APPENDIX F - GROUNDWATER RESOURCES

Monterey County Division of Environmental Health. Project Specific Hydrogeologic Report. Prepared by Todd Engineers. September 2002. Updated July 2003.

Monterey County division of Environmental Health. Written Correspondence to Paul Mugan, Associate Planner, Planning and Building Inspection Department from Laura Lawrence, R.E.H.S., EHS IV, Health Department. November 12, 2002.

California-American Water Company. Written Correspondence to Mr. Michael Cling, Attorney at Law from Terry Ryan. April 19, 2001.

Monterey County Health Department
Environmental Health Division
1270 Natividad Road
Salinas, California 93906

Project Specific Hydrogeologic Report

Harper Canyon Realty, LLC Subdivision

Updated July 2003

Prepared by:

Todd Engineers
Emeryville, California

Project Specific Hydrogeologic Report

Harper Canyon Realty, LLC Subdivision

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Prepared for:

Monterey County Health Department
Environmental Health Division
1270 Natividad Road
Salinas, California 93906

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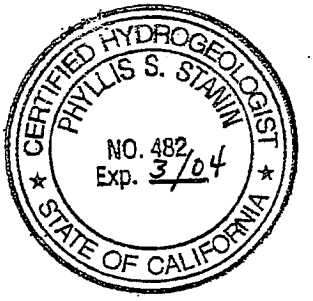

Phyllis D. Stanin

Phyllis Stanin
Principal Geologist

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Appendix

Executive Summary

The Monterey County Health Department, Division of Environmental Health is requiring a Project Specific Hydrogeologic Report for the proposed Harper Canyon Realty LLC (PLN 000696) development prior to deeming the application complete per authority of Title 19 of the Monterey County Code. This report summarizes Todd Engineers' review of available data and reports concerning the hydrogeologic conditions at the proposed site and vicinity. Todd Engineers examined the availability of sustainable long-term water supply for the project, conducted a local water balance, and identified potential effects the project may have on the quantity and quality of groundwater given the data available. The initial Project Specific Hydrogeologic Report was prepared in September 2002. This report updates that draft report with information from a new well.

The Harper Canyon Realty LLC subdivision (site) is approximately 12 miles southeast of Carmel. The 344 acre property will have seventeen homes with the combined lots comprising 164 acres on the northern portion of the property. The remaining property will be open space. Water supply for the development will include an existing well located outside of the subdivision moratorium area in the nearby Oaks subdivision and a new well, also outside of the subdivision moratorium area, east of San Benancio Road approximately 3,100 feet southeast of the Oaks well and approximately 2,600 feet west of the southern portion of the Harper Canyon property. This updated Project Specific Hydrogeologic Report includes installation and testing information from this new well, which had not be installed at the time of the September 2002 report. The Oaks well is currently supplying water at a rate of 4 gallons per minute (gpm) to nine homes in the Oaks subdivision. The Oaks well and new well will be tied together and supply water to the proposed subdivision. This new system will be transferred to the California-American Water Company (Cal Am) and operated as a satellite system.

Todd Engineers' review of available data indicates that pumping 13 acre feet per year (8 gpm) for the proposed Harper Canyon development will not deplete the aquifer on a regional basis. The Oaks well appears to be capable of sustaining a long-term pumping rate of 12 gpm to supply the Oaks subdivision and the Harper Canyon homes and does not appear to result in any appreciable impacts to nearby wells. Available data from the new well indicate that it can also sustain a long-term pumping rate over 12 gpm. Available data also indicate that the project will have a negligible effect on groundwater quantity and quality and that an adequate water supply exists. Neighboring wells should be monitored when the new well is pumped for long periods of time and, if impacts are seen, more production could be shifted to the Oaks well where there are fewer nearby wells.

Introduction

Background

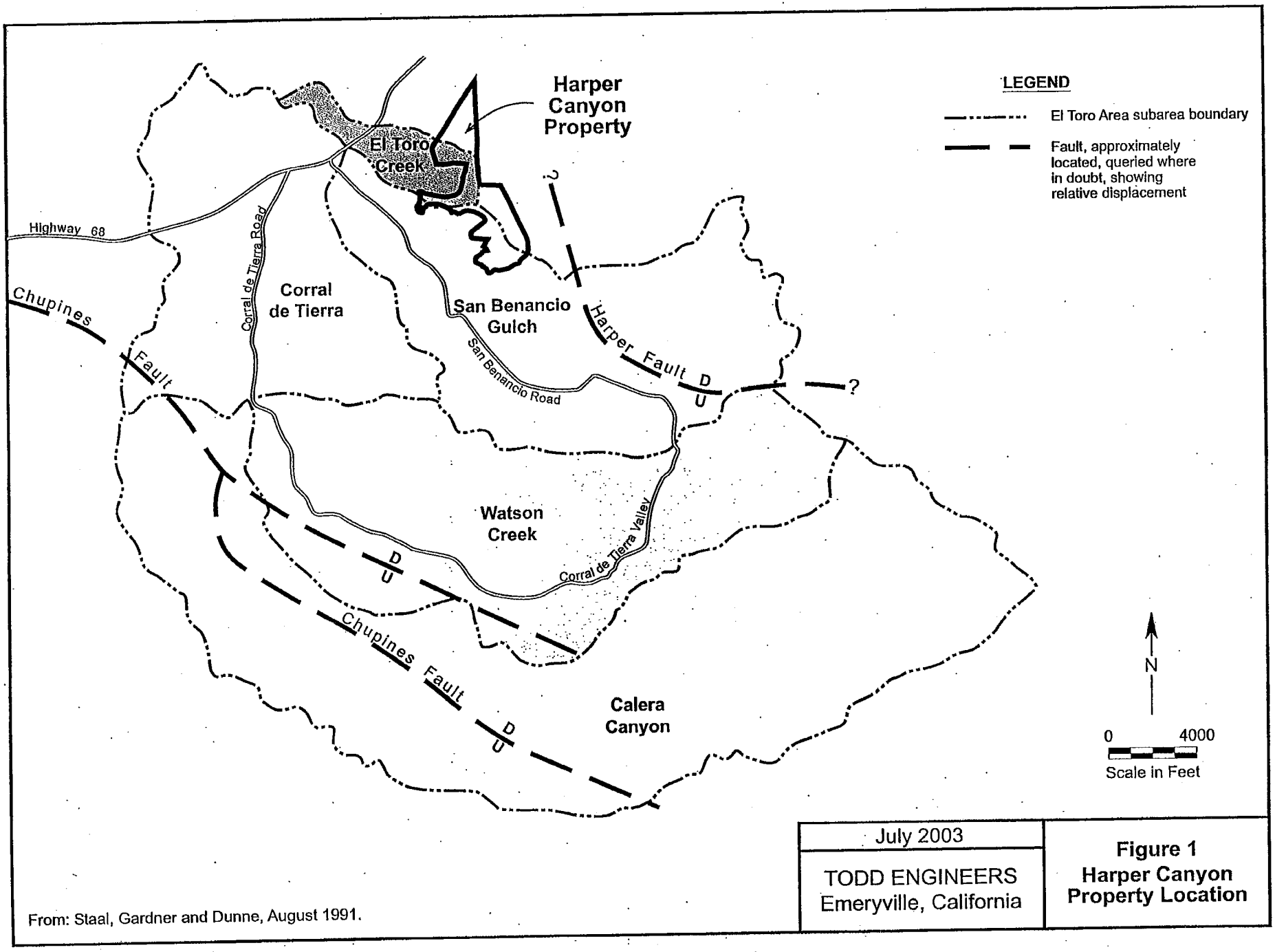
The Monterey County Health Department, Division of Environmental Health is requiring a Project Specific Hydrogeologic Report for the proposed Harper Canyon Realty LLC (PLN 000696) subdivision prior to deeming the application complete per authority of Title 19 of the Monterey County Code.

The Harper Canyon Realty LLC subdivision (site) is approximately 12 miles southeast of Carmel and just south of State Highway 68 and east of San Benancio Road (Figure 1). Seventeen homes are proposed on the northern portion of the property (Figure 2). The Harper Canyon LLC property covers 344 acres with the combined lots comprising 164 acres. The remaining 180 acres will remain as open space (Lawrence, June 4, 2002).

It is proposed that the development will merge with the nearby Oaks subdivision. The California-American Water Company (Cal Am) supplies water to the Oaks subdivision but its main supply wells are located further west in an area currently under a subdivision moratorium (called Zone B-8). One existing well outside the moratorium area (referred to as the Oaks well) supplies 4 gpm of water to nine homes in the Oaks subdivision. This well will be supplemented with a recently installed well east of San Benancio Road approximately 3,100 feet southeast of the Oaks well and approximately 2,600 feet west of the southern portion of the Harper Canyon property. The Oaks well and the new well will be tied together and supply water to the proposed subdivision. This new system will be transferred to Cal Am and operated as a satellite system to keep water from wells outside of the moratorium area separate from the other Cal Am wells. This prevents use in the moratorium area of water from the Salinas Valley Groundwater Basin Assessment Zone (called Zone 2/2A), in which the Oaks well and new well are located. Zone 2/2A is the area east of San Benancio Road (Lawrence, May 31, 2002).

Scope

This report summarizes Todd Engineers' review of available data and reports concerning the hydrogeologic conditions at the proposed site and vicinity. The purpose of the report is to provide an integrated overview of water resource conditions and potential impacts on groundwater and



From: Staal, Gardner and Dunne, August 1991.

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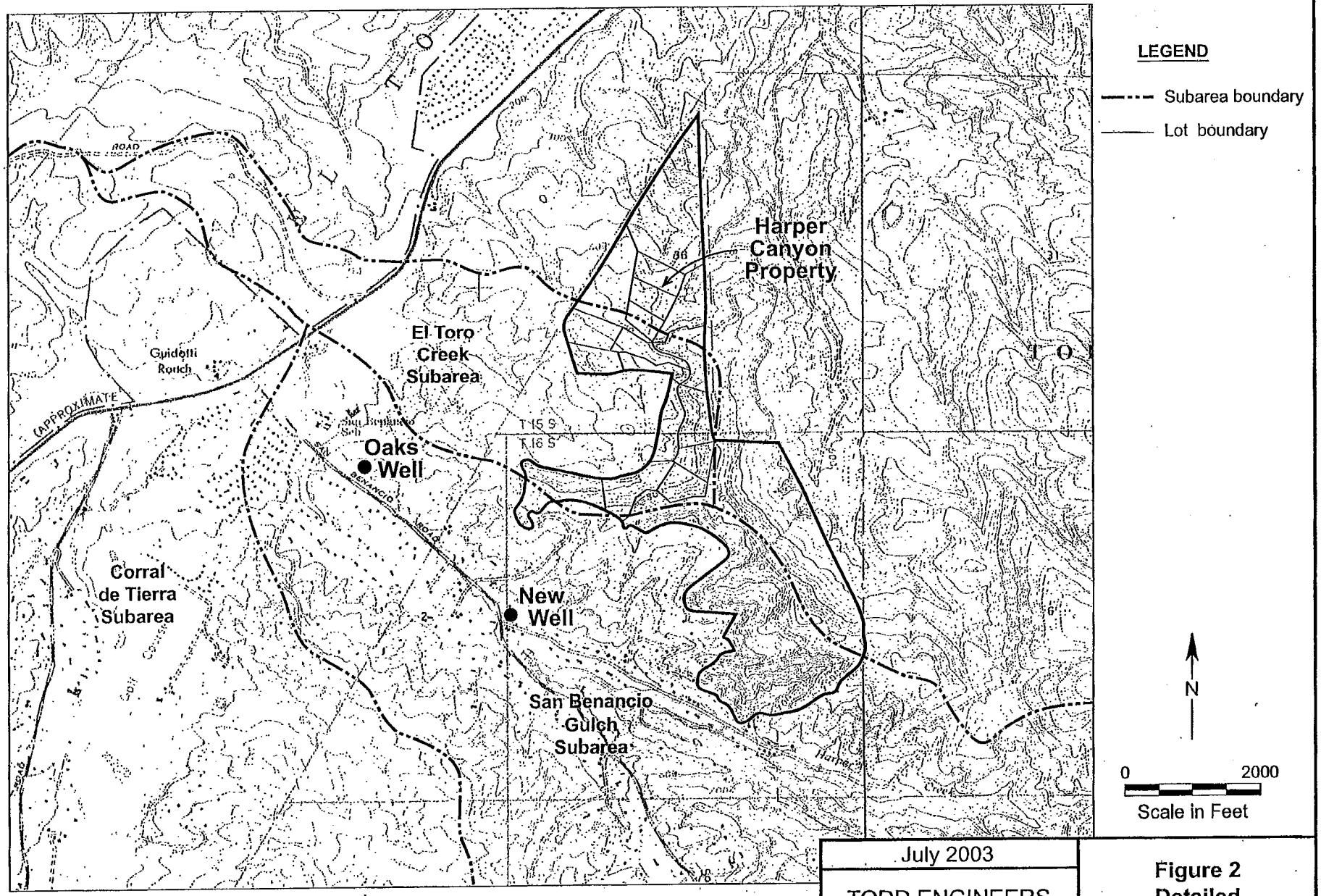
Figure 1
Harper Canyon Property Location



Base: USGS Spreckels 7.5 minute topographic map.

July 2003

TODD ENGINEERS
Emeryville, California

Figure 2
Detailed Location Map

mitigation measures resulting from the proposed development. Specifically, Todd Engineers examined the availability of sustainable long-term water supply for the project, conducted a local water balance, and identified potential effects the project may have on the quantity and quality of groundwater given the data available. This report updates a September 2002 report with installation and testing information from the new well which was installed in April 2003 and tested in June 2003.

Acknowledgements

This report was prepared under the supervision of David Abbott and Phyllis Stanin of Todd Engineers. We appreciate the direction and information from Laura Lawrence of the Monterey County Department of Health and her staff.

Hydrogeology

Geologic and Hydrogeologic Setting

The site is in the northern portion of the Salinas Valley, which is in the central part of the California Coast Ranges. The Salinas Valley is a northwest trending tectonic basin 120 miles long and up to 6 miles wide (EDAW, June 2001). The area is underlain by the Paso Robles Formation, which consists of a thick sequence of continental deposits of interbedded sand, gravel, and clay. This formation, also called the Aromas-Paso Robles Formation, is approximately 400 feet thick just west of the site (Feeney, August 8, 2000). The Santa Margarita Sandstone underlies the Paso Robles Formation and the Monterey Shale is below the Santa Margarita Sandstone.

The site is located in the Pressure subarea of the Salinas Valley Groundwater Basin (EDAW, June 2001). The site is in two subareas of the El Toro planning area of Monterey County (see Figure 2). The El Toro planning area has been divided into five subareas based on surface drainage divides (Figure 1). The southwestern portion of the site is in the San Benancio Gulch subarea and the central portion of the site containing most of the proposed development is in the El Toro Creek subarea. The northern tip and eastern strip of the site are outside of the El Toro planning area in the Greater Salinas planning area. Groundwater in the El Toro subareas north of the Chupines Fault is believed to be interconnected (Staal, Gardner & Dunne, August 1991; Fugro, February 1996; and Fugro, February 4, 1998).

Aquifers and Water Supply Wells

In the vicinity of the site, groundwater is pumped from three water bearing units; the Aromas-Paso Robles Formation, the Santa Margarita Sandstone, and alluvium in local drainages. The Monterey Shale is not considered water bearing since it produces wells with low yields and poor water quality in this area (Schmidt, May 31, 2001). In the vicinity of the Oaks well the Paso Robles Formation is approximately 400 feet thick and the Santa Margarita Sandstone is approximately 250 feet thick (Feeney, February 11, 2000). Typical well yields and specific capacities are listed below for the two principal aquifers in this area (Feeney, February 11, 2000).

Water Bearing Unit	Well Yield (gpm)	Specific Capacity (gpm/ft)
Paso Robles Formation	up to 200	2
Santa Margarita Sandstone	over 500	5

gpm = gallons per minute
gpm/ft = gallons per minute per foot of drawdown

The Oaks well is six inches in diameter, approximately 410 feet deep, and produces from the Paso Robles Formation (Feeney, February 11, 2000 and August 12, 2000). The depth to groundwater in 2000 was 95 feet and the top of the 180-foot screen is at a depth of 220 feet. Feeney (August 12, 2000) reports that the Oaks well can easily produce the design discharge rate of 60 gpm. Assuming a 24-hour specific capacity of 1.1 gpm/ft as calculated from a pumping test, the well is theoretically capable of a discharge rate of 138 gpm without dewatering the screen. Therefore, the practical yield of this well should be about two-thirds of the theoretical capacity, or 92 gpm. This operational practice of using two-thirds of the available drawdown or capacity compensates for seasonal local and regional water level fluctuations, decreasing well and pump efficiencies, and interference from other pumping wells.

The new well was drilled and installed between March 29 and April 10, 2003 by Roy Alsop Pump and Drilling, Inc., Salinas, California. A mud rotary drilling rig was used to drill a 12-inch diameter borehole to 460 feet below ground surface. The well was constructed of 6-inch diameter PVC casing that is perforated from 150 to 450 feet below ground surface. The well is screened at similar depths as the Oaks well and appears to also produce water from the Paso Robles Formation. A copy of the Well Completion Report is in the Appendix.

On June 18, 2003, Roy Alsop Pump and Drilling began a 72-hour constant-discharge pumping test on the new well. A 2-horsepower submersible pump was set at a depth of 211 feet. The static water level was measured at a depth of 102 feet providing available drawdown of 109 feet to the top of the pump. Note that this includes dewatering a portion of the 300-foot long screen. The pump was turned on at 10:40 am and the discharge rate and water level declines in the well were measured by Todd Engineers for the first five hours of the pumping test. The average discharge rate during the first five hours was 25 gpm and ranged between 24 gpm (at the five-hour mark) and 26

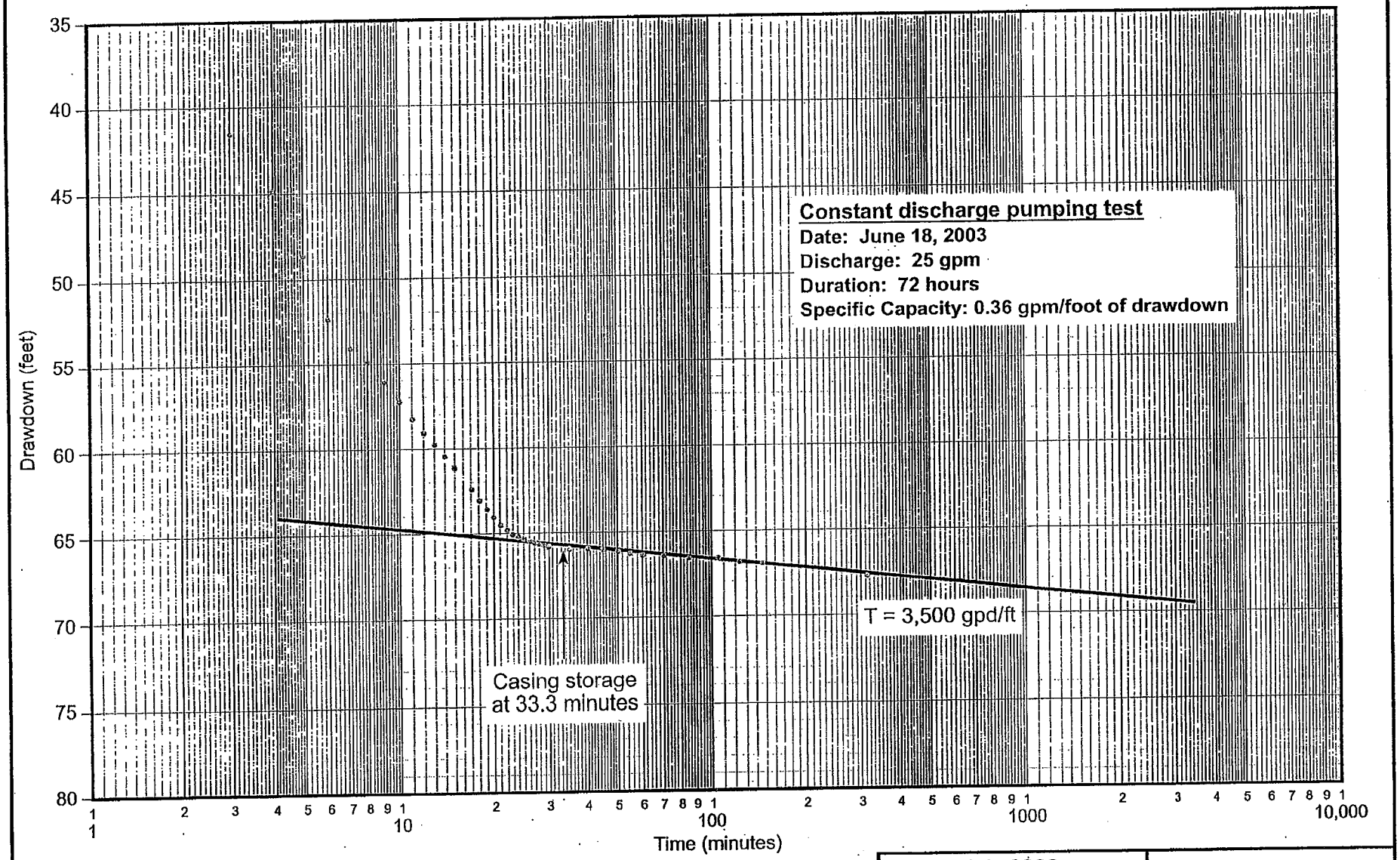
gpm (at the start of the test). Data were presented to a Monterey County inspector who visited the site at approximately 12:30 pm. Steve Allison of Roy Alsop Drilling measured the discharge rates and water levels in the well for the remainder of the 72-hour pumping test and for 48 hours of recovery. The drawdown at five hours was 67.83 feet (pumping water level was 169.83 feet below ground surface) while the maximum drawdown at 72 hours was 70 feet (172 feet below ground surface). A water quality sample was collected and sent to Monterey Bay Analytical Services in Carmel Valley at the end of the pumping test. The water level in the well recovered to 122.5 feet below ground surface after 48 hours of recovery. This equates to 71 percent recovery to the pre-pumping static water level (102 feet below ground surface). Todd Engineers assumes that the well continued to recover to near the original static water level after approximately 72 hours of non-pumping. Slow to incomplete recovery could indicate a highly inefficient well and/or an aquifer of limited extent. Pumping test, recovery, and water quality data are in the Appendix.

A Cooper-Jacob analysis (Driscoll, 1986) of the pumping test is shown on Figure 3. An analysis of the data indicates an aquifer transmissivity (T) of 3,500 gpd/ft. An evaluation of the specific capacity of the well during the test indicates that well efficiency is low (15 percent). Assuming a 24-hour specific capacity of 0.36 gpm/ft as calculated from the pumping test, the well is theoretically capable of a discharge rate of 17 gpm to the top of the screen. The practical yield is two-thirds of this at 12 gpm.

Groundwater Levels and Flow

Groundwater moves unimpeded across the El Toro subarea boundaries from the southern subareas to the northern subareas. Groundwater flow generally follows the topography and exits the El Toro planning area to the north and to the west. Groundwater elevations are about 320 feet above mean sea level in wells screened in the Paso Robles Formation in the northern San Benancio Gulch subarea (Schmidt, May 31, 2001).

The Monterey County Water Resources Agency has been measuring water levels in about 40 wells in the El Toro area since 1960. Schmidt (May 31, 2001) prepared updated hydrographs for these wells, including six wells in the San Benancio Gulch subarea. No long-term water level decline was apparent on hydrographs for two of these wells, which are screened in the Aromas-Paso Robles Formation and possibly the stream alluvium. The four other hydrographs were from wells screened in the Aromas-Paso Robles Formation and indicated long-term water level declines



July 2003	**Figure 3**
TODD ENGINEERS Emeryville, California	**Constant Discharge Pumping Test** **Harper Canyon**

between 0.4 and 1.6 feet per year from 1960 to 2000. Apparently no wells are monitored in the El Toro Creek subarea.

Groundwater Quality

Typical water quality for the two principal aquifers in this area is of a calcium-bicarbonate type for the Paso Robles Formation and of the sodium-chloride type for the Santa Margarita Sandstone with total dissolved solids (TDS) of 500 parts per million (ppm) and 1,000 ppm, respectively (Feeney, February 11, 2000).

Water quality data from the Oaks well was collected in July of 2000 and found to be of the sodium-chloride type (Feeney, August 12, 2000). Groundwater meets primary drinking water standards but exceeds secondary esthetic standards for TDS, electrical conductivity, and manganese. Primary maximum contaminant levels (MCLs) are enforceable while secondary standards are guidelines based on such criteria as taste, odor, and laundry staining.

The new well was sampled for water quality June 20, 2003 and found to be of the sodium-chloride type. Although both the Oaks well and the new well appear to be screened in the Paso Robles Formation, their water quality type (sodium-chloride) is more like the Santa Margarita as defined by Feeney (August 12, 2000). Water pumped from the new well may need to be treated since several constituents exceeded secondary MCLs as listed below. Hardness at 224 ppm and sodium at 127 ppm were also elevated, although MCLs have not been set for these two constituents.

Constituent	Concentration	Secondary MCL
Chloride	263 ppm	250 ppm
Manganese	169 ppb	50 ppb
Electrical conductance	1120 umhos/cm	900 umhos/cm
Total dissolved solids	689 ppm	500 ppm

Water Balance

A simple water balance was conducted to compare inflows (recharge) and outflows (demand) to determine if a surplus or deficit exists between groundwater demand and recharge.

Recharge

Todd Engineers reviewed recharge calculations by Staal, Gardner & Dunne, Inc. (August 1991) and Fugro (February 1996). Their estimates of 2.18 and 1.93 to 3.13 inches/year, respectively, seem reasonable given the annual precipitation and assumptions used in the calculations. Using a value of 2.18 inches for recharge, the total recharge in the El Toro Creek and San Benancio Gulch subareas was calculated by Feeney (April 25, 2000) to be 74 and 486 acre-feet per year (AF/y), respectively. This assumed "retrievable" acreages within each subarea watershed of 408 acres for El Toro Creek and 2,678 acres for San Benancio Gulch subareas.

Project Water Demand

The 17 lots are proposed to use a total of 5.61 AF/y (Harper Canyon Realty, May 30, 2001 and Lawrence, June 4, 2002). This results in a usage of 0.33 AF/y per home (5.61 AF/y/17 homes). Landscape irrigation is expected to be minimal and the development will be sewered. Thus, recharge associated with irrigation or septic system use is assumed to be negligible. Water supply for the development will come from the Oaks well and the new well west of the Harper Canyon property.

This water usage rate estimated by the applicant is on the low end when compared to typical water usage values in the area. Fugro (February 1996) estimated the average interior water usage of an existing home at 0.38 AF/y and exterior usage at 0.28 AF/y in the El Toro area. The Toro Water Company customers in the area used 0.68 AF/y between 1990 and 1993 and Ambler Park Water Company customers used 0.63 AF/y between 1984 and 1990 (Fugro, February 1996). For planning purposes, Monterey County has used a demand of 0.75 AF/y per home in the Rancho San Carlos development (Lawrence, September 6, 2002). After review of these demands and

discussions with county staff, it was decided to assume a demand value of 0.75 AF/y per home for a total demand of 12.75 AF/y for the 17 homes.

Comparison of Supply and Demand

Fugro (February 1996) concluded that recharge values in the four El Toro subareas north of the Chupines Fault, which are considered interconnected, exceeded current demand and were sufficient to meet estimated demand at build-out. The table below summarizes 1995 use and build-out projections from the Fugro (February 1996) report and updated in Feeney (April 25, 2000) using a recharge value of 2.18 inches. Build-out conditions were for 175 units in the El Toro Creek subarea and 542 units in the San Benancio Gulch subarea.

Subarea	Recharge @ 2.18 inches	1995 Demand (number of units)	Build-out Demand (number of units)	Build-out Water Surplus
El Toro Creek	74 AF/y	1.1 AF/y (1 unit)	69.3 AF/y (175 units)	4.7 AF/y
San Benancio Gulch	486 AF/y	342.2 AF/y (413 units)	456.1 AF/y (542 units)	29.9 AF/y

These values reflect a 1995 interior use of 0.38 AF/y per unit (57.6 percent) and exterior use of 0.28 AF/y per unit (42.4 percent). Future interior use was estimated to decrease to 0.20 AF/y per unit. The values also assume that 80 percent of the interior usage returns via septic systems and 20 percent of exterior usage is return flow. Additional irrigation needs of larger ranchettes and public areas are also included in these totals. Since the Harper Canyon homes will be sewered, no return flows via septic systems will occur. Assuming that 57.6 percent of water usage is interior the loss of septic return can be estimated to be 5.875 AF/y (12.75 AF/y x 0.576 x 0.80). Since this value is greater than the estimated surplus at projected build-out for the El Toro Creek subarea, the water balance should be recalculated if future developments are planned for this area.

Initial review indicates that recharge is greater than the 1995 water usage plus the proposed project usage in the El Toro Creek and San Benancio Gulch subareas. Based on these data, it

appears that a long-term supply exists for this subdivision. It is important to note that this water balance employs regional averages and that local deviations may exist. For example, water levels in some wells in the San Benancio Gulch subarea have experienced long-term declines (Schmidt, May 31, 2001). This indicates that local water level depressions exist and well specific hydrogeologic information is needed to evaluate local water level conditions.

Nitrate Balance

An *Initial Water Use/Nitrate Impact Questionnaire for Development in Monterey County* (Harper Canyon, May 30, 2001) was completed for the proposed development. Responses on this questionnaire suggest that the site would use septic and sewer systems. County of Monterey staff state that the subdivision will be entirely sewered (Lawrence, May 31, 2002). Thus, nitrate loading is not expected to increase since the subdivision will not be on septic systems. Therefore nitrate related impacts associated with the subdivision are negligible.

Potential Effects of Development on Groundwater

Effects on Local Wells

Feeney (July 19, 2000) conducted a 72-hour pumping test on the Oaks well to determine pumping rates and potential impacts on other wells. The well was pumped at 37 gpm resulting in a drawdown of 32.4 feet and a 24-hour specific capacity of 1.1 gpm/ft (Feeney, July 19, 2000). Transmissivity was calculated to be 1,085 gpd/ft. Feeney (July 19, 2000) concluded that pumping of the Oaks well at 4 gpm would not impact adjacent wells. He estimated that after 20 years of pumping, the drawdown 1,000 feet away would be less than 2 feet. Nearby wells included in the evaluation are the San Benancio School well located approximately 1,000 feet north and the Ambler Park wells located approximately 1,500 feet west of the Oaks well (Feeney, July 19, 2000).Pumping the Oaks well at the higher rate required to provide additional supply to the Harper Canyon subdivision would have little impact on the existing wells due to their distance from the pumping well. The cone of depression around the Oaks well would be deeper but the radius of influence would not change.

Similar calculations can be done for the new well. Assuming a T of 3,500 gpd/ft, a pumping rate of 12 gpm, and a storage coefficient of 0.05, drawdown 1,000 feet away at 20 years would be less than 2 feet. Available data indicate that there are at least five wells within 2,000 feet of the new well. It is unknown what volume of water, if any, is pumped from these wells, but they are likely domestic wells with small pumping volumes.

Effects on Aquifer

Regional effects on the aquifer from the pumping increase of 13 AF/y appear to be minimal when compared to recharge estimates. Note that this comparison is regional and on an average basis. Water levels will likely decline in times of extended drought.

Conclusions

Todd Engineers review of available data indicates that pumping 13 AF/y (8 gpm) for the proposed Harper Canyon development will not deplete the aquifer on a regional basis. Pumping the Oaks well or the new well at 12 gpm to supply the Oaks subdivision and the Harper Canyon homes does not appear to result in any appreciable impacts to nearby wells. In conclusion, available data indicate that the project will have a negligible effect on groundwater quantity and quality and that an adequate water supply exists.

Based on our review, we suggest that water levels and water quality be routinely measured and reported for the Oaks well and new well, including monthly water level measurements. These data could assist in determining aquifer(s) sensitivity to droughts and pumping. In addition, pumping volumes should also be recorded and submitted with other monitoring data. If these data are already being generated as part of a California Department of Health Services (DHS) permit, the County could access data from DHS. These data can be used for evaluation of new wells installed in the future.

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- Feeney Draft Technical Memorandum, *Well Location – Hydrogeologic Review, "The Oaks" Subdivision*, February 11, 2000, and
- Feeney Technical Memorandum, *Hydrogeologic Review "The Oaks" Subdivision Well - Well Interference Analysis*, July 19, 2000.

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Maps

County of Monterey Assessor's Map - *El Toro Portion of Lot 4.*

Unknown author, *Map of Present B-8 Zoning, Effective December 24, 1992*, showing Harper Canyon Realty, L.L.C. Property.

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Appendix

DUPLICATE
Driller's Copy
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. 768957

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./ STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. New 2003
Date Work Began 3/29/03, Ended 4/10/03
Local Permit Agency Monterey Co Health Dept
Permit No. 02-01036 Permit Date 4/2/03

GEOLOGIC LOG

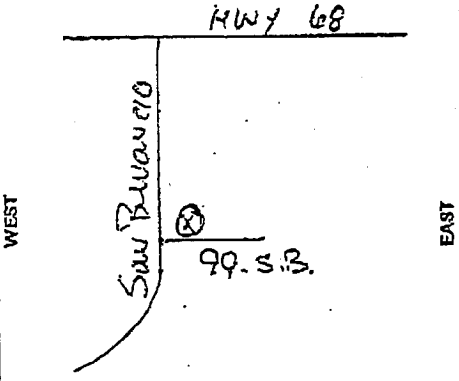
ORIENTATION (✓) ✓ VERTICAL — HORIZONTAL — ANGLE — (SPECIFY)
DRILLING METHOD ROTARY FLUID Mud

DEPTH FROM SURFACE FL	to FL	DESCRIPTION *Describe material, grain, size, color, etc.*
0	20	Top Soil, sand
20	85	D.G.
85	130	D.G., Sand, Clay
130	175	D.G., sand, small streaks of clay
175	190	Hard D.G.
190	445	D.G., streaks sand & clay
445	460	D.G., blue clay, brown shale

TOTAL DEPTH OF BORING 465 (Feet)
TOTAL DEPTH OF COMPLETED WELL 450 (Feet)

WELL OWNER
Name Harper Cyn Realts
Mailing Address 313 Main St #D
Salinas CA 93901
CITY STATE ZIP

WELL LOCATION
Address San Benancio Cyn Rd
City Salinas CA
County Monterey
APN Book 416 Page 621 Parcel 001
Township Range Section
Latitude DEG. MIN. SEC. DEG. MIN. SEC.

LOCATION SKETCH
NORTH


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.

ACTIVITY (✓)
✓ NEW WELL
MODIFICATION/REPAIR
— Deepen
— Other (Specify)
— DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")
PLANNED USES (✓)
WATER SUPPLY
✓ Domestic — Public
— Irrigation — Industrial
MONITORING —
TEST WELL —
CATHODIC PROTECTION —
HEAT EXCHANGE —
DIRECT PUSH —
INJECTION —
VAPOR EXTRACTION —
SPARGING —
REMEDIATION —
OTHER (SPECIFY) —

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 60+ (Ft.) BELOW SURFACE 1
DEPTH OF STATIC WATER LEVEL 80 (FL.) & DATE MEASURED 4/30/03
ESTIMATED YIELD 50+ (GPM) & TEST TYPE Air Lift
TEST LENGTH 4 (Hrs.) TOTAL DRAWDOWN 440 (FL)
May not be representative of a well's long-term yield.

DEPTH FROM SURFACE FL	to FL	BORE-HOLE DIA. (inches)	CASING (S) TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (inches)
0	150	12.25	✓				PLASTIC	6	sdr21	sdr21
150	450	12.25		✓			PLASTIC	6	032	032

DEPTH FROM SURFACE FL	to FL	ANNULAR MATERIAL TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	110	✓			
110	450			✓	8 x 16 sand

ATTACHMENTS (✓)
— Geologic Log
— Well Construction Diagram
— Geophysical Log(s)
— Soil/Water Chemical Analysis
— Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME Roy Alsop Pump and Drilling, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
1508 Abbott St ADDRESS Salinas CITY CA STATE 93901 ZIP
Signed WELL DRILLER/AUTHORIZED REPRESENTATIVE
04/30/03 DATE SIGNED
C57-569945 C-57 LICENSE NUMBER

DWR 188 REV. 11-97
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

ALSOP PUMP & DRILLING, INC.

WELL DEVELOPMENT LOG

CUSTOMER: TIME START : 10:40
RANCH:
DATE: 6/19/07

ENGINE HRS (start): FLOWMETER : 4315
ENGINE HRS (stop): @ 44 MIN 5474 = 26.34 GPM
SWL @ 90 MIN 6628 = 25.70 GPM
@ 124 MIN 7451 = 25.39 GPM (24.5 11:50am)
@ 148 MIN 8047 = 25.22 GPM
@ 310 MIN 11978 = 24.72 GPM 24.

TIME		GPM	PWL	YIELD	DESCRIPTION/COMMENTS	DTW	DD	TIME		
SWL	= 102.0'					102.0'		40	167' 11.5"	65.9
4" OD	PUMP	(2 COUPLS)						45	168' 0.25"	66.02
2 HP	PUMP							50	168' 2.00"	66.11
SET	@ 210'							55	168' 3.50"	66.29
TIME .5								60	168' 4.00"	66.33
1						124' 2.5"	22.21	70	168' 5.25"	66.44
2	1.5					130' 6.5" / 134' 11.5"	28.54 / 32.56	~~84~~	168' 6.68"	66.56
3						143' 6.5"	41.54	~~105~~	168' 7.25"	66.60
4						146' 10.0"	44.83	~~100~~		
5						150' 7.5"	48.63	~~110~~		
6						154' 4.5"	52.38	~~123~~	168' 10.00"	66.83
7						156' 1.0"	54.08	~~125~~		
8		-				156' 11.0"	54.92	146	169' 0.00"	67.1
9						158' 2.0"	56.17	~~150~~		
10						159' 3.0"	57.25	~~160~~		
11						160' 3.0"	58.25	~~170~~		
12						161' 1.0"	59.08	~~180~~		
13						161' 9.0"	59.75	~~190~~		
14						162' 5.5"	60.46	~~200~~		
15						163' 1.5"	61.13	~~210~~		
17						164' 5.5"	62.46	~~240~~		
18						165' 0.5"	63.04	~~260~~		
19						165' 7.0"	63.58	~~280~~		
20						166' 0.5"	64.04	~~290~~		
21						166' 6.0"	64.50	312	169' 10"	67.83
22						166' 9.75"	64.81			
23						167' 0.50"	65.04			
24						167' 2.25"	65.19			
25						167' 4.00"	65.33			
26						167' 5.5"	65.46			
27						167" 6.25"	65.52			
28						167" 7.25"	65.60			
29						167" 8.25"	65.69			
30						167" 9.00"	65.75			
35						167" 11.5"	65.96			

ALSOP PUMP & DRILLING, INC.

WELL DEVELOPMENT LOG

CUSTOMER HARPER CANYON REALTY
RANCH. SAN.BENANCIO
DATE 6-18-03

ENGINE HRS (start):
ENGINE HRS (stop):
SWL 102 FT

TIME		GPM	PWL	YIELD		DESCRIPTION/COMMENTS			
1040		30				CLEAR			
1045		27	154			CLEAR			
1050		27	159			CLEAR			
1055		26.5	162			CREAMY			
1100		25.5	166			CREAMY			
1103		25.5	167			CREAMY			
1110		25.5	167			CREAMY			
1115		25.5	168			CREAMY			
1120		25.5	168			CREAMY			
1125		25.5	168			CREAMY			
1130		25.5	168			STILL A LITTLE WHITE			
1140		25.8	168						
1150		25.5	168						
1200		25	168			ALMOST CLEAR			
1620		25	169' 10"						
2015		25	170' 4"						
	6-19-03								
0530		25	170' 6"						
1240		25	178			? BAD PWL READING			
1635		24	171' 8"						
1935		24	171' 3"						
	6-20-03								
0530		24	171' 6"						
0910		24	171' 6"			CLEAR			
0920						TAKE WATER SAMPLE			
0925						STOP TEST			
0930			171			RECOVERY			
0932			158						
0934			149						
0936			145						
0938			144						
0940			142						
0942			141' 6"						
0944			141						
0946			140' 6"						

ALSOP PUMP & DRILLING, INC.

WELL DEVELOPMENT LOG

PAGE 2

CUSTOMER: HARPER CANYON REALTY
RANCH: SAN BENANCIO
DATE: 6-20-03

ENGINE HRS (start):
ENGINE HRS (stop):
SWL

TIME		GPM	PWL	YIELD		DESCRIPTION/COMMENTS			
0948			140			RECOVERY CONTINUED			
0950			139' 6"						
1002			139						
1010			138' 8"						
1110			134' 6"						
1145			134						
1200			133						
1630			130						
	6-21-03								
0640			126' 7"						
1200			126						
1705			125						
	6-22-03								
900			122' 6"						

MONTEREY BAY ANALYTICAL SERVICES

121 Hitchcock Canyon Road
Carmel Valley, CA 93924
831.659.7538 Phone_Fax

ELAP Certification Number: 2385

Alsop Pump & Drilling
Steve Allison
1508 Abbott St.
Salinas, CA 93901

Monday, July 14, 2003

Lab Number: AA13555

Collection Date/Time: 6/20/2003 9:10 Sample Collector: HOLLAND D
Submittal Date/Time: 6/20/2003 9:10 System No.

Sample Description: 99 San Benancio

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed
Alkalinity, Total (as CaCO3)	SM2320B	mg/L	151		10		6/23/2003
Aluminum	EPA200.8	ug/L	Not detected	E	50	1000	7/11/2003
Antimony	EPA200.8	ug/L	Not detected	E	6.0	6	7/11/2003
Arsenic	EPA200.8	ug/L	28	E	2	50	7/11/2003
Barium	EPA200.8	ug/L	Not detected	E	100	1000	7/11/2003
Berillium	EPA200.8	ug/L	Not detected	E	1	4	7/11/2003
Bicarbonate (as HCO3-)	SM2320B	mg/L	184		10		6/25/2003
Bromide	EPA300.0	mg/L	0.18		0.10		6/21/2003
Cadmium	EPA200.8	ug/L	Not detected	E	1	5	7/11/2003
Calcium	SM3111B	mg/L	55		1		6/26/2003
Carbonate	SM2320B	mg/L	Not detected		10		6/23/2003
Chloride	EPA300.0	mg/L	263		1	250	6/21/2003
Chromium	EPA200.8	ug/L	2	E	1	50	7/11/2003
Color, Apparent (Unfiltered)	SM2120B	Color Units	Not detected		1	15	6/21/2003
Copper	SM 3111B	ug/L	Not detected		50	1000	6/21/2003
Cyanide	EPA 335.2	ug/L	Not detected		20	200	6/20/2003
Fluoride	EPA300.0	mg/L	0.22		0.10	2.0	6/21/2003
Hardness (as CaCO3)	SM2340B	mg/L	224		10		7/5/2003
Hydroxide	SM2320B	mg/L	Not detected		5		6/23/2003
Iron	SM3111B	ug/L	Not detected		100	300	6/21/2003
Langlier Index (60 deg. C)	SM2330B		-0.45				7/5/2003
Lead	SM3113B	ug/L	Not detected		5	15	6/22/2003
Magnesium	SM3111B	mg/L	21		1		6/26/2003
Manganese	SM3111B	ug/L	169		20	50	6/21/2003

mg/L: Milligrams per liter (=ppm) ug/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit
H: Analyzed outside of hold Time E: Analyzed by External Laboratory; see External Laboratory Result

MBAS (Surfactants)	SM5540C	mg/L	Not detected		0.05	0.50	6/21/2003
Mercury	EPA200.8	ug/L	Not detected	E	0.2	2	7/11/2003
Nickel	EPA200.8	ug/L	1	E	1	100	7/11/2003
Nitrate as NO3	EPA300.0	mg/L	5		1	45	6/21/2003
Nitrite-N	EPA300.0	mg/L	Not detected		0.10	1.00	6/21/2003
Odor Threshold at 60 C	SM2150B	TON	1		1	3	6/21/2003
o-Phosphate-P	EPA300.0	mg/L	0.11		0.10		6/21/2003
pH (Laboratory)	SM4500-H+B	STD. Units	6.6				6/20/2003
Potassium	SM3111B	mg/L	2.8		0.5		6/26/2003
Selenium	EPA200.8	ug/L	Not detected	E	5.0	50	7/11/2003
Silver	EPA200.8	ug/L	Not detected	E	10	100	7/11/2003
Sodium	SM3111B	mg/L	127		1		6/26/2003
Specific Conductance (E.C)	SM2510B	umhos/cm	1120		1	900	6/20/2003
Sulfate	EPA300.0	mg/L	18		1	250	6/21/2003
Synthetic Organic Compounds		ug/L	attached				6/26/2003
Thallium	EPA200.8	ug/L	Not detected	E	1.0	2	7/11/2003
Total Diss. Solids	SM2540C	mg/L	689		10	500	6/21/2003
Turbidity	EPA180.1	NTU	0.40		0.05	5.0	6/21/2003
Volatile Organic Compounds	EPA 502.2	ug/L	attached				6/26/2003
Zinc	EPA200.8	ug/L	343	E	50	5000	7/11/2003

Sample Comments:

Report Approved by:

Sigrid Weidner-Holland
Laboratory Director

mg/L: Milligrams per liter (=ppm) ug/L : Micrograms per liter (=ppb) PQL : Practical Quantitation Limit
H: Analyzed outside of hold Time E: Analyzed by External Laboratory; see External Laboratory Result

basic laboratory

www.basiclab.com

voice 530.243.7234 fax 530.243.7494

2218 Railroad Avenue
Redding, California 96001

Report To: MONTEREY BAY ANALYTICAL SERVICES
121 HITCHCOCK CANYON ROAD
CARMEL VALLEY, CA 93924

Lab Number: 3060817
Date: 07/11/03
Phone: (831) 659-7538
P.O.#: .

Attention: S. WEIDNER-HOLLAND
Project Name: METALS 200.8

Sample Description: 13555 / 99 SAN BENANCIO
Laboratory ID: 3060817-01

Date Sampled: 06/20/03
Date Received: 06/25/03

	TEST	RESULTS	UNITS	MCL/ACL	DLR
General Mineral	Calcium		mg/l		1
	Magnesium		mg/l		1
	Sodium		mg/l		1
	Potassium		mg/l		1
	Bicarbonate		mg/l		5
	Carbonate		mg/l		5
	Chloride		mg/l	250-500-600	1
	Sulfate		mg/l	250-500-600	0.40
	pH		units		0.01
	Alkalinity-Total @CaCO3		mg/l		5
	Hardness-Total @CaCO3		mg/l		1
	Specific Conductance @25C		umhos/cm	900-1600-2200	10
	Total Dissolved Solids		mg/l	500-1000-1500	5
	MBAS		mg/l	0.5	0.02
	Copper		ug/l	1300	50
	Iron		ug/l	300	100
	Manganese		ug/l	50	30
	Zinc	343	ug/l	5000	50
General Physical	Turbidity		NTU	5	0.01
	Color		units	15	5
	Odor		T.O.N.	3	2
Inorganic Chemical	Aluminum	ND	ug/l	1000	50
	Antimony	ND	ug/l	6	6.0
	Arsenic	28	ug/l	50	2
	Barium	ND	ug/l	1000	100
	Beryllium	ND	ug/l	4	1
	Cadmium	ND	ug/l	5	1.0
	Chromium	2	ug/l	50	1
	Lead		ug/l	15	5.0
	Mercury	ND	ug/l	2	0.2
	Nickel	1	ug/l	100	1
	Selenium	ND	ug/l	50	5.0
	Silver	ND	ug/l	100	10
	Fluoride		mg/l	1.4 -2.4	0.10
	Nitrate as N		mg/l	10	0.45
	Nitrite as N		mg/l	1	0.40
	Thallium	ND	ug/l	2	1.0
Radiological	Gross Alpha		pCi/l	5	1

ND - Not Detected at the detection limit
DLR - Reporting limit
MCL/ACL - Maximum contaminant level / action level

Approved By
Basic Laboratory, Inc.
California D.O.H.S. Cert #1677

BSK ANALYTICAL LABORATORIES

Sigrid Weidner-Holland
Monterey Bay Analytical
121 Hitchcock Canyon Road
Carmel Valley, CA 93924

Certificate of Analysis

ELAP Certificate #1180

Report Issue Date: 07/11/2003

BSK Submission #: 2003061567

BSK Sample ID #: 336114

Project ID: Project Desc:

Submission Comments:

Sample Type: Liquid
Sample Description: 99 San Bernancio
Sample Comments: 13555

Date Sampled: 06/20/2003
Time Sampled: 0910
Date Received: 06/24/2003

Organics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date	Analysis Date
1,1,1,2-Tetrachloroethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,1,1-Trichloroethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,1,2,2-Tetrachloroethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,1,2-Trichloro-1,2,2-Trifluoroethane	EPA 502.2	ND	µg/L	10.0	1	10	06/26/03	06/26/03
1,1,2-Trichloroethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,1-Dichloroethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,1-Dichloroethene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,1-Dichloropropene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,2,3-Trichlorobenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,2,3-Trichloropropane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,2,4-Trichlorobenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,2,4-Trimethylbenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,2-Dichlorobenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,2-Dichloroethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,2-Dichloropropane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,3,5-Trimethylbenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,3-Dichlorobenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,3-Dichloropropane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
1,4-Dichlorobenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
2,2-Dichloropropane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
2-Chlorotoluene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
4-Chlorotoluene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Benzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Bromobenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Bromochloromethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Bromodichloromethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Bromoform	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Bromomethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Carbon tetrachloride	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR

H: Analyzed outside of hold time
P: Preliminary result
S: Suspect result. See Cover Letter for comments.
E: Analysis performed by External laboratory. See External Laboratory Report attachments.

Report Authentication Code: *336114-761.5200*

1414 Stanislaus Street Fresno, CA 93706-1623 Phone 559-497-2888, In CA 800-877-8310 Fax 559-485-6935

BSK ANALYTICAL LABORATORIES

Sigrid Weidner-Holland
Monterey Bay Analytical
121 Hitchcock Canyon Road
Carmel Valley, CA 93924

Certificate of Analysis

ELAP Certificate #1180

Report Issue Date: 07/11/2003

BSK Submission #: 2003061567

BSK Sample ID #: 336114

Project ID: Project Desc:

Submission Comments:

Sample Type: Liquid
Sample Description: 99 San Bernancio
Sample Comments: 13555

Date Sampled: 06/20/2003
Time Sampled: 0910
Date Received: 06/24/2003

Organics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date	Analysis Date
Chlorobenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Chloroethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Chloroform	EPA 502.2	0.76	µg/L	0.5	1	0.5	06/26/03	06/26/03
Chloromethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
cis-1,2-Dichloroethene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
cis-1,3-Dichloropropene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Dibromochloromethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Dibromomethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Dichlorodifluoromethane	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Ethyl t-Butyl Ether	EPA 502.2	ND	µg/L	3.0	1	3	06/26/03	06/26/03
Ethylbenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Ethylenedibromide	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Hexachlorobutadiene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Isopropylbenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
m,p-Xylenes	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Methylene chloride	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Methyl-t-Butyl Ether	EPA 502.2	ND	µg/L	3.0	1	3	06/26/03	06/26/03
Naphthalene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
n-Butylbenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
n-Propylbenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
o-Xylene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
p-Isopropyltoluene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
sec-Butylbenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Styrene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
t-Amyl Methyl Ether	EPA 502.2	ND	µg/L	3.0	1	3	06/26/03	06/26/03
tert-Butylbenzene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Tetrachloroethene (PCE)	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Toluene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Total 1,3-Dichloropropene	EPA 502.2	ND	µg/L	-	-	N/A		

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR

H: Analyzed outside of hold time
P: Preliminary result
S: Suspect result. See Cover Letter for comments.
E: Analysis performed by External laboratory. See External Laboratory Report attachments.

Report Authentication Code: *336114-761.5200*

1414 Stanislaus Street Fresno, CA 93706-1623 Phone 559-497-2888, In CA 800-877-8310 Fax 559-485-6935

BSK ANALYTICAL LABORATORIES

Sigrid Weidner-Holland
Monterey Bay Analytical
121 Hitchcock Canyon Road
Carmel Valley, CA 93924

Certificate of Analysis

ELAP Certificate #1180

Report Issue Date: 07/11/2003

BSK Submission #: 2003061567

BSK Sample ID #: 336114

Project ID: Project Desc:

Submission Comments:

Sample Type: Liquid
Sample Description: 99 San Bernancio
Sample Comments: 13555

Date Sampled: 06/20/2003
Time Sampled: 0910
Date Received: 06/24/2003

Organics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date	Analysis Date
Total Trihalomethanes	EPA 502.2	0.76	µg/L	-	-	N/A		
Total Xylene Isomers	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
trans-1,2-Dichloroethene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
trans-1,3-Dichloropropene	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Trichloroethene (TCE)	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Trichloroflouromethane	EPA 502.2	ND	µg/L	5.0	1	5	06/26/03	06/26/03
Vinyl chloride	EPA 502.2	ND	µg/L	0.5	1	0.5	06/26/03	06/26/03
Dibromochloropropane	EPA 504.1	ND	µg/L	0.01	1	0.01	06/27/03	07/01/03
Ethylenedibromide	EPA 504.1	ND	µg/L	0.02	1	0.02	06/27/03	07/01/03
Aldrin	EPA 505	ND	µg/L	0.075	1	0.075	06/27/03	06/30/03
Chlordane	EPA 505	ND	µg/L	0.1	1	0.1	06/27/03	06/30/03
Chlorothalonil (Daconil,Bravo)	EPA 505	ND	µg/L	5.0	1	5	06/27/03	06/30/03
Dieldrin	EPA 505	ND	µg/L	0.02	1	0.02	06/27/03	06/30/03
Endrin	EPA 505	ND	µg/L	0.1	1	0.1	06/27/03	06/30/03
Heptachlor	EPA 505	ND	µg/L	0.01	1	0.01	06/27/03	06/30/03
Heptachlor epoxide	EPA 505	ND	µg/L	0.01	1	0.01	06/27/03	06/30/03
Hexachlorobenzene	EPA 505	ND	µg/L	0.50	1	0.5	06/27/03	06/30/03
Hexachlorocyclopentadiene	EPA 505	ND	µg/L	1	1	1	06/27/03	06/30/03
Lindane	EPA 505	ND	µg/L	0.2	1	0.2	06/27/03	06/30/03
Methoxychlor	EPA 505	ND	µg/L	10	1	10	06/27/03	06/30/03
PCBs: Arochlor Screen	EPA 505	ND	µg/L	0.2	1	0.2	06/27/03	06/30/03
Toxaphene	EPA 505	ND	µg/L	1.0	1	1	06/27/03	06/30/03
Trifluralin	EPA 505	ND	µg/L	1.0	1	1	06/27/03	06/30/03
2,4,5-T	EPA 515.3	ND	µg/L	1.0	1	1	06/30/03	06/30/03
2,4,5-TP (Silvex)	EPA 515.3	ND	µg/L	1.0	1	1	06/30/03	06/30/03
2,4-D	EPA 515.3	ND	µg/L	10	1	10	06/30/03	06/30/03
Bentazon (Basagran)	EPA 515.3	ND	µg/L	2.0	1	2	06/30/03	06/30/03
Dalapon	EPA 515.3	ND	µg/L	10	1	10	06/30/03	06/30/03
Dicamba (Banvel)	EPA 515.3	ND	µg/L	1.5	1	1.5	06/30/03	06/30/03

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
ND: None Detected at DLR

H: Analyzed outside of hold time
P: Preliminary result
S: Suspect result. See Cover Letter for comments.
E: Analysis performed by External laboratory. See External Laboratory Report attachments.

Report Authentication Code: *336114-761.5200*

1414 Stanislaus Street Fresno, CA 93706-1623 Phone 559-497-2888, In CA 800-877-8310 Fax 559-485-6935

BSK ANALYTICAL LABORATORIES

Sigrid Weidner-Holland
Monterey Bay Analytical
121 Hitchcock Canyon Road
Carmel Valley, CA 93924

Certificate of Analysis

ELAP Certificate #1180

Report Issue Date: 07/11/2003

BSK Submission #: 2003061567

BSK Sample ID #: 336114

Project ID: Project Desc:

Submission Comments:

Sample Type: Liquid
Sample Description: 99 San Bernancio
Sample Comments: 13555

Date Sampled: 06/20/2003
Time Sampled: 0910
Date Received: 06/24/2003

Organics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date	Analysis Date
Dinoseb (DNBP)	EPA 515.3	ND	µg/L	2.0	1	2	06/30/03	06/30/03
Pentachlorophenol (PCP)	EPA 515.3	ND	µg/L	0.2	1	0.2	06/30/03	06/30/03
Picloram	EPA 515.3	ND	µg/L	1.0	1	1	06/30/03	06/30/03
Alachlor (Alanex)	EPA 525.2	ND	µg/L	1.0	1	1	06/27/03	06/27/03
Atrazine (AAtrex)	EPA 525.2	ND	µg/L	0.5	1	0.5	06/27/03	06/27/03
Benzo(a)pyrene	EPA 525.2	ND	µg/L	0.1	1	0.1	06/27/03	06/27/03
bis(2-ethylhexyl) adipate	EPA 525.2	ND	µg/L	3.0	1	3	06/27/03	06/27/03
bis(2-ethylhexyl) phthalate	EPA 525.2	ND	µg/L	3.0	1	3	06/27/03	06/27/03
Bromacil (Hyvar)	EPA 525.2	ND	µg/L	10	1	10	06/27/03	06/27/03
Butachlor	EPA 525.2	ND	µg/L	0.38	1	0.38	06/27/03	06/27/03
Diazinon	EPA 525.2	ND	µg/L	0.25	1	0.25	06/27/03	06/27/03
Dimethoate (Cygon)	EPA 525.2	ND	µg/L	10	1	10	06/27/03	06/27/03
Metolachlor	EPA 525.2	ND	µg/L	0.5	1	0.5	06/27/03	06/27/03
Metribuzin	EPA 525.2	ND	µg/L	0.5	1	0.5	06/27/03	06/27/03
Molinate (Ordram)	EPA 525.2	ND	µg/L	2.0	1	2	06/27/03	06/27/03
Prometryn (Caparol)	EPA 525.2	ND	µg/L	2.0	1	2	06/27/03	06/27/03
Propachlor	EPA 525.2	ND	µg/L	0.5	1	0.5	06/27/03	06/27/03
Simazine (Princep)	EPA 525.2	ND	µg/L	1.0	1	1	06/27/03	06/27/03
Thiobencarb (Bolero)	EPA 525.2	ND	µg/L	1.0	1	1	06/27/03	06/27/03
3-Hydroxycarbofuran	EPA 531.1	ND	µg/L	3.0	1	3	06/30/03	06/30/03
Aldicarb	EPA 531.1	ND	µg/L	3.0	1	3	06/30/03	06/30/03
Aldicarb Sulfone	EPA 531.1	ND	µg/L	2.0	1	2	06/30/03	06/30/03
Aldicarb Sulfoxide	EPA 531.1	ND	µg/L	3.0	1	3	06/30/03	06/30/03
Carbaryl	EPA 531.1	ND	µg/L	5.0	1	5	06/30/03	06/30/03
Carbofuran	EPA 531.1	ND	µg/L	5.0	1	5	06/30/03	06/30/03
Methomyl	EPA 531.1	ND	µg/L	2.0	1	2	06/30/03	06/30/03
Oxamyl	EPA 531.1	ND	µg/L	20.0	1	20	06/30/03	06/30/03
Glyphosate	EPA 547	ND	µg/L	25	1	25	07/01/03	07/02/03
Endothall	EPA 548.1	ND	µg/L	45	1	45	06/25/03	06/26/03

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
DLR: Detection Limit for Reporting : PQL x Dilution
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Sample Type: Liquid

Sample Description: 99 San Bernancio

Sample Comments: 13555

Date Sampled: 06/20/2003
Time Sampled: 0910
Date Received: 06/24/2003

Organics

Analyte	Method	Result	Units	PQL	Dilution	DLR	Prep Date	Analysis Date
Diquat	EPA 549.1	ND	µg/L	4	1	4	06/26/03	06/27/03
Diuron	EPA 632	ND	µg/L	1.0	1	1	06/27/03	07/07/03
Surrogate								
1-Chloro-2-fluorobenzene	EPA 502.2	96	% Rec		1	N/A	06/26/03	06/26/03
Bromoform	EPA 504.1	94.5	% Rec	-	1	N/A	06/27/03	07/01/03
Tetrachloro-m-xylene	EPA 505	88	% Rec		1	N/A	06/27/03	06/30/03
DCPAA	EPA 515.3	98	% Rec		1	N/A	06/30/03	06/30/03
1,3-Dimethyl-2-nitrobenzene	EPA 525.2	100	%Rec		1	N/A	06/27/03	06/27/03
BDMC	EPA 531.1	106	% Rec	-	1	N/A	06/30/03	06/30/03
AMPA	EPA 547	95.5	% Rec	-	1	N/A	07/01/03	07/02/03
Benthiocarb	EPA 632	82	% Rec		1	N/A	06/27/03	07/07/03

mg/L: Milligrams/Liter (ppm)
mg/Kg: Milligrams/Kilogram (ppm)
µg/L: Micrograms/Liter (ppb)
µg/Kg: Micrograms/Kilogram (ppb)
%Rec: Percent Recovered (surrogates)

PQL: Practical Quantitation Limit
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Report Authentication Code: *336114-761.5200*

Monterey Bay Analytical Services
121 Hitchcock Cyn. Rd.
Carmel Valley, CA 93924

SAMPLE ID **AA13555**

CORRECTNESS OF ANALYSIS

CATION	MG/L	FACTOR	MEQ/L
Sodium	127	0.04350	5.52
Potassium	2.8	0.02558	0.07
Calcium	55	0.04990	2.74
Magnesium	21	0.08229	1.73
		SUM	10.07

ANION	MG/L	FACTOR	MEQ/L
Total Alkalinity	151	0.02000	3.02
Sulfate	18	0.02082	0.37
Chloride	263	0.02821	7.42
Nitrate	5	0.01613	0.08
Phosphates	0.1	0.01050	0.00
		SUM	10.90

ANION-CATION BALANCE: **-4** (% DIFFERENCE)

Note: Anion-cation sums must balance because all potable waters are electrically neutral. For anion sums below 10.0 meq/L, a 2% difference is acceptable. For anion sums between 10.0 - 800 meq/L, a 5% difference is acceptable. If the difference exceeds the above criteria, the sample should be reanalyzed.

ION SUM AND MEASURED CONDUCTIVITY:

Conductivity	1120	
Cation Sum X 100	1007	**90%**
Anion Sum X 100	1090	**97%**

Note: Ion sum (cation or anion) X 100 should be within 10% of the measured conductivity. If either sum is out of range, recheck analysis.

TDS/SEC Ratio **0.62**

Monterey County Health Department
Environmental Health Division
1270 Natividad Road
Salinas, California 93906

Project Specific Hydrogeologic Report

Harper Canyon Realty, LLC Subdivision

September 2002

Prepared by:

Todd Engineers
Emeryville, California

Project Specific Hydrogeologic Report

Harper Canyon Realty, LLC Subdivision

September 2002

Prepared for:

Monterey County Health Department
Environmental Health Division
1270 Natividad Road
Salinas, California 93906

Prepared by:

Todd Engineers
2200 Powell Street, Suite 225
Emeryville, California
Phone: 510 595-2120
Fax: 510 595-2112

Phyllis Stanin
Principal Geologist

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Executive Summary

The Monterey County Health Department, Division of Environmental Health is requiring a Project Specific Hydrogeologic Report for the proposed Harper Canyon Realty LLC (PLN 000696) development prior to deeming the application complete per authority of Title 19 of the Monterey County Code. This report summarizes Todd Engineers' review of available data and reports concerning the hydrogeologic conditions at the proposed site and vicinity. Todd Engineers examined the availability of sustainable long-term water supply for the project, conducted a local water balance, and identified potential effects the project may have on the quantity and quality of groundwater given the data available.

The Harper Canyon Realty LLC subdivision (site) is approximately 12 miles southeast of Carmel. The 343.92 acre property will have seventeen homes with the lots comprising 163.91 acres on the northern portion of the property. The remaining property will be open space.

It is proposed that the water supply for the development will include an existing well located outside of the subdivision moratorium area in the nearby Oaks subdivision. In addition, a new well is to be installed on the Harper Canyon property to supplement the Oaks well. Information regarding this new well will be included as an addendum to this report after installation and testing. The Oaks well is currently supplying water at a rate of 4 gallons per minute (gpm) to nine homes in the Oaks subdivision. The Oaks well and new well will be tied together and supply water to the proposed subdivision. This new system will be transferred to the California-American Water Company (Cal Am) and operated as a satellite system.

Todd Engineers' review of available data indicates that pumping 12.75 acre feet per year (7.9 gpm) for the proposed Harper Canyon development will not deplete the aquifer on a regional basis. Capacity and local impacts associated with the new well cannot be determined at this time because the proposed well location, construction, and pumping test results are unknown. The Oaks well appears to be capable of sustaining a long-term pumping rate of 12 gpm to supply the Oaks subdivision and the Harper Canyon homes and does not appear to result in any appreciable impacts to nearby wells. Available data indicate that the project will have a negligible effect on groundwater quantity and quality and that an adequate water supply exists. These conclusions are

pending the results of installation, testing, and water quality sampling of the new well, which will be included as an addendum to this report when available.

Introduction

Background

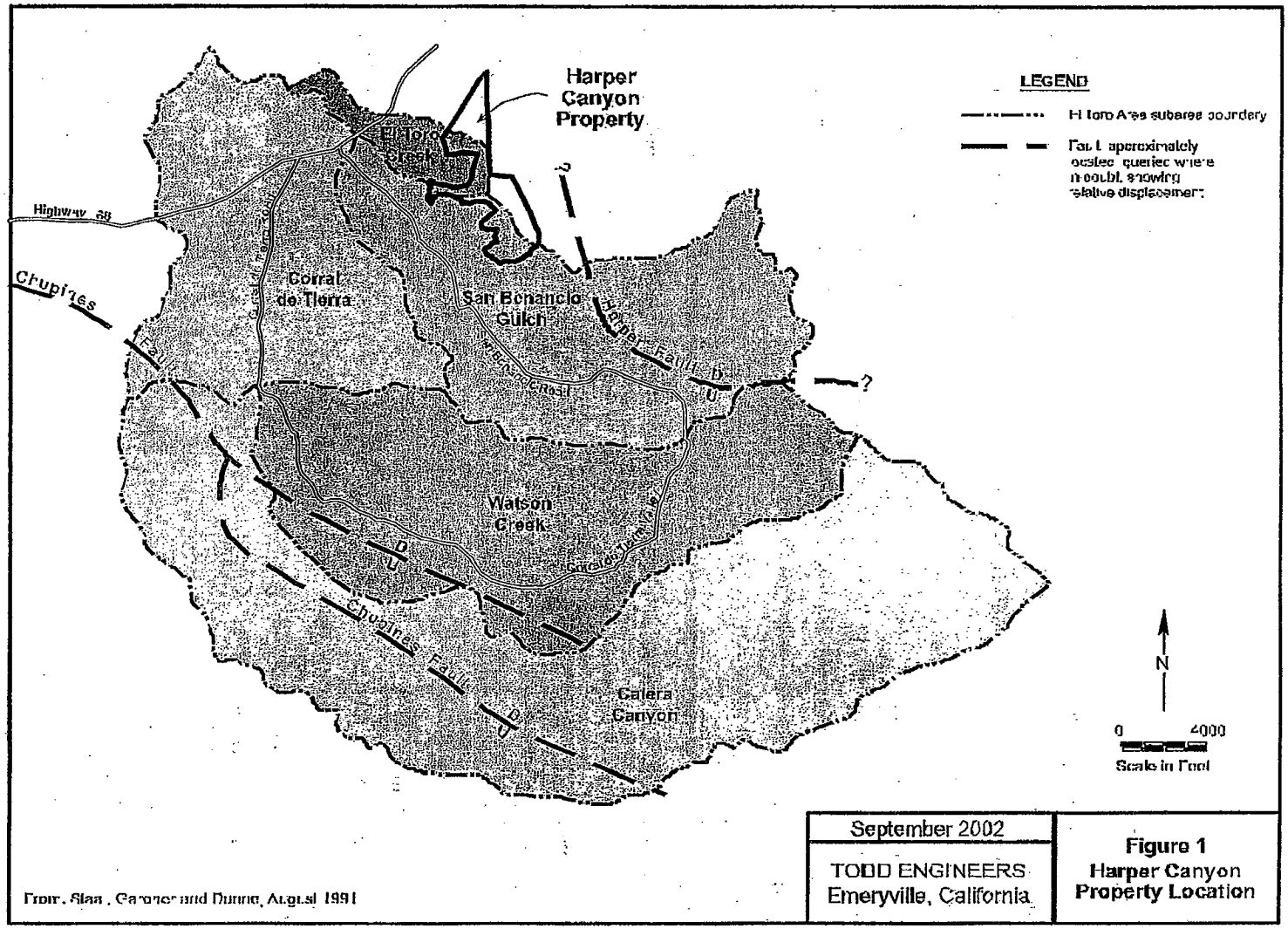
The Monterey County Health Department, Division of Environmental Health is requiring a Project Specific Hydrogeologic Report for the proposed Harper Canyon Realty LLC (PLN 000696) subdivision prior to deeming the application complete per authority of Title 19 of the Monterey County Code.

The Harper Canyon Realty LLC subdivision (site) is approximately 12 miles southeast of Carmel and just south of State Highway 68 and east of San Benancio Road (Figure 1). Seventeen homes are proposed on the northern portion of the property (Figure 2). The Harper Canyon LLC property covers 343.92 acres with the lots comprising 163.91 acres. The remaining 180 acres will remain as open space (Lawrence, June 4, 2002).

It is proposed that the development will consolidate with the nearby Oaks subdivision. The California-American Water Company (Cal Am) supplies water to the Oaks subdivision but its main supply wells are located further west in an area currently under a subdivision moratorium (called Zone B-8). One existing well in the Oaks subdivision (referred to as the Oaks well) is outside the moratorium area. The Oaks well supplies 4 gpm of water to nine homes in the Oaks subdivision. This well will be supplemented with a new well to be installed on the Harper Canyon property. The Oaks well and the new well will be tied together and supply water to the proposed subdivision. This new system will be transferred to Cal Am and operated as a satellite system to keep water from wells outside of the moratorium area separate from the other Cal Am wells. This prevents use in the moratorium area of water from the Salinas Valley Groundwater Basin Assessment Zone (called Zone 2/2A), in which the Oaks well and new well sites are located. Zone 2/2A is the area east of San Benancio Road (Lawrence, May 31, 2002).

Scope

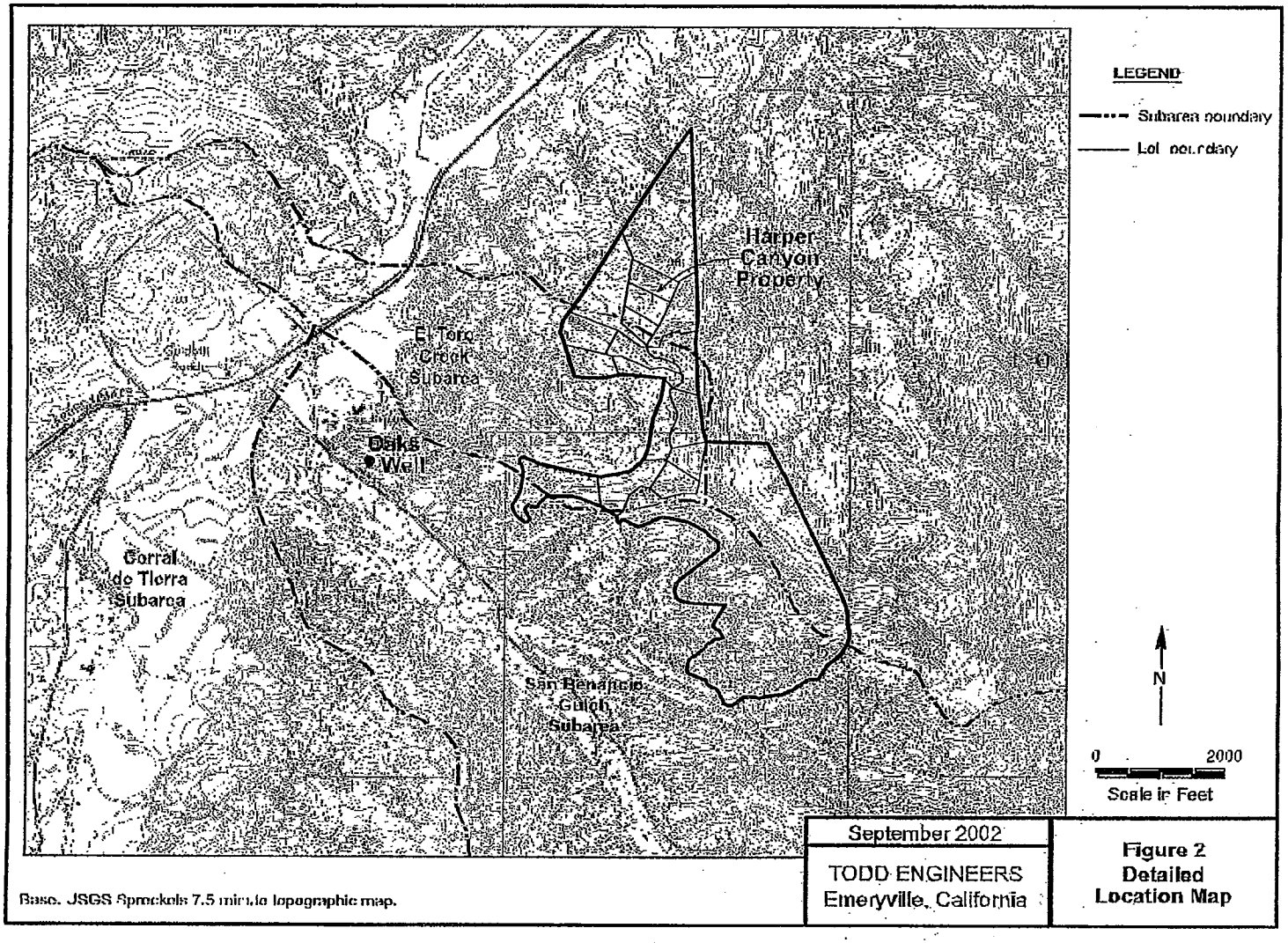
This report summarizes Todd Engineers' review of available data and reports concerning the hydrogeologic conditions at the proposed site and vicinity. The purpose of the report is to provide an integrated overview of water resource conditions and potential impacts on groundwater and mitigation measures resulting from the proposed development. Specifically, Todd Engineers


Harper
Canyon
Property
LEGEND
Fault approximately
located queried where
in doubt, showing
relative displacement
El Toro
Creek
Highway 68
Corral
de Tierra
San Bonanclo
Gulch
Chupines
Fault
Harper Fault
Watson
Creek
Calera
Canyon
N
0
4000
Scale in Feet
From: Slaa, Gardner and Dunne, August 1991
September 2002
TODD ENGINEERS
Emeryville, California
Figure 1
Harper Canyon
Property Location

examined the availability of sustainable long-term water supply for the project, conducted a local water balance, and identified potential effects the project may have on the quantity and quality of groundwater given the data available. Since this review does not involve the collection of field data, we have relied on the data and reports supplied to us from Monterey County Division of Environmental Health and other data in Todd Engineers' files.

Acknowledgements

This report was prepared under the supervision of David Abbott and Phyllis Stanin of Todd Engineers. We appreciate the direction and information from Laura Lawrence of the Monterey County Department of Health and her staff.



Base: USGS Spreckels 7.5 minute topographic map.

September 2002	**Figure 2 Detailed Location Map**
TODD ENGINEERS Emeryville, California	

Hydrogeology

Geologic and Hydrogeologic Setting

The site is in the northern portion of the Salinas Valley, which is in the central part of the California Coast Ranges. The Salinas Valley is a northwest trending tectonic basin 120 miles long and up to 6 miles wide (EDAW, June 2001). The area is underlain by the Paso Robles Formation, which consists of a thick sequence of continental deposits of interbedded sand, gravel, and clay. This formation, also called the Aromas-Paso Robles Formation, is approximately 400 feet thick just west of the site (Feeney, August 8, 2000). The Santa Margarita Sandstone underlies the Paso Robles Formation and the Monterey Shale is below the Santa Margarita Sandstone.

The site is located in the Pressure subarea of the Salinas Valley Groundwater Basin (EDAW, June 2001). The site is in two subareas of the El Toro planning area of Monterey County (see Figure 2). The El Toro planning area has been divided into five subareas based on surface drainage divides (Figure 1). The southwestern portion of the site is in the San Benancio Gulch subarea and the central portion of the site containing most of the proposed development is in the El Toro Creek subarea. The northern tip and eastern strip of the site are outside of the El Toro planning area in the Greater Salinas planning area. Groundwater in the El Toro subareas north of the Chupines Fault is believed to be interconnected (Staal, Gardner & Dunne, August 1991; Fugro, February 1996; and Fugro, February 4, 1998.)

Aquifers and Water Quality

In the vicinity of the site, groundwater is pumped from three water bearing units; the Aromas-Paso Robles Formation, the Santa Margarita Sandstone, and alluvium in local drainages. The Monterey Shale is not considered water bearing since it produces wells with low yields and poor water quality in this area (Schmidt, May 31, 2001). In the vicinity of the Oaks well the Paso Robles Formation is approximately 400 feet thick and the Santa Margarita Sandstone is approximately 250 feet thick (Feeney, February 11, 2000). Stream alluvium is reported up to 200 feet thick in the El Toro planning area (Schmidt, May 31, 2001).

Typical well yields, specific capacities, and water quality data are listed below for the two principal aquifers in this area (Feeney, February 11, 2000).

Water Bearing Unit	Well Yield (gpm)	Specific Capacity (gpm/ft)	Water Type	Total Dissolved Solids (mg/l)
Paso Robles Formation	up to 200	2	calcium-bicarbonate	500
Santa Margarita Sandstone	over 500	5	sodium-chloride	1,000

gpm = gallons per minute
gpm/ft = gallons per minute per foot of drawdown
mg/l = milligrams per liter

The Oaks well is six inches in diameter, approximately 410 feet deep, and produces from the Paso Robles Formation. The depth to groundwater in 2000 was 95 feet and the top of the 180-foot screen is at a depth of 220 feet. Feeney (February 11, 2000) reports that the Oaks well can be pumped at a rate of 60 gpm. Assuming a 24-hour specific capacity of 1.1 gpm/ft as calculated from a pumping test, the well is theoretically capable of a discharge rate of 138 gpm. Water quality meets primary drinking water standards but exceeds secondary esthetic standards for total dissolved solids and manganese. The new well should be sampled for water quality to ensure an adequate supply.

Groundwater Levels and Flow

Groundwater moves unimpeded across the El Toro subarea boundaries from the southern subareas to the northern subareas. Groundwater flow generally follows the topography and exits the El Toro planning area to the north and to the west. Groundwater elevations are about 320 feet above mean sea level in wells screened in the Paso Robles Formation in the northern San Benancio Gulch subarea (Schmidt, May 31, 2001).

The Monterey County Water Resources Agency has been measuring water levels in about 40 wells in the El Toro area since 1960. In 2001, Schmidt (May 31, 2001) prepared updated hydrographs for these wells, including six wells in the San Benancio Gulch subarea. No long-term water level decline was apparent on hydrographs for two of these wells, which are screened in the Aromas-Paso Robles Formation and possibly the stream alluvium. The four other hydrographs were

from wells screened in the Aromas-Paso Robles Formation and indicated long-term water level declines between 0.4 and 1.6 feet per year from 1960 to 2000. Apparently no wells are monitored in the El Toro Creek subarea.

Water Balance

A simple water balance is conducted here to compare inflows (recharge) and outflows (demand) to determine if a surplus or deficit exists between groundwater demand and recharge.

Recharge

Todd Engineers reviewed recharge calculations by Staal, Gardner & Dunne, Inc. (August 1991) and Fugro (February 1996). Their estimates of 2.18 and 1.93 to 3.13 inches/year, respectively, seem reasonable given the annual precipitation and assumptions used in the calculations. Using a value of 2.18 inches for recharge, the total recharge in the El Toro Creek and San Benancio Gulch subareas was calculated by Feeney (April 25, 2000) to be 74 and 486 acre-feet per year (AF/y), respectively.

Project Water Demand

The 17 lots are proposed to use a total of 5.61 AF/y (Harper Canyon Realty, May 30, 2001 and Lawrence, June 4, 2002). This results in a usage of 0.33 AF/y per home (5.61 AF/y/17 homes). Landscape irrigation is expected to be minimal and the development will be sewered. Thus, recharge associated with irrigation or septic system use is assumed to be negligible. Water supply for the development will come from the Oaks well and a new well on the Harper Canyon property.

This water usage rate estimated by the applicant is on the low end when compared to typical water usage values in the area. Fugro (February 1996) estimated the average interior water usage of an existing home at 0.38 AF/y and exterior usage at 0.28 AF/y in the El Toro area. The Toro Water Company customers in the area used 0.68 AF/y between 1990 and 1993 and Ambler Park Water Company customers used 0.63 AF/y between 1984 and 1990 (Fugro, February 1996). For planning purposes, Monterey County has used a demand of 0.75 AF/y per home in the Rancho San Carlos development (Lawrence, September 6, 2002). After review of these demands and

discussions with county staff, it was decided to assume a demand value of 0.75 AF/y per home for a total demand of 12.75 AF/y for the 17 homes.

Comparison of Supply and Demand

Fugro (February 1996) concluded that recharge values in the four El Toro subareas north of the Chupines Fault, which are considered interconnected, exceeded current demand and were sufficient to meet estimated demand at build-out. The table below summarizes 1995 use and build-out projections from the Fugro (February 1996) report and updated in Feeney (April 25, 2000) using a recharge value of 2.18 inches. Build-out conditions were for 175 units in the El Toro Creek subarea and 542 units in the San Benancio Gulch subarea.

Subarea	Recharge @ 2.18 inches	1995 Demand (number of units)	Build-out Demand (number of units)	Build-out Water Surplus
El Toro Creek	74 AF/y	1.1 AF/y (1 unit)	69.3 AF/y (175 units)	4.7 AF/y
San Benancio Gulch	486 AF/y	342.2 AF/y (413 units)	456.1 AF/y (542 units)	29.9 AF/y

These values reflect a 1995 interior use of 0.38 Af/y (57.6 percent) and exterior use of 0.28 AF/y (42.4 percent). Future interior use was estimated to decrease to 0.20 AF/y. The values also assume that 80 percent of the interior usage returns via septic systems and 20 percent of exterior usage is return flow. Since the Harper Canyon homes will be sewered, no return flows via septic systems will occur. Assuming that 57.6 percent of water usage is interior the loss of septic return can be estimated to be 5.875 AF/y (12.75 AF/y x 0.576 x .80 = 5.875 AF/y). Since this value is greater than the estimated surplus at projected build-out for the El Toro Creek subarea, the water balance should be recalculated if future developments are planned for this area.

Initial review indicates that recharge is greater than the 1995 water usage plus the proposed project usage in the El Toro Creek and San Benancio Gulch subareas. It is important to note that this water balance employs regional averages and that local deviations may exist. For example,

water levels in some wells in the San Benancio Gulch subarea have experienced long-term declines (Schmidt, May 31, 2001). This indicates that local water level depressions exist and well specific hydrogeologic information is needed to evaluate local recharge. Pumping tests should be conducted on the new well to determine aquifer capacity and at what rate the well could be pumped without impacting other nearby wells. This information will be included as an addendum to this report when available.

Nitrate Balance

An *Initial Water Use/Nitrate Impact Questionnaire for Development in Monterey County* (Harper Canyon, May 30, 2001) was completed for the proposed development. Responses on this questionnaire suggest that the site would use septic and sewer systems. Recent information from the County of Monterey staff state that the subdivision will be entirely sewered (Lawrence, May 31, 2002). Thus, nitrate loading is not expected to increase since the subdivision will not be on septic systems. Therefore nitrate related impacts associated with the subdivision are negligible.

Potential Effects of Development on Groundwater

Effects on Local Wells

It is difficult to determine local impacts associated with the addition of the new well since we do not know the subarea/planning area location, construction, or capacity of the proposed well. If the entire estimated project demand of 12.75 AF/y were to be provided by a new well, the well would have to pump a minimum of about 8 gpm.

Feeney (July 19, 2000) conducted a pumping test on the Oaks well to determine pumping rates and potential impacts on other wells. A 72-hour pumping test was performed on the Oaks well, which is screened in the Paso Robles Formation. The well was pumped at 37 gpm resulting in a drawdown of 32.4 feet and a 24-hour specific capacity of 1.1 gpm/ft (Feeney, July 19, 2000). Transmissivity was calculated to be 1,085 gpd/ft. Feeney (July 19, 2000) concluded that pumping of the Oaks well at 4 gpm would not impact adjacent wells. He estimated that after 20 years of pumping, the drawdown 1,000 feet away would be less than 2.1 feet. Nearby wells included in the evaluation are the San Benancio School well located approximately 1,000 feet north and the Ambler Park wells located approximately 1,500 feet west of the Oaks well (Feeney, July 19, 2000). Additional wells on the Harper Canyon property would be even further away from these wells.

Pumping the Oaks well at a higher rate would have little impact on the existing wells due to their great distance from the pumping well (over 1,000 feet). The cone of depression around the Oaks well would be deeper but the radius of influence would not change. The proposed new well will probably be over 1,000 feet away from the Oaks wells and other existing wells thus reducing the potential for impacts. Nonetheless, pumping tests should be conducted on the new well to assess the local impacts associated with pumping more than one well in the area.

Effects on Aquifer

Regional effects on the aquifer from the pumping increase of 12.75 AF/y appear to be minimal when compared to recharge estimates. Note that this comparison is regional and on an average basis. Local effects are uncertain since location, construction, and pumping capacity of the new well are unknown. Water levels will likely decline in times of extended drought. Hydrogeologic information should be analyzed for any additional wells since recharge, especially on a local level,

is limited. This information includes aquifer testing data for the new wells and any existing local wells, pumping rates for the existing and proposed wells, and historic water level and water quality data in nearby wells.

Conclusions

Todd Engineers review of available data indicate that pumping 12.75 AF/y for the proposed Harper Canyon development will not deplete the aquifer on a regional basis. Local impacts associated with the new well cannot be determined at this time since the proposed well location, depth, and pumping capacity are unknown. These data will be summarized in a report addendum after the well has been installed and tested. Pumping the Oaks well and the new well at 12 gpm to supply the Oaks subdivision and the Harper Canyon homes does not appear to result in any appreciable impacts to nearby wells. In conclusion, available data indicate that the project will have a negligible effect on groundwater quantity and quality and that an adequate water supply exists.

Based on our review, we recommend the following:

- Pumping tests should be conducted on any new well(s) installed on the Harper Canyon property to determine aquifer parameters, pumping rates, well interference, and local impacts.
- Water samples from the new well should be analyzed for water quality to ensure an adequate supply.
- Water levels and water quality should be routinely measured and reported for the Oaks well and new well(s), including monthly water level measurements. These data could assist in determining aquifer(s) sensitivity to droughts and pumping. In addition, pumping volumes should also be recorded and submitted with other monitoring data. If these data are already being generated as part of a California Department of Health Services (DHS) permit, the County could access data from DHS. These data can be used for evaluation of new wells installed in the future.
- Additional hydrogeologic understanding of this area on a local level is needed as additional developments are approved. This may involve construction of groundwater elevation maps, hydrographs, and aquifer testing of existing wells.

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- Feeney Technical Memorandum, *Well Construction and Testing Summary – "The Oaks" Well, San Benancio Canyon Road*, August 12, 2000,
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COUNTY OF MONTEREY
HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

MEMORANDUM

November 12, 2002

TO: Paul Mugan, Associate Planner
Planning and Building Inspection Department

FROM: Laura Lawrence, R.E.H.S., EHS IV
Health Department

SUBJECT: PLN 000696, Harper Canyon Realty LLC, Standard Subdivision

The Division of Environmental Health has reviewed a draft project specific hydrogeological report for the subject project. The report clearly indicates that there is adequate source capacity for the proposed project and that the project in and of itself should have negligible effects on the aquifer in this area and on nearby existing wells. Based upon this information, the Division of Environmental considers the application complete with conditions (see separate memo).

However, the existing water system will require a second well to sustain the additional connections proposed by the development. In agreement with the applicant, the following conditions are to be completed prior to a public hearing:

1. Prior to public hearing, a water supply well for the proposed water system shall be drilled under permit of the Division of Environmental Health. The water system is to be operated by California American Water Company.
2. After drilling the new well and prior to public hearing, provide evidence to the satisfaction of the Director of Environmental Health and California American Water Company that the water source meets applicable State and County standards for water quantity and quality.
3. Water quality and quantity information shall be submitted to the Division of Environmental Health and incorporated into the final Project Specific Hydrogeological Report for the subdivision.

COUNTY OF MONTEREY
HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

MEMORANDUM

November 12, 2002

TO: Paul Mugan, Associate Planner
Planning and Building Inspection Department

FROM: Laura Lawrence, R.E.H.S., EHS IV
Health Department

SUBJECT: PLN 000696, Harper Canyon Realty LLC, Standard Subdivision

The Division of Environmental Health now considers the subject application complete with the following conditions:

1. Design the water system improvements to meet the standards as found in Chapter 15.04 of the Monterey County Code, Titles 17 and 22 of the California Code of Regulations and as found in the Residential Subdivision Water Supply Standards. Submit engineered plans for the water system improvements, including plans for secondary treatment, and any associated fees to the Director of Environmental Health for review and approval prior to installing (or bonding) the improvements.
2. Design the water system improvements to meet fire flow standards as required and approved by the local fire protection agency. Submit evidence to the Division of Environmental Health that the proposed water system improvements have been approved by the local fire protection agency prior to installation or bonding of water system improvements.
3. The developer shall install or bond the water system improvements to and within the subdivision and any appurtenances needed prior to filing the final (parcel) map. The performance bond shall be based on an Engineering Report. Cost Estimate shall be submitted to and approved by the Division of Environmental Health.
4. Submit engineered plans for the sewer system to California Utilities Service for review and approval prior to installing the sewer system improvements. The sewer system improvements shall be installed or bonded for installation to and within the subdivision or prior to filing the final map. Provide evidence to the Director of Environmental Health that the proposed sewer system improvements have been approved by California Utilities Service prior to filing the final map.

COUNTY OF MONTEREY
HEALTH DEPARTMENT

MEMORANDUM — ENVIRONMENTAL HEALTH DIVISION

November 12, 2002

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COUNTY OF MONTEREY
HEALTH DEPARTMENT

MEMORANDUM — ENVIRONMENTAL HEALTH DIVISION

November 12, 2002

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California-American Water Company

Monterey Division
50 Ragsdale Dr., Suite 100, P.O. Box 951 • Monterey, CA 93942-0951

Terry Ryan
Vice President & Manager

April 19, 2001

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APR 23 2001
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ATTORNEY AT LAW

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Mr. Michael Cling, Attorney at Law
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RE: Harper Canyon Realty, LLC
APN: 416-521-001
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416-521-008
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This letter is to advise that the referenced property is located within the California-American Water Company (Cal-Am) service area. Cal-Am will serve water to these lots under the provisions of the rules, regulations and tariffs of the California Public Utilities Commission (CPUC) and in accordance with all applicable rules, regulations and ordinances and restrictions of any other regulatory agency with jurisdiction. The applicant for water service must comply with all Cal-Am rules and regulations as are on file with the CPUC and must obtain all required permits and pay all required fees as a condition of service.

Requirements for system improvements that may be necessary have not yet been determined. All costs required to upgrade the system for water service and fire protection to meet all applicable jurisdictional requirements for this project shall be the sole responsibility of the property owner. This may include, but is not limited to, source of supply, treatment, distribution and/or storage. The scope of this proposal to serve water is valid for an indefinite period of time, is subject to water availability to Cal-Am and to changes or modifications as approved, adopted or directed by the CPUC and/or other jurisdictions with authority.

Sincerely,

Terry Ryan