



023027.00

April 27, 2023

Mr. Kai Ferrara 3594 Buttermilk Lane Arcata, CA 95521

SUBJECT: WATER-SUSTAINABILITY EVALUATION FOR WELL ON PARCEL NO. 524-014-011, HUMBOLDT COUNTY, CALIFORNIA

## INTRODUCTION

This letter presents our evaluation of the sustainability of the water supply (groundwater well) for Parcel No. 524-014-011, Humboldt County, California. We understand that Humboldt County is requiring evaluation of whether the well is sustainable for its proposed use in a cannabis-growing operation.

Work consisted of review of previous site-specific studies conducted by Lawrence & Associates (L&A) for a previous owner of the parcel and report preparation (the site was known as the PG&E 36 Property). You provided information on the water usage and irrigation timing. Per your email of March 16, 2023, Humboldt County is requiring the following in relation to the well/water supply:

- a) Pumping schedule and monthly and annual usages.
- b) Site description including topography, existing and planned uses, existing and planned water supply sources.
- c) Description of the well, strata in which it is screened, depth of sanitary seal, if well seal is only the required 20 feet, describe the effects of shallow gravel/sand pack on ability of well to capture shallow water. If multiple intervals are screened, describe the anticipated impacts.
- d) Identification of any wells within 1,000 feet of the subject well, and if so, how will the use of the subject well affect the adjacent wells.
- e) Identification of any seeps, springs, or wetlands within 1,000 feet of the subject well.
- f) Effects on nearby water features from use of the well.
- g) A map showing the location of any existing wells within 1,000 feet of the project.
- h) A local geological map with a legend. A hydrogeological cross section map would also be helpful.
- i) Identification of groundwater recharge areas for both alluvial and confined aquifers, and a discussion of the sustainability of the well's productivity.
- j) Description of the lateral extent of identified aquitards/aquicludes.
- k) Evaluation of the extent of identified/interpreted aquitards or aquicludes using relationships presented in the hydrogeological cross section and supported by either mapped or boring log evidence.
- 1) References and data sources.

3590 Iron Court Shasta Lake, California 96019 (530) 275-4800 fax (530) 275-7970 www.lwrnc.com

## LAND AND WATER USE

The Site use is for a total 28,800 square foot, greenhouse Cannabis project. The plants are planted in native soil with added amendments, inside the greenhouses (K. Ferrara, email to B. Lampley, April 2023). The water is delivered by drip tape to the rows of plants, such that each plant has its own drip. The drip tape is installed beneath the mulch to reduce evaporative losses.

The water supply for the Project is an existing groundwater well previously identified as TW-3 for a previous investigation (L&A, March 2005, *Evaluation of Feasibility for Domestic Septic-Waste Disposal, Sierra Pacific Holding Company PG&E 36 Property*; L&A, March 2005, well drilling and testing program at PG&E 36 property, unpublished in-house data).

Unit Use: 300 gallons/hour per 1,000 sq. ft. **Average** Daily Month **Timing Daily Volume Monthly Volume** Area **Pumping** Rate hrs./day sq.ft. gallons gallons gpm 800 0.17 41 1,202 0.0 January 800 41 February 0.17 1,202 0.0 March 4,800 0.17 240 7,214 0.2 April 14,000 0.17 701 21,042 0.5 42,084 May 28,000 0.17 1,403 1.0 0.25 63,000 1.5 June 28,000 2,100 July 28,000 0.30 2,520 75,600 1.8 August 28,000 0.30 2,520 75,600 1.8 75,600 September 28,000 0.30 2,520 1.8 October 701 0.5 14,000 0.17 21,042 November 7,000 0.17 351 10,521 0.2 December 3,500 0.17 175 5,261 0.1 399,369 gallons ANNUAL USE: 0.8 gpm or 1.2 acre-feet

Table 1. Proposed Irrigation Schedule & Water Use

# SITE DESCRIPTION

The site is located in the North Fork of the Trinity River drainage. The river valley is generally oriented with a northwest trend. The drainage is marked by steep slopes with occasional flatter areas caused by hanging or abandoned stream meanders and stream terrace deposits. At the Site, on old river meander creates a relatively flat (slopes less than 10%) bench onto which slightly steeper debris flows have been deposited (10% to 30%) from two secondary drainages. The areal extent of the debris flows narrows and steepens up slope to the east. Above the debris flow

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deposits, the grades are steeper than 30% and side slopes range from vertical to 3-to-1 (horizontal to vertical).

## PROJECT WELL

Several wells and test borings were installed at the Site as part of the previously mentioned project (*ibid*.). Attachment A contains the Department of Water Resources (DWR) driller's logs for the wells and Figure 4 shows the locations.

All wells were completed with a 20-foot surface seal. As described in the following section (Hydrogeological Setting), the productive aquifer occurs within sand and gravel deposits atop bedrock at various depths depending on surface elevation.

Well yields range from less than 1 gallon per minute (gpm) to over 10 gpm. Wells TW-3 and TW-6 showed a long-term yield of 14 and 4 gpm, respectively (**Attachment B**). This is in excess of the highest average daily Project pumping rate of approximately 2 gpm. Both of these wells have sufficient yield for Project supply.

## HYDROGEOLOGICAL SETTING

The subject parcel is located in the Klamath Mountains Geologic province of northwestern California. The basement rock at the site consists the Jurassic age (208 to 146 million years old), Galice Formation (**Figure 2**). In the vicinity of the subject property, the Galice Formation consists of metamorphosed marine sandstone, ranging from massive to highly fractured. The Galice Formation has been incised by the south Fork of the Trinity River, leaving hanging meanders approximately 100 to 220 feet above the current channel. Within the meander are point-bar river terrace deposits of sand and gravel of Quaternary Age (less than 2 million years old).

Figure 3 shows a local geologic map based on field reconnaissance conducted in 2005 by L&A. West of South Fork Road is an exposed fin of sandstone protruding into the river deposits; the sandstone outcrop has been smoothed by river flows and subsequently weathered. Overlying the river deposits are debris flows of two different ages, both derived from the mountains to the east of the river. The older deposits have a developed soil including a 2-foot-deep soil horizon. A paleosol was observed in two test pits indicating episodic deposition between long periods of no deposition. The soil development suggests that portions of the older debris flows may have predated or been contemporaneous with the deposition of the river deposits. The younger debris-flow deposits overly both the older debris-flow deposits and stream deposits. The younger debris flow-deposits have no soil development indicating that they are of recent origin.

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The debris fans consist of coarse material and are generally very permeable. The underlying fractured sandstone will vary from virtually impermeable to moderately permeable depending on the degree of fracturing.

**Attachment A** contains the Department of Water Resources (DWR) driller's logs for the wells installed at the Site for a previous project; **Figure 4** shows the locations. The hydrogeologic setting for the Site is based on the results from these six wells which were installed in 2005 to investigate groundwater occurrence and evaluate well yields.

The wells showed that groundwater, where present, occurs at the base of the debris-flow deposits, immediately above the bedrock surface. Groundwater also may occur within the bedrock fractures, but the productive aquifer zone ranges in thickness from zero to approximately 15 feet. Depth to first water ranged from 12 to 95 feet; the depth depended on the elevation of the well location (wells farther uphill had deeper depths to water). Two dry holes (TB-1 and TB-2) were observed at the Site, downhill of and between the river and the more productive wells. The aquifer from which the Site wells, including TW-3 (the Project well) is not hydraulically connected to the river.

One spring was noted at the Site in 2005, near TW-1 (Figure 4). The spring likely occurs where the ground surface is lower in elevation and exposes the aquifer atop the bedrock.

Recharge to the aquifer is from infiltration of precipitation and stream flow. The recharge areas likely are represented by the drainage areas upstream of well locations, to the top of Hennessy Ridge. For example, the likely recharge area for well TW-3 (Project well) covers 385 acres (**Figure 1**). **Table 1** shows the calculation for estimating recharge to the aquifer from this area.

The estimated average annual recharge is 352 acre-feet/year. The estimated annual Project water use is 1.2 acre-feet/year. Thus, there is sufficient average recharge to sustain the Project use. In dry years, there may be no recharge and in wet years there may be more recharge. Because the aquifer is capable of storing water year to year, however, the Project well likely would be able to supply water even in dry years.

Table 1. Recharge Estimation

National Control of the Control of t								
Average Annual Precip	itation <sup>A</sup>		39.2	inches				
Runoff, assume 50%			19.6	inches				
Wet Season Evapotrar	spiration <sup>B</sup>		9.0	inches				
Net Precipitation for R	echarge		11	inches				
Average Recharge (net	precip. × 38	5 acres)	352	acre- feet/year				
Monthly Evap	otranspiration							
Month	Daily	Monthly						
	(inches)	(inches)						
Jan	0.04	1.20						
Feb	0.07	1.96						
Mar	0.10	3.10						
Apr	0.16	4.80						
May	0.21	6.51						
Jun	0.26	7.80						
Jul	0.29	8.99						
Aug	0.25	7.75						
Sep	0.19	5.70						
Oct	0.12	3.72						
Nov	Nov 0.06 1.80							
Dec	Dec 0.03 <u>0.93</u>							
		54.26	inches/year					
		8.99	inches/wet se (Jan-Mar, Nov					

#### Notes:

- A. Data from Mud Springs station (MUD), Trinity Co., https://cdec.water.ca.gov/dynamicapp/QueryDaily?s=MUD&end=2023-04-27
- B. CA Dept. of Water Resources, 2000, A Guide to Estimating Irrigation Water Needs of Landscape Plantings in California; https://cimis.water.ca.gov/Content/PDF/wucols00.pdf

Please contact me at <u>blampley@lwrnc.com</u> if you have any questions regarding this report.

Sincerely,

Bonnie Lampley Principal Hydrogeologist

enc.: Attachment A. Site Well Logs

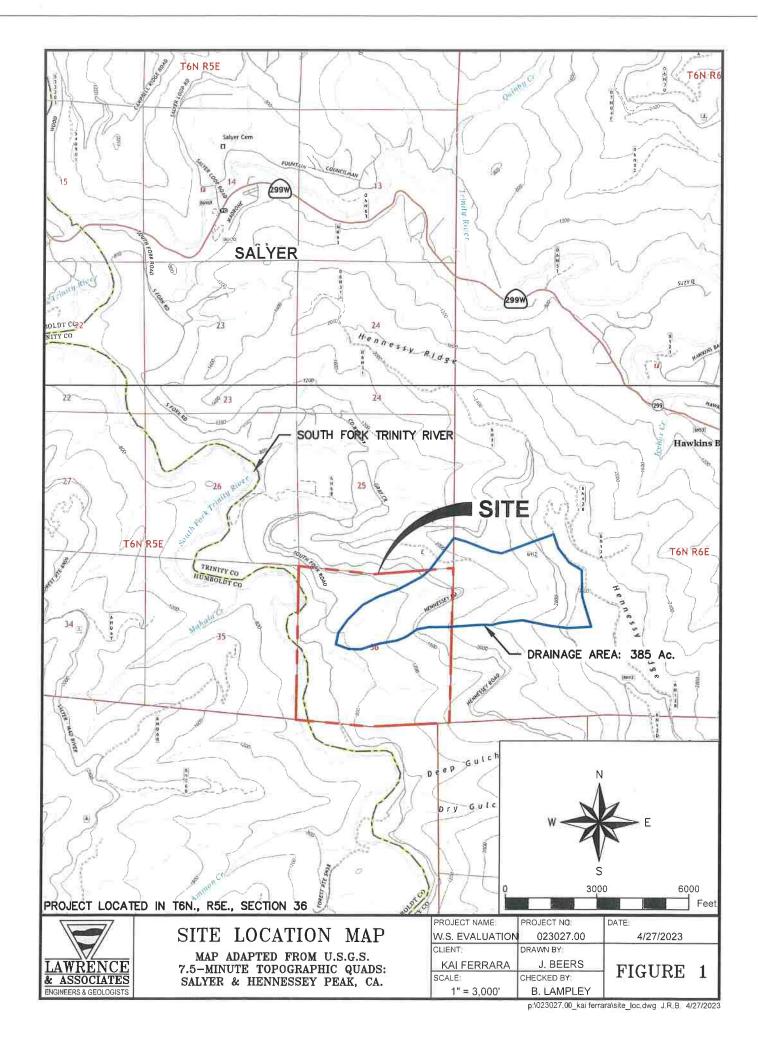
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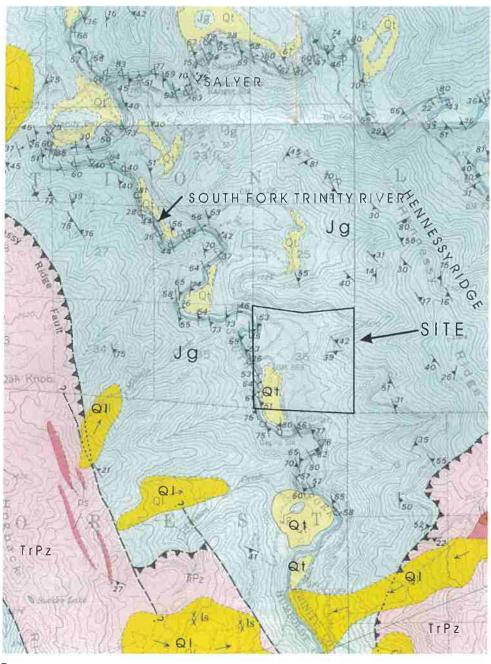
Attachment B. Site Well-Yield Testing

LAMPLEY

No. HG626

CERTIFIED HYDROGEOLOGIS





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LEGEND

QI: Quaternary landslide or slump

Qt: Quaternary terrace deposit

Jg: Jurassic Galice Formation (Sandstone)

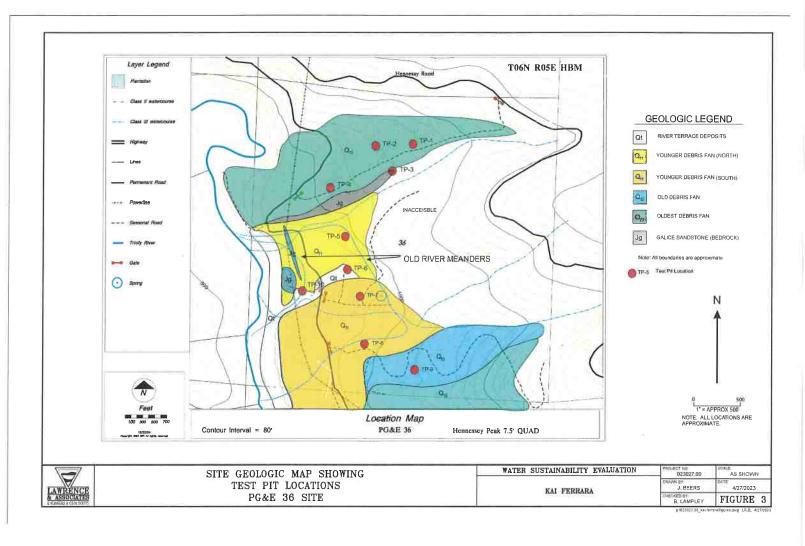
TrPz: Western Paleozoic and Triassic Belt (melange)

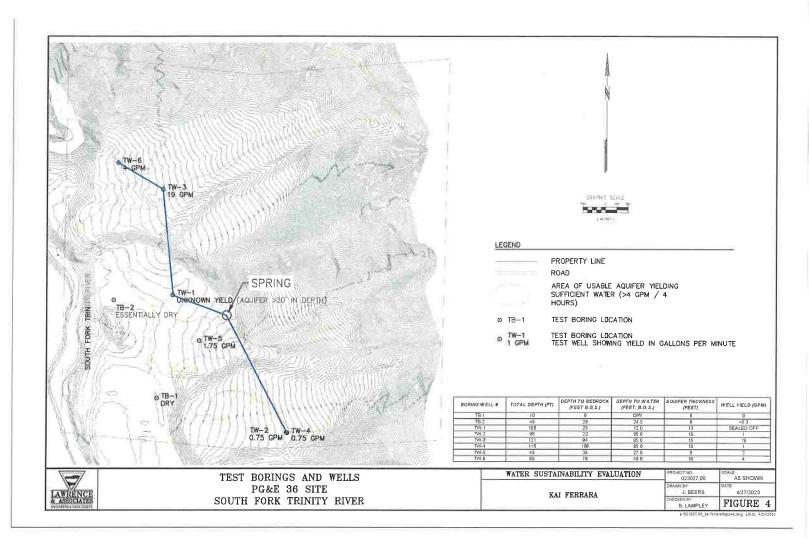
Adapted from: Yioung, J.C., 1978, Geologic Map and Sections of the Willow Creek 15' Quadrangle, Humbolt and Trinity Counties, California, California Division of Mines and Geology Map Sheet 31

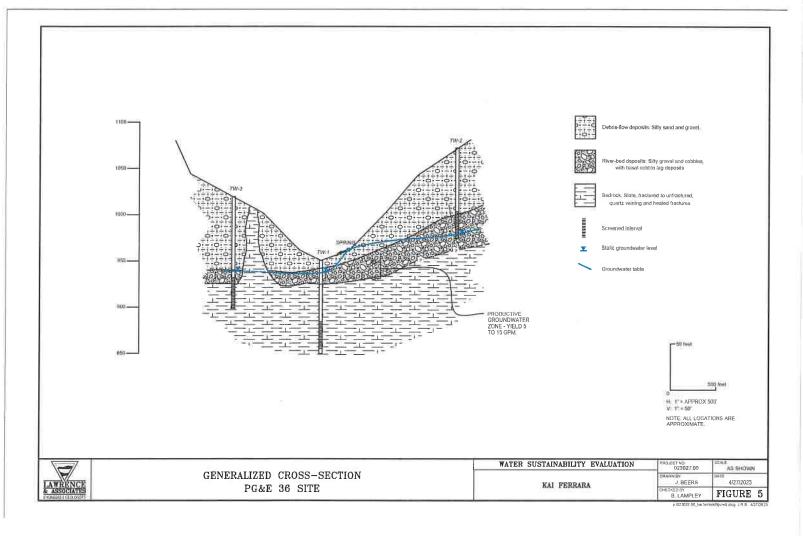


REGIONAL GEOLOGIC MAP

ī	PROJECT NAME:	PROJECT NO	DATE:
Ü	W.S. EVALUATION	023027.00	4/27/2023
	CLIENT:	DRAWN BY:	
m	KAI FERRARA	J. BEERS	FIGURE 2
	SCALE:	CHECKED BY	FIGURE 2
	1" = ~1 MILE	B. LAMPLEY	







**ATTACHMENT A**SITE WELL LOGS

# TRIPLICATE Owner's Copy

#### STATE OF CALIFORNIA

# WELL COMPLETION REPORT

Refer to Instruction Pamphlet

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WELL OWNER - GEOLOGIC LOG Namo Sterra Pacific Holding Co X VERTICAL DRILLING METHOD a 1 ORIENTATION (上) \_\_\_ HORIZONTAL \_ Mailing Address CYO Lawrence & Associates air rotary Fluid water DEPTH FROM SURFACE 3001 Market istorkm. 523 Rending Ch. Gain DESCRIPTION Address Approv Brus 105 St Describe material, grain size, color, etc. Silty sand w/oravel City on South Fork Boad 8 25 i Sandy gravel County Tribition 25 1001 Bedrock APN Book 19811 Page 080 Township 6 Range 5F Section \_ Lat 🗀 W Long DEG. MIN. MIN. SEC. LOCATION SKETCH ACTIVITY (∠) - NORTH Y NEW WELL MODIFICATION/REPAIR \_\_\_\_ Deepen \_\_ Other (Specify) ..... 12. N.C. DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG") all Dis USES (∠) WATER SUPPLY 11/1/11 \_\_\_ Domestic \_\_\_\_ Public See attached map Irrigation \_\_\_\_ Industrial MONITORING TEST WELL CATHODIC PROTECTION HEAT EXCHANGE DIRECT PUSH INJECTION VAPOR EXTRACTION SPARGING SOUTH REMEDIATION SOUTH

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE. OTHER (SPECIFY) WATER LEVEL & YIELD OF COMPLETED WELL DEPTH TO FIRST WATER 12 (Ft.) BELOW SURFACE DEPTH OF STATIC 由才在 WATER LEVEL\_\_\_ \_ (Ft.) & DATE MEASURED ESTIMATED YIELD \* DO GOX (GPM) & TEST TYPE\_ 100 TEST LENGTH \_\_\_\_\_ (Hrs.) TOTAL DRAWDOWN\_ TOTAL DEPTH OF BORING . (Feet) TOTAL DEPTH OF COMPLETED WELL \* May not be representative of a well's long-term yield. (Feet)

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Soil/Water Chemical Analyses	ADDRESS
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ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.	Signed

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(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

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 Signed C-57 LICENSED WATER WELL CONTRACTOR
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### STATE OF CALIFORNIA

# WELL COMPLETION REPORT

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Geologic Log	
Well Construction Diagram	
Geophysical Log(s)	
Soil/Water Chemical Analyses  X Other Sitte map	

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

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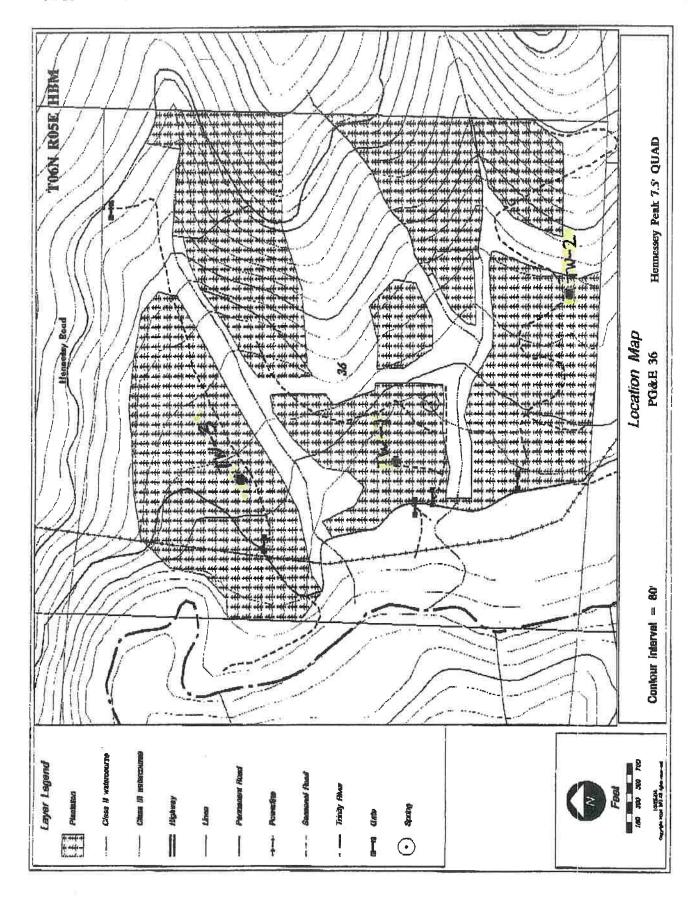
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P.O. Box 491925 2 Reading ADDRESS

Signed C-57 Licensed Water Well Contractor

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ATTACHMENTS (∠)

Well Construction Diagram Geophysical Log(s) Soll/Water Chemical Analyses

X Other Site man ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

Geologic Log

	•	
TRIPLICATE STATE OF CALIFORNIA	DWR USE ONLY	- DO NOT F
Owner's Copy WELL COMPLETION REPORT		
Page 1 of 1 Refer to Instruction Pamphlet	STATE WELL	NO./STATION NO
Owner's Well No No. 1092843		
Date Work Began 10-18-05, Ended 10-19-05	LATITUDE	LONGITU
Local Permit Agency Trinity County Environmental Health	APN/T	AS/OTHER
Permit No. WP 2005 - 059 Permit Date 9-13-05	WELL OWNER	

		— GEOLOGIC LOG	WELL OWNER -					
ORIENTAT	ION (×)		Name Sterra Pacific Holding Company Mailing Address CYOLAWrence & Associates					
DEPTH	FROM	METHOD <u>air rotary</u> Fluid <u>water</u>	2001 Market St., Rm. 523.	Redding, CA				
SURF		DESCRIPTION	OITY THE STATE OF	O (STATE ZIP				
Ft. to		Describe material, grain size, color, etc.	WELL LOCATION					
0 1	1.8	Gravelly silt. dry	Address approx. 5 dallos sout	h of Calyon				
18	26	Gravelly silt w/sand>damp	City or South Fork Road	Salver				
26	32	Silty gravel, moist to water	County Tristin	·				
. !		coarse Annie - Viene	APN Book (18) Page (120 Parcel 8					
32	35	Silty gravel fine gravels.	Township 106N Range 5E Section 3	6				
,		moist to wet -	Feb C 40 150 1978 N Long 197	1 24 1 100 W				
35	45	Bedrooks black shalls dru-	[1975] DEG. MIN. SEC. DE	G. MIN. SEC,				
<del></del>	1	Color Color Color	LOCATION SKETCH	ACTIVITY (\(\times\)				
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	· · · · · · · · · · · · · · · · · · ·			MODIFICATION/REPAIR Deepen				
· · · · · · · · · · · · · · · · · · ·			·	Other (Specify)				
+	1							
	· .1		_	— DESTROY (Describe Procedures and Materials				
<u> </u>	1 Li			Under "GEOLOGIC LOG")				
1	- <u>\ \ \ \</u>		·	USES (∠)				
		- 11161 B	See attached map	WATER SUPPLY Domestic Public				
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i	i		WEST	MONITORING				
	i		<b>&gt;</b>	TEST-WELL Y				
;				CATHODIC PROTECTION				
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		و المراجع المر	·	DIRECT PUSH				
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	<del></del>	· · · · · · · · · · · · · · · · · · ·		VAPOR EXTRACTION				
			SOUTH -	SPARGING				
<u> </u>	I		lllustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.	OTHER (SPECIFY)				
<u> </u>			necessary. PLEASE BE ACCURATE & COMPLETE.	01/12/1 (01/20/11/				
1	1		WATER LEVEL & YIELD OF COMPL	ETED WELL				
	<u> </u>		DEPTH TO FIRST WATER 27 (Ft.) BELOW SURFACE					
<u> </u>	i							
İ	<u>i</u>		DEPTH OF STATIC 27 (Ft.) & DATE MEASURED _	10-19-05				
i	i	1 1/		air Tift				
TOTAL DE	EPTH OF E		TEST LENGTH 2 (Hrs.) TOTAL DRAWDOWN 17 / 3	(Ft.)				
TOTAL DE	EPTH OF C	COMPLETED WELL(Feet)	* May not be representative of a well's long-term yield.					
	····		<u> </u>					

SARCOTOLO LAS AMERICANOS COLONOS COMENTOS CARROS CONTROLOS CONTROL

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ATTACHMENTS (∠)	1 the unde	reigned certify that		IFICATION 3	ccurate to the best of	my knowled	ne and helief
Geologic Log	i, ino dide					my knowied	igo and belief.
Well Construction Diagram	NAME	Diamond C			inc.		
Geophysical Log(s)	(PERS)	ON, FIRM, OR CORPORATION	) (TYPED OK PRINT	EU)			
Soil/Water Chemical Analyses		P.O. Box	491925-	4.24	Redding	ÇA	96049
Y Other Site wap	ADDRESS	Mary Mary	Com a file	Aldry have	CITY	STATE	ZIP
	Signed	The state of the	a letter to	,	11 -1	12-05	51240
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.	C-57	LICENSED WATER WELL CON	VTRACTOR,	5.31.2	DATE SIGNED		C-57 LICENSE NUMB

TRIPLICATE		STATE OF CA			E ONLY -	DO NOT FILL IN					
Owner's Copy	WELL (	COMPLE'. Refer to Instruct	FION REPO	RT L	TATE WELL NO	D./STATION NO.					
Page 1 of 1 Owner's Well No. This E			092844								
Date Work Began 10-20-05	, Ended!	<u> </u>	002011	LATITUDE	. 1	LONG)TUDE					
Local Permit Agency Trini	th County	Favirons	ental Mealt		APN/TRS/	OTHER					
Permit No. WP?NOS OSP		Date1	2.05	WELL	WNER -	4					
	HORIZONTAL /	ANGLE /SPEC	IFY) Name S	(1) A		ing Commany					
DRILLING METHOD 513.7	rotary FL		2 Annual Control of the Control of t								
DEPTH FROM SURFACE	DESCRIPTION		(2003 M2)	hot St R	<u>. 527,</u>	O STATE ZIP					
	uaterial, grain size, aval/cobbl		Address and	WELL LO	CATION—	th of Enlyan					
- Coakeo in		Thomas		South Fork		Salvar					
cobblas			County Trif								
	and motst			Page <u>030</u>							
	n diyarave	A damp	Township	Range <u>55</u>	Section  Long	36					
EG   SO   ClayCon We	wastal alles	used mond of G	DEG.	MIŃ. SEC.	Cong —, DE	G. MÎN, SEC.					
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i i	٠.					SPARGING					
	~		Illustrate or Describ	— SOUTH — e Distance of Well from Roa and attach a map, Use addit	ds, Buildings,	REMEDIATION OTHER (SPECIFY)					
		•	necessary. PLEASE	BE ACCURATE & COMP	LETE.						
				ER LEVEL & YIELD							
I I ·			· •	WATER A.O. (Ft.) BI	LOW SURFAC	E .					
			DEPTH OF STATIO	7 (Ft.) & DATE	MEASURED _	10-21-05					
l l				" <u>R</u> (GPM) &							
TOTAL DEPTH OF BORING 25 TOTAL DEPTH OF COMPLETED WELL	_(Feet) : (Feet)			(Hrs.) TOTAL DRAW		ـــــ (Ft.)					
TOTAL DEFIN OF COMPLETED WELL			Iviay not be rep	Tesentative by a wears to	g-terne yieut.						
DEPTH BORE-		ASING (S)		DEPTH FROM SURFACE	ANN	ULAR MATERIAL TYPE					
FROM SURFACE HOLE TYPE (	-) L MATERIAL/		NUGE SLOT SIZE	THORI GOTI AGE	CE- BEN-						
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ATTACHMENTS (≤)	·		CÉRTIFIC	ATION STATEMENT ete and accurate to the	hest of my b	nowledge and hellof					
Geologic Log	11	- '				nomouge and polici.					
Well Construction Diagram	NAME (PERS	UIAMONC ON, FIRM, OR CORPORA	TION) (TYPED OR PRINTED)	ing, Inc.		,					

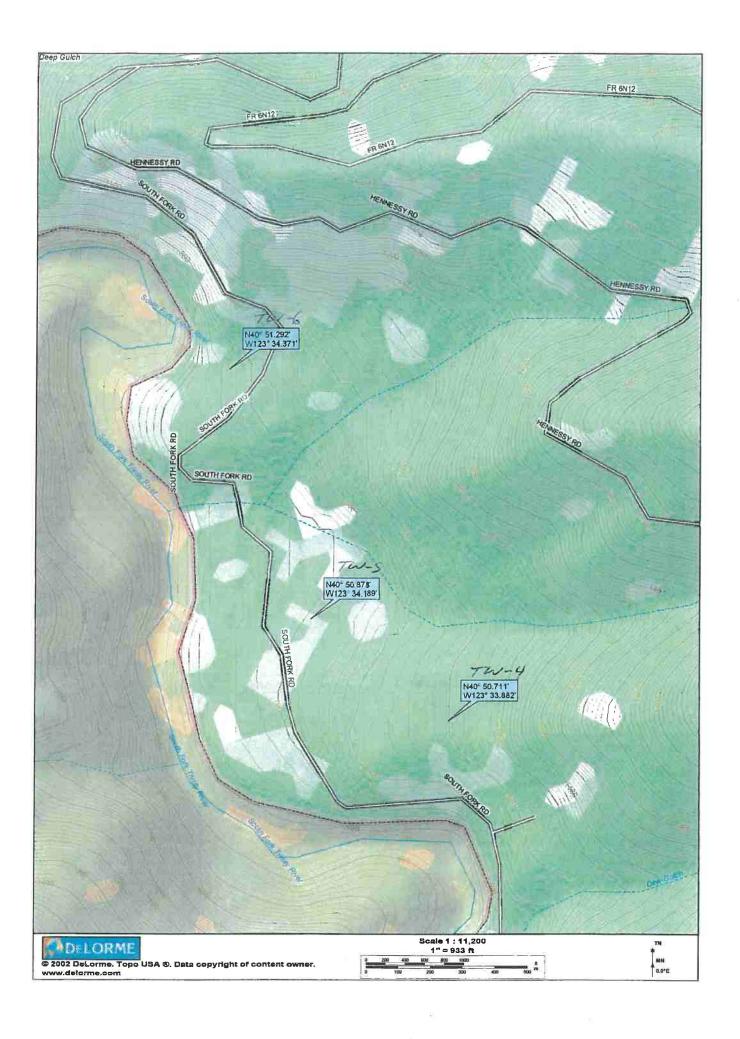
STATE

512406 C-57 LICENSE NUMBER

ADDRESS

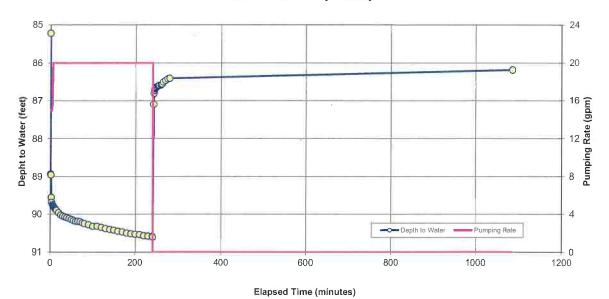
\_\_\_ Geophysical Log(s)
\_\_\_ Soll/Water Chemical Analyses
\_\_\_X Other \_\_\_ Site \_\_\_ mar\_0

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

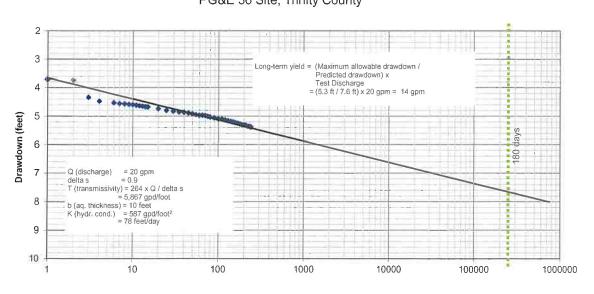


ATTACHMENT B
SITE WELL-YIELD TESTING

# Depth to Water & Pumping Rate, Test on TW-3, 08/22/05 PG&E 36 Site, Trinity County

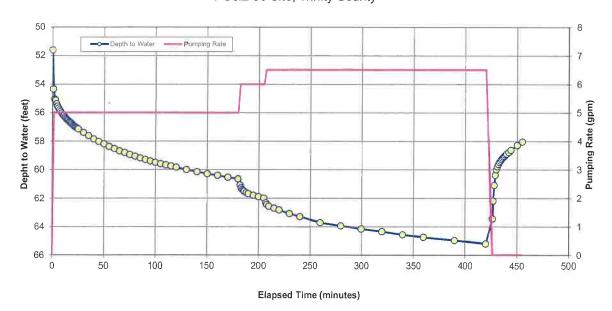


Drawdown vs. Elapsed Time, Test on TW-3, August 22 - 23, 2005 PG&E 36 Site, Trinity County

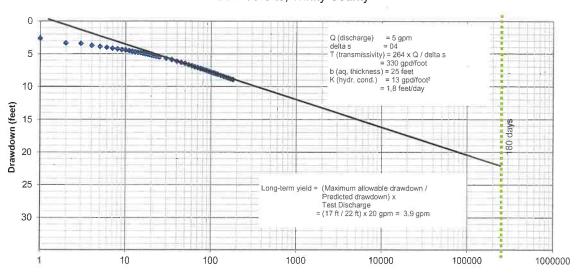


Elapsed Time (minutes)

# Depth to Water & Pumping Rate, Test on TW-6, 10/26/05 PG&E 36 Site, Trinity County



Drawdown vs. Elapsed Time, Test on TW-6, October 26, 2005 PG&E 36 Site, Trinity County



Elapsed Time (minutes)