EXHIBIT 16-G

TECHNICAL MEMORANDUM
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To:	MPWMD	Date:	April 29, 2011
Attention:	Joe Oliver, P.G., C.Hg, Water Resources Manager	Project No:	06-0015
Copy to:	Henrietta Stern Matthew Sundt		
From:	Robert Marks, P.G., C.Hg		
Subject:	Review of Well Source and Pumping Impact Assessment Report for: Flores/Pisenti Well #2, APN 103-071-019		

INTRODUCTION

Presented in this Technical Memorandum is a summary of our findings and conclusions based on our review of the above-referenced assessment report. The assessment report, dated March 22, 2011, was prepared for Paul Flores by Bierman Hydrogeologic (Bierman) in support of a Water Distribution System (WDS) permit application for a proposed project at the above-referenced property. Our review focused on evaluating the assessment report for compliance with the MPWMD Procedures for Preparation of Well Source and Pumping Impact Assessments (MPWMD Procedures), dated September 2005 (revised May 2006). A summary of our findings is presented below.

FINDINGS

General Description of Proposed WDS

An existing well located at the subject parcel is proposed to be utilized to supply indoor potable and outdoor irrigation water for a proposed WDS on the subject parcel. The proposed project consists of a single-family residence, guest house, and exterior landscaping with a combined average annual demand (not including conveyance and treatment system losses) of 1.27 acre-feet per year (afy). Interior potable demands total 0.51 afy, representing approximately 40 percent of the total WDS demands, with the remaining demands associated with outdoor water uses.

Hydrogeologic Setting

The subject well is located in the Jacks Peak area of Monterey. The well location is greater than 1,000 feet from the mapped boundary of Carmel Valley Alluvial Aquifer (CVAA) and is completed with perforations within fractured Monterey Formation bedrock; therefore, Hydrogeologic Setting #2 of the MPWMD Procedures is applicable to this well.

Well Construction Summary

Presented below is a summary of the as-built construction of the subject well as documented on its Well Completion Report:

Table 1. Well Construction Summary

Construction Feature	Flores/Pisenti Well #2
Total Cased Depth (ft. bgs[1])	600
Borehole Diameter (inches)	10
Casing Inside Diameter (inches)	5
Perforated Intervals (ft bgs)	Various between 180 to 580
Static Water Level[2] (ft bgs)	143.5
Date Drilled	10/7/10
DWR Well Completion Report No.	e069163
Date Signed	10/8/10
MCHD Permit No.	10-11806
Date Issued	9/24/10

Notes:
1 – feet below ground surface (ft bgs)
2 – following well construction

General Testing Methods

MPWMD Procedures specify eight general testing methods that apply to all pumping tests, regardless of the hydrogeologic setting. The testing methods are described in the assessment report and were reviewed for compliance with MPWMD Procedures, as summarized in Table 2 below:

Table 2. General Testing Methods Summary

Test Method	Compliance	Comments
1 - Witnessed by MCHD[1]	Yes	MCHD personnel present at startup
2 - Well Testing Method	Yes	Bierman performed test
3 - Timing of Test	Yes	Test performed in October 2010
4 - Discharge Rate	Yes	Test average approximately 6.3 gpm
5 - Control of Well Discharge	Yes	To ground through approximately 200 ft. of hose
6 - Wells Monitored	Yes	One offsite monitoring during test
7 - Data Collection	Yes	Documented in Appendix C of report
8 - Water Level Monitoring	Yes	Pressure transducer/datalogger used

Notes:
1 – Monterey County Health Department (MCHD).

As shown above, the general testing methods complied with MPWMD Procedures with no variations.

Well Testing Data Summary

Bierman conducted a 72-hour constant-rate pumping and recovery test on the subject well during the period October 12 through 21, 2010. Presented below is a summary of the well performance data developed from the testing program:

Table 3. Pumping Test Data Summary

Test Parameter	Flores/Pisenti Well #2
Static Water Level (ft bgs)	142.49
Total Volume Pumped (gallons)	27,094
Test Average Pumping Rate (gpm)	6.3
24-hour Volume Pumped (gallons)	9,008
24-hour Average Pumping Rate (gpm)	6.3
24-hour Pumping Level (ft bgs)	147.25
24-hour Drawdown (ft)	4.76
24-hour Specific Capacity (gpm/ft)[1]	**1.31**

Notes:
1 - gallons per minute per foot of drawdown (gpm/ft)

Well Yield Calculations

According to MPWMD Procedures, the yield of a well in Setting #2 is calculated by multiplying the 24-hour specific capacity by the available drawdown. As shown in Table 3 above, the 24-hour specific capacity of the subject was calculated to be 1.31 gpm/ft. Available drawdown for Setting #2 is defined as one-third of the saturated thickness penetrated by the well. The available drawdown calculations for the Flores/Pisenti Well #2 are as shown in Table 4 below:

Table 4. Available Drawdown Calculations

Parameter	Flores/Pisenti Well #2
Depth to Static Water Level (ft)	142.49
Depth to Bottom of Perforations (ft)	580.00
Saturated Thickness (ft)	437.51
Available Drawdown (ft)	**145.84**

MPWMD Procedures further require consideration of any shifts in the apparent transmissivity during the test, as well as water-level recovery data, to determine if any adjustments to the calculated 24-hour specific capacity and/or well yield should be made. A summary of these adjustment considerations is presented below:

Drawdown Curve and Apparent Transmissivity

MPWMD Procedures require that if the apparent transmissivity decreases between the first half and end of the test, the 24-hour specific capacity shall be adjusted by multiplying it by the ratio of late-time to early-time transmissivities. The assessment report presents calculated transmissivity values ranging between 184 to 852 gallons per day per foot (gpd/ft), depending on the portion of the curve analyzed and analytic method utilized. The transmissivity calculations take into account casing-storage effects during the initial portion of the drawdown curve (calculated to have expired within approximately 2 minutes[1] of pumping).

The drawdown curve did display a decrease in the apparent transmissivity between the first half and the end of the test; therefore, in accordance with MPWMD Procedures, Bierman made an adjustment to the 24-hour specific capacity by multiplying the ratio of late- to early-time transmissivity values as shown in Table 5 below.

Recovery Data

MPWMD Procedures also require that if 95% recovery is not achieved within two times the amount of time as the pumping period (i.e., 144 hours/6 days) the calculated well-yield should be reduced. After 6 days following termination of the pumping test, the water level had recovered to approximately 54.4%; therefore, consistent with previous practice, the calculated

[1] Based on an equation presented by Schafer, in The Johnson Well Journal (1978).

well-yield was adjusted by the amount of 6-day water level recovery less than 95% (i.e., 40.6% in this case), as shown in Table 5 below.

Calculated Well Yield

Based on the above, the final well-yield calculations in accordance with MPWMD Procedures for the subject well are summarized in Table 5 below:

Table 5. Well Yield Calculations Summary

Parameter	Flores/Pisenti Well #2
24-Hour Specific Capacity (gpm/ft)	1.31
Ratio of Late to Early Time Transmissivities	0.22
Adjusted 24-Hour Specific Capacity (gpm/ft)	0.284
Available Drawdown (ft)	145.84
Calculated Well Yield (gpm)	41.40
Recovery Adjustment (%)	40.6
Recovery Adjustment (gpm)	16.81
Final Calculated Well Yield (gpm)	**24.59**

Notes:
NA - Not Applicable

It is noted that Bierman presents a final calculated well yield value of 24.52 gpm; the slight difference between this value and that presented in Table 5 above is due to differences in numerical rounding.

Water Quality

A water-quality sample was collected from the well by Bierman on October 14, 2010 and was analyzed at a State Certified Laboratory for Title 22 primary inorganic and secondary compounds[2], general mineral and general physical parameters, and coliform bacteria. The results indicate that the water met the Maximum Contaminant Level (MCL) drinking-water standards[3] for primary inorganic constituents; however, the water exceeded the MCLs for several secondary (consumer acceptance-based) constituents, as summarized in Table 6 below:

[2] It is noted that perchlorate, MTBE, and thiobencarb were not analyzed.
[3] Updated December 21, 2010.

Table 6. Water Quality MCL Exceedance Summary

Constituent	Unit	MCL	Flores/Pisenti Well #2
Secondary Standards			
Iron	mg/L	0.3	0.310
Manganese	mg/L	0.05	0.074
Specific Conductance	uS/cm	900	1342
Total Dissolved Solids	mg/L	500	870

Given the water-quality results, the assessment report recommended that a Reverse Osmosis (RO) treatment system be installed; however, MCHD should also be consulted regarding treatment recommendations and/or requirements for this source and WDS. It is also noted that the sample tested positive for both total and coliform bacteria; therefore, the well and/or distribution system piping should be disinfected and resampled prior to being placed into potable service.

Water Demand Estimate

The subject well is proposed to provide both indoor potable and exterior irrigation supply to the proposed WDS, with an estimated base average annual demand of 1.27 afy[4]. As discussed above, given the water-quality results an RO treatment system has been recommended. Presented below is a summary of the instantaneous pumping-demand calculations prescribed by MPWMD Procedures based on the total average annual demand and the associated conveyance and treatment system losses for the subject WDS[5]:

Table 7. Demand Calculations Summary

Demand Category	Flores/Pisenti Well #2
Base Average Annual Demand (afy)	1.27
5% Conveyance Losses (afy)	0.07
15% Treatment Losses (afy)	0.22
Final Average Annual Demand (afy)	1.56
Average Day (gpm)	0.97
Dry Season (gpm)	1.16
Maximum Day (gpm)	1.45
12-hour Maximum Day (gpm)	**2.90**

[4] It is our understanding that this demand estimate is being reviewed by MPWMD staff; therefore, it was not independently verified as part of this review.
[5] Refer to the MPWMD Procedures for the derivation of these calculations.

Confirmation of Well Capacity

As presented above, the calculated well yield for the Flores/Pisenti Well #2 is approximately 24.59 gpm, which is greater than the 12-hour maximum-day demand (accounting for conveyance and treatment system losses) value of 2.90 gpm; therefore, based on MPWMD Procedures the well capacity is considered sufficient for the proposed WDS demand.

It is important to note that the above well-yield calculations are theoretical maximum sustained pumping rates based on calculations prescribed by MPWMD Procedures. The actual maximum rate achievable by any given well is practically limited by other factors, including: (a) the size of the selected pump and motor, (b) the pump (and intake) setting, (c) well-casing diameter, and (d) discharge-piping diameter.

Analysis of Offsite Impacts

MPWMD Procedures for Setting #2 require an evaluation of the potential well-pumping drawdown effects at existing offsite wells or any Sensitive Environmental Receptors (SERs) within 1,000 feet of the subject well. Projected drawdown impacts were calculated by Bierman utilizing the Modified Theis Nonequilibrium Equation[6]. The calculations assumed continuous pumping for 183 days at a dry-season demand pumping rate of 0.94 gpm[7]. A transmissivity value of 233 gpd/ft derived from analysis of the recovery curve and a literature-based storage coefficient value of 1.0×10^{-5} (dimensionless) were utilized in the calculations.

Potential Impacts on Existing Wells

Three existing offsite wells were identified by MPWMD within 1,000 feet of the subject well at distances ranging between approximately 537 to 992 feet. One of these wells (Flores/Pisenti Well #1), located approximately 537 feet from the subject well, was being simultaneously tested during the subject test (the pumping tests were staggered by approximately 75 minutes), and no evidence of mutual drawdown response between the wells was observed.

Bierman's calculations of projected drawdown utilizing the above-noted aquifer parameters indicate approximately 3.88 to 3.32 feet of calculated projected-drawdown impact at the nearest and farthest offsite wells, respectively. It is noted that Bierman's calculations utilize a dry-season demand pumping rate 0.94 gpm, which is based on the average annual WDS demand without consideration of the additional demands associated with conveyance and treatment system losses. Based on our calculations utilizing a dry-season demand pumping rate of 1.16 gpm (see Table 7), which takes into account system losses, approximately 4.79 to 4.09 feet of projected-drawdown impact is calculated at the nearest and farthest offsite wells, respectively. Based on available well construction information, the nearest offsite well (Flores/Pisenti Well #1) has a saturated thickness of approximately 762.1 ft. (based on depth to static water level of 131.9 ft. and the bottom of perforations at 894 ft.). The range of projected drawdown impact at this well represents an approximate 0.5 to 0.6 percent reduction in

[6] The projected drawdown calculations were verified as part of our review.
[7] Based on a base average annual demand value of 1.27 afy.

saturated thickness. The farthest offsite well (Maney) has a saturated thickness of approximately 343 ft. (based on a 2001 depth to static water level of 157 ft. and the bottom of perforations at 500 ft.). The range of projected drawdown impact at this well represents an approximate 1.0 to 1.2 percent reduction in saturated thickness. Assuming a 5 percent reduction in saturated thickness as an initial screening significance "threshold", the calculated drawdown impacts would be considered less than significant.

Potential Impacts on SERs

The subject well is located greater than 1,000 feet from the mapped boundary of the CVAA and there are no other SERs identified within 1,000 feet of the subject well; therefore, analysis of potential impacts on SERs is not required by MPWMD Procedures.

CONCLUSIONS

Based on our review of the subject assessment report, we offer the following conclusions:

Well Capacity

The maximum day 12-hour demand for the subject WDS was calculated according to MPWMD Procedures to be approximately 2.90 gpm, which is less than the calculated well-yield of 24.59 gpm; therefore, the well capacity is considered **sufficient** for the **1.27 to 1.56 afy** annual demand for this well.

Water Quality

The water-quality results indicate that the water from the well exceeded the Maximum Contaminant Level (MCL) drinking-water standards for several secondary (consumer acceptance-based) constituents. As such, the assessment report recommended that an RO treatment system be installed; however, the MCHD should be consulted regarding treatment requirements and/or recommendations for this source and WDS prior to this well being placed into potable service.

Analysis of Offsite Impacts

Analysis of projected drawdown impacts at existing offsite wells as a result of pumping the subject well to meet the demands of the subject WDS indicates that the impacts are likely to be **less than significant**. There are no SERs located within 1,000 feet of the subject well.

CLOSURE

This memorandum has been prepared exclusively for the Monterey Peninsula Water Management District for the specific application to the processing of a Water Distribution System permit. The findings and conclusions presented herein were based on our review of the subject assessment for compliance with MPWMD Procedures and were prepared in accordance

with generally accepted hydrogeologic practices. No other warranty, express or implied, is made.

It is noted that the long-term sustainable capacity and offsite impacts of wells completed in fractured-bedrock settings is dependant on a variety of factors that cannot be fully evaluated through analysis of relatively short-duration pumping tests and application of conventional aquifer analysis. The movement and long-term availability of groundwater in these materials is controlled by the occurrence, connectedness, and distribution of fractures. The distribution and connectedness of fractures to sources of recharge are essentially random, and the volume of groundwater in storage in these systems is often limited. The low volume of groundwater in storage can limit long-term supply, particularly during periods of deficient recharge. The implications of these factors should, therefore, be taken into consideration when planning long-term use and projecting impacts of wells that are completed in fractured-bedrock settings.