BASELINE DATA REPORT

Section 9.0

Ground Water

OCTOBER 2009

Submitted To:

New Mexico Mining and Minerals Division
&
U.S. Forest Service (Cibola National Forest)

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9.0 Ground Water

NMAC §19.10.6.602 D.(13) (g)

Baseline data shall include, as applicable:

(g) Ground water information shall include the following:

(iii) Lithology and thickness of each geologic unit below the site indicating which units are water bearing, cross sections and potentiometric maps indicating the location of wells and the ground water flow direction in the vicinity of the site, and references or sources for this information.

(iv) A description of the aquifer characteristics including total dissolved solids concentration, maximum and minimum depths to ground water, direction of flow and gradients, transmissivity and storativity, and a general description of ground water quality, and references or sources for this information.

(v) A determination of the probable hydrologic consequences of the operation and reclamation, on both the permit and affected areas, with respect to the hydrologic regime, quantity and quality of surface and ground water systems that may be affected by the proposed operations, including the dissolved and suspended solids under seasonal flow conditions.

9.1 Introduction

The Roca Honda permit area is located in the southeastern part of the San Juan structural basin, within the southeast part of the Ambrosia Lake uranium subdistrict, which was the site of previous uranium mining and associated mine dewatering activities from the 1960s through the 1980s. The permit area lies within the Bluewater Underground Water Basin as extended by the OSE on May 14, 1976.

Large amounts of data on ground water exist for the San Juan basin because the area contains deposits of recoverable uranium and valuable ground water resources. The USGS, the New Mexico Bureau of Mines and Mineral Resources, and the New Mexico State Engineer cooperated in several hydrogeologic studies of the San Juan basin. These studies have described area aquifers and compiled and analyzed ground water quality data and estimates of hydraulic parameter values (Brod and Stone 1981, Frenzel and Lyford 1982, Stone et al. 1983, Craigg et al. 1989, Dam et al. 1990, Dam 1995, and Craigg 2001). Moreover, as part of the Regional Aquifer System Analysis program, the USGS developed a steady–state multi–aquifer ground water flow model of the San Juan basin (Kernodle 1996).

The Roca Honda permit area is approximately three miles northwest of the Mt. Taylor uranium mine, formerly operated by GMRC and others and now owned by RGRC. This mine was dewatered during the 1970s and early 1980s. Ground water quality data and hydraulic parameter estimates were collected both at the Mt. Taylor mine and at various mines west of the Roca Honda permit area in the Ambrosia Lake subdistrict (NMEI 1974, GMRC 1979a, and Kelley et al. 1980). The ground water quality and hydraulic characteristics of the Westwater

Canyon Member of the Morrison Formation were re-evaluated more recently by Hydro Resources, Inc. (HRI) and the U.S. Nuclear Regulatory Commission (USNRC) during site licensing in the Crownpoint and Church Rock areas (HRI 1988 and 1991 and USNRC 1997).

Historic exploratory drilling conducted by others, and more recent drilling conducted by RHR, determined that the strata beneath the permit area represent the same sequence of rocks found in the San Juan structural basin. Potentiometric data collected from wells in and near the permit area indicate that ground water moves continuously through the permit area in the same aquifers found to the west. The aquifers and aquitards encountered in the permit area likely have hydraulic characteristics similar to those found in the same units elsewhere in the San Juan structural basin.

In general, the hydraulically significant structural features of the southeastern San Juan basin have been previously identified, and the ground water quality and hydraulic characteristics of the aquifers in the Roca Honda permit area are expected to lie within the ranges identified in previous studies. Data on water quality and aquifer hydraulic characteristics within the permit area are sparse. Consequently, RHR has compiled the relevant published and unpublished information near the permit area. This effort included an inventory of wells previously identified in published and unpublished reports as being present near the Roca Honda permit area. The inventory includes location, completion dates, well depth, producing formation, measured water levels, and availability of chemical data for each well. The wells were field-checked and RHR incorporated some of them, along with three wells drilled by RHR within the permit area, into a quarterly water quality sampling program. The data for these wells is contained in Appendix 9-A through 9-H.

The well data inventory, earlier studies, recent drilling by RHR, and the water quality sampling program provide a great deal of baseline information for the ground water in and adjacent to the permit area. This section presents the existing data as it pertains to regional hydrogeology (Section 9.2), hydrology of the general permit area (Section 9.3), aquifer and ground water characteristics of the general permit area (Section 9.4), and aquitards (Section 9.5). These sections, together with pertinent sections of Section 7.0, “Geology,” contain descriptions of lithology and thickness of each geologic unit below the site. The sufficiency of the existing information to characterize ground water conditions within the Roca Honda permit area is discussed in each section. The data will be further supplemented by the SAP, which is currently undergoing agency review.

9.2 Regional Hydrology

The Roca Honda permit area is in the southeastern part of the San Juan structural basin in northwestern New Mexico as shown in Figure 9–1. The basin is a roughly circular asymmetric structural depression at the eastern edge of the Colorado Plateau. It is bounded on the northwest by laccoliths associated with the Four Corners platform, on the north by the San Juan uplift, and on the northeast by a broad arch. The basin is bounded on the east by the structurally complex Nacimiento uplift and on the southeast by the extensively fractured Rio Grande rift, the Ignacio monocline, and the Lucero uplift. The Precambrian dome of the Zuni uplift (the southwestern limb of which is known as the Nutria monocline) and the Defiance uplift form the south-central and southwestern margins of the basin, and the northern end of the Defiance uplift forms the western margin of the basin (Craigg 2001 and Woodward 1987). These structural boundaries appear to also form hydrogeologic boundaries.

The San Juan structural basin is an artesian basin. In general, recharge enters the ground water flow systems as precipitation on permeable formations which crop out along the southern margin of the basin and on the flanks of the Zuni, Chuska, and San Mateo Mountains. Ground water then flows downgradient northwestward to discharge along the San Juan River, and northeastward and eastward to discharge to tributaries of the Rio Grande including the Rio Salado, Rio Puerco, and Rio San Jose, and to springs which discharge along faults (Stone et al. 1983). Discharge also occurs artificially from wells. An undetermined amount of subsurface, inter-formational movement of water may occur. As ground water moves downgradient from the recharge area within permeable formations, it is prevented from moving vertically by overlying shale units which act as aquitards, and at the center of the basin, high artesian heads are present in most bedrock aquifers. This BDR identifies the aquifers and aquitards.

The San Juan structural basin contains a number of internal structural boundaries that affect the movement of ground water through aquifers. Potentiometric surface maps indicate that the pattern of ground water movement in the southeastern part of the basin is greatly influenced by the Zuni uplift, San Mateo dome, and McCartys syncline. Figure 9–1 shows the general pattern of deep ground water flow in the Jurassic and Cretaceous aquifers. Additional information on deep ground water flow is in Stone et al. (1983) and Kernodle (1996). The movement of ground water through the alluvium of valleys and through shallow aquifer systems in some Upper Cretaceous rocks is influenced by topography and surface water drainages, and is independent of and sometimes in a different direction than ground water movement in the deep aquifers.

According to Stone et al. (1983), the steady-state inflow/outflow rate of ground water through the basin is approximately 40 cfs for Cretaceous and Jurassic sandstone aquifers and less than half of that for Cenozoic aquifers. Kernodle (1996) simulated a total steady-state outflow from the entire 19,380-square-mile San Juan basin aquifer system of 195 cfs, all of which was simulated as being discharged to the surface water system in the lower reaches of the San Juan River and Rio Puerco (Kernodle 1996). That simulation indicated 135 cfs of the recharge to the aquifers was from stream bed infiltration, 56 cfs was from direct precipitation, and 4 cfs was leakage from the Chuska Sandstone.

Aquifers within the southeastern part of the San Juan basin include, from deepest to shallowest, the Permian Glorieta Sandstone and San Andres Limestone, the Middle Jurassic Entrada Sandstone, the Upper Jurassic Westwater Canyon Member of the Morrison Formation, the Upper Cretaceous Dakota Sandstone, the Upper Cretaceous Gallup Sandstone of the Mesaverde Group, the Upper Cretaceous Crevasse Canyon Formation of the Mesaverde Group, and the Upper Cretaceous Point Lookout Sandstone and Menefee Formation of the Mesaverde Group. Within topographic valleys, Quaternary alluvium can contain local aquifers. Although formations deeper than the San Andres Limestone may contain ground water, their depths generally preclude ground water exploration or development except along the margins of the basin where they are close to the surface. Whether a particular formation is used as an aquifer in an area of the basin is dependent on the depth to ground water, formation yield, and quality of ground water as well as the presence of shallower aquifers (NMEI 1974, Stone et al. 1983, Brod and Stone 1981, and Kernodle 1996).

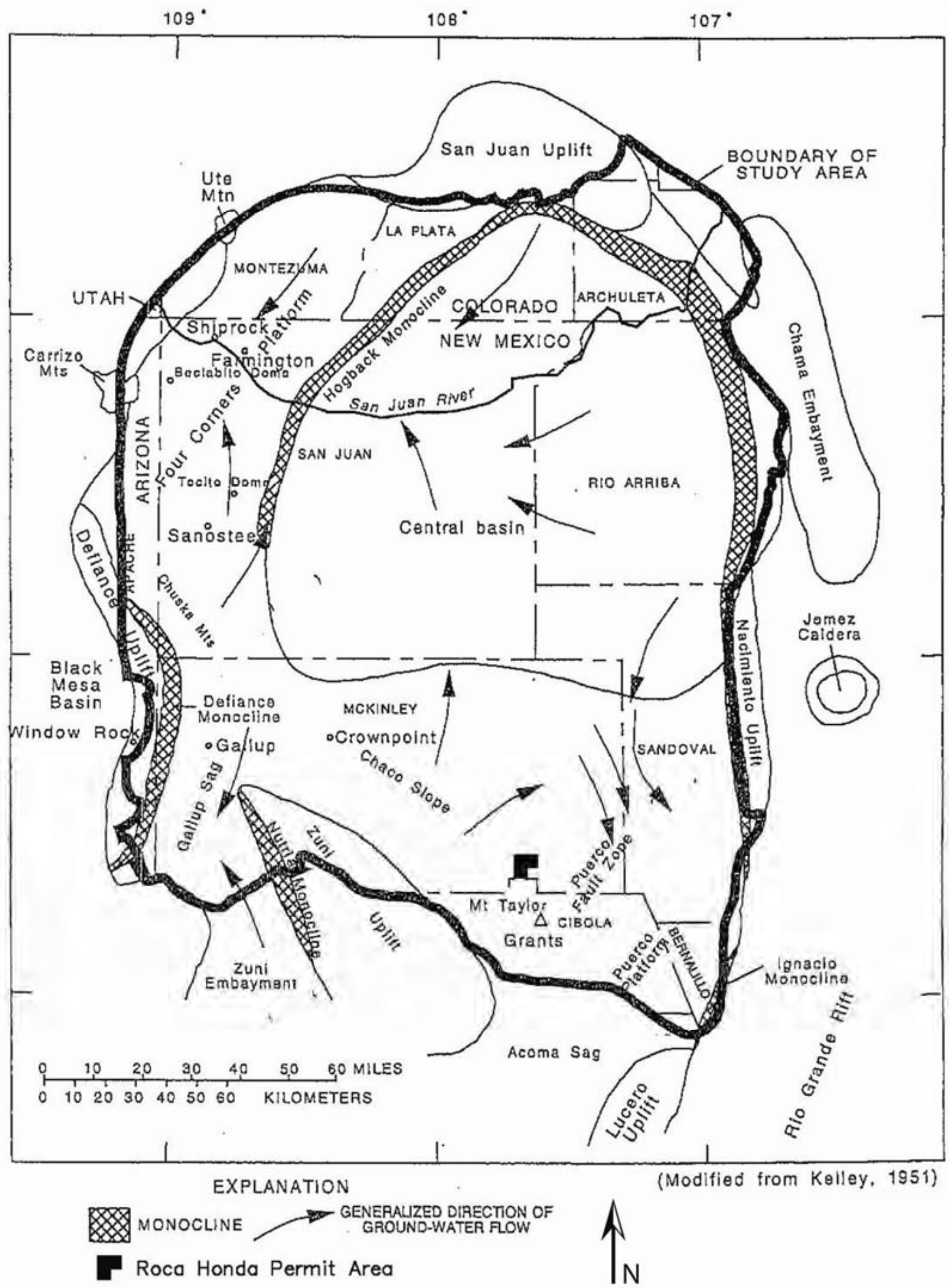

Figure 9-1. Structural Elements of the San Juan Structural Basin and Adjacent Areas and Generalized Patterns of Ground Water Flow in Rocks of Jurassic and Cretaceous Age (Modified from Dam, 1995, Figure 2)

Figure 9-2 is a typical stratigraphic section of the San Juan Basin in the vicinity of the permit area. Thick aquitards separate the aquifers. Ground water in the Westwater Canyon Member is hydraulically isolated from ground water in deeper aquifers by the Recapture Member of the Morrison Formation and, in unfaulted areas, from ground water in the overlying Dakota Sandstone by the Brushy Basin Member of the Morrison Formation. The main body of the Mancos Shale functions as an aquitard between the Dakota Sandstone and the Gallup Sandstone. A similar aquitard, the Mulatto Tongue of the Mancos Shale, lies above the Gallup Sandstone between the Dilco Coal Member and the Dalton Sandstone Member of the Crevasse Canyon Formation. The Satan Tongue of the Mancos Shale splits the sandstones of the Point Lookout Sandstone. Shale units in the lower Menefee Formation may form hydraulic barriers between ground water in it and the Point Lookout Sandstone.

9.3 Hydrogeology of the Permit Area Locality

The term “Roca Honda/San Mateo area” is used herein to refer to an area which encompasses T13N R8W and a few additional miles to the east and west. It includes the upper and middle San Mateo Creek valley and the Roca Honda permit area. Ground water is present in the Roca Honda/San Mateo area within the stream bed alluvium of San Mateo Creek and in the following bedrock formations, from deepest to shallowest; the Westwater Canyon Member of the Morrison Formation, the Dakota Sandstone, the Gallup Sandstone, the Point Lookout Sandstone, and the Menefee Formation (Cooper and John 1968, NMEI 1974, Brod and Stone 1981, OSE 2008, GMRC 1979a, and Metric 2005a). The Dalton Sandstone of the Crevasse Canyon Formation is a minor source of water to stock wells north and east of the permit area.

Area geologic structure and the presence of multiple aquifers and aquitards have caused the development of complex aquifer systems in the Roca Honda/San Mateo area (See Figure 9-2). From deepest to shallowest, these include; (1) a deep confined system in the Westwater Canyon Member, which may be in local hydraulic connection with ground water in the Dakota Sandstone and the lower sandstones in the Mancos Shale; (2) a confined system in the Gallup Sandstone; (3) an unconfined system in the Point Lookout Sandstone, which transforms into a confined system as ground water moves eastward downgradient; (4) an unconfined system in the Menefee Formation in hydraulic connection with San Mateo Creek; and (5) a shallow unconfined system that is locally perched in the alluvium of the stream bed of San Mateo Creek. These aquifer systems are described in more detail below. The latter three systems are not present within the permit area, though they are present in the San Mateo Creek valley.

9.3.1 Westwater Canyon Member of the Morrison Formation

The deepest aquifer system of interest in the Roca Honda/San Mateo area and the Roca Honda permit area is a deep confined system present within the Westwater Canyon Member of the Morrison Formation and possibly the overlying Dakota Sandstone and the sandstones in the lower part of the Mancos Shale. Faulting may have allowed local inter-aquifer connection of ground water among these formations in the faulted areas, and the rock units may function as a single aquifer system in these areas (Figure 9-3). Movement of ground water within this deep confined system is controlled largely by geologic structure. The rate of ground water movement is influenced by intergranular and fracture permeability of the rocks.

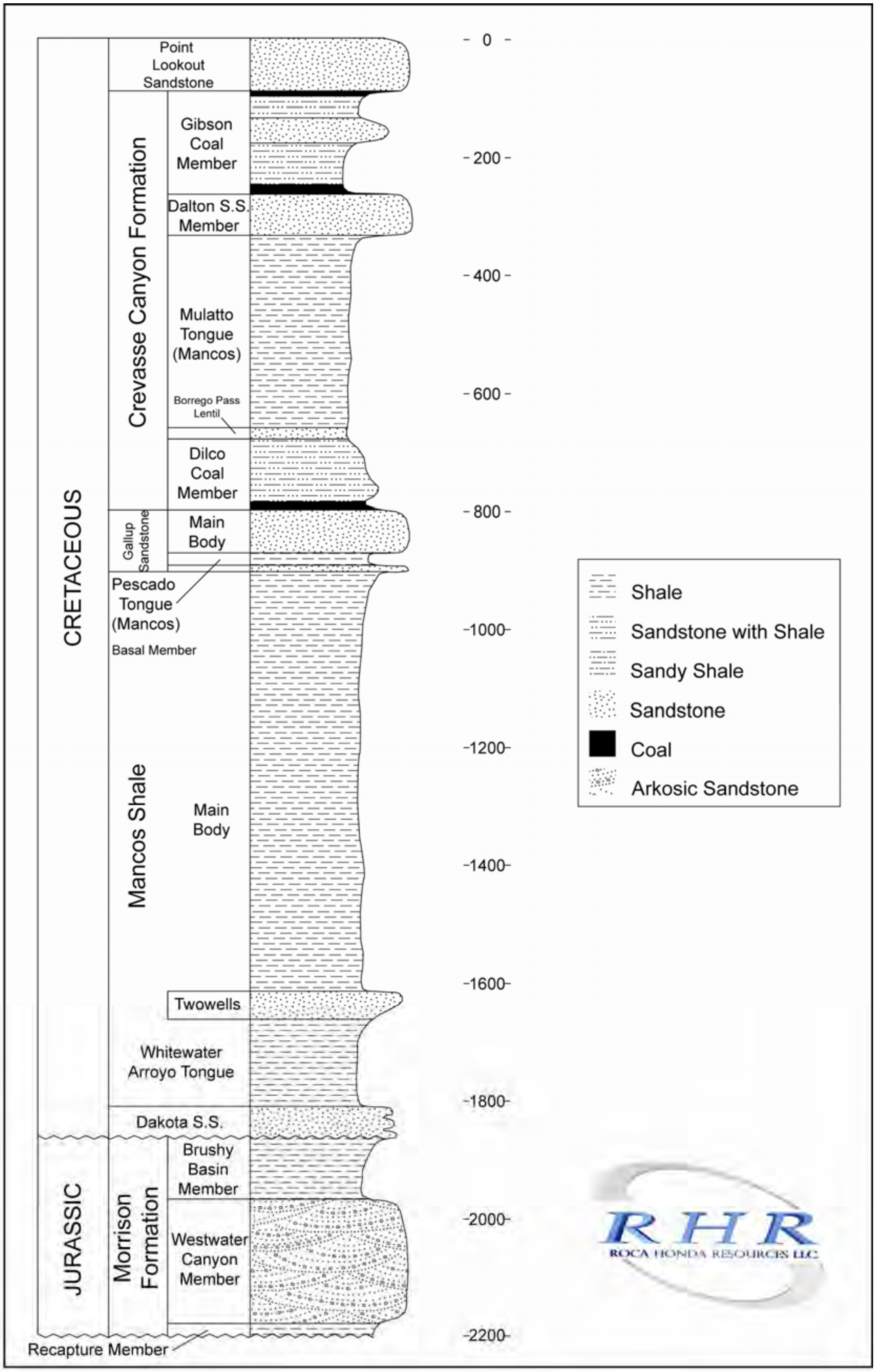

Figure 9-2. Typical Stratigraphy of the Permit Area

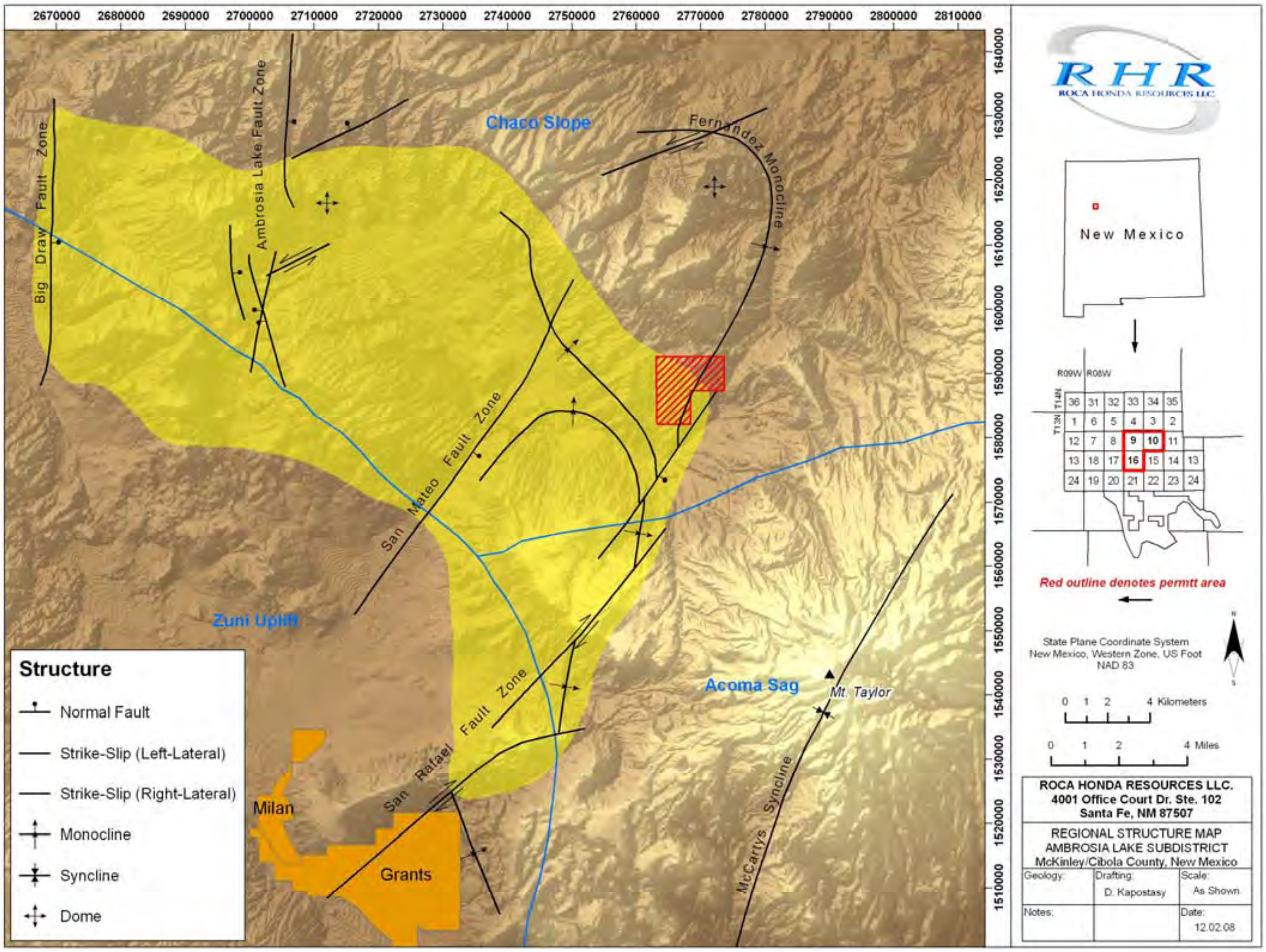

Figure 9-3. Regional Structure near the Permit Area

The Westwater Canyon Member is an aquifer as well as the major uranium ore horizon in the Grants district (Stone et al. 1983). It is an example of a classic artesian aquifer. Recharge occurs when surface water infiltrates the geologic strata in and around the Zuni and Defiance uplifts and moves downdip toward the deeper parts of the San Juan basin. Brod and Stone (1981) indicate that much of the ground water recharge to the deep confined system occurs in drainage-ways on the bedrock outcrops along the western basin margins, and as seepage into fractures. They note that San Mateo Creek is a source of recharge to this deep aquifer system, contributing recharge where it flows over outcrop areas. The topographically high recharge area produces high hydraulic head in the aquifers in the center of the basin where ground water is under confined pressure (USNRC 1997). Dewatering of the Westwater Canyon Member for the purpose of underground mining lowered the potentiometric surface in the local area of uranium mines during the 1970s, but water levels have substantially recovered since mining ceased (see Figure 6 in Kelley et al. 1980, for a 1979 potentiometric contour map). Figures 9–4 and 9–5 show two interpretations of the pre-development potentiometric surface for the Westwater Canyon Member in the San Juan basin.

Ground water within this deep system moves through the Roca Honda permit area. Three deep monitor wells were completed by RHR in the Westwater Canyon Member within the Roca Honda permit area. The water level elevations measured in these wells indicate that the ground water system within that aquifer is continuous with the system in the Westwater Canyon Member in the southern San Juan basin. The projected potentiometric surface for the Westwater Canyon Member in the Roca Honda/San Mateo area as constructed from available data is shown in Figure 9–6. The potentiometric surface in the Westwater Canyon Member through the Roca Honda permit area is shown in the cross sections in Figures 9-7 and 9-8. Section 7.0, Geology, of this BDR contains a detailed discussion of the geology of the permit area.

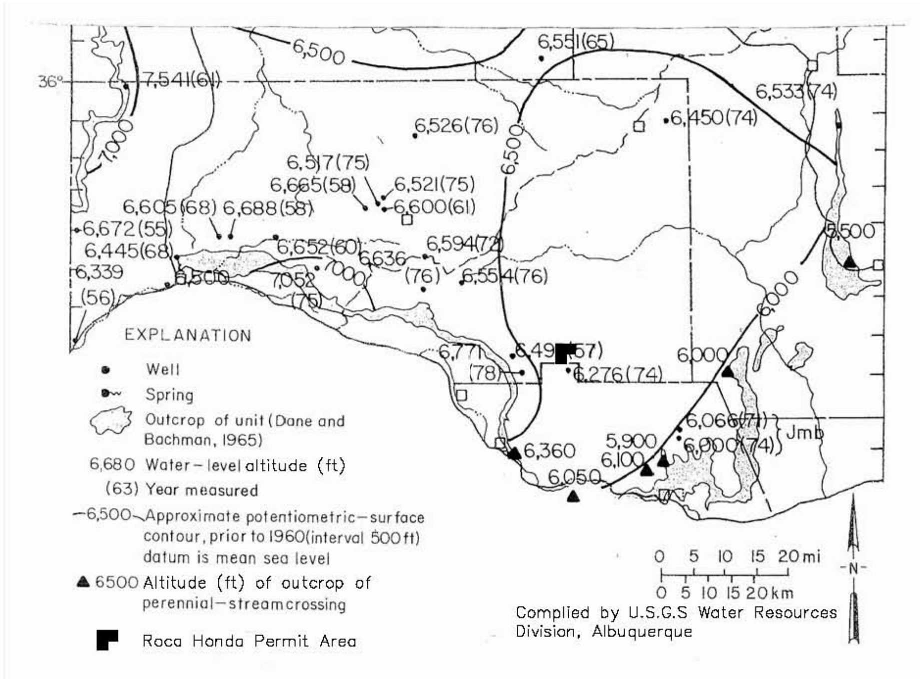

Figure 9-4. Water-Level Elevations and Potentiometric Surface for Westwater Canyon Member in the Southern Portion of the San Juan Basin (Modified from Stone et al. 1983, Figure 72)

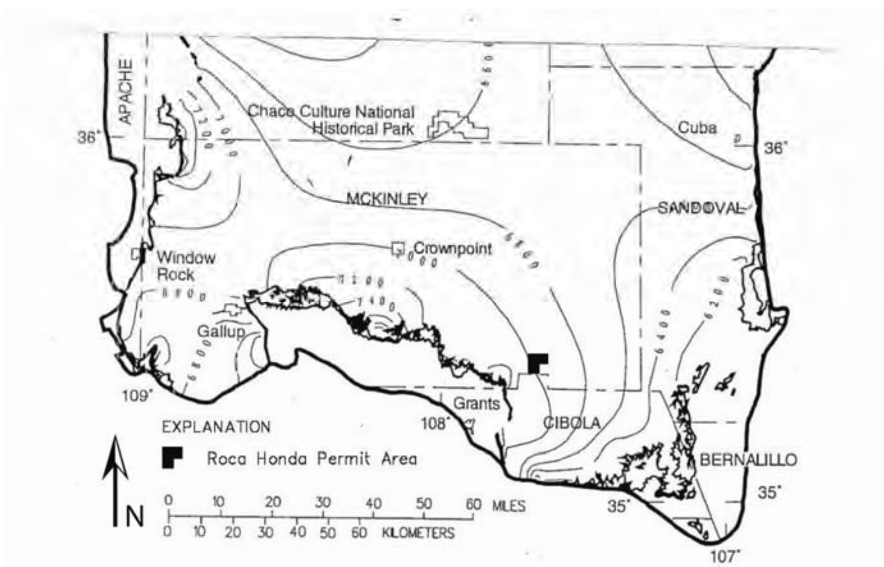

Figure 9-5. Simulated Steady-State Head in the Westwater Canyon Member (Modified from Kernodle 1996, Figure 52)

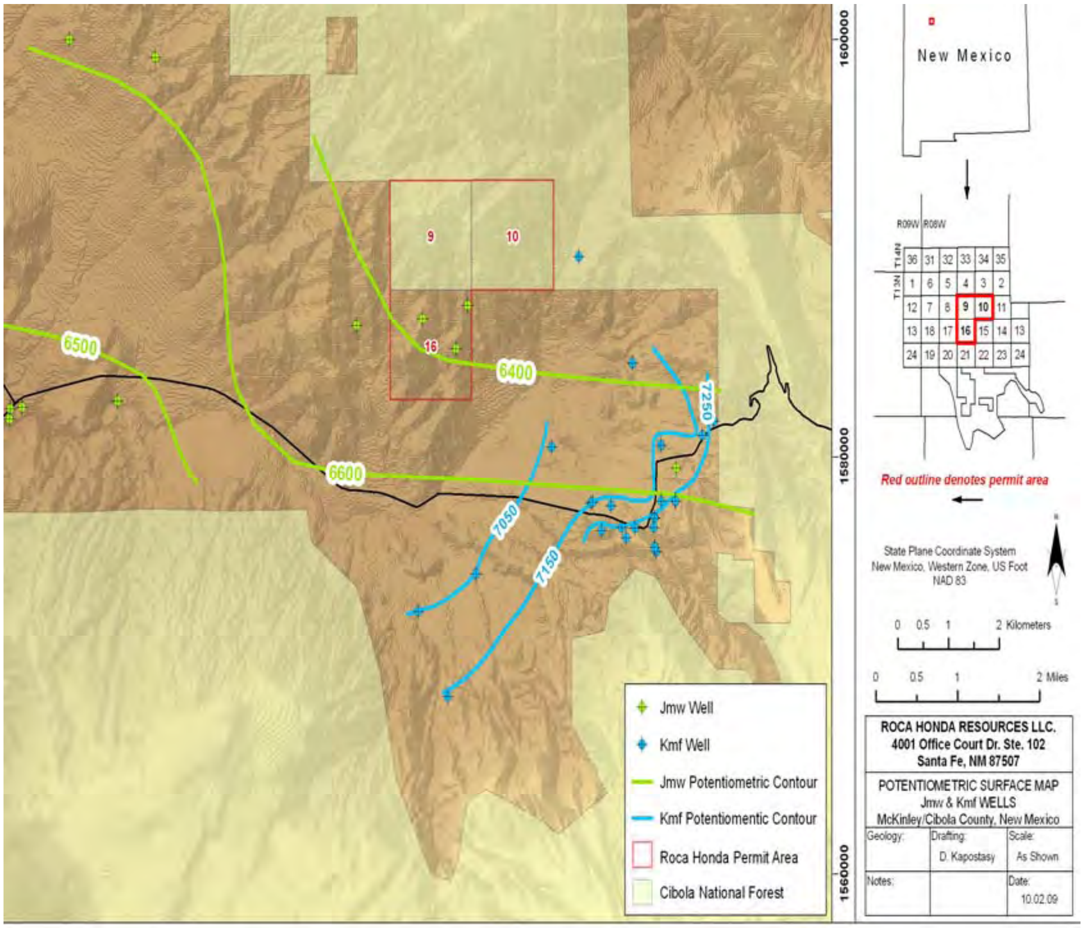

Figure 9-6. Roca Honda/San Mateo Area Wells with Menefee Formation and Westwater Canyon Member of the Morrison Formation Potentiometric Surface

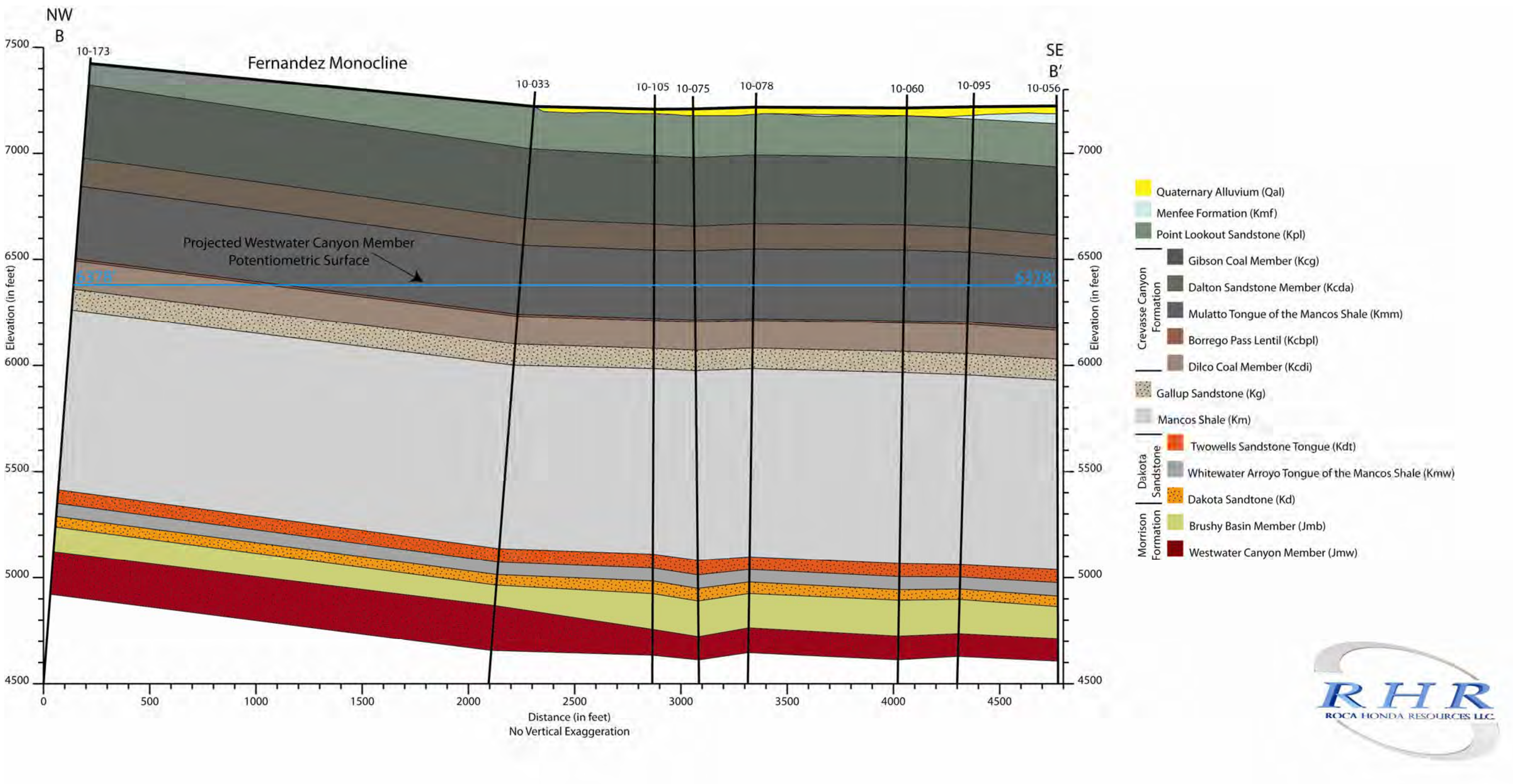

Figure 9-7. Cross-Section Across Section 10 of the Permit Area Showing Potetiometric Surface of the Westwater Canyon Member
(Cross-Section Location can be found in Section 7.0 Geology, Figure 7-7)

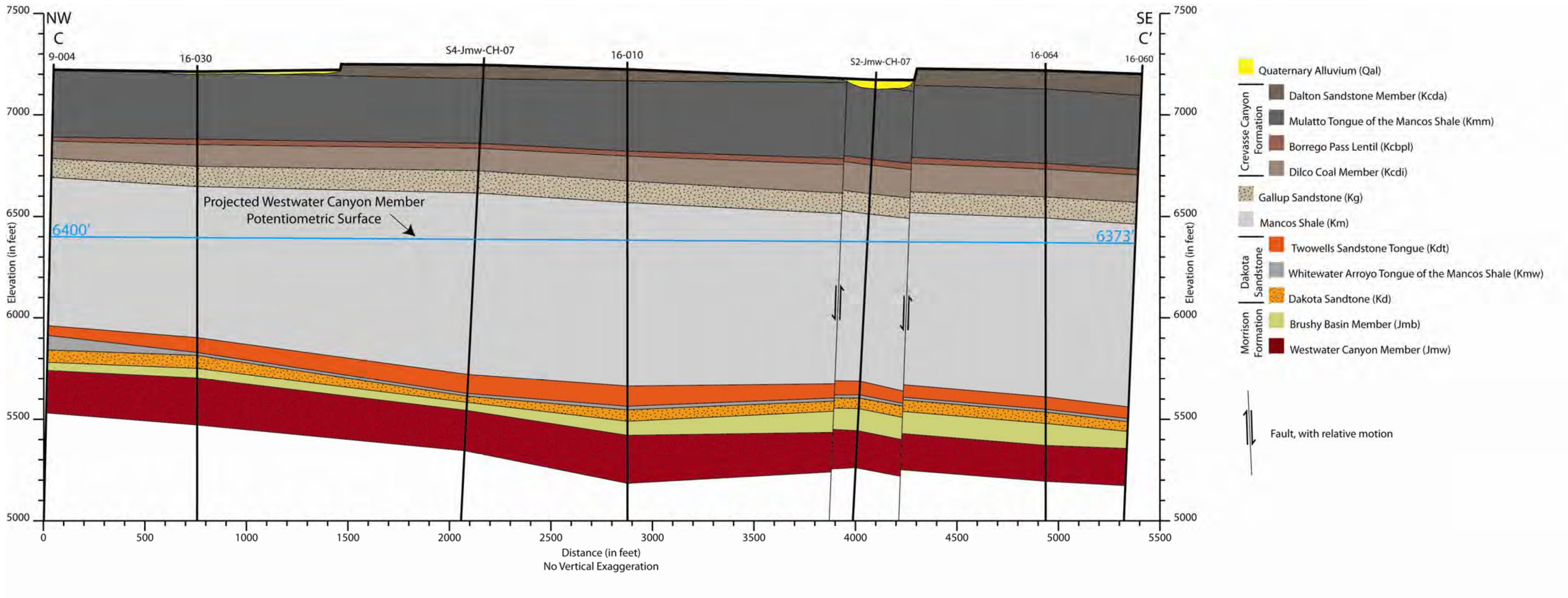

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Figure 9-8. Cross-Section Across Section 16 of the Permit Area Showing Potetiometric Surface of the Westwater Canyon Member
(Cross-Section Location can be found in Section 7.0 Geology, Figure 7-7)

9.3.2 Gallup Sandstone

The Gallup Sandstone is present in the subsurface within the permit area. Ground water moves through the Gallup Sandstone in a confined system separate from the deep aquifer system, although an unknown amount of inter-formation movement of ground water may occur. Dam (1995) and Kernodle (1996) show a potentiometric surface within Gallup Sandstone that indicates flow to the east-northeast in the Roca Honda/San Mateo area. Few water level or water quality data are available for the Gallup Sandstone in the Roca Honda/San Mateo area, though an irrigation well recently drilled by the Lee Ranch may produce partially from the Gallup Sandstone. Permission will be obtained form the Lee Ranch to monitor this well during pump testing. Figure 9–9 shows the water level elevation, potentiometric surface, and outcrop areas for the Gallup Sandstone in the San Juan basin as interpreted by Stone et al. (1983).

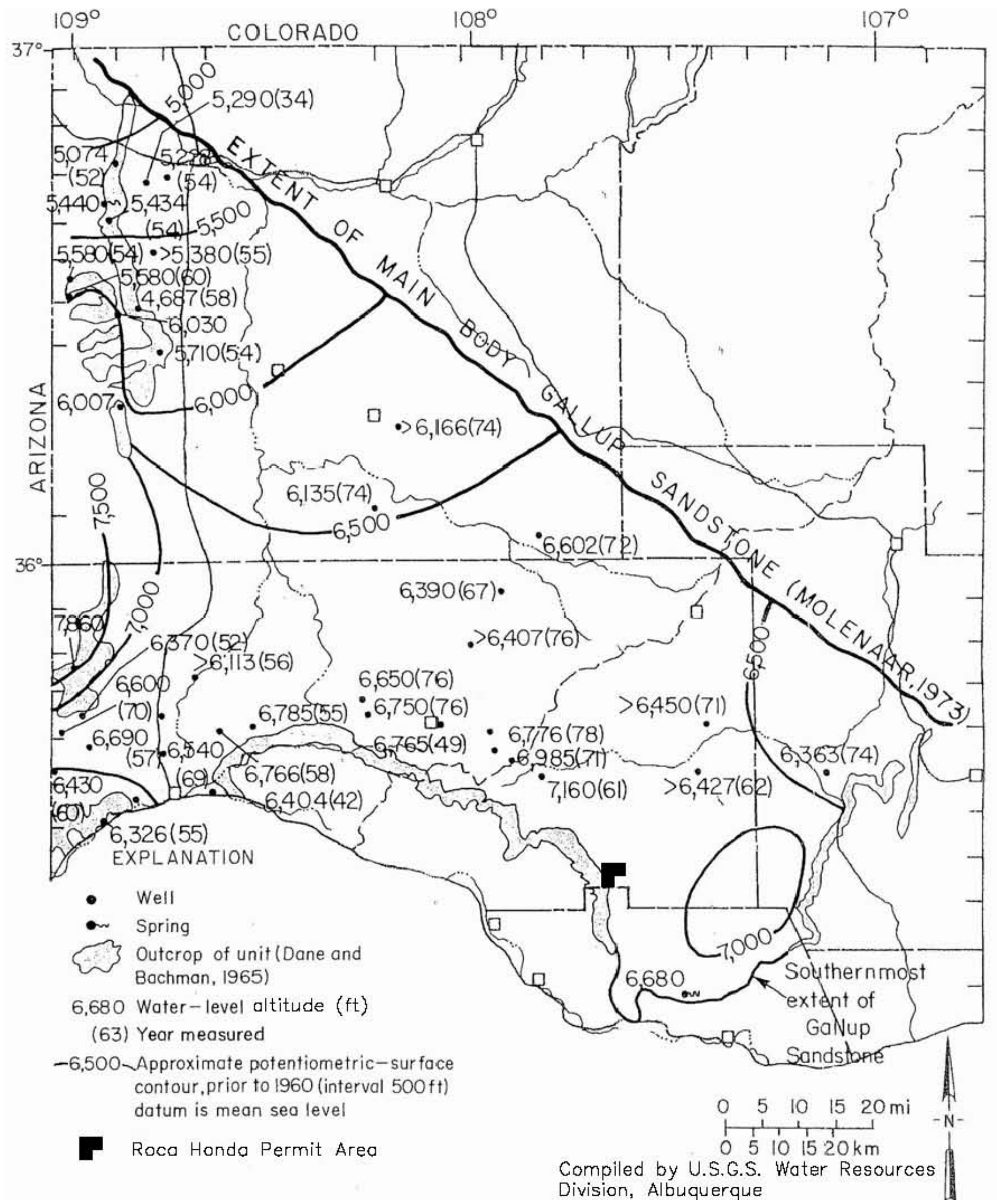

Figure 9-9. Regional Water Level Elevation and Potentiometric Surface for Gallup Sandstone (Modified from Stone et al. 1983, Figure 59)

9.3.3 Point Lookout Sandstone

The Point Lookout Sandstone is present at the surface within the Roca Honda permit area (see Figure 7–3 “Geologic Map of the Roca Honda Permit Area,” in Section 7.0, Geology). It is probably not saturated in most areas, but functions as a recharge zone on the eastern side of the Fernandez monocline and an aquifer in the vicinity of the community of San Mateo.

Ground water moves eastward through sandstones of the Point Lookout Sandstone under both unconfined and confined conditions. Recharge enters the fractured sandstones along San Mateo Creek, where water in the arroyo flows over the outcrops and along the Fernandez monocline, where the formation crops out extensively (see Figure 7–3, Section 7.0, Geology). As ground water within the Point Lookout Sandstone moves eastward, it is confined by the overlying Menefee Formation. Figure 9–10 shows the water-level elevation and potentiometric surface for the Point Lookout Sandstone in the San Juan basin.

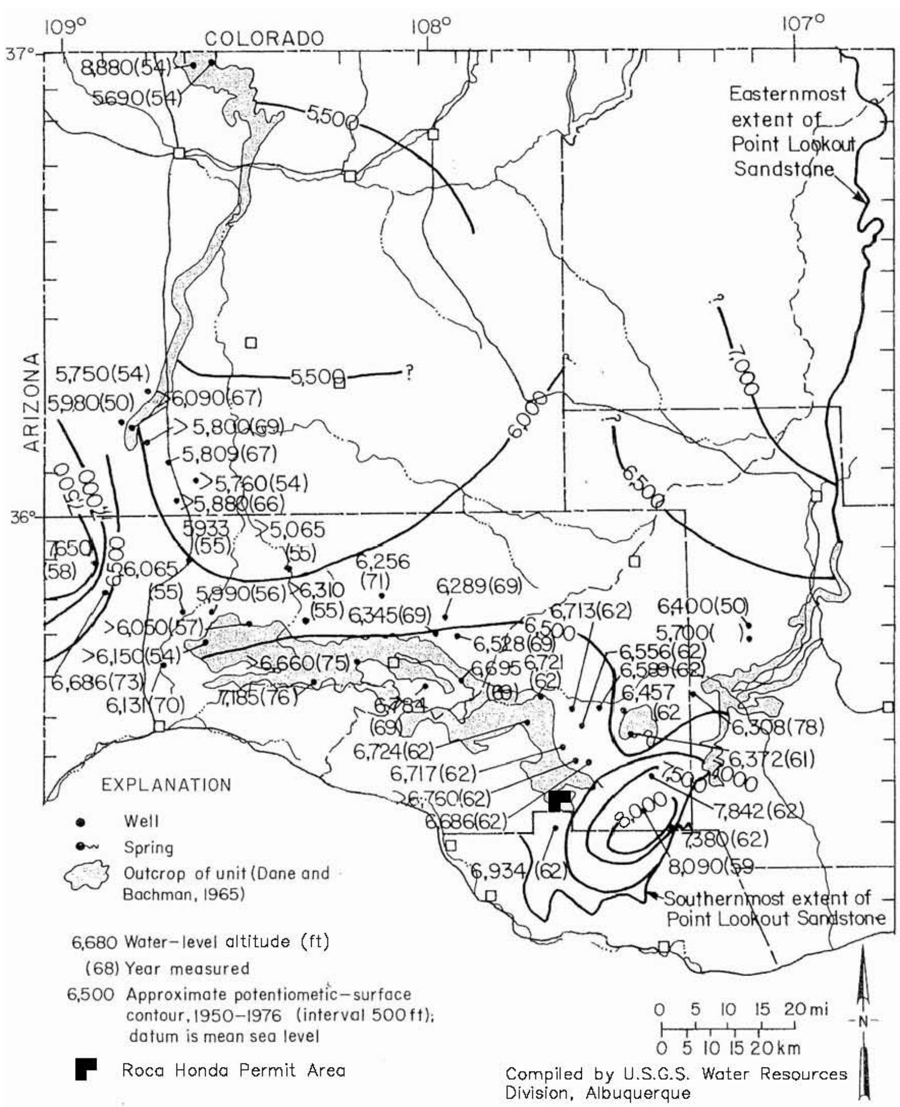

Figure 9-10. Water Level Elevations and Potentiometric Surface for Point Lookout Sandstone (Modified from Stone et al. 1983, Figure 51)

9.3.4 Menefee Formation and Alluvium

Unconfined aquifer systems are also present in the Roca Honda/San Mateo area, both in the alluvium of San Mateo Creek stream bed and in the Menefee Formation. The Menefee Formation is present only in a small area of the Roca Honda permit area and is probably unsaturated. The alluvium of San Mateo Creek is not present in the permit area. The water tables within these aquifers conform to area topography rather than geologic structure and are therefore closely related to surface drainages (Brod and Stone 1981). Although Menefee Formation strata dip eastward into the McCartys syncline like the underlying rocks, ground water within it follows the topography and moves westward generally parallel to San Mateo Creek rather than eastward down the dip of geologic strata. Ground water in the Menefee Formation is recharged from infiltration at San Mateo Creek, from mountain front recharge along the flank of Mt. Taylor, and from precipitation on outcrops. East of the community of San Mateo, ground water in the Menefee Formation appears to have a slight confined head, probably caused by mountain-front recharge and the presence of shale and silt within the formation which impede vertical movement of ground water and cause local confined and perched conditions. As ground water moves westward through the Menefee Formation, unconfined conditions prevail and the potentiometric surface merges with the unconfined surface of the stream bed alluvium. Water level elevation and the projected water table in the Menefee Formation are shown in Figure 9–6.

The stream bed alluvium contains an unconfined aquifer fed by the flow of San Mateo Creek, which flows westward over the Menefee Formation, losing water to that formation (Brod and Stone 1981). In some areas on the flats west of the community of San Mateo, the stream and unconfined aquifer may be locally perched on the Menefee Formation shales. It appears that where San Mateo Creek crosses the outcrop contact between the Menefee Formation and the more permeable fractured sandstones of the Point Lookout Sandstone a few miles west of the community of San Mateo, the stream loses flow and becomes ephemeral (see Figure 8–6 in Section 8.0, "Surface Water"). The stream infiltration is probably a major source of recharge to the Point Lookout Sandstone.

9.4 Aquifer Characteristics in the Permit Area

Geologic formations that function as aquifers within the Roca Honda/San Mateo area are discussed below. The terminology follows that of the geology section presented earlier (See Figure 9-2 and Figure 7–4, Section 7.0, Geology). Descriptions of the physical nature, hydraulic characteristics, and typical ground water quality are readily available in published and unpublished reports. Reports that contain data or information specific to the Roca Honda/San Mateo area include: Cooper and John (1968), NMEI (1974), Brod and Stone (1981), GMRC (1979a), RGRC (1994), and Metric (2005a). Additional information on permit area geology and ground water chemistry has been collected by RHR. The geologic information has been incorporated in the "Geology" section of this BDR, while the new water chemistry data is included in Tables 9-1 through 9-8 presented later herein with each respective aquifer discussion. The hydraulic parameters of all the aquifers are heterogeneous and anisotropic, meaning that they are spatially and directionally variable.

In the Roca Honda/San Mateo area, aquifers are the Westwater Canyon Member of the Morrison Formation, Dakota Sandstone, Gallup Sandstone, Point Lookout Sandstone, Menefee Formation, and the San Mateo Creek alluvium. The Westwater Canyon Member is regionally an important aquifer in the San Juan basin, but east of the R8W line within T13N, the Westwater Canyon

Member is too deep to be targeted by local wells. The principal locally-used aquifers within the Roca Honda/San Mateo area are the Menefee Formation and the Point Lookout Sandstone. Some wells also produce from valley alluvium. The Dalton Sandstone Member of the Crevasse Canyon Formation is not relied on as an aquifer within the area, but supplies poor quality water to a stock well northeast of San Mateo Mesa (Brod and Stone 1981). There are no production wells from any aquifers within the Roca Honda permit area.

The available water quality analyses of ground water from the alluvium, Menefee Formation, Point Lookout Sandstone, and Westwater Canyon Member of the Morrison Formation are presented in Tables 9–1 through 9–8, located in the discussion section for each respective formation. These tables include both information on ground water quality and well location from the 1960s and 1970s within approximately 5 miles of the Roca Honda permit area and data collected as part of the recent RHR ground water monitoring program. The precision, accuracy, and comparability of the older data are commonly unclear because information is not available about well construction, sampling methods, or laboratory analytical methods. Nevertheless, the data can be considered a good general indication of background water quality. The more recent RHR ground water sampling and analyses provide more reliable information as this more recent sampling has been conducted in accordance with SAP protocols. Additional sampling is proposed in the SAP undergoing agency review to further characterize baseline conditions. This more recent sampling has been and will be conducted in a manner to obtain ground water quality data with known levels of precision, accuracy, and comparability.

Except for stream bed alluvium, the geologic units in the Roca Honda/San Mateo area crop out or are in the shallow subsurface of the Roca Honda permit area. The Menefee Formation, Point Lookout Sandstone, and Crevasse Canyon Formation are not saturated everywhere within the permit area. Figure 7–3 (Section 7.0, “Geology”) shows where these units crop out in the permit area.

Water level data collected from three monitor wells drilled by RHR into the Westwater Canyon Member in the permit area indicate that the potentiometric surface within that unit beneath the permit area is continuous with the potentiometric surface in the Westwater Canyon Member in the southeastern San Juan structural basin. The data obtained from these wells indicates that the hydraulic characteristics and ground water quality within the aquifers beneath the permit area are within the same range as those encountered in the same geologic units in the southeastern portion of the basin, an area which includes the Ambrosia Lake and Roca Honda/San Mateo areas. Within the Roca Honda permit area, northwest-striking faults related to the San Rafael fault zone and strain features over the crest of the San Mateo dome may have increased hydraulic conductivity in that direction. Detailed information on the aquifers within the Roca Honda permit area is presented below from shallowest to deepest.

9.4.1 Ground Water Monitoring Program

Published and unpublished reports were reviewed to construct a database of water quality and water level data from historically existing wells. Plate 1 contained in the SAP shows the locations of these of wells and indicates the formations in which they are completed and whether historical chemistry data are available. Appendix 9-H, Table H-1 tabulates the available information about these wells. The precision, accuracy, and comparability of the data are uncertain because the information was collected by various researchers at different times. Data about well construction, sampling methods, or laboratory analytical methods are not always known. The data is nonetheless useful in constructing a baseline for the area.

In August of 2008, RHR began a regional quarterly ground water sampling program (RGWSP) for a sub-set of the wells shown on Plate 1. Wells were selected for inclusion in the RGWSP on the following basis: 1) the depth of the well and the screened interval were known with some certainty; 2) the well was screened within one aquifer; 3) an even distribution of wells over the permit area vicinity was considered desirable; 4) water from as many aquifers as possible was collected; 5) the well owner was willing to allow sampling; 6) the well could be located in the field and access was possible; and 7) historical water chemistry data were available for the well.

Out of the 142 wells in Appendix 9-H, Table H-1, 25 were included in the RGWSP. To date (August 2009), water samples have been collected and analyzed from the wells in the RGWSP on four occasions. Though every effort was made to sample all the wells each quarter, in some cases it was not possible to do so, usually because the owner could not be contacted.

The ground water samples were collected as described in the SAP. Electrical conductivity, pH, and temperature were measured in the field. The samples were properly collected, stored and shipped to an Environmental Protection Agency-accredited laboratory. The water samples were analyzed for major ions, dissolved metals, non-metals, total metals (uranium), total radionuclides, volatile organic compounds, and synthetic organic compounds.

The complete analyses are included in Appendix 9-A through 9-G. Major and minor constituents are tabulated in Tables 9-1 through 9-10 in the discussion section for each respective formation that follows. The term “major” refers to the major ions, while “minor” refers to dissolved metals, total metals, non-metals and radionuclides. No qualitative judgment as to the importance of the individual constituents for regulatory purposes is intended with use of these designations. The historical water chemistry data abstracted from published and unpublished reports are also included in Tables 9-1 though 9-10. These data generally provide information on ground water quality from the 1960s and 1970s within approximately 5 miles of the Roca Honda permit area.

During 2007, RHR also drilled three deep monitoring wells into the Westwater Canyon Member within Section 16 of the permit area. The wells were drilled for the purposes of: 1) providing background ground water chemistry data; 2) monitoring water levels within the Westwater Canyon member as the Roca Honda mine is developed; 3) running aquifer pump tests to allow RHR to better assess hydraulic parameters of the Westwater Canyon aquifer within the permit area. Water chemistry from these wells is included in the Section 9.4.7 “Morrison Formation” tables.

The RGWSP will be continued under the SAP.

9.4.2 Alluvium

Quaternary alluvial material overlies bedrock throughout the San Mateo Creek valley. Although it probably accepts and transmits ground water from precipitation to underlying bedrock units, it is most likely unsaturated except near San Mateo Creek. San Mateo Creek alluvial materials consist of unconsolidated sands and silts. Well logs indicate this material is from 10 to 80 ft thick although it may be significantly thicker in some areas (OSE 2008). A few wells produce solely from the alluvium, but most also penetrate the underlying Menefee Formation.

Ground water in stream bed alluvium is under unconfined conditions, and the depth to water is typically a few tens of feet. The stream bed alluvium is recharged by San Mateo Creek, which receives flow from precipitation and runoff from Mt. Taylor and from spring flow in its upper reaches. The stream bed aquifer loses water to sandstone layers in the underlying Menefee Formation, but because the Menefee Formation contains a significant amount of shale and siltstone (65 percent), the unconfined aquifer may be semi-perched in some areas (GMRC 1979b). The GMRC speculated that the many springs within the valley may represent local unconfined or perched ground water conditions caused by impermeable shale or siltstone units that interrupt vertical infiltration and force water horizontally to valley walls. A few miles west of the community of San Mateo, San Mateo Creek usually disappears into the alluvium and the fractured sandstones of the Point Lookout Sandstone.

Aquifer tests conducted in San Lucas Canyon as part of GMRC's pipeline and mill siting investigations indicated that the transmissivity of the stream bed alluvium was 708 to 1,450 ft^2/day, and hydraulic conductivity was 27 ft/day (Hydro-Search, Inc., and Jacobs Engineering Group, Inc. 1979). The stream bed alluvium of San Mateo Canyon likely exhibits similar values. It is expected that the permeabilities will be less than those of other stream bed deposits composed of sandier source materials because the stream bed alluvium within San Mateo and San Lucas Canyons was derived from bedrock formations composed largely of shale and siltstone.

Tables 9–1 and 9–2 show analyses of major and minor chemical constituents, respectively, in ground water samples from wells producing from the alluvium. Complete laboratory reports are provided in Appendix 9-A. Water is of the sodium-bicarbonate-sulfate type with total dissolved solids (TDS) of 325 to 748 mg/L (Brod and Stone 1981).

Table 9-1. Water Quality in Alluvium - Major Constituents

Roca Honda/San Mateo Area Ground Water Major Constituent Quality Data for Alluvium (mg/L unless otherwise specified)																				
WELL LOCATION																				
Well ID #	**Township (N)**	**Range (W)**	**Section**	**Data Source**	**Sample Date**	**Specific conductance (µmhos)**	**pH (s.u.)**	**Temp. °F**	**Hardness (mg/L as $CaCO_3$)**	**Alkalinity (as $CaCO_3$)**	**Ca (dissolved)**	**Mg**	**Na (dissolved)**	**K (dissolved)**	**Bicarbonate as HCO_3**	**Sulfate as SO_4**	**Cl**	**F**	**Silica as SiO_2**	**Nitrogen Nitrate as NO_3**	**TDS**
120	13	9	24	RH	8/06/2008	1218	7.13	67	ND	330	69	25	227	3	400	356	26	1.3	18.4	ND	
120				RH	11/16/2008	1206	7.71	53.5	ND	324	67	25	232	3	395	334	24	1.6	18.7	ND	603
120				RH	2/18/2009	1496	9.29	43	ND	442	10	4	313	4	472	273	34	2.8	8.7	ND	748
121	13	9	24	RH	8/18/2008	1573	9.16	56.6	ND	207	45	4	368	3	161	452	42	.5	1.1	ND	
21	13	8	22	RH	8/21/2008	601	6.99	60.15	ND	313	54	16	78	1	382	22	7	1.0	67.2	ND	
21				RH	11/08/2008	669	7.78	54.45	ND	328	56	16	86	1	401	26	7	1.1	70.9	ND	334
21				RH	2/11/2009	649	7.66	51.48	ND	340	41	15	81	ND	415	16	5	1.1	59.0	ND	325
115	13	9	22	RH	9/16/2008	765	7.10	56.41	ND	281	49	9	154	3	343	137	15	1.1	19.8	5.71	
115				RH	11/13/2008	875	7.78	57.5	ND	286	47	9	157	3	349	129	15	1.1	20.6	5.6	437
33	13	8	23	RH	9/22/2008				ND	443	71	17	263	2	540	300	39	.9	30.6	2.0	
33				RH	11/17/2008	1309	7.52	54.98	ND	421	71	17	264	2	349	264	34	.7	27.7	ND	655
131	14	8	25	D,E	10/23/1979	1,010	8	11.9 (°C)			75	69	70	1.7	454	202	18	0.8		0.09	672

Data Source:
A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper and John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
O OSE 2008
RH Roca Honda 2008, 2009

Table 9-2. Water Quality in Alluvium – Minor Constituents

Roca Honda/San Mateo Area Ground Water Minor Constituent Quality Data for Alluvium (µg/L unless otherwise specified)																										
Well ID #	**Township (N)**	**Range (W)**	**Section**	**Data Source**	**Sample Date**	**Ba** mg/L	**B** mg/L	**Se** mg/L	**Zn**	**Cu**	**Pb**	**As**	**Cr**	**Co**	**Mn**	**Fe**	**Cd**	**Ni**	**Mo**	**Hg**	**Ag**	**Al**	**Gross Alpha (pCi/L)**	**Ra-226 (pCi/L)**	**Ra-228 (pCi/L)**	**U (mg/L)**
120	13	9	24	RH	8/06/2008	ND	.2	ND	ND	ND	ND	ND	ND	ND	.07	ND	ND	ND	ND	ND	ND	ND	6.7	.41	.42	.0033
120				RH	11/16/2008	ND	.2	.0002	ND	ND	ND	.0001	ND	ND	.08	ND	ND	ND	ND	ND	ND	ND	8.2	.41	.25	.0031
120				RH	2/18/2009	ND	.5	ND	ND	ND	ND	ND	ND	ND	ND	.08	ND	ND	.01	ND	ND	ND	2.1	-.06	.71	ND
121	13	9	24	RH	8/18/2008	ND	.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.8	-.02	.27	ND
21	13	8	22	RH	8/21/2008	.1	ND	ND	ND	ND	ND	.003	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.8	.03	.31	.0049
21				RH	11/08/2008	ND	ND	.003	.1	ND	.1	.ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.4	.09	2.4	.0053
21				RH	2/11/2009	ND	ND	.003	.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.0	.71	.13	.0055
115	13	9	22	RH	9/16/2008	ND	.2	.026	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	205.	-.1	.32	.18
115				RH	11/13/2008	ND	.2	.026	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	228	-.1	.01	.166
33	13	8	23	RH	9/22/2008	ND	.3	.003	ND	ND	ND	ND	ND	ND	.26	.05	ND	ND	ND	ND	ND	ND	26.8	-.03	0	.0085
33				RH	11/17/2008	ND	.3	.002	ND	ND	ND	ND	ND	ND	.14	ND	ND	ND	ND	ND	ND	ND	13.7	-.3	.01	.008
131	14	8	25	D,E	10/23/1979	0.9	0.15	<0.002	250	10	20	<10	<20	<10	550	100	<5	<20	<50	<2	<5	200	<5	0.06±0.03	<1	<0.013

Data Source:
A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper and John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
Fa Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
O OSE 2008
RH Roca Honda, 2008, 2009

9.4.3 Menefee Formation

Within the Roca Honda permit area and the western part of the San Mateo Creek valley the Menefee Formation has been removed by erosion and does not crop out. It is present only in the extreme eastern part of the permit area beneath colluvium in the southeast part of Section 10. The formation is preserved east of the Fernandez monocline in the McCartys syncline. The formation crops out in places in the San Mateo Creek valley around the community of San Mateo.

The Menefee Formation is the uppermost unit of the Mesaverde Group present in the Roca Honda permit area. It is composed of shales interbedded with thin to thick sandstones and minor coal seams. The fine-grained, fluvial sandstone units constitute the aquifer beds. Logs from Mt. Taylor mine wells indicate that the thickness of the Menefee Formation is 767 ft in that area (RGRC 1994). Logs for domestic wells indicate that in the upper San Mateo Creek Valley, the Menefee Formation lies at the surface or under a veneer of alluvial material, and the thickness of the Menefee Formation penetrated was several hundred feet. However, it is noted that most of the wells did not penetrate the entire thickness of Menefee Formation.

Ground water is present within the Menefee Formation under slightly confined conditions in the area of the community of San Mateo and unconfined conditions a few miles to the west. The depth to water ranges from a few feet along the western outcrop area to several hundred feet in the community of San Mateo area. As shown on Figure 9–6, the movement of ground water within the Menefee Formation is topographically controlled. Ground water in the Menefee Formation moves westward through the formation, parallel to San Mateo Creek at a gradient of 150 ft per mile. Ground water from San Mateo Creek recharges the Menefee Formation in some areas. Ground water in the Menefee Formation probably moves laterally into the Point Lookout Sandstone at the outcrop contact between the units and downward into the Point Lookout Sandstone in the subsurface.

The Menefee Formation is a sufficiently productive aquifer for domestic and stock purposes within the upper San Mateo Creek valley, and a number of wells within the valley reportedly produce from the Menefee Formation. Production is small, probably from discrete sandstone beds, but the depth to water is relatively shallow and in this area the ground water quality is good. Brod and Stone (1981) estimated that the maximum yield of wells producing from the Menefee Formation is less than 0.05 cfs (22 gpm). Tables 9–3 and 9–4 present reported analyses of major and minor chemical constituents, respectively, in ground water samples from wells producing from the Menefee Formation. Complete laboratory reports are provided in Appendix 9-B. The water is of sodium-bicarbonate type with some sulfate. The TDS concentration in most samples ranged from 180 to 616 mg/L, although the TDS in Well #7 had a TDS of up to 3,320 mg/L.

GMRC performed aquifer tests using the pilot hole for the Mt. Taylor mine shaft and, though the Menefee Formation was not tested, it was concluded that it probably had transmissivity and hydraulic conductivity values similar to the Point Lookout Sandstone which, within the San Lucas Canyon area, was determined to have a hydraulic conductivity of 3.7 ft/day (Hydro-Search, Inc. and Jacobs Engineering Group, Inc. 1979). Stone et al. (1983) noted that the transmissivity of the Menefee Formation as calculated in aquifer tests depends largely on the total thickness of the sandstone units penetrated. They reported a range of transmissivity values for the Menefee Formation from 10 to 100 ft^2/day.

Table 9-3. Water Quality in Menefee Formation Wells – Major Constituents

Roca Honda/San Mateo Area Ground Water Major Constituent Quality Data For Menefee Formation (mg/L unless otherwise specified)																					
Well ID #	**Township (N)**	**Range (W)**	**Section**	**Data Source**	**Sample Date**	**Specific conductance (µmhos)**	**pH (s.u.)**	**Temp °F**	**Hardness (mg/L as $CaCO_3$)**	**Alkalinity (as $CaCO_3$)**	**Ca (dissolved)**	**Mg**	**Na (dissolved)**	**K (dissolved)**	**Bicarbonate as HCO_3**	**Sulfate as SO_4**	**Cl**	**F**	**Silica as SiO_2**	**Nitrogen Nitrate as NO_3**	**TDS**
27	13	8	23	RH	8/06/2008	505	6.82	68.73	224	250	72	11	38	4	310	21	6	.4	51.6	.07	338
27				RH	11/13/2008	498	7.38	56.39	196	249	63	10	34	4	304	20	6	.4	55.9	ND	330
27				RH	2/16/2009	499	7.73	46.60	179	248	57	9	35	4	302	18	6	.4	38.7	ND	250
87	13	8	25	RH	8/12/2008	587	7.78	68.89	83	309	21	7	135	2	377	23	4	1.8	18.9	.11	367
87				RH	11/12/2008	643	8.54	53.70	118	329	36	11	129	2	402	26	5	1.5	29.3	0.5	258
87				RH	2/16/2009	663	8.46	46.42	105	326	27	9	113	2	398	22	4	1.6	21.3	0.8	331
62	13	8	24	RH	8/20/2008	956	7.4	57.90	176	340	48	14	188	2	415	74	106	.6	14	.13	616
62				RH	11/11/2008	893	8.03	58.55	110	328	30	9	183	1	400	67	45	.6	13.8	0.1	520
62				RH	2/18/2009	834	8.39	55.17	76	320	20	6	156	1	371	62	35	0.6	10.1	0.1	417
100	13	8	28	RH	8/21/2008	378	6.97	56.59	64	130	18	5	39	9	158	13	13	.2	5.2	ND	181
100				RH	11/08/2008	404	7.81	50.93	108	187	29	9	39	11	228	6	8	.3	3.2	ND	229
100				RH	2/11/2009	418	7.56	53.93	124	208	33	10	35	8	254	6	4	0.5	26.6	ND	209
7	13	8	11	RH	9/17/2008	3742	8.3	62.45	50	976	14	4	1190	3	870	1260	92	2.8	14.9	.05	566
7				RH	11/16/2008	4759	9.53	55.35	37	1220	8	4	1260	5	918	1250	82	2.8	14.0	ND	3320
7				RH	2/16/2009	3976	8.69	55.02	65	803	18	5	986	4	947	1300	77	2.8	7.2	ND	1988
4	13	8	1	D,E	10/16/1979	1,050	8.3	14.4 (°C)			30	10	200	3.3	460	50	65	3.8		0.62	625
4				I	3/10/1978	960					4	17.8	89	4.6	386	90.5	19			0	494
9	13	8	14	A,I	10/11/1972	2,123	7.61				78.6	36	350	4.6	514.9	430	18.1	0.5	11.1	1.45	1,445
8	13	8	14	C	3/10/1976		8.6		20		5.4	1.6	370	1.7	456	277	12	4.5			476
10	13	8	17	I	8/23/1977	1,100					29	22	170	5.5	254	289	7.3			2.9	669
20	13	8	22	A,C	10/18/1972	332	7.86				6.1	2.1	60	1.3	217.2	8	4	0.56	24.8	0.02	324
20				C	3/9/1976		8.2		20		5.6	1.4	81	1.2	172	6.9	<2	0.62			222
20				C	Dec-76		7.8		31		5.5	1.9	75	<2	202	9		1.2			189
20				I	Aug-77	360					7	1.7	76	1.5	207	22	4.9		22	0.8	240
26	13	8	23	I	2/9/1978	460					45	3.2	21	3.3	188		5			0	172
31	13	8	23	A	10/17/1972	315	7.38				42.3	6.4	20	3.4	197.7	9.5	8	0.32	70.8	0.03	358
31				C	3/9/1976		7.4		113		41	4.9	20	2.8	136	12	8	0.22			214
31				C	Dec-76		7.2		153		49	8.1	25	3.6	226	20		0.64			253
31				I	Feb-78	310					40	6.1	20.1	3.3	188		0.14			0	169
42	13	8	24	I	2/21/1978	1,150					3	0.8	268	1.1	431	185	6			0	680
41	13	8	24	C	3/9/1976		8.8		11		3.4	0.97	270	1.3	300	199	8	1.3			702
41				I	3/9/1978	880					1.2	0.4	206	1.1	385	99	4			0.1	510
45	13	8	24	C	3/9/1976		8.4		16		5.1	1.4	165	1.2	363	82	3	1.7			534
45				C	Dec-76		8.5		9		2.3	0.61	220	0.82	380	99		2.2			513
48	13	8	24	A,B	9/10/1962	836	9	13.8 (°C)			1.6	0	206	0.9	379	70	4.2		12	0.4	674
48				A	10/17/1972	800	8.75				3	0.5	190	0.9	417.3	48.5	12	1.7	13	0.11	685
48				C	3/9/1976		8.9		4		1.1	0.17	205	0.71	250	69	6	1.7			478
48				C	Dec-76		7.8		63		9.7	2.8	300	1.4	552	165		4			731
56	13	8	24	I	2/9/1978	790					26.4	9.2	154	1.5	365	96	18			0	448
57	13	8	24	I	2/9/1978	1,000					74	25	131	1.5	381	169	42			13	647

Table 9-3. (Continued)

Roca Honda/San Mateo Area Ground Water Major Constituent Quality Data For Menefee Formation (mg/L unless otherwise specified)																						
Well ID #	**Township (N)**	**Range (W)**	**Section**	**1/4 1/4 1/4**	**Data Source**	**Sample Date**	**Specific conductance (µmhos)**	**pH (s.u.)**	**Temp °F**	**Hardness (mg/L as $CaCO_3$)**	**Alkalinity (as $CaCO_3$)**	**Ca (dissolved)**	**Mg**	**Na (dissolved)**	**K (dissolved)**	**Bicarbonate as HCO_3**	**Sulfate as SO_4**	**Cl**	**F**	**Silica as SiO_2**	**Nitrogen Nitrate as NO_3**	**TDS**
58	13	8	24	342	C	3/9/1976		7.9		65		19	4.4	165	1.4	285	104	5	0.73			462
58	13	8	24	342	C	3/10/1976		7.9		65		18	4.4	165	1.4	267	104	10	0.71			978
91	13	8	26	221	A,I	10/24/1972	964	8.25				3.1	0.9	258	1.3	654	9.9	8	3	17.5	0.27	953
89	13	8	26	221	I	Jul-76	729					54	27	74	3.1	375	71	10			1.4	460
92	13	8	26	222	I	2/21/1978	450					55	9.5	27	5.4	244	37	8			0.65	265
98	13	8	27	133	I	8/22/1977	850					4	1.4	205	2	502	1.1	15				531
133	14	8	25	212	D,E	10/13/1979	2,970	7.5	13.8 (°C)			205	73	460	15	785	1,120	20	0.3		0.13	2,299

Data Source:

A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper and John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
O OSE 2008
RH Roca Honda Resources, 2008, 2009

Table 9-4. Water Quality in Menefee Formation Wells - Minor Constituents

Roca Honda/San Mateo Area Ground Water Minor Constituent Quality Data For Menefee Formation (µg/L unless otherwise specified)																																				
Well ID #	**Town-ship (N)**	**Range (W)**	**Section**	**Data Source**	**Sample Date**	**Sr** mg/L	**Ba** mg/L	**B** mg/L	**Li** mg/L	**Si** mg/L	**Se** mg/L	**Zn**	**Cu**	**Pb**	**Bi**	**As**	**Cr**	**Co**	**Mn**	**Fe**	**Sb**	**Cd**	**Ni**	**Mo**	**Hg**	**Ag**	**Al**	**V**	**PO_4**	**Gross Beta** pCi/L	**Gross Alpha** pCi/L	**Ra-226** pCi/L	**Th-230** pCi/L	**Ra-228** pCi/L	**U** mg/L	**Sr-90** pCi/L
27	13	8	23	RH	8/06/2008		.2	ND			ND	0.15	0.06	ND		ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	-.02	5.5	-0.03	-0.2	0.03	0.0049	
27				RH	11/13/2008		.2	ND			ND	0.26	0.08	ND		ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	4.4	5.8	-0.07	-0.1	-0.2	0.0041	
27				RH	2/16/2009		0.2	ND			0.001	0.11	0.05	ND		ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	4.1	5.3	-0.006	-0.1	0.08	0.0054	
87	13	8	25	RH	8/12/2008		.2	0.4			ND	0.01	0.02	ND		.008	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	0.3	8.0	0.12	-0.2	0.39	0.0024	
87				RH	11/12/2008		0.1	ND			ND	0.02	0.04	ND		0.002	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	5.6	8.4	-0.2	0.1	-0.4	0.0015	
87				RH	2/16/2009		ND	0.3			ND	ND	0.01	ND		0.002	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	0.7	2.0	-0.08	-0.02	2.1	0.0016	
62	13	8	24	RH	8/20/2008		ND	ND			ND	0.03	ND	ND		ND	ND	ND	0.01	ND		ND	ND	ND	ND	ND	ND	ND	ND	0.6	4.2	-0.10	1.7	0.77	0.0109	
62				RH	11/11/2008		ND	0.1			ND	0.03	ND	ND		ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	-3.0	5.5	-0.03	0.0	-0.3	0.0027	
62				RH	2/18/2009		ND	0.1			ND	0.02	ND	ND		ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	ND	-2	3.5	0.0	-0.02	0.55	0.0016	
100	13	8	28	RH	8/21/2008		ND	ND			ND	ND	ND	ND		ND	ND	ND	0.01	ND		ND	ND	ND	ND	ND	ND	ND	ND	3.5	1.9	0.13	1.5	0.79	0.0005	
100				RH	11/08/2008		ND	ND			ND	ND	ND	ND		ND	ND	ND	0.30	ND		ND	ND	ND	ND	ND	ND	ND	ND	14.1	6.6	0.009	0.0	1.5	ND	
100				RH	2/11/2009		ND	ND			ND	ND	ND	ND		ND	ND	ND	0.10	ND		ND	ND	ND	ND	ND	ND	ND	ND	5.3	6.3	0.12	0.05	0.3	0.0036	
7	13	8	11	RH	9/17/2008		ND	0.2			ND	0.08	ND	ND		0.004	ND	ND	0.01	0.12		ND	ND	ND	ND	ND	ND	ND	ND	-7.0	6.9	-0.06	2.8	0.1	0.1999	
7				RH	11/16/2008		ND	0.05			ND	0.08	ND	ND		0.009	ND	ND	0.01	0.51		ND	ND	ND	ND	ND	ND	ND	ND	21.0	48.9	0.89	-0.5	0.14	0.0009	
7				RH	2/16/2009		ND	0.5			ND	0.05	ND	ND		ND	ND	ND	0.06	0.57		ND	ND	ND	ND	ND	ND	ND	ND	14.2	15.8	1.3	-0.2	0.3	0.001	
4	13	8	1	D,E	10/16/1979		0.2	0.3			<0.002	300	60	20		10	<20	<10	20	<10		<5	<20	<50	<2	<5	700		2.01		<6	0.13±0.03		<1	<0.006	
9	13	8	14	A	10/11/1972	1.5	<1	1.2	0.04	12		30	3.1	2.6	<0.5	<0.5		<1	115	9,000	<0.6	1.6	<1	<3	<1					<0.02						
8	13	8	14	C	3/10/1976		<0.5	0.73			<0.005	20	30	40		<10	<5		80	6,900		2				<2									<0.002	
20	13	8	22	A,C	10/18/1972	<0.2	<1	<0.1	0.03	17		60	5.9	<0.25	<0.5	13		<1	3	132	<0.6	1.9	<1	<3	<1					<0.02						
20				C	3/9/1976		<0.3	0.1				30	<5	10		<10	40		8	640		<2				<5									<0.002	
20				C	Dec-76		0.5	0.1				30	<5	<10		<10	<5		<2	30		<2				<2									0.005	
26	13	8	23	A	10/17/1972	0.5	<1	<0.1	0.03	33		138	30	1.4	<0.5	<0.5		<1	0.8	90	<0.6	3	<1	<3	<1					<0.02						
26				C	3/9/1976		<0.5	<0.1			<0.005	170	<5	<10		<1	<5		<2	40		<2				<2									<0.002	
26				C	Dec-76		<0.5	0.1			<0.005	240	10	20		<10	<5		<2	100		<2				<2									0.004	
41	13	8	24	C	3/9/1976		<0.5	0.31			<0.005	220	<5	10		<10	<5		20	490		<2		<10		<2		<1							0.002	
41	13	8	24	C	3/9/1976		<0.1	0.3			<0.01	370	<3	<1		<10	9		24	800		<1		2		<1		<10							0.0053	
45	13	8	24	C	3/9/1976		<0.5	0.42			<0.005	80	<5	90		<190	<5		10	200		<2		50		<2		<1		2±9	2.3±2.0	0.1±0.2	0.0±0.4		<0.002	
45				C	Dec-76		<0.5	0.3			<0.005	60	<10	10		<10	<5		8	150		<2		<10		<2		<2		6±10	0.9±1.5	0.0±0.2	0.0±0.1	2±3	0.004	
48	13	8	24	A,B	9/10/1962																															
48				A	10/17/1972	<0.2	<1	0.7	0.03	11		30	7.6	<0.25	<0.5	<0.5		<1	2.4	170	<0.6	0.5	<1	<3	<1					<0.02						
48				C	3/9/1976		<0.5	0.5			<0.005	40	<5	<10		<10	<5		5	60		<2				<2									<0.002	
48				C	Dec-76		<0.5	0.4			<0.005	1,000	30	30		30	<5		7	330		<2				<2									<0.002	

Table 9-4. (Continued)

Roca Honda/San Mateo Area Ground Water Minor Constituent Quality Data For Menefee Formation (µg/L unless otherwise specified)																																				
Well ID #	Town-ship (N)	Range (W)	Section	Data Source	Sample Date	Sr mg/L	Ba mg/L	B mg/L	Li mg/L	Si mg/L	Se mg/L	Zn	Cu	Pb	Bi	As	Cr	Co	Mn	Fe	Sb	Cd	Ni	Mo	Hg	Ag	Al	V	PO_4	Gross Beta pCi/L	Gross Alpha pCi/L	Ra-226 pCi/L	Th-230 pCi/L	Ra-228 pCi/L	U mg/L	Sr-90 pCi/L
62	13	8	24	A,B	9/10/1962																															
62				C	3/9/1976		<0.5	0.2			<0.005	80	<5	10		<10	<5		5	30		<2				<2									0.002	
62				C	Dec-76		<0.5	0.2			<0.005	350	50	90		<10	<5		<2	50		<2				<2									0.008	
58	13	8	24	C	3/9/1976		<0.5	0.11			<0.005	150	20			<10	<5		20	170		<2				<2									<0.002	
58	13	8	24	C	3/10/1976		<0.5	0.13			<0.005	170	20	10		<10	<5		30	270		<2				<2									<0.002	
68	13	8	24	C	8/26/1976		0.4	0.2				4	?	<1		<10	<1		13	129		<1		<1						0±1		3.62±1.29		3.7±1.8		0±0.3
80	13	8	25	A	10/11/1972	<0.2	<1	<0.1	0.03	16		295	24	8.4	<0.5	<5		<1	1	1,550	<0.6	6.4	<1	<3	<1					<0.02						
91	13	8	26	A,B	9/11/1962																															
91				A	10/24/1972	<0.2	<1	1.3	0.03	20		740	120	2.5	<0.5	26		<1	35	4,300	<0.6	3.8	<1	<3	<1					<0.02						
133	14	8	25	D,E	10/13/1979		1	0.85			<0.002	620	20	30		<10	<20	<10	530	170		<5	<20	<50	<2	<5	100				<7	2.9±0.03		<1	<0.006	

Data Source:

A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper & John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
O OSE 2008
RH Roca Honda Resources 2008, 2009

9.4.4 Point Lookout Sandstone

The Point Lookout Sandstone underlies the Menefee Formation and is another unit of the Upper Cretaceous Mesaverde Group. The Point Lookout Sandstone is a very fine- to medium-grained sandstone with thin interbeds of dark shale in the lower part (Craigg 2001). In the Roca Honda permit area, the sandstone is dense, with low primary permeability. Logs from Mt. Taylor mine wells indicate that the Point Lookout Sandstone in that area consists of two sandstone units, each 115 ft thick, separated by the Satan Tongue of the Mancos Shale (RGRC 1994). Within the middle San Mateo Valley, the Point Lookout Sandstone crops out in a northeast-striking band about 2 miles west of the community of San Mateo. This outcrop band along the Fernandez monocline passes through Sections 9 and 10 of the Roca Honda permit area. The formation dips eastward beneath the Menefee Formation.

Ground water moves eastward through sandstones of the Point Lookout Sandstone under both unconfined and confined conditions. Recharge enters the fractured sandstone along San Mateo Creek where it flows over the outcrops, along the Fernandez monocline where the formation crops out extensively, and likely from inter-formation movement of ground water from the Menefee Formation. Well and water level data indicate that as ground water within the Point Lookout Sandstone moves downdip eastward, it becomes confined. There are insufficient data to create a potentiometric surface for the Point Lookout Sandstone in the immediate vicinity of the permit area.

The Point Lookout Sandstone is an aquifer in the area of the community of San Mateo, likely because fracturing and faulting has enhanced permeability. The Point Lookout Sandstone is reported to yield up to 0.1 cfs (50 gpm) to wells, though smaller rates are more common. Ground water in the Point Lookout Sandstone is a sodium bicarbonate water, similar to that of the Menefee Formation but lacking sulfate and magnesium. It contains from 200 to 650 mg/L TDS concentration. Tables 9–5 and 9–6 present analyses of major and minor chemical constituents, respectively, in ground water samples from wells producing from the Point Lookout Sandstone. Complete laboratory reports are provided in Apendix 9-C. The Point Lookout Sandstone is present at the surface within the Roca Honda permit area (see Figure 7–3, Section 7.0, Geology). It is likely not saturated within the permit area, but may capture recharge on the eastern side of the Fernandez monocline.

The GMRC performed aquifer tests using the pilot hole for the Mt. Taylor mine shaft, and found the Point Lookout Sandstone to have a transmissivity of 200 ft^2/day and a hydraulic conductivity of 1.5 ft/day (Brod and Stone 1981). Within the San Lucas Canyon area, the Point Lookout Sandstone was determined to have a hydraulic conductivity of 3.7 ft/day (Hydro-Search, Inc., and Jacobs Engineering Group, Inc. 1979). Stone et al. (1983) reported that a test by Dames and Moore northeast of Crownpoint gave a transmissivity of about 240 ft^2/day for the main body of the Point Lookout Sandstone and a transmissivity of about 70 ft^2/day for the Hosta Sandstone Tongue.

Table 9-5. Water Quality in Point Lookout Sandstone Wells - Major Constituents

Roca Honda/San Mateo Area Ground Water Major Constituent Quality Data for Point Lookout Sandstone (mg/L unless otherwise specified)																				
Well ID #	**Township (N)**	**Range (W)**	**Section**	**Data Source**	**Sample Date**	**Specific Conductance (micromhos)**	**pH (s.u.)**	**Temp. °F**	**Hardness (mg/L as $CaCO_3$)**	**Ca (dissolved)**	**Mg**	**Na (dissolved)**	**K (dissolved)**	**Bicarbonate as HCO_3**	**Sulfate as SO_4**	**Cl**	**F**	**Silica as SiO_2**	**Nitrogen Nitrate as NO_3**	**TDS**
90	13	8	26	RH	8/11/2008	404	8.03	68.98	18	5	1	101	1	253	2	1	1.0	18.4	ND	249
90				RH	11/10/2008	430	8.92	56.07	16	4	1	104	1	259	3	1	1.0	14.2	ND	258
90				RH	2/16/2009	992	9.03	65.75	11	3	ND	229	1	531	44	8	3.3	8.6	ND	626
22	13	8	22	RH	8/21/2008				21	6	2	68	1	192	6	ND	0.6	14.2	ND	204
22				RH	11/13/2008	316	8.53	57.97	22	6	2	78	1	200	6	ND	0.6	14.4	0.2	212
22				RH	1/11/2009	323	8.76	55.32	18	4	0.6	77	1	210	4	ND	0.6	11.7	ND	221
102	13	8	33	RH	9/24/2008				15	4	ND	311	2	670	ND	4	7.6	12.3	ND	655
102				RH	11/08/2008	706	8.82	52.53	12	3	1	195	2	443	ND	3	3.3	15.5	ND	446
102				RH	2/11/2009	837	8.83		10	2	ND	192	2	537	ND	4	5.0	11.4	ND	554
66	13	8	24	C	3/8/1976		8.2		24	6.4	1.8	78	1.3	174	6	2	0.63			276
66				C	Dec-76		7.8		26	5.5	2	75	1.3	197	7		1.2			
66				C	Dec-76		8.45		64.4	5.11	1.84	89	<0.1	176	<1		0.46			
78	13	8	25	A	10/11/1972	509	7.4			22.6	5.7	70.1	21.9	263.6	11.5	17	0.72	20.6	0.84 (total Nitrogen)	434
78				C	3/10/1976		7.4		149	44	10	44	2.7	184	40	16	0.4			320
90	13	8	26	A,B,C,I	9/11/1962	808	8.1	13.8 (°C)		74	24	76	3	365	103	22		14	14 (total Nitrogen)	695
102	13	8	33	C	6/1/1972	730	8		29	6.4	3.2	170	1.2	348	83	10				490
103	13	8	33	I	8/2/1977	940				2	0.4	218	4		10	20			0	538
122	14	7	34	E	Mar-July, 1979		7.1		260	130	41	64	3		400	6.7	0.79	7.3	<0.1 (N)	850
132	14	8	25	D,E	10/18/1979	909	7.9	14.7 (°C)		75	27	109	3	419	156	10	0.2		0.04	595

Data Source:

A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper and John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
O OSE 2008
RH Roca Honda Resources 2008, 2009

Table 9-6. Water Quality in Point Lookout Sandstone Wells - Minor Constituent

Roca Honda/San Mateo Area Ground Water Minor Constituent Quality Data for Point Lookout Sandstone (µg/L unless otherwise specified)

Well ID #	Town-ship (N)	Range (W)	Section	Data Source	Sample Date	Ba mg/L	B mg/L	Si mg/L	Se mg/L	Zn	Cu	Pb	As	Cr	Co	Mn	Fe	Cd	Ni	Mo	Hg	Ag	Al	V	Gross Beta pCi/L	Gross Alpha pCi/L	Ra-226 pCi/L	Th-230 pCi/L	Ra-228 pCi/L	U mg/L
90	13	8	26	RH	8/11/2008	ND	0.2			0.09	0.02	ND	ND	ND	ND	ND	0.03	0.03	ND	ND	ND	ND	ND		-2.0	0.3	0.24	0.1	2.1	ND
90				RH	11/10/2008	0.4	0.1			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		6.7	6.0	0.01	0.0	0.32	ND
90				RH	2/16/2009	ND	0.4			ND	0.01	ND	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		0.7	2.0	-0.08	-0.02	2.1	0.0016
22	13	8	22	RH	8/21/2008	ND	0.4			0.02	ND	ND	ND	ND	ND	0.01	0.06	ND	ND	ND	ND	ND	ND		-0.6	0.9	0.31	1.2	1.1	ND
22				RH	11/13/2008	0.3	ND			0.03	ND	ND	ND	ND	ND	ND	.03	ND	ND	ND	ND	ND	ND		-0.06	0.8	0.24	0.0	0.57	ND
22				RH	1/11/2009	0.3	ND			0.02	ND	ND	ND	ND	ND	ND	0.04								-0.9	1.5	0.28	-0.05	0.22	ND
102	13	8	33	RH	9/24/2008	0.2	0.5			0.09	ND	ND	0.001	ND	ND	0.02	0.04	ND	ND	ND	ND	ND	ND		-3.0	1.5	0.08	0.6	-0.2	ND
102				RH	11/08/2008	ND	0.5			0.05	ND	ND	0.001	ND	ND	ND	0.25	ND	ND	ND	ND	ND	ND		-2	0.4	-0.01	-0.5	1.6	ND
102				RH	2/11/2009	0.1	0.4			0.06	ND	ND	0.002	ND	ND	ND	0.09	ND	ND	ND	ND	ND	ND		-0.5	0.5	0.06	0.1	1.3	ND
66	13	8	24	C	3/8/1976	<0.5	0.11		<0.005	20	80	20	<10	<5		10	1,200	<2				<2			2±6	1.1±1.0	0.4±0.3	0.0±0.4		<0.002
66				C	Dec-76	0.5	0.1		<0.005	6	<5	10	<10	<5		6	110	<2				<2			0±6	2.3±1.3	0.0±0.3	0.0±0.2	0±3	0.004
102	13	8	33	C	6/1/1972	<0.1		13.3								<50	<100			<20										
122		14	7	E	Mar–Jul 1979	0.06	<0.2	7.3	<0.01	1100	<10	<50	<10	<10	<20	<10	2,400		<10	<50	<1	<20	<100	<10	10±2	<3	0.06±0.02		2±1	
123	14	7	19	C	3/9/1976	<0.5	0.13			5	<5		<10	<5		6	180	<2							1±6	0.3±0.6	0.3±0.7	0.0±0.4		<0.002
132	14	8	25	D,E	10/18/1979	0.45	0.25		<0.002	260	5	10	<10	<20	<10	20	<10	<5	<20	<50	<2	<5	<100			<7	0.41±0.03		2±1	<0.006

Note: There were no results for Sr, Sb, Li, Bi, PO^4, cyanide, Pb-210 (by analysis of Po-210), or Sr-90.

Data Source:

A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper & John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
O OSE 2008
RH Roca Honda Resources 2008, 2009

9.4.5 Crevasse Canyon Formation

A unit of the Mesaverde Group, the Crevasse Canyon Formation is divided into three members, in descending order: the Gibson Coal, the Dalton Sandstone, and the Dilco Coal (Stone et al. 1983). The Dalton Sandstone Member is the most permeable unit and consists of interbedded sequences of lenticular sandstone, siltstone, shale, and claystone with carbonaceous shale and coal common in the lower and upper parts (Craigg 2001). In the area of the community of San Mateo, the Dalton Sandstone Member is generally a clean, white to buff, massive fine- to medium-grained sandstone that is as much as 70 ft thick (NMEI 1974). The unit lies approximately 500 ft below land surface in the San Mateo Creek valley, and wells in that area do not appear to produce from the Dalton Sandstone Member, probably because sufficient water is available in the shallower Menefee Formation and the Point Lookout Sandstone. The Gibson Coal and Dilco Coal Members contain more coal and shale, and are less permeable. NMEI (1974) reports that the Dilco Coal Member is about 90 ft thick and the Gibson Coal Member is about 165 ft in the area of the Mt. Taylor mine.

The Dalton Sandstone is exposed in Sections 9 and 16 of the Roca Honda permit area along the Fernandez monocline, but is probably not saturated. There are insufficient data to contour the potentiometric surface in the Dalton Sandstone Member, but it is highly likely that ground water within it moves northeastward where the formation is saturated.

Brod and Stone (1981) report that a stock well producing from the Dalton Sandstone Member northeast of San Mateo Mesa has sodium sulfate water with a TDS of 4,500 mg/L. Stone et al. (1983) report that in other parts of the San Juan basin, TDS concentrations in the Dalton Sandstone Member are approximately 2,000 mg/L.

Brod and Stone (1981) note that because of the lower concentration of matrix material, the sandstone units in the Dalton Sandstone Member can be expected to have a higher intergranular permeability than the Point Lookout Sandstone. Stone et al. (1983) report that the transmissivity of the Dalton Sandstone Member is probably less than 50 ft^2/day, and note that Dames and Moore reported a possible transmissivity range for the Dalton Sandstone Member of 10 to 30 ft^2/day (Stone et al. 1983). As part of its alternative sites analysis, GMRC extensively evaluated the field permeability of the Dilco Coal Member in the area of La Polvadera Canyon and the area of the community of San Mateo. It was determined that the Dilco Coal Member had a weighted average permeability (hydraulic conductivity) of 4.43 ft/yr in La Polvadera Canyon and 5.3 ft/yr in the area of the community of San Mateo, with a range of 0 to 56 ft/yr. The transition zone between the Dilco Coal Member and the underlying Gallup Sandstone had a permeability range of 0 to 1,200 ft/yr (GMRC 1979a).

9.4.6 Gallup Sandstone

The Gallup Sandstone is predominantly a fine-to medium-grained arkosic sandstone with some conglomerate, shale, and coal (Stone et al, 1983 and Dam 1995). It lies conformably on the main body of the Mancos Shale. The thickness of the Gallup Sandstone ranges from approximately 600 ft in the outcrop area along the southern margin of the San Juan basin to 0 ft along a northwest-trending pre-Niobrara erosion limit in the center of the basin (Stone et al. 1983 and Dam 1995). In the Roca Honda permit area, the Gallup Sandstone is composed of two sandstone units totaling approximately 85 ft thick, split by approximately 20-ft of the Pescado Tongue of the Mancos Shale. The Pescado Tongue of the Mancos Shale probably causes a hydraulic separation between the two sandstone units. The Gallup Sandstone is 265 ft thick in the area of the Mt. Taylor mine (RGRC 1994). The top of the Gallup is at an elevation of about 6,700 - 6,900 ft in Section 16 of the permit area, which is about 450 ft below land surface, according to RHR's geophysical logs for holes S-2, S-3, and S-4. Ground water is present in the Gallup Sandstone under unconfined conditions along the southern margin of the San Juan basin and under confined conditions farther into the basin. Although the aquifer is relied on in some areas, providing the municipal supply of the towns of Gallup and Crownpoint to the northwest and the community of Marquez to the east, in general the depth and poor quality of the ground water make it an undesirable water supply target. Discharge from 49 water wells completed in the Gallup Sandstone ranged from 0.002 to 1.4 cfs (1 to 645 gpm), with a median production rate of 0.09 cfs (42 gpm). Reported specific capacity ranged from 0.12 to 2.10 gpm/ft (Kernodle 1996).

Two unused wells in the San Mateo/Roca Honda area that may penetrate the upper Gallup Sandstone are in Section 17, T13N R8W and in Section 36, T14N R9W. The water levels in these wells are 100 to 200 ft below land surface at elevations of 7,092 and 7,132 ft, respectively. The Lee Ranch has recently drilled an irrigation well in Section 23 of T13N R8W that may produce partially from the Gallup Sandstone. It is expected that ground water will be present in the Gallup Sandstone aquifer under confined conditions in the Roca Honda permit area. Insufficient data are available to contour the potentiometric surface of the Gallup Sandstone aquifer in the Roca Honda permit area. Because ground water in the formation is deep and of poor quality, Brod and Stone (1981) do not consider the Gallup Sandstone an aquifer in the Ambrosia Lake/San Mateo area.

Table 9-7 and 9-8 present summary analyses of major and minor constituents in Gallup Sandstone ground water, Appendix 9-D includes the complete laboratory reports.

Ground water in the Gallup Sandstone within the Roca Honda permit area vicinity is a sodium-bicarbonate water which has a TDS of about 550 mg/L. One of the wells sampled under the RGWSP is also high in sulfate.

Aquifer tests performed at 17 wells in the San Juan basin indicated that the transmissivity of the Gallup Sandstone ranged from 15 to 390 ft^2/day, with a median value of 123 ft^2/day. Values of storage coefficient ranged from 2×10^{-6} to 3.3×10^{-5} (Kernodle 1996). Lyford and Frenzel (1979) indicate that in the Roca Honda permit area, the transmissivity of the Gallup Sandstone is less than 100 ft^2 per day. As part of its alternative sites analysis, GMRC extensively evaluated the field permeability of the Gallup Sandstone in the area of La Polvadera Canyon and the San Mateo area. It was determined that the Gallup Sandstone had a weighted average permeability (hydraulic conductivity) of 8.8 ft/yr in La Polvadera Canyon and 31 ft/yr in the San Mateo area, with a range of 0 to 70 ft/yr.

Table 9-7. Water Quality in Gallup Sandstone Wells - Major Constituents

Roca Honda/San Mateo Area Ground Water Major Constituent Quality Data For Gallup Sandstone (mg/L unless otherwise specified)

WELL LOCATION				Source Data	Sample Date	Specific conductance (μmhos)	pH (s.u.)	Temp °F	Hardness (mg/L as $CaCO_3$)	Alkalinity (as $CaCO_3$)	Ca (dissolved)	Mg	Na (dissolved)	K (dissolved)	Bicarbonate as HCO_3	Sulfate as SO_4	Cl	F	Silica as SiO_2	Nitrogen Nitrate as NO_3	TDS
Well ID #	Township (N)	Range (W)	Section																		
32	13	8	23	RH	8/21/2008	797	8.41	61.57	6	470	2	ND	237	1	496	8	4	2.9	19.6	ND	546
16	13	8	17	RH	8/25/2008	947	7.92	60.80	213	240	32	32	169	5	293	285	7	0.5	8.3	0.6	647
16				RH	11/13/2008	961	8.61	56.10	173	215	24	28	172	5	250	265	6	0.4	6.8	ND	610
16				RH	2/12/2009	932	8.92	55.77	165	201	17	22	152	6	245	258	5	0.4		0.5	613

Data Source:

A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper and John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
RH Roca Honda Resources 2008, 2009

Table 9-8. Water Quality in Gallup Sandstone Wells - Minor Constituent

Roca Honda/San Mateo Area Ground Water Minor Constituent Quality Data For Gallup Sandstone (µg/L unless otherwise specified)																											
WELL LOCATION				**Source Data**	**Sample Date**	**Ba** mg/L	**B** mg/L	**Se** mg/L	**Zn**	**Cu**	**Pb**	**As**	**Cr**	**Co**	**Mn**	**Fe**	**Cd**	**Ni**	**Mo**	**Hg**	**Ag**	**Al**	**Gross Alpha** pCi/L	**Ra-226** pCi/L	**Th-230** pCi/L	**Ra-228** pCi/L	**U** mg/L
Well ID #	**Township (N)**	**Range (W)**	**Section**																								
32	13	8	23	RH	8/21/2008	ND	0.4	ND	ND	ND	ND	ND	ND	ND	0.01	0.06	ND	ND	ND	ND	ND	ND	2.2	0.13	1.8	1.2	ND
16	13	8	17	RH	8/25/2008	ND	.03	ND	.02	ND	ND	ND	ND	ND	.02	ND	ND	ND	ND	ND	ND	ND	3.9	0.85	0.7	1.1	ND
16				RH	11/13/2008	ND	.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.7	0.32	-0.2	-0.05	ND
16				RH	2/12/2009	ND	0.4	ND	0.05	0.01	ND	ND	ND	ND	0.08	13.8	ND	ND	ND	ND	ND	ND	6.0	0.71	0.04	0.13	ND

Data Source:

A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper and John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
RH Roca Honda Resources 2008, 2009

9.4.7 Dakota Sandstone

In the San Juan basin, the Dakota Sandstone is a sequence of sandstone, mudstone, and coal. The generally fine- to medium-grained arkosic sandstones contain limited amounts of ground water except where secondary permeability has been created by faults or where the sandstone layers are thinly bedded rather than massive (Brod and Stone 1981). GMRC described the Dakota Sandstone in the area of the Mt. Taylor mine as “yellow-gray, massive, well-cemented quartz sandstone, locally interbedded with carbonaceous shales and conglomerates.” It was noted that the Dakota Sandstone is locally hydraulically connected to the underlying Westwater Canyon Member of the Morrison Formation (GMRC 1979a). Core logs indicate that in the permit area, the Dakota Sandstone has an average thickness of about 50 ft. In the area of the Mt. Taylor mine, a thickness of 58 ft was reported (RGRC 1994). The top of the Dakota Sandstone is at an elevation of about 5,600 to 5,400 ft in the permit area. In the “Geologic Map of the San Mateo Quadrangle,” Santos (1966) contours the base of the Dakota Sandstone.

Along the southern margin of the San Juan basin, ground water is present in the Dakota Sandstone under unconfined conditions; farther into the basin, ground water in the Dakota Sandstone is confined. Some investigators note that under pre-development conditions the hydraulic head of ground water in the Dakota Sandstone was 200 ft higher than that in the Morrison Formation aquifer. Such changes in hydraulic head appear to be localized (Stone et al. 1983, Kelley et al. 1980, Cooper and John 1968, and Dam 1995). Stone et al. (1983) speculate that because the recharge areas for the Dakota Sandstone and the Morrison Formation are at similar elevations, the original head difference probably reflected more lateral flow in the Morrison Formation because of higher transmissivities or more continuity of the sandstones. They suggest that the persistence of the hydraulic head differences in other parts of the San Juan basin indicate that the vertical permeability of the confining layer between the two units is low (Stone et al. 1983).

A few wells may produce from the Dakota Sandstone for stock watering purposes north of the Roca Honda permit area. A few wells penetrate the Dakota Sandstone in the south-central part of the San Juan basin, but most wells do not produce solely from the Dakota Sandstone because water of superior quality is available within a short drilling distance in the underlying Westwater Canyon Member of the Morrison Formation. Wells producing from the Dakota Sandstone yield from 0.002 to 0.17 cfs (1 to 75 gpm), with a median value of 0.3 cfs (12 gpm) (Kernodle 1996). GMRC (1979a) noted that its depressurization wells for the Mt. Taylor mine had produced water at a rate of more than 0.22 cfs (100 gpm) from the Dakota Sandstone, and RHR encountered significant quantities of ground water in the Dakota Sandstone during drilling of deep monitor wells on the south side of Jesus Mesa.

Because most historic wells which penetrate the Dakota Sandstone are completed in multiple aquifers, water quality data are sparse for the Dakota Sandstone alone. Brod and Stone (1981), and Kelley et al. (1980) report that water in the Dakota Sandstone is typically sodium-sulfate water, with a TDS in the range of 600 to 1,400 mg/L. Within the Roca Honda permit area vicinity no wells are finished exclusively in the Dakota Sandstone and no water quality data area available. Transmissivity values of 44 to 85 ft^2/day and hydraulic conductivities of 0.7 to 1.5 ft/day have been reported for the Dakota Sandstone from aquifer tests northeast of Crownpoint, though transmissivities for this formation are generally less than 50 ft^2/day (Stone et al. 1983). Kernodle (1996) reports that a transmissivity of 2,000 ft^2/day was measured in a test east of

Grants. GMRC determined a transmissivity of 134 ft^2/day and a hydraulic conductivity of 1.6 ft/day for the Dakota Sandstone (Brod and Stone 1981). Specific capacities in 13 wells completed in the Dakota Sandstone ranged from 0.03 to 3.67 gpm/ft (Kernodle 1996).

9.4.8 Morrison Formation

The Morrison Formation consists of fine- to coarse-grained, locally conglomeratic sandstone, sandy siltstone, shale, and claystone that contains thin beds of limestone. In the San Juan basin, the Morrison Formation consists of five members, in ascending order: the Salt Wash, Recapture, Westwater Canyon, Brushy Basin, and Jackpile Sandstone (Craigg 2001). Although coarser-grained units within each of the members function as aquifers, the numerous shaley and clayey zones within the members act as aquitards. The Westwater Canyon Member is a sequence of non-marine sandstone, conglomeratic sandstone, and mudstone deposited by a braided stream complex. The sandstones are mainly a yellow-gray to pale-red, fine- to medium-grained, poorly sorted to unsorted, arkose to lithic arkose (NMEI 1974). Geophysical logs indicate that the thickness of the Westwater Canyon Member in the vicinity of the Roca Honda permit area ranges from 100 to 250 ft.

Recent drilling in the Roca Honda permit area has determined that the Westwater Canyon Member contains large quantities of ground water under confined conditions. Ground water in the member rose to an elevation of 6,370 ft, within 850 to 900 ft of land surface, although the top of the Westwater Canyon Member is between 1,700 and 1,850 ft below land surface on the south side of Jesus Mesa, or 5,400 to 5,700 ft in elevation. This aquifer is referred to as the “deep confined aquifer” in Section 9.1.2, “Hydrogeology of General Permit Area Locality.” Ground water movement in this aquifer is eastward with a gradient of about 50 ft per mile. Figure 9–5 shows the potentiometric surface for the deep confined aquifer in the Roca Honda/San Mateo area. Figures 9-6 and 9-7 show the potentiometric surface in the permit area.

Brod and Stone (1981) report that the highest measured permeability for the Westwater Canyon Member in the San Juan basin was near the community of San Mateo near the San Rafael fault zone along the Fernandez monocline. In that area, GMRC calculated hydraulic conductivity as 3.2 ft/day and transmissivity as 494 ft^2/day. They note that this value is 100 times the value determined in laboratory tests, because of the effect of fracturing. Hydraulic conductivity typically ranges from about 0.5 to 1.5 ft/day, though a few much higher and lower values have been reported. Lyford and Frenzel (1979) indicate that the range of transmissivity for the Morrison Formation in the Roca Honda permit area is 200 to 300 ft^2 per day. Kernodle (1996) reports that within the San Juan Basin, transmissivity, storage coefficient, and hydraulic conductivity values are available for the Morrison Formation from 31 aquifer tests. Transmissivity ranged from 2 to 480 ft^2/day with a median value of 115 ft^2/day, hydraulic conductivity for three of these wells ranged from 0.035 to 0.39 ft/day, and storage coefficient values calculated for nine wells ranged from $2{\times}10^{-4}$ to $2{\times}10^{-5}$ (Kernodle 1996). Kernodle calibrated his steady-state model of ground-water flow within the San Juan Basin using a horizontal hydraulic conductivity of .1 and vertical hydraulic conductivity of .001 for the Morrison Formation.

Wells completed in the Westwater Canyon Member have been pumped at rates between 0.02 and 1.25 cfs (10 and 560 gpm), with typical values of around 0.22 cfs (100 gpm). The GMRC reported that its Mt. Taylor dewatering wells pumped several hundred gpm from the Westwater Canyon Member and that a well at the mine was pumped at a rate of 0.89 cfs (400 gpm) for industrial use. Specific capacity is only moderate, and pumping at high rates will cause large drawdowns.

Table 9-9 and Table 9-10 present summary analyses of major and minor constituents in Westwater Canyon Member wells. Complete laboratory reports are included in Appendices 9-E and 9-F. Water quality data collected during the RGWSP indicates that water quality in the Westwater Canyon Member in the vicinity of the Roca Honda permit area is variable. Water collected from RHR monitor wells S-1, S-3 and S-4, drilled within the permit area, indicate that in the permit area the TDS is about 500 mg/L, and the water is a sodium-sulfate-bicarbonate water. The ground water collected from Westwater Canyon Member wells along San Mateo Creek has a TDS of about 3,300 mg/L, is high in sulfates, and high in calcium and sodium. Historical data from other wells located in the vicinity of the permit area show a similar water quality. Table 9-11 presents analyses of major and minor constituents in GMRC Westwater Canyon Member.

Where the Westwater Canyon Member and the Dakota Sandstone are hydraulically separated, ground water quality in the Dakota Sandstone is generally significantly poorer than ground water quality in the Westwater Canyon Member at the same location. In the Roca Honda permit area where that faulting has facilitated inter-formational movement of ground water, it is expected that the water quality in the two formations will be similar (Brod and Stone 1981). Table 9–12 presents water quality analyses for mine dewatering water pumped from three mines near the permit area. The quality of ground water pumped from the permit area will be similar.

9.4.9 Summary of Aquifer Characteristics

Table 9-13 summarizes the physical and hydraulic characteristics of the aquifers in the San Mateo Creek area, Roca Honda permit area, and the San Juan basin. The probable thicknesses in the Roca Honda permit area were determined from drilling conducted by RHR and previous exploration companies within the area.

Table 9-9. Water Quality in Westwater Canyon Member Wells - Major Constituents

Roca Honda/San Mateo Area Ground Water Major Constituent Quality Data For Westwater Canyon Member (mg/L unless otherwise specified)																					
WELL LOCATION				Source Data	Sample Date	Specific conductance (μmhos)	pH (s.u.)	Temp °F	Hardness (mg/L as $CaCO_3$)	Alkalinity (as $CaCO_3$)	Ca (dissolved)	Mg	Na (dissolved)	K (dissolved)	Bicarbonate as HCO_3	Sulfate as SO_4	Cl	F	Silica as SiO_2	Nitrogen Nitrate as NO_3	TDS
Well ID #	Township (N)	Range (W)	Section																		
116				RH	8/19/2008	3458	6.48	63.94	1960	175	544	146	236	2		2080	57	0.6	15.6	19.7	3290
116				RH	11/13/2008	3374	6.89	51.51	1890	175	518	144	240	6	213	1970	52	0.7	16.9	21.3	3330
116				RH	2/10/2009	3467	7.31	50.43	1930	172	538	142	240	6	210	1940	48	0.7	18.3	20.1	3310
114				RH	9/18/2008	3246	6.64	59.44	1770	175	504	125	208	10	213	1910	51	0.5	20.0	24.3	3140
114				RH	2/18/2009	3376	7.79	53.44	1870	188	524	135	215	11	229	1880	48	0.5	18.8	19.2	3210
113				RH	9/22/2008	3327	6.59	60.61	1980	168	548	147	236	7	205	2090	52	0.5	21.9	24.6	3320
113				RH	11/10/2008	3665	7.42	52.34	1960	173	539	148	224	6	212	2030	34	0.5	20.0	19.8	3280
113				RH	2/12/2009	3430	7.59	54.27	1840	168	507	138	231	6	205	2010	48	0.6	18.3	22.3	3440
138				RH	9/23/2008				1970	167	542	151	221	9	204	2040	51	0.3	22.7	22.8	3290
S1				RH	11/06/2008	798	8.16		63	176	19	4	169	3	203	204	4	0.7	29.2	ND	509
S1				RH	2/17/2009	722	8.06		48	171	14	3	139	2	200	205	3	0.7	20.2	ND	526
S4				RH	11/05/2008	775	7.93		99	177	31	5	137	3	205	201	3	0.6	27.8	ND	523
S4				RH	3/05/2009	762	8.2		85	176	26	5	126	3	214	194	2	0.6	21.7	ND	524
S3				RH	11/05/2008	640	7.96		67	170	21	3	134	2	198	152	3	0.8	32.5	ND	437
S3				RH	2/19/2009	661	8.01		53	168	18	2	123	3	205	148	3	0.7	25	ND	425
73	13	8	24	I	1974	900					4	0.5	240	2	280	265	10			0.8	650
112	13	9	22	I	8/24/1977	2,720					285	91	230	9.2	192	1,188	54			47	2,255
113	13	9	22	I	2/26/1975	2,150											36			18	2,200
114	13	9	22	I	2/26/1975	3,100											40			4.7	2,000
119	13	9	23	I	Mar-75	1,300											4.8			0.06	720

Data Source:

A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper and John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
RH Roca Honda Resources 2008, 2009 (S1, S3, and S4 are RHR Monitoring Wells)

Table 9-10. Water Quality in Westwater Canyon Member Wells - Minor Constituents

oca Honda/San Mateo Area Ground Water Minor Constituent Quality Data For Westwater Canyon Member (ug/L unless otherwise specified)																											
WELL LOCATION				**Source Data**	**Sample Date**	**Ba** mg/L	**B** mg/L	**Se** mg/L	**Zn**	**Cu**	**Pb**	**As**	**Cr**	**Co**	**Mn**	**Fe**	**Cd**	**Ni**	**Mo**	**Hg**	**Ag**	**Al**	**Gross Alpha** pCi/L	**Ra-226** pCi/L	**Th-230** pCi/L	**Ra-228** pCi/L	**U** mg/L
Well ID #	**Township (N)**	**Range (W)**	**Section**																								
116				RH	8/19/2008	ND	0.3	0.079	0.21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	22.6	0.35	0.0	0.77	0.0109
116				RH	11/13/2008	ND	0.2	0.061	0.07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	17.9	0.37	0.0	0.50	0.0106
116				RH	2/10/2009	ND	0.2	0.064	0.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	23.7	0.27	0.05	0.58	0.0121
114				RH	9/18/2008	0.2	0.2	0.048	.02	ND	ND	ND	ND	ND	0.07	ND	ND	ND	ND	ND	ND	ND	50.4	0.96	1.8	0.79	0.0199
114				RH	2/18/2009	ND	0.3	0.039	0.04	ND	ND	ND	ND	ND	0.07	ND	ND	ND	ND	ND	ND	ND	50.3	0.45	0.2	0.90	0.0217
113				RH	9/22/2008	ND	0.3	0.027	.02	ND	ND	0.001	ND	ND	0.11	ND	ND	ND	ND	ND	ND	ND	25.4	0.26	1.8	-0.3	0.0158
113				RH	11/10/2008	ND	0.2	0.024	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	28.2	0.27	0.3	0.35	0.0155
113				RH	2/12/2009	ND	ND	0.023	0.46	ND	ND	ND	ND	ND	0.17	11.0	ND	ND	ND	ND	ND	0.2	21.0	0.31	0.1	0.32	0.0169
138				RH	9/23/2008	ND	0.3	0.31	.02	0.01	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	44.4	0.12	0.3	0.38	0.0329
S1				RH	11/06/2008	ND	0.2	ND	ND	ND	ND	0.003	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	229	69.0	0.7	0.79	0.0023
S1				RH	2/17/2009	ND	0.1	ND	ND	ND	ND	0.003	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	290	56.0	0.2	1.0	0.0019
S4				RH	11/05/2008	ND	0.2	ND	ND	ND	ND	0.004	ND	ND	0.02	0.05	ND	ND	ND	ND	ND	ND	8.5	.26	0.0	0.93	0.002
S4				RH	3/05/2009	ND	ND	ND	0.3	ND	ND	0.003	ND	ND	0.02	ND	0.03	ND	ND	ND	ND	ND	6.6	.32	0.2	-.2	0.0019
S3				RH	11/05/2008	ND	0.2	ND	ND	ND	ND	0.003	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND	22.2	4.6	0.0	.23	0.006
S3				RH	2/19/2009	ND	0.1	ND	ND	ND	ND	0.003	ND	ND	0.03	ND	ND	ND	ND	ND	ND	ND	21.9	4.0	0.04	.25	0.0066

Data Source:
A NMEI 1974 (see particularly Table 7.5, Table 7.7)
B Cooper and John 1968 (see particularly Table 1)
C GMRC 1979a (see particularly Pt. 1: Table 2.6-2, Table 2.6-4, Table 2.2-19; also Pt. 1 Appendix B, Table B-1, Table B-3, Table B-4, Table B-6, Table B-7, Table B-9, Table B-10)
D GMRC 1979c (App. D to source E below) (see particularly Table 4)
E GMRC 1979d (see particularly Table II-4, Table III-1)
F Metric Corp. 2005b
F[a] Metric Corp. 2005a (see particularly Figure 7, Table 1)
G RGRC 1994
H NMED DP-61 file
I Brod and Stone 1981
O OSE 2008
RH Roca Honda Resources 2008, 2009 (S1, S3, and S4 are RHR Monitoring Wells)

Table 9-11. Average Water Quality for Westwater Canyon Member Wells

Constituent	mg/L	Constituent	mg/L
Al	<0.1	Mo	<0.05
Sb	<0.01	Ni	<0.05
As	0.01	N (nitrate)	<0.2
Ba	<0.5	P (ortho-phosphate)	Nil
Bi	<0.01	Phenols	0.003
B	0.3	K	8
Cd	<0.005	Ra-226+228	<7 pCi/L
Ca	5	Se	<0.01
Cl	18	Si	50
Cr	<0.01	Ag	<0.02
Co	<0.03	Na	230
Cyanide	<0.01	SO_4	280
F	<0.1	TDS	630
Fe	0.7	U	<0.005
Pb	<0.05	V	<0.005
Mg	<0.01	Zn	<0.01
Mn	0.4	Chemical oxygen demand	Nil
Hg	<0.001	pH (s.u.)	7.6

From Table B-10, Appendix B of Environmental Report (GMRC 1979)
s.u. = standard units

Table 9-12. Mine Dewatering Water Quality

Mine Dewatering Water Quality **Primarily Westwater Canyon Member, with Some Mixing with Dakota Sandstone** (except conductivity and pH, values are dissolved and in mg/L; radium and gross alpha in pCi/L)			
	11/05/1979	11/09/1979	11/07/1979
Constituent	Mt. Taylor	Bokum Marquez	Johnny M
TDS	696	1190	753
Conductivity (µmhos)	1061	1760	756
pH (s.u.)	9.02	8.43	7.85
As	0.007	<0.005	0.044
Ba	0.149	<0.001	0.212
Se	0.018	0.005	0.128
Mo	0.13	<0.01	0.612
NH_3	0.08	0.4	0.36
Na	225.4	361.1	101.2
Cl	11.9	38.7	8.53
SO_4	251.9	574.6	188.5
Ca	3.2	25.8	51.6
K	1.56	3.9	3.9
Bicarbonate	246	277.8	256
Cd	<0.001	<0.001	<0.001
Nitrate/Nitrite	0.25	0.18	0.36
Mg	0	0.6	15.6
V	<0.01	<0.01	1.408
Zn	<0.25	<0.25	<0.25
Al	1.12	0.53	17.8
Pb	<0.005	<0.005	0.008
Gross alpha	990±50	450±40	1,700±100
Ra-226	17±5	0.21± 0.06	Not analyzed
U	0.45	<0.005	5.09

µmhos = micromhos
NMEID 1980

Table 9-13. Summary of Aquifer Characteristics in the Vicinity of the Roca Honda Permit Area

Aquifer	Thickness Range in the San Juan Basin (ft)	Probable Thickness at the Roca Honda Permit Area (ft)	Transmissivity Range (median) (ft^2/day)	Hydraulic Conductivity (horizontal) (ft/day)	Hydraulic Conductivity (vertical) (ft/day)	Yield Range (gpm) (median)	TDS (mg/L)	Storativity	
								Specific Yield (Sy)	Storativity
Alluvium	10–80	0	700—1,450[h]	27[h]		<20[a]	590–14,000[a]	.1 to .25[f]	NA
Menefee	400–1,000[b]	<100[g]	10–100[b]	0.05–0.01[b]	0.00001[f]	<20[a]	200–1,400[a]	0.1	0.0001
Point Lookout Sandstone	40–415[b]	<120[g]	<1—240[b]	0.002–0.02[cb]	0.01–0.002[c] 0.0002–0.0001[f]	To >50[a]	200–700[a]		.000041[f]
Dalton Sandstone	80–180[bdg]	>100[g]	10–<50		0.0001[f]		4,500[a]	0.1	0.0001
Gallup Sandstone	90–700[b]	85[g]	15–390 (123)[bhf]	0.1—1.0[h]	0.002[f]	1–645(30)[ef]	1,200—2,200[h]	.09[h]	.000002 to .000033[f]
Lower Mancos Shale Sandstones	125[g]	125[g]	134[a]	0.05	0.002[f]	0–2,000[ag]	2,500–9,000[a]	0.1	0.0001
Dakota Sandstone	50–350[b]	50–60[g]	44–134[abf]	0.25–1.5[b]	0.002[f]	1–200 (13)[e]	600–1,400[a]	0.1	0.0001
Westwater Canyon	100–250[bg]	100–250[g]	50–500[ab]	0.1	0.001[f]	1–401 (32)[e]	360–2,200[a]	0.1[f.]	.0002 to .00002[bf]

[a]Brod and Stone 1981
[b]Stone et al., 1983
[c]Craigg et al. 1989
[d]RGRC 1994
[e]Dam 1995
[f]Kernodle 1996 (note hydraulic conductivity [vertical] values are model-simulated)
[g]Roca Honda Resources drilling
[h]GMRC 1979a
[i]Pike 1947

9.5 Aquitards in the Permit Area

Aquitards are geologic strata which, because of low permeability, cannot transmit sufficient quantities of water to function as aquifers. An aquitard will retard or prevent ground water movement from or into overlying or underlying aquifers. In the San Juan basin, most aquifers are separated by aquitards consisting of shale. Aquitards in the Roca Honda/San Mateo area are, from deepest to shallowest, the Recapture Member of the Morrison Formation, the Brushy Basin Member of the Morrison Formation, and the Mancos Shale. The shale layers within the Menefeee Formation and the Crevasse Canyon Formation also function as aquitards. The principal water-bearing units and aquitards in the Roca Honda permit area are shown in Figure 9-2 and Figure 7–4 of Section 7.0, Geology.

9.5.1 Mancos Shale

The Mancos Shale is a thick, dark gray, calcareous marine shale that represents the transgression of the Western Interior Seaway (NMEI 1974). The Mancos Shale conformably overlies the Dakota Sandstone and intertongues with the upper sandstones of the Dakota Sandstone. It is thickest in the northeastern part of the San Juan basin and consists of a main body and two tongues through most of the area. The main body of the Mancos Shale forms an aquitard above the Dakota Sandstone aquifer. The Mulatto Tongue of the Mancos Shale is an aquitard between the Dilco Coal Member and Dalton Sandstone Member of the Crevasse Canyon Formation.

The Satan Tongue of the Mancos Shale divides the Point Lookout Sandstone into upper and lower sandstones. Recent drilling in the Roca Honda permit area in Section 16 found approximately 720 ft of Mancos Shale, the top of which was about 700 ft below land surface at an elevation of 6,500–6,700 ft (RHR geophysical logs for holes S-2, S-3, and S-4). In the San Mateo Creek valley to the southwest of the permit area, the Mancos Shale crops out about 4 miles west of the community of San Mateo. In the area of the community of San Mateo, the Mancos Shale is at a depth of more than 1,500 ft.

Shales have low primary permeability and restrict movement of ground water. The main body of Mancos Shale acts as a barrier to movement of water into or out of the Dakota Sandstone from or into overlying formations. The USNRC staff agreed with the determination by HRI that it was unnecessary to monitor rocks of the Mesaverde Group in the area of HRI’s proposed in-situ uranium recovery operation from the Westwater Canyon Member of the Morrison Formation because of the “hydrologic separation” between the aquifers and the “thick, laterally extensive Mancos Shale separating the two systems” (USNRC 1997, EIS Docket 40-8968). The Mancos Shale is represented in the USGS model of the San Juan basin as a confining unit (Kernodle 1996).

In the Roca Honda permit area, the lower and middle Mancos Shale contain sandstone beds totaling about 125 ft in thickness. In the upper part of the Mancos Shale, a discontinuous, 45 ft thick sandstone unit in the Mulatto Tongue of the Mancos Shale crops out in the western half of Section 16. This sandstone may be the Borrego Pass Lentil of the Crevasse Canyon Formation, previously referred to as the Stray sandstone of local usage (Santos 1966) and is expected to be hydrologically similar to other Cretaceous sandstone aquifers in the area (Brod and Stone 1981).

Brod and Stone (1981) indicate that sandstones in the lower part of the Mancos Shale may transmit large quantities of water. Cooper and John (1968) report that two mines in the San Mateo area dewatered the middle Mancos Shale sandstones at rates of 2.0 and 4.5 cfs (900 and 2,000 gpm). Brod and Stone (1981) report that the hydrologist for GMRC indicated that the "Tres Hermanos unit" (a sandstone in the lower Mancos Shale) yielded large quantities of water at the Mt. Taylor mine. RGRC reports that the Mt. Taylor mine found 118 ft of sandstone in the Mancos Shale. RHR , however, recently drilled three monitor wells south of Jesus Mesa that penetrated the Mancos Shale and down into the Westwater Canyon Member without finding producible quantities of ground water in the Mancos Shale.

As part of its alternative sites assessment, GMRC extensively evaluated the field permeability of the Mancos Shale in the area of La Polvadera Canyon and the San Mateo area. It was determined that the upper part of the main body of the Mancos Shale had a weighted average permeability (hydraulic conductivity) of 0.05 ft/yr in La Polvadera Canyon.

9.5.2 Other Aquitards

The Recapture Member of the Morrison Formation is below the Westwater Canyon Member aquifer and above the Bluff Sandstone. The Recapture Member consists of interbedded red shale and white sandstone. It is present throughout the San Juan basin, although it is thickest in the south and southeast part of the basin, where it ranges from 125 to 300 ft thick. The USNRC (1997) reported that the Recapture Member at HRI's Church Rock facility is about 180 ft thick. Roca Honda Resources, LLC drilled 100 ft into the Recapture Member without fully penetrating the unit, although RGRC reported a total thickness of 78 ft of the Recapture Member was penetrated by the Mt. Taylor mine (RGRC 1994). Geophysical logs run in RHR's monitor well holes indicate that the top 50 ft of the Recapture Member in the Roca Honda permit area was siltstone or mudstone (hole S-4).

The Brushy Basin Member of the Morrison Formation is present between the Dakota Sandstone and the Westwater Canyon Member over most of the San Juan basin. The Brushy Basin Member consists primarily of variegated calcareous and bentonitic claystone and mudstone of lacustrine origin, with some fluvial sandstone and conglomeratic sandstone, and freshwater limestone (NMEI 1974). In some areas of the San Juan basin, the Brushy Basin Member is as much as 200 ft thick. Borehole geophysical data collected in the permit area indicate that the Brushy Basin Member is as much as 269 ft thick (See Table 7–1, Section 7.0, Geology). Where the Brushy Basin Member is thickest, there is a sandstone stringer (~5 to 10 ft thick) in the upper part that may be water bearing; this thin sandstone is referred to as the Brushy Basin Member B sandstone aquifer. Risser, Davis, Baldwin and McAda (1984) reported that a slug-type aquifer test conducted by the USGS north of Laguna, New Mexico determined that the 60-foot thick Brushy Basin Shale Member had a transmissivity of 20 ft^2 per day and a hydraulic conductivity of .33 ft/day. In the Ambrosia Lake area, the Brushy Basin Shale Member was less permeable and effectively separated ground water in the Dakota Sandstone from that in the Westwater Canyon Member.

An aquifer test conducted by HRI in September and October of 1988 to determine the degree of interconnectedness between the Westwater Canyon Member aquifer, the Dakota Sandstone aquifer, and the Brushy Basin Member B sandstone aquifer found no aquifer interconnection in the area of HRI's proposed Church Rock In-situ Recovery facilities (HRI 1988, NRC 1997). The USNRC reports that aquifer tests performed by HRI at its proposed Crownpoint mine site found no aquifer interconnection between the Westwater Canyon Member and the Dakota Sandstone (NRC 1997). There is evidence that there might be a direct connection along a fault zone between the Westwater Canyon Member and Dakota Sandstone beneath Jesus Mesa in the Roca Honda permit area Sections 9 and 10. The intensity of faulting in the Roca Honda permit area and the limited thickness of the Brushy Basin Shale Member shales in the permit area make it possible that the formation does not form an impermeable hydrogeologic barrier to movement of ground water between the Westwater Canyon Member and the Dakota Sandstone.

9.6 Potential Impacts of the Proposed Mine

The Roca Honda permit area is in the Bluewater Underground Water basin, as extended by the New Mexico State Engineer on May 14, 1976. The State Engineer has jurisdiction over both mine dewatering and appropriation of water for beneficial use in this area.

The Roca Honda mine project could impact area water resources in three ways:

1. Dewatering of the Roca Honda mine may cause local water level declines within the confined aquifer system present in the Westwater Canyon Member of the Morrison Formation. Water levels in the Dakota Sandstone, and possibly sandstone units in the lower part of the Mancos Shale may be locally affected. It is unlikely that dewatering will impact water levels in the aquifers relied on by water users in the San Mateo area, who use wells that produce from the shallow aquifers in the alluvium, i.e., the Menefee Formation, and the Point Lookout Sandstone. These geologic units are from 2,000 to 2,300 ft above the units to be dewatered. Ground water in aquifers below the Westwater Canyon Member, will not be impacted by mine dewatering because an aquitard, the Recapture Shale Member of the Morrison Formation, underlies the Westwater Canyon Member and separates the aquifers.

2. Shallow aquifers which may be vulnerable to potential impacts from facility activity or from discharged water include the alluvium, the Point Lookout Sandstone, and the Dalton Sandstone Member of the Crevasse Canyon Formation. Although the Menefee Formation is used as an aquifer in the San Mateo Creek watershed, it is not present downgradient of the proposed surface facility area. The Menefee Formation, however, is present beneath colluvium just east of proposed Shaft No. 2 in the SE¼ Section 10. The Mine Operations Plan describes in detail the measures that will be taken to protect those aquifers, including stormwater protection, ponding, lining, and water treatment.

3. The discharge of mine dewatering water into San Mateo Creek in the quantities anticipated will raise the level of the water table in the alluvium, at least locally. The water produced from dewatering activities will be treated to state and federal water discharge standards. Therefore, there will be no adverse impact on water quality within the alluvial aquifer or other formations recharged by the discharge where they outcrop in the arroyo.

The SAP for the Roca Honda project is currently undergoing agency review and will be implemented upon approval. This SAP contains a number of proposals to further characterize the groundwater hydrology and water quality of the permit area, including conducting significant regional and on-site groundwater sampling and analysis and performing a site specific hydrologic pump-test and modeling. These data will assist RHR in further evaluating potential impacts of its proposed mining activities. RHR has addressed estimating the impacts on ground and surface water systems due to mine dewatering by performing groundwater flow modeling. The model incorporates analytic calculations of the probable volume of mine water production. The model has been completed and is discussed in Section 9.6.1 below.

9.6.1 Groundwater Flow Model

RHR's modeling consultant has constructed a groundwater flow model which has been used to estimate the effects of Roca Honda mine depressurization/dewatering on local and regional water levels and surface water systems. The model is a modified version of a groundwater flow model previously developed by the consultant to assess the effects of uranium mine dewatering in the Ambrosia Lake area. The 2007 model was adapted in large part from a USGS model (USGS WRIR 95-4187) of groundwater flow within the San Juan Basin. The 2007 model has been accepted by the NMED as a predictive tool. MODFLOW-2000, a multi-dimensional, finite-difference, block-centered, saturated groundwater flow code, is used as the simulator.

Like the predecessor models, the modified model covers the entire San Juan Basin in northwestern New Mexico and southwestern Colorado. The model grid of the model has been refined in the area of the Roca Honda mine, and the model incorporates site-specific information on sub-surface structure in the Roca Honda mine area.

The model grid has 96 rows, 102 columns, and 10 layers. From highest to lowest, the geologic units represented in the model are: the San Jose Formation (layer 1), the Animas and Nacimiento formations (layer 2), the Ojo Alamo Sandstone, Kirtland and Fruitland formations and Pictured Cliffs Sandstone (layer 3), the Lewis Shale (layer 4), the Cliff House Sandstone, Menefee Formation and Point Lookout Sandstone (layer 5), the Mancos Shale (SW only) and Gallup Sandstone (SW only) (layer 6), the Mancos Shale (layer 7), the Dakota Sandstone (layer 8), the Brushy Basin Member of the Morrison Formation (layer 9), and the Westwater Canyon Member of the Morrison Formation (layer 10). Boundary conditions include areally-distributed recharge, perennial steams, ephemeral drainages, and wells.

The model was calibrated to pre-development (steady-state) conditions and to transient stresses. The simulated hydraulic heads were compared to water level data compiled from USGS monitor wells, published and unpublished records of water levels measured in uranium company wells and mines, and water level data from OSE files. The calculated residuals and pattern of potentiometric surface contours were considered reasonable.

Analytic calculations were applied to estimate the pumping rates which may be necessary to temporarily dewater the Westwater Canyon Member, the Dakota Sandstone, and the Gallup Sandstone in the Roca Honda mine area. The effects of this dewatering were estimated by simulating the calculated pumping rates in the calibrated model as stresses in the Roca Honda mine area. The model predicted that the maximum drawdown in the Gallup Sandstone causes a 10-foot drawdown contour to extend two miles out from the mine area; the maximum drawdown in the Dakota Sandstone causes a 10-foot drawdown contour to extend one mile out from the mine area; and the maximum drawdown in the Westwater Canyon Member causes a 10-foot drawdown contour to extend eight miles out from the mine area. These drawdowns would be expected to cause temporary water level declines within these radii in one existing well within each of these three geologic units.

The potential impact of mine dewatering on perennial stream systems was analyzed using the RIVER package of MODFLOW-2000. The groundwater flow model simulated that the impact of dewatering on area streams would be very small.

This modeling effort represents a preliminary analysis of potential impacts from RHR's proposed mine dewatering activities using the best data available today. The proposed aquifer testing program contained in the SAP will provide additional data that will allow RHR to refine the model, more accurately analyze the potential effects, and develop a mitigation strategy, as necessary.

9.7 References

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Appendix 9-A

Water Quality Data
2008-2009 Sampling
Alluvial Wells

Table A-1 Alluvial Well Water Quality Data (Page 1 of 4)

WELL ID	120	120		120	120	121	21	21	21	21	115	115	115	33	33	33	UNITS	R.L.	METHOD
Date Sampled	8/6/08	11/18/08		2/18/09	5/26/09	8/18/08	8/21/08	11/8/08	2/11/09	5/19/09	9/16/08	11/13/08	5/26/09	9/23/08	11/17/08	5/19/09			
FIELD MEASUREMENTS																			
Water Level (Altitude)	6832	6832	6832	-		6838	7061	7061	12.12		6736	6722		7133	7132		ft.		
pH	7.13	7.71	7.71	9.29		9.16	6.99	7.78	7.66		7.10	7.71		-	7.52		s.u.		HANNA Multi-meter
Conductivity	1218	1206	1206	1496		1573	601	669	649		765	875		-	1309		umhos/cm		HANNA Multi-meter
Temperature	67.00	53.52	53.52	43.00		56.60	60.15	54.45	51.48		56.41	57.50		-	54.98		degrees F		HANNA Multi-meter
Dissolved Oxygen	-	-	-	-		-	-	-	-		-	-		-	-		%		HANNA Multi-meter
Total Dissolved Solids, TDS	-	603	603	748		-	-	334	325		-	437		-	655		mg/l		HANNA Multi-meter
Turbidity	0	0	0	0		38.16	17.85	9.14	0.39		0	0		5.81	121		t.u.		HANNA Multi-meter
MAJOR IONS																			
Alkalinity, Total as CaCO3	330	329	324	442	332	207	313	328	340	345	281	286	297	443	421	229	mg/l	1.0	A2320 B
Carbonate as CO3	ND	ND	ND	33	ND	45	ND	ND	ND	ND	ND	ND	7	ND	ND	9	mg/l	1.0	A2320 B
Bicarbonate as HCO3	400	401	395	472	405	161	382	401	415	421	343	349	348	540	514	261	mg/l	1.0	A2320 B
Hydroxide as OH	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	1.0	A2320 B
Calcium	69	54	67	10	65	4	54	56	41	43	49	47	43	71	71	4	mg/l	1	E200.7
Chloride	26	24	24	34	23	42	7	7	5	6	15	15	13	39	34	ND	mg/l	1	E300.0
Fluoride	1.3	1.6	1.4	2.8	1.3	0.5	1.0	1.1	1.1	1.1	1.1	1.1	1.1	0.9	0.7	1.1	mg/l	0.1	A4500-F C
Magnesium	25	20	25	4	25	4	16	16	15	13	9	9	8	17	17	1	mg/l	1	E200.7
Nitrogen, Ammonia as N	0.1	0.1	0.1	0.10	0.07	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E350.1
Nitrogen, Kjeldahl, Total as N	ND	ND	ND	ND	ND	1.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.5	E351.2
Nitrogen, Nitrate as N	-	ND	ND	ND	ND	-	-	-	ND	ND	-	5.6	5.7	-	2.7	0.1	mg/l	0.1	E353.2
Nitrogen, Nitrate + Nitrite as N	-	ND	ND	ND	ND	-	-	ND	ND	ND	-	5.6	5.7	-	2.7	0.1	mg/l	0.05	E353.2
Nitrogen, Nitrite as N	ND	ND	ND	ND	ND	ND	0.14	ND	ND	ND	5.71	ND	ND	2.00	ND	ND	mg/l	0.1	A4500-NO2 B
Nitrogen, Total	ND	ND	ND	ND	ND	1.7	ND	ND	ND	ND	5.7	5.6	5.7	2.0	2.8	ND	mg/l	0.5	A4500-N A
Potassium	3	3	3	4	3	3	1	1	ND	ND	3	3	3	2	2	1	mg/l	1	E200.7
Silica	18.4	17.1	18.7	8.7	17.4	1.1	67.2	70.9	59.0	45.7	19.8	20.6	16.9	30.6	27.7	9.6	mg/l	0.2	E200.7
Sodium	227	279	232	313	186	368	78	86	81	76	15.4	157	144	263	264	88	mg/l	1	E200.7
Sulfate	356	364	334	273	338	452	22	26	16	19	137	129	123	300	264	1	mg/l	1	E300.0
NON-METALS																			
Organic Carbon, Total (TOC)	1.6	2.7	2.5	1.9	2.9	ND	ND	2.4	1	1.2	0.6	1.8	0.7	0.9	2.2	ND	mg/l	0.5	A5310 C
Carbon, Total	1.5	57.6	58.2	9.3	73.3	4.1	1.6	47.4	19.1	80.0	1.9	48.2	65.3	2.9	47.0	45.3	mg/l	9.7	SW9060
Phenolics, Total Recoverable	-	ND	ND	0.02	0.03	-	-	ND	ND	0.02	-	0.02	0.02	-	0.02	ND	mg/l	0.0	E420.1
Cyanide, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.005	Kelada mod
PHYSICAL PROPERTIES																			
Color	5.0	20.0	15.0	5.0	10.0	160.0	5.0	5.0	ND	ND	ND	5.0	ND	220.0	118	ND	c.u.	5.0	A2120 B
Conductivity	1370	1440	1350	1600	1330	1510	608.00	662	593	649	907	911	905	1500	1410	392	umhos/cm	1	A2510 B
Corrosivity	0.40	0.8	0.7	0.8	0.6	0.82	0.38	0.5	0.1	0.5	0.50	0.7	0.6	0.50	0.6	0.1	unitless		Calc.
Hardness as CaCO3	276	218	270	41	263	26	200	204	165	160	157	153	140	250	249	14	mg/l	1	A2340 B
Odor	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	T.O.N	1	A2150 B
pH	7.61	8.05	7.91	8.69	7.84	9.42	7.60	7.70	7.46	7.78	7.81	8.04	7.98	7.56	7.70	8.61	s.u.	0.01	A4500-H B
Solids, TDS @ 180 C	882	919	859	982	881	941	409.00	452	457	439	566	575	582	988	894	265	mg/l	10	A2540 C

Table A-1 Alluvial Well Water Quality Data (Page 2 of 4)

WELL ID	**120**	**120**		**120**	**120**	**121**	**21**	**21**	**21**	**21**	**115**	**115**	**115**	**33**	**33**	**33**	**UNITS**	**R.L.**	**METHOD**
Date Sampled	8/6/08	11/18/08		2/18/09	5/26/09	8/18/08	8/21/08	11/8/08	2/11/09	5/19/09	9/16/08	11/13/08	5/26/09	9/23/08	11/17/08	5/19/09			
METALS-DISSOLVED																			
Aluminum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.7
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Arsenic	ND	0.001	0.001	ND	ND	ND	0.003	0.003	0.003	0.003	ND	ND	ND	ND	ND	ND	mg/l	0.001	E200.8
Barium	ND	ND	ND	ND	ND	ND	0.10	0.1	0.2	0.1	ND	ND	ND	ND	ND	0.4	mg/l	0.1	E200.8
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.7
Boron	0.2	0.3	0.2	0.5	0.2	0.3	ND	0.1	ND	ND	0.2	0.2	0.2	0.3	0.3	ND	mg/l	0.1	E200.7
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Chromium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Cobalt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Copper	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	mg/l	0.01	E200.8
Iron	ND	ND	ND	0.08	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	mg/l	0.03	E200.8
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Manganese	0.07	0.07	0.08	0.01	0.10	ND	ND	ND	ND	ND	ND	ND	ND	0.26	0.14	ND	mg/l	0.01	E200.8
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.001	E245.1
Molybdenum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Selenium	ND	0.002	0.002	ND	ND	ND	ND	ND	ND	ND	0.026	0.026	0.028	0.003	0.002	ND	mg/l	0.001	E200.8
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.10	E200.8
Uranium	0.0033	0.0027	0.0032	ND	0.0036	ND	0.0049	0.0053	0.0055	0.0051	0.1800	0.166	0.192	0.0085	0.0080	ND	mg/l	0.0003	E200.8
Vanadium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Zinc	ND	0.01	0.02	ND	ND	ND	ND	ND	ND	0.03	0.02	ND	0.03	ND	ND	0.02	mg/l	0.01	E200.8
METALS-TOTAL																			
Uranium	0.0032	0.0027	0.0031	ND	0.0035	ND	0.0055	0.0060	0.0057	0.0057	0.1700	0.169	0.185	0.0100	0.0074	ND	mg/l	0.0003	E200.8
RADIONUCLIDES-TOTAL																			
Gross Alpha	6.7	11.8	8.2	2.1	5.3	1.8	8.8	7.4	5.6	8.6	205.0	228	166	26.8	13.7	3.5	pCi/L		E900.0
Gross Alpha precision (+/-)	3.1	3.5	3.1	2.6	2.9	3.2	2.3	2.2	2.0	2.4	8.1	8.6	7.4	5.0	5.2	1.0	pCi/L		E900.0
Gross Alpha MDC	4.3	4.2	4.1	4.2	4.2	5.2	2.6	2.8	2.5	2.8	2.3	2.3	2.7	5.2	7.0	1.2	pCi/L		E900.0
Gross Beta	0.9	4.9	9.0	1.8	-3	3.6	3.5	6.1	-2	-2	54.4	66.4	71.8	5.4	8.9	2.3	pCi/L		E900.0
Gross Beta precision (+/-)	3.7	3.4	3.4	2.7	3.3	3.5	1.8	1.9	1.9	1.8	3.2	3.3	3.3	3.5	3.7	2.0	pCi/L		E900.0
Gross Beta MDC	6.2	5.5	5.5	4.4	5.7	5.8	2.9	3.0	3.3	3.0	3.9	3.8	3.8	5.7	6.0	3.4	pCi/L		E900.0
Radium 226	0.41	0.41	0.23	-0.06	0.51	-0.02	0.03	0.09	-0.2	-0.1	-0.10	-0.1	-0.1	-0.03	-0.3	0.3	pCi/L		E903.0
Radium 226 precision (+/-)	0.21	0.18	0.15	0.12	0.19	0.16	0.12	0.13	0.09	0.10	0.07	0.07	0.10	0.13	0.12	0.17	pCi/L		E903.0
Radium 226 MDC	0.27	0.22	0.21	0.23	0.22	0.28	0.20	0.20	0.21	0.20	0.17	0.17	0.22	0.24	0.29	0.22	pCi/L		E903.0
Radium 228	0.42	0.25	0.66	0.71	2.6	0.27	0.31	2.40	0.46	1.00	0.32	0.01	0.03	0	0.01	0.05	pCi/L		RA-05
Radium 228 precision (+/-)	0.67	0.71	0.73	0.71	0.78	0.72	0.68	0.82	0.71	0.75	0.72	0.71	0.67	0.80	1.0	0.8	pCi/L		RA-05
Radium 228 MDC	1.1	1.2	1.2	1.1	1.1	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.1	1.3	1.8	1.3	pCi/L		RA-05
Radon 222	636	373	421	208	567	-162	1510	298	1510	1030	732	909	1010	820	946	65	pCi/L	100	D5072-92
Radon 222 precision (+/-)	63.1	50.1	50.6	49.7	52.3	51.9	56.0	62.5	66.8	51.4	53.4	50.9	57.2	46.8	67.8	38.6	pCi/L		D5072-92
Thorium 228	0.0	0.1	0.2	0.05	0.03	0.0	0.0	0.1	0.009	-0.030	-0.1	0.1	0.1	1.1	0.2	0.1	pCi/L		E907.0
Thorium 228 precision (+/-)	0.1	0.2	0.2	0.09	0.07	0.2	0.1	0.1	0.07	0.07	0.2	0.1	0.1	0.9	0.1	0.1	pCi/L		E907.0
Thorium 228 MDC	-	-	-	0.2	0.1	-	-	-	0.1	0.2	-	-	0.2	-	-	0.2	pCi/L		E907.0
Thorium 230	0.1	0.1	0.0	0.1	-0.02	1.7	0.0	0.0	-0.02	-0.01	0.3	-0.1	-0.1	2.6	-0.2	-0.2	pCi/L		E907.0
Thorium 230 precision (+/-)	0.2	0.3	0.3	0.1	0.1	0.5	0.2	0.1	0.07	0.10	0.1	0.1	0.1	0.2	0.1	0.1	pCi/L		E907.0
Thorium 230 MDC	-	-	-	0.2	0.2	-	-	-	0.1	0.2	-	-	0.2	-	-	0.2	pCi/L		E907.0
Thorium 232	0.1	0.0	0.1	0.03	-0.04	0.0	0.0	0.0	0.008	0.050	0.0	0.0	0.0	0.5	0.0	-0.008	pCi/L		E907.0
Thorium 232 precision (+/-)	0.1	0.1	0.2	0.09	0.06	0.1	0.1	0.09	0.05	0.09	0.1	0.1	0.1	0.1	0.1	0.09	pCi/L		E907.0
Thorium 232 MDC	-	-	-	0.2	0.2	-	-	-	0.1	0.2	-	-	0.2	-	-	0.2	pCi/L		E907.0

Table A-1 Alluvial Well Water Quality Data (Page 3 of 4)

WELL ID	120	120		120	120	121	21	21	21	21	115	115	115	33	33	33	UNITS	R.L.	METHOD
Date Sampled	8/6/08	11/18/08		2/18/09	5/26/09	8/18/08	8/21/08	11/8/08	2/11/09	5/19/09	9/16/08	11/13/08	5/26/09	9/23/08	11/17/08	5/19/09			
DATA QUALITY																			
A/C Balance (+/- 5)	2.30	5.21	4.69	-3.58	-3.42	6.19	3.15	2.97	-3.66	-7.02	2.83	3.48	-1.11	0.30	4.44	-6.34	%		Calc.
Anions	14.80	14.9	14.2	15.6	14.4	14.80	6.95	7.39	7.34	7.48	9.36	9.28	9.34	16.40	15.1	4.7	meq/l		Calc.
Cations	15.50	16.5	15.6	14.5	13.4	16.70	7.40	7.84	6.82	6.50	9.91	9.95	9.13	16.50	16.5	4.1	meq/l		Calc.
Solids, Total Dissolved Calc.	909	964	904	916	862	998	412	480	439	422	586	583	560	1010	981	247	mg/l		Calc.
TDS Balance (0.80 - 1.20)	0.97	0.950	0.950	1.07	1.02	0.94	0.99	0.940	1.04	1.04	0.97	0.990	1.040	0.98	0.910	1.070			Calc.
VOLATILE ORGANIC COMPOUNDS																			
1,1,1,2-Tetrachloroethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,1,1-Trichloroethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,1,2,2-Tetrachloroethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,1,2-Trichloroethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,1-Dichloroethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,1-Dichloroethene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,1-Dichloropropene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,2,3-Trichloropropane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,2-Dibromoethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,2-Dichlorobenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,2-Dichloroethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,2-Dichloropropane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,3-Dichlorobenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,3-Dichloropropane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
1,4-Dichlorobenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
2,2-Dichloropropane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
2-Chloroethyl vinyl ether	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
2-Chlorotoluene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
4-Chlorotoluene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Benzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Bromobenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Bromochloromethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Bromodichloromethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Bromoform	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Bromomethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Carbon tetrachloride	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Chlorobenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Chlorodibromomethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Chloroethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Chloroform	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Chloromethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
cis-1,2-Dichloroethene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
cis-1,3-Dichloropropene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Dibromomethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Dichlorodifluoromethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Ethylbenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
m+p-Xylenes	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Methyl ethyl ketone	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	20	E624
Methylene chloride	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
o-Xylene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Styrene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Tetrachloroethene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Toluene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
trans-1,2-Dichloroethene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
trans-1,3-Dichloropropene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Trichloroethene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Trichlorofluoromethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Vinyl chloride	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Xylenes, Total	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	1.0	E624
Surr: 1,2-Dichlorobenzene-d4	100.0	-	-		-	101.0	101.0	-		-	102.0	-	-	102.0	-	-	% REC	80-120	E624
Surr: Dibromofluormethane	99.0	-	-		-	103.0	103.0	-		-	96.0	-	-	102.0	-	-	% REC	80-120	E624
Surr: p-Bromofluorobenzene	91.0	-	-		-	99.0	100.0	-		-	99.0	-	-	99.0	-	-	% REC	80-120	E624
Surr: Toluene-d8	101.0	-	-		-	95.0	100.0	-		-	100.0	-	-	99.0	-	-	% REC	80-120	E624

Table A-1 Alluvial Well Water Quality Data (Page 4 of 4)

WELL ID	120	120		120	120	121	21	21	21	21	115	115	115	33	33	33	UNITS	R.L.	METHOD
Date Sampled	8/6/08	11/18/08		2/18/09	5/26/09	8/18/08	8/21/08	11/8/08	2/11/09	5/19/09	9/16/08	11/13/08	5/26/09	9/23/08	11/17/08	5/19/09			
SYNTHETIC ORGANIC COMPOUNDS																			
1,2,4-Trichlorobenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
2,4,6-Trichlorophenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
2,4-Dichlorophenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
2,4-Dimethylphenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
2,4-Dinitrophenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	50	E625
2,4-Dinitrotoluene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
2,6-Dinitrotoluene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
2-Chloronaphthalene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
2-Chlorophenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
2-Nitrophenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
3,3'-Dichlorobenzidine	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	20	E625
4,6-Dinitro-2-methylphenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	50	E625
4-Bromophenyl phenyl ether	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
4-Chloro-3-methylphenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
4-Chlorophenyl phenyl ether	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
4-Nitrophenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	50	E625
Acenaphthene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Acenaphthylene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Anthracene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Azobenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Benzidine	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	20	E625
Benzo(a)anthracene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Benzo(a)pyrene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Benzo(b)fluoranthene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Benzo(g,h,i)perylene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Benzo(k)fluorathene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
bis(-2-chloroethoxy)Methane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
bis(-2-chloroethyl)Ether	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
bis(2-chloroisopropyl)Ether	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
bis(2-ethylhexyl)Phthalate	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Butylbenzylphthalate	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Chrysene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Dibenzo(a,h)anthracene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Diethyl phthalate	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Dimethyl phthalate	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Di-n-butyl phthalate	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Di-n-octyl phthalate	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Fluoranthene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Fluorene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Hexachlorobenzene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Hexachlorobutadiene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	20	E625
Hexachlorocyclopentadiene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Hexachloroethane	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Ideno(1,2,3-cd)pyrene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Isophorone	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Naphthalene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
n-Nitrosodimethylamine	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
n-Nitroso-di-n-propylamine	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
n-Nitrosodiphenylamine	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Pentachlorophenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	50	E625
Phenanthrene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Phenol	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Pyrene	ND	-	-		-	ND	ND	-		-	ND	-	-	ND	-	-	ug/l	10	E625
Surr: 2,4,6-Tribromophenol	44.0	-	-		-	51.0	41.0	-		-	52.0	-	-	42.0	-	-	% REC	26-116	E625
Surr: 2-Fluorobiphenyl	53.0	-	-		-	60.0	49.0	-		-	54.0	-	-	48.0	-	-	% REC	25-94	E625
Surr: 2-Fluorophenol	28.0	-	-		-	24.0	27.0	-		-	34.0	-	-	31.0	-	-	% REC	11-67	E625
Surr: Nitrobenzene-d5	59.0	-	-		-	64.0	46.0	-		-	52.0	-	-	45.0	-	-	% REC	19-102	E625
Surr: Phenol-d5	26.0	-	-		-	29.0	25.0	-		-	32.0	-	-	27.0	-	-	% REC	15-54	E625
Surr: Terphenyl-d14	52.0	-	-		-	65.0	54.0	-		-	44.0	-	-	44.0	-	-	% REC	39-106	E625

Appendix 9-B

Water Quality Data
2008-2009 Sampling
Menefee Formation Wells

Table B-1 Menefee Formation Well Water Quality Data (Page 1 of 4)

WELL ID	**27**	**27**	**27**	**27**	**87**	**87**	**87**	**87**	**62**	**62**	**62**		**62**	**100**	**100**	**100**	**100**	**7**	**7**	**7**	**7**	**UNITS**	**R.L.**	**METHOD**
Date Sampled	8/6/08	11/13/08	2/16/09	5/19/09	8/12/08	11/12/08	2/16/09	5/19/09	8/20/08	11/11/08	2/18/09		5/26/09	8/21/08	11/8/08	2/11/09	5/19/09	9/17/08	11/16/08	2/16/09	5/18/09			
FIELD MEASUREMENTS																								
Water Level (Altitude)	7131	7131	-		7277	7277	-		7229	7229	-	-		7049	7047	29.78		7066	7067	-		ft.		
pH	6.82	7.38	7.73		7.78	8.54	8.46		7.40	8.03	8.39	8.39		6.97	7.81	7.56		8.30	9.53	8.69		s.u.		HANNA Multi-meter
Conductivity	505	498	499		587	643	663		956	893	834	834		378	404	418		3742	4759	3976		umhos/cm		HANNA Multi-meter
Temperature	68.73	56.39	46.60		68.89	53.70	46.42		57.90	58.55	55.17	55.17		56.59	50.93	53.93		62.45	55.35	55.02		degrees F		HANNA Multi-meter
Dissolved Oxygen	-	-	-		-	-	-		-	-	-	-		-	-	-		-	-	-		%		HANNA Multi-meter
Total Dissolved Solids, TDS	-	249	250		-	322	331		-	446	417	417		-	202	209		-	2377	1988		mg/l		HANNA Multi-meter
Turbidity	0	0	0		0	0	0.75		0	0	0	0		83	68	54		233	253	246		t.u.		HANNA Multi-meter
MAJOR IONS																								
Alkalinity, Total as CaCO3	250	249	248	257	309	329	326	344	340	328	321	320	329	130	187	208	211	976	1220	803	888	mg/l	1.0	A2320 B
Carbonate as CO3	ND	ND	ND	ND	ND	ND	ND	9	ND	ND	8	9	11	ND	ND	ND	ND	158	280	16	67	mg/l	1.0	A2320 B
Bicarbonate as HCO3	310	304	302	314	377	402	398	401	415	400	376	371	380	158	228	254	258	870	918	947	948	mg/l	1.0	A2320 B
Hydroxide as OH	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	1.0	A2320 B
Calcium	72	63	57	56	21	36	27	23	48	30	19	20	22	18	29	33	34	14	8	18	18	mg/l	1	E200.7
Chloride	6	6	6	5	4	5	4	4	106	45	35	35	40	13	8	4	4	92	82	77	76	mg/l	1	E300.0
Fluoride	0.4	0.4	0.4	0.5	1.8	1.5	1.6	1.7	0.6	0.6	0.6	0.6	0.6	0.2	0.3	0.5	0.5	2.8	2.8	2.8	2.8	mg/l	0.1	A4500-F C
Magnesium	11	10	9	9	7	11	9	8	14	9	6	6	7	5	9	10	10	4	4	5	5	mg/l	1	E200.7
Nitrogen, Ammonia as N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.5	0.14	0.22	0.2	0.3	0.17	0.2	mg/l	0.1	E350.1
Nitrogen, Kjeldahl, Total as N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.8	ND	ND	1	0.9	1.0	0.7	mg/l	0.5	E351.2
Nitrogen, Nitrate as N	-	ND	ND	0.1	-	0.5	0.8	0.2	-	0.1	ND	0.1	0.1	-	-	ND	ND	-	ND	ND	ND	mg/l	0.1	E353.2
Nitrogen, Nitrate + Nitrite as N	-	ND	0.08	0.10	-	0.5	0.78	0.20	-	0.1	0.09	0.10	0.11	-	ND	ND	ND	-	ND	ND	ND	mg/l	0.05	E353.2
Nitrogen, Nitrite as N	0.07	ND	ND	ND	0.11	ND	ND	ND	0.13	ND	ND	ND	ND	ND	ND	ND	ND	0.05	ND	ND	ND	mg/l	0.1	A4500-NO2 B
Nitrogen, Total	ND	ND	ND	ND	ND	0.5	0.8	ND	ND	ND	ND	ND	ND	ND	0.8	ND	ND	1.0	0.9	1.0	0.7	mg/l	0.5	A4500-N A
Potassium	4	4	4	4	2	2	2	2	2	1	1	1	1	9	11	8	6	5	5	4	4	mg/l	1	E200.7
Silica	51.6	55.9	38.7	34.7	18.9	29.3	21.3	16.7	14.0	13.8	9.4	10.1	10.8	5.2	3.2	26.6	19.1	14.9	14.0	7.2	7.6	mg/l	0.2	E200.7
Sodium	38	34	35	41	135	129	113	111	188	183	154	156	168	39	39	35	34	1190	1260	986	1110	mg/l	1	E200.7
Sulfate	21	20	18	17	23	26	22	24	74	67	62	62	60	13	6	6	4	1260	1250	1300	1240	mg/l	1	E300.0
NON-METALS																								
Organic Carbon, Total (TOC)	0.7	1.8	0.8	0.8	0.6	1.4	0.8	0.8	1.0	1.9	0.9	0.9	0.8	1.5	3.2	1.1	0.9	19.8	31.7	23.4	2.7	mg/l	0.5	A5310 C
Carbon, Total	ND	46.5	124	56.2	ND	69.9	155	67	ND	56.0	7.7	7.5	69.4	1.4	27.4	2.9	44.4	4.0	206.0	184	186	mg/l	9.7	SW9060
Phenolics, Total Recoverable	-	0.02	0.021	0.040	-	ND	ND	0.04	-	ND	0.02	0.02	0.06	-	ND	ND	0.03	-	ND	ND	0.04	mg/l	0.0	E420.1
Cyanide, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.005	Kelada mod
PHYSICAL PROPERTIES																								
Color	ND	5.0	ND	ND	ND	ND	ND	ND	5.0	ND	ND	ND	ND	189.0	20.0	ND	70.0	235.0	263	40.0	200.0	c.u.	5.0	A2120 B
Conductivity	505	507	417	500	632	665	606	662	1070	909	812	816	873	287	337	300	380	4600.0	4860	4450	4320	umhos/cm	1	A2510 B
Corrosivity	0.00	0.5	0.4	0.5	0.58	0.7	0.7	0.8	0.59	0.3	0.3	0.4	0.5	-0.29	0.1	-0.2	0.1	1.50	1.8	0.8	1.3	unitless		Calc.
Hardness as CaCO3	224	196	179	176	83	118	105	91	176	110	72	76	84	64	108	124	128	50	37	65	64	mg/l	1	A2340 B
Odor	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	T.O.N	1	A2150 B
pH	7.17	7.71	7.62	7.79	8.20	8.04	8.17	8.33	7.87	7.82	8.02	8.03	8.11	7.73	7.79	7.41	7.61	9.09	9.54	8.38	8.77	s.u.	0.01	A4500-H B
Solids, TDS @ 180 C	338	330	297	338	3.67	424	413	425	616	520	502	491	529	181	229	279	241	3000.0	3320	2830	2910	mg/l	10	A2540 C

Table B-1 Menefee Formation Well Water Quality Data (Page 2 of 4)

WELL ID	27	27	27	27	87	87	87	87	62	62	62		62	100	100	100	100	7	7	7	7	UNITS	R.L.	METHOD
Date Sampled	8/6/08	11/13/08	2/16/09	5/19/09	8/12/08	11/12/08	2/16/09	5/19/09	8/20/08	11/11/08	2/18/09		5/26/09	8/21/08	11/8/08	2/11/09	5/19/09	9/17/08	11/16/08	2/16/09	5/18/09			
METALS-DISSOLVED																								
Aluminum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.7
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Arsenic	ND	ND	ND	ND	0.008	0.002	0.002	0.002	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.004	0.009	ND	0.002	mg/l	0.001	E200.8
Barium	0.2	0.2	0.2	0.2	0.2	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1	0.1	ND	ND	ND	ND	mg/l	0.1	E200.8
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.7
Boron	ND	ND	ND	ND	0.4	0.4	0.3	0.3	ND	0.1	0.1	0.1	0.1	ND	ND	ND	ND	0.4	0.5	0.5	0.5	mg/l	0.1	E200.7
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Chromium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Cobalt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Copper	0.06	0.08	0.05	0.03	0.02	0.04	0.01	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Iron	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12	0.51	0.57	0.54	mg/l	0.03	E200.8
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Manganese	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND	ND	0.10	0.30	0.26	0.21	0.01	0.01	0.06	0.06	mg/l	0.01	E200.8
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.001	E245.1
Molybdenum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Selenium	ND	ND	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.002	ND	ND	ND	0.001	ND	mg/l	0.001	E200.8
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.10	E200.8
Uranium	0.0049	0.0041	0.0054	0.0049	0.0024	0.0015	0.0016	0.0014	0.0047	0.0027	0.0016	0.0016	0.0018	0.0005	ND	0.0036	0.0031	ND	0.0009	ND	ND	mg/l	0.0003	E200.8
Vanadium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Zinc	0.15	0.26	0.11	0.22	0.01	0.02	ND	0.02	0.03	0.03	0.02	0.02	0.03	ND	ND	ND	ND	0.08	0.08	0.05	0.02	mg/l	0.01	E200.8
METALS-TOTAL																								
Uranium	0.0049	0.0049	0.0051	0.4140	0.0025	0.0018	0.0016	0.0016	0.0048	0.0029	0.0016	0.0017	0.0017	0.0004	0.0009	0.0053	0.0024	0.0007	0.0004	ND	ND	mg/l	0.0003	E200.8
RADIONUCLIDES-TOTAL																								
Gross Alpha	5.5	5.8	5.3	11.1	8.0	8.4	2.0	7.3	4.2	5.5	3.1	3.5	3.8	1.9	6.6	6.3	8.2	6.9	48.9	15.8	35.9	pCi/L		E900.0
Gross Alpha precision (+/-)	1.9	1.4	1.5	2.3	2.1	2.0	1.4	1.7	2.9	2.2	1.8	1.7	1.9	1.0	1.6	1.6	2	7.5	16.2	9.3	12.4	pCi/L		E900.0
Gross Alpha MDC	2.4	1.6	1.9	2.6	2.4	2.2	2.1	1.8	4.4	2.9	2.5	2.4	2.7	1.4	1.8	1.9	2.2	11.6	21.3	13.4	16	pCi/L		E900.0
Gross Beta	-0.2	4.4	4.1	5.3	0.3	5.6	0.7	-0.8	0.6	-3.0	-3	-2	-2	3.5	14.1	5.3	8.2	-7.0	21.0	14.2	4.4	pCi/L		E900.0
Gross Beta precision (+/-)	1.9	1.7	1.7	1.7	1.4	1.7	1.6	2	2.7	2.3	2.1	1.7	2.2	1.7	1.9	1.9	1.7	8.2	8.7	8.5	11.5	pCi/L		E900.0
Gross Beta MDC	3.1	2.7	2.7	2.7	2.4	2.7	2.7	3.4	4.5	3.9	3.7	2.9	3.8	2.7	2.8	3.0	2.7	14.0	13.9	13.9	19.1	pCi/L		E900.0
Radium 226	-0.03	-0.07	-0.006	-0.1	0.12	-0.2	-0.08	-0.05	-0.10	-0.03	0.16	0.0	0.14	0.13	0.009	0.12	0.005	-0.06	0.89	1.3	0.37	pCi/L		E903.0
Radium 226 precision (+/-)	0.14	0.08	0.09	0.07	0.15	0.10	0.10	0.10	0.09	0.11	0.15	0.13	0.12	0.14	0.12	0.13	0.11	0.13	0.33	0.24	0.19	pCi/L		E903.0
Radium 226 MDC	0.26	0.16	0.17	0.18	0.23	0.24	0.22	0.2	0.22	0.20	0.22	0.23	0.18	0.22	0.20	0.19	0.19	0.24	0.38	0.16	0.24	pCi/L		E903.0
Radium 228	0.03	-0.2	1.3	-0.09	0.39	-0.4	2.1	-0.2	0.77	-0.3	0.85	0.55	0.7	0.79	1.5	0.60	0.58	0.1	0.14	2.6	0.45	pCi/L		RA-05
Radium 228 precision (+/-)	0.65	0.70	0.66	0.63	0.66	0.54	0.85	0.69	0.70	0.72	0.70	0.71	0.66	0.70	0.79	0.72	0.69	1.00	1.1	0.67	0.82	pCi/L		RA-05
Radium 228 MDC	1.1	1.2	1.0	1.1	1.1	0.9	1.3	1.2	1.1	1.2	1.1	1.1	1	1.1	1.2	1.2	1.1	1.7	1.8	0.95	1.3	pCi/L		RA-05
Radon 222	724	455	494	518	422	461	631	363	606	676	626	573	591	656	322	964	413	134	204	336	175	pCi/L	100	D5072-92
Radon 222 precision (+/-)	64.9	46.1	51.4	44.8	46.0	54.5	53.6	42.9	54.0	51.6	54.5	53.6	51.8	47.1	63.4	59.9	44.3	50.8	55.4	50.2	39.6	pCi/L		D5072-92
Thorium 228	0.1	0.0	0.08	0.03	-0.1	0.1	0.04	0.09	-0.1	0.0	0.04	0.05	0.02	0.1	0.1	0.3	0.05	-0.4	0.3	0.3	0.4	pCi/L		E907.0
Thorium 228 precision (+/-)	0.1	0.1	0.1	0.1	0.1	0.2	0.08	0.1	0.1	0.1	0.1	0.08	0.1	0.1	0.1	0.2	0.1	0.8	0.3	0.2	0.2	pCi/L		E907.0
Thorium 228 MDC	-	-	0.2	0.3	-	-	0.1	0.2	-	-	0.2	0.1	0.2	-	-	0.2	0.2	-	-	0.3	0.2	pCi/L		E907.0
Thorium 230	-0.2	-0.1	-0.1	0.02	-0.2	0.1	-0.02	0.2	1.7	0.0	0.02	-0.02	0.06	1.5	0.0	0.05	0.06	2.8	-0.5	-0.2	-0.02	pCi/L		E907.0
Thorium 230 precision (+/-)	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.5	0.1	0.1	0.1	0.2	0.5	0.1	0.09	0.2	0.3	0.1	0.2	0.2	pCi/L		E907.0
Thorium 230 MDC	-	-	0.2	0.3	-	-	0.2	0.2	-	-	0.2	0.2	0.3	-	-	0.2	0.2	-	-	0.4	0.3	pCi/L		E907.0
Thorium 232	0.0	0.0	-0.02	-0.02	-0.1	0.1	0.05	-0.01	0.0	0.0	0.08	0.01	-0.04	0.0	0.0	0.01	0.05	0.0	0.0	-0.07	-0.01	pCi/L		E907.0
Thorium 232 precision (+/-)	0.1	0.1	0.07	0.08	0.1	0.2	0.09	0.06	0.1	0.1	0.1	0.08	0.1	0.1	0.07	0.05	0.1	0.1	0.1	0.2	0.1	pCi/L		E907.0
Thorium 232 MDC	-	-	0.2	0.2	-	-	0.2	0.2	-	-	0.2	0.2	0.3	-	-	0.1	0.2	-	-	0.4	0.3	pCi/L		E907.0

WELL ID	**27**	**27**	**27**	**27**	**87**	**87**	**87**	**87**	**62**	**62**	**62**		**62**	**100**	**100**	**100**	**100**	**7**	**7**	**7**	**7**	**UNITS**	**R.L.**	**METHOD**
Date Sampled	8/6/08	11/13/08	2/16/09	5/19/09	8/12/08	11/12/08	2/16/09	5/19/09	8/20/08	11/11/08	2/18/09		5/26/09	8/21/08	11/8/08	2/11/09	5/19/09	9/17/08	11/16/08	2/16/09	5/18/09			
DATA QUALITY																								
A/C Balance (+/- 5)	4.57	-0.732	-3.10	-2.59	4.74	6.15	-1.31	-6.35	1.63	4.80	-3.46	-2.06	0.0989	-0.82	0.667	-2.33	-2.88	4.15	2.59	-1.23	3.98	%		Calc.
Anions	5.69	5.56	5.52	5.68	6.87	7.37	7.24	7.58	11.30	9.26	8.73	8.69	9.01	3.25	4.12	4.43	4.45	48.60	52.9	45.4	45.9	meq/l		Calc.
Cations	6.24	5.48	5.19	5.39	7.56	8.34	7.05	6.68	11.70	10.2	8.14	8.34	9.03	3.19	4.17	4.23	4.2	52.80	55.7	44.3	49.7	meq/l		Calc.
Solids, Total Dissolved Calc.	317	331	327	331	391	447	405	402	644	550	482	486	511	177	301	256	244	3170	3360	2880	3000	mg/l		Calc.
TDS Balance (0.80 - 1.20)	1.07	1.00	0.910	1.020	0.94	0.950	1.02	1.06	0.96	0.950	1.04	1.01	1.04	1.02	0.760	1.09	0.99	0.95	0.990	0.980	0.970			Calc.
VOLATILE ORGANIC COMPOUNDS																								
1,1,1,2-Tetrachloroethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,1,1-Trichloroethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,1,2,2-Tetrachloroethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,1,2-Trichloroethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,1-Dichloroethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,1-Dichloroethene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,1-Dichloropropene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,2,3-Trichloropropane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,2-Dibromoethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,2-Dichlorobenzene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,2-Dichloroethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,2-Dichloropropane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,3-Dichlorobenzene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,3-Dichloropropane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
1,4-Dichlorobenzene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
2,2-Dichloropropane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
2-Chloroethyl vinyl ether	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
2-Chlorotoluene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
4-Chlorotoluene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Benzene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Bromobenzene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Bromochloromethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Bromodichloromethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Bromoform	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Bromomethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Carbon tetrachloride	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Chlorobenzene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Chlorodibromomethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Chloroethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Chloroform	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Chloromethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
cis-1,2-Dichloroethene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
cis-1,3-Dichloropropene	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Dibromomethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Dichlorodifluoromethane	ND	-		-	ND	-		-	ND	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Ethylbenzene	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
m+p-Xylenes	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Methyl ethyl ketone	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	20	E624
Methylene chloride	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
o-Xylene	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Styrene	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Tetrachloroethene	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Toluene	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
trans-1,2-Dichloroethene	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
trans-1,3-Dichloropropene	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Trichloroethene	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Trichlorofluoromethane	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Vinyl chloride	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Xylenes, Total	ND	-		-	ND	-		-	-	-			-	ND	-		-	ND	-		-	ug/l	1.0	E624
Surr: 1,2-Dichlorobenzene-d4	100.0	-		-	98.0	-		-	-	-			-	92.0	-		-	102.0	-		-	% REC	80-120	E624
Surr: Dibromofluormethane	92.0	-		-	98.0	-		-	-	-			-	95.0	-		-	99.0	-		-	% REC	80-120	E624
Surr: p-Bromofluorobenzene	90.0	-		-	93.0	-		-	-	-			-	93.0	-		-	101.0	-		-	% REC	80-120	E624
Surr: Toluene-d8	96.0	-		-	92.0	-		-	-	-			-	97.0	-		-	98.0	-		-	% REC	80-120	E624

Table B-1 Menefee Formation Well Water Quality Data (Page 4 of 4)

WELL ID	27	27	27	27	87	87	87	87	62	62	62	62	100	100	100	100	7	7	7	7	UNITS	R.L.	METHOD
Date Sampled	8/6/08	11/13/08	2/16/09	5/19/09	8/12/08	11/12/08	2/16/09	5/19/09	8/20/08	11/11/08	2/18/09	5/26/09	8/21/08	11/8/08	2/11/09	5/19/09	9/17/08	11/16/08	2/16/09	5/18/09			
SYNTHETIC ORGANIC COMPOUNDS																							
1,2,4-Trichlorobenzene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
2,4,6-Trichlorophenol	ND	-		-	ND	-		[illegible]ND	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
2,4-Dichlorophenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
2,4-Dimethylphenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	ˆ		-	ug/l	10	E625
2,4-Dinitrophenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	50	E625
2,4-Dinitrotoluene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
2,6-Dinitrotoluene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
2-Chloronaphthalene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
2-Chlorophenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
2-Nitrophenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	0	E625
3,3'-Dichlorobenzidine	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	20	E625
4,6-Dinitro-2-methylphenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	50	E625
4-Bromophenyl phenyl ether	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
4-Chloro-3-methylphenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	ĄE6	E625
4-Chlorophenyl phenyl ether	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
4-Nitrophenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	50	E625
Acenaphthene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Acenaphthylene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Anthracene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Azobenzene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Benzidine	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	20	E625
Benzo(a)anthracene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Benzo(a)pyrene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Benzo(b)fluoranthene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Benzo(g,h,i)perylene	ND	-		-	ND	-		-	ND	-		-	ND	-		[illegible]	ND	-		-	ug/l	10	E625
Benzo(k)fluorathene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
bis(-2-chloroethoxy)Methane	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
bis(-2-chloroethyl)Ether	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
bis(2-chloroisopropyl)Ether	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
bis(2-ethylhexyl)Phthalate	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Butylbenzylphthalate	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Chrysene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Dibenzo(a,h)anthracene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Diethyl phthalate	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Dimethyl phthalate	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Di-n-butyl phthalate	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Di-n-octyl phthalate	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Fluoranthene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Fluorene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Hexachlorobenzene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Hexachlorobutadiene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	20	E625
Hexachlorocyclopentadiene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Hexachloroethane	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Ideno(1,2,3-cd)pyrene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Isophorone	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Naphthalene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
n-Nitrosodimethylamine	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
n-Nitroso-di-n-propylamine	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
n-Nitrosodiphenylamine	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Pentachlorophenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	50	E625
Phenanthrene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Phenol	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Pyrene	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ND	-		-	ug/l	10	E625
Surr: 2,4,6-Tribromophenol	47.0	-		-	55.0	-		-	45.0	-		-	44.0	-		-	34.0	-		-	% REC	26-116	E625
Surr: 2-Fluorobiphenyl	57.0	-		-	61.0	-		-	50.0	-		-	50.0	-		-	45.0	-		-	% REC	25-94	E625
Surr: 2-Fluorophenol	33.0	-		-	34.0	-		-	34.0	-		-	27.0	-		-	21.0	-		-	% REC	11-67	E625
Surr: Nitrobenzene-d5	60.0	-		-	54.0	-		-	57.0	-		-	49.0	-		-	49.0	-		-	% REC	19-102	E625
Surr: Phenol-d5	29.0	-		-	31.0	-		-	32.0	-		-	25.0	-		-	23.0	-		-	% REC	15-54	E625
Surr: Terphenyl-d14	50.0	-		-	71.0	-		-	51.0	-		-	45.0	-		-	39.0	-		-	% REC	39-106	E625

Appendix 9-C

Water Quality Data
2008-2009 Sampling
Point Lookout Sandstone Wells

Table C-1 Point Lookout Sandstone Well Water Quality Data (Page 1 of 4)

WELL ID	90	90	90	90	22	22	22	22	102	102	102	UNITS	R.L.	METHOD
Date Sampled	8/11/08	11/10/08	2/16/09	5/19/09	8/21/08	11/13/08	2/11/09	5/19/09	9/24/08	11/8/08	2/11/09			
FIELD MEASUREMENTS														
Water Level (Altitude)	6963	6963	-		6925	6920	-		6975	6974	-	ft.		
pH	8.03	8.92	9.03		-	8.53	8.76		-	8.82	8.83	s.u.	HANNA Multi-meter	
Conductivity	404	430	992		-	316	323		-	706	837	umhos/cm	HANNA Multi-meter	
Temperature	68.98	56.07	65.75		-	57.97	55.32		-	52.53	35.30	degrees F	HANNA Multi-meter	
Dissolved Oxygen	-	-	-		-	-	-		-	-	-	%	HANNA Multi-meter	
Total Dissolved Solids, TDS	-	215	496		-	249	162		-	353	418	mg/l	HANNA Multi-meter	
Turbidity	0	0	1.89		-	0	0.85		0	0	0	t.u.	HANNA Multi-meter	
MAJOR IONS														
Alkalinity, Total as CaCO3	215	230	475	228	172	174	172	178	586	389	454	mg/l	1.0	A2320 B
Carbonate as CO3	5	11	24	6	9	6	ND	6	22	15	8	mg/l	1.0	A2320 B
Bicarbonate as HCO3	253	259	531	265	192	200	210	204	670	443	537	mg/l	1.0	A2320 B
Hydroxide as OH	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	1.0	A2320 B
Calcium	5	4	3	3	6	6	4	5	4	3	2	mg/l	1	E200.7
Chloride	1	ND	8	ND	ND	ND	ND	ND	7	3	4	mg/l	1	E300.0
Fluoride	1.0	1.0	3.3	1.0	0.6	0.6	0.6	0.6	7.6	3.3	5.0	mg/l	0.1	A4500-F C
Magnesium	1	1	ND	1	2	2	2	2	1	1	ND	mg/l	1	E200.7
Nitrogen, Ammonia as N	ND	ND	0.13	0.09	ND	ND	0.07	0.07	0.2	0.1	0.17	mg/l	0.1	E350.1
Nitrogen, Kjeldahl, Total as N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.5	E351.2
Nitrogen, Nitrate as N	-	ND	ND	ND	-	0.2	ND	ND	-	ND	ND	mg/l	0.1	E353.2
Nitrogen, Nitrate + Nitrite as N	-	ND	ND	?D	-	0.20	ND	ND	-	ND	ND	mg/l	0.05	E353.2
Nitrogen, Nitrite as N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	A4500-NO2 B
Nitrogen, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.5	A4500-N A
Potassium	1	1	1	1	1	1	1	1	2	2	2	mg/l	1	E200.7
Silica	16.6	14.2	8.6	11.1	14.2	14.4	11.7	8.7	12.3	15.5	11.4	mg/l	0.2	E200.7
Sodium	101	104	229	79	77	78	68	69	311	195	192	mg/l	1	E200.7
Sulfate	2	3	44	1	6	6	4	5	ND	ND	ND	mg/l	1	E300.0
NON-METALS														
Organic Carbon, Total (TOC)	ND	1.2	0.5	ND	ND	0.8	ND	ND	ND	1.2	ND	mg/l	0.5	A5310 C
Carbon, Total	ND	34.0	204	45	ND	17.3	9.2	38.0	3.8	56.8	10.0	mg/l	9.7	SW9060
Phenolics, Total Recoverable	-	ND	ND	0.01	-	ND	ND	0.03	-	0.05	ND	mg/l	0.0	E420.1
Cyanide, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.005	Kelada mod
PHYSICAL PROPERTIES														
Color	ND	ND	ND	ND	ND	5.0	ND	ND	5.0	10.0	ND	c.u.	5.0	A2120 B
Conductivity	404	378	????39	390	306	327	186	305	1090	723	808	umhos/cm	1	A2510 B
Corrosivity	0.04	0.1	0.3	0.1	-0.12	0.1	-0.1	0.1	0.10	0.1	0.0	unitless		Calc.
Hardness as CaCO3	18	16	11	14	21	22	18	18	15	12	10	mg/l	1	A2340 B
Odor	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	T.O.N	1	A2150 B
pH	8.42	8.52	8.62	8.64	8.29	8.49	8.40	8.57	8.29	8.52	8.43	s.u.	0.01	A4500-H B
Solids, TDS @ 180 C	249	258	626	261	204	212	221	204	655	446	554	mg/l	10	A2540 C

Table C-1 Point Lookout Sandstone Well Water Quality Data (Page 2 of 4)

WELL ID Date Sampled	90 8/11/08	90 11/10/08	90 2/16/09	90 5/19/09	22 8/21/08	22 11/13/08	22 2/11/09	22 5/19/09	102 9/24/08	102 11/8/08	102 2/11/09	UNITS	R.L.	METHOD
METALS-DISSOLVED														
Aluminum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.7
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.001	0.002	mg/l	0.001	E200.8
Barium	0.4	0.4	0.2	0.4	0.3	0.3	0.3	0.3	0.2	ND	0.1	mg/l	0.1	E200.8
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.7
Boron	0.1	0.1	0.4	ND	ND	ND	ND	ND	0.5	0.5	0.4	mg/l	0.1	E200.7
Cadmium	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Chromium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Cobalt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Copper	0.02	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Iron	0.03	ND	ND	ND	ND	0.03	0.04	ND	0.04	0.25	0.09	mg/l	0.03	E200.8
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Manganese	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	mg/l	0.01	E200.8
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.001	E245.1
Molybdenum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.001	E200.8
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.10	E200.8
Uranium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.0003	E200.8
Vanadium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Zinc	0.09	ND	0.04	0.02	0.02	0.03	0.02	0.04	0.09	0.05	0.06	mg/l	0.01	E200.8
METALS-TOTAL														
Uranium	ND	ND	ND	ND	ND	ND	ND	ND	0.0003	ND	ND	mg/l	0.0003	E200.8
RADIONUCLIDES-TOTAL														
Gross Alpha	0.3	6.0	0.4	1.3	0.9	0.8	1.5	0.6	1.5	0.4	0.5	pCi/L		E900.0
Gross Alpha precision (+/-)	1.0	1.5	1.9	1.1	0.9	0.8	1	0.9	2.3	1.5	1.7	pCi/L		E900.0
Gross Alpha MDC	1.7	1.7	3.1	1.6	1.4	1.2	1.4	1.4	3.7	2.6	2.8	pCi/L		E900.0
Gross Beta	-2.0	6.7	-3	-2	-0.6	-0.06	-0.9	-2	-3.0	-2	-0.5	pCi/L		E900.0
Gross Beta precision (+/-)	1.8	1.8	2.3	1.5	1.6	1.6	1.7	1.5	2.7	1.9	1.9	pCi/L		E900.0
Gross Beta MDC	3.0	2.8	3.9	2.6	2.7	2.6	2.9	2.6	4.7	3.2	3.4	pCi/L		E900.0
Radium 226	0.24	0.01	-0.04	0.36	0.31	0.24	0.28	0.21	0.08	-0.01	0.06	pCi/L		E903.0
Radium 226 precision (+/-)	0.16	0.11	0.09	0.16	0.18	0.13	0.17	0.14	0.10	0.12	0.14	pCi/L		E903.0
Radium 226 MDC	0.22	0.19	0.18	0.18	0.23	0.17	0.22	0.19	0.16	0.21	0.22	pCi/L		E903.0
Radium 228	2.1	0.32	1.1	0.76	1.1	0.57	0.22	0.6	-0.2	1.6	1.3	pCi/L		RA-05
Radium 228 precision (+/-)	0.74	0.68	0.67	0.68	0.72	0.74	0.71	0.7	0.79	0.79	0.75	pCi/L		RA-05
Radium 228 MDC	1.1	1.1	1.0	1.1	1.1	1.2	1.2	1.1	1.3	1.2	1.2	pCi/L		RA-05
Radon 222	306	182	447	137	267	232	270	154	71	229	146	pCi/L	100	D5072-92
Radon 222 precision (+/-)	51.6	54.8	51.1	39.9	42.8	42.5	52.7	40.9	31.1	60.3	50.4	pCi/L		D5072-92
Thorium 228	0.1	0.0	0.01	0.07	0.0	0.0	0.6	0.05	-0.1	0.1	0.03	pCi/L		E907.0
Thorium 228 precision (+/-)	0.2	0.09	0.09	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.07	pCi/L		E907.0
Thorium 228 MDC	-	-	0.2	0.4	-	-	0.2	0.2	-	-	0.1	pCi/L		E907.0
Thorium 230	0.4	0.0	-0.05	-0.08	1.2	0.0	-0.05	-0.08	0.6	-0.5	0.1	pCi/L		E907.0
Thorium 230 precision (+/-)	0.4	0.1	0.1	0.4	0.5	0.1	0.1	0.1	0.1	0.4	0.09	pCi/L		E907.0
Thorium 230 MDC	-	-	0.3	0.4	-	-	0.2	0.3	-	-	0.1	pCi/L		E907.0
Thorium 232	0.1	0.0	-0.01	-0.03	0.0	0.0	0.006	-0.02	0.0	0.0	-0.003	pCi/L		E907.0
Thorium 232 precision (+/-)	0.1	0.08	0.1	0.2	0.1	0.1	0.06	0.1	0.1	0.3	0.03	pCi/L		E907.0
Thorium 232 MDC	-	-	0.2	0.5	-	-	0.1	0.2	-	-	0.1	pCi/L		E907.0

Table C-1 Point Lookout Sandstone Well Water Quality Data (Page 3 of 4)

WELL ID / **Date Sampled**	**90** 8/11/08	**90** 11/10/08	**90** 2/16/09	**90** 5/19/09	**22** 8/21/08	**22** 11/13/08	**22** 2/11/09	**22** 5/19/09	**102** 9/24/08	**102** 11/8/08	**102** 2/11/09	**UNITS**	**R.L.**	**METHOD**
DATA QUALITY														
A/C Balance (+/- 5)	3.71	1.48	-2.80	-5.36	2.33	2.56	-3.46	-4.62	5.97	4.26	-4.60	%		Calc.
Anions	4.45	4.74	10.8	4.65	3.63	3.67	3.57	3.71	12.30	8.04	9.43	meq/l		Calc.
Cations	4.79	4.88	10.2	4.18	3.80	3.86	3.33	3.38	13.90	8.76	8.60	meq/l		Calc.
Solids, Total Dissolved Calc.	295	375	585	249	205	211	198	200	701	460	492	mg/l		Calc.
TDS Balance (0.80 - 1.20)	0.84	0.690	1.07	1.05	1.00	1.00	1.12	1.02	0.93	0.970	1.13			Calc.
VOLATILE ORGANIC COMPOUNDS														
1,1,1,2-Tetrachloroethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,1,1-Trichloroethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,1,2,2-Tetrachloroethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,1,2-Trichloroethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,1-Dichloroethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,1-Dichloroethene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,1-Dichloropropene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,2,3-Trichloropropane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,2-Dibromoethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,2-Dichlorobenzene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,2-Dichloroethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,2-Dichloropropane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,3-Dichlorobenzene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
1,3-Dichloropropane	ND	-		-	ND	-		-	ND	-		e al	1.0	E624
1,4-Dichlorobenzene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
2,2-Dichloropropane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
2-Chloroethyl vinyl ether	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
2-Chlorotoluene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
4-Chlorotoluene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Benzene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Bromobenzene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Bromochloromethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Bromodichloromethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Bromoform	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Bromomethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Carbon tetrachloride	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Chlorobenzene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Chlorodibromomethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Chloroethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Chloroform	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Chloromethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
cis-1,2-Dichloroethene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
cis-1,3-Dichloropropene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Dibromomethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Dichlorodifluoromethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Ethylbenzene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
m+p-Xylenes	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Methyl ethyl ketone	ND	-		-	ND	-		-	ND	-		ug/l	20	E624
Methylene chloride	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
o-Xylene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Styrene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Tetrachloroethene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Toluene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
trans-1,2-Dichloroethene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
trans-1,3-Dichloropropene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Trichloroethene	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Trichlorofluoromethane	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Vinyl chloride	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Xylenes, Total	ND	-		-	ND	-		-	ND	-		ug/l	1.0	E624
Surr: 1,2-Dichlorobenzene-d4	95.0	-		-	98.0	-		-	96.0	-		% REC	80-120	E624
Surr: Dibromofluormethane	110.0	-		-	98.0	-		-	118.0	-		% REC	80-120	E624
Surr: p-Bromofluorobenzene	97.0	-		-	98.0	-		-	105.0	-		% REC	80-120	E624
Surr: Toluene-d8	92.0	-		-	100.0	-		-	107.0	-		% REC	80-120	E624

Table C-1 Point Lookout Sandstone Well Water Quality Data (Page 4 of 4)

WELL ID	90	90	90	90	22	22	22	22	102	102	102	UNITS	R.L.	METHOD
Date Sampled	8/11/08	11/10/08	2/16/09	5/19/09	8/21/08	11/13/08	2/11/09	5/19/09	9/24/08	11/8/08	2/11/09			
SYNTHETIC ORGANIC COMPOUNDS														
1,2,4-Trichlorobenzene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
2,4,6-Trichlorophenol	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
2,4-Dichlorophenol	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
2,4-Dimethylphenol	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
2,4-Dinitrophenol	ND	-		-	ND	-		-	ND	-		ug/l	50	E625
2,4-Dinitrotoluene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
2,6-Dinitrotoluene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
2-Chloronaphthalene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
2-Chlorophenol	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
2-Nitrophenol	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
3,3'-Dichlorobenzidine	ND	-		-	ND	-		-	ND	-		ug/l	20	E625
4,6-Dinitro-2-methylphenol	ND	-		-	ND	-		-	ND	-		ug/l	50	E625
4-Bromophenyl phenyl ether	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
4-Chloro-3-methylphenol	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
4-Chlorophenyl phenyl ether	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
4-Nitrophenol	ND	-		-	ND	-		-	ND	-		ug/l	50	E625
Acenaphthene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Acenaphthylene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Anthracene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Azobenzene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Benzidine	ND	-		-	ND	-		-	ND	-		ug/l	20	E625
Benzo(a)anthracene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Benzo(a)pyrene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Benzo(b)fluoranthene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Benzo(g,h,i)perylene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Benzo(k)fluorathene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
bis(-2-chloroethoxy)Methane	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
bis(-2-chloroethyl)Ether	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
bis(2-chloroisopropyl)Ether	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
bis(2-ethylhexyl)Phthalate	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Butylbenzylphthalate	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Chrysene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Dibenzo(a,h)anthracene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Diethyl phthalate	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Dimethyl phthalate	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Di-n-butyl phthalate	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Di-n-octyl phthalate	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Fluoranthene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Fluorene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Hexachlorobenzene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Hexachlorobutadiene	ND	-		-	ND	-		-	ND	-		ug/l	20	E625
Hexachlorocyclopentadiene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Hexachloroethane	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Ideno(1,2,3-cd)pyrene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Isophorone	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Naphthalene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
n-Nitrosodimethylamine	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
n-Nitroso-di-n-propylamine	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
n-Nitrosodiphenylamine	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Pentachlorophenol	ND	-		-	ND	-		-	ND	-		ug/l	50	E625
Phenanthrene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Phenol	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Pyrene	ND	-		-	ND	-		-	ND	-		ug/l	10	E625
Surr: 2,4,6-Tribromophenol	45.0	-		-	54.0	-		-	46.0	-		% REC	26-116	E625
Surr: 2-Fluorobiphenyl	54.0	-		-	60.0	-		-	48.0	-		% REC	25-94	E625
Surr: 2-Fluorophenol	30.0	-		-	32.0	-		-	32.0	-		% REC	11-67	E625
Surr: Nitrobenzene-d5	51.0	-		-	62.0	-		-	47.0	-		% REC	19-102	E625
Surr: Phenol-d5	28.0	-		-	31.0	-		-	29.0	-		% REC	15-54	E625
Surr: Terphenyl-d14	51.0	-		-	66.0	-		-	60.0	-		% REC	39-106	E625

Appendix 9-D

Water Quality Data
2008-2009 Sampling
Gallup Sandstone Wells

Table D-1 Gallup Sandstone Well Water Quality Data (Page 1 of 4)

WELL ID / Sampling Date	32 / 8/21/08	16 / 8/25/08	16 / 11/11/08	16 / 2/12/09	16 / 5/19/09	UNITS	R.L.	METHOD
FIELD MEASUREMENTS								
Water Level (Altitude)	6944	6946	6944	-		ft.		
pH	8.41	7.92	8.61	8.92		s.u.	HANNA Multi-meter	
Conductivity	797	947	961	932		umhos/cm	HANNA Multi-meter	
Temperature	61.57	60.80	56.10	55.77		degrees F	HANNA Multi-meter	
Dissolved Oxygen	-	-	-	-		%	HANNA Multi-meter	
Total Dissolved Solids, TDS	-	-	481	466		mg/l	HANNA Multi-meter	
Turbidity	1.69	19.43	28.47	61		t.u.	HANNA Multi-meter	
MAJOR IONS								
Alkalinity, Total as CaCO3	470	240	215	201	201	mg/l	1.0	A2320 B
Carbonate as CO3	38	ND	6	ND	10	mg/l	1.0	A2320 B
Bicarbonate as HCO3	496	293	250	245	226	mg/l	1.0	A2320 B
Hydroxide as OH	ND	ND	ND	ND	ND	mg/l	1.0	A2320 B
Calcium	2	32	24	17	14	mg/l	1	E200.7
Chloride	4	7	6	5	5	mg/l	1	E300.0
Fluoride	2.9	0.5	0.4	0.4	0.4	mg/l	0.1	A4500-F C
Magnesium	ND	32	28	22	20	mg/l	1	E200.7
Nitrogen, Ammonia as N	0.2	0.4	0.3	0.5	0.49	mg/l	0.1	E350.1
Nitrogen, Kjeldahl, Total as N	ND	0.6	ND	0.6	0.6	mg/l	0.5	E351.2
Nitrogen, Nitrate as N	-	-	ND	0.5	ND	mg/l	0.1	E353.2
Nitrogen, Nitrate + Nitrite as N	-	-	ND	0.49	ND	mg/l	0.05	E353.2
Nitrogen, Nitrite as N	ND	ND	ND	ND	ND	mg/l	0.1	A4500-NO2 B
Nitrogen, Total	ND	0.6	ND	1.1	0.6	mg/l	0.5	A4500-N A
Potassium	1	5	5	6	4	mg/l	1	E200.7
Silica	19.6	8.3	6.8	6.2	3.9	mg/l	0.2	E200.7
Sodium	237	169	172	152	158	mg/l	1	E200.7
Sulfate	8	285	265	258	229	mg/l	1	E300.0
NON-METALS								
Organic Carbon, Total (TOC)	ND	ND	0.8	1.1	1.2	mg/l	0.5	A5310 C
Carbon, Total	ND	2.1	42	3.5	40.7	mg/l	9.7	SW9060
Phenolics, Total Recoverable	-	-	ND	0.03	0.01	mg/l	0.0	E420.1
Cyanide, Total	ND	ND	ND	ND	ND	mg/l	0.005	Kelada mod
PHYSICAL PROPERTIES								
Color	5.0	185.0	40.0	-	20	c.u.	5.0	A2120 B
Conductivity	857	1030.0	993	932	907	umhos/cm	1	A2510 B
Corrosivity	0.07	0.53	0.6	0.6	0.7	unitless		Calc.
Hardness as CaCO3	6	213	173	135	119	mg/l	1	A2340 B
Odor	NOO	NOO	NOO	-	NOO	T.O.N	1	A2150 B
pH	8.64	8.14	8.37	8.58	8.75	s.u.	0.01	A4500-H B
Solids, TDS @ 180 C	546	647.0	610	613	578	mg/l	10	A2540 C

Table D-1 Gallup Sandstone Well Water Quality Data (Page 2 of 4)

WELL ID Sampling Date	32 8/21/08	16 8/25/08	16 11/11/08	16 2/12/09	16 5/19/09	UNITS	R.L.	METHOD
METALS-DISSOLVED								
Aluminum	ND	ND	ND	ND	ND	mg/l	0.1	E200.7
Antimony	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Arsenic	ND	ND	ND	ND	0.002	mg/l	0.001	E200.8
Barium	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Beryllium	ND	ND	ND	ND	ND	mg/l	0.01	E200.7
Boron	0.4	0.3	0.5	0.4	0.4	mg/l	0.1	E200.7
Cadmium	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Chromium	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Cobalt	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Copper	ND	ND	ND	0.01	ND	mg/l	0.01	E200.8
Iron	0.06	ND	ND	13.8	ND	mg/l	0.03	E200.8
Lead	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Manganese	0.01	0.02	ND	0.08	ND	mg/l	0.01	E200.8
Mercury	ND	ND	ND	ND	ND	mg/l	0.001	E245.1
Molybdenum	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Nickel	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Selenium	ND	ND	ND	ND	ND	mg/l	0.001	E200.8
Silver	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Thallium	ND	ND	ND	ND	ND	mg/l	0.10	E200.8
Uranium	ND	ND	ND	ND	ND	mg/l	0.0003	E200.8
Vanadium	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Zinc	ND	0.02	ND	0.05	ND	mg/l	0.01	E200.8
METALS-TOTAL								
Uranium	ND	0.0015	ND	ND	ND	mg/l	0.0003	E200.8
RADIONUCLIDES-TOTAL								
Gross Alpha	2.2	3.9	5.7	6.0	8.8	pCi/L		E900.0
Gross Alpha precision (+/-)	2.0	2.3	2.4	2.1	2.5	pCi/L		E900.0
Gross Alpha MDC	2.9	3.2	3.2	2.8	2.9	pCi/L		E900.0
Gross Beta	-5.0	-7.0	2.1	3.6	6.6	pCi/L		E900.0
Gross Beta precision (+/-)	2.2	2.4	2.4	2.0	1.9	pCi/L		E900.0
Gross Beta MDC	3.8	4.3	4.0	3.2	3.0	pCi/L		E900.0
Radium 226	0.13	0.85	0.32	0.71	0.48	pCi/L		E903.0
Radium 226 precision (+/-)	0.16	0.18	0.15	0.20	0.18	pCi/L		E903.0
Radium 226 MDC	0.24	0.13	0.20	0.18	0.20	pCi/L		E903.0
Radium 228	1.2	1.1	-0.05	0.13	0.53	pCi/L		RA-05
Radium 228 precision (+/-)	0.72	1.10	0.73	0.67	0.73	pCi/L		RA-05
Radium 228 MDC	1.1	1.7	1.2	1.1	1.2	pCi/L		RA-05
Radon 222	198	190	147	285	23.4	pCi/L	100	D5072-92
Radon 222 precision (+/-)	42.1	48.7	44.3	99.3	39.3	pCi/L		D5072-92
Thorium 228	0.2	0.4	0.2	0.2	0.2	pCi/L		E907.0
Thorium 228 precision (+/-)	0.2	0.2	0.2	0.1	0.1	pCi/L		E907.0
Thorium 228 MDC	-	-	-	0.1	0.2	pCi/L		E907.0
Thorium 230	1.8	0.7	-0.2	0.04	-0.07	pCi/L		E907.0
Thorium 230 precision (+/-)	0.7	0.3	0.1	0.08	0.10	pCi/L		E907.0
Thorium 230 MDC	-	-	-	0.1	0.2	pCi/L		E907.0
Thorium 232	0.2	0.0	0.0	0.0	0.009	pCi/L		E907.0
Thorium 232 precision (+/-)	0.2	0.1	0.1	0.03	0.07	pCi/L		E907.0
Thorium 232 MDC	-	-	-	0.08	0.20	pCi/L		E907.0

Table D-1 Gallup Sandstone Well Water Quality Data (Page 3 of 4)

WELL ID	**32**	**16**	**16**	**16**	**16**	**UNITS**	**R.L.**	**METHOD**
Sampling Date	8/21/08	8/25/08	11/11/08	2/12/09	5/19/09			
DATA QUALITY								
A/C Balance (+/- 5)	3.14	3.41	5.02	-0.651	2.330	%		Calc.
Anions	9.83	11.00	10.0	9.59	8.96	meq/l		Calc.
Cations	10.50	11.70	11.1	9.47	9.38	meq/l		Calc.
Solids, Total Dissolved Calc.	549	679	637	591	557	mg/l		Calc.
TDS Balance (0.80 - 1.20)	0.99	0.95	0.960	1.04	1.04			Calc.
VOLATILE ORGANIC COMPOUNDS								
1,1,1,2-Tetrachloroethane	ND	ND	-		-	ug/l	1.0	E624
1,1,1-Trichloroethane	ND	ND	-		-	ug/l	1.0	E624
1,1,2,2-Tetrachloroethane	ND	ND	-		-	ug/l	1.0	E624
1,1,2-Trichloroethane	ND	ND	-		-	ug/l	1.0	E624
1,1-Dichloroethane	ND	ND	-		-	ug/l	1.0	E624
1,1-Dichloroethene	ND	ND	-		-	ug/l	1.0	E624
1,1-Dichloropropene	ND	ND	-		-	ug/l	1.0	E624
1,2,3-Trichloropropane	ND	ND	-		-	ug/l	1.0	E624
1,2-Dibromoethane	ND	ND	-		-	ug/l	1.0	E624
1,2-Dichlorobenzene	ND	ND	-		-	ug/l	1.0	E624
1,2-Dichloroethane	ND	ND	-		-	ug/l	1.0	E624
1,2-Dichloropropane	ND	ND	-		-	ug/l	1.0	E624
1,3-Dichlorobenzene	ND	ND	-		-	ug/l	1.0	E624
1,3-Dichloropropane	ND	ND	-		-	ug/l	1.0	E624
1,4-Dichlorobenzene	ND	ND	-		-	ug/l	1.0	E624
2,2-Dichloropropane	ND	ND	-		-	ug/l	1.0	E624
2-Chloroethyl vinyl ether	ND	ND	-		-	ug/l	1.0	E624
2-Chlorotoluene	ND	ND	-		-	ug/l	1.0	E624
4-Chlorotoluene	ND	ND	-		-	ug/l	1.0	E624
Benzene	ND	ND	-		-	ug/l	1.0	E624
Bromobenzene	ND	ND	-		-	ug/l	1.0	E624
Bromochloromethane	ND	ND	-		-	ug/l	1.0	E624
Bromodichloromethane	ND	ND	-		-	ug/l	1.0	E624
Bromoform	ND	ND	-		-	ug/l	1.0	E624
Bromomethane	ND	ND	-		-	ug/l	1.0	E624
Carbon tetrachloride	ND	ND	-		-	ug/l	1.0	E624
Chlorobenzene	ND	ND	-		-	ug/l	1.0	E624
Chlorodibromomethane	ND	ND	-		-	ug/l	1.0	E624
Chloroethane	ND	ND	-		-	ug/l	1.0	E624
Chloroform	ND	ND	-		-	ug/l	1.0	E624
Chloromethane	ND	ND	-		-	ug/l	1.0	E624
cis-1,2-Dichloroethene	ND	ND	-		-	ug/l	1.0	E624
cis-1,3-Dichloropropene	ND	ND	-		-	ug/l	1.0	E624
Dibromomethane	ND	ND	-		-	ug/l	1.0	E624
Dichlorodifluoromethane	ND	ND	-		-	ug/l	1.0	E624
Ethylbenzene	ND	ND	-		-	ug/l	1.0	E624
m+p-Xylenes	ND	ND	-		-	ug/l	1.0	E624
Methyl ethyl ketone	ND	ND	-		-	ug/l	20	E624
Methylene chloride	ND	ND	-		-	ug/l	1.0	E624
o-Xylene	ND	ND	-		-	ug/l	1.0	E624
Styrene	ND	ND	-		-	ug/l	1.0	E624
Tetrachloroethene	ND	ND	-		-	ug/l	1.0	E624
Toluene	ND	ND	-		-	ug/l	1.0	E624
trans-1,2-Dichloroethene	ND	ND	-		-	ug/l	1.0	E624
trans-1,3-Dichloropropene	ND	ND	-		-	ug/l	1.0	E624
Trichloroethene	ND	ND	-		-	ug/l	1.0	E624
Trichlorofluoromethane	ND	ND	-		-	ug/l	1.0	E624
Vinyl chloride	ND	ND	-		-	ug/l	1.0	E624
Xylenes, Total	ND	ND	-		-	ug/l	1.0	E624
Surr: 1,2-Dichlorobenzene-d4	99.0	95.0	-		-	% REC	80-120	E624
Surr: Dibromofluormethane	95.0	106.0	-		-	% REC	80-120	E624
Surr: p-Bromofluorobenzene	96.0	102.0	-		-	% REC	80-120	E624
Surr: Toluene-d8	92.0	100.0	-		-	% REC	80-120	E624

Table D-1 Gallup Sandstone Well Water Quality Data (Page 4 of 4)

WELL ID Sampling Date	32 8/21/08	16 8/25/08	16 11/11/08	16 2/12/09	16 5/19/09	UNITS	R.L.	METHOD
SYNTHETIC ORGANIC COMPOUNDS								
1,2,4-Trichlorobenzene	ND	ND	-		-	ug/l	10	E625
2,4,6-Trichlorophenol	ND	ND	-		-	ug/l	10	E625
2,4-Dichlorophenol	ND	ND	-		-	ug/l	10	E625
2,4-Dimethylphenol	ND	ND	-		-	ug/l	10	E625
2,4-Dinitrophenol	ND	ND	-		-	ug/l	50	E625
2,4-Dinitrotoluene	ND	ND	-		-	ug/l	10	E625
2,6-Dinitrotoluene	ND	ND	-		-	ug/l	10	E625
2-Chloronaphthalene	ND	ND	-		-	ug/l	10	E625
2-Chlorophenol	ND	ND	-		-	ug/l	10	E625
2-Nitrophenol	ND	ND	-		-	ug/l	10	E625
3,3'-Dichlorobenzidine	ND	ND	-		-	ug/l	20	E625
4,6-Dinitro-2-methylphenol	ND	ND	-		-	ug/l	50	E625
4-Bromophenyl phenyl ether	ND	ND	-		-	ug/l	10	E625
4-Chloro-3-methylphenol	ND	ND	-		-	ug/l	10	E625
4-Chlorophenyl phenyl ether	ND	ND	-		-	ug/l	10	E625
4-Nitrophenol	ND	ND	-		-	ug/l	50	E625
Acenaphthene	ND	ND	-		-	ug/l	10	E625
Acenaphthylene	ND	ND	-		-	ug/l	10	E625
Anthracene	ND	ND	-		-	ug/l	10	E625
Azobenzene	ND	ND	-		-	ug/l	10	E625
Benzidine	ND	ND	-		-	ug/l	20	E625
Benzo(a)anthracene	ND	ND	-		-	ug/l	10	E625
Benzo(a)pyrene	ND	ND	-		-	ug/l	10	E625
Benzo(b)fluoranthene	ND	ND	-		-	ug/l	10	E625
Benzo(g,h,i)perylene	ND	ND	-		-	ug/l	10	E625
Benzo(k)fluorathene	ND	ND	-		-	ug/l	10	E625
bis(-2-chloroethoxy)Methane	ND	ND	-		-	ug/l	10	E625
bis(-2-chloroethyl)Ether	ND	ND	-		-	ug/l	10	E625
bis(2-chloroisopropyl)Ether	ND	ND	-		-	ug/l	10	E625
bis(2-ethylhexyl)Phthalate	ND	ND	-		-	ug/l	10	E625
Butylbenzylphthalate	ND	ND	-		-	ug/l	10	E625
Chrysene	ND	ND	-		-	ug/l	10	E625
Dibenzo(a,h)anthracene	ND	ND	-		-	ug/l	10	E625
Diethyl phthalate	ND	ND	-		-	ug/l	10	E625
Dimethyl phthalate	ND	ND	-		-	ug/l	10	E625
Di-n-butyl phthalate	ND	ND	-		-	ug/l	10	E625
Di-n-octyl phthalate	ND	ND	-		-	ug/l	10	E625
Fluoranthene	ND	ND	-		-	ug/l	10	E625
Fluorene	ND	ND	-		-	ug/l	10	E625
Hexachlorobenzene	ND	ND	-		-	ug/l	10	E625
Hexachlorobutadiene	ND	ND	-		-	ug/l	20	E625
Hexachlorocyclopentadiene	ND	ND	-		-	ug/l	10	E625
Hexachloroethane	ND	ND	-		-	ug/l	10	E625
Ideno(1,2,3-cd)pyrene	ND	ND	-		-	ug/l	10	E625
Isophorone	ND	ND	-		-	ug/l	10	E625
Naphthalene	ND	ND	-		-	ug/l	10	E625
n-Nitrosodimethylamine	ND	ND	-		-	ug/l	10	E625
n-Nitroso-di-n-propylamine	ND	ND	-		-	ug/l	10	E625
n-Nitrosodiphenylamine	ND	ND	-		-	ug/l	10	E625
Pentachlorophenol	ND	ND	-		-	ug/l	50	E625
Phenanthrene	ND	ND	-		-	ug/l	10	E625
Phenol	ND	ND	-		-	ug/l	10	E625
Pyrene	ND	ND	-		-	ug/l	10	E625
Surr: 2,4,6-Tribromophenol	42.0	45.0	-		-	% REC	26-116	E625
Surr: 2-Fluorobiphenyl	50.0	51.0	-		-	% REC	25-94	E625
Surr: 2-Fluorophenol	28.0	25.0	-		-	% REC	11-67	E625
Surr: Nitrobenzene-d5	55.0	52.0	-		-	% REC	19-102	E625
Surr: Phenol-d5	26.0	23.0	-		-	% REC	15-54	E625
Surr: Terphenyl-d14	59.0	51.0	-		-	% REC	39-106	E625

Appendix 9-E

Water Quality Data
2008-2009 Sampling
Westwater Canyon Member Regional Wells

Table E-1 Westwater Canyon Member Well Water Quality Data (Page 1 of 4)

WELL ID	116	116	116	116	116	114	114	114	113	113	113	113	138	UNITS	R.L.	METHOD
Sampling Date	8/19/08	11/13/08	2/10/09	5/21/09	5/21/09	9/18/08	2/18/09	5/26/09	9/22/08	11/10/08	2/12/09	5/26/09	9/23/08			
FIELD MEASUREMENTS																
Water Level (Altitude)	-	-	-			6725	-		6728	6733	-		6729	ft.		
pH	6.48	6.89	7.31			6.64	7.79		6.59	7.42	7.59		-	s.u.	HANNA Multi-meter	
Conductivity	3458	3374	3467			3246	3376		3327	3665	3430		-	umhos/cm	HANNA Multi-meter	
Temperature	63.94	51.51	50.43			59.44	53.44		60.61	52.34	54.27		-	degrees F	HANNA Multi-meter	
Dissolved Oxygen	-	-	-	-	-	-	-	-	-	-	-	-	-	%	HANNA Multi-meter	
Total Dissolved Solids, TDS	-	1687	1727			-	1688		-	1833	1715		-	mg/l	HANNA Multi-meter	
Turbidity	0	0	0			406	160		89	38.12	98		0	t.u.	HANNA Multi-meter	
MAJOR IONS																
Alkalinity, Total as CaCO3	175	175	172	182	183	175	188	172	168	173	168	179	167	mg/l	1.0	A2320 B
Carbonate as CO3	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	1.0	A2320 B
Bicarbonate as HCO3	-	213	210	222	224	213	229	210	205	212	205	219	204	mg/l	1.0	A2320 B
Hydroxide as OH	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	1.0	A2320 B
Calcium	544	518	538	496	504	504	524	433	548	539	507	501	542	mg/l	1	E200.7
Chloride	57	52	48	48	48	51	48	45	52	50	48	48	51	mg/l	1	E300.0
Fluoride	0.6	0.7	0.7	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.3	mg/l	0.1	A4500-F C
Magnesium	146	144	142	136	138	125	135	114	147	148	138	142	151	mg/l	1	E200.7
Nitrogen, Ammonia as N	ND	ND	ND	ND	ND	ND	ND	0.81	ND	ND	ND	ND	ND	mg/l	0.1	E350.1
Nitrogen, Kjeldahl, Total as N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.5	E351.2
Nitrogen, Nitrate as N	-	21.3	20.1	18.2	17.6	-	18.9	22.8	-	19.8	22.3	23.9	-	mg/l	0.1	E353.2
Nitrogen, Nitrate + Nitrite as N	-	21.3	20.1	18.20	17.6	-	19.2	23	-	19.8	22.3	23.9	-	mg/l	0.05	E353.2
Nitrogen, Nitrite as N	19.70	ND	ND	ND	ND	24.30	0.3	0.2	24.60	ND	ND	ND	22.80	mg/l	0.1	A4500-NO2 B
Nitrogen, Total	19.7	21.3	20.1	18.2	17.6	24.3	19.2	23.3	24.6	19.8	22.3	23.9	22.8	mg/l	0.5	A4500-N A
Potassium	6	6	6	6	6	10	11	11	7	6	6	7	9	mg/l	1	E200.7
Silica	15.6	16.9	18.3	18.7	18.8	20.0	18.8	18.9	21.9	20.0	18.3	21.6	22.7	mg/l	0.2	E200.7
Sodium	236	240	240	242	243	208	215	201	236	224	231	237	221	mg/l	1	E200.7
Sulfate	2080	1970	1940	1920	1910	1910	1880	1802	2090	2030	2010	2000	2040	mg/l	1	E300.0
NON-METALS																
Organic Carbon, Total (TOC)	2.6	3.3	2.7	2.9	2.9	4.9	4.2	6.2	2.2	3.9	3.2	2.6	2.5	mg/l	0.5	A5310 C
Carbon, Total	2.8	32.5	11.6	39.3	39.4	1.6	8.1	46.8	2.1	36.5	5.2	42.8	1.1	mg/l	9.7	SW9060
Phenolics, Total Recoverable	-	ND	0.03	ND	ND	-	0.01	0.02	-	ND	ND	ND	-	mg/l	0.0	E420.1
Cyanide, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.005	Kelada mod
PHYSICAL PROPERTIES																
Color	ND	ND	ND	ND	ND	10.0	5.0	5.0	256.0	5.0	-	ND	20.0	c.u.	5.0	A2120 B
Conductivity	3580	3590	3740	3540	3550	3490	3640	3350	3770	3820	3780	3640	3510	umhos/cm	1	A2510 B
Corrosivity	0.70	0.8	0.6	0.8	0.8	0.70	0.6	0.6	0.60	0.8	0.7	0.8	0.80	unitless		Calc.
Hardness as CaCO3	1960	1890	1930	1800	1830	1770	1870	1550	1980	1960	1840	1840	1970	mg/l	1	A2340 B
Odor	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	-	NOO	NOO	T.O.N	1	A2150 B
pH	7.45	7.56	7.38	7.52	7.52	7.45	7.35	7.48	7.37	7.54	7.51	7.54	7.56	s.u.	0.01	A4500-H B
Solids, TDS @ 180 C	3290	3330	3310	3260	3300	3140	3210	3100	3320	3280	3440	3390	3290	mg/l	10	A2540 C

Table E-1 Westwater Canyon Member Well Water Quality Data (Page 2 of 4)

WELL ID	116	116	116	116		114	114	114	113	113	113	113	138	UNITS	R.L.	METHOD
Sampling Date	8/19/08	11/13/08	2/10/09	5/21/09		9/18/08	2/18/09	5/26/09	9/22/08	11/10/08	2/12/09	5/26/09	9/23/08			
METALS-DISSOLVED																
Aluminum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.2	ND	ND	mg/l	0.1	E200.7
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Arsenic	ND	ND	ND	ND	ND	ND	ND	0.001	0.001	ND	ND	ND	ND	mg/l	0.001	E200.8
Barium	ND	ND	ND	ND	ND	0.2	0.1	0.2	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.7
Boron	0.3	0.2	0.2	0.3	0.3	0.2	0.3	0.3	0.3	0.2	ND	0.3	0.3	mg/l	0.1	E200.7
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Chromium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Cobalt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Copper	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	mg/l	0.01	E200.8
Iron	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11.0	ND	ND	mg/l	0.03	E200.8
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Manganese	ND	ND	ND	ND	ND	0.07	0.07	0.06	0.11	ND	0.17	ND	0.01	mg/l	0.01	E200.8
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.001	E245.1
Molybdenum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Selenium	0.079	0.061	0.064	0.052	0.053	0.048	0.039	0.047	0.027	0.024	0.023	0.027	0.031	mg/l	0.001	E200.8
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.10	E200.8
Uranium	0.0109	0.0106	0.0121	0.0103	0.0096	0.0199	0.0217	0.0208	0.0158	0.0155	0.0169	0.0161	0.0329	mg/l	0.0003	E200.8
Vanadium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Zinc	0.21	0.07	0.08	0.11	0.33	0.02	0.04	0.01	0.20	0.02	0.46	0.01	0.02	mg/l	0.01	E200.8
METALS-TOTAL																
Uranium	0.0119	0.0107	0.0118	0.0112	0.0113	0.0229	0.0222	0.0212	0.0221	0.0158	0.0176	0.0154	0.0348	mg/l	0.0003	E200.8
RADIONUCLIDES-TOTAL																
Gross Alpha	22.6	17.9	23.7	20.6	28.3	50.4	50.3	36	25.4	28.2	21.0	25.4	44.4	pCi/L		E900.0
Gross Alpha precision (+/-)	10.8	7.6	14.8	8.9	9.5	12.1	12	10.1	11.3	11.0	8.7	10.1	10.7	pCi/L		E900.0
Gross Alpha MDC	15.2	9.9	21.3	12.1	12.1	13.9	13.7	12.3	15.6	14.8	11.7	13.4	12.3	pCi/L		E900.0
Gross Beta	5.2	9.5	-6	7.8	10	16.9	27.1	15.4	6.0	6.0	2.0	-20.0	9.4	pCi/L		E900.0
Gross Beta precision (+/-)	8.2	8.2	17.4	10.6	10.6	8.3	8.7	10.8	8.3	11.2	8.4	8.4	8.6	pCi/L		E900.0
Gross Beta MDC	13.6	13.5	29.4	17.5	17.6	13.3	13.8	17.6	13.7	18.5	14.0	14.5	14.2	pCi/L		E900.0
Radium 226	0.35	0.37	0.27	0.47	0.47	0.96	0.45	0.47	0.26	0.27	0.31	-0.10	0.12	pCi/L		E903.0
Radium 226 precision (+/-)	0.17	0.15	0.16	0.16	0.16	0.20	0.19	0.19	0.13	0.14	0.14	0.10	0.10	pCi/L		E903.0
Radium 226 MDC	0.21	0.17	0.21	0.1	0.14	0.16	0.23	0.21	0.16	0.19	0.16	0.22	0.15	pCi/L		E903.0
Radium 228	0.77	0.50	0.58	1.3	1.30	0.79	0.90	0.50	-0.3	0.35	0.32	0.53	0.38	pCi/L		RA-05
Radium 228 precision (+/-)	0.74	0.73	0.72	0.65	0.62	0.83	0.72	0.67	0.78	0.68	0.63	0.71	0.81	pCi/L		RA-05
Radium 228 MDC	1.2	1.2	1.2	0.99	1.0	1.3	1.2	1.1	1.3	1.1	1.0	1.2	1.3	pCi/L		RA-05
Radon 222	812	824	819	813	674	127	106	634	1010	1120	1000	1130	756	pCi/L	100	D5072-92
Radon 222 precision (+/-)	53.5	49.3	67.2	101	98.6	67.5	48.5	53	66.3	64.5	108	59	45.5	pCi/L		D5072-92
Thorium 228	-	0.0	0.05	0.02	-0.01	0.2	0.2	0.2	0.0	0.3	0.1	0.1	0.1	pCi/L		E907.0
Thorium 228 precision (+/-)	-	0.2	0.1	0.1	0.3	0.6	0.2	0.2	0.8	0.3	0.2	0.1	0.4	pCi/L		E907.0
Thorium 228 MDC	-	-	0.2	0.3	0.7	-	0.2	0.3	-	-	0.3	0.3	-	pCi/L		E907.0
Thorium 230	0.0	0.2	0.1	0.1	-0.2	1.8	0.07	-0.04	1.8	0.3	-0.1	-0.1	0.3	pCi/L		E907.0
Thorium 230 precision (+/-)	0.2	0.1	0.2	0.2	0.4	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.2	pCi/L		E907.0
Thorium 230 MDC	-	-	0.2	0.3	0.7	-	0.3	0.3	-	-	0.3	0.3	-	pCi/L		E907.0
Thorium 232	-	0.0	-0.04	-0.04	0.10	-0.1	0.1	-0.02	-0.1	0.0	-0.07	0.02	-0.1	pCi/L		E907.0
Thorium 232 precision (+/-)	-	0.1	0.07	0.09	0.30	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	pCi/L		E907.0
Thorium 232 MDC	-	-	0.2	0.3	0.6	-	0.2	0.2	-	-	0.3	0.3	-	pCi/L		E907.0

Table E-1 Westwater Canyon Member Well Water Quality Data (Page 3 of 4)

WELL ID	116	116	116	116		114	114	114	113	113	113	113	138	UNITS	R.L.	METHOD
Sampling Date	8/19/08	11/13/08	2/10/09	5/21/09		9/18/08	2/18/09	5/26/09	9/22/08	11/10/08	2/12/09	5/26/09	9/23/08			
DATA QUALITY																
A/C Balance (+/- 5)	-0.14	0.839	2.7	0.300	1.25	-1.90	1.27	-4.97	-0.28	0.339	-1.45	-1.08	0.37	%		Calc.
Anions	49.70	47.5	46.6	46.3	46.0	46.50	45.7	44.3	50.20	48.60	48.3	48.2	48.90	meq/l		Calc.
Cations	49.60	48.3	49.2	46.6	47.2	44.80	46.9	40.1	49.90	49.0	46.9	47.2	49.30	meq/l		Calc.
Solids, Total Dissolved Calc.	3260	3150	3130	3060	3060	3290	3040	2850	3290	3390	3170	3170	3210	mg/l		Calc.
TDS Balance (0.80 - 1.20)	1.01	1.06	1.06	1.07	1.08	0.95	1.06	1.09	1.01	0.970	1.09	1.07	1.02			Calc.
VOLATILE ORGANIC COMPOUNDS																
1,1,1,2-Tetrachloroethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,1,1-Trichloroethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,1,2,2-Tetrachloroethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,1,2-Trichloroethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,1-Dichloroethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,1-Dichloroethene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,1-Dichloropropene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,2,3-Trichloropropane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,2-Dibromoethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,2-Dichlorobenzene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,2-Dichloroethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,2-Dichloropropane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,3-Dichlorobenzene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,3-Dichloropropane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
1,4-Dichlorobenzene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
2,2-Dichloropropane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
2-Chloroethyl vinyl ether	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
2-Chlorotoluene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
4-Chlorotoluene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Benzene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Bromobenzene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Bromochloromethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Bromodichloromethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Bromoform	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Bromomethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Carbon tetrachloride	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Chlorobenzene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Chlorodibromomethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Chloroethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Chloroform	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Chloromethane	ND	-		-	[illegible]N	ND		-	ND	-		-	ND	ug/l	1.0	E624
cis-1,2-Dichloroethene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
cis-1,3-Dichloropropene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Dibromomethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Dichlorodifluoromethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Ethylbenzene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
m+p-Xylenes	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Methyl ethyl ketone	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	20	E624
Methylene chloride	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
o-Xylene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Styrene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Tetrachloroethene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Toluene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
trans-1,2-Dichloroethene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
trans-1,3-Dichloropropene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Trichloroethene	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Trichlorofluoromethane	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Vinyl chloride	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	624
Xylenes, Total	ND	-		-	-	ND		-	ND	-		-	ND	ug/l	1.0	E624
Surr: 1,2-Dichlorobenzene-d4	87.0	-		-	-	102.0		-	104.0	-		-	102.0	% REC	80-120	E624
Surr: Dibromofluormethane	88.0	-		-	-	101.0		-	110.0	-		-	102.0	% REC	80-120	E624
Surr: p-Bromofluorobenzene	99.0	-		-	-	103.0		-	102.0			-	100.0	% REC	80-120	E624
Surr: Toluene-d8	113.0	-		-	-	99.0		-	100.0	-		-	100.0	% REC	80-120	E624

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WELL ID	116	116	116	116		114	114	114	113	113	113	113	138	UNITS	R.L.	METHOD
Sampling Date	8/19/08	11/13/08	2/10/09	5/21/09		9/18/08	2/18/09	5/26/09	9/22/08	11/10/08	2/12/09	5/26/09	9/23/08			
SYNTHETIC ORGANIC COMPOUNDS																
1,2,4-Trichlorobenzene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
2,4,6-Trichlorophenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
2,4-Dichlorophenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
2,4-Dimethylphenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
2,4-Dinitrophenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	50	E625
2,4-Dinitrotoluene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
2,6-Dinitrotoluene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
2-Chloronaphthalene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
2-Chlorophenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
2-Nitrophenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
3,3'-Dichlorobenzidine	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	20	E625
4,6-Dinitro-2-methylphenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	50	E625
4-Bromophenyl phenyl ether	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
4-Chloro-3-methylphenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
4-Chlorophenyl phenyl ether	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
4-Nitrophenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	50	E625
Acenaphthene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Acenaphthylene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Anthracene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Azobenzene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Benzidine	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	20	E625
Benzo(a)anthracene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Benzo(a)pyrene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Benzo(b)fluoranthene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Benzo(g,h,i)perylene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Benzo(k)fluorathene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
bis(-2-chloroethoxy)Methane	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
bis(-2-chloroethyl)Ether	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
bis(2-chloroisopropyl)Ether	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
bis(2-ethylhexyl)Phthalate	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Butylbenzylphthalate	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Chrysene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Dibenzo(a,h)anthracene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Diethyl phthalate	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Dimethyl phthalate	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Di-n-butyl phthalate	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Di-n-octyl phthalate	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Fluoranthene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Fluorene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	
Hexachlorobenzene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Hexachlorobutadiene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	20	E625
Hexachlorocyclopentadiene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Hexachloroethane	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Ideno(1,2,3-cd)pyrene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Isophorone	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Naphthalene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
n-Nitrosodimethylamine	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
n-Nitroso-di-n-propylamine	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
n-Nitrosodiphenylamine	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Pentachlorophenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	50	E625
Phenanthrene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Phenol	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Pyrene	-	ND		-	-	ND		-	ND	-		-	ND	ug/l	10	E625
Surr: 2,4,6-Tribromophenol	-	46.0		-	-	48.0		-	56.0	-		-	53.0	% REC	26-116	E625
Surr: 2-Fluorobiphenyl	-	40.0		-	-	52.0		-	58.0	-		-	55.0	% REC	25-94	E625
Surr: 2-Fluorophenol	-	30.0		-	-	32.0		-	38.0	-		-	36.0	% REC	11-67	E625
Surr: Nitrobenzene-d5	-	53.0		-	-	54.0		-	64.0	-		-	48.0	% REC	19-102	E625
Surr: Phenol-d5	-	31.0		-	-	32.0		-	36.0	-		-	27.0	% REC	15-54	E625
Surr: Terphenyl-d14	-	36.0		-	-	51.0		-	66.0	-		-	67.0	% REC	39-106	E625

Appendix 9-F

Water Quality Data
2008-2009 Sampling
Westwater Canyon Member Permit Area Wells

Table F-1 Westwater Canyon Member Pemit Area Well Water Quality Data (Page 1 of 5)

Well ID	**S1**							**S4**							**S3**							
Sample ID	**RH08-0008**	**RH08-0066**	**RH08-0066**	**RH08-0066a**	**RH08-0079**	**RH09-0016**	**RH09-0055**	**RH08-0067**	**RH08-0067**	**RH08-0067a**	**RH08-0067b**	**RH08-0077**	**RH09-0021**	**RH09-0054**	**RH08-0068**	**RH08-0068**	**RH08-0068a**	**RH08-0068b**	**RH08-0078**	**RH09-0023**	**RH09-0056**	
Collection Date	4/7/08	8/27/08	8/27/08	9/8/08	11/6/08	2/17/09	6/23/09	8/27/08	8/27/08	9/8/08	10/10/08	11/5/08	3/5/09	5/28/09	8/28/08	8/28/08	9/8/08	11/5/08	11/5/08	2/19/09	6/23/09	**UNITS**
Collection Time	19:20	10:00	10:00	10:15	12:45	13:40	12:15	14:15	14:15	10:30	10:00	10:45	10:50	9:45	10:15	10:15	10:45	12:15	13:45	10:25	14:15	
Comments	Initial	Q1	Q1<MQL	Q1-FT-RAD	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-NIT	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-RAD	Q2	Q3	Q4	
MAJOR IONS																						
Alkalinity, Total as CaCO3	-	-	-	-	176	171	171	-	-	-	-	177	176	172	-	-	-	-	170	168	175	mg/l
Carbonate as CO3	-	-	-	-	6	4	ND	-	-	-	-	5	ND	6	-	-	-	-	4	ND	ND	mg/l
Bicarbonate as CO3	-	-	-	-	203	200	209	-	-	-	-	205	214	198	-	-	-	-	198	205	214	mg/l
Hydroxide as OH	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Calcium	-	-	-	-	19	14	16	-	-	-	-	31	26	19	-	-	-	-	21	18	30	mg/l
Chloride	-	-	-	-	4	3	4	-	-	-	3	3	2	3	-	-	-	-	3	3	3	mg/l
Fluoride	-	-	-	-	0.7	0.7	0.6	-	-	-	0.6	0.6	0.6	0.7	-	-	-	-	0.8	0.7	0.6	mg/l
Magnesium	-	-	-	-	4	3	3	-	-	-	-	5	5	3	-	-	-	-	3	2	5	mg/l
Nitrogen, Ammonia as N	-	-	-	-	ND	ND	ND	-	-	-	-	0.2	0.13	0.05	-	-	-	-	ND	ND	0.11	mg/l
Nitrogen, Kjeldahl, Total as N	-	-	-	-	ND	ND	ND	-	-	-	0.6	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Nitrogen, Nitrate as N	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND		ND	mg/l
Nitrogen, Nitrate+Nitrite as N	-	-	-	-	ND	ND	ND	-	-	-	ND	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Nitrogen, Nitrite as N	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Nitrogen, Total	-	-	-	-	ND	ND	ND	-	-	-	0.6	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Potassium	-	-	-	-	3	2	2	-	-	-	-	3	3	2	-	-	-	-	2	3	3	mg/l
Silica	-	-	-	-	29.2	20.2	25.6	-	-	-	-	27.8	21.7	28.7	-	-	-	-	32.5	25	27.5	mg/l
Sodium	-	-	-	-	169	139	147	-	-	-	-	137	126	129	-	-	-	-	134	123	132	mg/l
Sulfate	-	-	-	-	204	205	209	-	-	-	206	201	194	156	-	-	-	-	152	148	208	mg/l
NON-METALS																						
Carbon, Total	-	-	-	-	47.9	ND	28	-	-	-	-	25.6	46	30.5	-	-	-	-	15.5	0.7	30.1	mg/l
Organic Carbon, Total (TOC)	-	-	-	-	1.2	3.9	3.7	-	-	-	-	1.0	ND	1.2	-	-	-	-	1.1	3.9	2.3	mg/l
Phenolics, Total Recoverable (Distilled)	-	-	-	-	ND	ND	0.06	-	-	-	-	ND	ND	0.02	-	-	-	-	ND	0.05	0.02	mg/l
Cyanide, Total	-	ND	ND	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	mg/l
PHYSICAL PROPERTIES																						
Chlorine, Residual Total	-	0.02	0.02	-	-	-	-	0.02	0.02	-	-	-	-	-	0.02	0.02	-	-	-	-	-	mg/l
Color	-	-	-	-	ND	ND	ND	-	-	-	-	ND	5	ND	-	-	-	-	ND	5.0	ND	c.u.
Conductivity	-	-	-	-	798	722	777	-	-	-	-	775	762	661	-	-	-	-	640	661	771	umhos/cm
Corrosivity	-	-	-	-	0.2	-0.02	-0.04	-	-	-	-	0.2	0.4	0.2	-	-	-	-	0.06	0.03	0.1	unitless
Hardness	-	-	-	-	63	48	52	-	-	-	-	99	85	60	-	-	-	-	67	53	95	mg/l
Odor	-	-	-	-	NOO	NOO	NOO	-	-	-	-	NOO	NOO	NOO	-	-	-	-	NOO	present	NOO	NOO
pH	-	-	-	-	8.16	8.06	8.00	-	-	-	8.59	7.93	8.20	8.12	-	-	-	-	7.96	8.01	7.87	s.u.
Solids, Total Dissolved TDS @ 180 C	-	-	-	-	509	526	525	-	-	-	527	523	524	435	-	-	-	-	437	425	529	mg/l
METALS - DISSOLVED																						
Aluminum	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Antimony	-	ND	ND	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	mg/l
Arsenic	-	0.003	0.0031	-	0.003	0.003	0.003	0.003	0.0035	-	-	0.004	0.003	0.003	0.004	0.0039	-	-	0.003	0.003	ND	mg/l
Barium	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Beryllium	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Boron	-	-	-	-	0.2	0.1	0.2	-	-	-	-	0.2	ND	0.2	-	-	-	-	0.2	0.1	0.2	mg/l
Cadmium	-	-	-	-	ND	ND	ND	-	-	-	-	ND	0.03	ND	-	-	-	-	ND	ND	ND	mg/l
Chromium	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Cobalt	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Copper	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Iron	-	-	-	-	ND	ND	ND	-	-	-	-	0.05	ND	0.03	-	-	-	-	ND	ND	0.04	mg/l
Lead	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Manganese	-	-	-	-	0.02	0.01	0.01	-	-	-	-	0.02	0.02	0.03	-	-	-	-	0.02	0.03	0.02	mg/l
Mercury	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Molybdenum	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Nickel	ND	ND	ND	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	mg/l
Selenium	ND	ND	ND	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	ND	ND	-	-	ND	ND	0.012	mg/l
Silver	ND	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Thallium	ND	ND	ND	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	ND	ND	-	-	ND	ND	ND	mg/l
Uranium	0.0032	-	-	-	0.0023	0.0019	0.002	-	-	-	-	0.0020	0.0019	0.0057	-	-	-	-	0.006	0.0066	0.0017	mg/l
Vanadium	ND	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	-	-	-	-	ND	ND	ND	mg/l
Zinc	ND	ND	ND	-	ND	ND	ND	ND	ND	-	-	ND	0.03	0.02	0.07	0.07	-	-	ND	ND	0.02	mg/l

Table F-1 *Westwater Canyon Member Pemit Area Well Water Quality Data (Page 2 of 5)*

Well ID	S1							S4							S3							
Sample ID	**RH08-0008**	**RH08-0066**	**RH08-0066**	**RH08-0066a**	**RH08-0079**	**RH09-0016**	**RH09-0055**	**RH08-0067**	**RH08-0067**	**RH08-0067a**	**RH08-0067b**	**RH08-0077**	**RH09-0021**	**RH09-0054**	**RH08-0068**	**RH08-0068**	**RH08-0068a**	**RH08-0068b**	**RH08-0078**	**RH09-0023**	**RH09-0056**	**UNITS**
Collection Date	4/7/08	8/27/08	8/27/08	9/8/08	11/6/08	2/17/09	6/23/09	8/27/08	8/27/08	9/8/08	10/10/08	11/5/08	3/5/09	5/28/09	8/28/08	8/28/08	9/8/08	11/5/08	11/5/08	2/19/09	6/23/09	
Collection Time	19:20	10:00	10:00	10:15	12:45	13:40	12:15	14:15	14:15	10:30	10:00	10:45	10:50	9:45	10:15	10:15	10:45	12:15	0.572916667	10:25	14:15	
Comments	Initial	Q1	Q1<MQL	Q1-FT-RAD	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-NIT	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-RAD	Q2	Q3	Q4	
METALS - TOTAL																						
Aluminum	-	ND	0.03	-	-	-	-	ND	0.063	-	-	-	-	-	ND	0.009	-	-	-	-	-	mg/l
Antimony	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Arsenic	-	ND	0.0034	-	-	-	-	ND	0.0038	-	-	-	-	-	0.0151	0.0077	-	-	-	-	-	mg/l
Barium	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Beryllium	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Boron	-	0.1	0.1	-	-	-	-	0.2	0.2	-	-	-	-	-	0.2	0.2	-	-	-	-	-	mg/l
Cadmium	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Chromium	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Cobalt	-	ND	ND	-	-	-	-	0.0008	0.0008	-	-	-	-	-	0.003	ND	-	-	-	-	-	mg/l
Copper	-	ND	ND	-	-	-	-	ND	0.0006	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Iron	0.51	-	-	-	-	-	-	-	-	-	0.04	-	-	-	-	-	-	-	-	-	-	mg/l
Lead	-	0.0005	0.0005	-	-	-	-	0.0006	0.0006	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Manganese	0.03	-	-	-	-	-	-	-	-	-	0.02	-	-	-	-	-	-	-	-	-	-	mg/l
Mercury	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Molybdenum	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Nickel	-	0.0013	0.0013	-	-	-	-	0.0034	0.0034	-	-	-	-	-	0.002	0.0006	-	-	-	-	-	mg/l
Selenium	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Silver	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Thallium	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Uranium	-	0.0039	0.0036	-	0.0023	0.0022	0.0022	0.0022	0.0022	-	-	0.0018	0.0017	0.0091	0.0072	0.0071	-	-	0.0076	0.0069	0.0019	mg/l
Vanadium	-	ND	0.001	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
Zinc	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	mg/l
VOLATILE ORGANIC COMPOUNDS																						
1,1,1,2-Tetrachloroethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,1,1-Trichloroethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,1,2,2-Tetrachloroethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1.1.2-Trichloroethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,1-Dichloroethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,1-Dichloroethene (1,1-Dichloroethylene)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,1-Dichloropropene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,2,3-Trichloropropane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,2-Dibromoethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,2-Dichlorobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,2-Dichloroethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,2-Dichloropropane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,3-Dichlorobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,3-Dichloropropane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,4-Dichlorobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2,2-Dichloropropane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2-Chloroethyl vinyl ether	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2-Chlorotoluene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
4-Chlorotoluene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Benzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Bromobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Bromochloromethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Bromodichloromethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Bromoform	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Bromomethane (Methyl bromide)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Carbon tetrachloride	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Chlorobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Chlorodibromomethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Chloroethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Chloroform	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Chloromethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
cis-1,2-Dichloroethene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l

Table F-1 Westwater Canyon Member Pemit Area Well Water Quality Data (Page 3 of 5)

Well ID	S1							S4							S3							
Sample ID	**RH08-0008**	**RH08-0066**	**RH08-0066**	**RH08-0066a**	**RH08-0079**	**RH09-0016**	**RH09-0055**	**RH08-0067**	**RH08-0067**	**RH08-0067a**	**RH08-0067b**	**RH08-0077**	**RH09-0021**	**RH09-0054**	**RH08-0068**	**RH08-0068**	**RH08-0068a**	**RH08-0068b**	**RH08-0078**	**RH09-0023**	**RH09-0056**	**UNITS**
Collection Date	4/7/08	8/27/08	8/27/08	9/8/08	11/6/08	2/17/09	6/23/09	8/27/08	8/27/08	9/8/08	10/10/08	11/5/08	3/5/09	5/28/09	8/28/08	8/28/08	9/8/08	11/5/08	11/5/08	2/19/09	6/23/09	
Collection Time	19:20	10:00	10:00	10:15	12:45	13:40	12:15	14:15	14:15	10:30	10:00	10:45	10:50	9:45	10:15	10:15	10:45	12:15	0.572916667	10:25	14:15	
Comments	Initial	Q1	Q1<MQL	Q1-FT-RAD	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-NIT	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-RAD	Q2	Q3	Q4	
VOLATILE ORGANIC COMPOUNDS																						
cis-1,3-Dichloropropene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Dibromomethane (ethylene dibromide)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Dichlorodifluoromethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Ethylbenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
m+p-Xylenes	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Methyl ethyl ketone	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Methylene chloride	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
o-Xylene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Styrene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Tetrachloroethene (tetrachloroethylene)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Toluene	-	3.3	3.3	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
trans-1,2-Dichloroethene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
trans-1,3-Dichloropropene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Trichloroethene (1,1,2-trichloroethylene)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Trichlorofluoromethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Vinyl chloride	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Xylenes, Total	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Surr: 1,2-Dichlorobenzene-d4	-	94.0	94.0	-	-	-	-	105	105	-	-	-	-	-	92.0	92.0	-	-	-	-	-	%REC
Surr: Dibromofluoromethane	-	97.0	97.0	-	-	-	-	95.0	95.0	-	-	-	-	-	98.0	98.0	-	-	-	-	-	%REC
Surr: p-Bromofluorobenzene	-	102	102	-	-	-	-	102	102	-	-	-	-	-	98.0	98.0	-	-	-	-	-	%REC
Surr: Toluene-d8	-	99.0	99.0	-	-	-	-	98.0	98.0	-	-	-	-	-	101	101	-	-	-	-	-	%REC
SYNTHETIC ORGANIC COMPOUNDS																						
1,2,4-Trichlorobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,2-Dichlorobenzene	-	-	ND	-	-	-	-	-	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,3-Dichlorobenzene	-	-	ND	-	-	-	-	-	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
1,4-Dichlorobenzene	-	-	ND	-	-	-	-	-	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2,4,6-Trichlorophenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2,4-Dichlorophenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2,4-Dimethylphenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2,4-Dinitrophenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2,4-Dinitrotoluene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2,6-Dinitrotoluene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2-Chloronaphthalene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2-Chlorophenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
2-Nitrophenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
3,3'-Dichlorobenzidine	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
4,6-Dinitro-2-methylphenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
4-Bromophenyl phenyl ether	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
4-Chloro-3-methylphenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
4-Chlorophenyl phenyl ether	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
4-Nitrophenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Acenaphthene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Acenaphthylene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Anthracene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Azobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Benzidine	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Benzo(a)anthracene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Benzo(a)pyrene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Benzo(b)fluoranthene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Benzo(g,h,i)perylene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Benzo(k)fluoranthene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
bis(-2-chloroethoxy)Methane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
bis(-2-chloroethyl)Ether	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
bis(2-chloroisopropyl)Ether	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
bis(2-ethylhexyl)Phthalate	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l

Table F-1 Westwater Canyon Member Pemit Area Well Water Quality Data (Page 4 of 5)

Well ID	S1							S4							S3							
Sample ID	**RH08-0008**	**RH08-0066**	**RH08-0066**	**RH08-0066a**	**RH08-0079**	**RH09-0016**	**RH09-0055**	**RH08-0067**	**RH08-0067**	**RH08-0067a**	**RH08-0067b**	**RH08-0077**	**RH09-0021**	**RH09-0054**	**RH08-0068**	**RH08-0068**	**RH08-0068a**	**RH08-0068b**	**RH08-0078**	**RH09-0023**	**RH09-0056**	
Collection Date	4/7/08	8/27/08	8/27/08	9/8/08	11/6/08	2/17/09	6/23/09	8/27/08	8/27/08	9/8/08	10/10/08	11/5/08	3/5/09	5/28/09	8/28/08	8/28/08	9/8/08	11/5/08	11/5/08	2/19/09	6/23/09	**UNITS**
Collection Time	19:20	10:00	10:00	10:15	12:45	13:40	12:15	14:15	14:15	10:30	10:00	10:45	10:50	9:45	10:15	10:15	10:45	12:15	0.572916667	10:25	14:15	
Comments	Initial	Q1	Q1<MQL	Q1-FT-RAD	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-NIT	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-RAD	Q2	Q3	Q4	
SYNTHETIC ORGANIC COMPOUNDS																						
Butylbenzylphthalate	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Chrysene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Dibenzo(a,h)anthracene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Diethyl phthalate	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Dimethyl phthalate	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Di-n-butyl phthalate	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Di-n-octyl phthalate	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Fluoranthene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Fluorene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Hexachlorobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Hexachlorobutadiene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Hexachlorocyclopentadiene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Hexachloroethane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Indeno(1,2,3-cd)pyrene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Isophorone	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Naphthalene *(is this total?)*	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Nitrobenzene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
n-Nitrosodimethylamine	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
n-Nitrosodi-n-propylamine	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
n-Nitrosodiphenylamine	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Pentachlorophenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Phenanthrene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Phenol	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Pyrene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Surr: 2,4,6-Tribromophenol	-	41.0	41.0	-	-	-	-	50.0	50.0	-	-	-	-	-	46.0	46.0	-	-	-	-	-	%REC
Surr: 2-Fluorobiphenyl	-	42.0	42.0	-	-	-	-	56.0	56.0	-	-	-	-	-	51.0	51.0	-	-	-	-	-	%REC
Surr: 2-Fluorophenol	-	27.0	27.0	-	-	-	-	31.0	31.0	-	-	-	-	-	28.0	28.0	-	-	-	-	-	%REC
Surr: Nitrobenzene-d5	-	46.0	46.0	-	-	-	-	55.0	55.0	-	-	-	-	-	64.0	64.0	-	-	-	-	-	%REC
Surr: Phenol-d5	-	22.0	22.0	-	-	-	-	24.0	24.0	-	-	-	-	-	25.0	25.0	-	-	-	-	-	%REC
Surr: Terphenyl-d14	-	48.0	48.0	-	-	-	-	59.0	59.0	-	-	-	-	-	79.0	79.0	-	-	-	-	-	%REC
DIOXINS																						
2,3,7,8-Tetrachlorodibenzo-p-dioxin	-	-	ND	-	-	-	-	-	ND	-	-	-	-	-	-	ND	-	-	-	-	-	pg/l
PESTICIDES																						
4,4'-DDD	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
4,4'-DDE	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
4,4'-DDT	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aldrin	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
alpha-BHC	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
alpha-Chlordane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
beta-BHC	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Chlordane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
delta-BHC	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Dieldrin	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Endosulfan I (alpha)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Endosulfan II (beta)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Endosulfan sulfate	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Endrin	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Endrin aldehyde	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Endril Ketone	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
gamma-BHC (Lindane)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
gamma-Chlordane	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Heptachlor	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Heptachlor epoxide	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Methoxychlor	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Toxaphene	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l

Table F-1 Westwater Canyon Member Pemit Area Well Water Quality Data (Page 5 of 5)

Well ID	S1							S4							S3							
Sample ID	RH08-0008	RH08-0066	RH08-0066	RH08-0066a	RH08-0079	RH09-0016	RH09-0055	RH08-0067	RH08-0067	RH08-0067a	RH08-0067b	RH08-0077	RH09-0021	RH09-0054	RH08-0068	RH08-0068	RH08-0068a	RH08-0068b	RH08-0078	RH09-0023	RH09-0056	
Collection Date	4/7/08	8/27/08	8/27/08	9/8/08	11/6/08	2/17/09	6/23/09	8/27/08	8/27/08	9/8/08	10/10/08	11/5/08	3/5/09	5/28/09	8/28/08	8/28/08	9/8/08	11/5/08	11/5/08	2/19/09	6/23/09	UNITS
Collection Time	19:20	10:00	10:00	10:15	12:45	13:40	12:15	14:15	14:15	10:30	10:00	10:45	10:50	9:45	10:15	10:15	10:45	12:15	0.572916667	10:25	14:15	
Comments	Initial	Q1	Q1<MQL	Q1-FT-RAD	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-NIT	Q2	Q3	Q4	Q1	Q1<MQL	Q1-FT-RAD	Q1-FT-RAD	Q2	Q3	Q4	
PESTICIDES																						
Aroclor 1016 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aroclor 1221 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aroclor 1232 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aroclor 1242 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aroclor 1248 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aroclor 1254 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aroclor 1260 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aroclor 1262 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Aroclor 1268 (PCB)	-	ND	ND	-	-	-	-	ND	ND	-	-	-	-	-	ND	ND	-	-	-	-	-	ug/l
Surr: Decachlorobiphenyl	-	70.0	70.0	-	-	-	-	93.0	93.0	-	-	-	-	-	97.0	97.0	-	-	-	-	-	%REC
Surr: Tetrachloro-m-xylene	-	57.0	57.0	-	-	-	-	82.0	82.0	-	-	-	-	-	84.0	84.0	-	-	-	-	-	%REC
RADIONUCLIDES																						
Uranium	-	-	-	3.0	-	-	-	-	-	1.7	-	-	-	-	-	-	5.0	-	-	-	-	ug/l
Gross Alpha	418	-	-	136	229	290.0	350.0	-	-	10.0	-	8.5	6.6	30.9	-	-	17.8	15.9	22.2	21.9	10.9	pCi/l
Gross Alpha precision (+/-)	9.7	-	-	5.9	8.2	8.5	9.3	-	-	2.1	-	2.0	2.1	3.1	-	-	2.3	2.2	2.6	2.5	2.1	pCi/l
Gross Alpha MDC	1.7	-	-	2.5	2.6	1.8	2.3	-	-	2.5	-	2.2	2.6	2.3	-	-	2.2	1.9	2.2	1.9	2.3	pCi/l
Gross Beta	178.0	-	-	35.2	72.0	88.4	117.0	-	-	0.3	-	5.6	3.3	7.1	-	-	3.3	7.1	4.9	9.4	8.7	pCi/l
Gross Beta precision (+/-)	3.6	-	-	2.4	3.1	2.9	3.6	-	-	1.8	-	2.3	2.1	1.8	-	-	1.9	1.9	1.7	1.7	2.1	pCi/l
Gross Beta MDC	2.6	-	-	3.0	3.4	2.8	3.3	-	-	3.0	-	3.8	3.4	2.9	-	-	3.0	3.0	2.7	2.6	3.3	pCi/l
Radium 226	62.9	-	-	28	69.0	56.0	65.0	-	-	0.45	-	0.26	0.32	3.6	-	-	3.1	2.0	4.6	4.0	0.18	pCi/l
Radium 226 precision (+/-)	1.40	-	-	1.1	1.80	1.50	1.60	-	-	0.17	-	0.25	0.14	0.36	-	-	0.37	0.51	0.42	0.40	0.14	pCi/l
Radium 226 MDC	0.20	-	-	0.22	0.21	0.20	0.21	-	-	0.19	-	0.34	0.17	0.18	-	-	0.21	0.36	0.14	0.18	0.19	pCi/l
Radium 228	0.90	-	-	-0.1	0.06	1.0	0.81	-	-	-0.04	-	0.93	-0.2	0.17	-	-	0.33	0.93	0.23	0.25	1.20	pCi/l
Radium 228 precsion (+/-)	0.70	-	-	0.66	0.79	0.90	0.66	-	-	0.67	-	1.5	0.52	0.62	-	-	0.69	1.60	0.67	0.81	0.64	pCi/l
Radium 228 MDC	1.2	-	-	1.1	1.3	1.4	1.0	-	-	1.1	-	2.5	0.90	1.0	-	-	1.1	2.5	1.1	1.3	0.98	pCi/l
Radium 226/228 Combined	63.8	-	-	27.9	69.1	57.0	65.8	-	-	0.4	-	1.2	0.12	3.8	-	-	3.4	2.9	4.8	4.3	1.4	pCi/l
Radon 222	120000	-	-	-	128000	73500	83100	-	-	-	-	1070	1070	19400	-	-	-	-	13800	11500	835	pCi/l
Radon 222 precision (+/-)	436.0	-	-	-	378.0	312	335.0	-	-	-	-	59.9	66.6	171.0	-	-	-	-	143.0	207.0	54.7	pCi/l
Thorium 228	-	-	-	-	0.00	0.01	0.1	-	-	-	-	0.0	0.07	0.06	-	-	-	0.1	0.00	0.04	0.06	pCi/l
Thorium 228 precision (+/-)	-	-	-	-	0.1	0.1	0.2	-	-	-	-	0.07	0.1	0.09	-	-	-	0.1	0.1	0.1	0.10	pCi/l
Thorium 230	6.0	-	-	0.3	0.7	0.2	0.2	-	-	0.0	-	0.0	0.2	-0.1	-	-	0.0	-0.1	0.0	0.04	-0.1	pCi/l
Thorium 230 precision (+/-)	0.6	-	-	0.2	0.3	0.2	0.3	-	-	0.05	-	0.09	0.1	0.1	-	-	0.09	0.1	0.1	0.1	0.10	pCi/l
Thorium 232	-	-	-	-	0.00	0.02	-0.02	-	-	-	-	0.0	-0.004	0.03	-	-	-	0.0	0.0	0.04	-0.02	pCi/l
Thorium 232 precision (+/-)	-	-	-	-	0.1	0.2	0.1	-	-	-	-	0.05	0.08	0.09	-	-	-	0.1	0.1	0.09	0.08	pCi/l
DATA QUALITY																						
A/C Balance (+/- 5)	-	-	-	-	4.72	-4.92	-2.58	-	-	-	-	1.16	-2.46	0.44	-	-	-	-	3.96	-0.753	-1.35	%
Anions	-	-	-	-	7.90	7.81	7.91	-	-	-	-	7.82	7.64	6.80	-	-	-	-	6.67	6.57	7.95	meq/l
Cations	-	-	-	-	8.68	7.08	7.51	-	-	-	-	8.01	7.27	6.86	-	-	-	-	7.22	6.47	7.74	meq/l
Solids, Total Dissolved Calc.	-	-	-	-	545	496	485	-	-	-	-	521	490	452	-	-	-	-	459	430	522	mg/l
TDS Balance (0.80 - 1.20)	-	-	-	-	0.930	1.06	1.08	-	-	-	-	1.00	1.07	0.960	-	-	-	-	0.950	0.990	1.01	

Appendix 9-G

Water Quality Data
2008-2009 Sampling
Multiple Aquifer/Unknown Formations of Completion

Table G-1 Multiple Aquifer/Unknow Formation Well Water Quality Data (Page 1 of 4)

WELL ID	4	47	111	111	111	111	106	83	83	5	12	12	12	UNITS	R.L.	METHOD
Sampling Date	8/7/08	11/18/08	8/13/08	11/10/08	2/11/09	5/26/09	8/13/08	8/20/08	11/10/08	9/25/08	11/13/08	2/12/09	5/18/09			
Formation of Completion	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Qal/Jmw	Kmf/Kpl	Kmf/Kpl	Kmf/Kpl	Kd/Jmw	Kd/Jmw	Kd/Jmw			
FIELD MEASUREMENTS																
Water Level (Altitude)	-	-	6641	6641	-		6835	7106	7106	7132	-	-		ft.		
pH	7.16	7.68	6.92	7.61	8.20		6.72	9.06	9.91	-	7.43	8.28		s.u.		HANNA Multi-meter
Conductivity	1200	1233	670	718	712		3168	840	859	-	832	840		umhos/cm		HANNA Multi-meter
Temperature	67.49	52.82	64.76	54.80	48.40		57.95	56.05	53.49	-	52.58	39.84		degrees F		HANNA Multi-meter
Dissolved Oxygen	-	-	-	-	-		-	-	-	-	-	-		%		HANNA Multi-meter
Total Dissolved Solids, TDS	-	616	-	351	356		-	-	429	-	416	420		mg/l		HANNA Multi-meter
Turbidity	0	0	0	0	1.59		1.23	7.21	4.6	13.29	0	0		t.u.		HANNA Multi-meter
MAJOR IONS																
Alkalinity, Total as CaCO3	330	321	253	260	256	269	154	465	466	333	267	261	275	mg/l	1.0	A2320 B
Carbonate as CO3	ND	ND	ND	ND	ND	ND	ND	82	79	28	ND	-	2	mg/l	1.0	A2320 B
Bicarbonate as HCO3	400	392	309	317	313	328	188	401	408	349	326	-	331	mg/l	1.0	A2320 B
Hydroxide as OH	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	mg/l	1.0	A2320 B
Calcium	68	68	87	87	75	78	524	ND	ND	2	51	46	48	mg/l	1	E200.7
Chloride	25	24	18	16	15	17	46	3	2	4	8	7	7	mg/l	1	E300.0
Fluoride	1.2	1.4	0.2	0.2	0.2	0.2	0.5	4.3	4.2	1.0	0.8	0.8	0.8	mg/l	0.1	A4500-F C
Magnesium	26	25	14	15	14	13	175	ND	ND	ND	15	13	14	mg/l	1	E200.7
Nitrogen, Ammonia as N	ND	ND	ND	ND	ND	ND	ND	0.2	0.2	0.1	ND	ND	ND	mg/l	0.1	E350.1
Nitrogen, Kjeldahl, Total as N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.5	E351.2
Nitrogen, Nitrate as N	-	ND	-	1.0	1.1	1.0	-	-	ND	-	ND	0.1	ND	mg/l	0.1	E353.2
Nitrogen, Nitrate + Nitrite as N	-	ND	-	1.0	1.09	1.07	-	-	ND	-	ND	0.11	ND	mg/l	0.05	E353.2
Nitrogen, Nitrite as N	ND	ND	1.08	ND	ND	ND	12.70	ND	ND	ND	ND	ND	ND	mg/l	0.1	A4500-NO2 B
Nitrogen, Total	ND	ND	1.1	1.0	1.1	1.1	12.7	ND	ND	ND	ND	ND	ND	mg/l	0.5	A4500-N A
Potassium	3	3	5	5	6	5	5	ND	ND	ND	4	3	4	mg/l	1	E200.7
Silica	121.0	18.7	19.0	17.4	16.0	116.5	11.8	2.3	1.9	10.1	22.3	19.4	21.4	mg/l	0.2	E200.7
Sodium	175	229	58	59	54	59	243	219	249	177	143	127	136	mg/l	1	E200.7
Sulfate	323	335	97	93	88	98	2440	4	2	57	177	176	169	mg/l	1	E300.0
NON-METALS																
Organic Carbon, Total (TOC)	1.2	2.4	ND	1.9	0.5	0.6	3.4	ND	4.6	0.7	1.5	0.6	0.6	mg/l	0.5	A5310 C
Carbon, Total	1.4	60.6	ND	36.8	6.3	61.0	3.6	ND	65.2	2.1	52	6.6	55.8	mg/l	9.7	SW9060
Phenolics, Total Recoverable	-	ND	-	ND	0.015	ND	-	-	ND	-	ND	ND	0.02	mg/l	0.0	E420.1
Cyanide, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.005	Kelada mod
PHYSICAL PROPERTIES																
Color	10.0	10.0	ND	ND	-	ND	5.0	5.0	5.0	20.0	ND	ND	ND	c.u.	5.0	A2120 B
Conductivity	1290	1350	726	722	668	732	3650	878.0	900.0	754	894	857	887	umhos/cm	1	A2510 B
Corrosivity	0.80	0.8	0.49	0.6	0.5	0.5	0.51	0.37	0.4	0.30	0.6	0.1	0.4	unitless		Calc.
Hardness as CaCO3	274	273	278	279	245	250	2030	2	2	6	189	168	179	mg/l	1	A2340 B
Odor	NOO	NOO	NOO	NOO	-	NOO	NOO	NOO	NOO	NOO	NOO	NOO	NOO	T.O.N	1	A2150 B
pH	7.99	7.97	7.60	7.69	7.63	7.66	7.33	9.30	9.34	8.95	7.90	7.52	7.81	s.u.	0.01	A4500-H B
Solids, TDS @ 180 C	859	868	444	435	463	461	3440	485.0	508	458	567	588	591	mg/l	10	A2540 C

Table G-1 Multiple Aquifer/Unknow Formation Well Water Quality Data (Page 2 of 4)

WELL ID	47	47	111	111	111	111	106	83	83	5	12	12	12	UNITS	R.L.	METHOD
Formation of Completion	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Qal/Jmw	Kmf/Kpl	Kmf/Kpl	Kmf/Kpl	Kd/Jmw	Kd/Jmw	Kd/Jmw			
METALS-DISSOLVED																
Aluminum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.7
Antimony	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.001	E200.8
Barium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Beryllium	0.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.7
Boron	ND	0.2	ND	ND	ND	ND	0.1	0.7	0.7	0.4	0.2	0.2	0.2	mg/l	0.1	E200.7
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Chromium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Cobalt	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Copper	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Iron	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.42	ND	ND	ND	mg/l	0.03	E200.8
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Manganese	0.09	0.08	0.08	0.07	0.06	0.07	0.12	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Mercury	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.001	E245.1
Molybdenum	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.05	E200.8
Selenium	ND	0.002	0.071	0.074	0.071	0.082	0.008	ND	ND	ND	ND	ND	ND	mg/l	0.001	E200.8
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.01	E200.8
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.10	E200.8
Uranium	0.0046	0.0033	0.0586	0.0576	0.0603	0.0608	0.0106	ND	ND	ND	ND	ND	ND	mg/l	0.0003	E200.8
Vanadium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	mg/l	0.1	E200.8
Zinc	0.01	ND	0.02	0.01	0.02	0.02	ND	0.07	0.04	0.01	0.10	0.15	0.08	mg/l	0.01	E200.8
METALS-TOTAL																
Uranium	0.0034	0.0032	0.0625	0.0570	0.0573	0.0612	0.0112	ND	ND	0.0006	ND	ND	ND	mg/l	0.0003	E200.8
RADIONUCLIDES-TOTAL																
Gross Alpha	4.3	6.2	55.0	75.0	48.2	56.7	11.7	-0.9	2.4	2.8	2.1	3.4	2.1	pCi/L		E900.0
Gross Alpha precision (+/-)	2.8	3.0	4.4	5.0	3.7	4.5	9.9	2.0	2.1	1.2	1.6	1.6	2	pCi/L		E900.0
Gross Alpha MDC	4.2	4.1	2.9	2.6	2.2	2.7	15.2	3.6	3.2	1.6	2.3	2.2	3.1	pCi/L		E900.0
Gross Beta	4.2	0.9	20.3	29.7	27.3	22.4	0.9	-6.0	-3	-2.0	-1	12.0	3.3	pCi/L		E900.0
Gross Beta precision (+/-)	3.8	3.3	2.1	2.4	2.3	2.4	7.9	2.0	2.4	1.8	2.3	1.9	2.3	pCi/L		E900.0
Gross Beta MDC	6.2	5.5	2.9	3.2	3.1	3.4	13.2	3.6	4.1	3.0	3.8	2.8	3.7	pCi/L		E900.0
Radium 226	0.34	0.38	1.10	0.98	1.0	1.1	0.13	-0.02	-0.2	0.04	0.25	0.43	-0.1	pCi/L		E903.0
Radium 226 precision (+/-)	0.22	0.17	0.26	0.23	0.25	0.29	0.13	0.12	0.09	0.10	0.13	0.18	0.11	pCi/L		E903.0
Radium 226 MDC	0.30	.21	0.23	0.21	0.20	0.26	0.19	0.22	0.22	0.16	0.17	0.22	0.23	pCi/L		E903.0
Radium 228	0.05	-0.05	0.61	2.1	0.62	1.3	2.1	0.1	2.4	-0.02	0.47	0.78	0.85	pCi/L		RA-05
Radium 228 precision (+/-)	0.66	0.70	0.71	0.81	0.76	0.87	0.78	0.67	0.83	0.79	0.73	0.73	0.8	pCi/L		RA-05
Radium 228 MDC	1.1	1.2	1.2	1.2	1.2	1.4	1.2	1.1	1.2	1.3	1.2	1.2	1.3	pCi/L		RA-05
Radon 222	600	484	1580	1190	1530	1520	493	133	145	205	87	257	36.5	pCi/L	100	D5072-92
Radon 222 precision (+/-)	55.1	51.2	63.8	65.7	115	63	51.7	48.8	54.6	67.9	39.5	101	37.9	pCi/L		D5072-92
Thorium 228	0.0	0.1	0.0	0.3	0.08	0.01	0.1	0.2	0.0	ND	1.7	0.03	0.09	pCi/L		E907.0
Thorium 228 precision (+/-)	0.1	0.2	0.2	0.3	0.1	0.1	0.2	0.3	0.08	0.2	0.5	0.08	0.1	pCi/L		E907.0
Thorium 228 MDC	-	-	-	-	0.2	0.2	-	-	-	-	-	0.2	0.3	pCi/L		E907.0
Thorium 230	-0.1	-0.1	1.3	-0.1	-0.01	0.10	1.1	3.1	0.0	0.5	-0.2	-0.07	-0.02	pCi/L		E907.0
Thorium 230 precision (+/-)	0.1	0.2	0.5	0.2	0.1	0.1	0.4	0.9	0.1	0.2	0.1	0.08	0.1	pCi/L		E907.0
Thorium 230 MDC	-	-	-	-	0.2	0.1	-	-	-	-	-	0.1	0.3	pCi/L		E907.0
Thorium 232	0.0	0.0	0.0	0.0	0.03	-0.008	0.0	0.0	0.0	0.0	0.0	0.03	-0.03	pCi/L		E907.0
Thorium 232 precision (+/-)	0.1	0.1	0.1	0.2	0.09	0.04	0.1	0.1	0.06	0.1	0.1	0.07	0.09	pCi/L		E907.0
Thorium 232 MDC	-	-	-	-	0.2	0.1	-	-	-	-	-	0.1	0.2	pCi/L		E907.0

Table G-1 Multiple Aquifer/Unknow Formation Well Water Quality Data (Page 3 of 4)

WELL ID	**47**	**47**	**111**	**111**	**111**	**111**	**106**	**83**	**83**	**5**	**12**	**12**	**12**	**UNITS**	**R.L.**	**METHOD**
Formation of Completion	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Qal/Jmw	Kmf/Kpl	Kmf/Kpl	Kmf/Kpl	Kd/Jmw	Kd/Jmw	Kd/Jmw			
DATA QUALITY																
A/C Balance (+/- 5)	-2.93	4.58	3.56	3.73	-0.364	-1.870	-4.47	-0.28	6.35	-1.08	4.00	-0.94	1.83	%		Calc.
Anions	14.00	14.1	7.66	7.67	7.45	7.99	56.00	9.67	9.62	8.03	9.29	9.12	9.25	meq/l		Calc.
Cations	13.20	15.5	8.22	8.26	7.40	7.69	51.20	9.62	10.90	7.85	10.1	8.95	9.6	meq/l		Calc.
Solids, Total Dissolved Calc.	897	901	448	593	431	458	3590	514	571	456	578	554	572	mg/l		Calc.
TDS Balance (0.80 - 1.20)	0.96	0.960	0.99	0.730	1.07	1.01	0.96	0.94	0.890	1.00	0.980	1.06	1.03			Calc.
VOLATILE ORGANIC COMPOUNDS																
1,1,1,2-Tetrachloroethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,1,1-Trichloroethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,1,2,2-Tetrachloroethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,1,2-Trichloroethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,1-Dichloroethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,1-Dichloroethene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,1-Dichloropropene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,2,3-Trichloropropane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,2-Dibromoethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,2-Dichlorobenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,2-Dichloroethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,2-Dichloropropane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,3-Dichlorobenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,3-Dichloropropane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
1,4-Dichlorobenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
2,2-Dichloropropane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
2-Chloroethyl vinyl ether	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
2-Chlorotoluene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
4-Chlorotoluene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Benzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Bromobenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Bromochloromethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Bromodichloromethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Bromoform	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Bromomethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Carbon tetrachloride	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Chlorobenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Chlorodibromomethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Chloroethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Chloroform	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Chloromethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
cis-1,2-Dichloroethene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
cis-1,3-Dichloropropene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Dibromomethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Dichlorodifluoromethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Ethylbenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
m+p-Xylenes	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Methyl ethyl ketone	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	20	E624
Methylene chloride	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
o-Xylene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Styrene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Tetrachloroethene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Toluene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
trans-1,2-Dichloroethene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
trans-1,3-Dichloropropene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Trichloroethene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Trichlorofluoromethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Vinyl chloride	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Xylenes, Total	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	1.0	E624
Surr: 1,2-Dichlorobenzene-d4	100.0	-	101.0	-		-	92.0	105.0	-	102.0	-		-	% REC	80-120	E624
Surr: Dibromofluormethane	98.0	-	90.0	-		-	102.0	98.0	-	122.0	-		-	% REC	80-120	E624
Surr: p-Bromofluorobenzene	98.0	-	98.0	-		-	94.0	109.0	-	116.0	-		-	% REC	80-120	E624
Surr: Toluene-d8	96.0	-	91.0	-		-	96.0	98.0	-	108.0	-		-	% REC	80-120	E624

Table G-1 Multiple Aquifer/Unknow Formation Well Water Quality Data (Page 4 of 4)

WELL ID	**47**	**47**	**111**	**111**	**111**	**111**	**106**	**83**	**83**	**5**	**12**	**12**	**12**	**UNITS**	**R.L.**	**METHOD**
Formation of Completion	Unk.	Unk.	Unk.	Unk.	Unk.	Unk.	Qal/Jmw	Kmf/Kpl	Kmf/Kpl	Kmf/Kpl	Kd/Jmw	Kd/Jmw	Kd/Jmw			
SYNTHETIC ORGANIC COMPOUNDS																
1,2,4-Trichlorobenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
2,4,6-Trichlorophenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
2,4-Dichlorophenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
2,4-Dimethylphenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
2,4-Dinitrophenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	50	E625
2,4-Dinitrotoluene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
2,6-Dinitrotoluene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
2-Chloronaphthalene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
2-Chlorophenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
2-Nitrophenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
3,3'-Dichlorobenzidine	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	20	E625
4,6-Dinitro-2-methylphenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	50	E625
4-Bromophenyl phenyl ether	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
4-Chloro-3-methylphenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
4-Chlorophenyl phenyl ether	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
4-Nitrophenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	50	E625
Acenaphthene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Acenaphthylene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Anthracene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Azobenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Benzidine	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	20	E625
Benzo(a)anthracene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Benzo(a)pyrene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Benzo(b)fluoranthene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Benzo(g,h,i)perylene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Benzo(k)fluorathene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
bis(-2-chloroethoxy)Methane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
bis(-2-chloroethyl)Ether	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
bis(2-chloroisopropyl)Ether	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
bis(2-ethylhexyl)Phthalate	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Butylbenzylphthalate	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Chrysene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Dibenzo(a,h)anthracene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Diethyl phthalate	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Dimethyl phthalate	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Di-n-butyl phthalate	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Di-n-octyl phthalate	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Fluoranthene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Fluorene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Hexachlorobenzene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Hexachlorobutadiene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	20	E625
Hexachlorocyclopentadiene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Hexachloroethane	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Ideno(1,2,3-cd)pyrene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Isophorone	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Naphthalene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
n-Nitrosodimethylamine	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
n-Nitroso-di-n-propylamine	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
n-Nitrosodiphenylamine	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Pentachlorophenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	50	E625
Phenanthrene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Phenol	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Pyrene	ND	-	ND	-		-	ND	ND	-	ND	-		-	ug/l	10	E625
Surr: 2,4,6-Tribromophenol	41.0	-	50.0	-		-	49.0	31.0	-	34.0	-		-	% REC	26-116	E625
Surr: 2-Fluorobiphenyl	43.0	-	53.0	-		-	52.0	47.0	-	41.0	-		-	% REC	25-94	E625
Surr: 2-Fluorophenol	28.0	-	34.0	-		-	31.0	19.0	-	23.0	-		-	% REC	11-67	E625
Surr: Nitrobenzene-d5	51.0	-	56.0	-		-	54.0	44.0	-	39.0	-		-	% REC	19-102	E625
Surr: Phenol-d5	22.0	-	31.0	-		-	29.0	25.0	-	25.0	-		-	% REC	15-54	E625
Surr: Terphenyl-d14	53.0	-	50.0	-		-	53.0	49.0	-	37.0	-		-	% REC	39-106	E625

Appendix 9-H

List of 142 Wells Used As Initial Regional Well Sampling Guide
(Corresponds to Plate 1 of SAP)

Table H-1. Wells Identified as being within 7 Miles of the Permit Area (Page 1 of 4)

Well ID	OSE File No.	Designation in Previous Inventories							T	R	Sec	1st Q	2nd Q	3rd Q	Easting	Northing	Producing Formation	Well Depth	DTW	Water Elevation	Date of Water Level Measurement	Elevation (ft)
		GMRC ER	NMEIBS	San Lucas Canyon	Polvadera Canyon	DP-61 Monitor Wells	NMMMR HR2	Metric Corp.														
1									13	7	30	4	2	1	262362.0	3912136.2	Jmw	4207	>500	7709		8209
2			17						13	7	30	4	3	2	262181.0	3911688.6		>1980	<300	8004		8304
3			16						13	7	33	2	3	4	265362.3	3910526.5		1500 approx	>400	8120	9/29/1972	8520
4				M-1					13	8	1		2	3	260080.1	3919137.6	*Kpl*	400				7162
5	RG 33107 EXPL								13	8	1	4	1	1	260480.2	3918556.4	*Kmf, Kpl*	394	72	7159	8/18/1979	7231
6							DK1		13	8	7	4	3	4	252786.4	3916502.3	Kd					7221
7									13	8	11	3	2	1	258514.1	3917001.6	Kmf	192.3	76.9	7121		7198
8		S-16							13	8	14	4	2	2	259531.5	3915409.5	Kmf					7185
9			1				MF1		13	8	14	4	2	2	259531.5	3915409.5	Kmf	200	71.5	7114	9/10/1962	7185
10							U1		13	8	17	2	2	3	254510.3	3916097.2						7182
11			20						13	8	17	2	4	1	254500.9	3915937.1						7169
12	B 00848							46	13	8	17	2	1	3	254110.0	3916112.0						7165
13	B 00848 S								13	8	17	2	1	3	254110.0	3916112.0						7165
14	B 00848 O							3,47	13	8	17	2	1	4	254310.0	3916112.0	Kd,Jmw	1611	1315	5863	4/1/1981	7178
15	B 00851								13	8	17	2	1	4	254310.0	3916112.0						7178
16	B 01084							50	13	8	17	2	3	2	254295.0	3915909.0	*Kg*	320	60	7092	1/1/1963	7152
17	B 01544								13	8	18	1	2	3	252103.0	3916155.0	*Kd*	715	624	6417	6/14/2003	7041
18	B 00390								13	8	18	2	2	1	252904.0	3916338.0	*Kd,Jmw*	1800	800	6333	12/31/1974	7133
19	B 00557							6	13	8	21	4	3	2	255825.0	3913453.0	Qal					7037
20		S-4	2				MF2		13	8	22	2	4	2	257901.8	3914231.9	Kmf	157.3	37.5	7066	10/23/1962	7103
21	B 00415 O-4							40	13	8	22	2	1	2	255983.0	3911840.0	*Qal*	32	15	7062	3/23/1978	7077
22	B 01085							7, 51?	13	8	22	2	4	2	257866.0	3914204.0	Kpl	476	90	7013	12/31/1920	7103
23	B 00415 O-3								13	8	22	4	2	2	256194.0	3912240.0	*Qal*	32	15	7055	3/23/1978	7070
24	B 00415 O-3								13	8	22	4	2	2	256194.0	3912240.0	Qal	32	15	7055	3/23/1978	7070
25	B 01442								13	8	22	4	4	4	257845.0	3913200.0	*Kpl*	620	87	7049	6/15/2000	7136
26							MF3		13	8	23	3	2	4	258686.9	3913537.5	Kmf					7172
27							MF4		13	8	23	3	4	2	258686.9	3913396.5	Kmf	305	37.5	7138	2/1/1978	7175
28								9	13	8	23	4	1	3	258857.4	3913552.2	Qal	79	34	7144		7178
29								61	13	8	23	4	2	4	259385.7	3913592.0	Qal	100				7224
30								10	13	8	23	4	3	1	258867.2	3913340.1	Qal	?				7185
31		S-10	3				MF5	11	13	8	23	4	3	2	259048.8	3913331.9	Kmf	92	35	7170	10/17/1972	7205
32	B 01442 EXP L-2								13	8	23	3	1	3	258063.0	3913591.0	Kg	1150	107	7016	5/28/2002	7123
33	B 00544								13	8	23	3	4	3	258355.0	3913491.0	Qal	68	30	7122	6/17/1978	7152
34	B 00815								13	8	23	3	4	2	258652.0	3913380.0	Kmf	300	260	6915	1981	7175
35	B 00734							12	13	8	23	4	4	1	259248.0	3913362.0	Qal	73				7224
36	B 00735								13	8	23	4	4	1	259248.0	3913362.0	Qal	65	30	7194	7/3/1980	7224
37	B 00736								13	8	23	4	4	2	259448.0	3913362.0						7247
38	B 00737							13	13	8	23	4	4	2	259448.0	3913362.0	Qal	80				7247
39								MW-1	13	8	24	1	2	1	260072.3	3914591.1	Kmf	63				7257
40						MW-3			13	8	24	1	2	4	260329.5	3914333.9	Qal	65				7274
41		S-14					MF7	19	13	8	24	1	4	1	260055.7	3914201.1	Kmf	285	55	7202		7257

Table H-1. Wells Identified as being within 7 Miles of the Permit Area (Page 2 of 4)

Well ID	OSE File No.	Designation in Previous Inventories							T	R	Sec	1st Q	2nd Q	3rd Q	Easting	Northing	Producing Formation	Well Depth	DTW	Water Elevation	Date of Water Level Measurement	Elevation (ft)
		GMRC ER	NMEIBS	San Lucas Canyon	Polvadera Canyon	DP-61 Monitor Wells	NMMMR HR2	Metric Corp.														
42							MF16		13	8	24	1	4	1	260055.7	3914201.1	Kmf	250	59	7198	Oct-72	7257
43						MW-1			13	8	24	1	4	2	260329.5	3914201.1	Qal	60				7277
44						MW-2			13	8	24	1	4	2	260329.5	3914201.1	Qal	65				7277
45		S-8						18	13	8	24	1	4	4	260329.5	3913919.1	Kmf	160				7290
46									13	8	24	1	4	4	260329.5	3913919.1	Kmf	160				7290
47	B 01429							55	13	8	24	2	2	2	261109.5	3914516.1	*Kmf*	245	90	7335		7425
48		S-13	4				MF8	24	13	8	24	2	2	3	260877.0	3914317.3	Kmf	?	184.5	7138	6/2/1973	7323
49	B 00404								13	8	24	2	3	4	260752.6	3913902.5						7333
50	B-516-(1)-S							27	13	8	24	2	4	3	260877.0	3913910.8	Kpl	1125	470	6899		7369
51	B-516-(1)-S-2							28	13	8	24	2	4	3	260877.0	3913910.8	Kpl	1045	453	6916		7369
52	B-516-(1)-S-3							29	13	8	24	2	4	3	260877.0	3913910.8	*Kpl*	1065				7369
53								MW-2	13	8	24	3	2	2	260321.2	3913786.4	*Qal*	44				7303
54						MW-4			13	8	24	3	2	4	260321.2	3913496.0	*Qal*	prob.60				7310
55						MW-5			13	8	24	3	2	2	260321.2	3913786.4	*Qal*	prob.60				7303
56			6				MF9	22	13	8	24	3	3	4	259898.1	3913126.6	Kmf	200	50	7247	pre-1962	7297
57			7				MF10	23	13	8	24	3	3	4	259898.1	3913128.6	Kmf	140	89.5	7207	9/10/1962	7297
58		S-9, S-19						21	13	8	24	3	4	2	260321.2	3913363.3	Kmf	250	15	7301		7316
59								MW-3	13	8	24	3	4	4	260304.6	3913122.7	*Qal*	46				7362
60								20	13	8	24	3	4	4	260304.6	3913122.7	*Qal*	?				7362
61							MF12		13	8	24	3	3	4	259898.1	3913131.0	Kmf	120	101	7196	2/1/1978	7297
62		S-12	5				MF11	25	13	8	24	3	3	4	259898.1	3913131.0	Kmf	200	87.4	7209	1976	7297
63							MF14		13	8	24	3	4	1	260039.1	3913371.6	Kmf	500	139	7141	3/1/1978	7280
64									13	8	24	3	4	2	260312.9	3913363.3	*Kmf*	250	15	7301		7316
65									13	8	24	3	4	2	260312.9	3913363.3	*Kmf*					7316
66		S-1							13	8	24	4	1	2	260736.0	3913769.8	*Kmf*	800	260	7092		7352
67		S-22							13	8	24	4	1	2	260736.0	3913769.8	*Km*	2000	700	6652		7352
68			SM2443						13	8	24	4	1	2	260736.0	3913769.8						7352
69								MW-5	13	8	24	4	1	1	260478.8	3913769.8	*Qal*	32.5				7326
70								MW-4	13	8	24	4	1	3	260453.9	3913496.0	*Qal*	47.5				7326
71	B-00516							26	13	8	24	4	2	1	260868.7	3913778.1	Kpl	925				7382
72									13	8	24	4	1	2	260727.7	3913778.1	*Km*	2000	700	6649	1976	7349
73	B-00516						Mw(W1)	26	13	8	24	2	3	4	260350.0	3913856.0	Jmw	3535	1062	6238	10/1/1976	7300
74	B-00524							17	13	8	24	3	4	4	260251.0	3913154.0	Kpl?	520	260	7089	1978	7349
75			8				MF15		13	8	25	1	1	2	259881.5	3912990.0	Kmf	150	43	7260	9/10/1962	7303
76			9a				MF17	32a	13	8	25	1	1	4	259889.8	3912699.6	Kmf,Qal	120	36	7303	9/1/1962	7339
77			9b				MF18	32b	13	8	25	1	1	4	259889.8	3912699.6	Kmf	250	80	7259	10/1/1972	7339
78		S-15	9						13	8	25	1	1	4	259889.8	3912699.6	Kmf		103.87	7235	1976	7339
79			10				A7	42	13	8	25	1	1	1	259632.6	3912981.7	Qal	21	19.5	7267	9/1/1962	7287
80			15				MF16	43	13	8	25	1	1	4	259881.5	3912699.6	Kmf	35	27	7312	10/11/1972	7339
81								45	13	8	25	1	1	4	259881.5	3912699.6	Kmf		103.9	7235		7339

Table H-1. Wells Identified as being within 7 Miles of the Permit Area (Page 3 of 4)

Well ID	OSE File No.	Designation in Previous Inventories							T	R	Sec	1st Q	2nd Q	3rd Q	Easting	Northing	Producing Formation	Well Depth	DTW	Water Elevation	Date of Water Level Measurement	Elevation (ft)
		GMRC ER	NMEIBS	San Lucas Canyon	Polvadera Canyon	DP-61 Monitor Wells	NMMMR HR2	Metric Corp.														
82	B-00428							44?	13	8	25	1	2	3	259997.7	3912716.2	Kpl,Kmf	325	75	7317	7/31/1971	7392
83		S-20							13	8	25	1	2	1	260006.0	3912990.0	Kpl		269.35	7044	1976	7313
84	B-00839							33	13	8	25	1			259920.0	3912641.0	Kmf	420	120	7229	9/8/1980	7349
85	B-00906							48	13	8	25	1	1		259733.0	3912847.0	*Kmf,Qal*	230	50	7250	6/22/1981	7300
86	B-00729								13	8	25	1	3	3	259618.0	3912339.0	*Kmf*					7333
87	B-00829							34	13	8	25	1	3	2	259818.0	3912539.0	Kmf,Qal	210	50	7352	8/18/1980	7402
88		S-11	12				MF19	38	13	8	26	2	1	1	258846.4	3912971.0	Kmf,Qal	40	33.4	7181	1976	7215
89							MF20		13	8	26	2	1	1	258848.9	3912971.0	Kmf	180	36	7179	8/1/1973	7215
90			11a				P2a		13	8	26	2	2	1	259251.0	3913006.6	Kpl	336	281	6973	9/11/1962	7254
91			11b				P2b(P3)		13	8	26	2	2	1	259251.0	3913006.6	Kmf	200	32.8	7221	10/24/1972	7254
92							MF21		13	8	26	2	2	2	259508.2	3912990.0	Kmf	57.5	21.5	7255	2/1/1978	7277
93	B-00428 S							37	13	8	26	2	1	2	259231.0	3912957.0	Kpl	703	210	7041		7251
94	B-01185							53	13	8	26	2	2		259332.0	3912858.0	Kmf	185	70	7200	4/21/1989	7270
95	B-00385							54	13	8	26	2	2	1	259231.0	3912957.0	*Kpl*	707	196	7055	10/27/1976	7251
96	B-00738							36	13	8	26	2	2	2	259431.0	3912957.0	Qal	80	36	7238	12/12/1979	7274
97								35	13	8	26	2	3	3	258812.0	3912368.0	*Kmf*					7261
98							MF22		13	8	27	1	3	3	256355.8	3912417.6	Kmf		24.2	7046	8/1/1977	7070
99	RG-43456		21					59	13	8	27	1	3	4	256604.0	3912429.0	*Kmf*	300				7080
100	B-01086							52	13	8	28	3	4	3	255202.0	3911899.0	*Kmf*	210	20	7050	1/1/1947	7070
101	B-00997								13	8	30				252287.0	3912456.0	*Km*					7267
102			22					41	13	8	33	2	3	4	255740.2	3910867.1	Kpl	600				7169
103							MF23(P4?)		13	8	33	2	3	4	255791.7	3910857.9	Kpl	500	113	7056	8/1/1977	7169
104	RG-43457							60	13	8	33	4	1	2	255750.0	3910641.0	*Kmf*	320	50	7142	1/1/1967	7192
105	B-01046								13	8	33	4	4	3	255937.0	3910028.0	*Tb*					7402
106	B-01190								13	9	11	3	3	3	248512.0	3916669.0	*Qal/Jmw*	390	37	6863	8/31/1989	6900
107							DK2		13	9	13	1	1	1	250096.7	3916461.4	*Km*	155	142.9	6799	2/1/1958	6942
108	B-00456								13	9	14	2	3		249391.0	3915949.0						6939
109	B-01104								13	9	14	4	3		249372.0	3915145.0	*Jmw*	303	247	6643	4/2/1986	6890
110							W2		13	9	15	3	4	3	247252.5	3915093.8	*Jmw*	260	223.7	6614	12/1/1957	6837
111	B-01115								13	9	15	3	4	4	247479.0	3915109.0	*Jmw*	478	204	6643	7/21/1986	6847
112							W6		13	9	22	1	1	1	246875.9	3914945.2	Jmw		220	6611		6831
113							W7		13	9	22	1	2	1	247232.7	3914945.2	Jmw	297	204.8	6632	12/1/1958	6837
114							W8		13	9	22	1	2	1	247232.7	3914945.2	Jmw	330	198.5	6639	10/1/1962	6837
115							A11		13	9	22	2	1	2	247916.5	3914915.5	Qal	130	37.1	6797	3/1/1975	6834
116	B-01636								13	9	22	1	2		247377.0	3914802.0	*Qal*	260	80	6744	5/10/2005	6824
117	B-00659								13	9	22	2	1	3	246883.0	3914717.0	*Jmw*	220	190	6641	1/18/1979	6831
118	B-00861								13	9	22	2	3	1	246981.0	3914003.0						6854
119							W9		13	9	23	2	1	2	249502.1	3914856.0	*Qal/Jmw*	280	50.5	6816	3/1/1976	6867
120			13				A12		13	9	24	2	2	1	251266.1	3914846.1	Qal	80	56.5	6856	12/1/1957	6913
121			14				A3		13	9	24	2	2	1a	251266.1	3914846.1	Qal	80	56.6	6856	12/1/1957	6913
122					Laguna Well				14	7	34?				267604.0	3920146.5						7805

Table H-1. Wells Identified as being within 7 Miles of the Permit Area (Page 4 of 4)

Well ID	OSE File No.	Designation in Previous Inventories							T	R	Sec	1st Q	2nd Q	3rd Q	Easting	Northing	Producing Formation	Well Depth	DTW	Water Elevation	Date of Water Level Measurement	Elevation (ft)
		GMRC ER	NMEIBS	San Lucas Canyon	Polvadera Canyon	DP-61 Monitor Wells	NMMMR HR2	Metric Corp.														
123		S-7							14	7	19	2	2	1	263316.3	3924150.0	Kpl					6913
124							DL2(1)		14	8	4	3	3	4	255438.2	3927730.8	Kcda		150.3	6982	10/16/1962	7133
125									14	8	4	3	3	4	255438.2	3927730.8			500	6633		7133
126					Section 4 Well				14	8	4	3	3	4	255438.2	3927730.8	Kcda					7133
127			18						14	8	12	2	3	4	260941.7	3926787.1	*Kmf,Kpu*					6972
128							MN1		14	8	15	2	4	4	258241.4	3925189.3	Km	1320	500	6701		7201
129					Polvadera Well				14	8	15	2	4	4	258241.4	3925189.3	Kd	830	670	6531	3/1/1979	7201
130			19						14	8	15	4	3	3	257531.2	3924423.1	Km	1320				7247
131				SL-1					14	8	25	2	1	2	260782.9	3922629.1	Qal	50				7021
132				SL-2					14	8	25	2	1	2	260782.9	3922629.1	Kpl	230				7021
133				SL-3					14	8	25	2	1	2	260782.9	3922629.1	Kmf	260				7021
134									14	9	36	3	1	3	250259.5	3920146.9	*Jmw*	1500	582	6511		7093
135									14	9	34	4	2	2	248570.5	3920456.0	*Jmw*	1004	508	6526		7034
136	B-00993								14	9	35	4	1	1	249310.1	3920610.5	Jmw	1398				7077
137	B-00993-S								14	9	36	4	1	3	250527.0	3920058.0	Jmw	1553	0	7133		7133
138									13	9	22				246874.0	3914825.0	Jmw	170	86	6645		6815
140															258825.0	3913271.0		66	18.6			
141															248514.0	3915237.0		>410				
142									13	9	22				247749.0	3915037.0						
143									13	9	22				247689.0	3915023.0						

Previous Inventory Designation:

GMRC ER	GMRC Environmental Report, 1979
NMEIBS	New Mexico Environmental Institute Environmental Baseline Study, 1974
San Lucas Canyon	GMRC "Hydrologic Effects of Tailings Pipeline and Mill Site Facilities, Mt. Taylor Uranium Mill Project," 1979 (App. D to GMRC Groundwater Discharge Plan, December, 1979)
Polvadera Canyon	GMRC Groundwater Discharge Plan (December, 1979).
DP-61 Monitor wells	NMED DP-61 file for GMRC
NMMMR HR2	NMMMR Hydrologic Sheet 2
Metric Corp.	Consultant report to RGRC, 12/2005, 3/2005