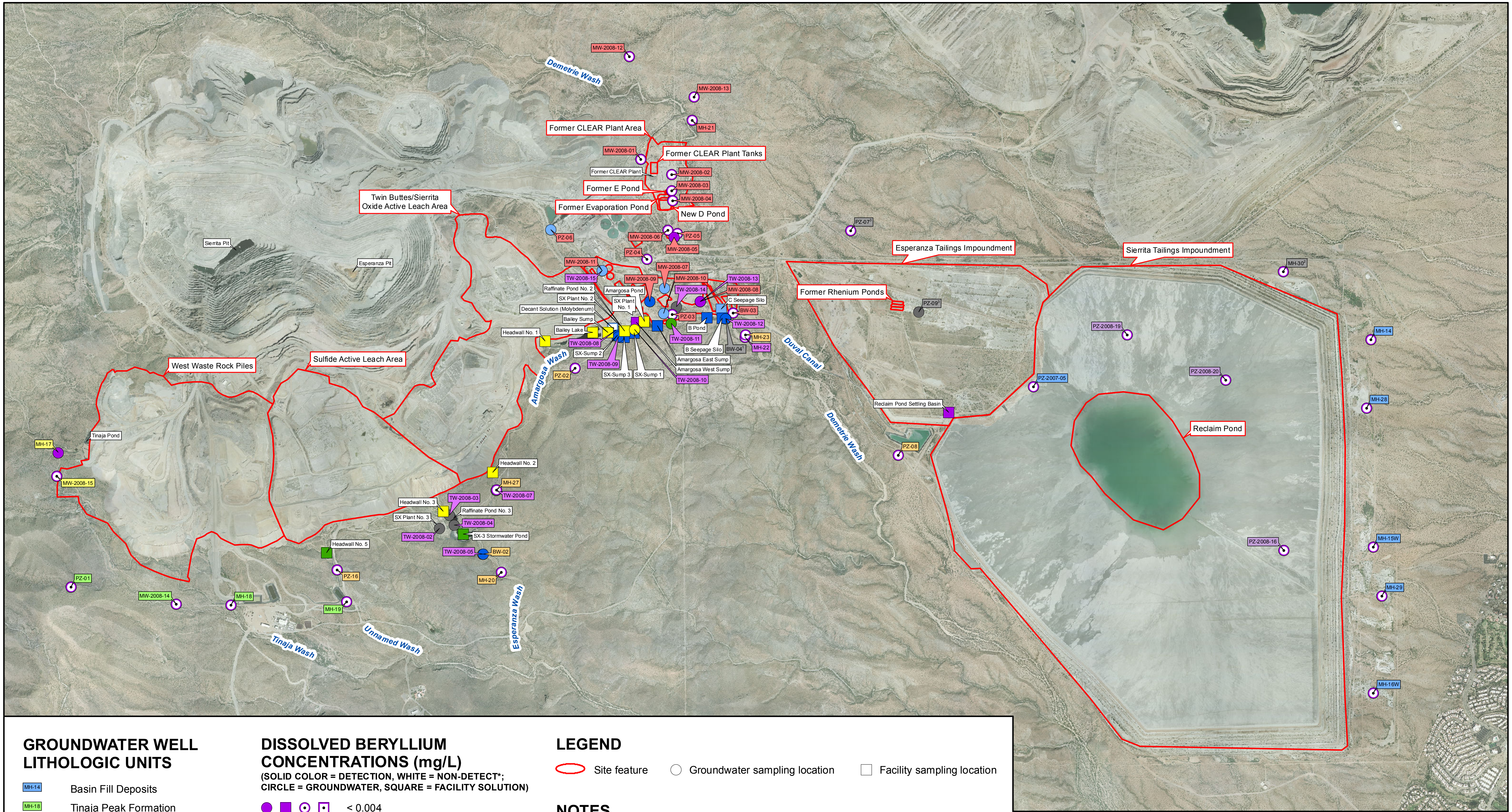
GROUNDWATER INVESTIGATION REPORT

TOTAL ALKALINITY CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
20

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 20 alkalinity concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED BERYLLIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.004
- ≥ 0.004
- ≥ 0.04
- ≥ 0.4
- ≥ 0.6
- Not sampled/not analyzed for dissolved beryllium

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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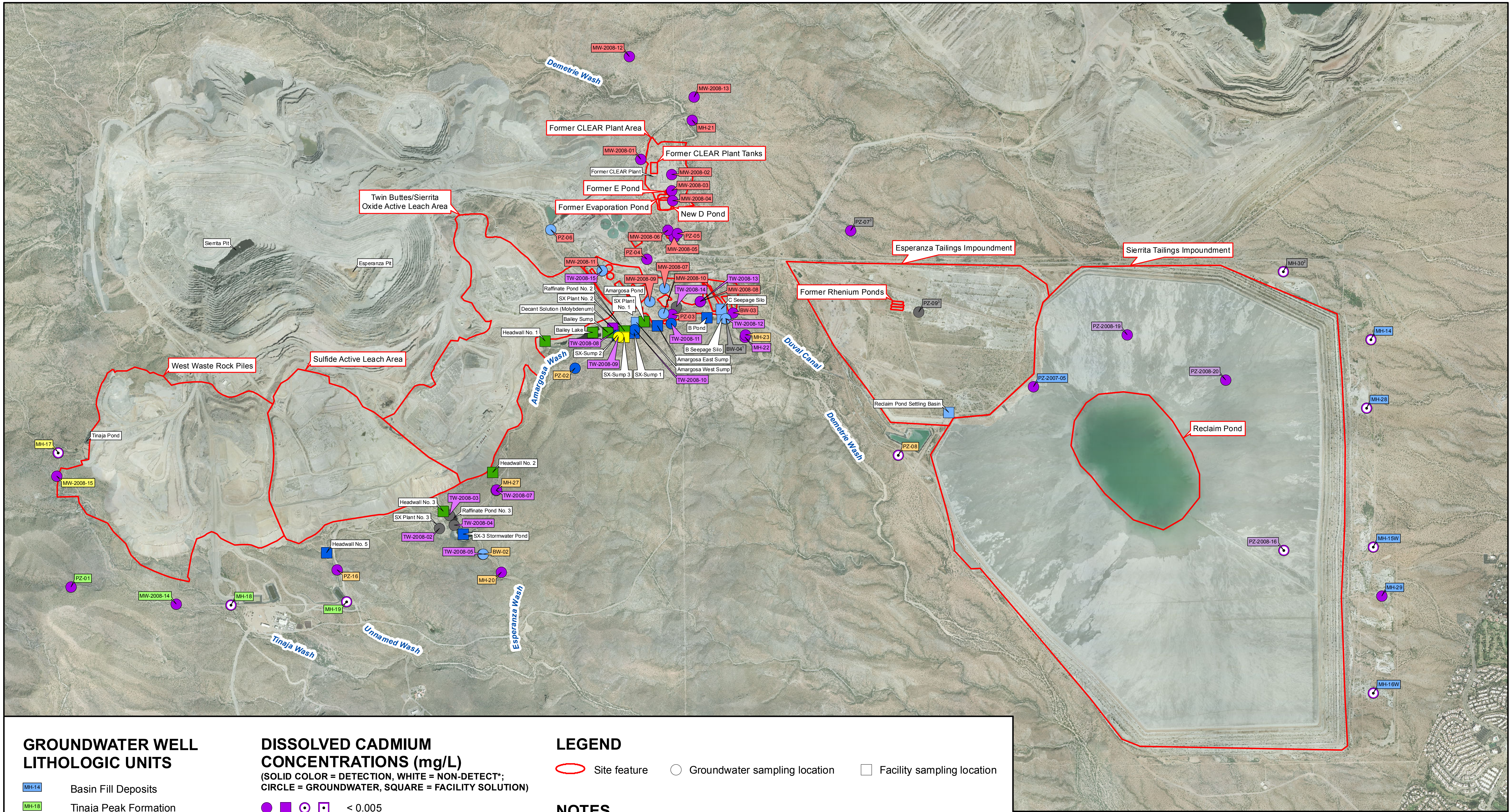
GROUNDWATER INVESTIGATION REPORT

DISSOLVED BERYLLIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
21

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 21 beryllium concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED CADMIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.005
- ≥ 0.005
- ≥ 0.5
- ≥ 1
- ≥ 1.5
- Not sampled/not analyzed for dissolved cadmium

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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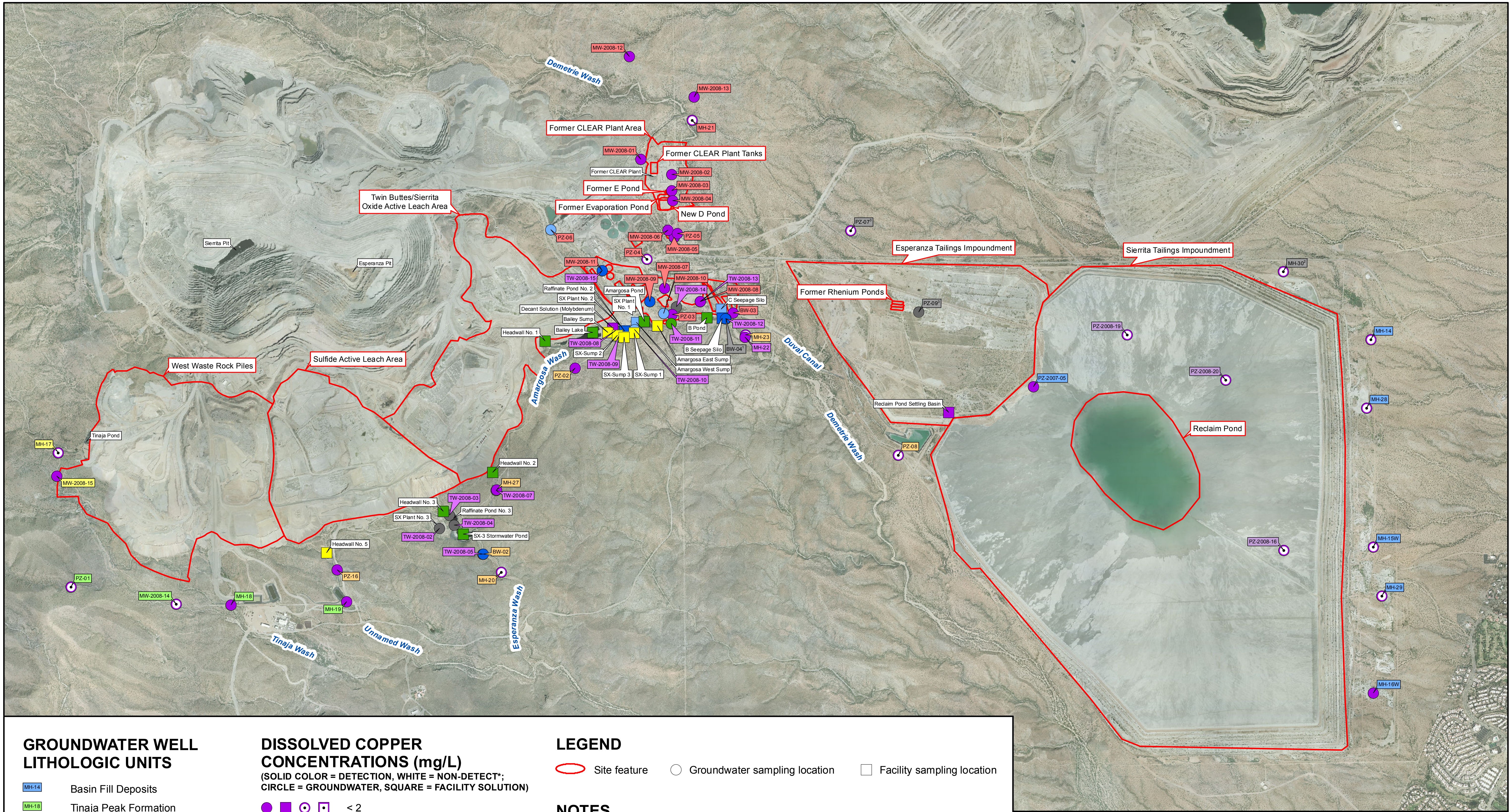
GROUNDWATER INVESTIGATION REPORT

DISSOLVED CADMIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
22

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 22 cadmium concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED COPPER CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 2
- ≥ 2
- ≥ 10
- ≥ 100
- ≥ 500
- Not sampled/not analyzed for dissolved copper

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED COPPER CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

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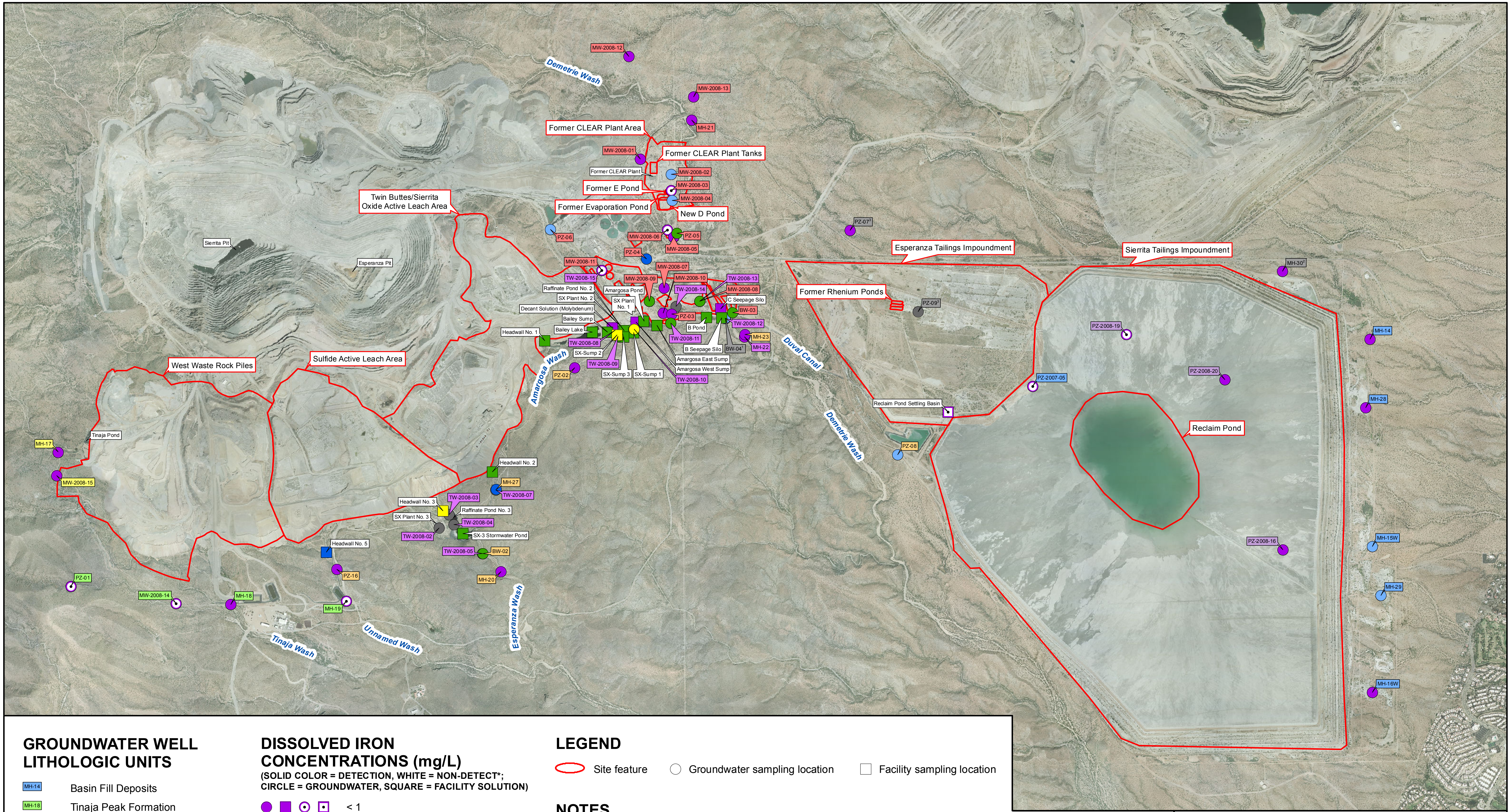
FIGURE
23

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 23 copper concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED IRON CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 1
- ≥ 1
- ≥ 5
- ≥ 10
- ≥ 500
- Not sampled/not analyzed for dissolved iron

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED IRON CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

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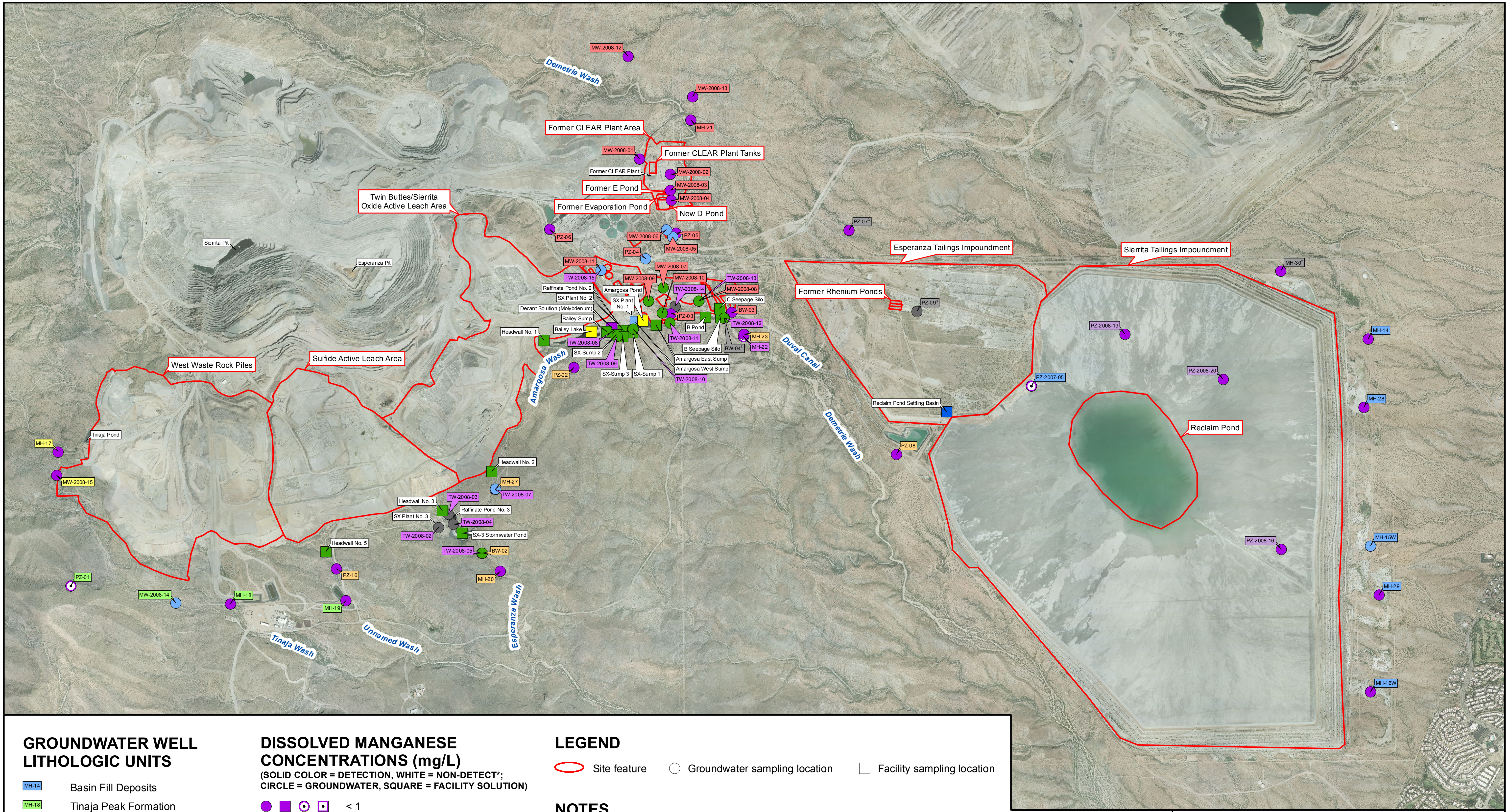
FIGURE **24**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 24 iron concentrations (site-wide).mxd 12/17/2013



G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 25 manganese concentrations (site-wide).mxd 12/17/2013

GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED MANGANESE CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

Purple	< 1
Light blue	≥ 1
Blue	≥ 5
Green	≥ 10
Yellow	≥ 500
Gray	Not sampled/not analyzed for dissolved manganese

LEGEND

Site feature
Groundwater sampling location
Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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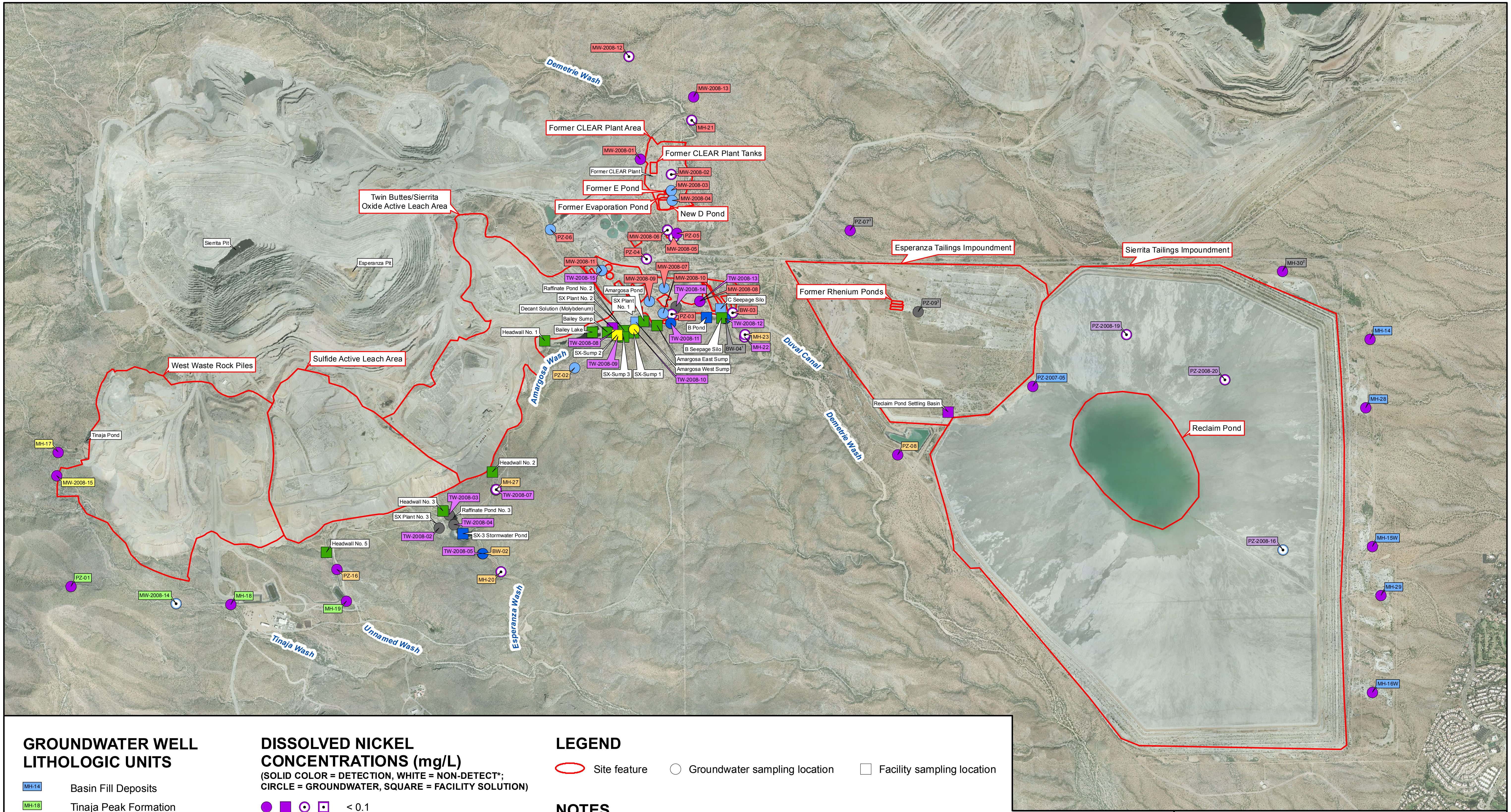
GROUNDWATER INVESTIGATION REPORT

DISSOLVED MANGANESE CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
25



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED NICKEL CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.1
- ≥ 0.1
- ≥ 1
- ≥ 5
- ≥ 10
- Not sampled/not analyzed for dissolved nickel

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

Feet

0 1,500 3,000

Scale: 1" = 3,000'

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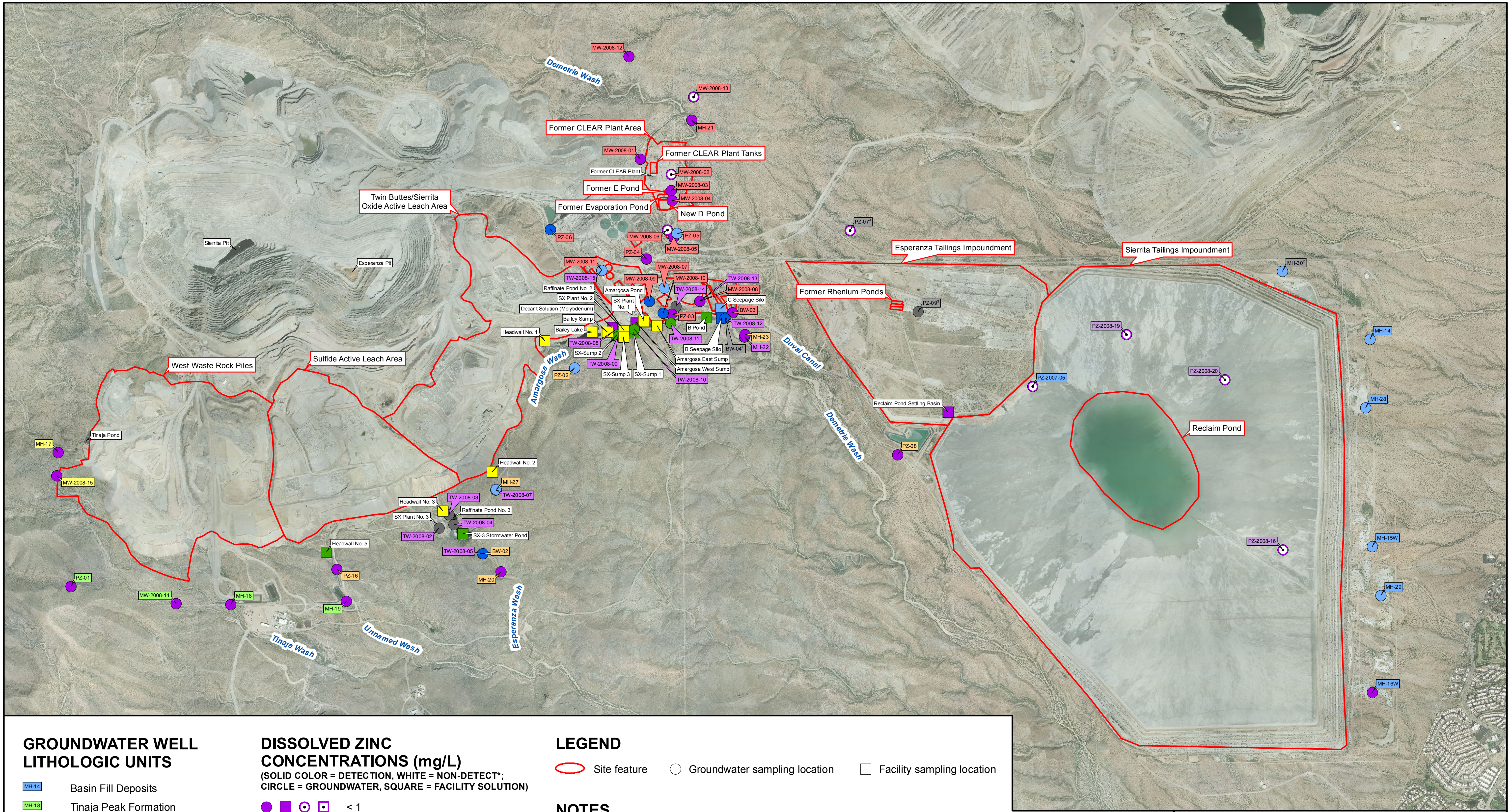
DISSOLVED NICKEL CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
26

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 26 nickel concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED ZINC CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 1
- ≥ 1
- ≥ 10
- ≥ 50
- ≥ 100
- Not sampled/not analyzed for dissolved zinc

LEGEND

Site feature — Groundwater sampling location — Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

0 1,500 3,000 Feet
Scale: 1" = 3,000'

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DISSOLVED ZINC CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

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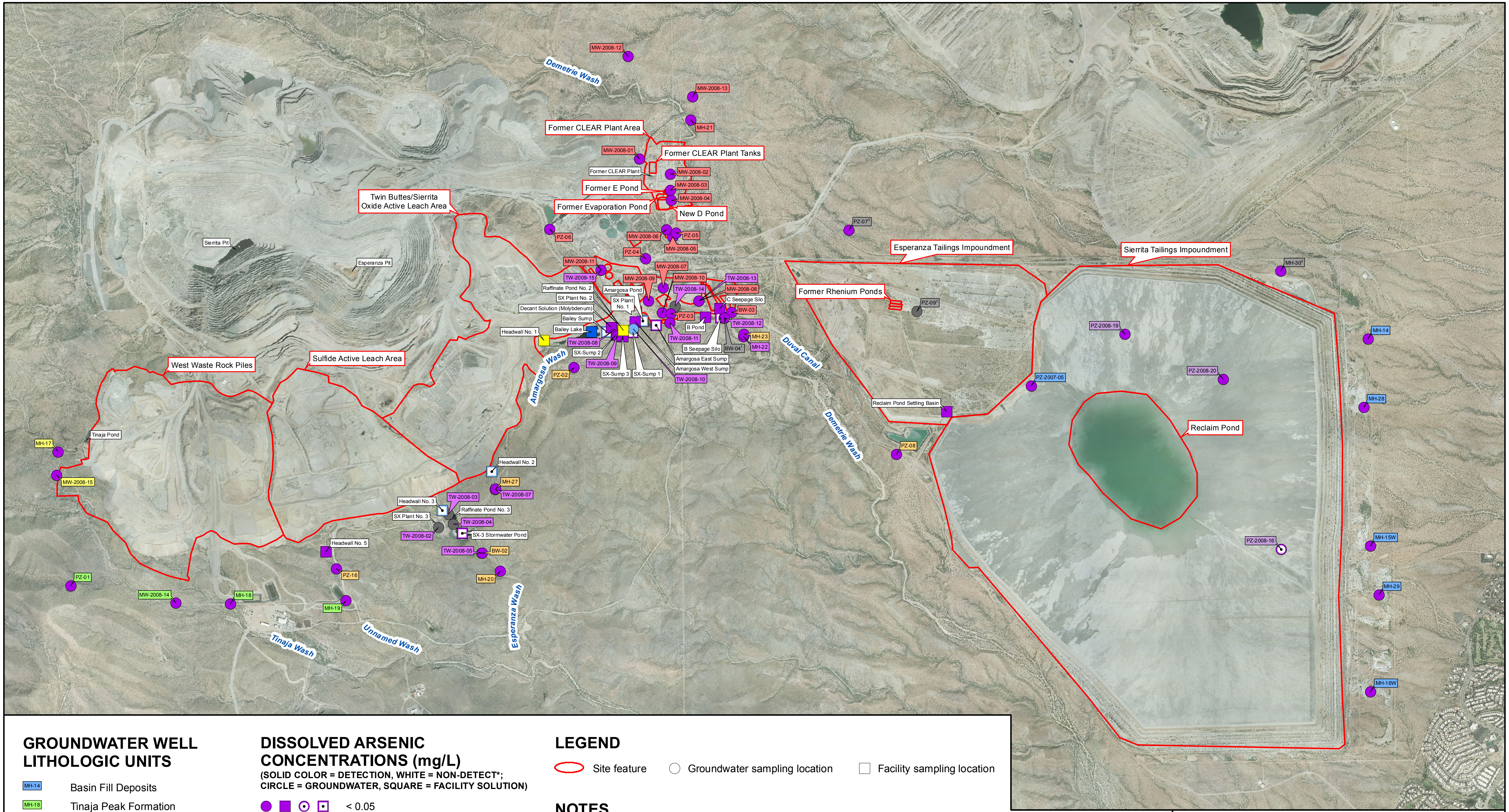
FIGURE **27**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 27 zinc concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED ARSENIC CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- (purple) < 0.05
- (light blue) ≥ 0.05
- (blue) ≥ 0.06
- (green) ≥ 0.07
- (yellow) ≥ 0.08
- (grey) Not sampled/not analyzed for dissolved arsenic

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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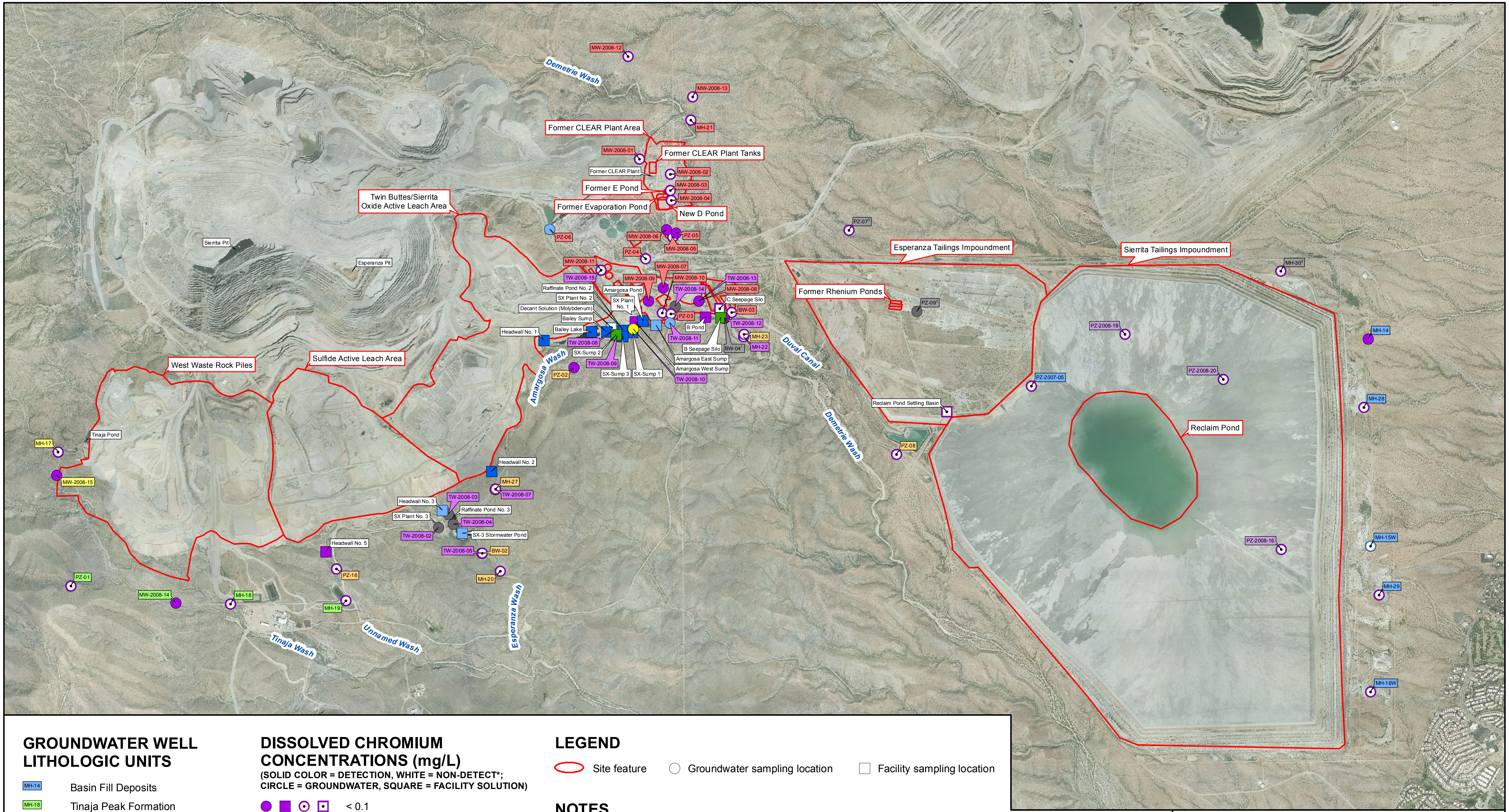
DISSOLVED ARSENIC CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
28

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 28 arsenic concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED CHROMIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.1
- ≥ 0.1
- ≥ 1
- ≥ 5
- ≥ 10
- Not sampled/not analyzed for dissolved chromium

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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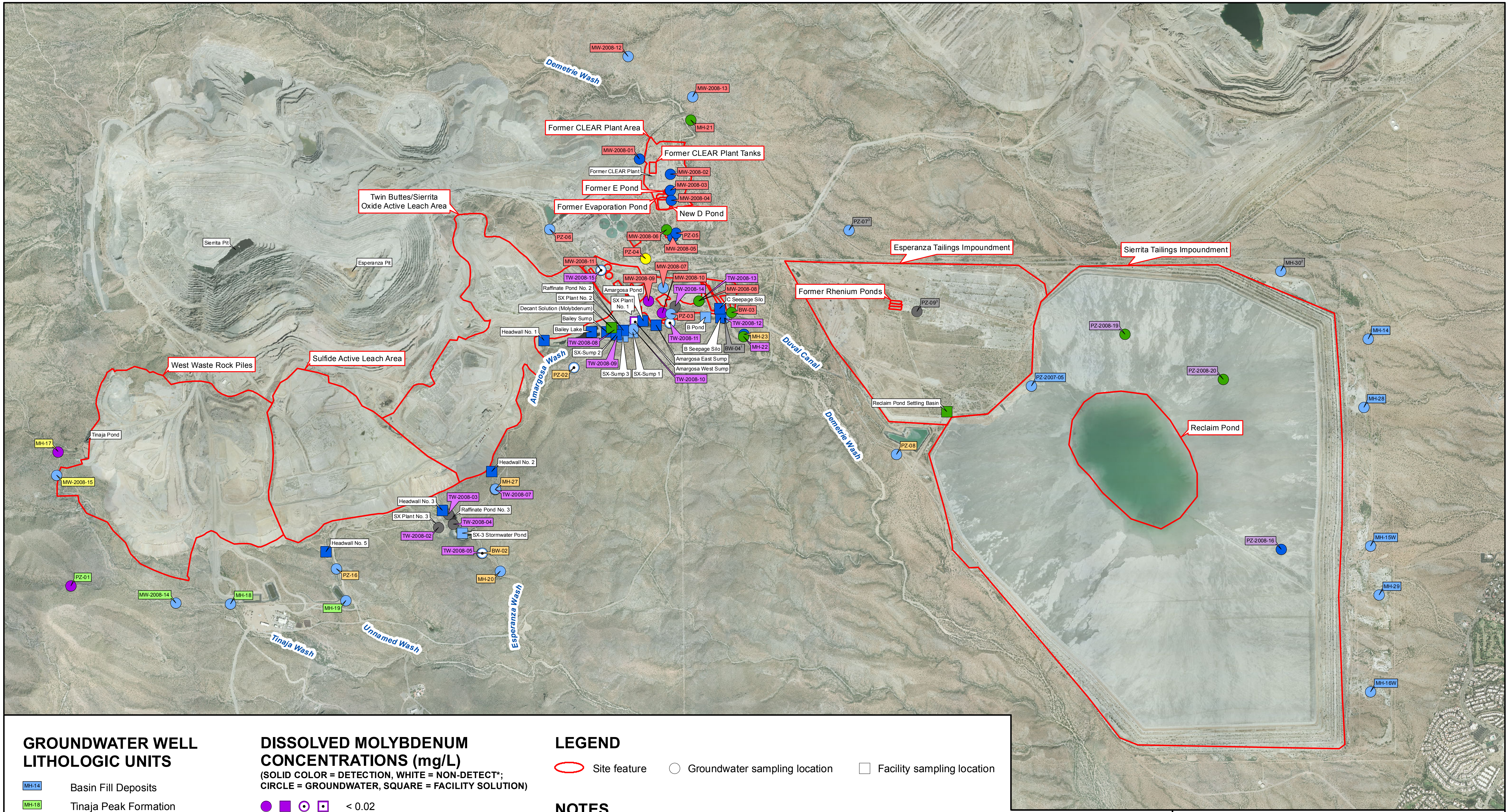
GROUNDWATER INVESTIGATION REPORT

DISSOLVED CHROMIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE **29**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 29 chromium concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED MOLYBDENUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- Purple: < 0.02
- Light blue: ≥ 0.02
- Blue: ≥ 0.2
- Green: ≥ 2
- Yellow: ≥ 5
- Grey: Not sampled/not analyzed for dissolved molybdenum

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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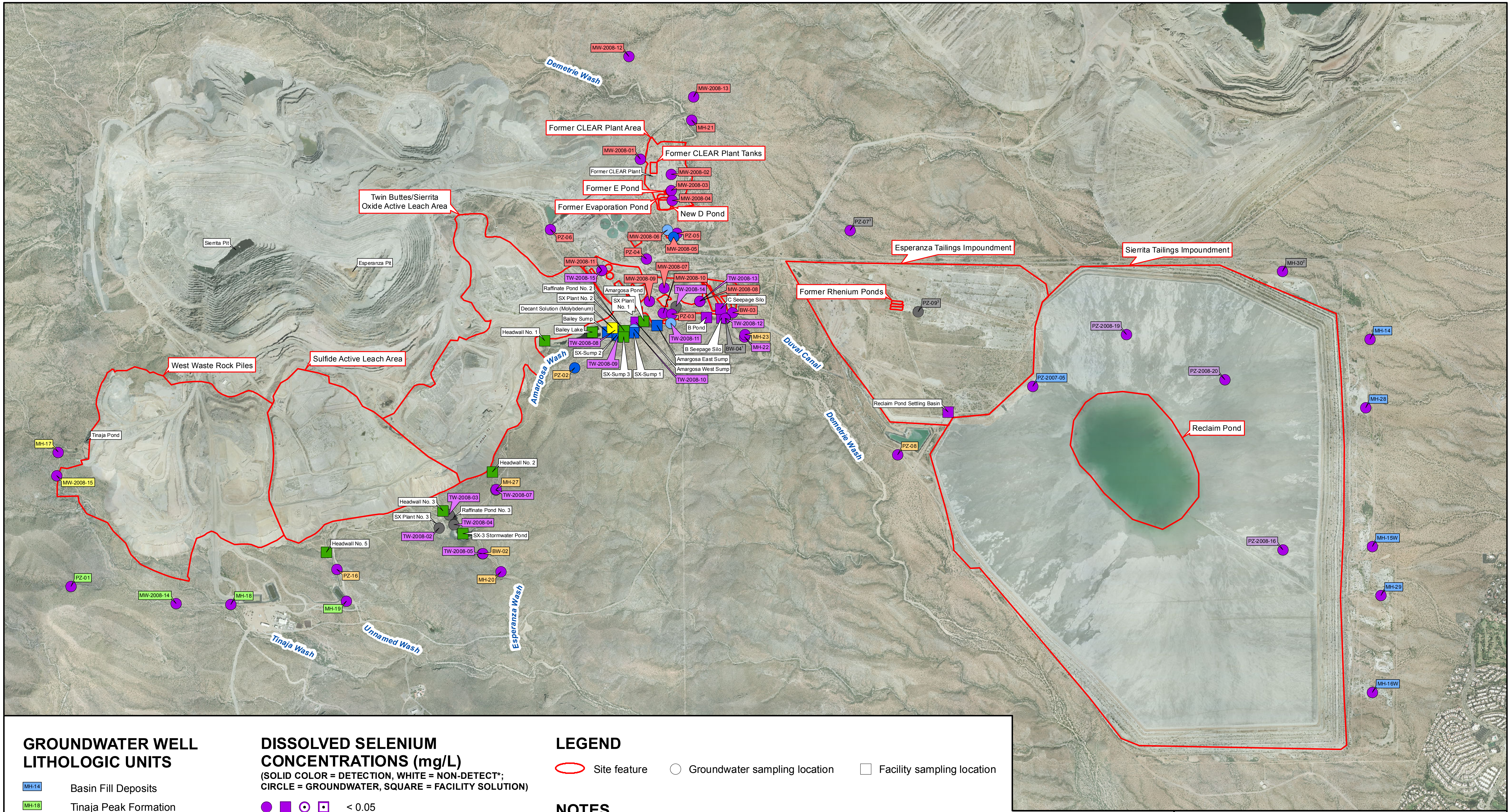
GROUNDWATER INVESTIGATION REPORT

DISSOLVED MOLYBDENUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
30

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 30 molybdenum concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED SELENIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.05
- ≥ 0.05
- ≥ 0.07
- ≥ 0.1
- ≥ 0.2
- Not sampled/not analyzed for dissolved selenium

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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DISSOLVED SELENIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

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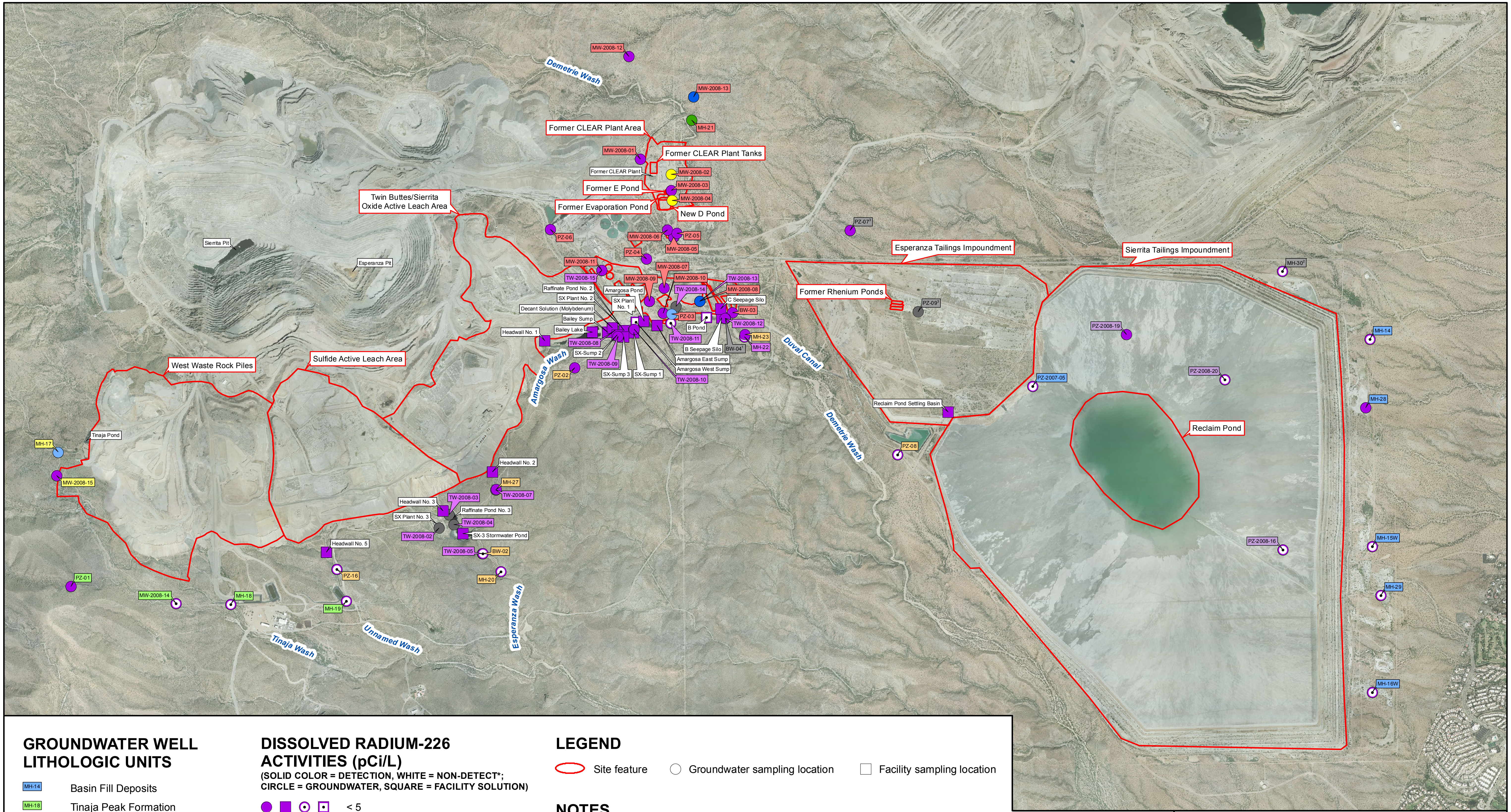
FIGURE **31**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 31 selenium concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED RADIUM-226 ACTIVITIES (pCi/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 5
- ≥ 5
- ≥ 7
- ≥ 10
- ≥ 15
- Not sampled/not analyzed for dissolved radium-226

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed activities represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect activities, the colored ring around the edge of the symbol represents the activity range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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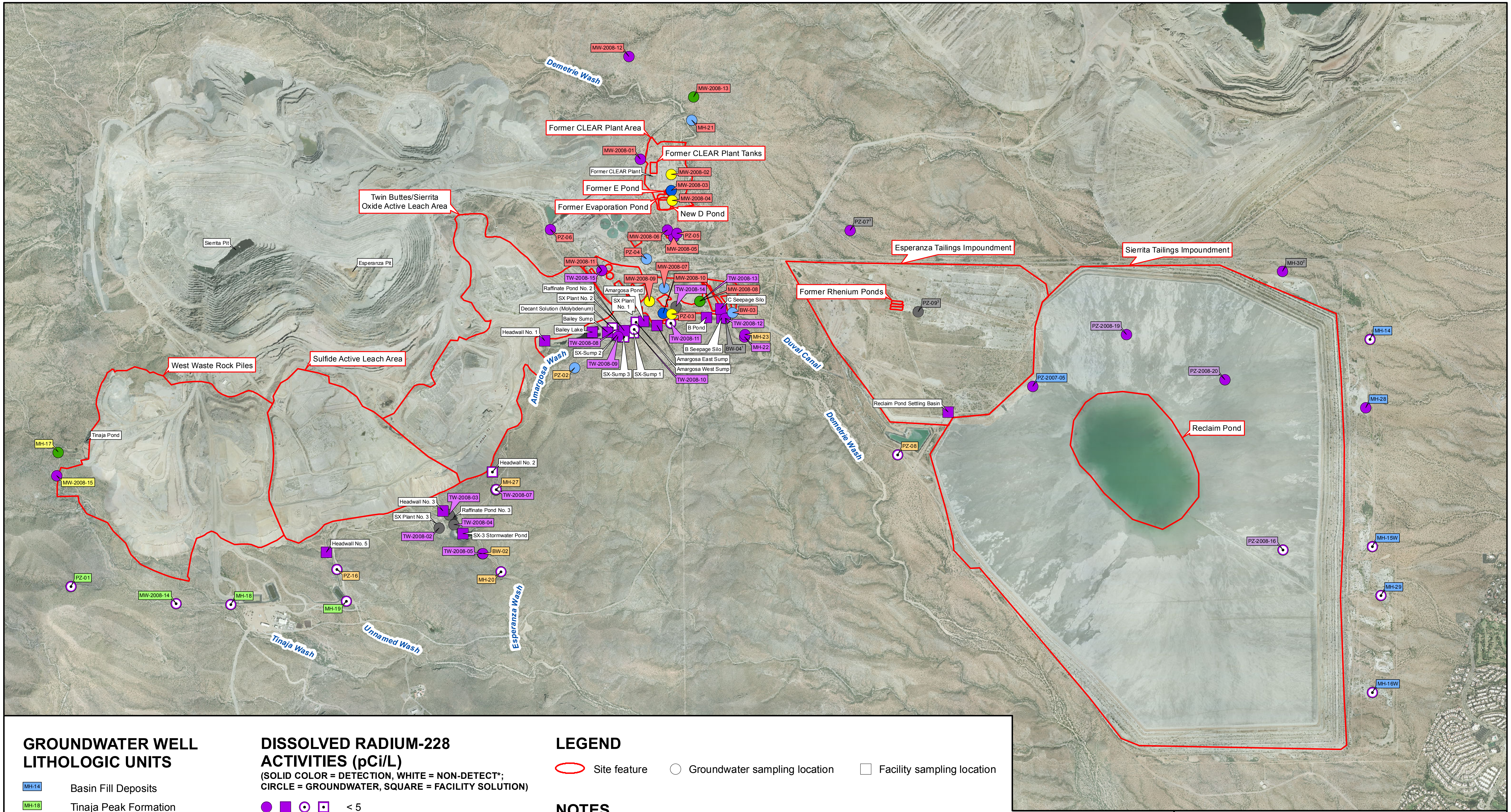
GROUNDWATER INVESTIGATION REPORT

DISSOLVED RADIUM-226 ACTIVITIES IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE **32**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 32 radium-226 activities (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED RADIUM-228 ACTIVITIES (pCi/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 5
- ≥ 5
- ≥ 7
- ≥ 10
- ≥ 15
- Not sampled/not analyzed for dissolved radium-228

LEGEND

Site feature

Groundwater sampling location

Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· Displayed activities represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
· * = for non-detect activities, the colored ring around the edge of the symbol represents the activity range into which the reporting limit falls.
· [1] = BW-04 is screened in the bedrock complex.
· [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
· [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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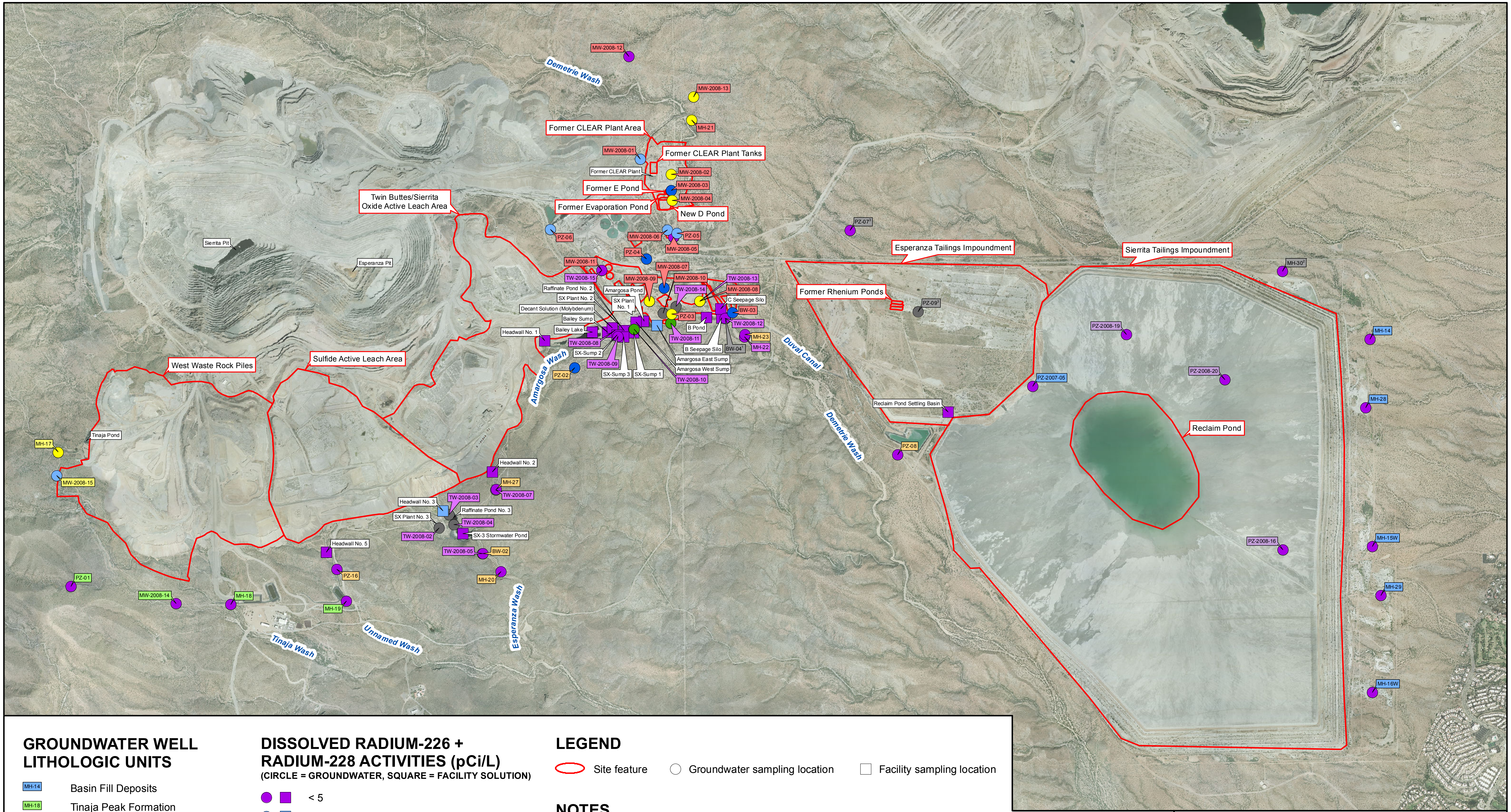
GROUNDWATER INVESTIGATION REPORT

DISSOLVED RADIUM-228 ACTIVITIES IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

ARCADIS

FIGURE
33

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 33 radium-228 activities (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED RADIUM-226 + RADIUM-228 ACTIVITIES (pCi/L)

(CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 5
- ≥ 5
- ≥ 7
- ≥ 10
- ≥ 15
- Not sampled/not analyzed for dissolved radium-226 and/or dissolved radium-228

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed activities represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

Feet
0 1,500 3,000
Scale: 1" = 3,000'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED RADIUM-226 + RADIUM-228 ACTIVITIES IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

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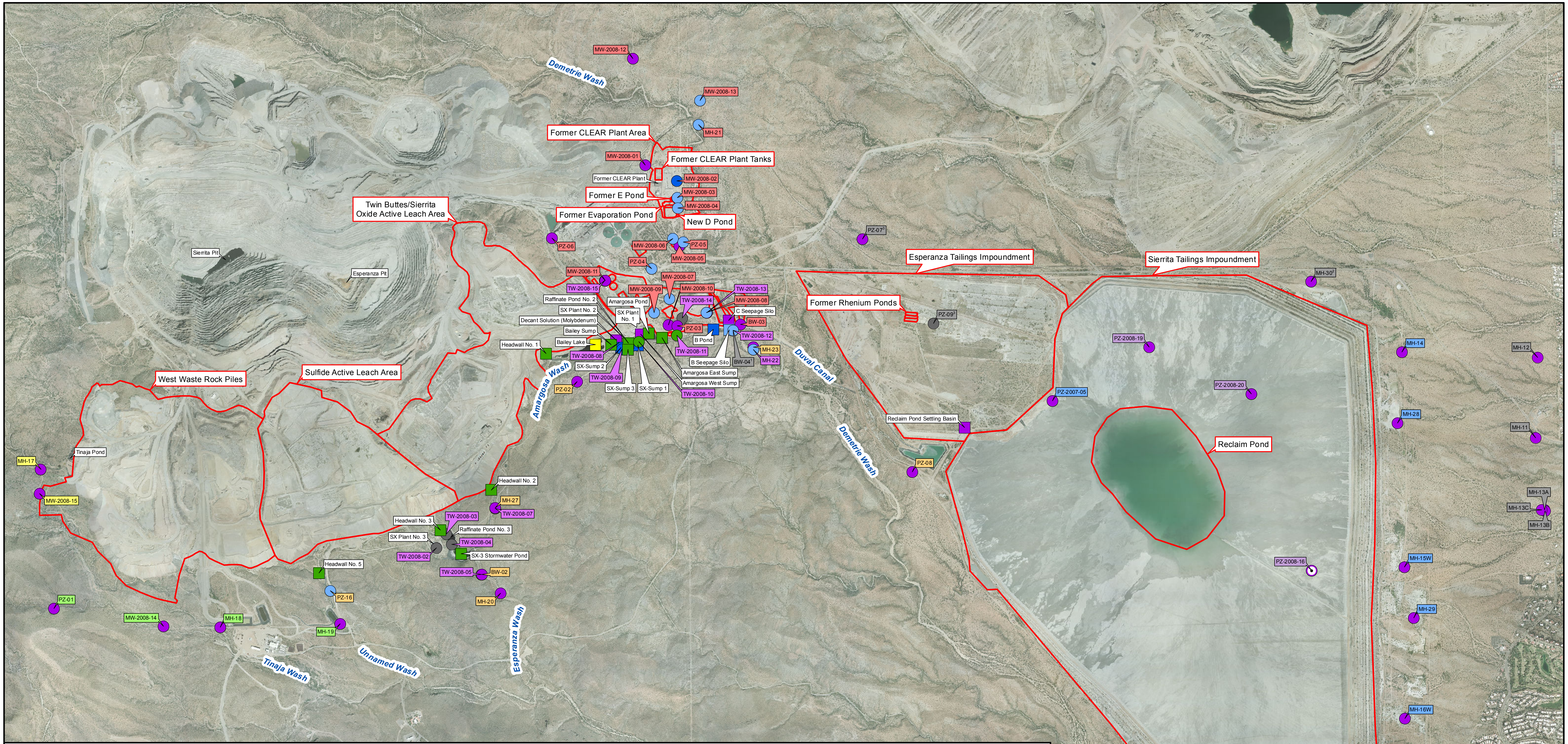
FIGURE
34

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 34 radium-226 + radium-228 activities (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED URANIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.2 (purple)
- ≥ 0.2 (light blue)
- ≥ 1 (blue)
- ≥ 3 (green)
- ≥ 9 (yellow)
- Not sampled/not analyzed for dissolved uranium (gray)

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.
- [2] = MH-30 is screened across both basin fill and Mesozoic sedimentary rocks.
- [3] = PZ-07 and PZ-09 are screened across both basin fill and Ruby Star Intrusives.

N

0 1,500 3,000 Feet

Scale: 1" = 3,000'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED URANIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (SITE-WIDE)

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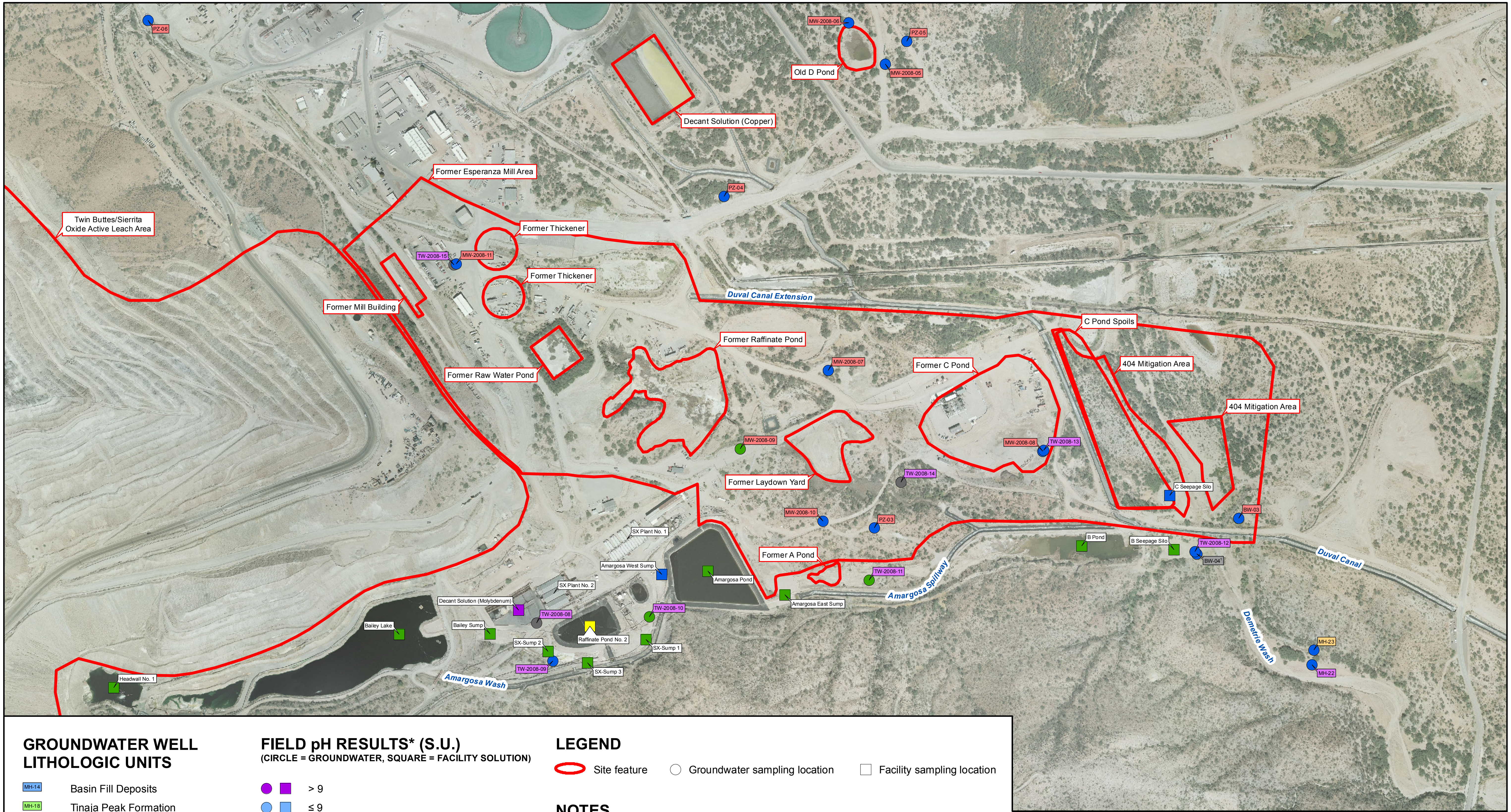
FIGURE **35**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 34 uranium concentrations (site-wide).mxd 12/17/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

FIELD pH RESULTS* (S.U.)

(CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- > 9
- ≤ 9
- ≤ 7
- ≤ 4
- ≤ 2
- Not sampled/not measured for pH

LEGEND

Site feature — Groundwater sampling location — Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· * = pH results represent the lowest value measured in the field at each location during the Voluntary Remediation Program (VRP) time period.
· [1] = BW-04 is screened in the bedrock complex.

N

Feet
0 250 500
Scale: 1" = 500'

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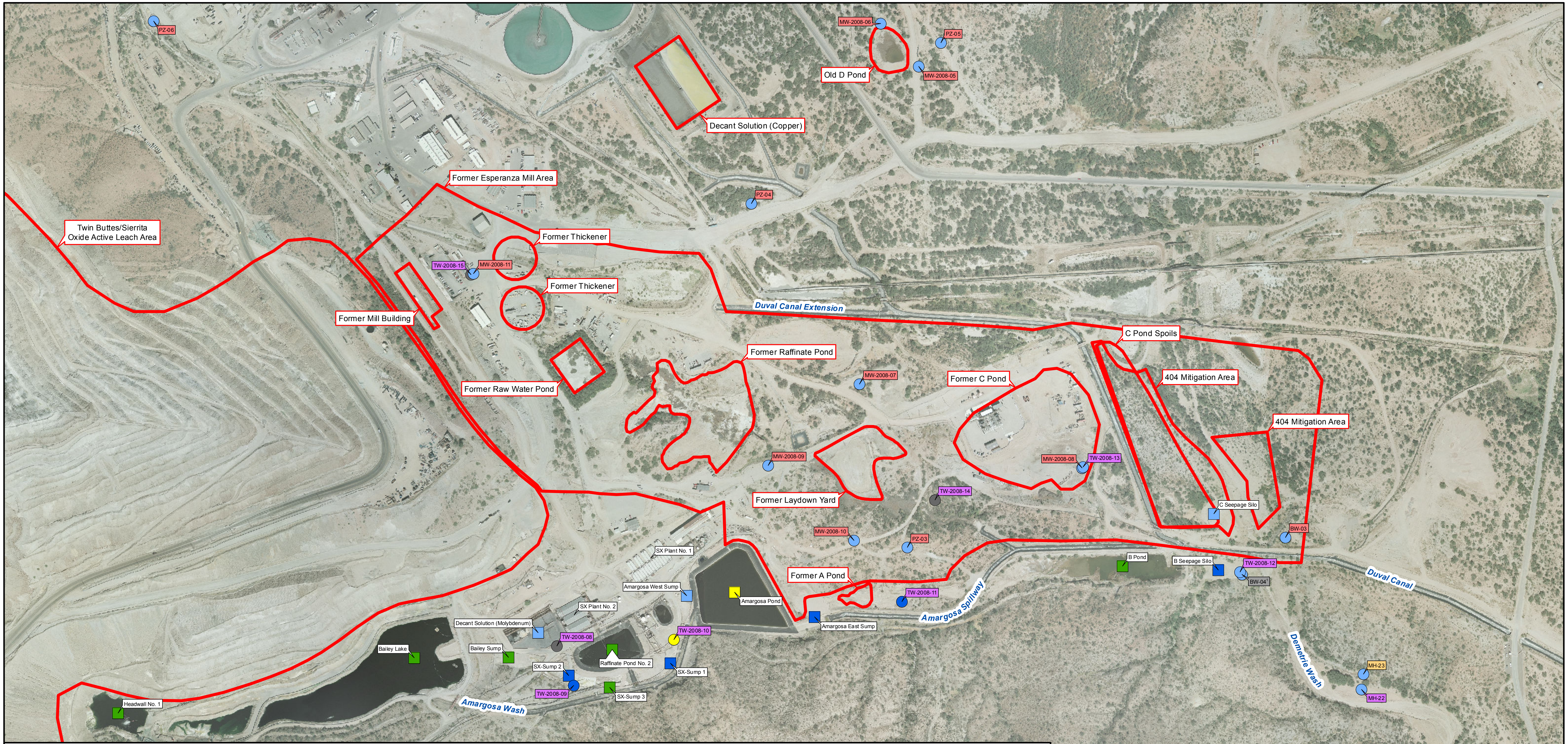
GREEN VALLEY, ARIZONA
VOLUNTARY REMEDIATION PROGRAM
GROUNDWATER INVESTIGATION REPORT

FIELD pH RESULTS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

ARCADIS

FIGURE
36

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 36 pH results (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

TOTAL DISSOLVED SOLIDS CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

Purple	< 500
Light blue	≥ 500
Dark blue	≥ 10,000
Green	≥ 25,000
Yellow	≥ 50,000
Gray	Not sampled/not analyzed for total dissolved solids

LEGEND

Site feature · Groundwater sampling location · Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

Feet 0 250 500

Scale: 1" = 500'

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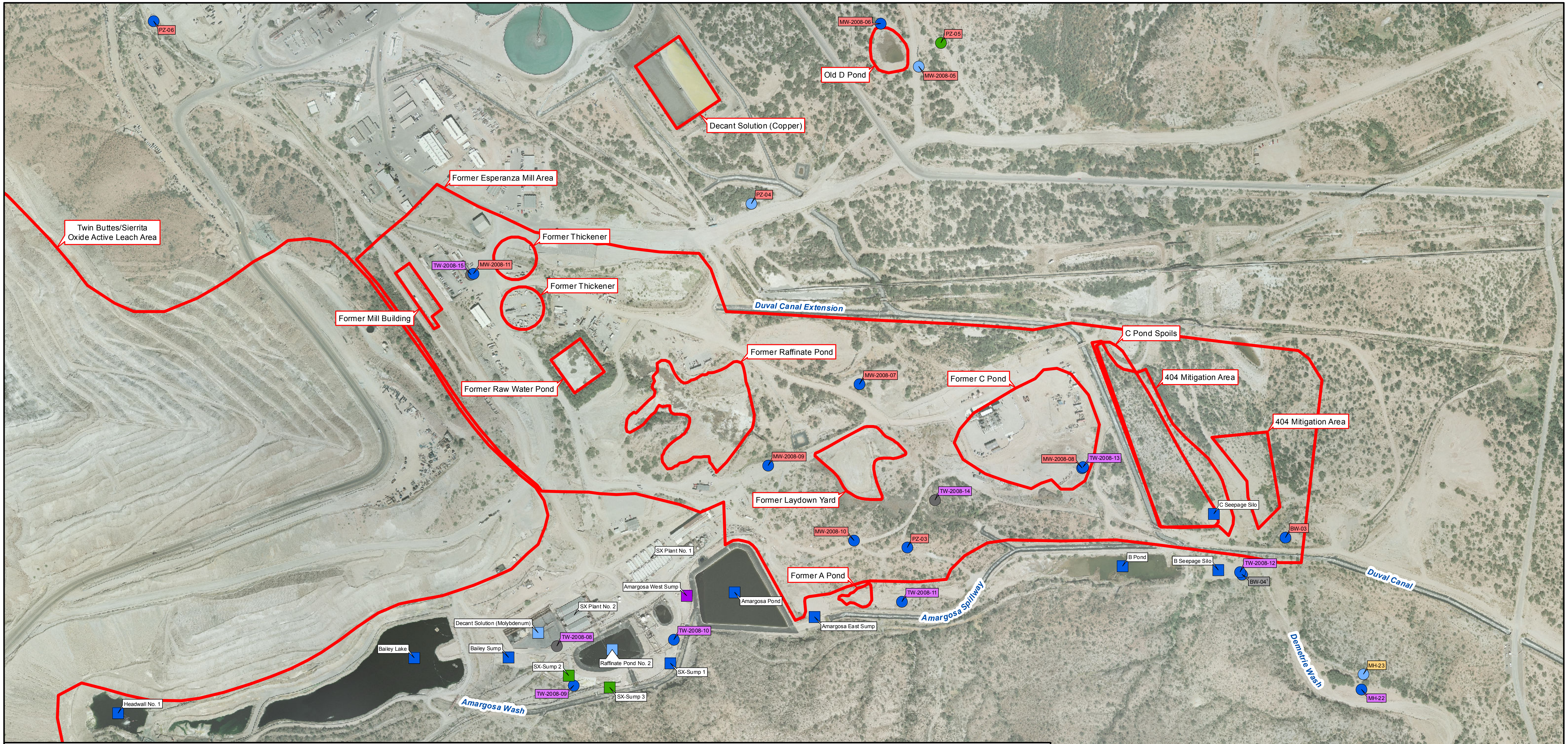
GREEN VALLEY, ARIZONA
VOLUNTARY REMEDIATION PROGRAM
GROUNDWATER INVESTIGATION REPORT

TOTAL DISSOLVED SOLIDS CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

ARCADIS

FIGURE **37**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 37 TDS concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED CALCIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 300
- ≥ 300
- ≥ 500
- ≥ 750
- ≥ 1,000
- Not sampled/not analyzed for dissolved calcium

LEGEND

Site feature | Groundwater sampling location | Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
· * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
· [1] = BW-04 is screened in the bedrock complex.

N

Feet
0 250 500
Scale: 1" = 500'

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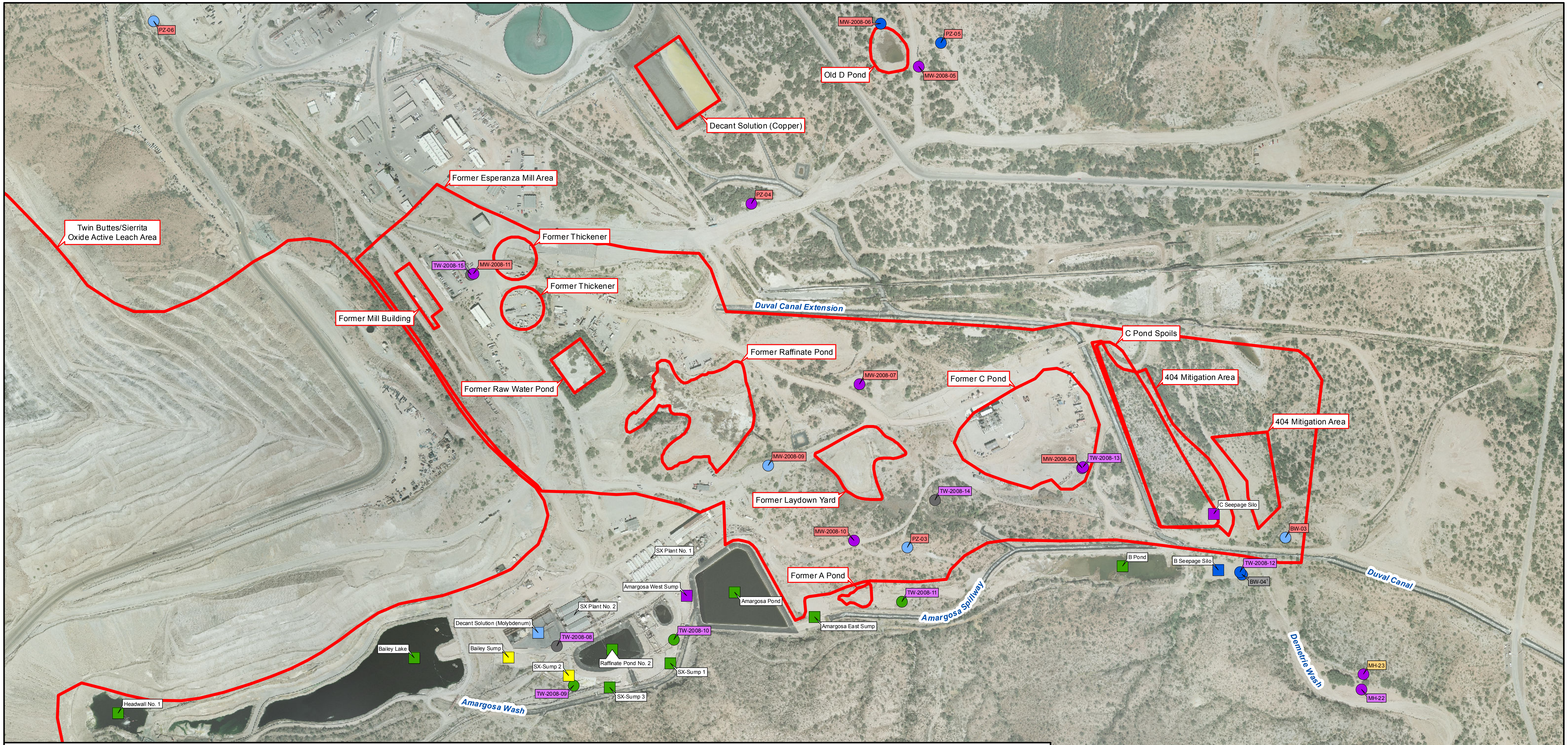
GROUNDWATER INVESTIGATION REPORT

DISSOLVED CALCIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

ARCADIS

FIGURE
38

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 38 calcium concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

CHLORIDE CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 500
- ≥ 500
- ≥ 1,000
- ≥ 2,500
- ≥ 5,000
- Not sampled/not analyzed for chloride

LEGEND

Site feature | Groundwater sampling location | Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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CHLORIDE CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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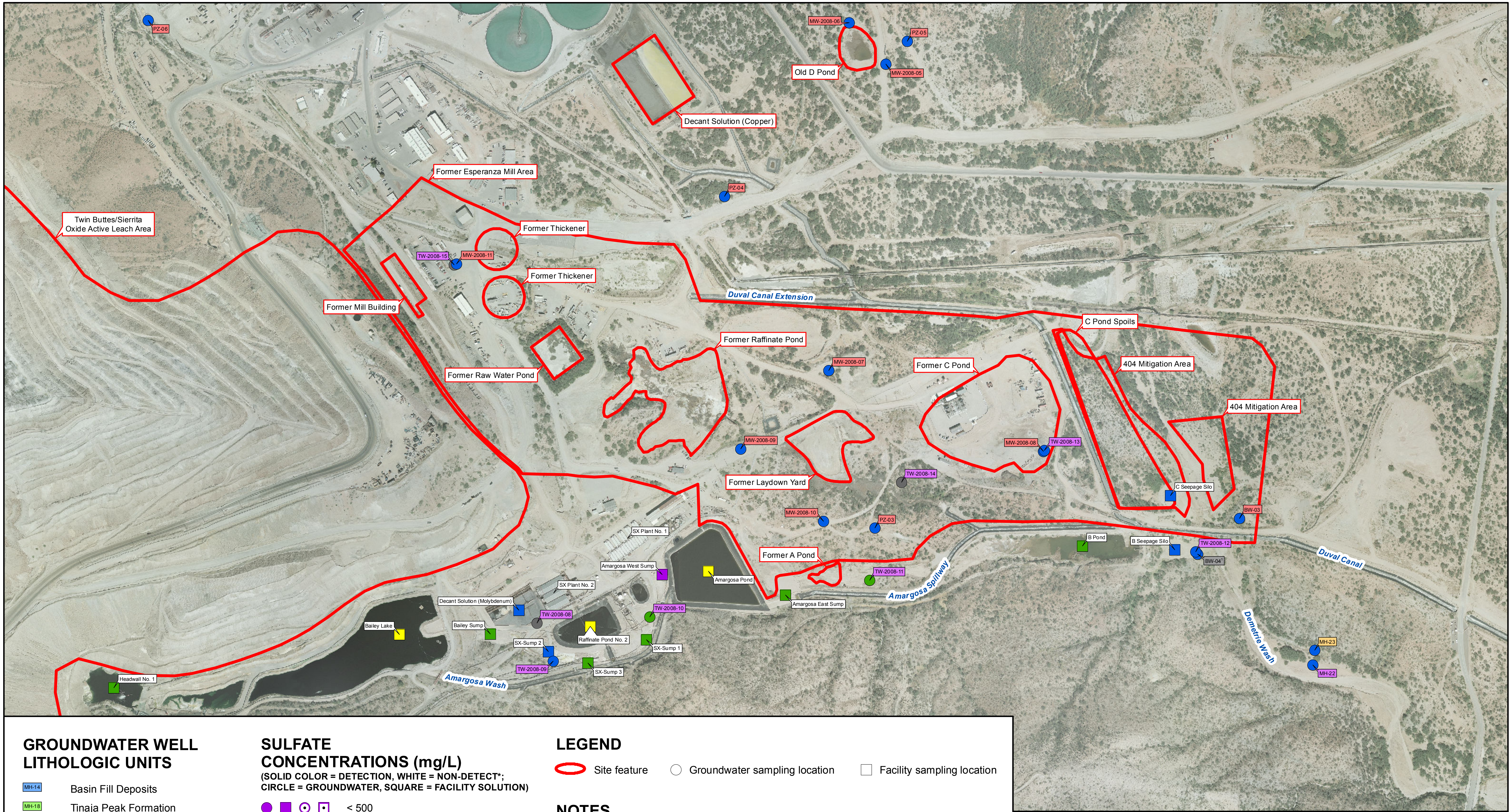
FIGURE **39**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 39 chloride concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

SULFATE CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 500
- ≥ 500
- ≥ 1,000
- ≥ 10,000
- ≥ 30,000
- Not sampled/not analyzed for sulfate

LEGEND

Site feature — Groundwater sampling location — Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
· * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
· [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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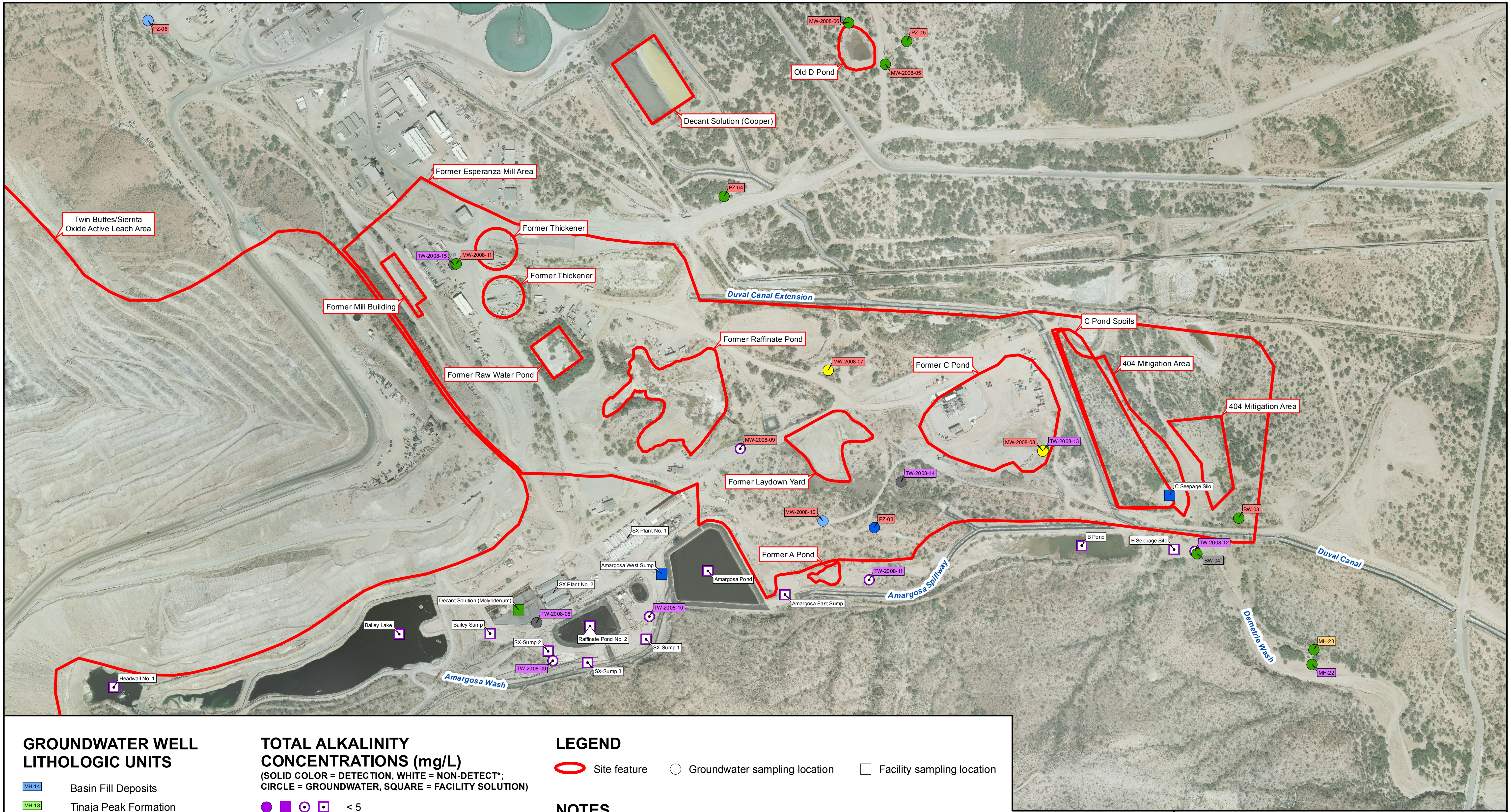
SULFATE CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

ARCADIS

FIGURE
40

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 40 sulfate concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

TOTAL ALKALINITY CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 5
- ≥ 5
- ≥ 100
- ≥ 200
- ≥ 400
- Not sampled/not analyzed for total alkalinity

LEGEND

Site feature — Groundwater sampling location — Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

Feet
0 250 500
Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

TOTAL ALKALINITY CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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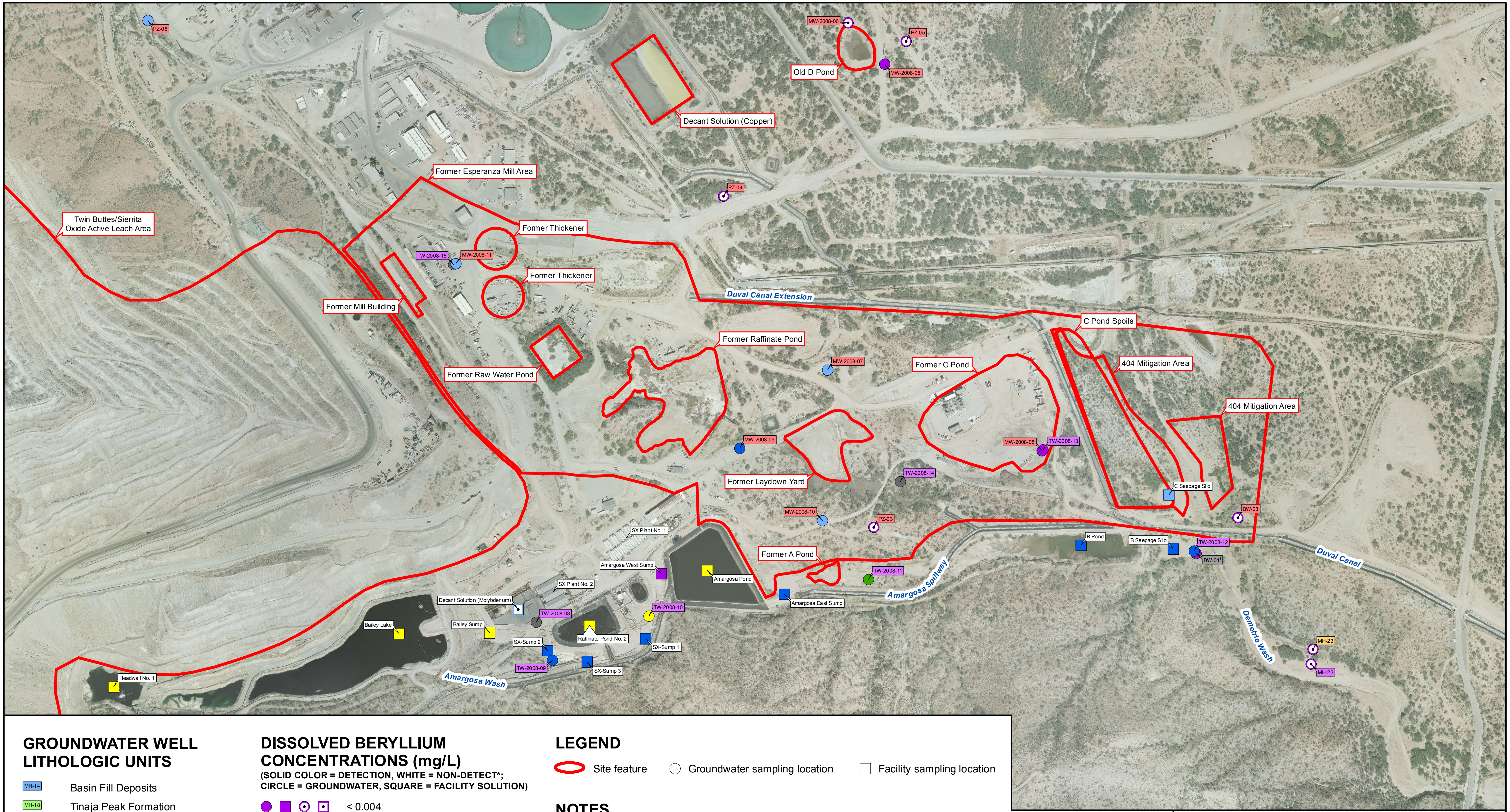
FIGURE
41

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 41 alkalinity concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED BERYLLIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.004
- ≥ 0.004
- ≥ 0.04
- ≥ 0.4
- ≥ 0.6
- Not sampled/not analyzed for dissolved beryllium

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
· * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
· [1] = BW-04 is screened in the bedrock complex.

N

Feet
0 250 500
Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED BERYLLIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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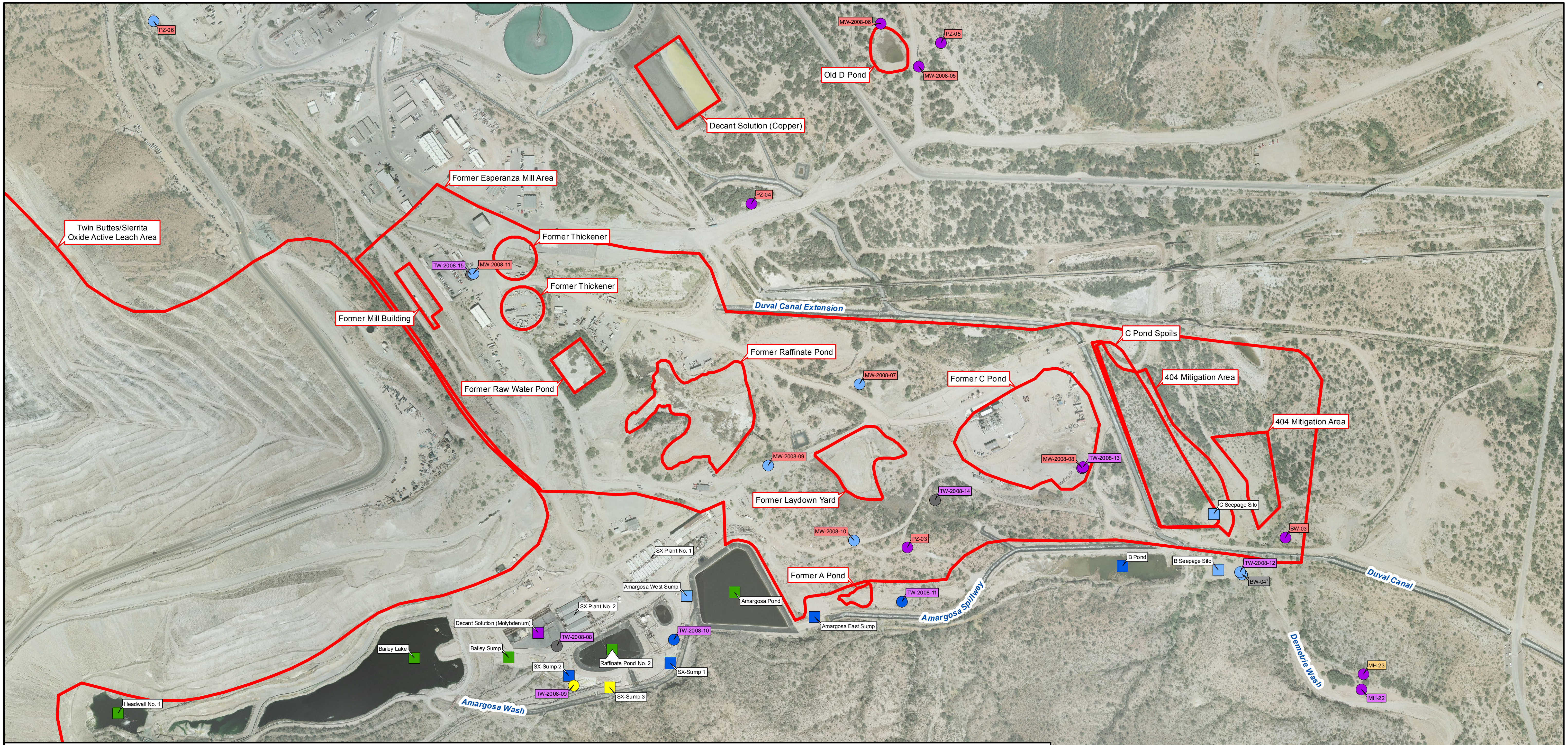
FIGURE
42

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 42 beryllium concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED CADMIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.005
- ≥ 0.005
- ≥ 0.5
- ≥ 1
- ≥ 1.5
- Not sampled/not analyzed for dissolved cadmium

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

Feet
0 250 500
Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED CADMIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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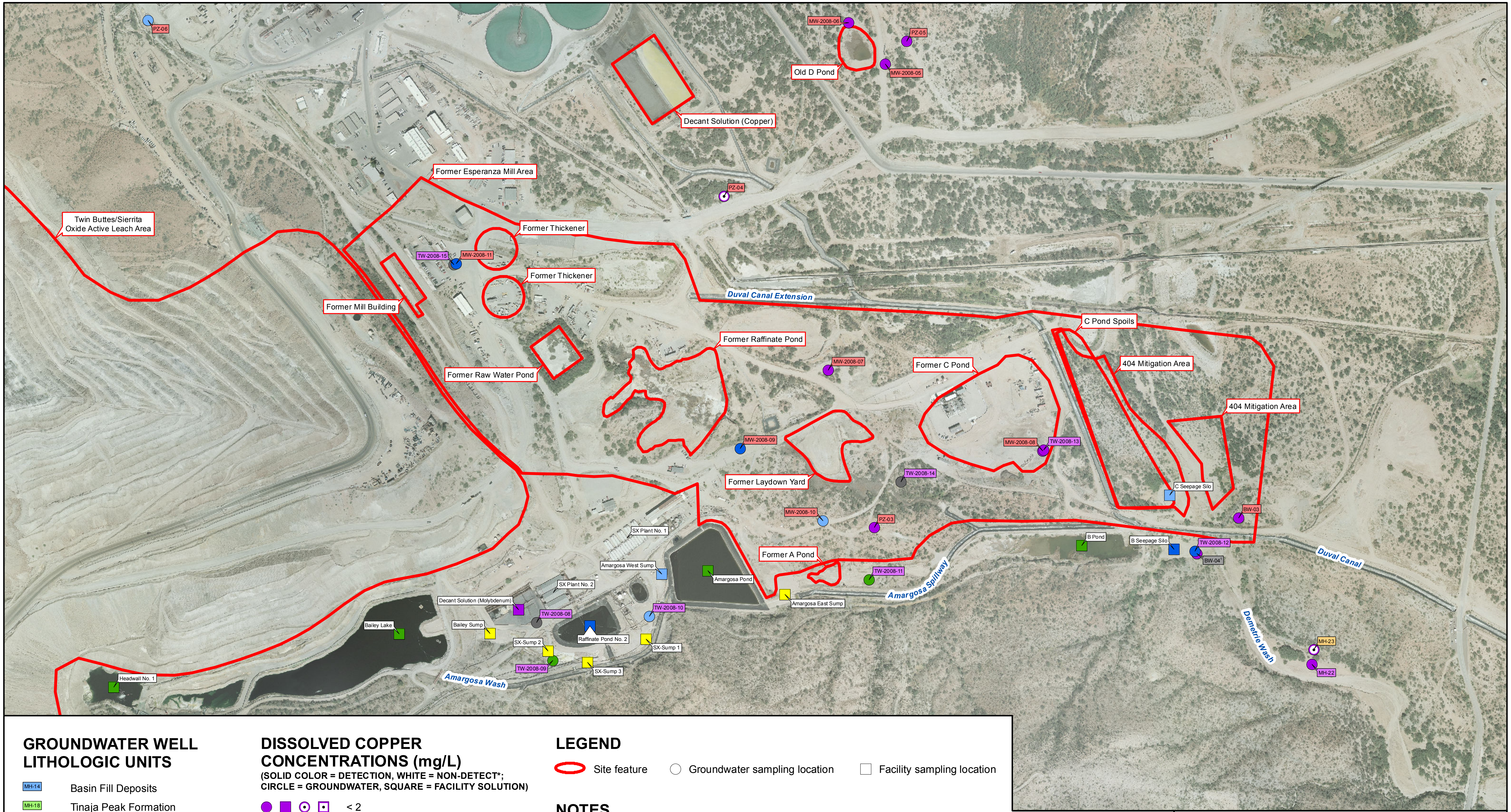
FIGURE
43

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 43 cadmium concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED COPPER CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 2
- ≥ 2
- ≥ 10
- ≥ 100
- ≥ 500
- Not sampled/not analyzed for dissolved copper

LEGEND

Site feature — Groundwater sampling location — Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED COPPER CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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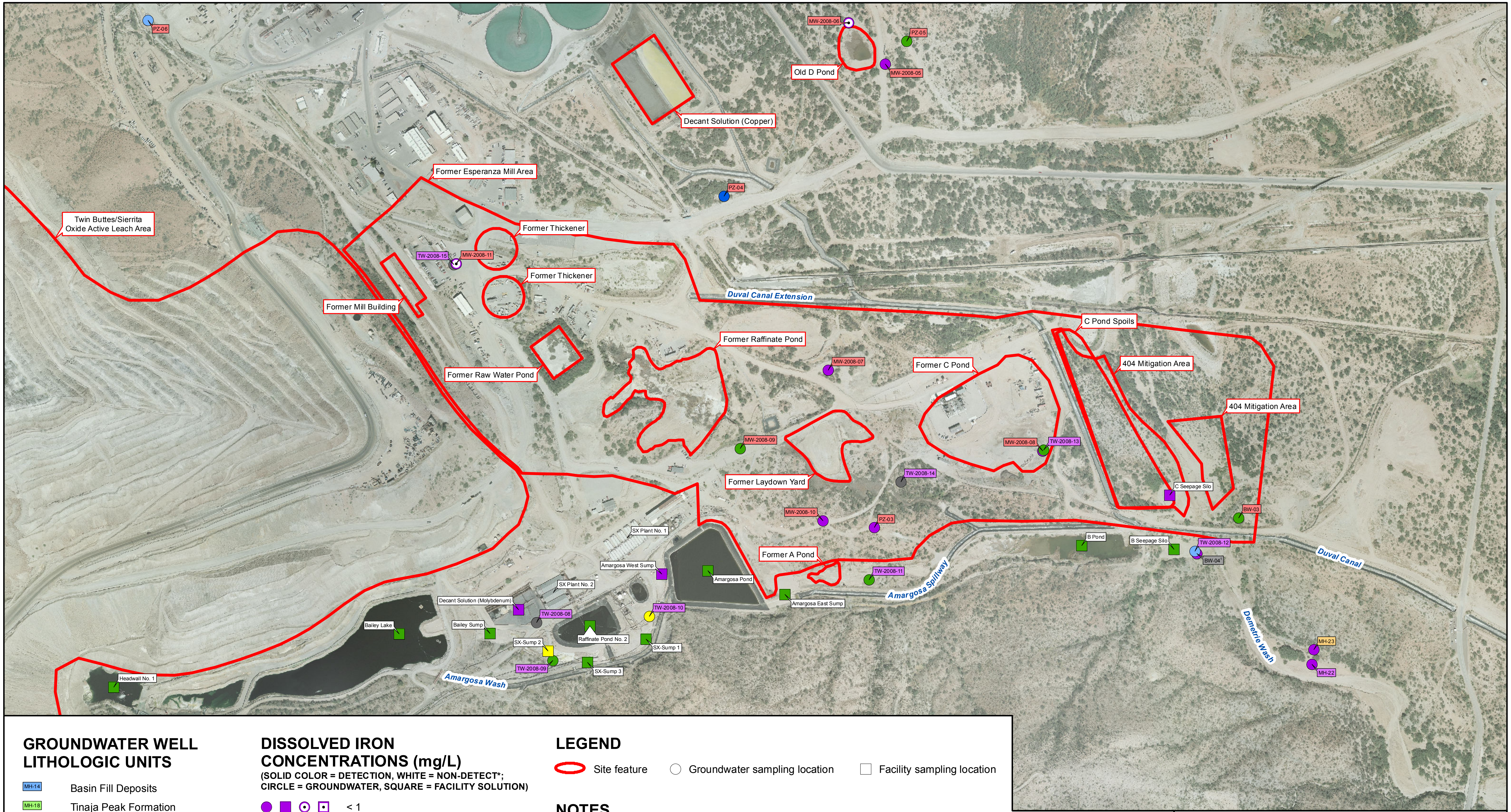
FIGURE
44

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 44 copper concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED IRON CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 1
- ≥ 1
- ≥ 5
- ≥ 10
- ≥ 500
- Not sampled/not analyzed for dissolved iron

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED IRON CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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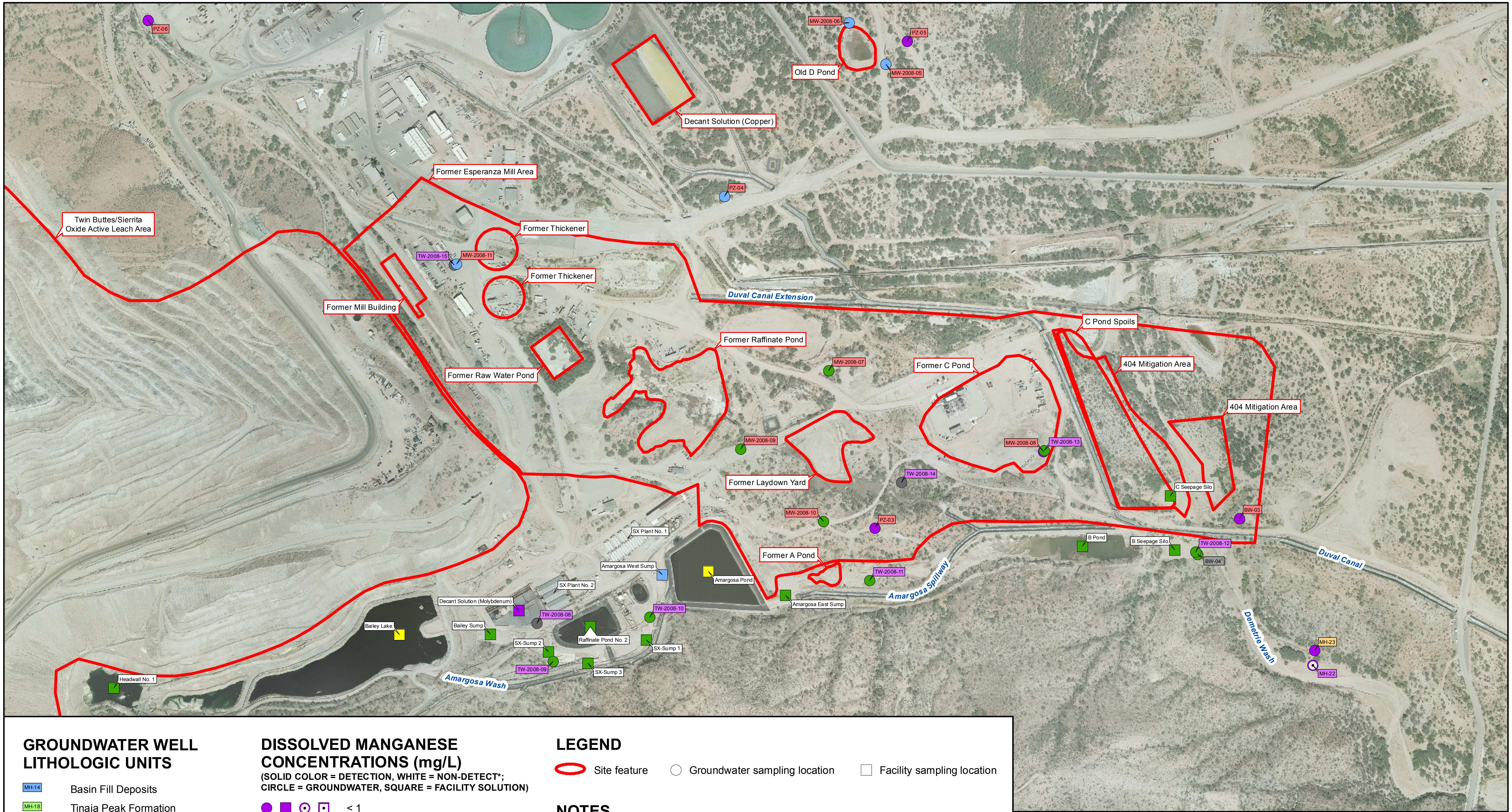
FIGURE **45**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 45 iron concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED MANGANESE CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 1
- ≥ 1
- ≥ 5
- ≥ 10
- ≥ 500
- Not sampled/not analyzed for dissolved manganese

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
· * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
· [1] = BW-04 is screened in the bedrock complex.

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED MANGANESE CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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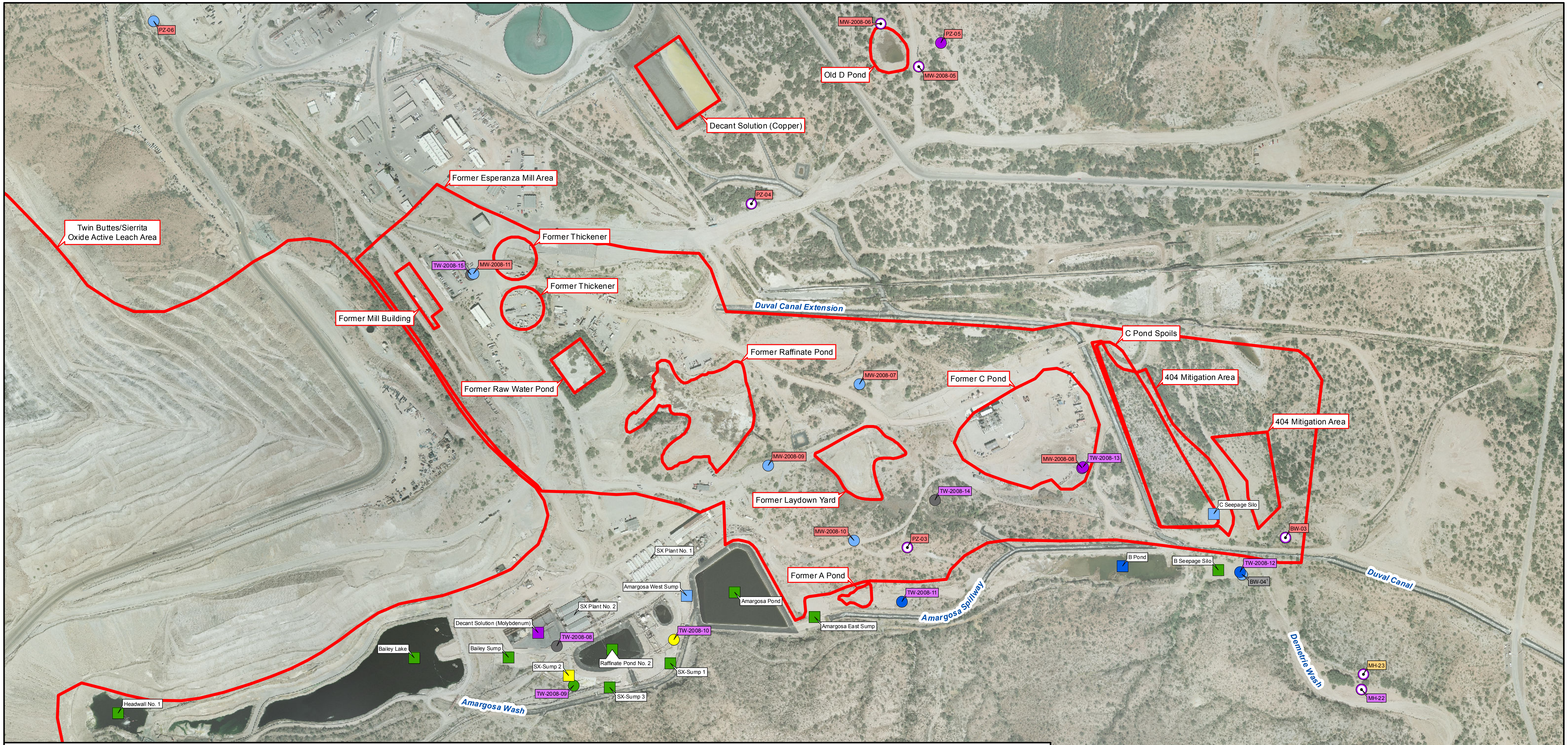
FIGURE
46

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 46 manganese concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED NICKEL CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.1
- ≥ 0.1
- ≥ 1
- ≥ 5
- ≥ 10
- Not sampled/not analyzed for dissolved nickel

LEGEND

Site feature Groundwater sampling location Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED NICKEL CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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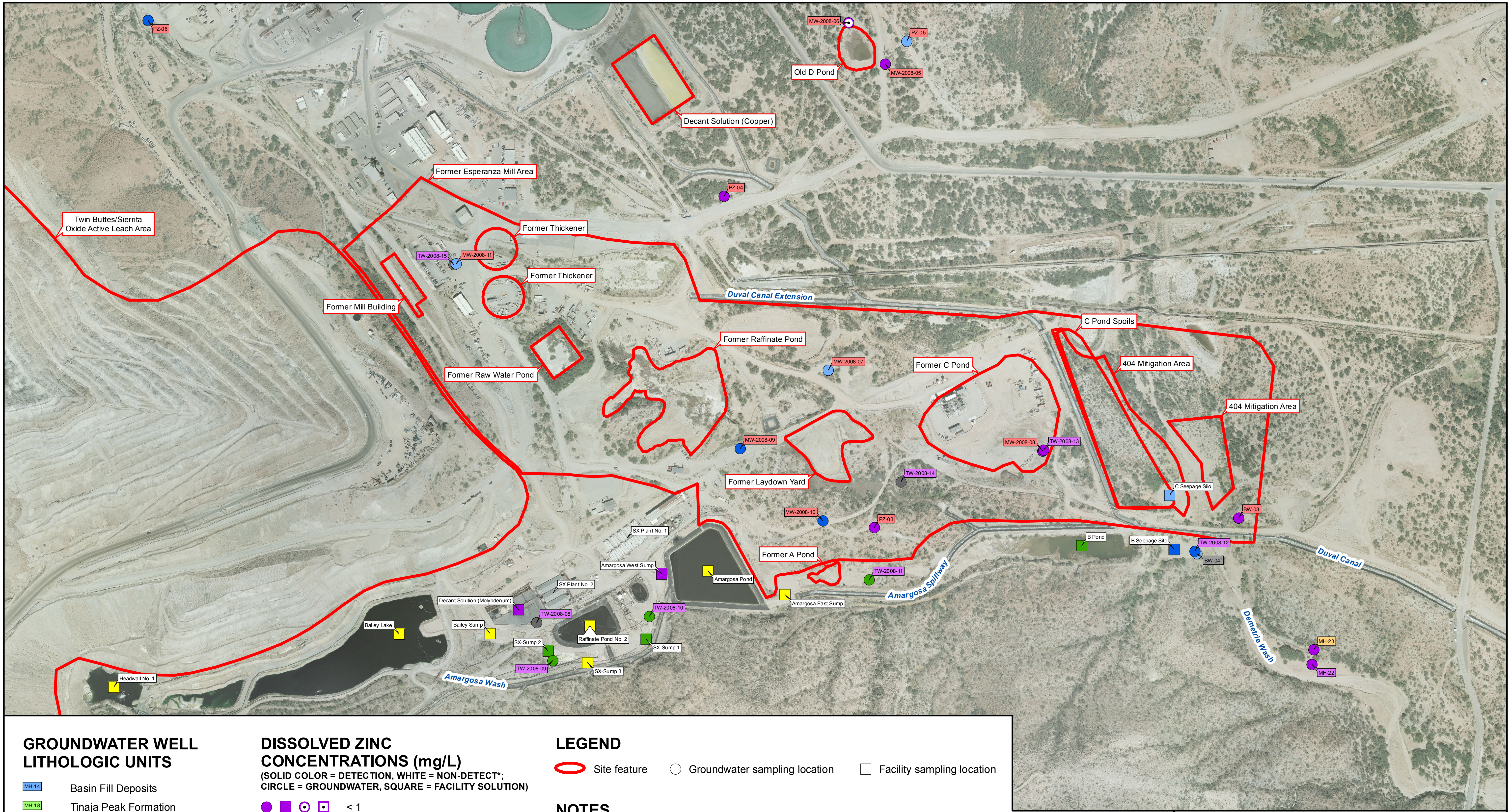
FIGURE
47

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 47 nickel concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED ZINC CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 1
- ≥ 1
- ≥ 10
- ≥ 50
- ≥ 100
- Not sampled/not analyzed for dissolved zinc

LEGEND

Site feature · Groundwater sampling location · Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED ZINC CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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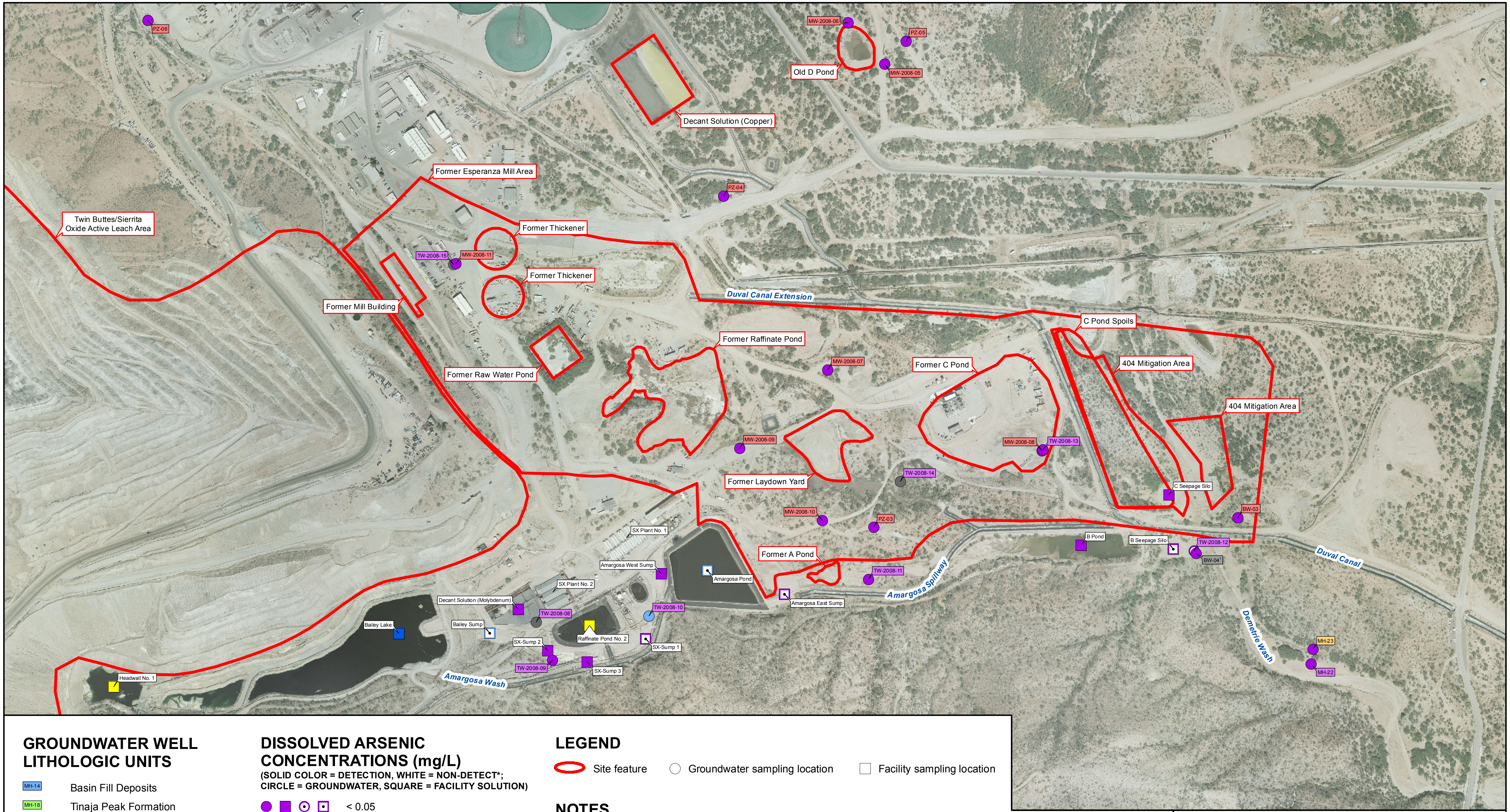
FIGURE 48

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 48 zinc concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 — Basin Fill Deposits
- MH-18 — Tinaja Peak Formation
- MH-17 — Harris Ranch Quartz Monzonite
- BW-02 — Demetrie Volcanics
- BW-03 — Ruby Star Granodiorite/Intrusives
- MH-22 — Alluvium
- PZ-2008-16 — Tailings
- BW-04 — Other

DISSOLVED ARSENIC CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.05
- ≥ 0.05
- ≥ 0.06
- ≥ 0.07
- ≥ 0.08
- Not sampled/not analyzed for dissolved arsenic

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED ARSENIC CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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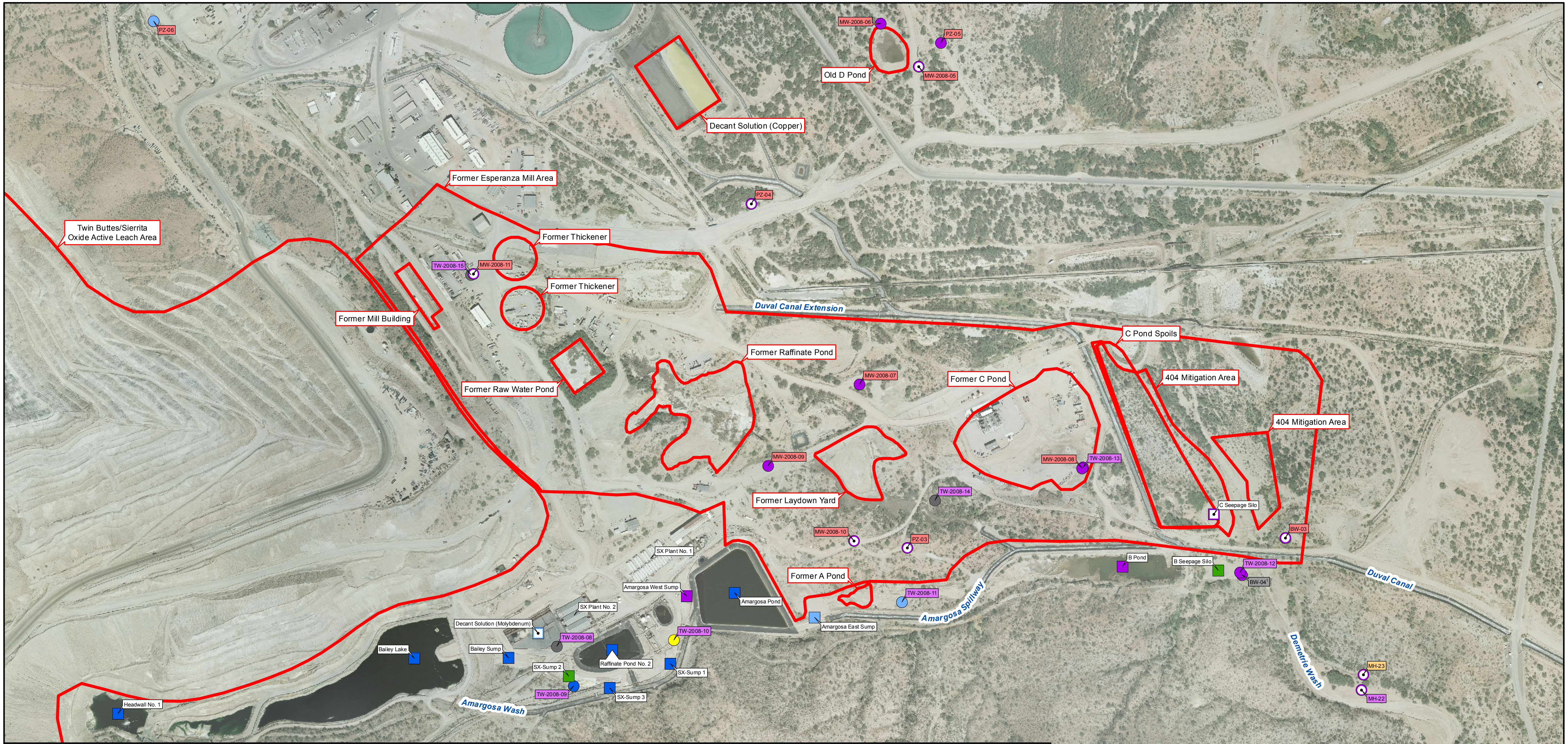
FIGURE
49

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 49 arsenic concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED CHROMIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.1
- ≥ 0.1
- ≥ 1
- ≥ 5
- ≥ 10
- Not sampled/not analyzed for dissolved chromium

LEGEND

Site feature | Groundwater sampling location | Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED CHROMIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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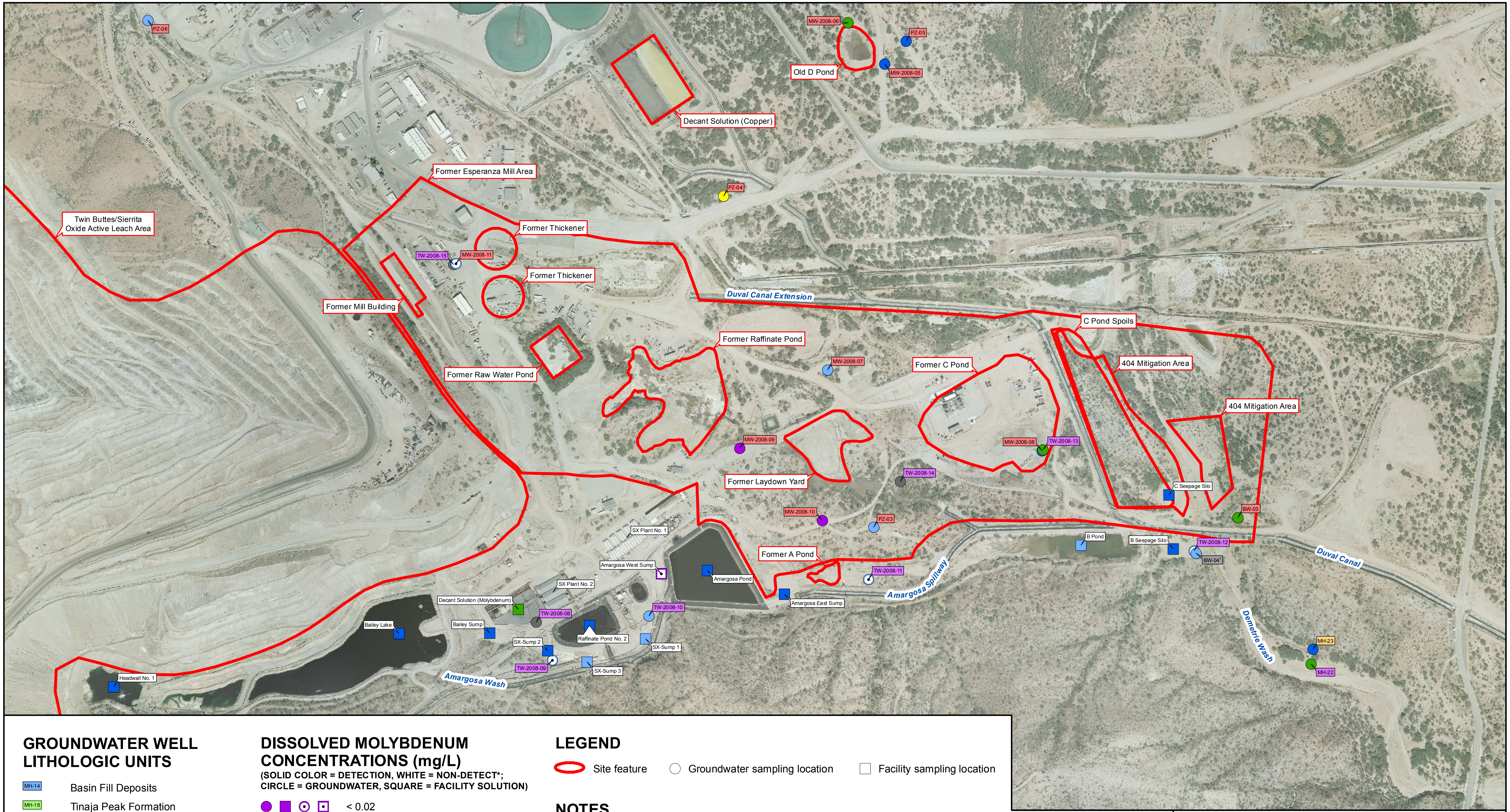
FIGURE
50

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 50 chromium concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED MOLYBDENUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.02
- ≥ 0.02
- ≥ 0.2
- ≥ 2
- ≥ 5
- Not sampled/not analyzed for dissolved molybdenum

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED MOLYBDENUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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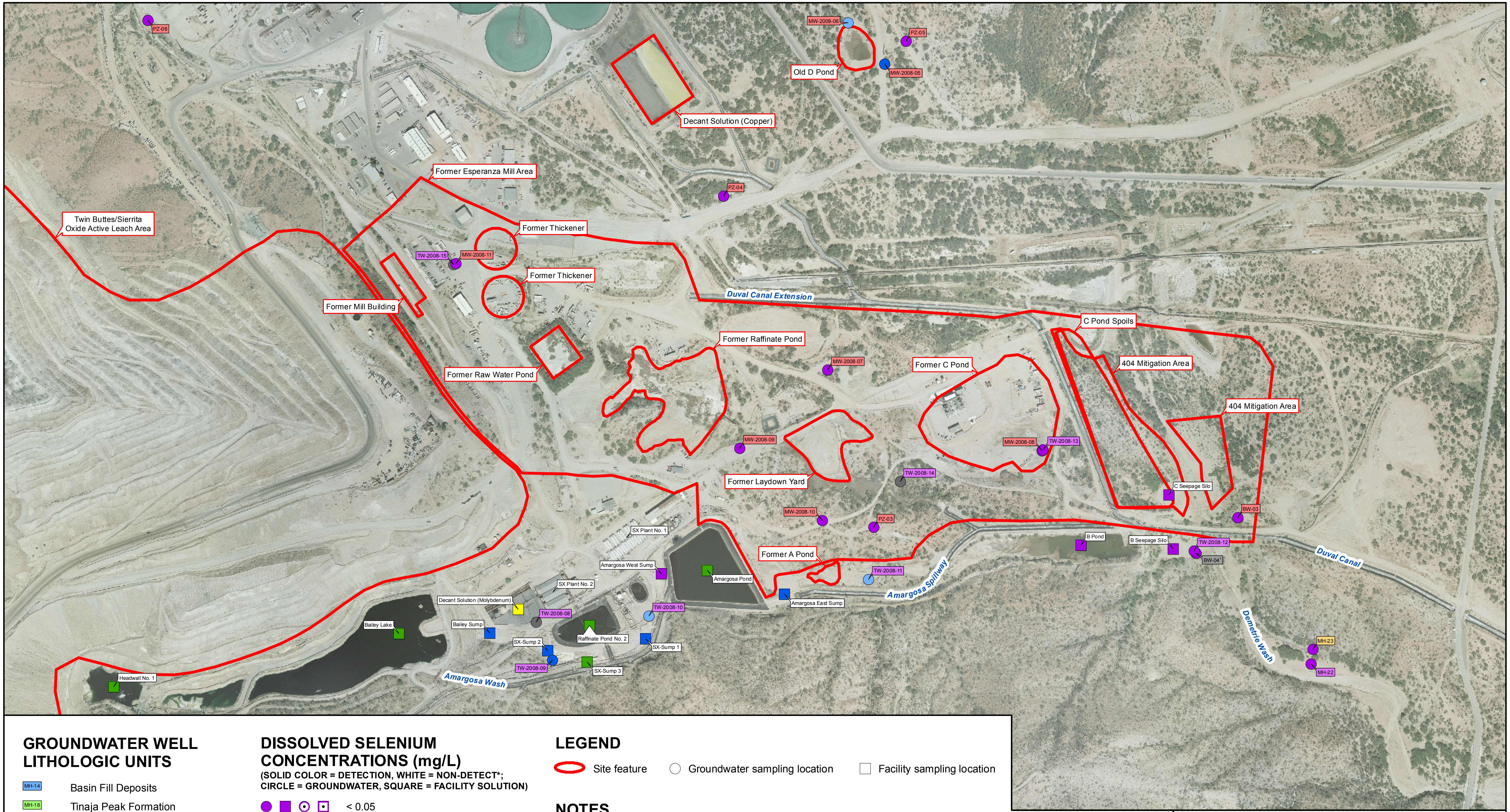
FIGURE
51

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 51 molybdenum concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED SELENIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.05
- ≥ 0.05
- ≥ 0.07
- ≥ 0.1
- ≥ 0.2
- Not sampled/not analyzed for dissolved selenium

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

· Aerial photo source: Kenney, 2010.
· Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
· * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
· [1] = BW-04 is screened in the bedrock complex.

N

Feet
0 250 500
Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED SELENIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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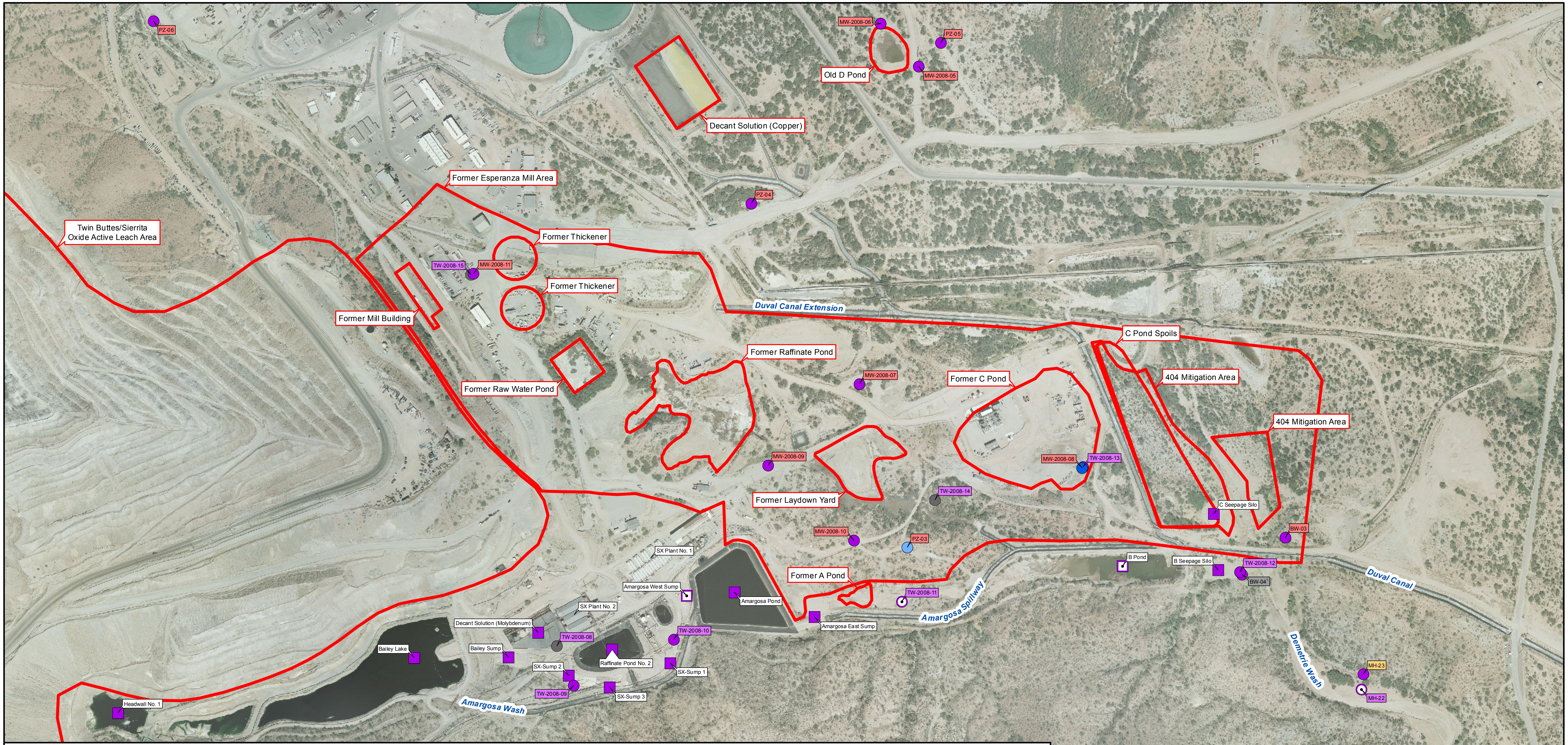
FIGURE
52

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 52 selenium concentrations (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED RADIUM-226 ACTIVITIES (pCi/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 5
- ≥ 5
- ≥ 7
- ≥ 10
- ≥ 15
- Not sampled/not analyzed for dissolved radium-226

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed activities represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect activities, the colored ring around the edge of the symbol represents the activity range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

N

0 250 500 Feet

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED RADIUM-226 ACTIVITIES IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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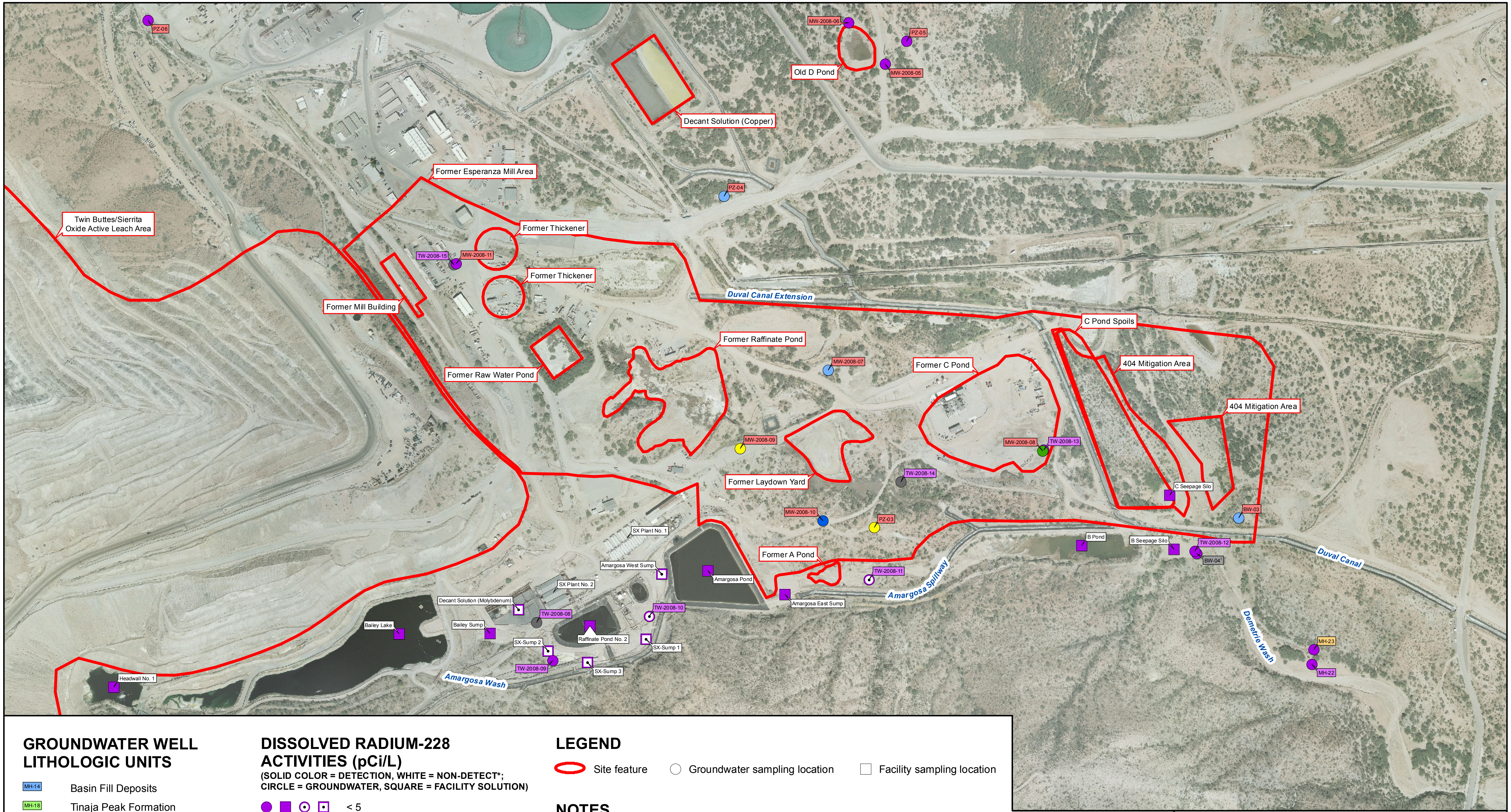
FIGURE
53

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 53 radium-226 activities (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED RADIUM-228 ACTIVITIES (pCi/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

Purple	< 5
Light blue	≥ 5
Blue	≥ 7
Green	≥ 10
Yellow	≥ 15
Gray	Not sampled/not analyzed for dissolved radium-228

LEGEND

Site feature — Groundwater sampling location — Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed activities represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect activities, the colored ring around the edge of the symbol represents the activity range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

Feet
0 250 500
Scale: 1" = 500'

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DISSOLVED RADIUM-228 ACTIVITIES IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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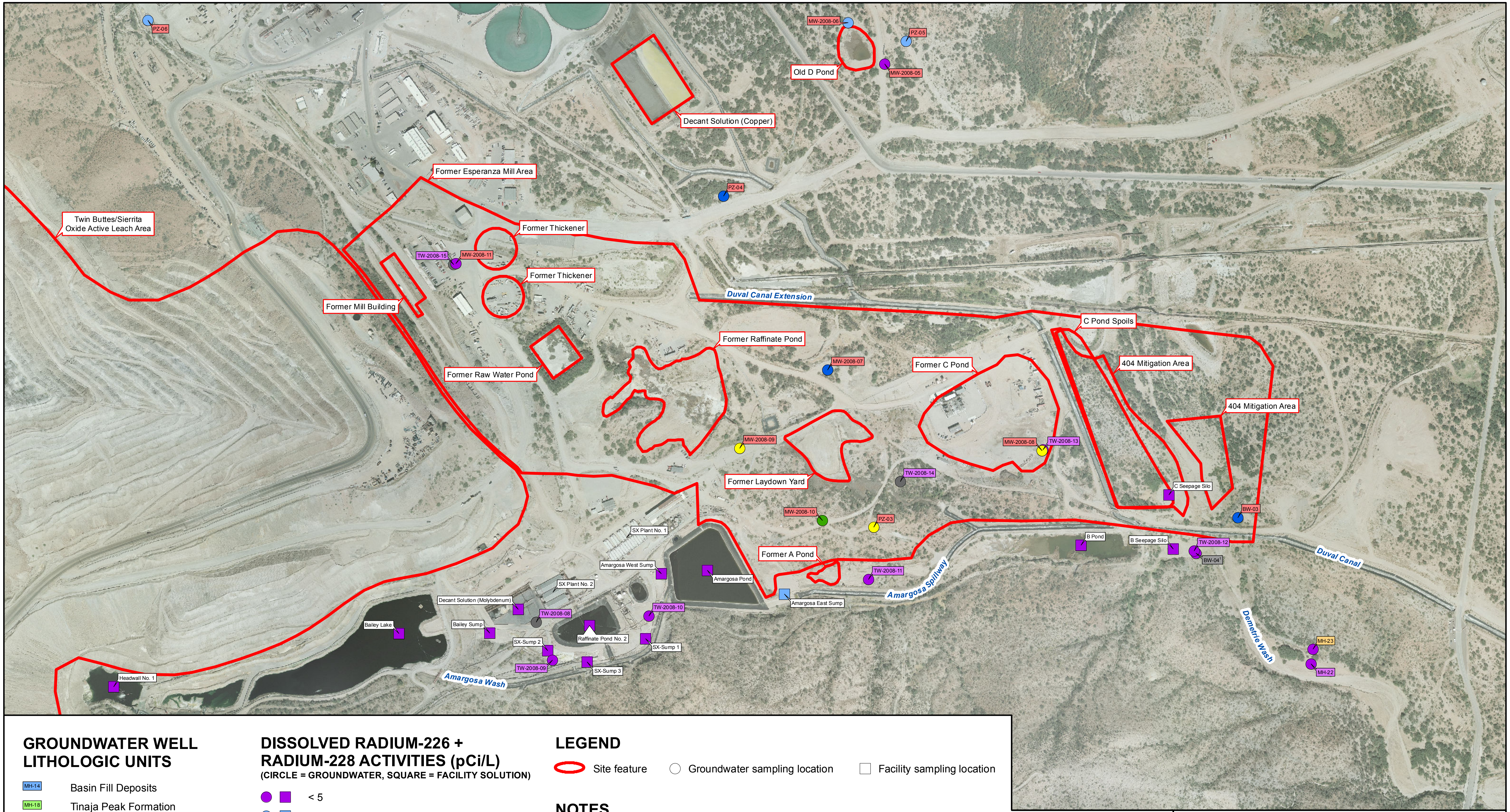
FIGURE
54

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 54 radium-228 activities (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

- MH-14 Basin Fill Deposits
- MH-18 Tinaja Peak Formation
- MH-17 Harris Ranch Quartz Monzonite
- BW-02 Demetrie Volcanics
- BW-03 Ruby Star Granodiorite/Intrusives
- MH-22 Alluvium
- PZ-2008-16 Tailings
- BW-04 Other

DISSOLVED RADIUM-226 + RADIUM-228 ACTIVITIES (pCi/L)

(CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 5
- ≥ 5
- ≥ 7
- ≥ 10
- ≥ 15
- Not sampled/not analyzed for dissolved radium-226 and/or dissolved radium-228

LEGEND

- Site feature
- Groundwater sampling location
- Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed activities represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- [1] = BW-04 is screened in the bedrock complex.

Feet

0 250 500

Scale: 1" = 500'

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GROUNDWATER INVESTIGATION REPORT

DISSOLVED RADIUM-226 + RADIUM-228 ACTIVITIES IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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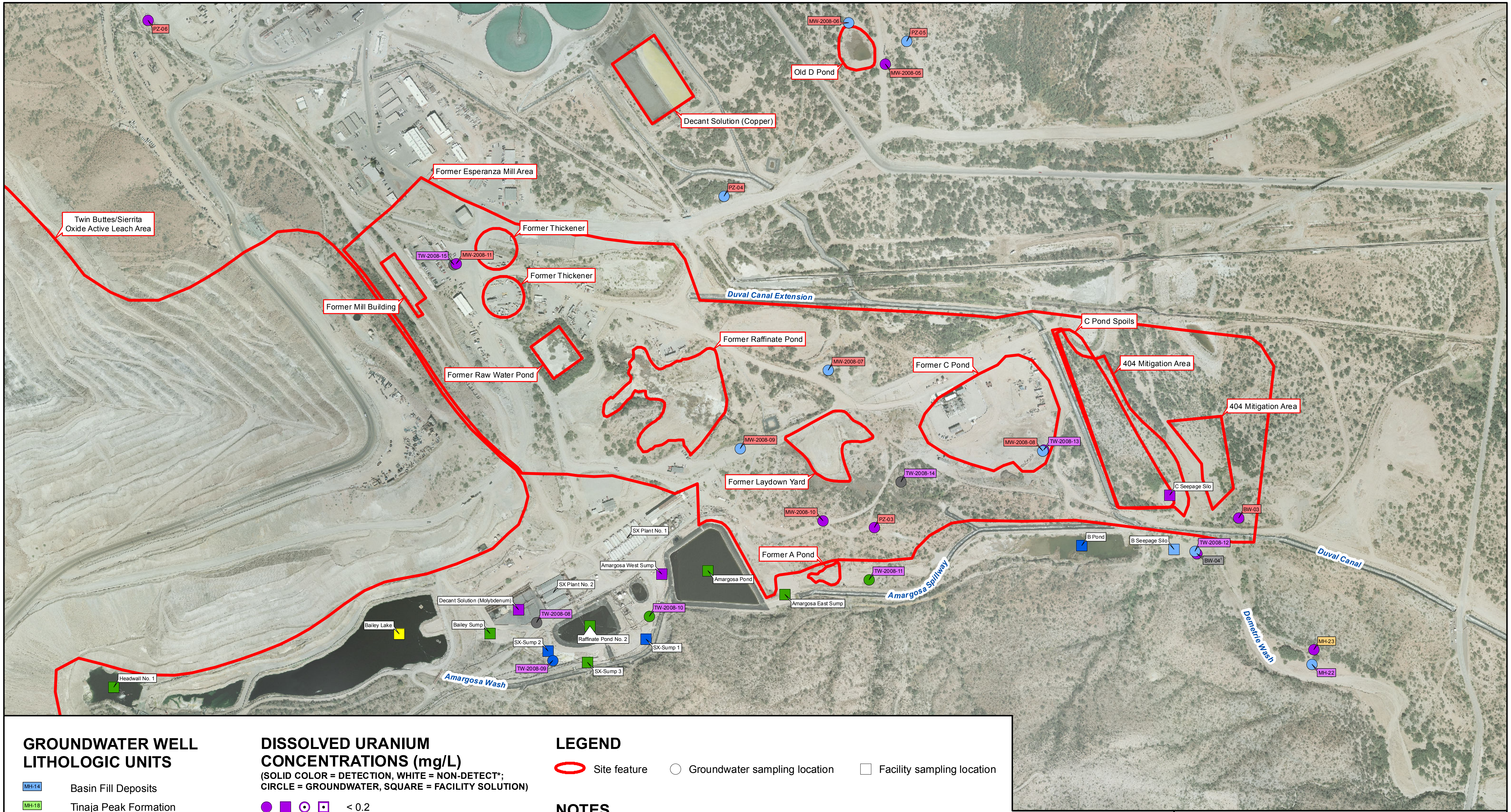
FIGURE **55**

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 55 radium-226 + radium-228 activities (Esperanza Mill).mxd 11/19/2013



GROUNDWATER WELL LITHOLOGIC UNITS

MH-14	Basin Fill Deposits
MH-18	Tinaja Peak Formation
MH-17	Harris Ranch Quartz Monzonite
BW-02	Demetrie Volcanics
BW-03	Ruby Star Granodiorite/Intrusives
MH-22	Alluvium
PZ-2008-16	Tailings
BW-04	Other

DISSOLVED URANIUM CONCENTRATIONS (mg/L)

(SOLID COLOR = DETECTION, WHITE = NON-DETECT*; CIRCLE = GROUNDWATER, SQUARE = FACILITY SOLUTION)

- < 0.2
- ≥ 0.2
- ≥ 1
- ≥ 3
- ≥ 9
- Not sampled/not analyzed for dissolved uranium

LEGEND

Site feature — Groundwater sampling location — Facility sampling location

NOTES

- Aerial photo source: Kenney, 2010.
- Displayed concentrations represent the highest observed at each location during the Voluntary Remediation Program (VRP) time period.
- * = for non-detect concentrations, the colored ring around the edge of the symbol represents the concentration range into which the reporting limit falls.
- [1] = BW-04 is screened in the bedrock complex.

0 250 500 Feet
Scale: 1" = 500'

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GREEN VALLEY, ARIZONA
VOLUNTARY REMEDIATION PROGRAM
GROUNDWATER INVESTIGATION REPORT

DISSOLVED URANIUM CONCENTRATIONS IN GROUNDWATER AND ACTIVE FACILITY SOLUTIONS (FORMER ESPERANZA MILL AREA)

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FIGURE
56

G:\Project\Sierrita\GIS\Projects\VRP GW characterization report\Final 11-22-2013\Figure 56 uranium concentrations (Esperanza Mill).mxd 11/19/2013