Background Wells Report
BMI Common Areas
Eastside Area

Submitted to:

April 2,2009

NDEP NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

Prepared for:

Basic Remediation COMPANY

Daniel B. Stephens & Associates, Inc.
260 Newport Center Drive • Newport Beach, California 92660

Responsible CEM for this Project

I hereby certify that I am responsible for the services described in this document and for the preparation of this document. The services described in this document have been provided in a manner consistent with the current standards of the profession and, to the best of my knowledge, comply with all applicable federal, state, and local statutes, regulations, and ordinances.

Stephen J. Cullen, PhD., C.E.M. (No. 1839, Exp. 11/12/09
Daniel B. Stephens & Associates, Inc.

Individuals Who Provided Technical Input to this Document

John J. Dodge, P.G.
Daniel B. Stephens & Asscociates, Inc.

Table of Contents

List of Figures

Figure

List of Tables

Table

List of Appendices

1. Introduction

This report identifies and provides technical justification for the selection of background wells in the Shallow Zone at the Eastside Area of the Basic Management, Incorporated (BMI) Common Areas/Complex (the "Site") in Clark County, Nevada (Figure 1). Proposed existing wells are identified to be used for background purposes and the rationale and criteria used to propose the wells are presented and discussed.

The scope of work for this report has previously been discussed between Basic Remediation Company (BRC) and Nevada Division of Environmental Protection (NDEP) representatives, in a NDEP meeting on February 4, 2009 and in written correspondence to BRC dated February 20, 2009.

1.1 Location and Setting

The Site is located in Clark County, Nevada, and is situated approximately 2 miles west of the River Mountains and 1 mile north of the McCullough Range. As shown in Figure 1, the area surface topography slopes in a westerly to northwesterly direction from the River Mountains and in a northerly to northeasterly direction from the McCullough Range. Near the Site, the surface topography slopes in a northerly direction toward the Las Vegas Wash.

The uppermost water-bearing zone is unconfined and occurs primarily in alluvium (referred to as the Shallow Zone). At some locations on portions of the Site, Shallow Zone groundwater is first encountered in the uppermost portion of the Tertiary Muddy Creek Formation (TMCf). This unconfined Shallow Zone groundwater generally flows in a northerly direction toward Las Vegas Wash. The Shallow Zone groundwater is generally continuous across the Site, but there are areas where Shallow Zone wells are dry. Below the Shallow Zone, deeper groundwater occurs in sporadically encountered lenses under pressure in the Middle Zone, designated between approximately 90 and 270 feet below grade. Deep Zone groundwater is generally continuous across the Site and is characterized with wells screened below 270 feet bgs to a maximum nominal depth of 400 ft bgs. Groundwater elevation data from the last several rounds of groundwater monitoring (2006, 2007, 2008) show that Deep Zone groundwater is confined, and the potentiometric surface of Deep Zone groundwater is oriented generally north towards Las Vegas Wash (MWH, 2008).

Separate NDEP-approved project documents provide information regarding area geology and hydrogeology, soils, history, and investigations completed to-date (e.g., BRC, 2007).

1.2 Objective

The objective of this report is to present and justify the criteria used in the selection of the background wells for the Eastside. Background wells need to be designated at the Site in locations where historical site operations were not conducted in order to document and evaluate groundwater conditions representative of an area relatively free of site-related impacts. Data from the background wells can then be compared to data from onsite wells, along with comparison to state and federal water quality standards, to assist in the evaluation of Site impacts. Background well data will also be used, in part, for remedial decision-making.

2. Background Well Selection

The background wells are located according to the following selection criteria:

- Hydraulically upgradient;
- Outside of the areas of historical site use;
- Along the majority of the upgradient site boundary; and
- In an area relatively free of potential site-related soil and groundwater impacts;
- Where offsite upgradient groundwater impacts are not detected;
- Where offsite upgradient groundwater impacts, if present, are well characterized.

Proposed background wells must also be properly constructed to represent the hydrogeologic zone of interest. To qualify as Shallow Zone background wells at the BRC Site, the proposed wells must be adequately screened in the Shallow Zone. At the Eastside Area, the following wells meet the criteria listed above (Figure 2):

- AA-01
- AA-27
- AA-UW-1
- AA-UW-2
- AA-UW-3
- AA-UW-4
- AA-UW-5
- AA-UW-6

In addition, as discussed with the NDEP, these wells are being proposed to be designated as Shallow background wells at the Site because:

- Broad suite soil data from the well locations indicate that minimal or no soil impacts are present at these locations; and/or, detected impacts attenuate with depth, indicating there is relatively minimal potential for groundwater impacts due to Site use;
- Five rounds of broad suite groundwater data indicate that there is relatively little or no impacts to groundwater at the well locations;
- The results of analytical and numerical modeling indicate that historical discharge to the nearby ponds at the Site did not create localized groundwater mounding or upgradient flow; thus, potential contaminant transport from the ponds upgradient to the well locations did not occur.

Each of the criteria listed above is further discussed in the following sections.

2.1 Groundwater Occurrence and Flow Direction

Figure 2 presents a map of the Shallow Zone potentiometric surface at the Site. As discussed above in Section 1.1, Shallow Zone groundwater occurs in the Qal and the uppermost TMCf at the Site. Flow direction in the Shallow Zone is directed generally to the north towards the Las Vegas wash.

Flow direction has been approximately consistent over the last several rounds of water level measurement at the Site completed in 2006, 2007, and 2008 (MWH, 2008). As shown on Figure 2, the proposed background wells are located at the southern, southwestern, and southeastern boundary of the Eastside area, and are well distributed along the Site perimeter in this area. This portion of the Site perimeter is the upgradient boundary of the Eastside Area.

Several soil borings were completed in the upgradient areas as part of the background metals investigation (ERM, 2008). Based on these borings, it appears that Shallow Zone groundwater occurs at much deeper depths further upgradient, or the Shallow Zone is absent further upgradient to the east. As identified by wet soil logged in the field, groundwater was encountered in only two of the 23 borings. Groundwater was encountered at 140 ft below grade in boring DBSA-17 and at 84.7 feet below grade in boring DBSA-20.

The other background metals soil borings (except DBSA-33) were drilled between 80 and 160 feet below grade but only moist soil was logged (boring DBSA-33 was terminated at 32.5 feet when the TMCf was encountered). Since groundwater occurs at deeper depths further upgradient, additional wells installed in these areas would likely be screened in a different hydrogeologic unit than the existing onsite wells. The proposed background wells are screened in the same hydrogeologic unit as the onsite wells (Table 1, Appendix A). As a result, the proposed background wells are better suited for background data comparison than new wells installed further upgradient would be.

2.2 Historical Site Use and Facility Operations

Historical site use and facility operations are detailed for the Eastside Area in the 2006 Closure Plan (BRC, 2006) and in other related BRC documents. As described in BRC (2006), the Eastside Area covers approximately 2,321 contiguous acres. The Eastside Area lies to the east of Boulder Highway and to the north of Lake Mead Parkway and consists of land on which:

- Unlined wastewater effluent evaporation/infiltration ponds (and associated conveyance ditches) were built and into which various plant wastewaters were discharged from 1942 through 1976;
- Effluent from the adjacent TIMET plant was disposed of through the use of a spray irrigation wheel used between 1985 and 1990;
- Lined wastewater effluent ponds were constructed and into which effluent from the TIMET plant was discharged from 1976 to 2005;
- The City of Henderson constructed municipal wastewater infiltration basins (e.g., the Southern RIBs);
- Unlined wastewater effluent ponds were constructed but which were never used; and,
- Land that has remained desert.

The proposed background wells are located within those areas of the Site that were not used for the operations described above. The land in the vicinity of the background wells has remained primarily open desert with relatively minor adjacent property development for residential or commercial (non-industrial) use.

2.3 *Modeling Results*

The results of analytical and numerical modeling indicate that historical discharge to the nearby ponds at the Site did not create localized groundwater mounding; thus, potential contaminant transport from the ponds upgradient to the well locations did not occur. As a result, the background wells locations can be considered to be relatively free of Site-related impacts due to former effluent discharge to the Eastside ponds.

2.3.1 Analytical Modeling

In 2006, as an early step in developing a numerical groundwater flow model of the Site, the NDEP requested an analytical evaluation of the potential occurrence of groundwater mounding beneath the former effluent disposal ponds. The purpose of the analytical calculations was to develop an initial estimate of potential groundwater system behavior and to guide further development of a more rigorous numerical model.

Several analytical mounding calculations were completed in conjunction with the development of a preliminary groundwater flow model. The mounding calculations illustrated that, given a reasonable range of assumed aquifer properties and the best known historical estimate of wastewater recharged at the Upper Ponds (Westphal and Nork, 1972), simulated water levels rose well above land surface, which clearly is not a reasonable result.

Once this result was obtained, the preliminary numerical flow model was used to evaluate the approximate extent of the theoretical mounding, and the location of one of the initial model boundary conditions was adjusted accordingly to remove the mounding. As a result, the original recharge estimate from (Westphal and Nork, 1972) did not appear to be appropriate for application over an extended period of time. Subsequent numerical modeling, discussed below, also led to this conclusion.

2.3.2 Numerical Modeling

BRC recently completed and submitted a draft groundwater flow model calibration report to the NDEP (BRC, 2008). An evaluation of the potential historical mounding was evaluated again with the updated flow model. The results are consistent with the prior evaluation and further support the conclusion that discharge-induced mounding and upgradient flow did not occur (BRC, 2008).

2.4 *Soil and Groundwater Impacts*

Broad suite soil data from the well locations indicate that minimal or no soil impacts are present at the background well locations, or, detected shallow impacts attenuate with depth, indicating that there has been minimal potential for groundwater impacts due to historic Site use (Table 2, Table 3). Metals data for the background well locations are broadly consistent with background metals concentrations defined for the Site (ERM, 2009) In addition, relatively few organic compounds are detected in soil, at relatively low concentrations (Appendix B).

Five rounds of broad suite groundwater data indicate that there are relatively little or no Site-related impacts to groundwater at the well locations. Selected analytical data for the background locations is discussed below in the following sections. Further, more detailed analysis of these data will be presented in the upcoming Conceptual Site Model (CSM) Report for the Eastside area.

2.4.1 Soil Data - Metals

The currently available background metals dataset for the Eastside area (ERM, 2009) was compared to the range of metals concentrations data collected from the background well locations (Table 2, Appendix C) (excluding duplicates). Metals data from the background well borings were sorted into the following groups based on sample depth and the geographic location of the boring:

- Shallow (samples from less than 20 feet below grade) - data compared to “Shallow 2005” background metals dataset (reported in ERM, 2009) or the “Supplemental Shallow 2008” dataset (Mohawk area);

- Deep Qal - (Samples from greater than or equal to 20 feet below grade, but collected above the Qal/UMCf contact) - data compared to “Qal-River”, “Qal-McCullough” or “Qal-Mixed” datasets;

- Deep TMC - Samples collected from the UMCf (below the Qal/TMC contact) - data compared to “TMC” dataset.

The "Qal-River" dataset represents background metals characterized from soils collected in the shallow alluvial fan system originating in the River Range mountains to the east of the Site. The "Qal-McCollough" dataset represents background metals characterized from soils collected in the shallow alluvial system originating in the McCollough Range mountains to the south/southwest of the Site. The "Qal-Mixed" dataset represents background metals characterized from soils collected in the shallow alluvial system originating from both the River Range and the McCollough Range mountains.

Shallow data from less than 20 feet bgs from well boring AA-UW-6 were compared to the "Mohawk" dataset since this boring is located in the former Mohawk area at the Site. All other shallow (less than 20 feet) data were compared to the 2005 dataset (ERM, 2009).

Deep data below 20 feet bgs from well boring AA-UW-5 were compared to the "Mixed" dataset since this boring is located in where the River and McCollough fan systems coalesce. Deep data below 20 feet bgs from well boring AA-UW-6 were compared to the "River" dataset since this boring is located where the River Range alluvial system is present. All other deep data (above the UMCf contact) were compared to the "McCollough" dataset since the borings are located where the McCollough Range alluvial system is present. Deep data below the Qal/UMCf contact were compared to the "TMC" dataset.

<u>Shallow Metals</u>

No detected shallow metals (from less than 20 feet) in the AA-UW-6 well boring in the former Mohawk area exceeded background concentrations in the Supplemental Shallow 2008 dataset.

As shown in Table 2, fifty out of 591 (8.5%) detected metals concentrations from the remaining shallow (less than 20 feet) well boring samples exceeded the maximum background metals concentrations in the Shallow 2005 dataset. Nominally, ten detected metals concentrations (for copper, silver, sodium) exceed 105% of the maximum background metals concentration, and six concentrations (for silver and sodium) exceeded 200% of the maximum background metals concentration. A review of the historical Site operations (BRC et al., 2007) indicates that copper and silver were not identified as either feedstock or as disposed waste constituents. Sodium is naturally occurring and is ubiquitous at the Site. Therefore, these metals (copper, silver, sodium) are not considered critical site-related metals

Deep Metals (Above the Qal-UMCf contact)

For deep data (from 20 feet or deeper, but above the Qal/TMC contact), two detected metals concentrations (thorium-230 and strontium) nominally exceeded the maximum detected background metals concentration for the "Mixed" dataset applicable to deep data from boring AA-UW-5. Thorium-230 was detected in AA-UW-5 (40 feet below grade) at 1.90 picoCuries per gram (piC/g). The background thorium-230 concentration (Mixed dataset) is 1.85 piC/g (ERM, 2009). These concentrations are broadly comparable in value. Also, a review of the historical Site operations (BRC et al., 2007) indicates that thorium-230 and strontium were not identified as either feedstock or as disposed waste constituents. Therefore, these constituents are not considered critical site-related chemicals. Seven out of 74 detected metals concentrations in well boring AA-UW-6 exceeded the maximum background concentrations in the "River" dataset (for silicon, sodium, lithium, thorium-230). Thorium-230 was detected in AA-UW-6 (20 feet below grade) at 2.16 piC/g, and the background thorium-230 concentration (River dataset) is 1.49 piC/g (ERM, 2009). At 30 feet, thorium-230 was detected at 1.48 piC/g in boring AA-UW-6. (More shallow samples (from 5 and 10 feet) showed thorium-230 consistent with background (Table 2). Below the UMCf contact at 33.5 feet, thorium-230 was detected again at 3.03 piC/g at 40 feet in boring AA-UW-6). Two of the 74 AA-UW-6 detections over the maximum exceeded 150% of the background maximum (silicon, sodium) in the "River" dataset.

A review of the historical Site operations (BRC et al., 2007) indicates that thorium-230, strontium, lithium, and silver and were not identified as either feedstock or as disposed waste constituents. Therefore, these constituents are not considered critical site-related chemicals.

For deep metals data collected from samples within the McCollough Range alluvial system (all borings except AA-UW-5 and AA-UW-6), 46 of 46 detected metals concentrations nominally exceed the background maximum. However, only 7 of the 46 detections exceeded 150% of the maximum (antimony, thallium, magnesium, copper, and zinc) and 3 detections of two metals (antimony and thallium) exceeded 200% of the maximum. These constituents were not identified as either historical feedstock or as historical disposed waste constituents (BRC et al., 2007). Although there are some nominal detections over background, theses data are interpreted to indicate that significant site-related impacts are not present at the proposed background well locations.

Deep Metals (below the Qal-UMCf contact)

Soil samples collected and analyzed below the Qal/UMCf contact were compared to the "TMC" dataset background levels established for UMCf soils in 2009. Of the 342 analytic detections on UMCf soil samples collected from proposed background wells, 21.6% (74) of the analyses resulted in constituent detections above their respective maximum 2009 background concentration (Table 2).

In order to understand the general make up of the data, the data set was narrowed by evaluating the degree to which results were greater than the maximum 2009 background concentrations. Of the 342 analytic detections, 39 analyses resulted in detections greater than 25% above the maximum background concentration. At this evaluation concentration, exceedances occurred for 18 metals (Table 2). These exceedances represent 11.4% of the total 342 analyses.

When compared to twice the maximum 2009 background concentration (100% greater than the maximum), exceedance constituents (and the number of exceedances) included:

- Cadmium (1), calcium (1), magnesium (1), molybdenum (1), thorium-230 (1), uranium (1), and zinc (1).

This represents 7 exceedances out of a total of 342 analyses, or 2% of the total analytic detections.

2.4.2 Soil Data - Nonmetals

Up to 2.5 milligrams per kilogram (milligrams per kilogram [mg/kg]) (60 feet bgs) perchlorate was detected in soil boring SB-01 drilled near background well AA-01 (Table 3). Perchlorate was also detected at more shallow depths in this boring. Perchlorate is also detected in groundwater samples from well AA-01 and the other background wells. The detected concentrations, however, are not considered Site-related due to historical perchlorate use and release at adjacent upgradient and cross gradient facilities (such as Tronox and AMPAC).

Similarly, relatively low concentrations of volatile organic compounds (less than 60 micrograms per kilogram [ug/kg]) have been detected in soil samples from the well borings (Table 3).

Tetrachloroethene (PCE) is detected in soil samples from borings completed near wells AA-01 and AA-UW-5 (up to 7.7 ug/kg). Trichloroethene (TCE), a degradation daughter compound of PCE, is not detected in soil samples from the background well locations. However, both PCE and TCE are detected in the background groundwater well samples. TCE was detected less than 1 ug/L (in wells AA-01 and AA-UW-01) and PCE was detected at a maximum of 84 ug/L in well AA-01 (Table 4). PCE and TCE are also documented to have been released at upgradient sites to the southwest (e.g. TIMET and Tronox).

2.4.3 Groundwater Data

Piper trilinear diagrams and Stiff polygonal diagrams of major cation and anion data for BRC wells are provided as Figures 3, 4, 5, and 6. As shown on these figures, the ion data show that the hydrogeochemical signature of groundwater in the background wells is consistent with other Shallow Zone wells screened in the same hydrogeologic unit. A relatively few Site wells, however, have a relatively distinct hydrogeochemical signature, such as wells POU-3 (relatively low sulfate content and relatively high chloride content; located in the southern portion of the Site in an area of groundwater impacted by offsite sources) and AA-22 (anomalously high calcium and low magnesium content; located just down gradient from the Northern RIBs). The hydrogeochemical similarity of the proposed background wells to other Shallow Zone wells make them good candidates as background wells.

Groundwater samples collected from the Shallow Zone background wells over the five monitoring events were compared to Basic Comparison Levels (BCLs) established by the Nevada Division of Environmental Protection (NDEP) to determine the level of chemical impact to the wells, if any. Each of the proposed background wells appear to have been impacted above the BCLs for various individual chemical constituents (Table 4).

For the five monitoring events, the most frequent detections above the BCLs by the greatest number of chemicals have been observed in wells AA-01 and AA-27. Chemicals detected above the respective BCLs in these two wells include:

- Arsenic (As), tetrachloroethylene (PCE), chlorine, trichloroethylene (TCE), chloroform, formaldehyde, acetaldehyde, perchlorate, fluoride, thallium, dimethyl phosphorodithioic acid, nitrate, and hexavalent chromium (Cr6).

Based on isoconcentration plots of chemicals presented in the monitoring reports for the five monitoring events, the chemical distribution data appear to indicate that these chemicals are moving from offsite locations onto the Site. The most likely source of these chemicals in groundwater is the historic operations in the BMI Plants area.

Chemical impacts to the remaining wells (AA-UW1, AA-UW2, AA-UW3, AA-UW4, AA-UW5, and AA-UW6) include:

- As, PCE, chlorine, chloroform, TCE, perchlorate, 1,4-dichlorobenzene, and iron.

The general spatial trends of the data indicate that the concentrations are greater in wells to the south of the Site and decrease with increasing distance to the north-northeast. An exception to this spatial trend is for As, where the concentration in well AA-UW6 (102 ug/L), located to the northeast, was greater than in well AA-UW1 (69.8 ug/L) located farther to the south towards the plants area. This anomaly in the data spatial trend may be attributable to the spatial variability of the natural As content of geologic materials in the Site vicinity. As with wells AA-01 and AA-27 discussed above, the chemical distribution data appear to indicate that (with the possible exception of As) these chemicals are moving from offsite locations on to the Site. The most likely source of these chemicals in groundwater is the historic operations in the BMI Plants area.

Groundwater samples collected from the proposed Shallow Zone background wells over the five monitoring events were also compared to federal secondary maximum contaminant levels (MCLs) for total dissolved solids (TDS). Monitoring wells AA-UW4 and AA-UW6 exceed ten times the secondary MCL (i.e. greater than 5,000 mg/L) for TDS. Wells AA-27, AA-UW1, AA-UW2, AA-UW3, and AA-UW5 had lower concentrations of TDS but exceeded the secondary MCL during one or more monitoring events (Table 4). Total dissolved solids (TDS) concentrations are relatively consistent between sampling rounds (for wells AA-01 and AA-27 sampled more than once), although some nominal increase in TDS concentrations are evident in AA-01 and AA-27 (Table 4).

3. Summary and Conclusion

Proposed background wells AA-01, AA-27, and AA-UW-1 to AA-UW-6 meet the criteria listed above in Section 2 for designation as Shallow Zone background wells for the Eastside Area.

Given the location of the Site boundaries relative to the direction of groundwater flow and the physiographic and hydrogeologic features in the Site vicinity, there appear to be no alternative locations suitable for siting of Site background wells.

Existing BRC data and modeling results that characterize groundwater flow conditions, current and historical site use, soil quality, site location, and groundwater quality support the selection of these wells for use as background wells.

References

Basic Remediation Company (BRC), Environmental Resources Management (ERM), and Daniel B. Stephens & Associates, Inc. (DBS&A). 2007. *Closure Plan, BMI Common Areas, Clark County, Nevada.* Prepared for Basic Remediation Company (BRC), Henderson, Nevada. May, 2007.

BRC, 2008. Draft groundwater flow model calibration report, prepared by Daniel B. Stephens & Associates, Inc. (DBS&A), November 4.

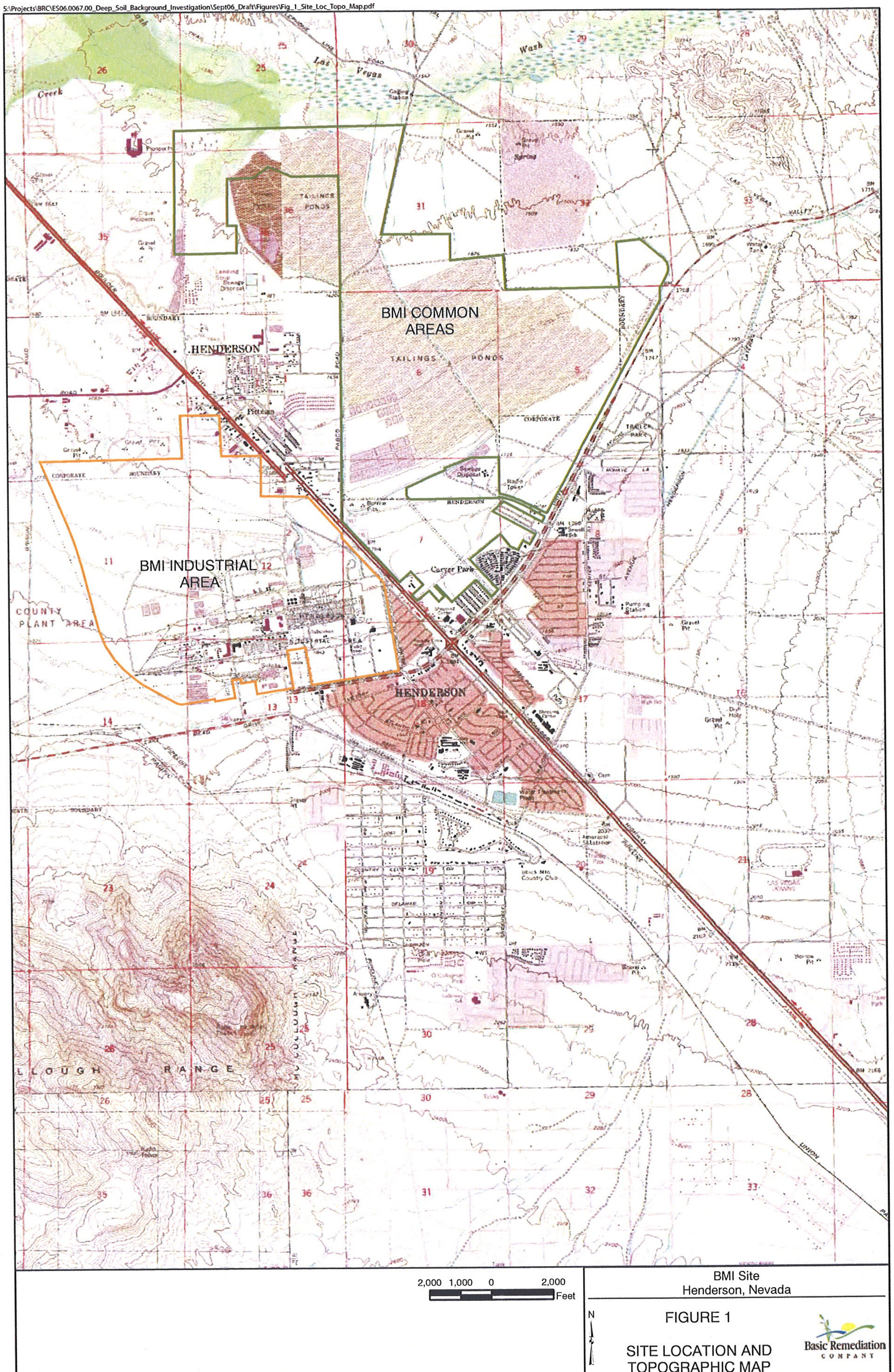
MWH, 2008. *Fifth round groundwater monitoring report, April - July 2008, BMI Common Areas (Eastside), Clark County, Henderson, Nevada.* Prepared for Basic Remediation Company (BRC), Henderson, Nevada. December 2008.

ERM, 2009, Draft (in preparation) Soil Background Metals Report, prepared for Basic Remediation Company (BRC), Henderson, Nevada.

Westphal, J.A. and W.E. Nork. 1972. *Reconnaissance analysis of effects of waste-water discharge on the shallow ground-water flow system, Lower Las Vegas Valley, Nevada.* Project Report No. 19, Center for Water Resources Research, Desert Research Institute, University of Nevada System. April 1972.

Figures

S:\Projects\BRC\ES06.0067.00_Deep_Soil_Background_Investigation\Sept06_Draft\Figures\Fig_1_Site_Loc_Topo_Map.pdf



Nevada-Clark Co. 7.5 Minute Series (Topographic)
Henderson, Nevada SE, Boulder City NW, and Sloan NE Quadrangles

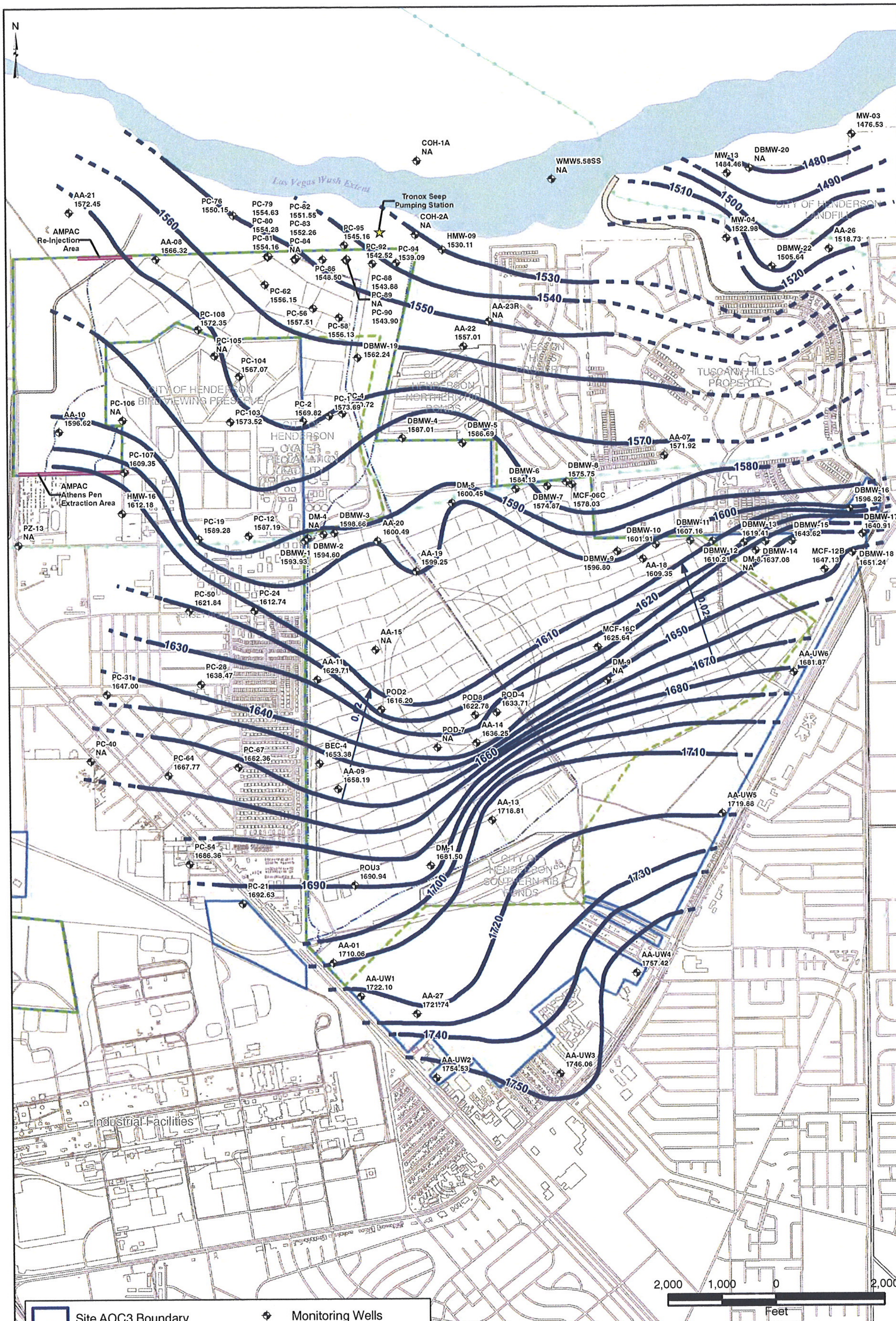
BMI Site
Henderson, Nevada

FIGURE 1

SITE LOCATION AND TOPOGRAPHIC MAP

Basic Remediation Company

Prepared by:	Date	JOB No. 1881262
MKJ MWH	09/28/06	FILE: GIS/BRC/BKGD_FIGURE1.MXD



Site AOC3 Boundary

Site Soil Boundary

Ditches

Flood Conveyance Channels

Laterals

Monitoring Wells

Water Level Contour (dashed where interred)

Proposed Background Well

FIFTH ROUND GROUNDWATER EVENT (APRIL-JULY 2008)

Notes:
NA - Not available.
Measurements are in feet above mean sea level (ft msl).

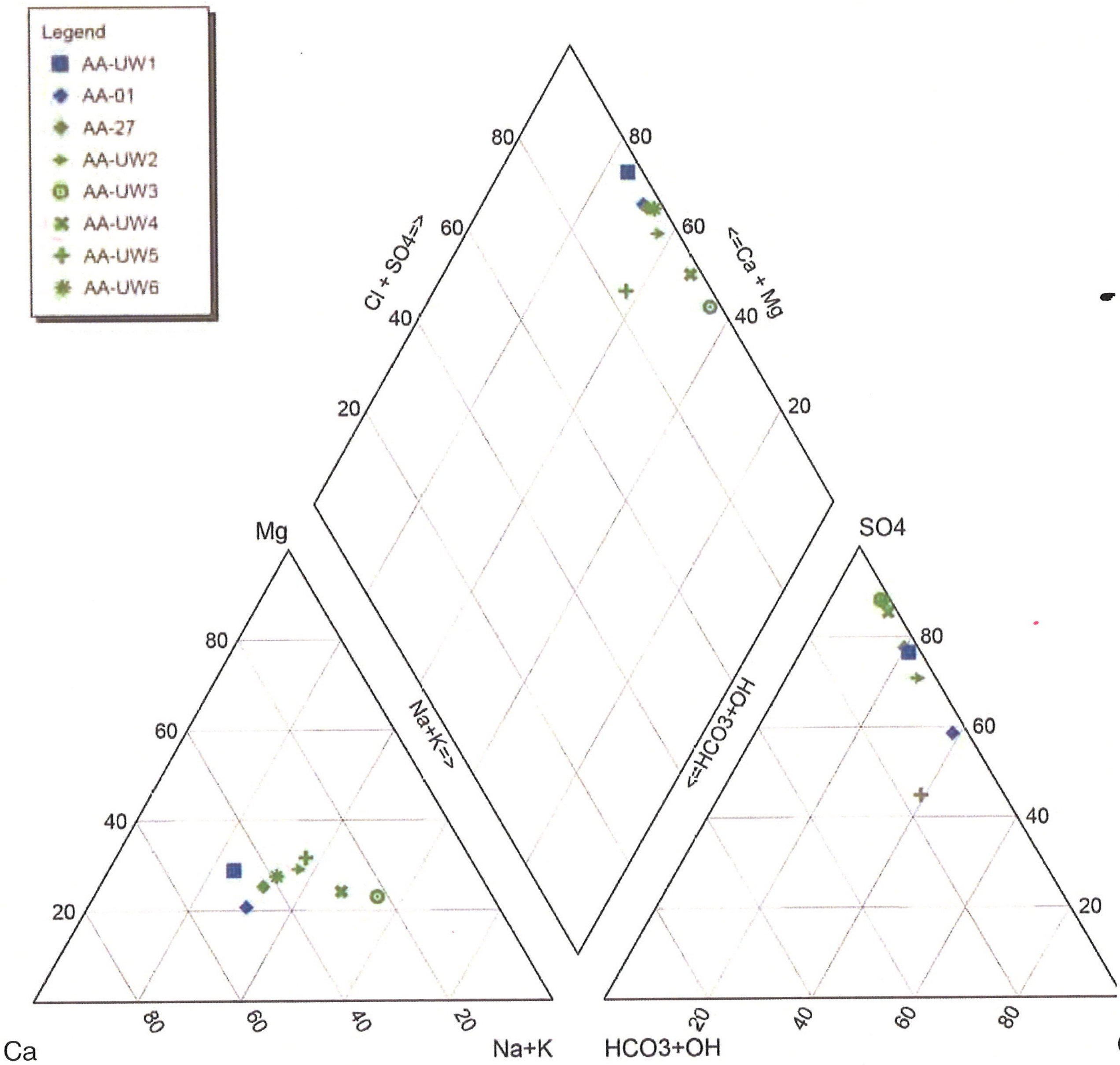
BMI Common Areas (Eastside)
Clark County, Nevada

FIGURE 3-1

POTENTIOMETRIC SURFACE MAP OF THE SHALLOW WATER-BEARING ZONE WELLS

Basic Remediation Company

Prepared by: MWH | Date 12/17/08 | JOB No. 0064277 | FILE: GIS/BRC/WATERLEVELS.MXD



Note: Data from 5th round sampling event (April-July 2008)

BMI COMMON AREAS (EASTSIDE)
HENDERSON, NEVADA

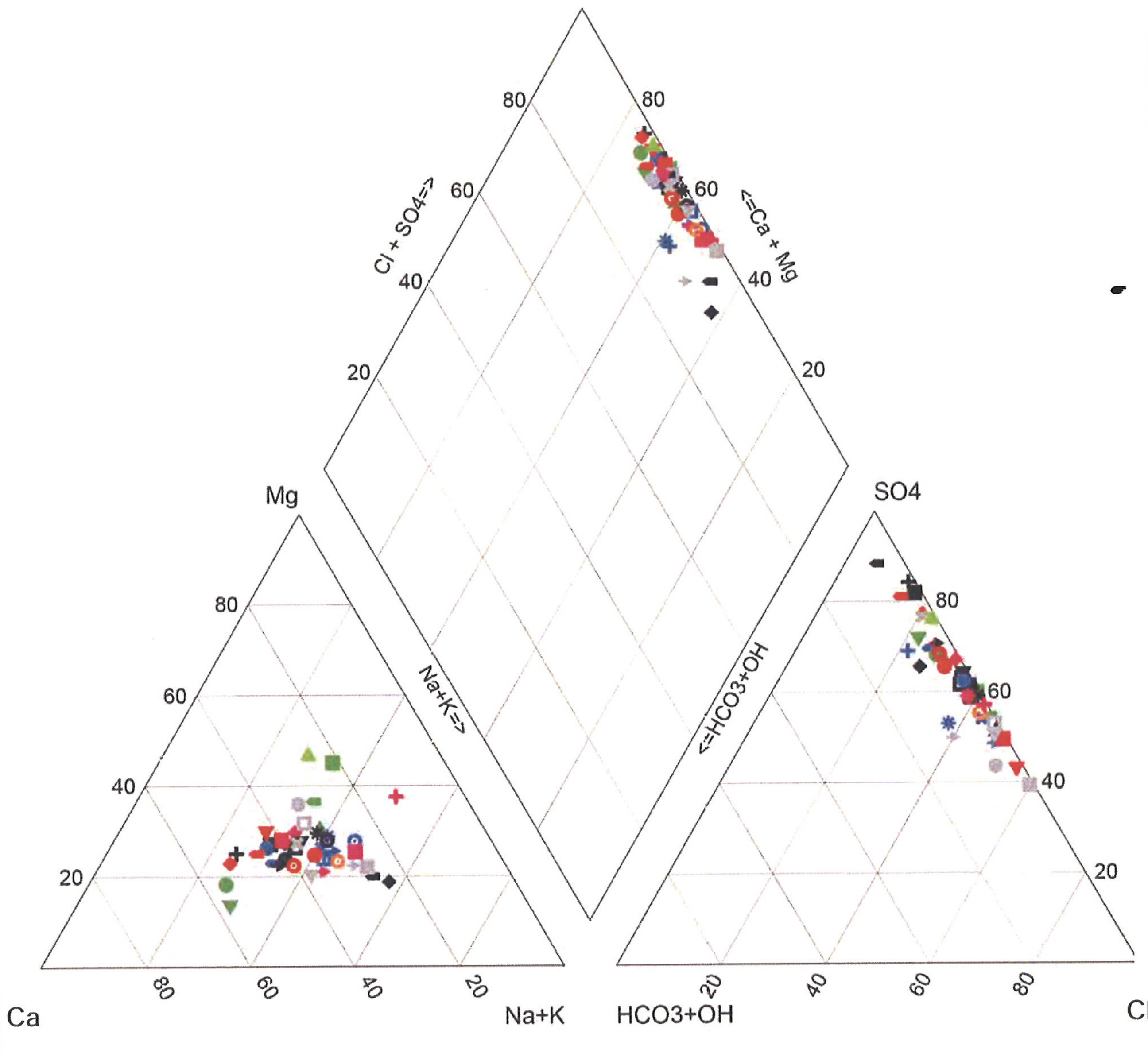
Piper Trilinear Diagrams - Background Wells

Daniel B. Stephens & Associates, Inc.

3-06-09 JN ES09.0013

Figure 3

S:\Projects\BRC\ES09.0013_BRC_RTCs_and_NDEP_Mtg\VR_Drawings\piper.CDR



Note: Data from 5th round sampling event (April-July 2008)
The PC well series is not included on this map for clarity.

BMI COMMON AREAS (EASTSIDE)
HENDERSON, NEVADA

Piper Trilinear Diagrams - Select Shallow Zone Wells

S:\Projects\BRC\ES09.0013_BRC_RTCs_and_NDEP_Mtg\VR_Drawings\piper.CDR

Daniel B. Stephens & Associates, Inc.

3-06-09 JN ES09.0013

Figure 4 Page 1

Legend

- ▲ DBMW-7
- ▼ DBMW-13
- ● DBMW-14
- ■ DBMW-15
- ◆ DBMW-16
- DBMW-17
- DBMW-19
- DBMW-2
- ✖ DBMW-20
- ✚ DBMW-22
- DBMW-3
- DBMW-4
- DBMW-6
- DBMW-10
- DBMW-8
- DBMW-9
- DM-1
- HMW-09
- DBMW-5
- AA-07
- AA-08
- AA-09
- AA-10
- AA-13
- AA-18
- AA-20
- AA-21
- AA-22
- AA-23R
- DBMW-12
- DBMW-11
- COH-2A
- DBMW-1
- AA-26
- MW-04
- MW-13
- POD2
- POD8
- POD8
- POU3
- WMW5.58SS
- MCF-12B
- MCF-06C
- MW-03
- MCF-16C

BMI COMMON AREAS (EASTSIDE)
HENDERSON, NEVADA

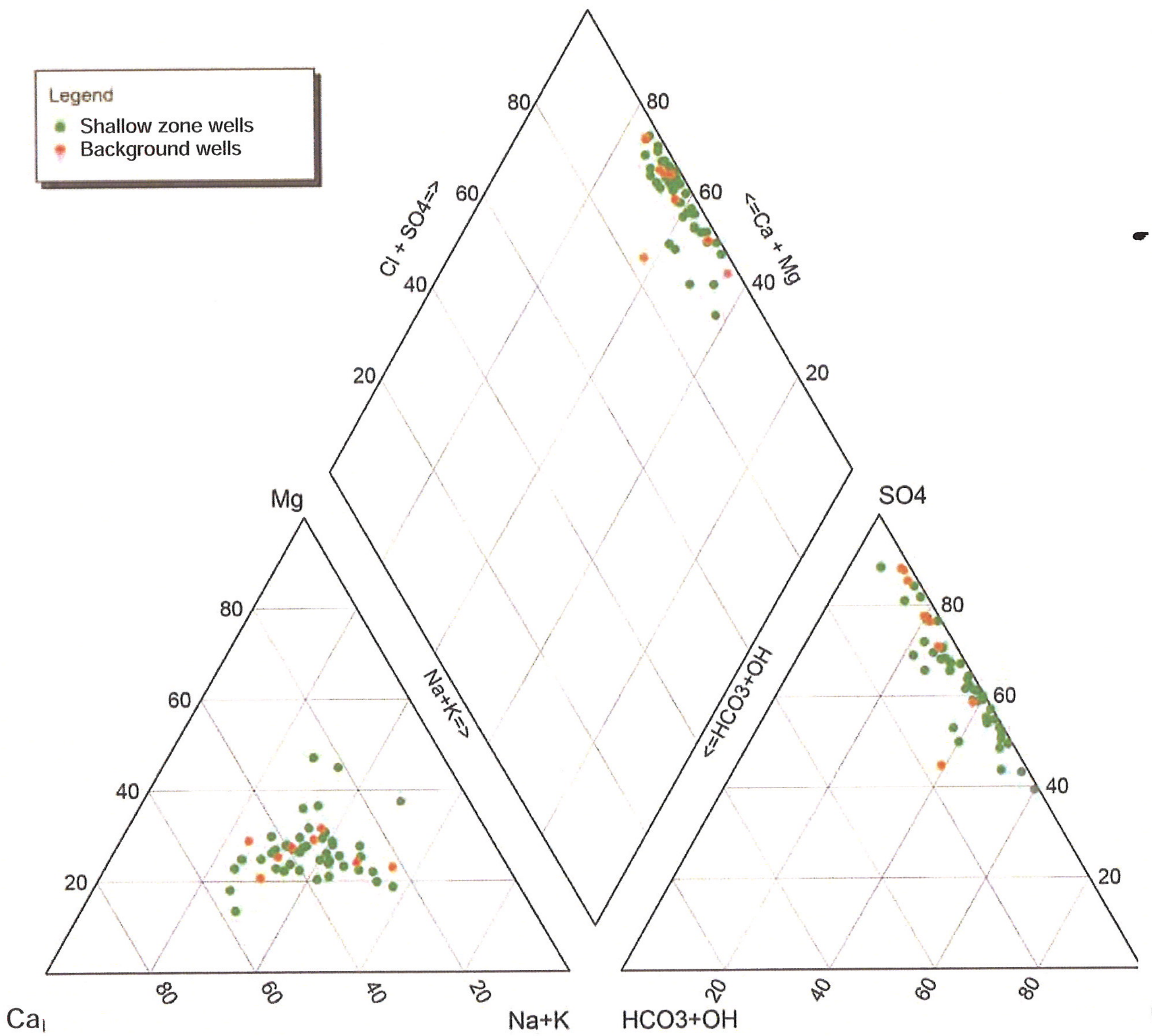
Legend for Figure 4

Daniel B. Stephens & Associates, Inc.

3-06-09

JN ES09.0013

S:\Projects\BRC\ES09.0013_BRC_RTCs_and_NDEP_Mtg\VR_Drawings\piper.CDR



Note: Data from 5th round sampling event (April-July 2008)

S:\Projects\BRC\ES09.0013_BRC_RTCs_and_NDEP_Mtg\VR_Drawings\piper.CDR

BMI COMMON AREAS (EASTSIDE)
HENDERSON, NEVADA

Piper Trilinear Diagrams - Background Wells and Select Shallow Zone Wells

Daniel B. Stephens & Associates, Inc.

3-06-09 JN ES09.0013

Figure 5

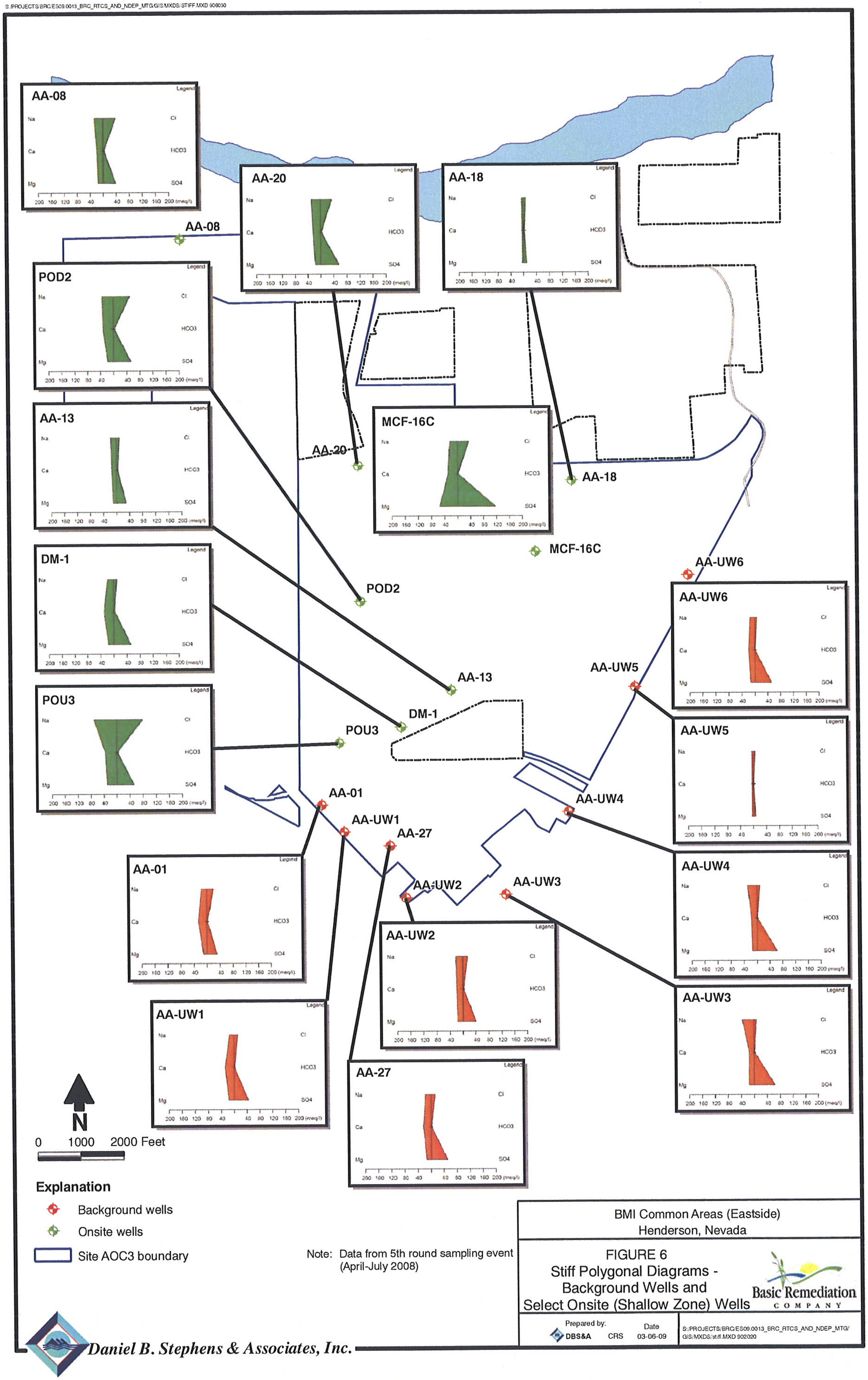


FIGURE 6
Stiff Polygonal Diagrams - Background Wells and Select Onsite (Shallow Zone) Wells

Tables

(Tables 2, 3, and 4 on disc)

Table 1. Summary of Well Construction Data - Background Wells

Well ID	Top of Casing Elevation (amsl)	Surface Elevation (amsl)	Total Boring Depth (feet bgs)	Casing Material	Diameter of Casing (inches)	Depth to Top of Screen (feet bgs)	Depth to Bottom of Screen (feet bgs)	Screen Interval (ft)	Screen Slot Size (inches)	Well Installation Date	Water-bearing Zone	Date Measured	Measured Depth to Water (ft.-btoc)	Groundwater Elevation (ft.-amsl)	Comments
AA-01	1757.13	1754.93	401	Sch 80 PVC	4	29	49	20	0.01	2/25/04	Shallow	4/8/04	45.10	1712.03	
												4/18/06	44.78	1712.35	
												7/27/06	45.44	1711.69	
												10/16/06	45.63	1711.50	
												1/22/07	45.68	1711.45	Solinst #36573
												6/3/08	47.07	1710.06	
AA-27	1789.43	1787.03	143	Sch 80 PVC	4	61.5	81.5	20	0.01	7/7/04	Shallow	7/13/04	59.45	1729.98	
												4/19/06	65.85	1723.58	
												7/26/06	66.77	1722.66	
												10/16/06	66.82	1722.61	
												1/22/07	66.97	1722.46	Solinst #36573
												6/3/08	67.69	1721.74	
AA-UW1	1774.45	1771.22	69.4	Sch 40 PVC	4	54.5	64.5	10	0.02	7/30/07	Shallow	6/3/08	52.35	1722.10	Keck 82050088
AA-UW2	1821.36	1817.63	82.72	Sch 40 PVC	4	55	75	20	0.02	8/3/07	Shallow	6/3/08	66.83	1754.53	Keck 82050088.
AA-UW3	1812.72	1809.07	88.53	Sch 40 PVC	4	60	80	20	0.02	8/6/07	Shallow	6/3/08	66.66	1746.06	Keck 82050088
AA-UW4	1800.28	1796.79	60.7	Sch 40 PVC	4	35	55	20	0.02	8/7/07	Shallow	6/5/08	42.86	1757.42	Keck 82050088
AA-UW5	1768.68	1765.05	63.62	Sch 40 PVC	4	37	57	20	0.02	8/8/07	Shallow	6/5/08	48.80	1719.88	Keck 82050088
AA-UW6	1740.81	1737.01	68.66	Sch 40 PVC	4	37	57	20	0.02	8/8/07	Shallow	6/5/08	58.94	1681.87	Keck 82050088

Appendix A

(on disc)

Appendix B (on disc)

Appendix C (on disc)