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Water Availability Analysis

Cuvaison Winery P16-00146
Planning Commission Hearing January 17, 2018

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WATER AVAILABILITY ANALYSIS

Revised September 27, 2016

Carneros Cuvaison Winery

1221 Duhig Road
Napa, CA
APN 047-120-005 & 006

INTRODUCTION & BACKGROUND INFORMATION

The purpose of this report is to supplement the Carneros Cuvaison Winery Land Use Permit modification application. The Carneros Cuvaison Winery located at 1221 Duhig Road in Napa, CA is proposing an increase in the number of employees and visitors. The winery is requesting an increase to 28 employees on an average day and 34 employees on a harvest day. They are also anticipating 75 visitors on an average day with an increase to 180 visitors on a peak day. Additionally requested are 38 marketing events annually (24 events of 60 guests and 14 events of 200 guests). RAM Engineering has prepared this Water Availability Analysis for the purpose of assessing the water availability for the proposed increase in use.

Cuvaison, Incorporated owns two contiguous parcels (047-120-005 & 047-120-006). The water for the winery is supplied by a primary well located on APN 047-120-006 which is then pumped to a 10,000 gallon storage tank on APN 047-120-005. The winery and tasting room are also located on APN 047-120-005. There are three wells total on parcel 006: the primary project well, the “back-up” project well, and the residential well. There are no neighboring wells located within 500 feet of the primary source well other than the “back-up well” on the same parcel and under same ownership. As a result, there are no non-project wells located within 500 feet of the source well and as a result, the Tier 2 well interference criterion is met. Additionally, there are no springs located within 1500 feet of the primary source well and as a result, the Tier 2 spring interference criterion is met.

The water supply system for the winery consists of a source well, a 10,000 gallon water storage tank, 60,000 gallon fire protection storage tank, and then distribution to the winery building, office/lab building, and tasting room building. There are two forms of voluntary treatment being provided, ultraviolet lights and reverse osmosis, which have been incorporated as a precautionary measure only. The residential water supply system for the easterly parcel, APN 047-120-006, consists of a well that solely serves the existing three-bedroom home. The property currently has 206 acres of planted vineyard, and 60 acres of fallow vineyard. All of the irrigation for the vineyard and landscaping on both parcels is provided by the four reservoirs on site. These existing storage reservoirs total 190 AF in diversion rights (of which 142 AF is obligated to the two project parcels, and 48 AF is obligated to neighboring parcels). The reservoirs are not fed by a groundwater source, they are fed by direct rainfall, surface runoff, drain tile water, Carneros Creek, and from recycled process wastewater generated by the winery.

A Phase I Study Water Availability Analysis was prepared by Summit Engineering, Inc. for Cuvaison Winery in February 2006. The 2006 WAA indicated that since both parcels reside in the valley floor region with a threshold groundwater extraction volume of 1.0 AF/Acre, the 206 acre winery parcel (047-120-005) has a total groundwater extraction threshold of 206 AF/Year and the second 183 acre parcel where the well is located (047-120-006) has a total groundwater extraction threshold of 183 AF/Year. The Conclusion of the 2006 WAA indicated that the total combined allowable water allotment for both parcels was 392 AF/year, and that the projected actual water use for both parcels was 288.76 AF/year.

The values stated in the 2006 WAA are utilized below as "Existing Use". However, for the purpose of this Analysis, an estimated recharge is utilized as opposed to the standard Valley Floor groundwater extraction value.

WATER QUALITY

The primary well that serves the winery was drilled in April, 2006. The well permit and well completion report are on file at Napa County. Additionally, raw water sample analytical results conformed to the most current NELAC standards and total coliform and fecal coliform were both absent from the sample.

ESTIMATED RECHARGE

David H. Peterson, CEG, CHG of Wagner & Bonsignore has conducted an estimate of Groundwater Recharge for this site. Peterson concludes that an average year rainfall would result in a recharge of 0.3 AF/Acre and a drought year would result in a recharge of 0.17 AF/Acre. See Attached Memorandum dated September 21, 2016.

PROJECTED & EXISTING ANNUAL WATER DEMAND (BOTH PARCELS)

Domestic Water Use (Residential and Winery):

AVERAGE WEEKDAY (NO EVENTS):

3 bedrooms x 120 gpd	=	360
28 full-time employees x 15 gpd	=	420
75 tasting visitors x 3 gpd	=	225
Total	=	1005 gpd

AVERAGE WEEKEND DAY (NO EVENTS):

3 bedrooms x 120 gpd	=	360
28 full-time employees x 15 gpd	=	420
180 tasting visitors x 3 gpd	=	540
Total	=	1320 gpd

AVERAGE DAY (W/ 60 PERSON EVENT):

3 bedrooms x 120 gpd	=	360
28 full-time employees x 15 gpd	=	420
75 tasting room visitors x 3 gpd	=	225
60 person event guests x 3 gpd	=	180
Total	=	1185 gpd

AVERAGE DAY (W/ 200 PERSON EVENT):

3 bedrooms x 120 gpd	=	360
28 full-time employees x 15 gpd	=	420
0 tasting room visitors x 3 gpd	=	0
200 person event guests x 3 gpd	=	600
Total	=	1380 gpd

HARVEST WEEKDAY (NO EVENTS):

3 bedrooms x 120 gpd	=	360
34 full-time employees x 15 gpd	=	510
75 tasting visitors x 3 gpd	=	225

Total	=	1095 gpd

HARVEST WEEKEND DAY (NO EVENTS):

3 bedrooms x 120 gpd	=	360
34 full-time employees x 15 gpd	=	510
180 tasting visitors x 3 gpd	=	540
Total	=	1410 gpd

HARVEST PEAK DAY (W/ 60 PERSON EVENT):

3 bedrooms x 120 gpd	=	360
34 full-time employees x 15 gpd	=	510
180 tasting room visitors x 3 gpd	=	540
60 person event guests x 3 gpd	=	180
Total	=	1590 gpd

HARVEST PEAK DAY (W/ 200 PERSON EVENT):

3 bedrooms x 120 gpd	=	360
34 full-time employees x 15 gpd	=	510
0 tasting room visitors x 3 gpd	=	0
200 person event guests x 3 gpd	=	600
Total	=	1470 gpd

	Projected Use	# Days Per Year	TOTAL (gallons)	TOTAL (acre-feet)
Ave. Week Day (no events)	1005 gpd	213	214,065	
Ave. Weekend Day (no events)	1320 gpd	61	80,520	
Ave. Day (60 person event)	1185 gpd	20	23,700	
Ave. Day (200 person event)	1380 gpd	11	15,180	
Harvest Week Day (no events)	1095 gpd	48	52,560	
Harvest Weekend (no events)	1410 gpd	5	7,050	
Harvest Day (60 person event)	1590 gpd	4	6,360	
Harvest Day (200 person event)	1470 gpd	3	4,410	
ANNUAL TOTALS		365	403,845	**1.24 AF**

Landscape Irrigation:

The total existing area for landscape irrigation around the winery buildings has been calculated at approximately 1,500 sf. Note that this area is actually irrigated by a combination of sprinklers and drip irrigation. However, sprinklers are utilized in the following calculation to be conservative.

1,500 sf landscape area	x	0.40 (rotary sprinklers) / 100 sf	=	6 gpm
6 gpm	x	15 minutes per day	=	90 gpd

90 gpd x 243 non-rain days = 21,870 gallons = **0.07 AF/year**

Vineyard Irrigation:

The onsite storage reservoirs provide 142 AF of diversion rights, none of which include groundwater extraction. Typical water usage associated with vineyard irrigation would be 0.5 AF/acre/year. As a result, the associated water use for irrigation of 266 acres of vines would be 266 acres x 0.5 AF/ year = **133 AF/year.** As you can see, the water available in the existing reservoir storage exceeds the irrigation demand of the vineyard, which further supports the fact that groundwater extraction is not needed for any of the vineyard irrigation during a normal rainfall year.

During an average rainfall year, 142 AF of water is diverted into the onsite reservoirs and 133 AF is depleted from the onsite reservoirs for vineyard irrigation. This would leave a surplus of 9 AF of water in any given year. During a drought year, it can be estimated that 60% of an average rainfall year would divert (0.6 x 142 AF) 85.3 AF of water into the reservoirs. With the previous year's 9 AF of surplus, that would leave 94.2 AF of water available for irrigation of the vineyards in a drought year. This would result in (133 AF – 94.2 AF) **38.8 AF/year** of groundwater extraction needed to irrigate the vineyards in a drought year.

Process Water (PW) Use:

Gallons of wine produced onsite = 340,000 gal

Generation rate = 5.0 gal PW/gal wine

(This is based on well meter readings indicating a total water use for the winery (domestic, process wastewater, and landscaping) of 5.8 AF from 7/8/14 through 7/8/15.

Annual Volume = 340,000 gal wine x 5.0 gal PW/gal wine = 1,700,000 gal PW = **5.2 AF/year**

Total Projected Ground Water Use (Non-drought year):

1.24 AF Domestic + 0.07 AF Landscape + 0 AF Vineyard + 5.2 AF Winery PW = **6.51 AF**

Total Projected Overall Water Use (Drought year):

1.24 AF Domestic + 0.07 AF Landscape + 38.8 AF Vineyard + 5.2 AF Winery PW = **45.31 AF**

APN's (both parcels)	Parcel Size (A)	Recharge Factor Non-Drought Year (B)	Allowable Water Allotment (A) X (B)
047-120-005 & 006	**392 acres**	**0.3**	**117.6 AF**

EXISTING USE*:		**PROPOSED USE (***From Calculations above***):**	
Domestic *(Residential & Winery)*	2.45 af/yr	Domestic *(Residential & Winery)*	1.24 af/yr
Landscape Irrigation	incl. above af/yr	Landscape Irrigation	0.07 af/yr
Vineyard Irrigation	139.5 af/yr	Vineyard Irrigation**	0 af/yr
Winery Process Wastewater	6.25 af/yr	Winery Process Wastewater	5.2 af/yr
TOTAL:	148.2 af/yr	**TOTAL:**	6.51 af/yr

APN's (both parcels)	Parcel Size (A)	Recharge Factor Drought Year (B)	Allowable Water Allotment (A) X (B)
047-120-005 & 006	**392 acres**	**0.17**	**66.4 AF**

EXISTING USE*:		**PROPOSED USE (***From Calculations above***):**	
Domestic *(Residential & Winery)*	2.45 af/yr	Domestic *(Residential & Winery)*	1.24 af/yr
Landscape Irrigation	incl. above af/yr	Landscape Irrigation	0.07 af/yr
Vineyard Irrigation	139.5 af/yr	Vineyard Irrigation**	38.8 af/yr
Winery Process Wastewater	6.25 af/yr	Winery Process Wastewater	5.2 af/yr
TOTAL:	148.2 af/yr	**TOTAL:**	45.31 af/yr

Is the proposed use less than the existing usage ☒ Yes ☐ No ☐ Equal

**The Existing Use information is from WAA by Summit Engineering, Inc., Water Demand Analysis, Table 1, dated November 9, 2005. See attached.*

CONCLUSION

This Water Availability Analysis has shown that the projected water use is less than the existing water use for the intended change in employees, visitors, and events. Furthermore, this analysis has shown that the proposed use is also less that the Allowable Water Allotment both during an average rainfall and a drought year. Based on the findings of this report, it is clear that the proposed expansion of visitors, employees, and events will not affect or deplete the groundwater supplies, nor interfere with groundwater recharge.

Signature: Tamara Martin, REHS **Date: 9-27-16** **Phone: 707-824-0266**

Wagner&Bonsignore
Consulting Civil Engineers, A Corporation

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MEMORANDUM

To: Tammy Martin, REHS, RAM Engineering

From: David H. Peterson, CEG 1186, CHG 86

Date: September 21, 2016

Re: **Estimate of Groundwater Recharge**
Carneros Cuvaison Winery Property, 1221 Duhig Road, Napa

This memorandum provides our estimate of annual groundwater recharge at the 392-acre Carneros Cuvaison Winery property, (Napa APN 047-120-005 & 006) located at 1221 Duhig Road in Napa, California. We understand the Cauvaison Winery is applying for a Land Use Permit modification and the groundwater recharge estimate is needed for preparation of a Water Availability Analysis.

Hydrogeologic Setting

Published geologic mapping of the vicinity (Wagner and Gutierrez, 2010) indicate that the eastern margin of the property is underlain at the surface by volcanic units of the Tertiary-age Sonoma Volcanics, which are overlain throughout most of the western portions of the property by sedimentary strata of the Huichica formation.

Regionally, the Sonoma Volcanics consist of andesite, basalt, and rhyolite lava flows, tuffs, and interbedded sedimentary strata, deposited over an area approximately 30 by 40 miles (Ford, 1975). Published descriptions of the Sonoma Volcanics indicate that it has great variability in lithology and water-bearing properties, with wells close to one another having markedly different yields and pumping drawdowns (Ferrar and others, 2006).

The Huichica formation overlies the Sonoma Volcanics throughout most of the property and is described as consisting of massive yellow silt and yellow and blue clay with interbedded lenses of sand, gravel, and tuff (Ferrar and others, 2006). The material in the formation was derived mainly from erosion of the Sonoma Volcanics and was deposited as alluvial fans by small streams and in small lakes and lagoons. The formation has been estimated to reach a thickness of over 1,000 feet, with the bottom 200 feet containing coarse materials such as cobbles and boulders (Kunkel and Upson, 1960).

Driller's logs for wells completed in the site vicinity within the Huichica formation, are presented in a study by Kunkel and Upson (1960). The logs indicate that blue and yellow clays predominate the formation, with up to about 20 percent of the formation locally consisting of gravel, sand, or mixtures described as "boulders and clay," "clay and gravel," or "clay with sand." Groundwater in the Huichica formation is reported to be unconfined (Kunkel and Upson, 1960).

Groundwater Recharge Estimates

Estimates from Published Sources

The source for water recharging the Huichica formation is thought to be from precipitation falling on the outcrop area, as well as infiltration from streams crossing the formation (Kunkel and Upson, 1960). Published data for Mediterranean-type climates (receiving almost no precipitation for half the year) indicates that ground-water recharge is on the order of 10 to 20 percent of long-term precipitation (Bouwer, ASCE, 2003). Using data from the PRISM Climate Group (Oregon State University, 2012), the 30-year weighted average (1981-2010) for rainfall at the site is 26 inches. This would be equivalent to about 2.6 to 5.2 inches (0.2 to 0.4 feet) of the available precipitation, or about 78 to 157 acre-feet of recharge on the 392-acre property.

In their hydrologic budget for the Sonoma Creek watershed (which included the Carneros area west of the site), Ferrar and others (2006) used the water balance method to estimate that of the 30 inches of average precipitation (basin wide), 11.5 inches ran off to streams and about 15.8 inches was lost to evapotranspiration, with the remaining 2.7 inches, or 9 percent, occurring as recharge. Presumably, recharge rates in the level, alluvial valley floor areas would be higher, while recharge on steeper upland areas would be lower. If nine percent of the average rainfall were to recharge evenly throughout the property, this would amount to about 2.34 inches (0.2 feet) of recharge, or about 78 acre feet on the property.

Just northwest of the subject property, a similar recharge evaluation was performed by Luhdorff & Scalmanini Consulting Engineers (2015), for the Hudson Vineyards parcel (APN-070-016, at 5398 Sonoma Highway. At this property, the consultant relied in part on previous work performed for the Napa River Watershed, as well as comparison to the Redwood Creek watershed, where vegative cover was similar. The site is also underlain by Huichica formation, and the consultant concluded that recharge of 10 percent of average precipitation was appropriate (also obtained from PRISM Climage Group)

Estimates from Well Hydrographs

The approximate recharge to the aquifer was also estimated using the water table fluctuation method described by the U.S. Geological Survey (http://water.usgs.gov/ogw/gwrp/methods/wtf/). In this method, the total water level change measured in a well hydrograph, from the seasonal low (usually in the fall) to the highest point (in spring) is multiplied by the specific yield (that amount of water that would be expected to drain from an unconfined aquifer during pumping or natural discharge) to estimate the amount of water that refilled that aquifer during the period.

In a USGS groundwater study of the Napa and Sonoma Valleys, Kunkel and Upson (1960) estimated specific yield based on the soil/rock composition. Because the Huichica formation constitutes most of the outcrop area on the property, geologic units predominated by clay and gravel (alternating), clay, gravel, and sand were assigned a specific yield of 10 percent. In the Napa County Water Availability Analysis (WAA) Guidance Document, Adopted May 12, 2015 (Table F-2, p.32), specific yields are given for a variety of geologic materials, ranging up to 0.3 (i.e. 30 percent of the volume of the formation). Assuming a predominantly clayey strata, with interbedded sand and gravel, and using the County guidance document, a specific yield in the range of about10 percent was considered typical for the Huichica formation and in general agreement with the prior study by Kunkel and Upson (1960).

As discussed, the 30-year average seasonal precipitation for the area was obtained from the PRISM Climate Group, as shown on the attached Figure 1. The approximate average annual precipitation across the property was estimated at 26 inches. The well hydrographs reviewed on the Department of Water Resources Water Data Library were located south of the subject property, primarily along Ramal Road. In this area, average precipitation is lower, on the order of about 22 inches (PRISM Climate Group, 2012; Sonoma County Water Agency, 2005).

The locations of four wells, all drilled in the Huichica formation are shown on the attached map. In the four hydrographs reviewed, it was noted that seasonal water levels varied widely, both between wells and in different years. This may be due to variations in composition of the Huichica formation and surface soils in different locations, slope, depth to the water table, or other factors, such as local well pumping. In Well 4N/4W-5D02, water levels were noted to rise an average of about 3.3 feet. At a specific yield of 10% (0.10), this amounts to 0.33 feet of water recharged (i.e., acre-ft per acre), or about 16 percent of rainfall. In drought years, the amount was about 9%, or roughly half. In Wells 4N/4W-5B01 AND SV-Q18-01, the calculated recharge varied widely, from about 11 to 60 percent in non-drought years. In the same wells, recharge during drought periods ranged from about 8 to 23 percent of rainfall. At Well 4N/4W-5D02, monitored since May 2012 in the recent drought, water level rises ranged between 3.3 and 5.6 feet, for an average storage increase of 0.43 feet (acre-ft per acre). Based on this widely scattered hydrograph data, it appears that during average years, recharge is quite variable over the outcrop area of the Huichica formation and may be somewhat higher locally than the published regional estimates.

Discussion and Conclusions

Previous USGS studies have estimated that groundwater recharge in the vicinity during an average rainfall year is about 9 percent of precipitation. At the subject property, this would be about 0.2 feet of recharge annually (26 inches or 2.17 feet x 0.09). Recent County-wide and nearby studies by Luhdorff and Scalmanini Consulting Engineers (2013 and 2015) estimated about the same recharge of 10 percent of average rainfall. Our review of water level monitoring data from the DWR's Water Data Library indicates that recharge in the site vicinity is somewhat higher, although the variability between wells is quite high and a meaningful average is difficult to assess. If the lower-end of the estimate for each well is used, it appears that recharge in the vicinity of the four wells reviewed may range from about 11 to 17 percent (about 14 percent average) during average

years. Recharge during drought years was more consistent, at about 8 percent of the average rainfall.

For the site, with 26 inches of average rainfall, the hydrograph-derived average year recharge would amount to about 2.17 ft x 0.14 = 0.30 feet (or acre-feet/acre), with about 2.17 x 0.08 = 0.17 acre-ft/acre in a drought period. Over the 392 acre property, this amounts to recharge of about 118 acre-feet in a normal year, and about 67 acre-feet during drought periods.

We trust this memorandum provides the information you require. Please contact us if you have questions or require additional information.

References

Bouwer, H., 2003, Integrated Water Management for the 21st Century, Problems and Solutions in Perspectives in Civil Engineering, Commemorating the 150th Anniversary of the American Society of Civil Engineers: J.S. Russell, Ed., ASCE 150th Anniversary Paper, p. 79-88.

Ferrar, C.D., Metzger, L.F., Nishikawa, T., Koczot, K.M., and Reichard, E.G., 2006, Geohydrologic Characterization, Water Chemistry, and Ground-Water Flow Simulation Model of the Sonoma Valley Area, Sonoma County, California: U.S. Geological Survey Scientific Investigations Report 2006-5092, 181p., w/illustrations.

Kunkel, F. and Upson, J.E., 1960, Geology and Ground Water in Napa and Sonoma Valleys, Napa and Sonoma Counties, California: U.S. Geol. Survey Water-Supply Paper 1495, 252p., with illustrations.

Luhdorff and Scalmanini Consulting Engineers and MBK Consulting Engineers, 2013, Updated Hydrogeologic Conceptualization and Characterization of Conditions: Consultant's report to the County of Napa, January 2013, 181p, with figures.

Luhdorff and Scalmanini Consulting Engineers, 2015, Memorandum, Hudson Vineyards Tier 1 Water Availability Analysis, Estimated Average Annual Groundwater Recharge: Consultant's report to Hudsonia LLC, March 19, 2015, 11p.

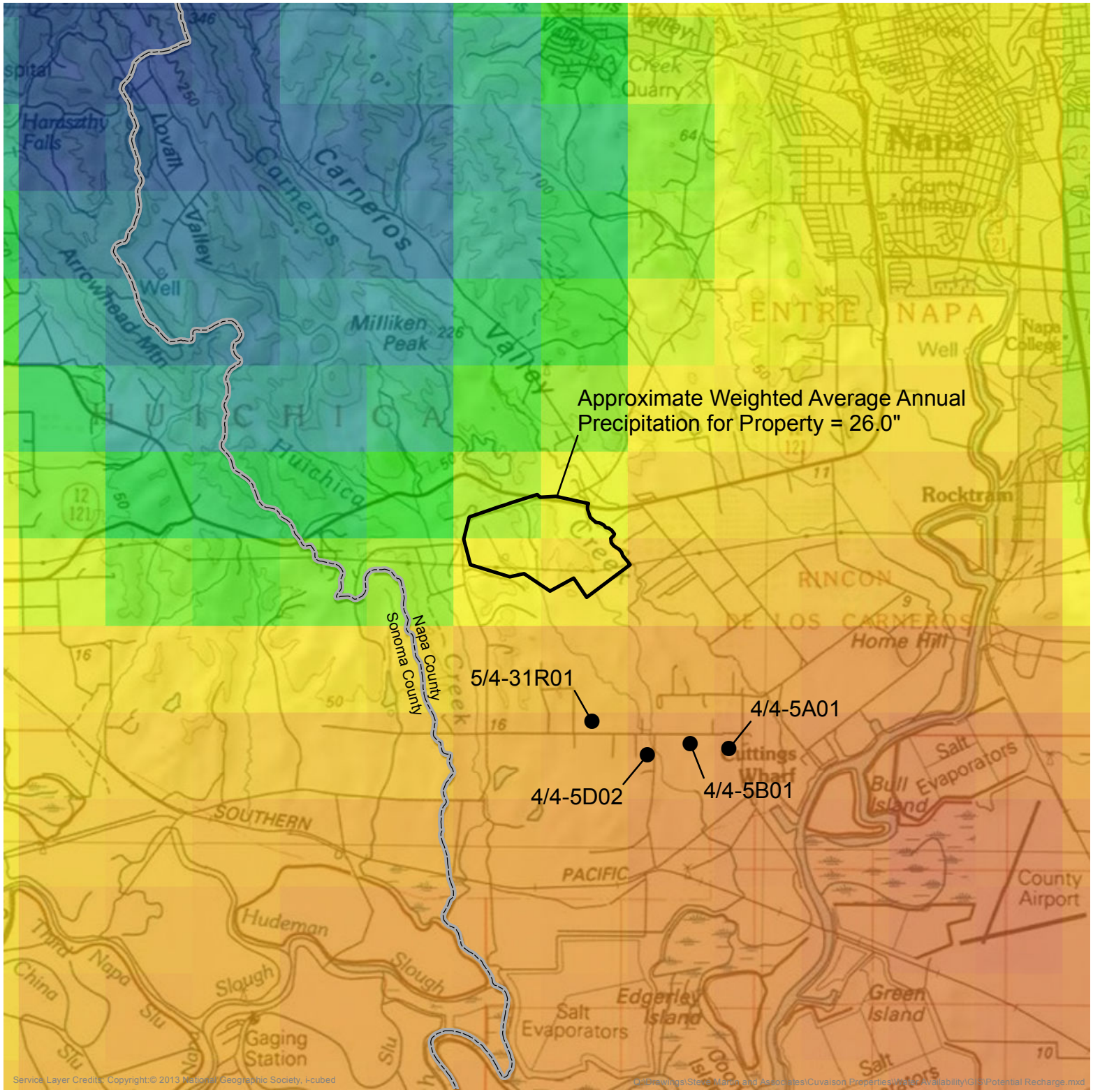
Wagner, D.L. and Gutierrez, C.I., 2010, Preliminary Geologic Map of the Napa 30' x 60' Quadrangle, California: California Geological Survey Preliminary Geologic Map Series, available at: http://www.conservation.ca.gov/cgs/rghm/rgm/preliminary_geologic _maps.htm

Table 1
Steve Martin & Associates - Cuvaison Winery
Weighted Mean Annual Precipitation

Location	Area (ac)	Mean Annual Precipitation[(1)] (in)	Volume (ac-in)
Cuvaison Winery			
	86.9	27.04	2,349.0
	90.8	25.90	2,350.7
	133.6	25.23	3,371.7
	80.2	26.23	2,103.8
	0.2	24.14	5.2
Total	**391.7**		**10,180.5**
Weighted Average		**26.0**	

Notes:

(1) *United States Average Annual Precipitation, 1981-2010 (800m; BIL)* , PRISM Climate Group at Oregon State University, July 10, 2012.



N

0 0.5 1

Miles

Well Location (from DWR) and State Well Number

Approximate Property Boundary

Average Annual Precipitation (in.)

High : 35

Low : 20

Source: *United States Average Annual Precipitation, 1981-2010 (800m; BIL)*, PRISM Climate Group at Oregon State University, July 10, 2012.

FIGURE 1

Steve Martin & Associates

Cuvaison Winery

Average Annual Precipitation and Well Location Map

Napa County, California

Wagner&Bonsignore

Consulting Civil Engineers, A Corporation

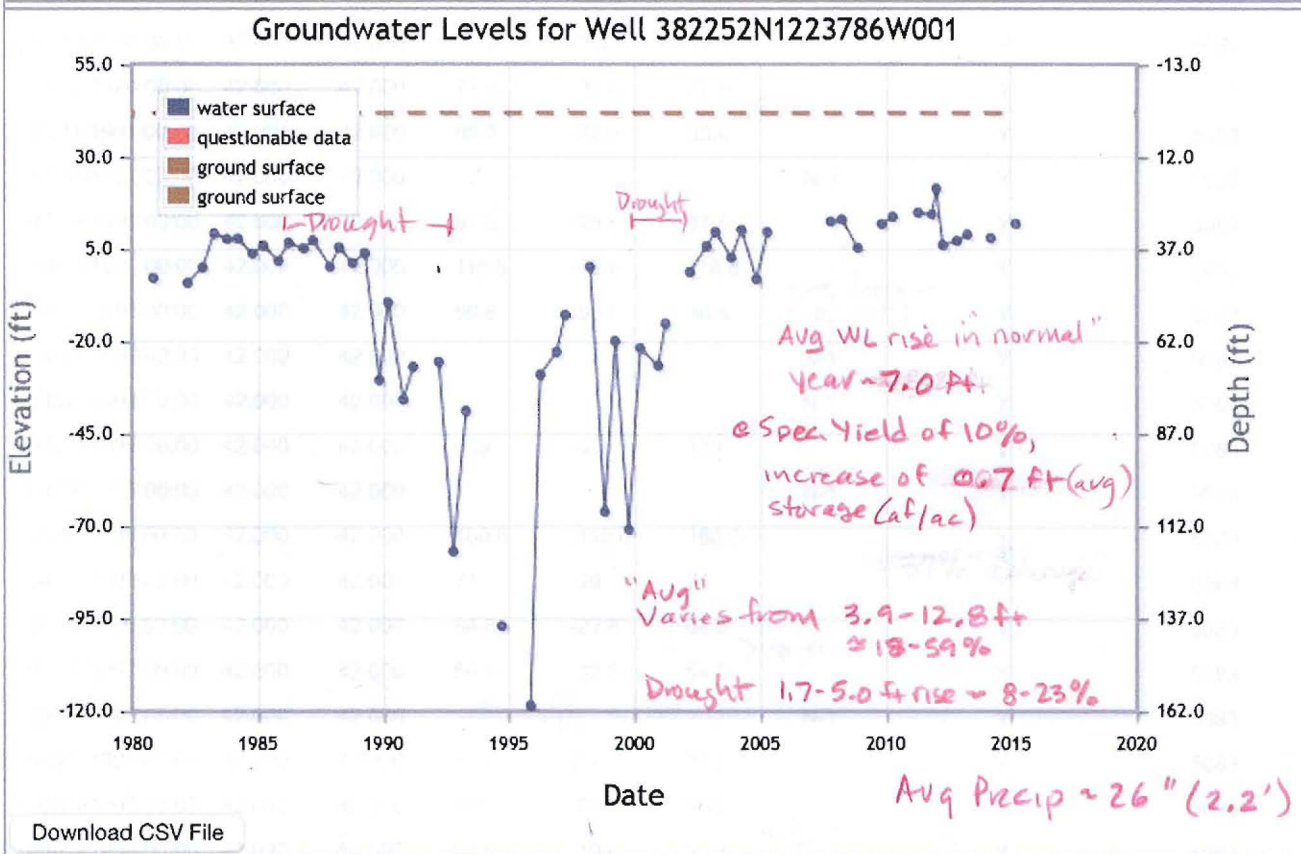
September 2016

SV-Q18-01

Groundwater Levels for Station 382252N1223786W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Station Data | **Recent Groundwater Level Data** | Historical Groundwater Level Data



Download CSV File

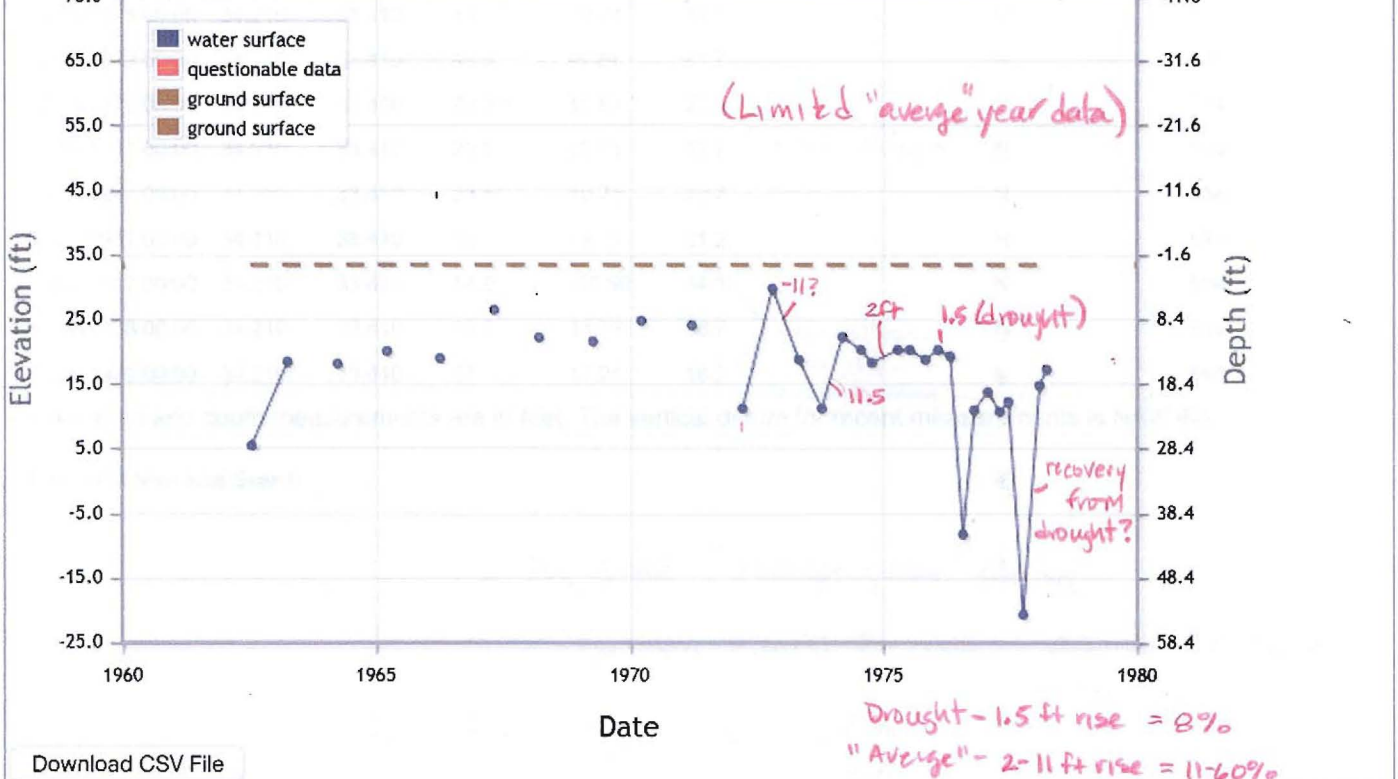
Date	RPE	GSE	RPWS	WSE	GS to ...	Msmt Code	CASGEM Msmt	Agency
10/30/1980 00:00	42.000	42.000	44.8	-2.8	44.8		Y	5083
04/13/1981 00:00	42.000	42.000				N-1	Y	5083
06/11/1981 00:00	42.000	42.000				N-1	Y	5083
10/16/1981 00:00	42.000	42.000				N-1	Y	5083
03/10/1982 00:00	42.000	42.000	46.1	-4.1	46.1		Y	5083
10/20/1982 00:00	42.000	42.000	41.9	0.1	41.9		Y	5083
04/04/1983 00:00	42.000	42.000	32.6	9.4	32.6		Y	5083
10/11/1983 00:00	42.000	42.000	34.2	7.8	34.2		Y	5083

Groundwater Levels for Station 382293N1223260W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

4N/4W-5B61

Station Data | **Recent Groundwater Level Data** | Historical Groundwater Level Data



Drought - 1.5 ft rise = 8%
"Average" - 2-11 ft rise = 11-60%

Download CSV File

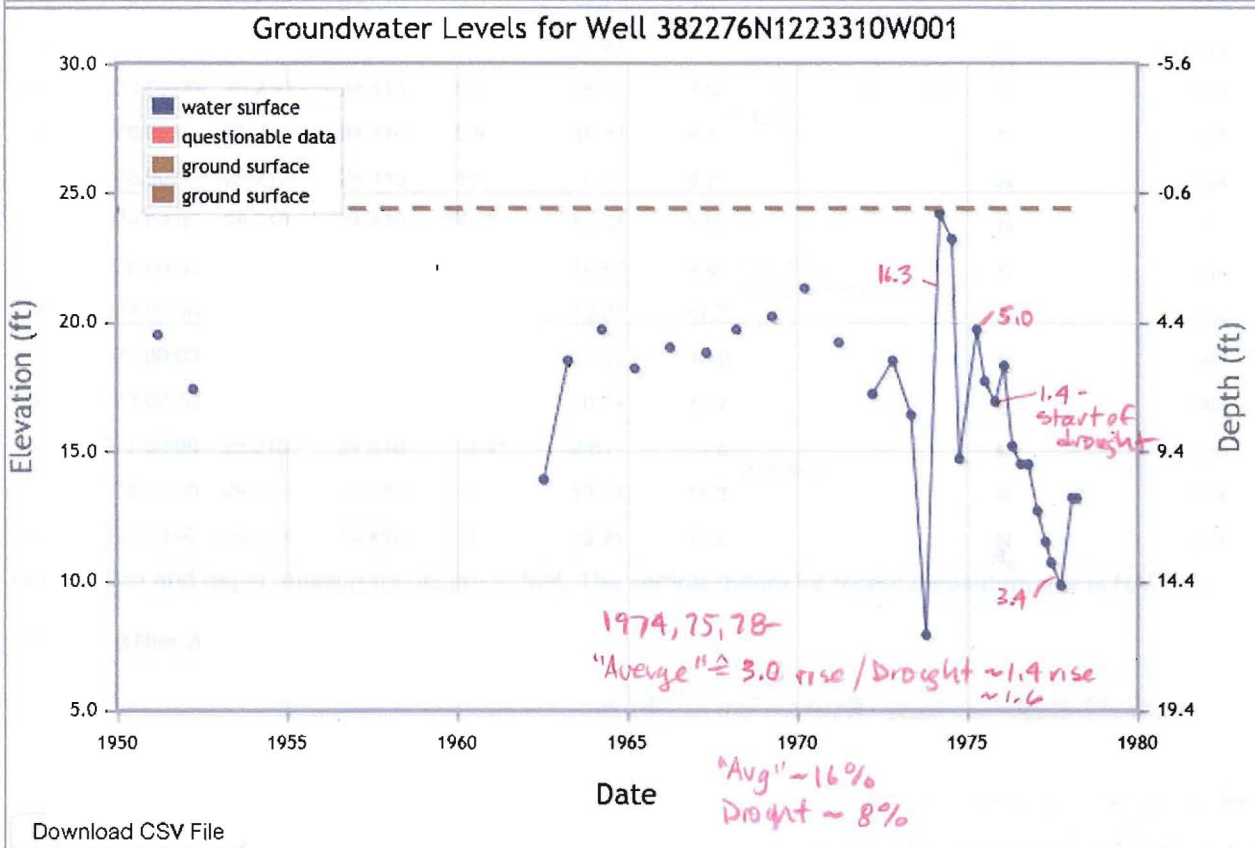
Date	RPE	GSE	RPWS	WSE	GS to ...	Msmt Code	CASGEM Msmt	Agency
07/18/1962 00:00	34.210	33.410	28.7	5.51	27.9		N	1
04/03/1963 00:00	34.210	33.410	15.8	18.41	15		N	284
03/31/1964 00:00	34.210	33.410	16.1	18.11	15.3		N	284
03/22/1965 00:00	34.210	33.410	14.2	20.01	13.4		N	284
04/06/1966 00:00	34.210	33.410	15.3	18.91	14.5		N	284
05/01/1967 00:00	34.210	33.410	7.8	26.41	7		N	284
03/18/1968 00:00	34.210	33.410	12.1	22.11	11.3		N	284
04/09/1969 00:00	34.210	33.410	12.7	21.51	11.9		N	284

4N/4W -5D02

Groundwater Levels for Station 382276N1223310W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Station Data | **Recent Groundwater Level Data** | Historical Groundwater Level Data



Download CSV File

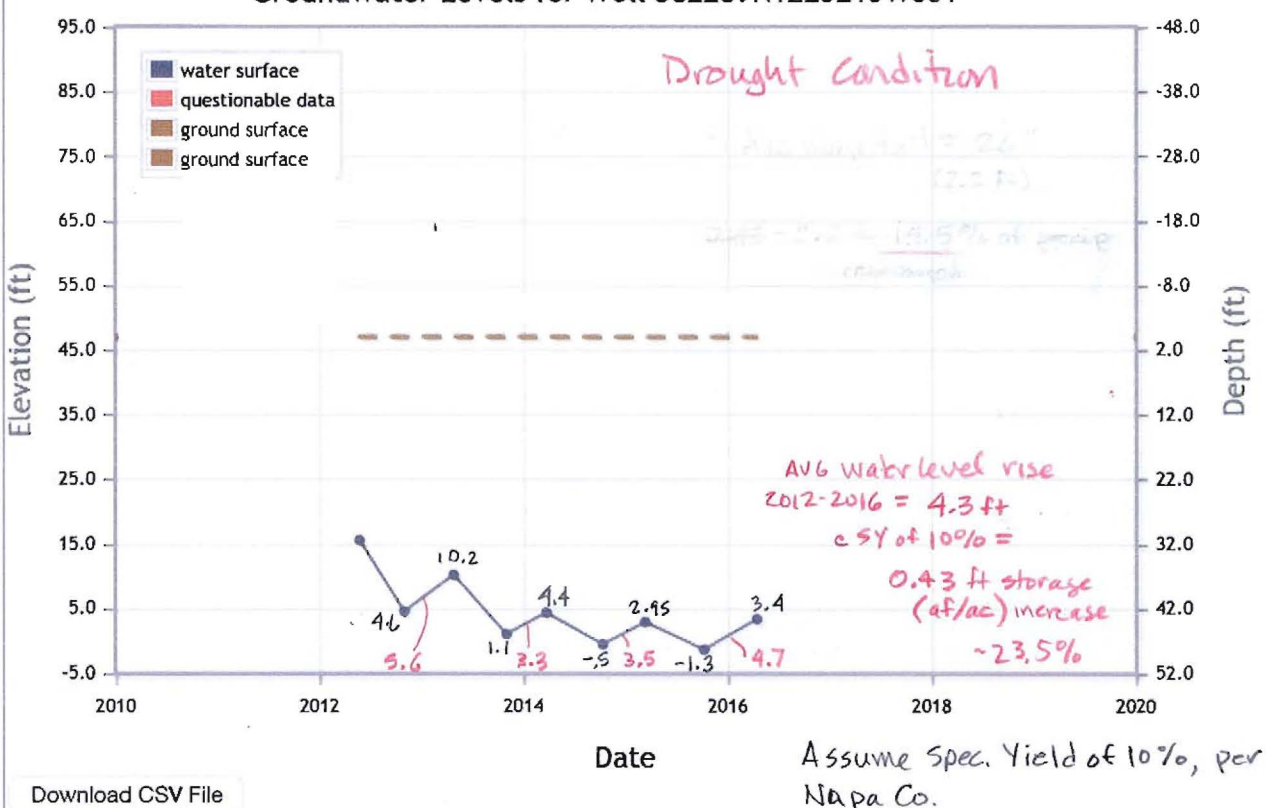
Date	RPE	GSE	RPWS	WSE	GS to ...	Msmt Code	CASGEM Msmt	Agency
03/13/1951 00:00	25.210	24.410	5.7	19.51	4.9		N	5167
03/28/1952 00:00	25.210	24.410	7.8	17.41	7		N	5167
07/19/1962 00:00	25.210	24.410	11.3	13.91	10.5		N	1
04/03/1963 00:00	25.210	24.410	6.7	18.51	5.9		N	284
03/31/1964 00:00	25.210	24.410	5.5	19.71	4.7		N	284
03/22/1965 00:00	25.210	24.410	7	18.21	6.2		N	284
04/06/1966 00:00	25.210	24.410	6.2	19.01	5.4		N	284
05/01/1967 00:00	25.210	24.410	6.4	18.81	5.6		N	284

Groundwater Levels for Station 382289N1223213W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Well 4N/4W-5A01

Station Data | **Recent Groundwater Level Data** | Historical Groundwater Level Data



Assume Spec. Yield of 10%, per Napa Co.

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Date	RPE	GSE	RPWS	WSE	GS to ...	Msmt Code	CASGEM Msmt	Agency
05/22/2012 10:20	47.650	47.000	32.05	15.6	31.4		Y	5104
10/29/2012 10:30	47.650	47.000	43.05	4.6	42.4		Y	5104
04/23/2013 12:30	47.650	47.000	37.42	10.23	36.77		Y	5104
10/29/2013 12:50	47.350	47.000	46.26	1.09	45.91		Y	5104
03/20/2014 10:30	47.350	47.000	42.95	4.4	42.6		Y	5104
10/07/2014 12:10	47.650	47.000	48.15	-0.5	47.5		Y	5104
03/09/2015 13:16	47.650	47.000	44.7	2.95	44.05		Y	5104
10/06/2015 16:23	47.650	47.000	48.95	-1.3	48.3		Y	5104