

Water Availability Analysis

Chappellet Winery Use Permit Major Modification P18-00307 Planning Commission Hearing May 6, 2020

Water Availability Analysis

Chappellet Winery Inc. Care of: Cyril Chappellet 1581 Sage Canyon Road St. Helena, California 94574

Prepared by:



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Contents

Limitations	Introduction	1
Project Aquifer .7 Water Demand .7 Groundwater Recharge Analysis .12 Model Development .13 Comparison of Water Demand and Groundwater Recharge .21 Well Interference Analysis .21 Summary .21	Limitations	1
Water Demand. .7 Groundwater Recharge Analysis. .12 Model Development .13 Comparison of Water Demand and Groundwater Recharge .21 Well Interference Analysis. .21 Summary. .21	Hydrogeologic Conditions	3
Groundwater Recharge Analysis	Project Aquifer	7
Model Development13Comparison of Water Demand and Groundwater Recharge21Well Interference Analysis21Summary21	Water Demand	7
Comparison of Water Demand and Groundwater Recharge	Groundwater Recharge Analysis	12
Well Interference Analysis	Model Development	13
Summary21	Comparison of Water Demand and Groundwater Recharge	21
	Well Interference Analysis	21
References	Summary	21
	References	22

Appendix A – Well Completion Reports

Introduction

Chappellet Winery is seeking to modify an existing County of Napa use permit to expand winery production, add employees, and increase the number of annual visitors to the winery for tours, tastings, and events. The subject property is located at 1581 Sage Canyon Road (Napa County APN 032-010-090) approximately one mile east of Lake Hennessey (Figure 1). The existing water supply for the winery is a well on a parcel (APN 032-010-092) approximately 1 mile to the southeast also owned by Chappellet Winery (Figure 1). This well (Well 1 in Figure 2) is also known as the Corral Well and only serves the winery parcel. The existing use permit P11-00138 was issued in 2014 with the creation of a State-regulated Transient Non-Community Water System. The proposed project will increase wine production by 100,000 gallons to a total annual production of 250,000 gallons. Annual visitors will increase by 21,835 to a total of 38,905. Six new employees will be added for a total of 30 employees.

This Water Availability Analysis (WAA) was developed based on the guidance provided in the Napa County Department of Planning, Building, & Environmental Services' Water Availability Analysis Guidance Document formally adopted by the Napa County Board of Supervisors in May 2015. The WAA includes the following elements: estimates of existing and proposed water uses within the project recharge area, compilation of drillers' logs from the area and characterization of local hydrogeologic conditions, analyses to estimate groundwater recharge relative to proposed uses (Tier 1), and a screening analysis of the potential for well interference at neighboring wells located within 500-ft of the project well (Tier 2).

Limitations

Groundwater systems of Napa County and the Coast Range are typically complex, and available data rarely allows for more than general assessment of groundwater conditions and delineation of aquifers. Hydrogeologic interpretations are based on the drillers' reports made available to us through the California Department of Water Resources, available geologic maps and hydrogeologic studies, and professional judgment. This analysis is based on limited available data and relies significantly on interpretation of data from disparate sources of disparate quality.

Given the significant depths to water in the project well (350-ft), the relationship between groundwater recharge generated within the project parcel area and groundwater availability at the project wells is not expected to be very tightly coupled. It is likely that water flowing to the project wells is primarily supplied by groundwater inflows from surrounding areas rather than from recharge occurring on the overlying landscape. Analysis of the age and sources of the deep groundwater occurring beneath the project parcel is beyond the scope of this study.



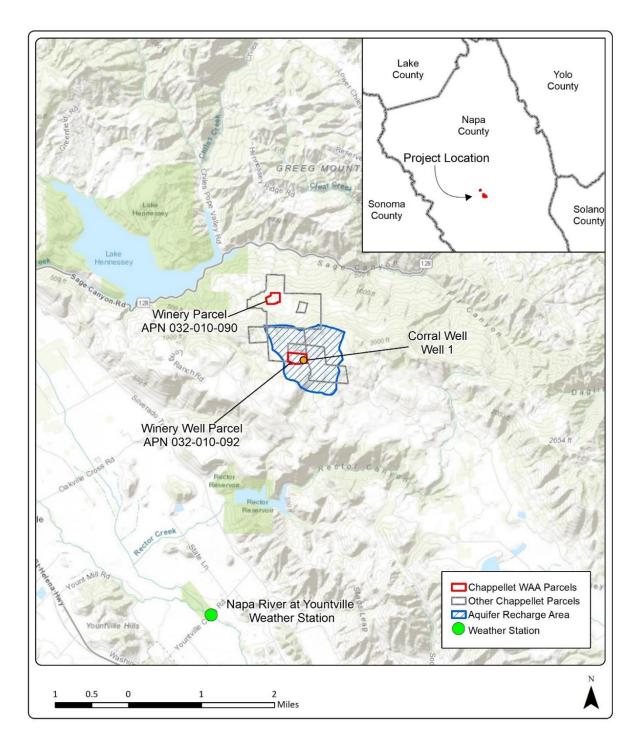


Figure 1: Project location map



Hydrogeologic Conditions

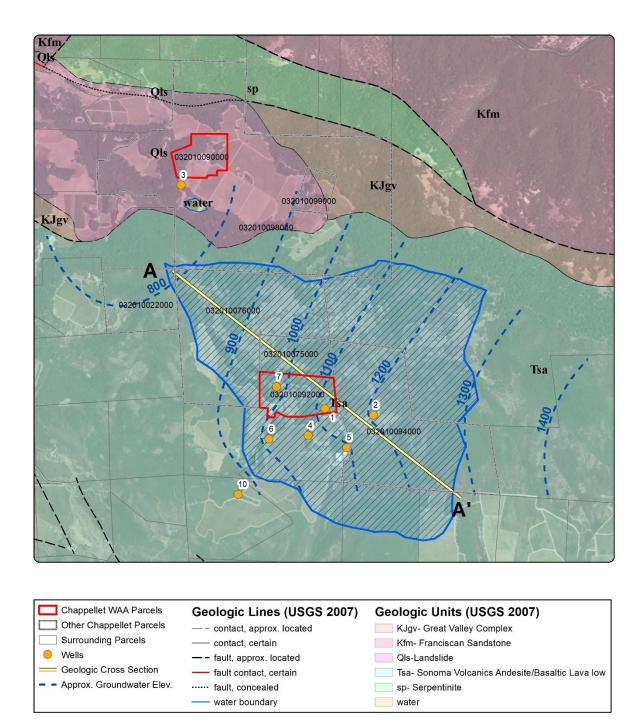
The project parcel is located on Pritchard Hill east of Lake Hennessey on a topographic bench oriented northwest to southeast in the mountains east of the Napa Valley. The bedrock geology mapped in the area of the project parcels is typical of the uplands east of the southern half of Napa Valley. The main geologic unit mapped at the project site and intersected by the project well (Well 1) is andesitic and basaltic lava flows of the Tertiary-aged Sonoma Volcanics (Map unit Tsa, see Map 2). This portion of the Tsa unit is part of an approximately 32 square-mile northwest to southeast oriented block bound to the north and east by a contact with the older Mesozoic-aged rocks of the Coast Range Ophiolite which is a portion of the Great Valley Complex, the Franciscan Complex and a relatively large Quaternary landslide and to the west by overlying alluvium of the Napa Valley. The Tsa unit is part of the lower member of the Sonoma Volcanics which was described by Weaver (1949) as individual lava flows displaying great variability in thickness and texture over short distances. Given this heterogeneity it can be expected that hydrogeologic conditions exhibit similar spatial variability and yields from wells completed anywhere in the Tsa unit. Reconnaissance confirmed the mapped bedrock geology.

Rocks of the Sonoma Volcanics overlie the basement rocks of the Mezosoic-age Coast Range Ophiolite and the Franciscan Complex. Several drillers logs including that of the project well (Well 1) report encountering serpentine at depths of 600 ft or more (Appendix A). The Serpentinite (sp) unit of the Coast Range Ophiolite is of Jurassic (144-208 My) age and is mainly sheared serpentinite but also can include harzburgite (Graymer, 2007).

The rocks of the Coast Range Ophiolite are generally considered poor aquifer material; however, successful wells of generally limited capacity are common in this highly variable geologic unit. Primary porosity in the Coast Range Ophiolite is low and groundwater occurs primarily in fractures. Well yields are variable depending on the degree of fracturing; however, yields are generally low and on the order of a few gallons per minute; dry test holes are also common within these rocks (LCSE, 2013).

In general, wells drilled in the Sonoma Volcanics tend to have low to moderate yield. Typical yields range from 16 to 50 gallons per minute (gpm) with reported yields as high as several hundred gpm (LSCE 2013). Unwelded sections of tuff are considered to be good water producers (DWR 1982). Bedrock units such as the Andesite to Basalt Lava Flows (map unit Tsa) typically have low primary porosity and are only water yielding where fractured (DWR 1982).





N	0	0.5	1 Miles	OEI

Figure 2: Surficial geology and locations of wells on and near the project parcel. Surficial geology based on data from the Geologic Map of Eastern Sonoma and Western Napa Counties (Graymer et al., 2007).



Well Data

Our search of the Department of Water Resources and County of Napa records found a total of 11 well completion reports for wells completed in similar geology and located within approximately one mile of the project parcels. Of the 11 wells, 10 were located specifically on surrounding parcels while one was only located generally in the Pritchard Hill area; data for this latter well was used to summarize local hydrogeologic characteristics but was not used in any geospatial analysis. Several well locations were identified by Chappellet staff while the remaining wells on surrounding parcels were located using the locations marked on the well logs as guidance and then confirmed using aerial photos of the area. Well locations are shown in Figure 2. Applicable well information was compiled (see Appendix A).

Well Number	1	2	3	4	5	6	7	8	9	10	11
Year Completed	2008	2014	1982	2010	2007	1995	1991	1992	1988	2008	2014
Depth (ft)	627	625	640	798	750	620	700	398	650	755	560
Estimated Yield (gpm)	45	30	10	35	25	20	30	40	20	45	150
Static Water Level (ft)	400	350	450	420	460	400	460	249	420	565	240
Top of Screen (ft)	447	225	420	500	300	420	440	258	440	605	280
Bottom of Screen (ft)	627	625	640	798	750	620	700	398	650	755	560
Geologic Unit	Tsa										

 Table 1: Well completion details for the project well (Well 1) and nearby wells.

All wells identified were productive. Well bores range from 398 to 798 feet deep, with an average depth of about 648 feet. Geologic materials encountered in all wells are described by drillers as hard gray volcanic or dark rock interbedded with ash of varying color and/or red to brown hard rock. These descriptions are consistent with what we would expect to find in an area mapped as andesitic and basaltic lava flows within a larger geologic formation made up of various volcanic rocks. Geologic logs for all wells within the project recharge area report rocks consistent with the Sonoma Volcanics to depths of approximately 600 ft. Wells 1, 2 and 7 all report green rock or green serpentine with gray shale beginning at depths between 600 and 615 ft deep. This boundary is likely the contact between the Sonoma Volcanics and the underlying basement rocks of the serpentinite (sp) of the Coast Range ophiolite. Reported static water level for all 11 wells ranged between 240 and 565 feet below ground surface with an average depth of 401 feet. In several wells the depths at which water was encountered coincided with layers of ash or tuff and fractured lavas. Well yields reported on Well Completion Reports ranged from 10 to 150 gallons per minute, with an average of 41 gallons per minute. Typically, operational well yields are about half or less compared to yields reported on Well Completion Reports.

The project well, Well 1, is also known as the Corral Well and is located 0.95 miles south of the winery on parcel number 032-010-092. This parcel is owned by Alexa Chappellet et al, an official easement allowing the winery to use this water is included in the 2014 Transient Non-community Water System technical, managerial and financial report by Applied Engineering (Applied Civil Engineering, 2014). The Corral Well was drilled in 2008 to a depth of 710 ft and completed to a depth of 627 ft. The geologic log describes a sequence of clays and gray rock for the first 125 ft, ash and gray rock were encountered between 125 ft and 450 ft, and hard light gray and hard



green and gray rock from 450 ft to 615 ft. The sequence of rocks described to this depth is consistent with the Tsa unit. At 615 ft rocks described as "gray and green shale with streaks of serpentine" are recorded to the bottom of the hole at 710 ft, indicating that they penetrated the basement rocks of the Coast Range ophiolite. Well 1 is screened between 447 ft and 627 ft. Approximately 12 ft of the screened interval is within the serpentinite (sp). Due to the generally poor aquifer characteristics of this rock and the relatively short section of perforated well casing in the serpentinite, the project aquifer is assumed to be within the Sonoma Volcanics.

The well log reports depth to first water as 440 ft and a static water level of 400 ft after development in May 2008. A pump test was performed in August 2011 and reported a prepumping water level of 408 ft. After six hours of pumping at rate of 30 gallons per minute the water level had drawn down eight ft to 416 ft and remained stable for the last two hours of the test. Within four minutes after shutting off the pump the water level had recovered to its initial level of 408.

Well 2 is located on a parcel owned by Chappellet Vineyard about 900 ft east of Well 1 and is known as the Vineyard Well. The Vineyard Well was completed in 2014 to a depth of 625 feet and has a static water level of 350 feet below the ground surface. The well is completed in materials consistent with what would be expected in the Tsa unit: "Hard gray fractured rock", "Hard purple rock" and "Soft green ash", "Black ash" and "White ash" down to a depth of 600 feet. At 600 feet the driller reports "Green Serpentine with Gray Shale" which is evidence that they penetrated the basement rocks of the Coast Range ophiolite. Screened intervals begin at a depth of 225 ft and alternate every 20 feet with blank casing until the bottom of the well at 625 ft. From 605 to 625 ft the casing is blank while 585 to 605 ft is perforated, therefore only 5 ft of the screened interval is within the serpentinite (sp). Due to the small section of perforated pipe within the rocks of the sp and the generally poor aquifer characteristics of the sp the project aquifer is assumed to be within the Sonoma Volcanics. After four hours of pumping the well driller reported an estimated yield of 30 gallons per minute with a drawdown of 270 ft.

Using the spatial distribution of groundwater levels for the 10 specifically located wells an interpolated groundwater surface was generated using the Kriging method (a procedure fitting a surface to data) in ArcGIS. A contour layer is displayed in Figure 2. It should be noted that the groundwater elevation data used for this interpolation comes from well logs up to 36 years old and may not be representative of current conditions. However, more recent water elevations are generally consistent with older elevations. As shown in Figure 2, the groundwater running east-west along a line from Well 2 to Well 7. This ridge marks a potential divide in the groundwater flow directions, one to the northwest and one to the southwest. Well 1 is located along this ridge due to the nature of the interpolation. A cross section displaying the ground surface, interpolated groundwater surface and well locations is shown in Figure 3.



Geologic Cross Section

A geologic cross section oriented northwest by southeast is shown in Figure 3 (see Figure 2 for location). The interpolated groundwater surface is displayed along with the approximated contact between Tsa and sp. Depths and casing intervals are also shown for Wells 1, 2 and 7. This representation shows the groundwater table dipping to the northwest at a depth of approximately 400 to 700 feet below ground surface.

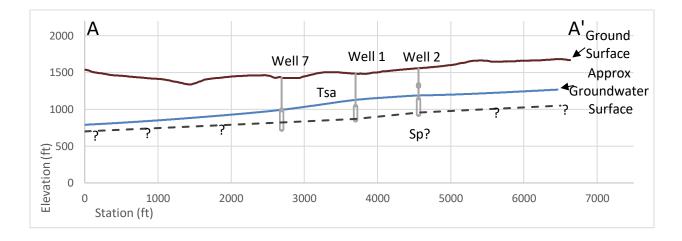


Figure 3: Hydrogeologic cross section A -A' through the vicinity of the project parcel (see Figure 2 for location).

Project Aquifer

The extent of the project aquifer/project recharge area is defined by surface water drainage patterns and the interpolated groundwater surface. The northern, northwestern and eastern boundaries of the project aquifer are defined by surface drainage divides directing flows towards the main channel that flows through the northeast corner of the winery well parcel. The southern and southwestern boundary extends to include a portion of the drainage to the south of the winery well parcel to include a portion of the interpolated groundwater surface draining to the south that is potentially intersected by Well 1.

The total area of the project aquifer is 459 acres. The recharge area is underlain by the Tsa unit of the Sonoma Volcanics. The project well (Well 1, Corrall Well) is screened within the Sonoma Volcanics. Given that depths to groundwater are relatively deep and given that impermeable layers of material including clays are present within the Sonoma Volcanics, the project aquifer is likely confined or semi-confined.

Water Demand

Within the project recharge area, water demand was estimated for both the existing and proposed conditions. Water use at the winery and vineyards surrounding parcels owned by Chappellet was determined using site details provided by Chappellet and verified using available



satellite imagery. The project recharge area also includes portions of six neighboring parcels. Use on these parcels was estimated using Napa County agricultural and winery GIS database information along with satellite imagery. One additional parcel that has the same ownership and a contiguous vineyard with a parcel intersecting the recharge area was included in the existing water use estimate. Uses within the recharge area include winery use, residential use and irrigation for vineyards and small orchards.

Existing Use

In the existing condition, the winery parcel (APN 032-010-090) contains a residence, a portion of vineyard, a barrel storage building and the winery. The demand of the modestly sized single family residence was 0.5 acre-ft annually; this rate is in the middle of the range provided by Napa County guidance for single family dwellings. The vineyard on the winery parcel part of a larger block of vines that extend onto the adjacent parcel APN 032-010-096 also owned by Chappellet. These vines are irrigated using surface water diversions and do not require groundwater from the project well. Irrigation practices of vineyards on adjacent parcels are discussed later in this report.

The following summary of existing groundwater use focuses on total uses within the project well recharge area (Figure 2), and therefore includes groundwater use estimated for other parcels along with the Chappellet parcels (Tables 3-8). Total existing water use by the Chappellet Winery parcel, served by Well 1, is described in detail below (Table 2).

Currently the winery is permitted to produce 150,000 gallons of wine a year with a total of 24 combined full time and part time employees. Based on Napa County water use guidelines, demand for winery processing water is 2.15 acre-ft per 100,000 gallons of wine while winery domestic and landscaping demand is an additional 0.5 acre-ft per. Annual production of 150,000 gallons gives a total demand of approximately 4 acre-ft. Employee daily use is estimated to be 15 gallons per employee per Napa County. Assuming the 24 employees work five days a week all year or 260 days the total demand equals 0.29 acre-ft annually in addition to the 4 acre-ft required by the winery (Table 2).

Daily tours and tastings at the winery are approved to host a maximum of 40 visitors a day. Assuming 40 visitors a day, 365 days a year this totals to a maximum of 14,600 tasting visitors annually. For marketing events that include on-site catering Chappellet is approved for several events with varying numbers of guests totaling to a maximum of 2,470 guests annually. Napa County guidance assumes a daily water use of 3 gallons per tasting visitor and 15 gallons per marketing events visitors. Using these rates the existing maximum annual demand for all 17,070 visitors to the winery is 0.25 acre-ft. Considering the uses above, the existing water use on the Chappellet Winery parcel totals to 5.01 acre-ft/yr (Table 2).



	Irrigation Use (acre-ft/yr)	Residential use (acre-ft/yr)	Winery Use (acre-ft/yr)	• •	Event Use (acre-ft/yr)	Total Use (acre-ft/yr)
Existing Use Chappellet Winery Parcel	0.0	0.50	3.98	0.29	0.25	5.01
Proposed Use Chappellet Winery Parcel	0.0	0.50	6.63	0.36	0.51	8.00

Table 2: Existing and proposed groundwater uses associated with the Chappellet Winery Parcel (Well 1)

In addition to uses on the Chappellet winery parcel, use on the surrounding parcels within the project recharge area includes three additional residences, landscaping associated with these houses, vineyard, a small orchard, and the Continuum winery. Two residences are large and are assumed to have a demand of 0.75 acre-ft per year the upper limit suggested by Napa County guidance (Table 4). The third residence is located on the winery well parcel and is smaller so a demand of 0.5 acre-ft per year (similar to that of the winery parcel residence) is applied. Lawn and landscaping areas above the first 1,000 ft² on these parcels totals to 32,165 ft² and 5,050 ft² respectively (Table 4).

A total of 88.1 acres of vineyard is located on or connected to parcels with wells within the project recharge area. Of this Chappellet owns 14.2 acres and irrigates with water collected via surface water diversions stored in existing reservoirs. Four existing water rights (A020616, A026508, A027298 and D032686) are registered to Chappellet Vineyard LLC in the California Department of Water Resources database with a total of 134 acre-ft allowed annually. Although the rights allow for the diversion of 134 acre-ft, the existing reservoirs are only able to capture approximately 50 acre-ft. In addition to diversions, 3 acre-ft of water is recycled from winery use and approximately 3 acre-ft of rain water is collected from roofs and stored in the onsite ponds. An additional 93.7 acres of vineyard owned by Chappellet is located on parcels to the north of the recharge area (032-010-090, 098, and 099). These vines are also irrigated using water collected into the reservoirs as mentioned above. Chappellet estimate irrigation demand varies between 30 and 40 acre-ft depending on the season.

Nearly all the water used for irrigation of all Chappellet vineyards is recycled, collected and diverted water; in addition, a very small amount of water from Well 2 may be used at the end of the growing season. Chappellet estimates this amount to be less than 1% of the total irrigation volume. If we assume conservatively that this amount is 1% of the upper end of the annual demand of 40 acre-ft this would be a demand of 0.4 acre-ft (Table 5).

The remaining 73.6 acres of vineyard within the project recharge area are located on three parcels west of the project well (APN's 03.2-010-091, 032-030-043 and 032-030-044) these parcels are all associated with the Continuum Winery. Although the parcel boundary for 032-030-043 does not intersect the recharge area it does have continuous vineyard with the adjacent parcel to the east (APN 032-030-044). To be conservative, it is assumed that this vineyard uses water from a well located within the recharge area. Two reservoirs are located on these parcels and are associated with three appropriative water rights totaling 25 acre-ft annually. Assuming annual vineyard irrigation demand of 0.5 acre-ft per acre per year, the 73.6 acres of vines would require 36.8 acre-ft annually. Although the specific practices are not known for these vineyards it is highly likely that this diverted water is used to irrigate these 73.6 acres of vineyard. The



allotted 25 acre-ft would be sufficient to meet about 68% of the estimated demand of 36.8 acreft; it is assumed that the remaining 11.8 acre-ft of vineyard irrigation (equivalent to 23.6 acres of vineyard) is supplied by one of the wells located on the Continuum parcels within the project recharge area.

In addition to the vineyards, 0.7 acres of orchard were identified on a parcel within the recharge area. Napa county guidance lists an annual demand of 4 acre-ft per acre for orchards which results in an annual demand of 2.8 acre-ft for the existing condition.

Water use for the Continuum winery was estimated using information reported in the Napa County Winery GIS shapefile. The current information associated with permit P10-00255-MOD for Continuum shows an annual production of 28,000 gallons with 16 employees which amounts to a total winery demand of 0.93 acre-ft. Tastings are by appointment only and a maximum of 2 visitors/day (728 annually) are allowed. For marketing events a maximum annual count of 450 visitors is listed. Assuming a usage of 3 gallons per visitor for tastings and 15 gallons per visitor for marketing events the maximum visitor use for Continuum is 0.03 acre-ft annually.

Based on these uses, the existing water demand within the project recharge area is estimated to be 26.4 acre-ft/yr (Table 3). Residential water demand is estimated to be 5.97 acre-ft/yr (Table 4), irrigation demand is estimated to be 15 acre-ft/yr (Table 5), winery use is estimated to be 4.72 acre-ft/yr (Table 6) winery guest use is estimated to be 0.28 acre-ft/yr (Table 7), and winery employee use is estimated to be 0.48 acre-ft/yr (Table 8).

Table 3: Existing and proposed groundwater uses within the project recharge area.

	Irrigation Use	Residential use	Winery Use	Employee Use	Event Use	Total Use
	(acre-ft/yr)	(acre-ft/yr)	(acre-ft/yr)	(acre-ft/yr)	(acre-ft/yr)	(acre-ft/yr)
Existing Use	15.0	5.97	4.72	0.48	0.28	26.4
Proposed Use	15.0	5.97	7.37	0.55	0.54	29.4

Table 4: Estimated existing and proposed residential groundwater use within the project recharge area.

Use Category	# of Units	Use per Unit (ac-ft/yr)	Use per 1,000 square feet above first 1,000 (ac-ft/yr)	Annual Water Use (ac-ft/yr)
Oversized Main Residence Main Residence Lawn Other Landscaping	2 2 32 5	0.75 0.50	0.10 0.05	1.50 1.00 3.22 0.25
TOTAL				5.97



Use Category	Number of Acres	Use per Acre (ac-ft/yr)	Supplemental Chappellet Use (ac-ft/yr)	Annual Water Use (ac-ft/yr)
Existing Vineyard Irrigation	23.6	0.5	0.4	12.2
Existing Orchard Irrigation	0.70	4		2.8
TOTAL				15.0
Proposed Irrigation Total	23.6	0.5	0.4	12.2
Proposed Orchard Total	0.70	4.0		2.8
TOTAL				15.0

Table 5: Estimated existing and proposed vineyard and orchard irrigation use within the project recharge area.

Table 6: Estimated existing winery use within the project recharge area.

Use Category	Annual Production (gal/yr)	Use per 100,000 gal of production	Annual Water Use (ac-ft/yr)
Winery Process Use	178,000	2.15	3.83
Winery Domestic Use	178,000	0.50	0.89
TOTAL			4.72

Table 7: Estimated existing winery guest use within the project recharge area.

	# of	Use per	Annual
Visitor Category	Vistors	Visitor	Water Use
Tours and Tastings	15,288	3	0.14
Marketing w/ Onsite Catering	2,920	15	0.13
TOTAL			0.28

Table 8: Estimated existing employee use within the project recharge area.

Work Category	# of Employees	# Work Days per Year	Use per Employee (gal/day)	Annual Water Use (ac-ft/yr)
Full-time	40	260	15	0.48
TOTAL				0.48

Proposed Use

In the proposed condition, the Chappellet project will increase wine production by 100,000 gallons for a total annual production of 250,000 gallons. The total number of visitors annually will increase by 21,835 to 38,905. Six new employees will be added for a total of 30 employees. No other uses will change as part of the proposed project. In this condition the estimated water



use will increase by 3.0 acre-ft/yr to 8.0 acre-ft /yr for the project parcel (Table 2) and to 29.4 acre-ft/yr within the project recharge area (Table 3). All increases in groundwater use are from increases in winery processing and domestic use (Table 9), winery guest use (Table 10) and winery employees (Table 11).

	Annual	Use per	Annual Water
Use Category	Production	100,000 gal of	Use (ac-ft/yr)
Winery Process Use	278,000	2.15	5.98
Winery Domestic Use	278,000	0.50	1.39
TOTAL			7.37

Table 10: Estimated proposed winery guest use within the project recharge area.

	# of	Use per	Annual
Visitor Category	Vistors	Visitor	Water Use
Tours and Tastings	35,403	3	0.33
Marketing w/ Onsite Catering	4,680	15	0.22
TOTAL			0.54

Table 11: Estimated proposed employee use within the project recharge area.

Work Category	# of Employees	# Work Days per Year	Use per Employee (gal/day)	Annual Water Use (ac-ft/yr)
Full-time	46	260	15	0.55
TOTAL				0.55

Groundwater Recharge Analysis

The Soil Water Balance (SWB) model developed by the U.S. Geological Survey (Westenbroek et al., 2010) was used to produce a spatially distributed estimate of annual recharge in the vicinity of the project parcel defined by the project recharge area. This model operates on a daily timestep and calculates runoff based on the Natural Resources Conservation Service (NRCS) curve number approach and Actual Evapotranspiration (AET) and recharge based on a modified Thornthwaite-Mather soil-water-balance approach (Westenbroek et al., 2010).

This approach simulates potential recharge from infiltration of precipitation and does not account for the capacity of the project aquifer materials to accept recharge. As discussed above under Limitations, groundwater occurring at significant depths may not be directly related to the recharge generated on the overlying landscape. Significant additional recharge may occur



through streambed infiltration, and/or groundwater inflows from outside the defined project recharge area, however quantifying these recharge components is beyond the scope of this analysis.

Model Development

The project recharge area is 459 acres and is underlain by both the Sonoma Volcanics and by the Coast Range ophiolite Complex. The model was developed using a 10-meter resolution rectangular grid and water budget calculations were made on a daily time step. Key spatial inputs included a flow direction map developed from the USGS 10-meter resolution Digital Elevation Model (DEM), a land cover dataset developed from the U.S. Forest Service (USFS) CALVEG dataset and modified based on the Napa County shapefile of agricultural areas and interpretation of 2016 aerial photography (Figure 4), a distribution of Hydrologic Soil Groups (A through D classification from lowest to highest runoff potential; Figure 5), and Available Water Capacity (AWC) developed from the NRCS Soil Survey Geographic Database (SSURGO).

A series of model parameters were assigned for each land cover type/soil group combination including a curve number, dormant and growing season interception storage values, and a rooting depth (Table 12). Curve numbers were assigned based on standard NRCS methods. Interception storage values and rooting depths were assigned based on literature values and previous modeling experience. Infiltration rates for hydrologic soil groups A through D were applied based on Cronshey et al. (1986) (Table 13) along with default soil-moisture-retention relationships based on Thornthwaite and Mather (1957) (Figure 6).

Daily precipitation and daily minimum and maximum air temperature data were compiled for the Napa River at Yountville Cross Road Weather Station which is located approximately 3.7 miles southwest of the project parcel (Figure 1). This station was selected because it represents the best available weather station for the project site in terms of proximity, elevation, and exposure.

Based on the PRISM dataset which describes the spatial variations in long-term precipitation for the continental U.S., the 1980 to 2010 mean annual precipitation at the Angwin Weather Station was 31.6 inches versus 38 for the project parcel (PRISM, 2010). The precipitation data was scaled up by a factor of 1.2 to account for the difference in precipitation between the station location and the project parcel. Water Year 2010 was selected to represent average water year conditions for the analysis because it represents a recent year with near long-term average precipitation conditions (40.2 inches at the scaled Napa River at Yountville Cross Road Station). The model was also evaluated for Water Year 2014 to represent drought conditions. Water Year 2014 precipitation at the scaled Napa River at Yountville Cross Road Station was 18.0 inches or approximately 57% of long-term average conditions.

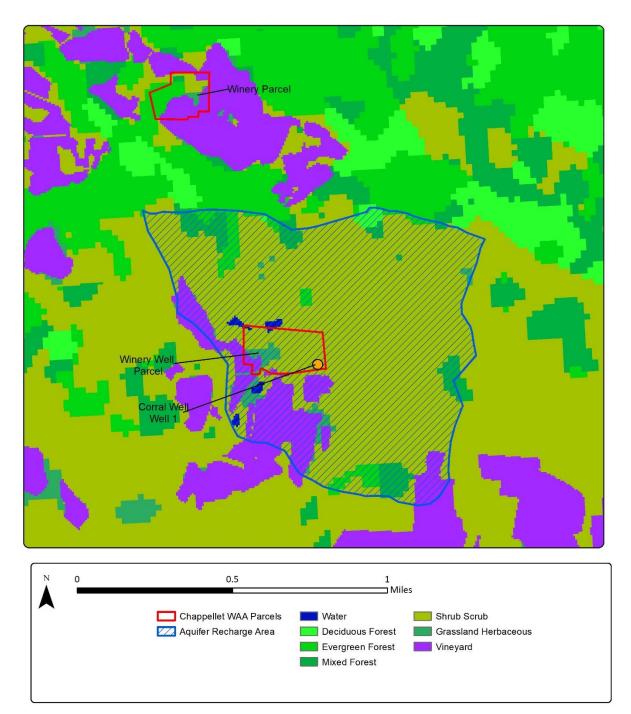


Figure 4: Land cover map used in the SWB model.



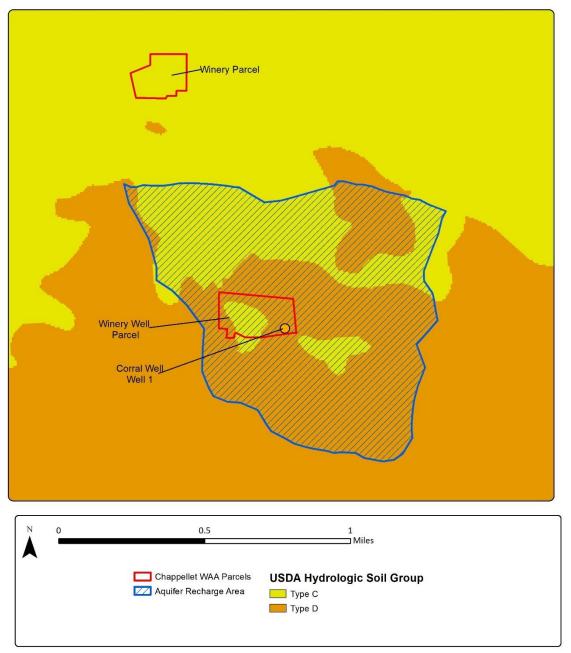
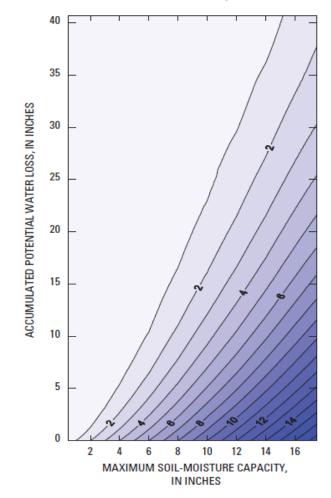


Figure 5: Soil map used in the SWB model.





SOIL MOISTURE RETAINED, IN INCHES

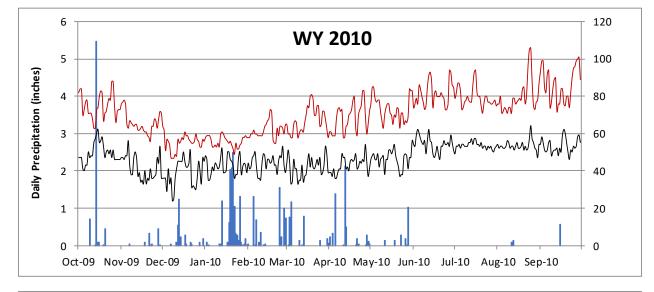
Figure 6: Soil-moisture-retention table (Thornthwaite and Mather, 1957).

		eption Values	Cur	ve Num	ber	Rooting Depth (ft)				
Land Cover	Growing	Dormant	В	С	D	В	С	D		
Land Cover	Season	Season	Soils	Soils	Soils	Soils	Soils	Soils		
Grassland/Herbaceous	0.005	0.004	58	71	78	1.1	1.0	1.0		
Deciduous Forest	0.050	0.020	55	70	77	5.1	4.9	4.7		
Evergreen Forest	0.050	0.050	55	70	77	4.2	4.0	3.9		
Mixed Forest	0.050	0.035	55	70	77	4.7	4.5	4.3		
Scrub/Shrub	0.080	0.015	48	65	73	2.8	2.7	2.6		
Vineyard	0.080	0.015	61	75	81	2.1	2.0	1.9		
Water	0.000	0.000	100	100	100	0.0	0.0	0.0		

Table 12: Soil and land cover properties used in the SWB model

Soil Group	Infiltration Rate (in/hr)
А	> 0.3
В	0.15 - 0.3
С	0.05 - 0.15
D	<0.05
D	<0.05





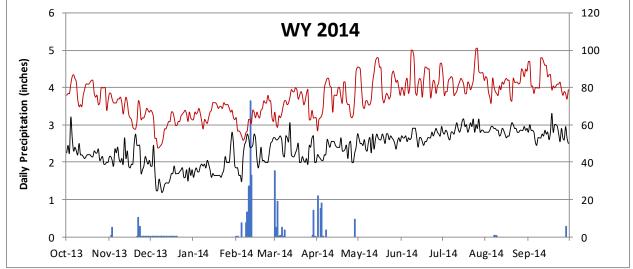


Figure 7: Daily precipitation (blue bars) and minimum (black lines) and maximum (red lines) air temperatures used in the SWB model.

Results

The simulated Water Year 2010 (average water year) recharge results indicate that recharge varied across the project recharge area from 1 to 11.5 inches, excluding areas classified as water where the model assumes zero recharge (Figure 8). Spatially averaged over the project recharge area, recharge accounted for 4.9 of the 40.2 inches (12%) of precipitation in 2010. The simulated Water Year 2014 (dry water year) recharge results indicate that recharge varied across the project recharge area from near zero to 6.7 inches (Figure 9). Spatially averaged over the project recharge area, only 2.5 of the 18 inches of precipitation (14%) was recharge. Recharge as a percentage of annual precipitation ranged from 14% in the average water year to 7% in the dry water year (Table 14).

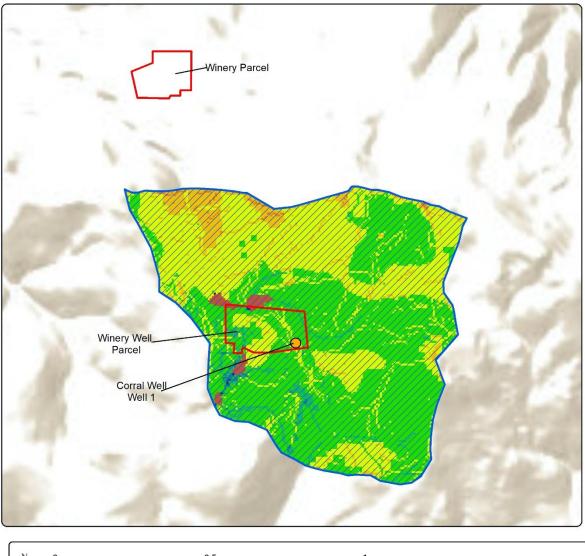
Groundwater recharge estimates can also be expressed as a total volume by multiplying the calculated recharge by the project aquifer recharge area of 459 acres. This calculation yields an estimate of total recharge of 95.6 acre-ft/yr during the drought conditions of Water Year 2014 and of 168.5 acre-ft/yr for the average Water Year of 2010.

LSCE (2013) estimated recharge based on water balance modeling in several watersheds in the county underlain primarily by Sonoma Volcanics (Milliken Creek, Tulucay Creek, Conn Creek and Napa River above Calistoga). The recharge estimates in these watersheds ranged from 5 to 21% of annual precipitation. The recharge estimates produced from this study (12% of average water year precipitation) using SWB fall within the range of the LSCE estimates for larger watershed areas underlain by Sonoma Volcanics and appear to be reasonable.

	2010 Nor	mal Year	2014 Dry Year				
		% of		% of			
	inches	precip	inches	precip			
Precipitation	40.2		18.0				
Recharge	4.9	12%	2.5	14%			

Table 14: Summary of recharge results from the SWB model.





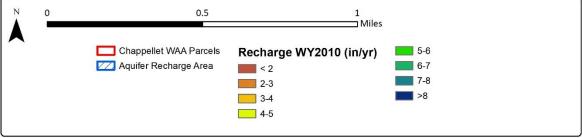
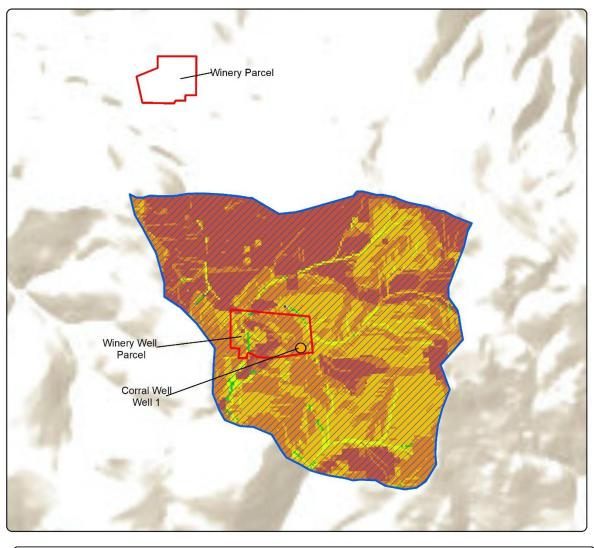


Figure 8: WY 2010 recharge simulated with the SWB model.





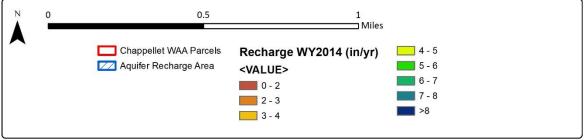


Figure 9: WY 2014 recharge simulated with the SWB model.





Comparison of Water Demand and Groundwater Recharge

The total proposed groundwater use for the project recharge area is estimated to be 29.4 acft/yr combined for seven parcels including the project parcel. Estimated groundwater use in the project recharge area is equivalent to 17% of the estimated average water year groundwater recharge of 168.3 acre-ft/yr and 31% of the estimated dry water year recharge of 95.6 acre-ft/yr (Table 15). At the project scale the proposed groundwater use for the Chappellet Winery is estimated to be 8 acre-ft/yr (Table 2) which is equivalent to 5% of the estimated average water year recharge and 8% of the estimated dry water year recharge. These comparisons indicate that there is a substantial surplus of groundwater resources in terms of estimated average annual groundwater recharge to the project recharge area. Given the magnitude of this surplus, the 3.0 acre-ft/yr increase in water use associated with the proposed increased winery production, employees and guest attendance is highly unlikely to result in reductions in groundwater levels or depletion of groundwater resources over time.

Table 15: Comparison of proposed water use to average and dry year groundwater recharge in the project recharge area.

	Avera	ige Water Year	· (2010)	Dry Water Year (2014)						
Total Proposed Demand (ac-ft/yr)	Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge	Recharge (ac-ft/yr)	Recharge Surplus (ac-ft/yr)	Demand as % of Recharge				
29.4	168.3	138.9	17%	95.6	66.2	31%				

Well Interference Analysis

There are no non-project wells within 500 feet of the project well. The nearest neighboring well that could be precisely located (Well 4) is 580 feet southwest of Well 1 (Figure 2). Based on the WAA guidance document, a Tier 2 well interference analysis is not required given that all non-project wells are located greater than 500-feet from the project wells.

Summary

Application of the Soil Water Balance model (SWB) to the project recharge area revealed that average water year recharge was approximately 4.9 inches/yr or 168.3 acre-ft/yr. During drought conditions, recharge was significantly lower at 2.5 inches/yr or 95.6 acre-ft/yr. The total proposed water use for the project aquifer recharge area is estimated to be 29.4 acre-ft/yr. This represents about 17% of the mean annual recharge indicating that the project is unlikely to result in declines in groundwater elevations or depletion of groundwater resources over time. The nearest neighboring well is located more than 500-ft from the project well indicating that a Tier 2 well interference analysis is not required.



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APPENDIX A

WELL COMPLETION REPORTS



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			· ·							vel <u>350</u>		(Fee	t) Date	Measu	ired 03/13/2	2014			
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	Other Signed C-57 Licensed Water Well Contractor 3/19/2014 808-508 ttach additional information, if it exists. C-57 Licensed Water Well Contractor Date Signed C-57 License Number																		
	REV. 1/2006												mea C	-97 LIC	ense Numbe	ar.			

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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ORIGINAL		CES AGENCY			Do not fill in
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	-	(12) WELL	LOG: Total depth	640 ft. Depth of c	ompleted well <u>640 ft.</u>
	-	from ft. to f	t. Formation (Describ	e by color, character	, size or material)
	-	<u> </u>		<u>gray rock</u>	······································
(2) LOCATION OF WELL (See instruc County_NapaOwner's	tions): 32010			<u>red rock-m</u> e	e <u>d hard</u>
Well address if different from aboveOwners	wen Number <u>, 12 = 0, 10 = 2</u>	100 -175			rs brwn clay
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WELL LOCATION SKETCH	Other	╞──_@	<u></u>		
(5) EQUIPMENT: (6) GRAVEL	VACK:		9		· · · · · · · · · · · · · · · · · · ·
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(9) WELL SEAL:		-			
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	X Intervalft.		<u> </u>		
Method of sealing <u>Cement</u> (10) WATER LEVELS:			<u>3/19_1982</u>	_ Completed	<u>4/7 19.82</u>
Depth of first water, if known 475	ft.	This well was drill	ER'S STATEMEN led under my jurisdic		true to the best of my
Standing level after well completion 450	ft	knowledge and be			
(11) WELL TESTS: Was well test made? Yes X No I If yes, by				ll Driller)	
Type of test Pump \Box Bailer \Box Depth to water at start of test <u>450</u> t.	Air lift 🖄			gson Drill	
arge 10 gal/min after hours	At end of testft Water temperature			oration) (Typed or pri lejo Hwy	inted)
Consider analysis made? Yes \Box No $\stackrel{\text{IV}}{\simeq}$ If yes, by			ejo, Ca		_{Zip} 94589
	ach copy to this report	License No. 294	1001	Date of this report	4/9/82

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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TOTAL D	EPTH OF	BORING	<u><u>ĝ</u></u>	00	_(Fee							(GPM) & ⁻				EM at day
1	EPTH OF		ED V	WELL	7	98 (Feet)				May not be repre						f test
DEF	этн	BORE-					CASING (S)					PTH		ANNU	JLAR	MATERIAL
FROM S	URFACE	HOLE DIA.		/PE (±		MATERIAL /	INTERNAL	GAUGI		SLOT SIZE	FROM	SURFACE	CE-	BEN-		
Ft. to	o Ft.	(Inches)	BLANK	SCREEN CON- DILICTOR	III	GRADE	DIAMETER (Inches)	OR WA THICKNE		IF ANY (Inches)	Ft.	to Ft.	MENT (⊻)	TONITE	FILL (⊻)	FILTER PACK (TYPE/SIZE)
0	55	124	V			Plasti	i 6	F49	0.	21	D	55	V			
55	500	9	1			n	и	le			55	798			Nel	Pack.
Ena	798	a		0		n	24	и	_	077	• , • ,					Gravel
500	110	_7				VL						- - -				
		IMENTS	(ビ)			I, the un	dersigned, ce	ertify that I	this re	CERTIFICA: eport is complete			best of	my kn	owledg	e and belief.
) _	Geologic Well Cor	Log struction Dia	agran	n			Pulliam	Well E	xplc	mation Inc						
		ical Log(s) er Chemical	Ano!	Vecc		("EI	5110 St			•	a CA	94558				
	Other	2 Onerflical	Anal	y000		ADDRESS	φ	\mathcal{D}	11	1 -		CITY	, -	a	STATE	ZIP
ATTACH A	DDITIONAL	NFORMATIC	DN, IF	T EX	(ISTS.	Signed C-	57 LICENSED WAT	WELL CON	TRACTO	Artic IR		DA	TE SIGNED	7	C	57 LICENSE NUMBER

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

												— DWA US				Well 5	
ORIGINA File with						WELL C		OF CALIFO LETIO			т			NO	181		
Page							Refer to In		Pamphl	et	l r	s	TATE WE	ELL NO	./STATIO	ŇŇO.	ļ
Owner's			120	07		Ended				.02			L		, LOI		
Local P	ermit Ag	ency Ma	- <u>∠</u> ∪ 1⊡2	∪7 റവ	unt.		-03/29/	2007							1 I.	 	
Perm	it No	07-000	<u>)</u> 91			Permit 1	Date)3/12/2	2 007		_		API	N/TRS/C	OTHER		
						.oc						(11713) 1 4	******	n _			
ORIENTAT	ION (⊻)			L Dota		IZONTAL A	NGLE	(SPECIFY)	N								-
DEPTH SURF					ĎB	SCRIPTION		1117	10								-
Ft. to	p Ft.		lesci	ribe n	nater	al, grain size,	color, etc			<u>~~~~</u> ress <u>168</u>	<u>\ \ \</u>	- WELL LO	CATIO	N—	0141		
0	13	Bro	wn	Cla	ay d	Gray Roc		2	City	Saint' I	lelena	NO)		au -			
13	30	Por		1	ρτ	ed Ash	V K	$\langle \rangle$	Cou		$\frac{\lambda a^{\nu} 5)^{\nu}}{2}$			0(1			
	- 50	Kec	I G	тау		ACTINASTIN	$\leq \uparrow \uparrow$	1		Book <u>032</u> n̂ship_ <u>1∽</u>			Parcel Section		000	•	
30	125	Har	d	Gray	/ , \F	ed.&. Brow	m Ash)		\mathcal{T}			<u>N</u>	Long_			1	w
125	215	Uor		<u>UN</u>	.(17.				2)		CATION	SEC. SKETCH		DE		WIN. SEC. 『IVITY(二) EW WELL	
	<u>L</u> LJ	nar اللا	<u>u : (</u>	$\frac{\sigma(a)}{\langle \rangle}$		lcanić Ro)) []			NORI	н				EW WELL CATION/REPAIR	
215	225	Rec	<u>~</u> A	sh, `	1		$\overline{\mathcal{O}}$			1	~		h n			Deepen Other (Specify	0
225	340-	11) on	<u>\ \ \</u>		k k Ash Ye	$\underline{\bigcirc}$, N	490	Caryo	1 KB				
		~~ 010			<u></u>		TTOM C	лау		\	KE.		/	-	Pr	ESTROY (Describe ocedures and Mate oder "GEOLOGIC L	rials
340	360	JRec	A	sh\ ð	2>Re	d Clay					\sim	MC	くび		USES	(⊻)	JU ,
360	500	Har	<u>, h</u>	<u>INI</u> Crav	V 1 R.	Black Roc	k som	<u> </u>) a			SUPPLY prestic Publi	
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E00	F10			1					3		,		٦/Ś	2 ŭ		TEST WELL _	_
500	512	Red	A	sh							_1		//@			HEAT EXCHANGE _	
512	630	Gra	y I	Rock	ς						2	7 /	/			DIRECT PUSH _	—
620	(FF	0		<u> </u>		<u> </u>									VAP	DR EXTRACTION _	
_630	655	Gra	<u>y</u> 1	KOCK	ČČ	Gray Clay	,				SOUT		ven			SPARGING _ REMEDIATION _	
655	715	Gre	en	& 0	Gray	Ash	•		Fence	rate or Describe 15, Rivers, etc. at sary. PLEASE I	ud attach a'	map. Use addit	tonal pape	ings, er if	c	THER (SPECIFY) _	
715	730	i.Ta i	+0	Ash	•							& YIELD)MPL	ETED	WELL	
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750	790	Gre	en 7	Sha 40	le				ESTI	MATED YIELD	: 47	(GPM)&	TEST TY	PE	tin.	LIFT	
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300	1.21	_7			┼──┼─	~~~~	n	5C.		032	 	 					
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	Other DDITIONAL					ADDRESS C	Tom	P				L	+	-0	7 8	308-508	
DWR 188 RE		AFOMMA HO	an, IP				LICENSED WAT					0/	TE SIGNED		Ċ	57 LICENSE NUMBER	

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

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File with DWR					℣ℇ⅃⅃	COMP Lefer to Ins	truction	DIN Pam	REPORT		8	TATE W		./STATI	ON NO.		
Page _1 of Owner's Well No	1				-	No	· 54	7	123	L. (
Data Work Bogan	2/27/95	;		1	Ended3/3	1 <u>/95</u>			190		LATITUDE			L01	KGITUDE		
Local Permit Ag	ency Nat	a	Cou	int	y Environm	ental_	Healti	'n		-	<u></u>			1			
Permit No.	38402				Permit I	Date <u>2</u>	<u>/17/9</u>	5		. └┈┈		A	PN/1HS	/OTHER			
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SURFACE		~	.,		SCRIPTION		. <u>\</u> . 1	TOITY	men pris 1		ELL/EOC			~			
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70 85					<u>rock soft</u>	<u>```}`````````````````````````````````</u>	/2 ^{5/1}	Lat	itude	VIN. SEC.	<u>NOHTH</u> L	ongitu	ude _	EG.	I WEST		
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	BROWN & J						<u></u>			NORTH							
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160 175 175 190	Black, B Black, d				fract med			l		-		-		'			
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	Grav roc	-	- · · ·	1							3			P U	rocedures and Materials ader "GEOLOGICLOG")		
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					ard fract				ustrate or Descrif	SÓ UTH 1e Distance o	f Well from	Landn	rarks	t	TION OTHER (Specify)		
					s black hard	1		\$U	ich as Roads, Baile LEASE BE ACC	dings, Fence	, Hipers, etc.	•					
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625 665	Gray roc	<u>k s</u>	tri	<u>nge</u> r	<u>rs black med</u>					· Rota		F	LUID _	WTE	<u>r foam</u>		
			_		. <u></u>			DEF	WATER DE STATIC								
								WA	TER LEVEL	20	(Ft.) & DA	te me	ASURE	D <u>J</u> Air	/30/95		
t	t	CÉE				· · · · · · · · · · · · · · · · · · ·	- -	ES1	TIMATED YIELD		(GPM) & 7	EST T	YPE	mlo	F a		
TOTAL DEPTH OF		<u>665</u>		_ (Fe 4	200				ST LENGIH					- 			
TOTAL DEPTH OF	COMPLETE	W. U	<u>E</u> LL		<u>220 (Feet)</u>			<u> </u>	inay not be repres				_	_			
DEPTH	0005				C	ASING(S))			DE		· 1	INNU		MATERIAL		
FROM SURFACE	BORE- HOLE		²Ε (<i>±</i>			INTERNAL	GAUG		SLOT SIZE	FROM S	URPAGE	CE-	BEN-	<u>11</u>	'PE		
	DIA.	DEEN	DON-		MATERIAL/ GRADE	DIAMETER (Inches)	OR W	ALL	IF ANY (inches)	Ft. 1	6 Ft.	MENT	TONITE	FILL	FILTER PACK (TYRE/SIZE)		
Ft. to Ft.			_	릴		L					_ <u>. </u>	(∠)	(土)	(<u>×</u>) V			
620 420	· · · · - +	_	X	┟━┥	<u> I-C-1 </u>	6	F-480		032	665	30			_	Pea_grave1		
420 1		X	+.	$\left - \right $	<u>I-C-1</u>	6	F-480	1	╀┈───┤	$-\frac{30}{29}$	29	v	 X -	<u> </u>	- 20		
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Geolog		• -	-	•						ete and ac	curate to t	he ber	st of a	y knov	viedge and belief.		
	_	ram			NAME	Dost	<u>ier-C</u>	irec	ison Inc.		·						
	Well Construction Diagram Geophysical Log(s) Soll/Water Chemical Analyses																
-	ater Chemical	Analy	\$8 8		<u> 5365</u>	Napa \	<u>/allej</u>	0	<u>tiqhway, /</u>	America	<u>n Cany</u>	on,	CA.	<u>945</u> STATE	<u>89</u>		
Other					- I MUNICISS			51	LI TI	1							
ATTACH ADDITIONA					S. Signer M		<u>rvu</u> Rorazed) ref	1 RESENT	TATIVE			<u>3/3</u>	107 S ED	<u>y</u>	C-57 LICENSE_NUMBER		
DWR 188 REV. 7-90		IF A	10DI	TION	AL SPACE IS	EEDED, L	JSE NEX	TCC	ONSECUTIVELY	NUMBER	ED FORM						
•			'														

File with DWR

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" EIE
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

网络金属 "我们的这些人的?""你说说说说说,你们说说,我就是我们的是我们的是你们,你没有你的你?你们的是你们认知了你……""你说,你一下来你,我们给她给你,你不知道你

No. 120020

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Do not fill in

Well 7

e of Intent No	WATER	WELL	DRILLERS	REPORT
Permit No. or Date				

State Well No.______ Other Well No.______

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	(12) WELL LOG: Total depth 710 ft. Depth of completed well 700 ft.
	from ft. to ft. Formation (Describe by color, character, size or material)
· .	0 - 30 Br. rock hard
(2) LOCATION OF WELL (See instructions):	
Southy Owner's wen Kumber GOL OTO LY	
Well address if different from above	90 - 148 Black rock hand to m-hard
Township 07N Range 04W Section 08	148 - 206 Red & Black rosk A-hard
Distance from cities, roads, railroads, fences, etc	206 - 237 Black & brown rock m-hard
	237 - 263 Black the some stringers of red rock
	263 - 285 Black & hand green rock stringers of brown &
	285 - 340 Rhack rock hard red rock
(3) TYPE OF WORK:	340 2427 Red wock with hard stringers of black rock
	427 450 Black rock with hard stringers of green rock
Wett	
LAKE Reconditioning	
HENNESSEY	
Horizontal Well	COAL - 611 Red rock soft
destruction materials and	an >- 670 Green rock soft
procedures in Item 12	6702 - 695 Green rock with m-hand stringers of grey rock
γ (4) PROPOSED USE	695 - XQ Soft green pock
Domestic Domestic	
	1-0 020
Industrial	
Well () Test Well	
↓ Sife Test Well □	
Municipal D	
WELL LOCATION SKETCH Other	
(5) EQUIPMENT: (6) GRAVED PACK:	
Rotary 🖄 Reverse 🗌 Des 🖾 No 🗹 Size	
Cable Air K Pitmeter of bore	
Other D Bucket Realized from 25 700 ft	
(7) CASING INSTALLED: (8) PERFORAPTONS:	
Steel Plastic A Concrete Type of perferation or size of screen	
From To Dia. Cage of From To Show	
ft. ft. Wall ft. Size	_
0 440 6 200 440 460 .032	
460 480 6 200 480 580 0 032	
(9) WELL SEAL:	-
Was surface sanitary seal provided? Yes X No \Box If yes, to depth <u>25</u> ft.	_
Were strata sealed against pollution? Yes No K Intervalft.	-
Method of sealing Bentonite & Concrete	Work started 12-16 19.90 Completed 1-14 19.91
(10) WATER LEVELS: Depth of first water, if known 470 ft.	WELL DRILLER'S STATEMENT:
460	This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief
(11) WELL TESTS: Was well test made? Yes X No [If yes, by whom? driller	(Well Driller)
Type of test Pump Bailer Air lift 🕅	NAMEDoshier-Gregson, Inc.
Depth to water at start of test_460 ft. At end of test_460 ft	(Person, firm, or corporation) (Typed or printed)
arge <u>30 gal/min after 4 hours</u> Water temperature	Address 5365 Napa-Vallejo Hwy.
nical analysis made? Yes 🕅 No 🗋 If yes, by whom?	cityVallejo,_CAzip94589-9679
Was electric log made? Yes D No X If yes, attach copy to this report	License No. 258826 Date of this report_ 1-21-91

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

	Contraction of the second second	A BULL COMPANY AND AND AND AND AND	
			Well 8
ORIGINAL	STATE OF	CALIFORNIA 08 N/P	Do not fill in
File with DWR	THE RESOUR	RCES AGENCY	
	DEPARTMENT OF	WATER RESOURCES	No. 120017
Permit No. or Date	WATER WELL D	ORILLERS REPORT	State Well No
Permit No. or Date			Other Well No. 07N04W08N
1/ 77 0 7 1 1 1	(101)	(19) WELL LOCI THE	
1677 Suge churgo 7032 -	10-000	from ft. to ft. Formation (Des	epth 610 ft. Depth of completed well 610 ft. scribe by color, character, size or material)
\sim		2 - 20 Red & Brown	wn clav
(2) LOCATION OF WELL (See instruct	ctions):	20 - 55 Gray & Blaa	ack rock med hard
CountyNdpaOwner's V Well address if different from abovePritchard	Well Number 32-010-29	55 - 70 Gray & blac	ack rock stringer brown clay
Township		70 - 130 Black brown	in & ked rock med hard
Distance from cities, roads, railroads, fences, etc	Section	130 - 160 Black & rec	d rock hand fract
		220 - 265 Brown red 8	& gray rock hard fract
		265 - 295 (Black brown	black rock hard fract
		295 - 390 Black gray	red rock stringers dark & light
	(3) TYPE OF WORK:	390 2495 Black gray	red rock hard fract brow
	New Well X Deepening	495 600 Black red d	gk. green brown rock hard fract
Da.	Reconstruction	ou - one Gray rock to	Jand
VA ATA	Horizontal Well	Alt	, V
te Hu	Destruction D (Describe	149- 4H a	
W Gate FILL F	destruction materials and procedures in Item 12	-V	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
	(4) PROPOSED USE?	<u>n)) ~</u>	- A CO IK
of tence	Domestic	- The C	off a
n Utende	Irrigation		5
	Industrial Test Well	-AHA D	\$
- 1.50 m	Stock	All - Rao	
	Municipal	e - Co	
WELL LOCATION SKETCH	Other	A GW	
(5) EQUIPMENT: (6) GRAVELY	PACK:		
Rotary Reverse Reverse No Cable		Ally -	
Cable Air X Unbucter of bore Other Mid Bucket Packet from	610 25 m	AW-	
(7) CASING INSTALLED: (8) PERFORAT	and the second s	- <u></u>	
	high or size of screen		an a
From To Dia. Care or From	To Kala	-	
ft. ft. Wall ft.	ft. size	-	
0 480 6 200 480	610 032	-	
	all the	-	
(9) WELL SEAL:	- Aller -	-	
Was surface sanitary seal provided? Yes 🕱 No 🗆 If	If yes, to depth 25 ft.	-	
Were strata sealed against pollution? Yes	T Interval ft	-	(*)
Method of sealing Bentonite PelTets & G (10) WATER LEVELS:	oncrete	Work started 12-14 19.90	Completed 1-8 19.91
Depth of first water, if known	495 ft.	WELL DRILLER'S STATEMEN This well was drilled under my purisdic	
Standing level after well completion	470 ft.	Furnand	liption any this report is true to the best of my
(11) WELL TESTS: Was well test made? Yes 立 No 匚 If yes, by w	whom? driller	SIGNED KUYMONA	Skebster Vell Driller)
Type of test Pump D Bailer G	Air lift 🕅	NAME Doshier - Gregs	ison, Inc.
5 0 2	At end of testft	Address 5365 Napa-Valle	moration) (Typed or printed)
nical analysis made? Yes 🖄 No 🗆 If yes, by w	Water temperature whom?lab	CityVallejo, CA	Zip 94589-9679
Was electric log made? Yes No X If yes, attach		License No. 258826	
		EXT CONSECUTIVELY NUMBE	

ORIGINAL

of Intent No.

- 1 こうで についため アンバーセット ひがく ジャープ しょうそう

File	with	DWR
1110	***	DITA

STATE OF CALIFORNIA THE RESOURCES AGENCY DEPARTMENT OF WATER RESOURCES WATER WELL DRILLERS REPORT

Do not fill in

Well 9

No. 245581

State Well No.______ Other Well No. ______

Permit No. or Date	CHARD 412 Other Well No. 04008
1	
· ·	(12) WELL LOG: Total depth 665 ft. Depth of completed well 650 ft.
· · · · · · · · · · · · · · · · · · ·	(coorder by coord, character, size of material)
,	
(2) LOCATION OF WELL (See instructions): CountyNapaOurset's Well Number 32-010-27	
CountyOwner's well Number	
Well address if different from above	
Distance from cities, roads, railroads, fences, etc	55 - 85 Black red and gray rock med hard
	85 - 145 Red black rock med hard
	145 - 175 Brown and gray rock hard
	175 - 245 Black brown gray hard
(3) TYPE OF WORK: New Well X Deepening Reconstruction	245 305 Black and brown rock hard
New Well X Deepening	_305 Start Tk red rock hard fract
A FG X Reconstruction	325 - 365 Dk red black and brown rock hard fract
Reconditioning	365 -425 Black fock hard fract
	425 -485 Dk red and black rock hard fract
destruction materials and	485 - 505 Dk red bock med hator fract
procedures in Item 12X	505 - 525 Green white and gray tock med hard fract
(4) PROPOSED USE	stringers black reck
BNDERSON Domestic Irrigation Industrial	525 - 585 Hz green and gray hard fract
Irrigation	585 615 Gray rock hard
Industrial	615 -650 Black red Green gray stringers white rock soft
Test Well	650 -665 Black green white stringers shale
Stock	
SAGE CANYON ROAD Stock	
WELL LOCATION SKETCH	<u> </u>
(5) EQUIPMENT: (6) GRAVEL PACK;	
Rotary Reverse Key Xey Xo Size	
Cable Air X Filmeter of bore 9 7/8, 8 8/3/4	
Other \Box Bucket \Box Packet from 650 to 26 fr	} ((),∨_
(7) CASING INSTALLED: Steel Plastic Compute Type of performing or size of screen	
From To Dia. Gage of From To Stor ft. ft. Wall ft. size	
	-
500 520 6 200 520 650 500	-
(9) WELL SEAL: Was surface sanitary seal provided? Yes X No _ If yes, to depth26 ft.	
•	-
Were strata sealed against pollution? Yes No D Interval ft. Method of sealing Bentinite Pellets and Concrete	7/1/98 7/1/0/00
	Work started 7/1/88 Completed 7/12/88 19
(10) WATER LEVELS: 450	WELL DRILLER'S STATEMENT:
Standing level after well completion420ft	This well was drilled under my invitation and this report is true to the best of my knowledge and belief.
(11) WELL TESTS:	SIGNED ATTACARO
Was well test made? Yes X, No [] If yes, by whom? Driller	(Well Driller)
Type of test Pump □ Bailer □ Air lift X Depth to water at start of test 420 ft. At end of test 650 ft	NAME Doshier-Gregson, Inc. (Person firm or composition) (Typed or printed)
	(Person, firm, or corporation) (Typed or printed) Address
argegai/mm afternours water temperature	CityVallejoZip_94589
Was electric log made? Yes No X If yes, by whom? Was electric log made? Yes No X If yes, attach copy to this report	License No258826Date of this report7/14/88
ig meet to g to g a you, a more copy to and report	

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ORIGINAL			STATE C	OF CALIFO	RNIA	DWR_US	E ONLY -	Well 10
File with DWR			COMP	LETIC	N REPOR		DYMI	
Page of		I	-	struction P	^{amphlet} '3633			
Owner's Well No.	05/16/2008	Fadad 0			2022			
•	ncy <u>Napa Cou</u>		<u>J/20/2</u>					
Permit NoEC		Permit I	Date	03/21/2	2007	-	APN/TRS	OTHER
	GEOLOGIC.				(/ A (~) (A	WELL O	OWNER —	•
ORIENTATION (1)	XX_ VERTICAL HO	RIZONTALA		(SPECIFY)	Name			
DEPTH FROM	METHOD Rotary		JID AI	<u>r</u> ;	Mailing			
SURFACE		ESCRIPTION rial, grain size,	color at	117 0.				TE Z(P
Ft. to Ft.	Describe mater	riai, grain size,		5)~~~		WELL LO	CATION -	
0 25	Red Clay & 1	lad Ash	ລົເນັ	<u> </u>		Sage Canyon	KOAG	
			5 1	1	County Napa			
25 70	Brown Clay	& hard Gra	v Ròck	<u>~</u>	APN Book 032	<u>V</u> Page 030	Parcel 04	43-000
	((3107-1	$\langle 1 \rangle$		Township 10	Range	Section	
70 115	<u>Hard Cray V</u>	òlcañic, Rò	ck) j		Eat DEG. N	IN. SEC.	Long	EG. MIN. SEC.
<u> </u>	$\overline{(0)}$	$\frac{1}{1}$				CATION SKETCH		AGTIVITY (~) -
- <u>115</u> - <u>150</u> -	Brown Ash	$(\cdot, \cdot, \cdot, \cdot)$			P.A.	NORTH	· · /	NEW WELL
150 255	Hard Grav &			Deel	1000	Malley /	UJ f	MODIFICATION/REPAIR
<u>150 255 </u>	Haro Gray &	- feeu voi	Same -	NOCK	•		7/	Other (Specify)
255 290	Red Brown	& White A	sh		11 J.	ile I		DESTROY (Describe
		115					L	Procedures and Materials Under "GEOLOGIC LOG"
290 360	Hard Gray R	očk & Red	Volvan	ic_Ash	Sand L	NYON-Rd		USES (∠)
	- INVILL			ŧ				WATER SUPPLY
	Hard Gray Ro	ock				0	F	Irrigation Industrial
		· · ·				752 ·	EAST	
	Red Ash & G	ray Rock			4	5	•	TEST WELL
4051 5201	Hand Coase D				ب-تا			HEAT EXCHANGE
495 - 530 -	Hard Gray R	9 6 K			K			DIRECT PUSH
- 530 - 590 -	Red & Green	Volcanic	Rock		\			
					7	Bugli		SPARGING
<u>590 - 660 -</u>		Rock			Illustrate or Describe	Distance of Well from Rod	ds, Buildings,	
i i					Fences, Rivers, etc. an necessary. PLEASE B	d attach a map. Use addit E ACCURATE & COMI	ional paper if PLETE.	OTHER (SPECIFY)
<u>- 660 - 755 -</u>	Hard Black (& Green Ro	ck		WATEF	LEVEL & YIELD	OF COMPL	ETED WELL
					DEPTH TO FIRST W	атея <u>600</u> (Fl) в	ELOW SURFAC	E
			· · · ··=•		DEPTH OF STATIC	Ser		5-20-00
······································							E MEASURED _ TEST TYPE	5-28-08 1: 1:ET
TOTAL DEPTH OF B	ORING 755 (Fe	et)						(Ft.) GPM at day
	OMPLETED WELL 🗶					sentative of a well's lo		
	· · · · · · · · · · · · · · · · · · ·		ASINC (S)					ULAR MATERIAL
DEPTH FROM SURFACE	BORE- HOLE TYPE (∠)		ASING (S)	<u> </u>		DEPTH FROM SURFACE	Ann	TYPE
		MATERIAL /	INTERNAL DIAMETER	GAUGE OR WALL	SLOT SIZE		CE- BEN-	
Ft. to Fl.	DIA. (Inches) HANK NATURAL (Inches) HANK NATURAL HANK NAT	GRADE	(Inches)	THICKNES	S (Inches)	Ft. to Ft.	MENT TONITE	E FILL FILTER PACK (TYPE/SIZE)
0 53	12 1/	Plastic	6	F48	ø 👘 👘	19 53		, <u> </u>
					<u> </u>			
53 60 B	9 1	,n	n	4		53 755		Well Pack
								Gravel
600 755	4 V	p	2	4	.030			
		_		<u> </u>	CERTIFICA	TION STATEMENT	<u></u>	<u>II</u>
		I, the unde	rsigned, ce	artify that thi				nowledge and belief.
Geologic 1	-	II * т			Exploration		-	
Well Cons Geophysic	truction Diagram				(TYPED OR PRINTED)			
	Chemical Analyses		<u>110 St</u>	ate His	hway 128	Napa, CA 9	4558	
Other		ADDRESS	1 1	D 11		CITY	• • -	STATE ZIP
ATTACH ADDITIONAL IN	FORMATION, IF IT EXISTS.	Signed Signed	LICENSED MATE	ER WELL CONTR	ACTOR		- 30-2	808-508
		0-57	LIJENJED MAIL	-n mell CONTR	noron	UA	is aloneo	G-G7 LIGENSE NUMBER

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Well 11

P.1

Page Dwne Date V Local	1 1's Well N Nork Beg Permit Ag	th DWR of lumber <u>k</u> an <u>03/0</u>	Krupp Knief # 5/2015 anning, Build	2 Da	te Work E	Si Vell Co Rota No nded <u>3/25</u> nta!	tate of C mple to Instruct e0260	alifornia tion Rep lion Pamphlet					nly – D	Site Number
			Geol	ogic Log							W	ell Owner		
		on OVe	artical OH	orizontal	OAngl	e Spect	ty	Nama	Krupp Vi	nevard		on Owner	-	
		Air Drillin	9			Fluid Air			Address			rd		Contraction of the second s
	oth from i	Feet	De	De acribe materi	scription			City n			angen		te ca	Zip 94558
0	20	0	Soft volcanic	\$							We	I Locatio		<u></u>
200	25		Hard black re		1			Addres	s Soda	canvon		- Locallo		
250	30	0	Same rock b	ut fracture	d and 20	gpm)		City n		2 Sullivin		Co	unty 1	Napa
300	40		soft yellow a		1			Latitud		1.00		N Longit		14/
400	49	0	Hard fracture		reen and	brown ro	ck		Dea.	Min.				Dea. Min. Seu.
490 510	51		soft red volca					Ostum			al Lat.			cimal Long.
565	56		soft yellow vo						ook 032		ge <u>010</u>			cel <u>086</u>
000	108	0	Hard fracture	d black ro	CK	61- 2-		Towns	-		ge		Sec	lion
				-0					muti be dran	North	sfler form		ON	Activity New Well Modification/Repair O Deepen O Other
		- 1 - 1 - 1	. NIN					1-	tage	K			00	Destroy Describe procedures and materials ander GEOLOGIC LOG [*] Planned Uses
		ar	1832	013 Build	ing			Mest	-	1	Kn	inth Drup 15		Vater Supply Domestic □Public Infigation □Industriai
			MAR 200	ining. Certic	5				×	1		ũ		athodic Protection
		-	accular	1:31.50			_			1.				Dewatering
-			e Emilon.		-			-11		1	(Sunta		leat Exchange
			0-					-11		1	F	Je !		njection
										1	-	_	OR	fonitoring Temediation
							-			t	luntins	Dr		parging
										South	Ś	bock		est Well
_								Elustrate or e	enuriue distance	of well from	ronte, buikfir	rya, tencea,		apor Extraction
								particular and a second	o ettach a map cuinta and con	10 A 1 1 A 1 A 4		Print 44.4M	00	iner
	-										of Con	npleted W		
	-							Depth to Depth to	first wate	r <u>240</u>			_ (Fee	et below surface)
									evel 24	0	(Fe	et) Date I	Measu	red 03/26/2015
	Depth of		590			Feet		Estimat	d Yield *	150	(GF	M) Test T	ype _	AirLift
Tolal	Depth of	Complete	ed Well 560			Feet		Test Le	ngin 2.0		(Ho	urs) Total	Drawd	own 0 (Feet)
				0	lage		-	- May no	t pe repre	sentativ	9 01 8 WE	all's long ter		and a second
	th from	Boreho		and the state of t	Ings	Wall	Outelde	Scroon	Slot Size	Der	th from	Annula	r Mat	terial
	10 Faet	Diamet (Inches		Mate		(Inches)	Diameter (Inches)		HAny (Inches)	S	to Feet	Fill		Description
0	280	14	Blank	PVC Sch. 8			8			20	20	Bentonite Filter Pact		seal pea gravel
80	560	14	Staggered	PVC Sch. 8			8	Milled Slots	0.032		1000	1 100 1 001		POR MICHOI
	-										1		-	
			1								1			
	L	-						1						
-		Attach	menta						ertificat					
	Geologia	Log			I, the unit	dersigned,	certify th	at this report					of my l	knowledge and belief
	Well Cor	nstruction sical Log(Diagram			Person, Fir	m of Coror			-	-			
ā	SollWat	er Chemi	s) Ical Analyses		1115 0	nt george	ave		napa		_	<u>C</u> E		4558
	Other	or onem	ion rundiyses		Signed	2 3	dress	B		Cit	,	Stat 48	7027	Zip
		mation, if it a	1000 The 1000 CC					Well Contractor						