Appendix 5.15D
Groundwater Interim Assessment

Cardno ENTRIX

Shaping the Future

Draft

BrightSource Energy

Hidden Hills Project Interim Assessment Report

May 2011

Prepared For

BrightSource Energy

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Chapter 1

Introduction

The BrightSource Energy (BSE) Hidden Hills project is a solar power generating facility utilizing BSE's proprietary LPT solar thermal energy system. Cardno ENTRIX was contracted by BSE to evaluate the sustainability of groundwater resources as the water supply for the facility.

This report is a preliminary assessment of the hydrogeology and water resources related to the proposed facility. The purpose of the report is to provide a summary of the initial findings and to evaluate if there is a viable water source for the project needs. In order to determine the viability of water supply for the project, it is necessary to evaluate the hydrogeology of the project site and the overall water balance of the Pahrump Valley Basin.

This report was developed using existing site data, published geologic reports and planning documents, pumping data, and other publicly available data to assess site conditions and describe the hydrogeologic setting of the basin.

Chapter 2

Project Description

2.1 Location

The BSE Hidden Hills project is located in southeastern California along the California – Nevada state line (Figures 1 and 2). The Hidden Hills site, as shown on Figure 2, is located in southeastern Inyo County California and borders Nye and Clark counties in Nevada.

The site is approximately 40 miles west of Las Vegas, Nevada and lies within the Pahrump Valley.

Figure 1. Map showing the regional location of the Hidden Hills project along the California – Nevada state line (DeLorme Topo USA)

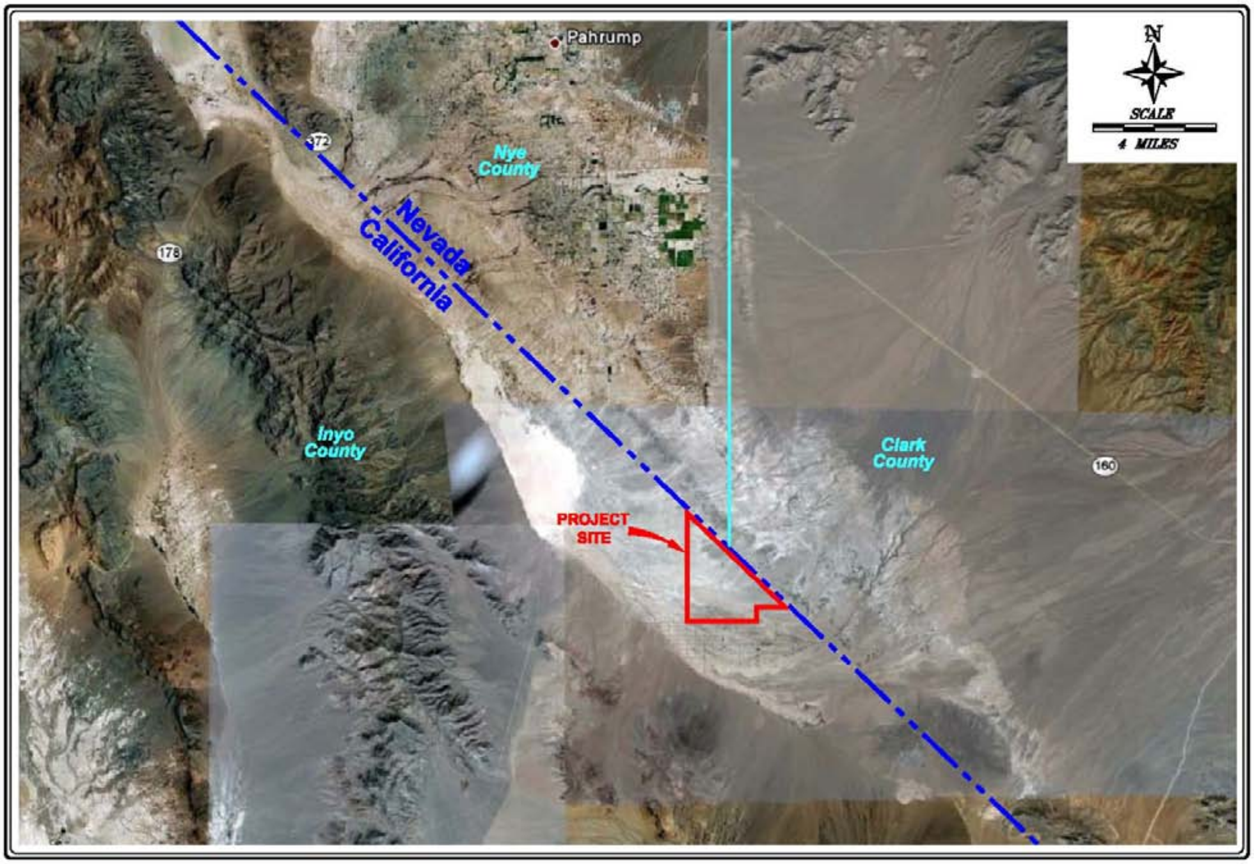

Figure 2. Map showing the project site location (Google Earth)

The Pahrump Valley encompasses an area of approximately 1,050 square miles and straddles the California-Nevada state line with the majority of the valley lying within Nevada. The Pahrump Valley is bordered to the northeast by the Spring Mountains, to the northwest by the Montgomery Mountains, to the west by the Nopah Range, and to the southwest by the Kingston Range. Pahrump Valley lies within Nye and Clark counties in Nevada and within Inyo and San Bernardino counties in California. The town of Pahrump, Nevada with a current population of approximately 38,000 (Nye County Department of Planning) is the sole municipality within the valley and is located in the northern and eastern portions of the valley within Nye County, Nevada.

2.2 Description of Facility

BrightSource's LPT solar thermal energy systems generate power the same way as traditional power plants – by creating high temperature steam to turn a turbine. However, instead of using fossil fuels or nuclear power to create the steam, BrightSource uses solar energy.

At the heart of BrightSource's proprietary LPT solar thermal system is a state-of-the-art solar field design, optimization software and a control system that allow for the creation of high temperature steam. The steam can then be integrated with conventional power plant components for electricity generation.

BrightSource's LPT solar thermal system uses proprietary software to control thousands of tracking mirrors, known as heliostats, to directly concentrate sunlight onto a boiler filled with water that sits atop a tower. When the sunlight hits the boiler, the water inside is heated and creates high temperature steam. Once produced, the steam is used in a conventional turbine to produce electricity. A schematic diagram of the solar array is provided as Figure 3.

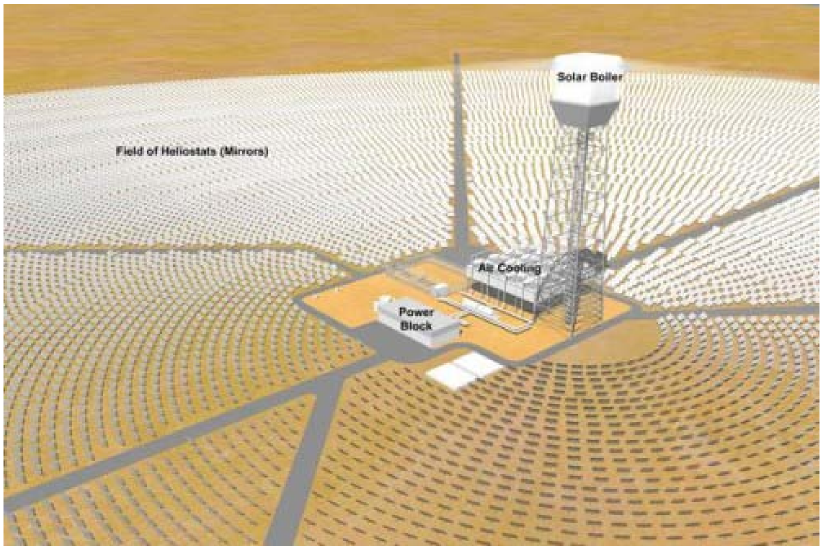

Figure 3. Site Features (BrightSource)

2.3 Project Demands

The proposed Hidden Hills facility will require a reliable groundwater source to supply the boiler system. The water will be derived from one or more on-site supply wells. Based on the proposed system design, a supply of up to 400 acre-feet per year is needed to meet the site's water demand.

Chapter 3

Geologic / Hydrologic Setting

3.1 Introduction

An understanding of the geologic and hydrologic setting is important for this project in evaluating the project site water supply. An understanding of the regional and local geologic framework is necessary to assess the site and its relationship to the system.

3.2 Regional Setting

The Pahrump Valley is located within a regional hydrogeologic regime know as the Death Valley Regional Flow System. The Death Valley Regional Flow System (DVRFS) lies within the Great Basin and encompasses an area of southern Nevada and southeastern California. The United States Geological Survey has been studying the geology and hydrology within the DVRFS as part of evaluations conducted for the Nevada Test Site.

The boundary of the DVRFS (Belcher et al. 2002a) is shown on the figure presented as Figure 4. The Pahrump Valley is located in the southeastern area of the DVRFS.

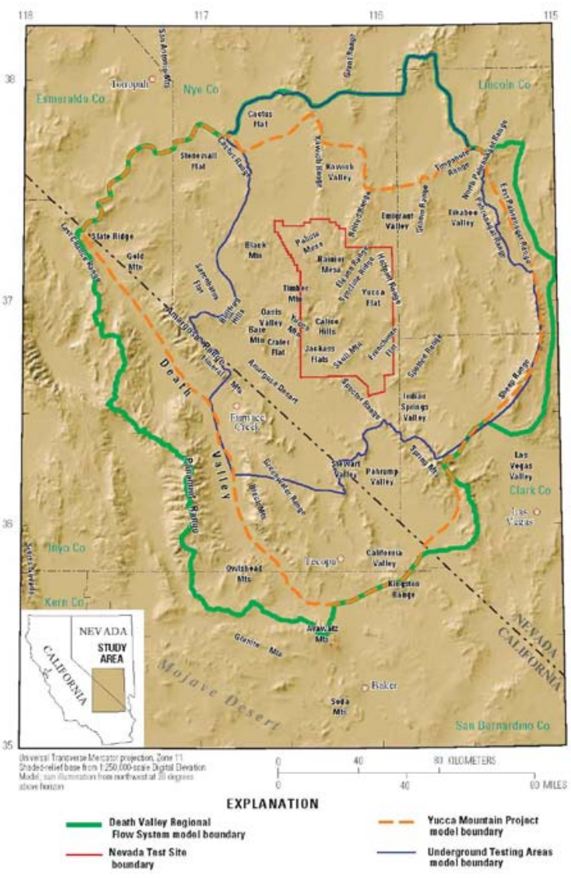

Figure 4. DVRFS (Belcher et al. 2002a)

3.3 Pahrump Valley

Pahrump Valley is approximately 30 miles wide by 42 miles long. The valley is located along the Pahrump Valley Fault Zone and was formed as a "pull-apart" (i.e., the result of regional extension or 'stretching' of the earth's crust) basin (Blakely et al, 1998). The locations of the faults within the valley are show on Figure 5.

Elevations of the central basin range from 2,457 feet at Stewart Dry Lake in the northwestern Pahrump Valley to approximately 3,000 feet in the southwest. The elevations of the surrounding mountains range from 6,400 feet in the Nopah Range to 11,900 feet in the Spring Mountains (AMEC 2006).

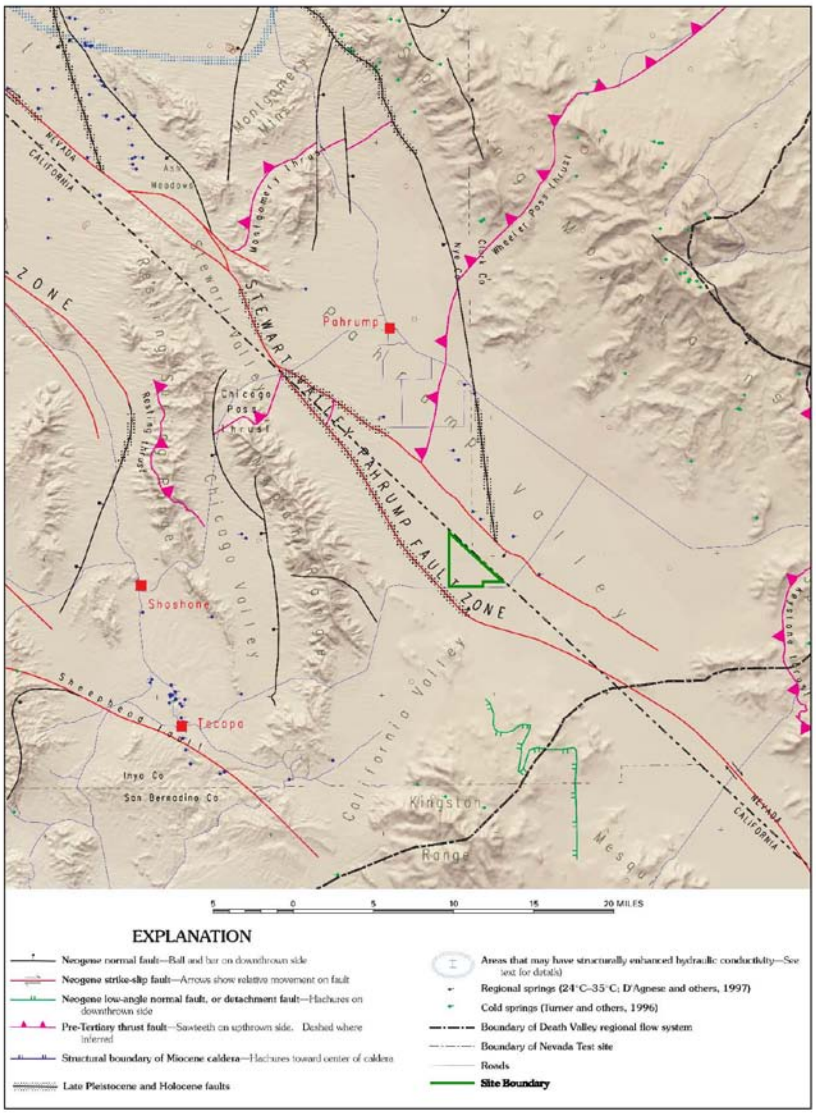

Figure 5. Map showing the Pahrump Valley Fault Zone (Potter et al. 2002)

The Pahrump Valley is a drained closed basin with no essentially no surface water outflow from the valley (Buqo 2004). The valley floor is comprised of basin fill and alluvial sediments. The sediments in the central portion of the basin are finer grained Quaternary playa and Quaternary and Tertiary lacustrine associated fine grain deposits with coarser Quaternary and Tertiary unconsolidated sediments comprising the alluvial deposits located at the base of the surrounding mountains (Planert and Williams 1995).

The valley is underlain by Triassic to Mississippian carbonate rocks and Devonian to Cambrian carbonate and clastic rocks which also form the adjacent Spring Mountains and the eastern portion of the Nopah Range. Groundwater is recharged from the surrounding mountains and groundwater flow is discharged from the Pahrump Valley to basins at lower elevations as shown on Figure 6 (Harrill 1986 and Buqo 2004). Existing monitoring wells in carbonate aquifer have shown an upward gradient indicating a confining unit is present that separates the basin fill aquifer from the carbonate aquifer.

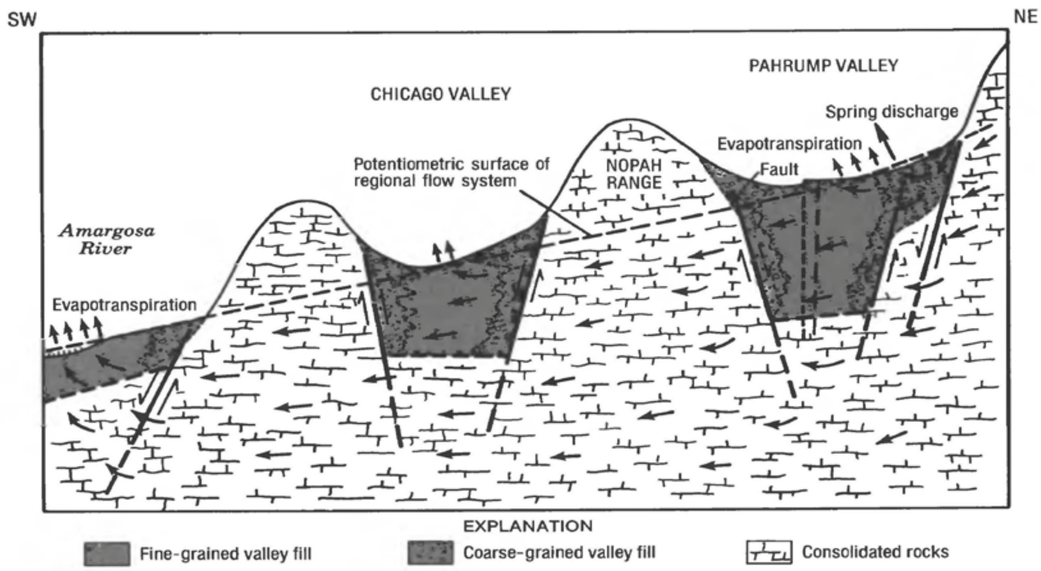

Figure 6. Cross section of the Pahrump Basin showing generalized groundwater flow to adjacent basins (Harrill 1986)

3.4 Basin Fill/Alluvial Aquifer

The basin fill and alluvial sediments comprising the valley floor range from 200 meters (650 feet) to over 3,000 meters (9,800) thick (Blakely 1998). The Basin Fill/Alluvial Aquifer is the predominant source of groundwater supply for the Pahrump Valley.

The basin fill sediments in the central area of the basin and the alluvial fan deposits at the base of the mountains form areas of varying hydraulic conductivity[1]. The materials within the central portion of the basin are finer than the alluvial sediments and have lower productivity capacity. The sediments comprising the aquifer at the Hidden Hills site are within an area identified as having the lowest transmissivity (Planert and Williams 1995). When low hydraulic conductivity

[1] Hydraulic conductivity is a measure of the ease with which water can move through pore spaces or fractures.

aquifers are pumped the cone of depression created is relatively deep but narrow compared to the same pumping rate in an aquifer with higher hydraulic conductivity. This has the effect of creating more drawdown immediately adjacent to the well but reducing the extent of the drawdown away from the well. Based upon the work documented in these previous reports, the hydraulic conductivity of the basin fill aquifer in the vicinity of the site is relatively low. Because some degree of variability in the aquifer properties is likely, portions of the aquifer in or around the site may contain zones with hydraulic conductivity that are greater than the average value conducted by these past tests.

3.5 Lower Carbonate Aquifer

The carbonate rocks which comprise the adjacent mountains surrounding the basin, including the Spring Mountains to the east of the Pahrump basin to the east, extend below the basin fill sediments in the valley floor. These carbonate sediments comprise the Lower Carbonate Aquifer (Belcher et al. 2002a, Harrill 1986). The carbonate aquifer has only been tapped by a few wells due to expense and the associated technical difficulties in constructing wells to the depth of the aquifer. The basin fill aquifer generally a more attractive choice because it provides sufficient well yields at much lower development cost.

Infiltration of precipitation that occurs on the surrounding mountains, and mainly on the Spring Mountains, is the primary source of recharge to the both the Basin Fill and Lower Carbonate aquifers in the valley. The carbonate aquifer has a very high hydraulic conductivity value and is laterally extensive. Pumping from this aquifer can create broad cones of depression than can extend miles to tens of miles from the well. The aquifer sustains numerous springs, primarily in adjacent basins such as the Amargosa valley to the west that are home to threatened and endangered species. Groundwater extractions from this aquifer could affect sensitive ecological resources, which makes it an unacceptable selection for the project water supply.

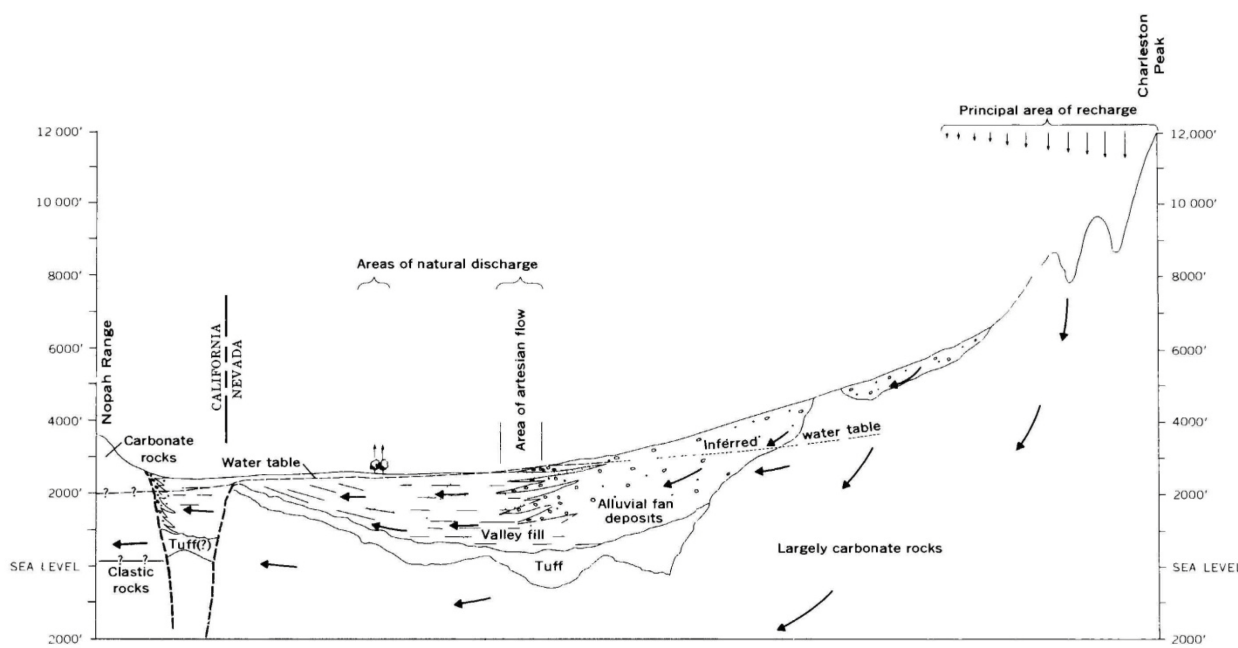

Figure 7. Cross section of the Pahrump Valley showing the relation of the basin fill sediments within the valley and underlying carbonate sediments (Malmberg 1967)

3.6 Local Basin Sub-Division

The Pahrump Valley Fault Zone is located along the California – Nevada state line (Figure 5) The Hidden Hills project is located west of a major fault splay of the Pahrump Valley Fault Zone. The project site is located in an area depicted on the far left side of the cross section provided as Figure 7. Note the localized thicker section of basin fill sediments on the California side of the state line. This localized feature may be a subdivision within the overall basin which could influence and/or isolate impacts to the aquifer from on-site pumping.

The map shown in Figure 5 illustrates the presence of relic spring mounds along the fault trace located east of the state line. The relic spring mounds are indicators of groundwater discharge from the basin fill aquifer during previous period of wetter climate. The relic mounds are located on the eastern side of the fault trace and may indicate a structural and/or topographic feature which separates the basin on either side of this fault trace.

Work conducted by Buqo (2006) evaluated the groundwater gradients in the valley. The hydraulic gradient data was used to assess the potential influence of the Pahrump Valley Fault Zone (PVFZ) on the potentiometric surface. The hydraulic gradient in the PVFZ was lower compared to the overall gradient of the valley. Some of the available data suggest that the fault may act as a hydraulic flow barrier (Comartin 2010), and development of additional aquifer testing programs may be conducted to better understand the hydraulic effect of these faults.

Part of the determination of potential drawdown effects of the proposed project depends upon the groundwater conditions to the west and southwest of the project site near the base of the Nopah Range, where groundwater levels are not well known (Malmberg, 1967, Winograd and Thordarson 1975, and Harrill 1986). The presence of coarser clastic sediments at the base of the Nopah Range and the potential of localized sub-basin recharge from the Nopah Range could influence the local hydrogeologic conditions at the project site and could also influence the response of the local aquifer to groundwater pumpage. The presence of the Pahrump Valley fault system and the associated small basin could reduce the propagation of the cone of depression from pumping at the project site. Infiltration of precipitation through the coarse alluvial deposits adjacent to the Nopah Range could provide local recharge to the aquifer.

3.7 Previous Aquifer Testing/Analyses/Assessment

Limited aquifer hydraulic testing has been conducted in the vicinity of the project site. An aquifer performance test (APT) was reportedly conducted in 1966 (AMEC 2006 from Geotechnical Consultants 1966). A separate on-site APT was conducted by Broadbent and Associates, Inc. (2003) on a well located in Section 27, Township 22N, Range 10E.

The testing performed by Geotechnical Consultants was conducted at a pumping rate of 275 gallons per minute. The calculated average transmissivity[2] was 7,225 gallons per day per foot and a storage coefficient of 0.064 was determined.

[2] Transmissivity is the rate at which groundwater flows thru an aquifer and is measured in units of gallons per day per foot of aquifer thickness.

The on-site test conducted by Broadbent and Associates was conducted at a pumping rate of 154 gallons per minute. The inefficiency of the production well caused the pump test to be halted after 22 hours due to declining water levels in the well. Transmissivity was the only parameter reported from the pumping test results. The reported transmissivity was 4,675 gallons per day per foot.

These aquifer performance tests were conducted with monitoring wells located too far from the pumping well to accurately measure aquifer parameters. The analysis of the data was limited to a simplistic approach (known as the "Cooper-Jacob straight line method") that does not account for leakance[3] from semi-confining units or other aquifer boundaries and which is therefore insufficient to accurately determine the aquifer parameters needed to develop a defensible groundwater model. An aquifer performance test with appropriately located monitoring wells will allow for calculation of the aquifer properties that are key input values for a groundwater model.

Measurement of aquifer parameter data associated with "semi-confined" layers will avoid over estimating transmissivity and also aid in determining differences in flow depending on direction of flow within the aquifer. The proposed aquifer testing will aid in determining aquifer barrier boundaries such as faults within the aquifer that can limit the expansion of the cone of depression and correspondingly increase drawdown. The proposed testing data will also allow accurate determination of the extent of the cone of depression, impacts of pumping on other wells, and drawdown within the well; all of which are important criteria to address in consideration of project regulatory review.

[3] Leakance is a hydrogeologic term for the slow drainage from low hydraulic conductivity layers that may exist within an aquifer and which yield water at lower rates that the surrounding materials.

Chapter 4

Water Balance

4.1 Introduction

Before human influences, the natural groundwater system in the Pahrump Valley was in a state of dynamic equilibrium with inputs to the system balanced with discharges from the system. Since the extensive groundwater uses began in the mid-1900s, the groundwater system in the basin now includes the influence of human activities in addition to the natural fluxes (Harrill 1986).

The Pahrump Valley lies within a semi-arid region and is a groundwater basin with minimal surface water discharge. The groundwater system inputs in the basin are recharge from precipitation, recharge from rainfall and snow melt water runoff from the surrounding mountains, return flow from pumpage (irrigation infiltration and domestic wastewater disposal as examples), and inter-basin flow through the subsurface. As there is nearly no surface water discharge from the basin, water is lost from the basin by evaporation, transpiration from native and landscape vegetation, groundwater flow out of the basin to nearby downgradient basins, and the consumptive loss of groundwater withdrawal from wells.

4.2 Sustainable/Perennial Yield

The sustainable yield (also called the perennial yield in Nevada) is defined as the amount of water that the groundwater system can provide for uses in excess of the natural losses and takes into account the maintenance of dynamic water levels. This quantity is a factor of the natural inputs, such as rainfall and groundwater recharge, the natural discharge, such as evaporation, transpiration, groundwater flow out of the basin, and induced recharge and captured outflow from artificial withdrawals. This yield is the volume available for uses such irrigation, public water supply, domestic water supply, industrial/commercial usage, and recreational usage.

Malmberg (1967) has estimated that the perennial yield of the basin is 12,000 acre-feet per year. Harrill (1986) revaluated the basin yield and determined a perennial yield of 19,000 acre-feet per year. The Nevada State Engineer (1994) uses the estimates of Malmberg to set the basin perennial yield.

4.3 Precipitation

Pahrump Valley is located in a region which receives less than 6-inches of precipitation per year, based upon average annual precipitation data for a 29-year period within Nye County and vicinity (Buqo 2004). It should be noted that the valley, while receiving low annual precipitation, is bounded by areas of higher precipitation. These areas of greater precipitation represent the higher elevations and include the adjacent Spring Mountains. The average annual precipitation in the Spring Mountains ranges from 28 to 32 inches per year in some areas.

4.4 Recharge

Recharge to the Pahrump Valley occurs from precipitation infiltration from watersheds at higher elevations, primarily the Spring Mountains (Malmberg 1967, Harrill 1986, Comartin 2010). Although there are runoff events associated with intense short-duration storms within the valley, these events are infrequent and precipitation that is not taken up by vegetation does not contribute materially to the recharge within the basin (Comartin 2010). Data compiled from seven different studies on the recharge to the basin calculated an average value of 22,312 acre-feet per year (AMEC 2006). The perennial yield for the basin accounts for subsurface outflow from the basin and water demand for riparian habitats and is lower than the total recharge.

4.5 Evaporation/Transpiration

The Pahrump Valley climate is semi-arid and is characterized by low annual precipitation, low humidity, and wide variations in daily temperatures (Buqo 2006, Comartin 2010). Evaporation in the Pahrump Valley is greater than the precipitation throughout the year. Average monthly precipitation rates are less than one-inch in the valley and corresponding evaporation rates range from approximately one-inch to over 15-inches per month (Nevada Rural Water Association 2010). Net evaporation, precipitation minus evaporation, is negative in every month. Therefore, within the valley (as opposed to the adjacent mountains) there is no direct net effect to recharge to the system from precipitation.

Evapotranspiration from native phreatophyte species in the basin has been estimated at an annual rate of 10,000 acre-feet per year (Malmberg 1967) to 12,500 acre-feet per year (Comartin 2010). In addition to native plant species, transpiration from agricultural and landscaping contributes to losses from the system. However, as agricultural and landscaping irrigation is supplied from groundwater, the transpiration losses are included in the withdrawal quantities supplied by the groundwater system (minus return flow to the aquifer).

4.6 Spring Discharge

Spring discharge occurs when the potentiometric surface of the groundwater intersects the land surface. The locations of springs within the basin are influenced by topographic or structural features. Two major springs, Manse Spring and Bennetts Spring, along with numerous smaller springs are located in the basin. Largely as a result of groundwater pumping from the basin aquifer, both Manse and Bennetts springs have ceased to flow (in 1959 and in 1979, respectively).

Because there is no surface water outflow from the basin and the flow from the (now defunct) springs infiltrated into the ground in relatively short distances from the point of discharge (and therefore corresponded with relatively small amount of added evaporative loss), the impacts of spring discharge to the overall water balance is negligible (Malmberg 1967, Harrill 1986).

4.7 Inter-Basin Transfer

Inter-basin transfer is the movement of water from one basin to another and is one element of the water balance in the valley. As shown in Figure 6, Pahrump Valley lies at higher elevations than adjacent water basins. Water moves from the up-gradient Pahrump Valley through the groundwater system (primarily through the deeper Carbonate Aquifer). Malmberg (1967) estimated the volume of subsurface discharge from the Pahrump Basin at 12,000 acre-feet per year.

4.8 Historical Usage and Trends

Prior to 1910, the primary source of water supply for human use in the valley was surface water from springs. The first wells drilled in the valley, around 1910, supplied small quantity domestic use (Comartin 2010). High yield irrigation wells were drilled in the valley beginning in 1937 to supply agricultural uses (Malmberg 1967). The primary agricultural crops in the Pahrump Valley were cotton and alfalfa.

Comartin (2010) compiled data from the Nevada Division of Water Resources (NVDWR) and the USGS DVRFS pumpage database to determine historical pumpage in the Pahrump Valley. The plotted historical basin pumpage is shown in Figure 8. Also shown on Figure 8 is the perennial basin yield of 19,000 acre-feet per year as determined by Harrill (1986) and is indicated by the dashed line. A table of the historical pumpage is provided as Appendix A.

Basin perennial yields were exceeded beginning in the 1950s and continued until the late 1980s. Pumpage declined from the late 1970s to near the basin yield. The pumpage increased above the basin perennial yield through the 1980s and has declined to near the basin perennial yield in the 2000s.

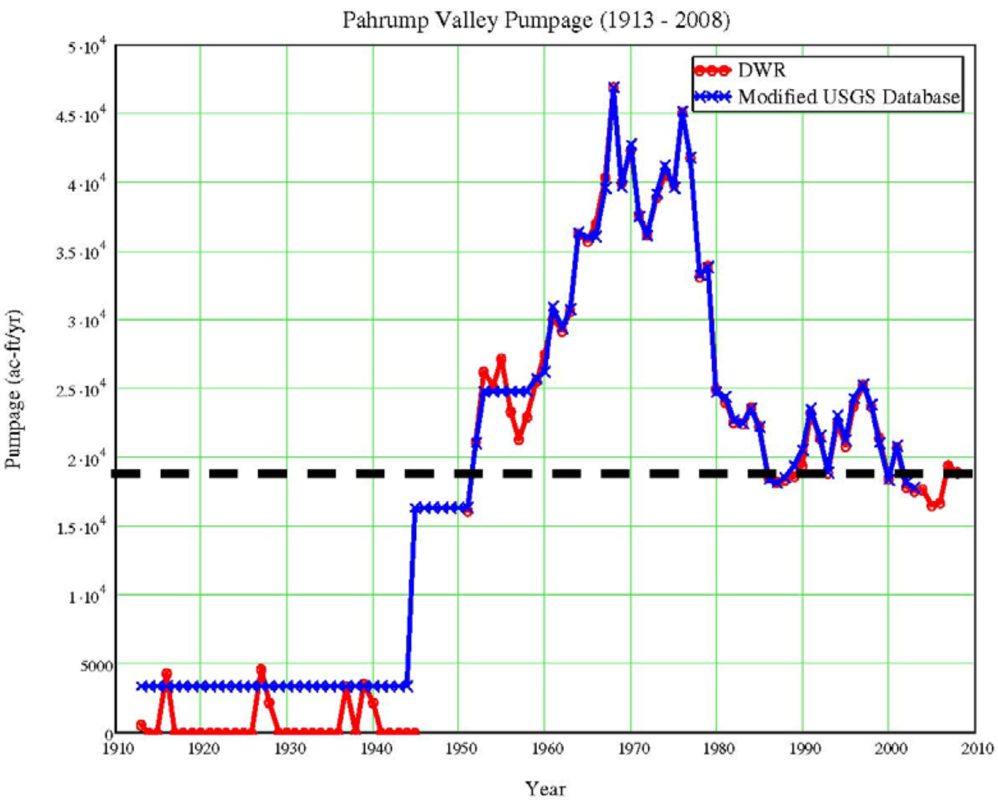

Figure 8. Historical Pahrump Valley pumpage (Comartin 2010). Horizontal, dashed black line represents 19,000 acre-feet per year perennial yield (Harrill, 1986).

Comartin (2010) plotted the historical pumpage by usage type (Figure 9) and included a plot of the cumulative number of wells constructed in the valley. Groundwater withdrawals increased steadily from the mid-1940s as a result of increasing agricultural activity in the valley with the peak usage occurring in 1968. It should be noted that the total basin pumping was primarily related to agricultural irrigation until the late 1970s. Beginning at this time, there was an increase in residential construction in the basin and the conversion of agricultural land to residential and commercial development. Residential water usage is less per acre than agricultural usage. As agricultural land was replaced, total pumping in the basin began to decline until the late 1980s. It should be noted that the increasing rate of well construction beginning in the 1970s and the increasing domestic and public supply usage correspond to the decrease in total basin pumping. This relationship is due to the substitution of domestic use for higher demand agricultural irrigation use.

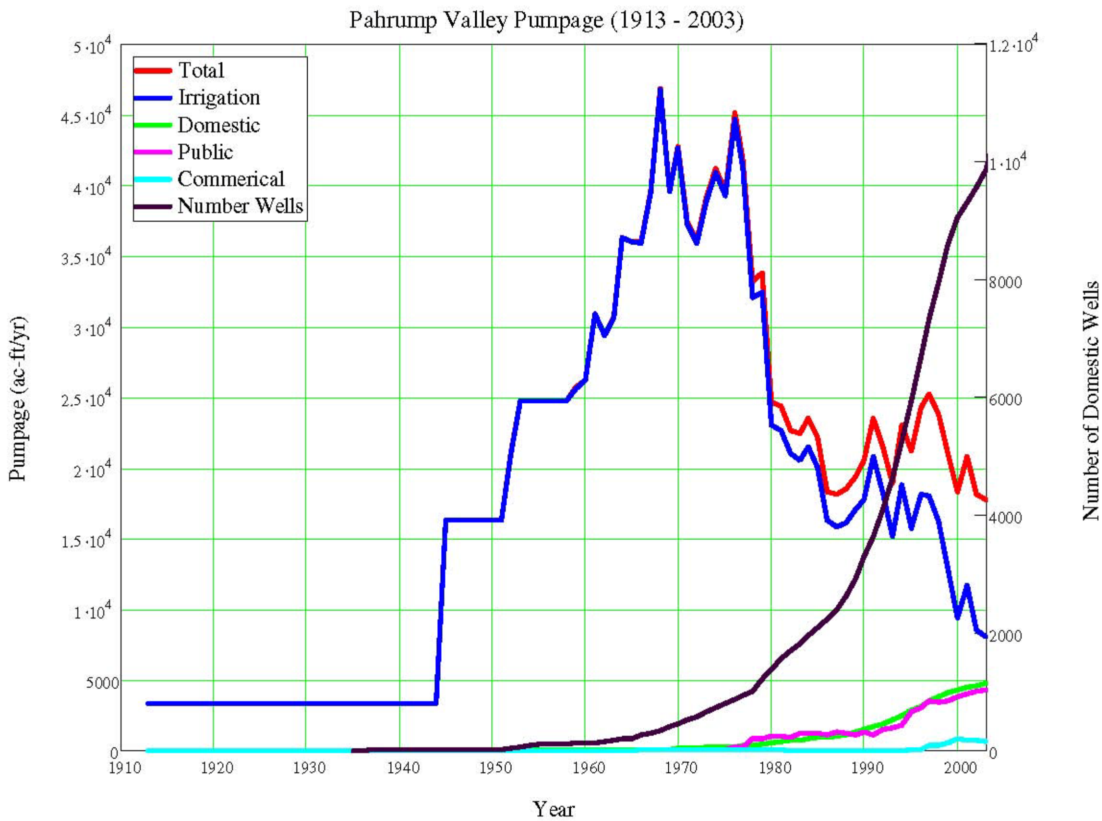

Figure 9. Historical Pahrump Valley pumpage by use type (Comartin 2010)

4.9 Current Groundwater Rights

The Nevada Division of Water Resources regulates the appropriation of water rights in Nevada. The face value of currently authorized groundwater rights for the Nevada portion of the Pahrump Valley Basin, designated as Nevada hydrographic area 162, are 62,422 acre-feet per year. California does not administer nor regulate the acquisition and exercise of groundwater rights. California law recognizes both overlying and appropriative rights to groundwater. An owner of land overlying a groundwater basin has the right to the reasonable and beneficial use of groundwater on the overlying land correlative to other overlying right holders. Surplus groundwater can be appropriated on non-overlying lands according to principle of prior appropriation.

Water rights within the California portion of the Pahrump Valley are not included in the NVDWR appropriations and are estimated to be in the range of 50 acre-feet per year. The NVDWR Hydrographic Area Summary of the Pahrump Valley which summarizes the basin and includes the appropriated water rights is provided as Appendix B. The Hydrographic Basin Summary by Manner of Use for the Pahrump Valley is included as Appendix C.

4.10 Current Water Usage

The quantity of water pumped is much less than the face value of the authorized groundwater appropriations. Water usage data from NVDWR was obtained from 2004 through 2009 to update the data provided in Comartin 2010. The updated data show that the basin perennial yield estimated by USGS was exceeded from 2004 through 2008. However, beginning in 2009, the DWR changed their calculation assumption associated with domestic per well usage from 1.0 acre-feet per year to 0.5 acre-feet per year. This change in domestic usage has reduced the calculated 2010 basin withdrawals to approximately 15,000 acre-feet per year, which is less than the USGS (Harrill 1986) estimated perennial yield.

Mr. Rick Felling of the Carson City NVDWR office, contacted to discuss the reasoning for the reduction in the per-well domestic usage, stated that the reason for the reduction was based upon observations that domestic wells were not being used for outside irrigation. Although he mentioned that there is return flow from wastewater systems, it does not appear that this was a reason for the reduction. Mr. Felling noted that NVDWR uses 1.0 acre-feet per year in other Nevada basins. The updated water usage data is included in Appendix D.

Aerial photographs were reviewed to estimate the extent of agricultural activities in the California portion of the basin. No apparent agricultural operations were noted. However, agricultural fields were noted in the southeastern tip of Inyo County within the adjacent Sandy Valley area. The aerial photo review showed that the California portion of the basin is sparsely settled and there are fewer than 100 dwellings within the Inyo County portion of the basin. Domestic usage is likely less than 50 acre-feet per year in the California portion of the basin.

4.11 Population Trends/Future Demand

Population changes in Nye County are projected to increase at annual rates of 2 to 4 percent (Buqo 2004). It has been estimated that based on the projected population increases as many as 20,000 additional domestic wells will be constructed in Pahrump Valley in the next 50 years and that the total domestic demand will increase from approximately 17,000 acre-feet per year up to 28,000 acre-feet per year (Buqo 2004).

In 1998 approximately 3,000 acres of agriculture were in production withdrawing almost 15,000 acre-feet per year. It is estimated that 1,000 acres are currently in production within the basin. Agricultural production is expected to continue to decrease in Pahrump Valley with greater conversion to residential development (Buqo 2004).

4.12 Groundwater Levels

Groundwater levels within the Pahrump Basin prior to the development of groundwater withdrawals were estimated by Harrill (1986). The pre-development water level elevation at the Hidden Hills site was between 2,400 and 2,500 feet above sea level. The land surface elevation at the site is approximately 2,600 feet. Based on this data, the pre-development water level on site was approximately 100 to 200 feet below land surface. The water level on site was measured at approximately 108 feet below land surface in the Orchard well in 2011 (Layne Christensen 2011). The pre-development water levels were determined on a regional basis and are therefore somewhat crude estimates. It is possible that the historical on-site groundwater surface was actually higher than determined from the projected historical levels based on the water level measured in the Orchard well.

Water level changes in wells located in various parts of the Pahrump Valley were plotted from long-term monitoring data by Buqo (2004). Water levels plotted in red represent long-term data recorded in USGS monitoring wells; those plotted in blue represent monitoring wells with a high density of historical data. The water level changes shown on Figure 10 are from wells located within the Nevada part of the basin. Declining water levels were recorded in all wells for the period of record with the exception of wells located at the eastern edge of the valley.

Water levels in wells located at the eastern edge of the valley showed declining trends until the 1980s with increasing water levels for the remaining period of record. The change in the water level from declining water levels to increasing water levels corresponds to periods where agricultural irrigation was being replaced with lower volume domestic-usage withdrawals. These wells are also located nearest to the recharge area of the high-elevation Spring Mountains which may account for the increasing water levels noted after the 1980s.

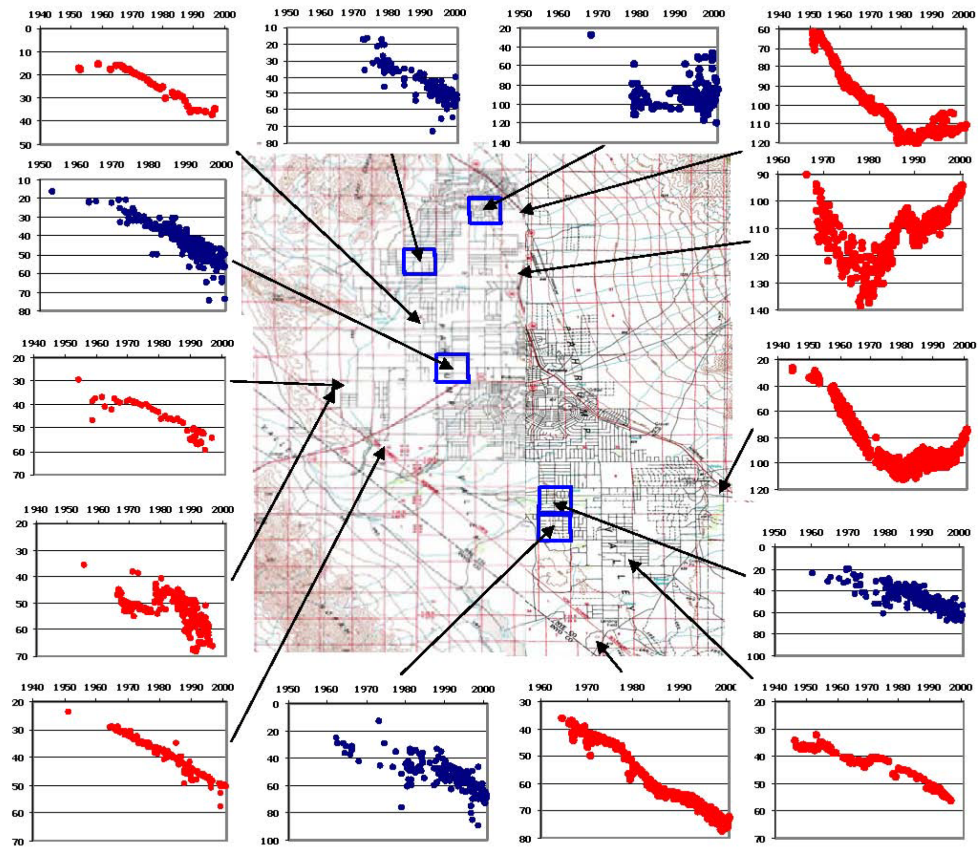

Figure 10. Pahrump Valley water level changes in wells (Buqo 2004)

4.13 Projected Basin Water Levels/Trends

Buqo (2007) has projected water level declines in the basin and based on his data, the water levels at the California – Nevada border are projected to fall to deeper that 130 feet below ground surface by 2030 which corresponds to a water level decline of approximately 20 feet at the Hidden Hills site.

Chapter 5

Site Wells

5.1 Locations

Literature review and site investigation have indicated that there are six well locations on the project site. A map of the well locations is provided in Figure 11. A site investigation located four wells of which three were located on the property. The three wells are identified as the Orchard well, well 2, well 3, and well 4. Two additional wells were identified on site from the AMEC (2006) report. No well construction reports or geologic logs are available for these wells.

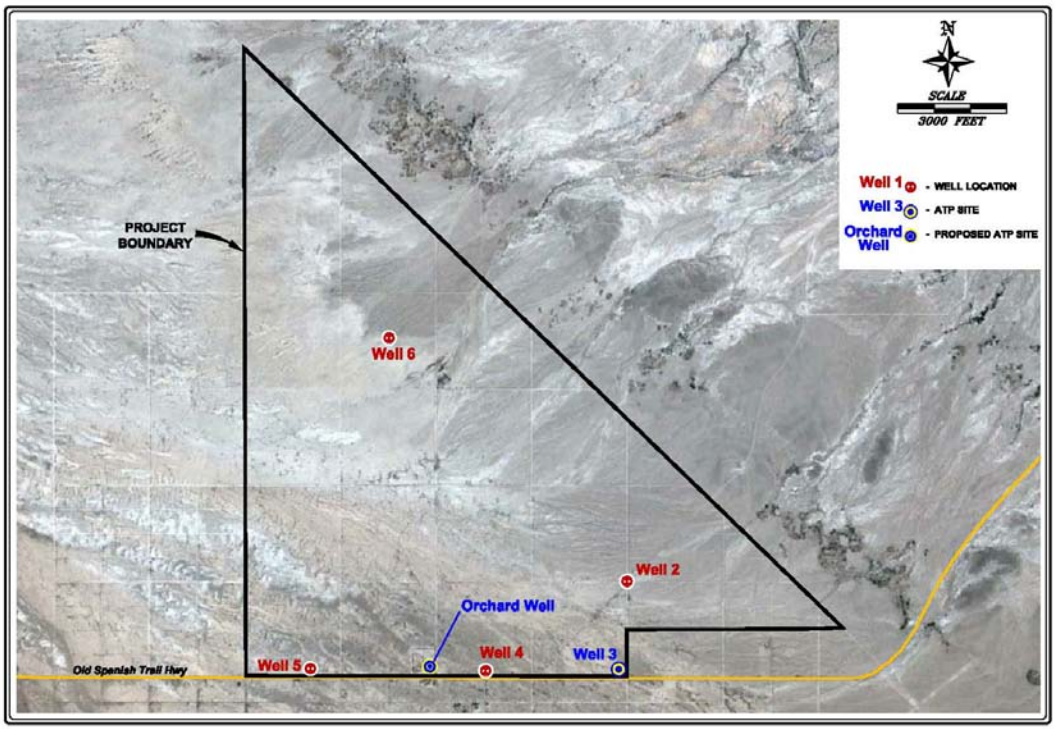

Figure 11. Map showing locations of identified on-site wells

5.2 Conditions

Of the identified on-site wells, the Orchard well was selected as a possible candidate for additional testing. A video survey of the well was conducted by Layne Christensen to assess the well condition. The well inspection report from Layne Christensen is provided in Appendix E. The review of the video survey has indicated that the Orchard well may be acceptable for use as a production well during an aquifer performance test, although initial pump operation will be needed to verify.

Chapter 6

Discussion of Potential Project Impact and Further Investigation

Because the project site lies in a portion of the Pahrump basin with low water usage and may be separated from the main portion of the basin by a series of faults, impacts from site pumping may be minimal in the surrounding area.

Additionally, because the project site lies in California where no water right permit or approval is required to develop a groundwater source. Under California law, as an owner of land overlying a groundwater basin, BrightSource has a right to the reasonable and beneficial use of groundwater for use on the overlying land. Although there is no legal impediment to utilizing groundwater at the site, it is important to assess the extent to which pumping for the duration of project would affect groundwater supplies and groundwater levels in the vicinity of the project site and in the Pahrump Basin as a whole.

Based upon available information on the overall Pahrump Basin's perennial yield as calculated by Harrill (1986), there is sufficient groundwater to meet current basin-wide demands. In consideration of the large quantity of authorized but unexercised groundwater pumping appropriations as reported by the Nevada State Engineer's Office and as identified from local planning projections, there is a potential for increased groundwater pumping in the Nevada portion of the basin that could eventually exceed the basin's estimated perennial yield. This additional pumping, however, would be located 10 miles or more to the north of the project site, as is the case of the vast majority of the current pumping. The relationship of this far-removed groundwater usage to groundwater supplies and groundwater levels in the project site area may be minimal.

Proposed aquifer performance testing at the project site wells will provide diagnostic information on (a) anticipated drawdown at the anticipated flow rates from the proposed project well(s), (b) distances in various directions that effects of the pumping would occur, (c) potential presence of flow barriers (which could be faults, impermeable strata or other subsurface conditions), and (d) water quality. Aquifer performance testing will inform the extent to which the Project's proposed groundwater use would affect the overall Pahrump Basin perennial yield. Aquifer performance testing may demonstrate potential that pumping at the project site would be isolated from and not affect the majority of other pumping in the Nevada portion of the basin due to natural flow barriers and basin discharge through the project site vicinity.

Additionally, if project pumping is anticipated to affect the overall basin perennial yield and availability of groundwater in the Nevada portion of the basin, BSE will evaluate options to acquire and retire senior water rights in the Nevada portion of the basin that equal or exceed the water demands of the project. Such a strategy would create a net water balance benefit to the basin and more than offset any regional groundwater impacts.

Chapter 7

Review, Conclusions, and Recommendations

The Pahrump Valley has a long history of pumping, primarily from the basin fill aquifer. Past pumping exceeded the perennial yield of the valley. Current pumping is below the perennial yield estimated by the USGS (Harrill, 1986). If exercised, existing allocations in the Nevada portion of the valley could allow future pumping to exceed the perennial yield of the basin by a factor of three or more – this is not anticipated to occur for many decades and is dependent on a large number of economic and other factors.

The presence of known faults and relic spring mounds northeast of the site suggests that the project area may be located in an isolated portion of the Pahrump Valley. The project is located in a localized area of thicker basin fill sediments west of the Pahrump Valley Fault Zone. This localized feature may be a sub-basin within the overall basin which could influence and/or isolate impacts to the greater Pahrump Valley aquifer from on-site pumping. The presence of springs on the eastern side of the fault trace located east of the state line may indicate a structural and/or topographic feature which differentiates the basin on either side of this fault trace. The presence of coarser clastic sediments at the base of the Nopah Range and localized sub-basin recharge from the Nopah Range, although unknown, could be a factor in the influence of on-site groundwater pumping.

Previous aquifer tests conducted on the site were limited by the design of the tests and the layout of the monitoring wells. A more controlled pumping test with strategically located monitoring wells would provide defensible aquifer parameters necessary to construct a reliable model of the aquifer.

Additionally, if project pumping is anticipated to affect the overall basin perennial yield and availability of groundwater in the Nevada portion of the basin, BSE will explore options to acquire and retire senior water rights in the Nevada side of the basin that would offset all, or more, of the project water usage. This would mitigate any regional groundwater impacts from the project and create a net benefit for the water balance of the basin.

Chapter 8

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Appendix A

Pahrump Valley Historical Pumpage

APPENDIX A: Annual Pumpage Estimates using updated USGS and DWR data.

Time Step	Year	m^3/day	ac-ft/yr
1	1913	11270.30	3335.00
2	1914	11270.30	3335.00
3	1915	11270.30	3335.00
4	1916	11270.30	3335.00
5	1917	11270.30	3335.00
6	1918	11270.30	3335.00
7	1919	11270.30	3335.00
8	1920	11270.30	3335.00
9	1921	11270.30	3335.00
10	1922	11270.30	3335.00
11	1923	11270.30	3335.00
12	1924	11270.30	3335.00
13	1925	11270.30	3335.00
14	1926	11270.30	3335.00
15	1927	11270.30	3335.00
16	1928	11270.30	3335.00
17	1929	11270.30	3335.00
18	1930	11270.30	3335.00
19	1931	11270.30	3335.00
20	1932	11270.30	3335.00
21	1933	11270.30	3335.00
22	1934	11270.30	3335.00
23	1935	11270.30	3335.00
24	1936	11270.30	3335.00
25	1937	11270.30	3335.00
26	1938	11270.30	3335.00
27	1939	11270.30	3335.00
28	1940	11270.30	3335.00
29	1941	11270.30	3335.00
30	1942	11270.30	3335.00
31	1943	11270.30	3335.00
32	1944	11270.30	3335.00
33	1945	54923.70	16252.50
34	1946	54923.70	16252.50
35	1947	54923.70	16252.50
36	1948	54923.70	16252.50
37	1949	54923.70	16252.50
38	1950	54923.70	16252.50
39	1951	54925.39	16253.00
40	1952	70838.98	20962.00
41	1953	83719.56	24773.50
42	1954	83721.26	24774.00
43	1955	83724.63	24775.00

Time Step	Year	m^3/day	ac-ft/yr
44	1956	83724.63	24775.00
45	1957	83724.63	24775.00
46	1958	83726.33	24775.50
47	1959	86766.09	25675.00
48	1960	88596.04	26216.50
49	1961	104531.60	30932.00
50	1962	99314.66	29388.25
51	1963	103713.80	30690.00
52	1964	122785.40	36333.50
53	1965	121779.40	36035.80
54	1966	121653.30	35998.50
55	1967	133776.90	39586.00
56	1968	158452.50	46887.75
57	1969	134107.40	39683.80
58	1970	144470.00	42750.20
59	1971	126453.80	37419.00
60	1972	122054.10	36117.10
61	1973	132322.10	39155.50
62	1974	136807.30	40482.71
63	1975	133847.90	39607.00
64	1976	152670.50	45176.81
65	1977	141339.30	41823.80
66	1978	112381.30	33254.80
67	1979	114111.20	33766.70
68	1980	83201.18	24620.10
69	1981	81621.80	24152.75
70	1982	76364.30	22597.00
71	1983	76002.70	22490.00
72	1984	79582.34	23549.25
73	1985	74775.98	22127.00
74	1986	61916.52	18321.75
75	1987	61208.54	18112.25
76	1988	62420.90	18471.00
77	1989	65558.67	19399.50
78	1990	69358.80	20524.00
79	1991	79579.80	23548.50
80	1992	72707.79	21515.00
81	1993	63745.62	18863.00
82	1994	77778.24	23015.40
83	1995	71674.02	21209.10
84	1996	82085.95	24290.10
85	1997	85417.03	25275.80
86	1998	80425.34	23798.70
87	1999	70902.17	20980.70
88	2000	61777.97	18280.75
89	2001	70343.05	20815.25

Time Step	Year	m^3/day	ac-ft/yr
90	2002	61100.40	18080.25
91	2003	59896.48	17724.00

Appendix B

Hydrographic Area Summary

Nevada Divsion of Water Resources

HYDROGRAPHIC AREA SUMMARY

Hydrographic Area No. **162** *Hydrographic Area Name* **PAHRUMP VALLEY**

Subarea Name

Hydrographic Region No. **10** *Hydrographic Region Name* **CENTRAL**

Area (sq. mi.) **789**

Counties within the hydrographic area **Clark, Nye**

Nearest Communites to Hydrographic Area **Pahrump, Las Vegas**

Designated (Y/N, Order No.) **Y, O-1107** *For All or Portion of Basin* **All**

Preferred Use **O-1107 Preferred Uses COM, IND <=1,** *For All or Portion of Basin* **All**

State Engineer's Orders: **(Click search icons to find all designation orders or rulings for this basin)** *For All or Portion of Basin* **All**

State Engineer's Rulings

Pumpage Inventory Status **Ongoing** *Crop Inventory Status* **None**

Water Level Measurement? **Y**

Yield Values

Perennial Yield (AFY) **12000**

System Yield (AFY)

Yield Reference(s) **State Engineer Order 1107**

Yield Remarks

Source of Committed Data: **NDWR Database** *Supplementally Adjusted?*

Manner Of Use	*Underground*	*Geothermal*	*Other Ground Water*
Commercial	**1,064.09**	**0.00**	**0.00**
Construction	**67.00**	**0.00**	**0.00**
Domestic	**141.17**	**0.00**	**0.00**
Environmental	**0.00**	**0.00**	**0.00**
Industrial	**227.61**	**0.00**	**0.00**
Irrigation (Carey Act)	**0.00**	**0.00**	**0.00**
Irrigation (DLE)	**2,280.73**	**0.00**	**0.00**
Irrigation	**20,526.72**	**0.00**	**0.00**
Mining and Milling	**5.00**	**0.00**	**0.00**
Municipal	**29,149.22**	**0.00**	**0.00**
Power	**0.00**	**0.00**	**0.00**
Quasi-Municipal	**8,519.59**	**0.00**	**0.00**
Recreation	**434.85**	**0.00**	**0.00**
Stockwater	**6.18**	**0.00**	**0.00**
Storage	**0.00**	**0.00**	**0.00**
Wildlife	**0.00**	**0.00**	**0.00**
Other	**0.00**	**0.00**	**0.00**
Totals	**62,422.15**	**0.00**	**0.00**

Related Reports

USGS Reconnaissance **None** *USGS Bulletin* **3, 5, 6**

Other References

Comments **Basin is Shared in Common with California**

Appendix C

Hydrographic Area Basin Summary by Manner of Use

Run Date: 04-12-2011

Nevada Division of Water Resources

Hydrographic Basin Summary By Manner of Use

Hydrographic Basin:	162	Yield:	12000	AFA
Hydrographic Region:	10 CENTRAL	Reference:	State Engineer Order 1107	
Basin Name:	PAHRUMP VALLEY	Remarks:		

	Active Annual Duty*			Pending Annual Duty*		
Manner of Use	Groundwater	Geothermal	Other Groundwater	Groundwater	Geothermal	Other Groundwater
Commercial	1,064.09	0.00	0.00	12.50	0.00	0.00
Construction	67.00	0.00	0.00	0.00	0.00	0.00
Domestic	141.17	0.00	0.00	0.00	0.00	0.00
Industrial	0.00	0.00	0.00	0.00	0.00	0.00
Environmental	227.61	0.00	0.00	0.00	0.00	0.00
Irrigation (Carey Act)	0.00	0.00	0.00	0.00	0.00	0.00
Irrigation (DLE)	2,280.73	0.00	0.00	0.00	0.00	0.00
Irrigation	20,526.72	0.00	0.00	11.50	0.00	0.00
Mining and Milling	5.00	0.00	0.00	0.00	0.00	0.00
Municipal	29,149.22	0.00	0.00	604.51	0.00	0.00
Power	0.00	0.00	0.00	0.00	0.00	0.00
Quasi-Municipal	8,519.59	0.00	0.00	792.00	0.00	0.00
Recreation	434.85	0.00	0.00	0.00	0.00	0.00
Stockwater	6.18	0.00	0.00	0.00	0.00	0.00
Storage	0.00	0.00	0.00	0.00	0.00	0.00
Wildlife	0.00	0.00	0.00	0.00	0.00	0.00
Other	0.00	0.00	0.00	0.00	0.00	0.00
Totals:	62,422.15	0.00	0.00	1,420.51	0.00	0.00

BASIN STATUS: PARTLY DESIGNATED SUPPLEMENTALLY ADJUSTED:

PRELIMINARY DATA SUBJECT TO REVISION

* May include supplemental duties as well as duties associated with applications to change

Appendix D

Updated Pahrump Valley Pumpage Data

GROUND WATER PUMPAGE INVENTORY
PAHRUMP VALLEY, NO. 162
2004

IRRIGATION	6,369 ac-ft
GOLF COURSE (Champion)	1,183 ac-ft
UTILITIES, INC. (including executive golf course, meters commercial, domestic and line losses)	3,078 ac-ft
COMMERCIAL AND OTHER USE NOT ON UTILITIES, INC.	1,427 ac-ft
QUASI-MUNICIPAL NOT ON UTILITIES, INC.	620 ac-ft
DOMESTIC NOT ON UTILITIES, INC. Domestic wells drilled in 2004 = 549	9,907 ac-ft
Total	22,584 ac-ft

PAHRUMP 2004

GOLF COURSE (CHAMPION)

89 Days at 284,000 gallons per day (winter)
92 Days at 915,000 gallons per day (spring)
94 Days at 1,920,000 gallons per day (summer)
90 Days at 1,060,000 gallons per day (fall)

UTILITIES, INC.

Tree farm and maintenance - 30 acres
Holy Park East and West - 12 acres
Executive Golf Course - 50 acres
3,225 homes and mobile homes
225 commercial
7 schools
42 irrigation

COMMERCIAL, QUASI-MUNICIPAL AND OTHER USE

The amount listed under commercial, quasi-municipal and other use not on Utilities, Inc. was derived from on site field investigations and actual meter readings.

DOMESTIC

The amount listed under domestic not on Utilities, Inc. was estimated by taking the number of domestic wells drilled to date in Pahrump and assigning a 1.0 acre-foot usage for each well.

GROUND WATER PUMPAGE INVENTORY
PAHRUMP VALLEY, NO. 162
2005

IRRIGATION		4,583 ac-ft
GOLF COURSE (Champion)		1,183 ac-ft
UTILITIES, INC. (including executive golf course, meters commercial, domestic and line losses)		3,335 ac-ft
COMMERCIAL AND OTHER USE NOT ON UTILITIES, INC.		1,507 ac-ft
QUASI-MUNICIPAL NOT ON UTILITIES, INC.		668 ac-ft
DOMESTIC NOT ON UTILITIES, INC. Domestic wells drilled in 2005 = 578		10,477 ac-ft
	Total	21,753 ac-ft

PAHRUMP 2005

GOLF COURSE (CHAMPION)

89 Days at 284,000 gallons per day (winter)
92 Days at 915,000 gallons per day (spring)
94 Days at 1,920,000 gallons per day (summer)
90 Days at 1,060,000 gallons per day (fall)

UTILITIES, INC.

Tree farm and maintenance - 30 acres
Holy Park East and West - 12 acres
Executive Golf Course - 50 acres
4,252 homes and mobile homes
276 commercial
21 schools
81 irrigation

COMMERCIAL, QUASI-MUNICIPAL AND OTHER USE

The amount listed under commercial, quasi-municipal and other use not on Utilities, Inc. was derived from on site field investigations and actual meter readings.

DOMESTIC

The amount listed under domestic not on Utilities, Inc. was estimated by taking the number of domestic wells drilled to date in Pahrump and assigning a 1.0 acre-foot usage for each well.

GROUND WATER PUMPAGE INVENTORY
PAHRUMP VALLEY, NO. 162
2006

IRRIGATION		3,506 ac-ft
GOLF COURSE (Champion)		1,183 ac-ft
UTILITIES, INC. (including executive golf course, meters commercial, domestic and line losses)		4,243 ac-ft
COMMERCIAL AND OTHER USE NOT ON UTILITIES, INC.		1,618 ac-ft
QUASI-MUNICIPAL NOT ON UTILITIES, INC.		748 ac-ft
DOMESTIC NOT ON UTILITIES, INC. Domestic wells drilled in 2006 = 349		10,826 ac-ft
	Total	22,124 ac-ft

PAHRUMP 2006

GOLF COURSE (CHAMPION)

89 Days at 284,000 gallons per day (winter)
92 Days at 915,000 gallons per day (spring)
94 Days at 1,920,000 gallons per day (summer)
90 Days at 1,060,000 gallons per day (fall)

UTILITIES, INC.

Tree farm and maintenance - 30 acres
Holy Park East and West - 12 acres
Executive Golf Course - 50 acres
4,115 homes and mobile homes
307 commercial
16 schools
94 irrigation

COMMERCIAL, QUASI-MUNICIPAL AND OTHER USE

The amount listed under commercial, quasi-municipal and other use not on Utilities, Inc. was derived from on site field investigations and actual meter readings.

DOMESTIC

The amount listed under domestic not on Utilities, Inc. was estimated by taking the number of domestic wells drilled to date in Pahrump and assigning a 1.0 acre-foot usage for each well.

GROUND WATER PUMPAGE INVENTORY
PAHRUMP VALLEY, NO. 162
2007

IRRIGATION	4,580 ac-ft
GOLF COURSE (Champion)	1,183 ac-ft
UTILITIES, INC. (including executive golf course, meters commercial, domestic and line losses)	5,323 ac-ft
COMMERCIAL AND OTHER USE NOT ON UTILITIES, INC.	1,439 ac-ft
QUASI-MUNICIPAL NOT ON UTILITIES, INC.	1,347 ac-ft
DOMESTIC NOT ON UTILITIES, INC. Domestic wells drilled in 2007 = 140	10,966 ac-ft
Total	24,838 ac-ft

PAHRUMP 2007

GOLF COURSE (CHAMPION)

89 Days at 284,000 gallons per day (winter)
92 Days at 915,000 gallons per day (spring)
94 Days at 1,920,000 gallons per day (summer)
90 Days at 1,060,000 gallons per day (fall)

UTILITIES, INC.

Tree farm and maintenance - 30 acres
Holy Park East and West - 12 acres
Executive Golf Course - 50 acres
4,473 homes and mobile homes
302 commercial
16 schools
114 irrigation

COMMERCIAL, QUASI-MUNICIPAL AND OTHER USE

The amount listed under commercial, quasi-municipal and other use not on Utilities, Inc. was derived from on site field investigations and actual meter readings.

DOMESTIC

The amount listed under domestic not on Utilities, Inc. was estimated by taking the number of domestic wells drilled to date in Pahrump and assigning a 1.0 acre-foot usage for each well.

GROUND WATER PUMPAGE INVENTORY
PAHRUMP VALLEY, NO. 162
2008

IRRIGATION	4,543 ac-ft
GOLF COURSE (Champion)	1,183 ac-ft
UTILITIES, INC. (including executive golf course, meters commercial, domestic and line losses)	4,179 ac-ft
COMMERCIAL AND OTHER USE NOT ON UTILITIES, INC.	1,387 ac-ft
QUASI-MUNICIPAL NOT ON UTILITIES, INC.	2,073 ac-ft
DOMESTIC NOT ON UTILITIES, INC. Domestic wells drilled in 2008 = 36	11,002 ac-ft
Total	24,367 ac-ft

PAHRUMP 2008

GOLF COURSE (CHAMPION)

89 Days at 284,000 gallons per day (winter)
92 Days at 915,000 gallons per day (spring)
94 Days at 1,920,000 gallons per day (summer)
90 Days at 1,060,000 gallons per day (fall)

UTILITIES, INC.

Tree farm and maintenance - 30 acres
Holy Park East and West - 12 acres
Executive Golf Course - 50 acres
4,521 homes and mobile homes
299 commercial
16 schools
114 irrigation

COMMERCIAL, QUASI-MUNICIPAL AND OTHER USE

The amount listed under commercial, quasi-municipal and other use not on Utilities, Inc. was derived from on site field investigations and actual meter readings.

DOMESTIC

The amount listed under domestic not on Utilities, Inc. was estimated by taking the number of domestic wells drilled to date in Pahrump and assigning a 1.0 acre-foot usage for each well.

GROUNDWATER PUMPAGE INVENTORY
PAHRUMP VALLEY, NO. 162
2009

IRRIGATION	3582 Ac-Ft
GOLF COURSE (Willow Creek, formerly Champion)	1183 Ac-Ft
UTILITIES, INC. [Including Lakeview Golf Course (formerly Executive), commercial, domestic and line losses]	3773 Ac-Ft
COMMERCIAL AND OTHER USES NOT ON UTILITIES, INC.	1381 Ac-Ft
QUASI-MUNICIPAL NOT ON UTILITIES, INC.	531 Ac-Ft
DOMESTIC NOT ON UTILITIES, INC. Domestic wells drilled in 2009 = 17 Domestic wells plugged in 2009 = 3	5559 Ac-Ft
NO PERMITS OR CERTIFICATES	82 Ac-Ft
TOTAL	16,091 Ac-Ft

PAHRUMP VALLEY - 2009

WILLOW CREEK GOLF COURSE (FORMERLY CHAMPION GOLF COURSE)

89 Days at 284,000 gallons per day (winter)
92 Days at 915,000 gallons per day (spring)
94 Days at 1,920,000 gallons per day (summer)
90 Days at 1,060,000 gallons per day (fall)

UTILITIES, INC.

Lakeview Golf Course (formerly Executive Golf Course) - 50 acres
3826 homes and mobile homes
603 commercial
136 irrigation
65 public access
6 schools

COMMERCIAL, QUASI-MUNICIPAL AND OTHER USES

The amounts listed under commercial, quasi-municipal and other uses not on Utilities, Inc, was derived from on-site field investigations and actual meter readings.

DOMESTIC

The amount listed under domestic not on Utilities, Inc. was estimated by taking the number of domestic wells drilled to date in Pahrump Valley, and assigning a 0.5 acre-foot usage for each well.

GROUNDWATER PUMPAGE INVENTORY
PAHRUMP VALLEY, NO. 162
2010

IRRIGATION	2885 Ac-Ft
UTILITIES, INC. [Includes Lakeview Golf Course (formerly Executive), Willow Creek Golf Course (formerly Champion), commercial, irrigation, domestic and line losses]	3625 Ac-Ft
COMMERCIAL AND OTHER USES NOT ON UTILITIES, INC.	1316 Ac-Ft
QUASI-MUNICIPAL NOT ON UTILITIES, INC.	462 Ac-Ft
DOMESTIC NOT ON UTILITIES, INC. Domestic wells drilled in 2010 = 12 Domestic wells plugged in 2010 = 40	5550 Ac-Ft
NO PERMITS OR CERTIFICATES	208 Ac-Ft
TOTAL	15,229 Ac-Ft

PAHRUMP VALLEY – 2010

UTILITIES, INC.

Lakeview Golf Course (formerly Executive Golf Course)
Willow Creek Golf Course (formerly Champion Golf Course)
4699 homes and mobile homes
251 commercial
75 irrigation
8 P.A. (public schools, etc.)

COMMERCIAL, QUASI-MUNICIPAL AND OTHER USES

The amounts listed under commercial, quasi-municipal and other uses not on Utilities, Inc, was derived from on-site field investigations and actual meter readings.

DOMESTIC

The amount listed under domestic not on Utilities, Inc. was estimated by taking the number of domestic wells drilled to date in Pahrump Valley, and assigning a 0.5 acre-foot usage for each well.

Appendix E

Orchard Well Data

Layne Christensen Co.

11001 Etiwanda Ave.
Fontana, Ca. 92337
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT: Bright Source Energy
ADDRESS: Unknown
CONTACT: Clay Jensen **PHONE:** 702-556-0600
JOB LOCATION: Northwest corner of Old Spanish Trail and Charleston View
GPS LOCATION: Latitude: N 35° 58' 21.2" | Longitude: W 115° 53' 59.9"

WELL NUMBER: Orchard **General Inspection** **JOB NUMBER:** 11710

SURVEYED BY: Jeff Conner **DATE:** 7-Mar-11

REVIEWED BY: **WATER LEVEL:** 107' 5"

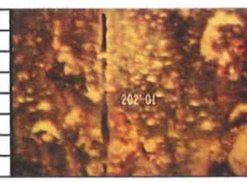
WATER CONDITION: Clear **TOTAL DEPTH:** 600' ?

CASING DIAMETER: 20" **SURVEY DEPTH:** 361'

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0 - 107'	Casing appears to have moderate scale.
105' 8"	Hole found when camera was returning to top of well.
107' 5"	Camera enters static water level.
107 - 270'	Casing appears to have moderate scale and growth.
	Gravel pack in not visible behind perforations.
270 - 361'	Casing appears to have heavy scale and growth,
	over perforations.
361'	Camera comes to rest at debris in casing.

Perforations:	
Vertical and Horizontal Slot	0 - 361'



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