

**SulTech**

*A JOINT VENTURE OF SULLIVAN CONSULTING GROUP AND TETRA TECH EM INC.*

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12 February 2008

Frances Fadullon, RPM (IR Site 35)  
John Kowalczyk, LRPM Alameda Point (RPM CTO 130)  
Care of Craig Hunter, Project Manager  
Tetra Tech EM, Inc  
135 Main Street, Suite 1800  
San Francisco, CA 94105

Subject: Alameda Point Monitoring Well AOC 23-MW01

Dear Ms. Fadullon:

The purpose of this letter is to provide my analysis of suitability for service of the fourth of four monitoring wells installed at Alameda Point IR Site 35 Area of Concern (AOC) 23 under Contract Task Order 130. This well was installed without a California Professional Geologist (PG) on site. As a California PG who has not heretofore been associated with this site, I have been tasked by the SulTech management team to interview responsible personnel involved and review the lithologic and well-completion data for all four wells installed at this site. The purpose of this review was to determine whether the well in question was installed correctly and what, if any, corrective action needs to be taken.

### **Background**

Four shallow groundwater monitoring wells were to be installed at IR Site 35 AOC 23 to monitor dissolved concentrations of vinyl chloride in groundwater. The project is being conducted by SulTech, a joint venture between Tetra Tech EM, Inc and Sullivan Consulting Group for the US Naval Facilities Engineering Command, Southwest Division Base Realignment and Closure (BRAC) office. The wells were to be installed in accordance with the approved Sampling and Analysis Plan (SAP) for closing identified data gaps at the site, in accordance with Alameda County Public Works Agency, Water Resources Office and State of California guidelines and in accordance with SulTech's standard operating procedures (SOP.) It is the policy of SulTech that all well installations occur under the "responsible charge" of a California registered PG.

The SulTech team consisted of a California registered PG, Douglas Grant, and a lead field Environmental Scientist, Hannah Thompson. The hollow stem auger drilling and well installation were conducted by Vironex driller Tim McGinty under subcontract to SulTech. Monitoring well AOC23-MW03 was constructed on December 12, 2007. Monitoring wells AOC23-MW02 and -MW04 were constructed on December 13, 2007. The borehole for monitoring well AOC23-MW01 was advanced on December 13, 2007, but met refusal at a depth of approximately 4 feet and was abandoned. The installation of MW01 was then re-scheduled for Monday, January 7, 2008.

At approximately 7 PM on Sunday evening, January 6, the PG called the field scientist to tell her that he was sick and would not be able to work the next day. Having worked side-by-side on the installation of the three other wells at this site and because of concerns about calling the Project Manager or other responsible party late on Sunday and dealing with possible repercussions from cancelling the scheduled well installation the next morning, the PG encouraged the field technician to go ahead and install the well as scheduled. His reasoning was that he had confidence in her abilities, she already had experience with

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this particular driller during the three previous well installations and he assured her that he would provide guidance by phone if necessary.

Both the PG and field scientist were aware that the regulator from the California Department of Toxic Substances Control (DTSC), Michelle Dalrymple, who is responsible for the regulatory oversight of this project, would be visiting the site to observe the well installation. Neither was sufficiently concerned to have thought it necessary to notify the Project Manager that the PG would not be present during a well installation when it was known that the DTSC regulator would be observing. The regulator arrived at the site at approximately 9:10 AM and was given a health and safety briefing after which Vironex began hand-augering the first five feet of the well bore.

### **Records Review and Personnel Interviews**

Well installations were investigated by reviewing relevant sections of the Sampling and Analysis Plan for Data Gaps at IR Site 35, borehole logs and well installation for the four wells installed at AOC 23, well development data sheets for all four wells and daily field notes taken by the technician during all four well installations. The well installations were also investigated by conducting phone interviews with Michelle Dalrymple (DTSC,) Tim McGinty (Vironex driller who installed all four wells,) Doug Grant (SulTech PG) and Hannah Thompson (SulTech field scientist.) Their patience and cooperation during this process is greatly appreciated.

Of the four monitoring wells installed at this site, three (MW01, MW03 and MW04) were installed at a total depth of approximately 14 feet and one (MW02) was installed at a total depth of 13 feet. At each location, a hand auger was used to advance the boring for the first four or five feet. The boreholes for all four wells were then augered to total depth using a nominal 6-inch-diameter Geoprobe hollow stem auger rig with direct-push continuous sampling of the undisturbed soil in advance of the auger.

All four monitoring wells were constructed using nominal 2-inch diameter PVC casing with 10 feet of 0.010-inch slotted 2-inch diameter PVC well screen. An appropriately graded #2/12 sand filter pack was used to fill the annular space surrounding the well screen to approximately 1/2 to 1 foot above the top of the slotted interval. The remaining annular volume in each well was filled with 3/8-inch bentonite pellets to a depth of approximately 1 to 1-1/2 feet below ground surface (bgs.) The remaining annular space in each well was filled with concrete with an approximately 8-inch diameter steel flush mounted surface completion and a sloped concrete apron. A 2-inch diameter lockable well cap was installed at the top of each of the well casings.

The lithology logged from the continuous sample cores taken from all four boreholes was similar, consisting primarily of sand, silty sand and clayey sand. Depth to water ranged from approximately 4.5 feet below ground surface (bgs) in MW02 to approximately 7.5 feet bgs in MW01. The lithologic details described for each of the well borings appears adequate, although the accuracy of the lithologic descriptions cannot be substantiated at this point by anyone other than those who logged the continuous core samples.

Generally speaking, all four monitoring wells were relatively routine installations with nothing particularly remarkable occurring except for the presence of flowing or "heaving" sands in the borehole for monitoring well MW01. This made it difficult at first to place the well casing string to the bottom of the borehole at 14 feet and required the driller to again auger to the bottom to clean out the well sufficiently to place the bottom of the well casing at the proper depth. According to the driller, Tim

McGinty, he was able to correct the problem and placed the well casing at the required depth. He said that part of the annular space surrounding the well screen was filled with natural flowing sand from the formation, but that he was able to pour four bags of sand into the remaining space up to approximately 3 feet bgs, or 1 foot above the top of the well screen. This would have been approximately one bag less than the five sacks of sand placed in each of the other three wells, according to the well completion records. Copies of soil boring logs and the monitoring well completion records for the four wells installed at AOC 23 are included as Attachment 1.

It should be noted that the SAP states the following about filter pack emplacement on page 37: "The filter pack will be placed around the screen from approximately 1 foot below the bottom of the screen end cap to approximately 1 foot above the top of the well screen." Each of the well construction diagrams show the bottom of the screen end cap to be placed at the bottom of the borehole. There is no evidence to suggest that the well borings were augered any deeper than the target depth for the bottom of the well screen end cap and it is not known if having done so would have helped or worsened the problem with flowing sand in monitoring well MW01.

Well development records were also reviewed for all four monitoring wells and confirm that well development was begun for each well at least 24 hours after well installations were complete, except for well MW02 for which well development was begun approximately 23 hours after well installation was completed. Parameters monitored during well development were temperature, pH, conductivity, turbidity, oxidation/reduction potential, and dissolved oxygen. Each well was developed for approximately 1 hour, except for MW01, which was developed for three and one half hours and showed the best reduction in turbidity of all the wells. Other parameters were deemed relatively stable before concluding development procedures. Well development data sheets for the four AOC 23 wells are included as Attachment 2.

### **Specific Issues Raised**

When the State DTSC regulator arrived on site she spoke with the Ms. Thompson and observed that she was not a geologist but an environmental scientist. She was informed that the responsible California registered PG was not on site having called in sick the night before. When she posed specific questions to Ms. Thompson about the local geologic and hydrogeologic environment, she noted that Ms. Thompson's knowledge of the local geology and hydrogeology was very limited. The regulator then observed Ms. Thompson's logging of the boring cores and did not agree with her uniform soil classification of a fat clay for what the regulator observed to be silty sand at a depth of approximately 7.5 feet, coincident with the top of groundwater.

The regulator also observed that Ms. Thompson was not watching the driller as the well was being constructed and was placing too much faith in the driller to provide accurate counts of materials going into constructing the well, particularly the number of sacks of filter pack sand. She noted as the well installation began that the driller had stacked 6 sacks of sand near the well, which was an appropriate number of sacks for the anticipated well construction. At the completion of the well installation she counted only 1 empty sack of sand and one ¼-empty sack of sand out of the six and observed that four full sacks of sand were placed back on the truck. She suggested that Ms. Thompson talk to the drillers and carefully observe their activity during well construction so that she could accurately record the number of sacks of sand, bentonite and concrete that were being placed in the annular space of the monitoring well. Concerned that the well had insufficient filter pack, which could result in a turbidity problem that could

affect analytical accuracy, she asked Ms. Thompson to make sure the well was developed as best as possible before leaving the site.

### **Responses to Issues Raised**

As the State DTSC regulator accurately determined, the field scientist who logged the boring and oversaw construction of monitoring well MW01 is an environmental scientist and not a geologist. She has a Bachelor of Science degree in Environmental Science from the University of California in Santa Barbara (2003) and her college curriculum included one course in hydrogeology. She has been working on SulTech environmental projects since 2005. Her experience with borehole logging and well installation includes assisting the project PG with well logging, installation and sampling on two previous projects and assisting with the installation of the three wells installed previously at AOC 23. It is not the policy of SulTech to have an environmental scientist log and install monitoring wells except under the direct supervision of a registered California PG. In this case, the Project Manager should have been told that the PG in this case would not be present so that the Project Manager could have made the decision to either identify a substitute PG to be sent to the site or reschedule the well installation.

The regulator's observation of the field scientist's erroneously logging a silty sand layer as a fat clay must be taken seriously since it is easy to envision circumstances under which a misclassification of lithology would be critical to the evaluation of groundwater quality. It is for such reasons that registered PGs are required to take responsibility for lithologic classification and well construction. Hydrogeologically, it is important to know where clay layers exist that can impede the vertical movement of groundwater and prevent contaminated water flowing between high-porosity water-bearing zones. In this situation, the clay layer described in the log for MW01 corresponds to a similar clay layer at a similar depth logged in MW02, MW03 and MW04 by the PG in December. In my opinion, the relative clay content of the approximately 1.5 foot thick fine-grained low-porosity layer at the top of the upper groundwater zone in MW01 is not cause for significant concern and would not likely compromise any analytical data obtained from this well. The field scientist states that she followed the Uniform Classification System and American Society for Testing and Materials standards protocol in deciding to classify the layer from 7 feet 3 inches to 8 feet 9 inches bgs as a sandy organic clay (OH) with medium plasticity. However, without having the credentials or oversight of a registered PG on site, it would have been difficult for her to have successfully debated and defended her classification with a seasoned, experienced regulator had her opinion been challenged. For this reason it would be safe to assume that the boring log could contain errors, but this would not warrant replacement of this well without sufficient evidence that the well was improperly constructed in such a way as to compromise analytical data obtained from it.

The regulator's observation that the field scientist was not watching the driller as the well was being constructed and placed too much faith in the driller to provide accurate information is a very legitimate concern. Vironex is a reputable company and Tim McGinty is an experienced driller; however, once a well is completed it is impossible to verify what went into constructing the well and thus it is of paramount importance for all stakeholders that the well construction be witnessed and appropriately documented. Heaving sands at this location meant that it was likely that at least a portion of the annular volume surrounding the well screen and casing would have been filled with natural sand from the formation. The subsurface lithology in the vicinity of this well is known to contain abundant fine grained materials and a good filter pack is important to minimize the turbidity of any water samples collected. Since turbidity can affect the analytical results of groundwater samples, this is an important issue. The regulator believes that only one and three quarters bags of filter pack sand were used to construct the well. This would suggest that one half to three quarters of the filter pack surrounding the well screen in MW01

is natural formational silty sand. The worst case would be that the sand could have bridged on installation leaving a remote possibility of the sand eventually settling allowing bentonite, if not fully hydrated, to enter the well screen. The driller claims to have used no less than four full sacks of sand to construct the filter pack, which, if correct, would suggest there is very little chance of bridging and that less than one third of the filter pack is natural formational sand. Because the SulTech field scientist on site was not monitoring the well construction, it should be assumed conservatively that most of the filter pack in this well is natural formational sand containing an abundance of fine materials.

The development of well MW01 proceeded very similar to the development of monitoring wells MW02, MW03 and MW04. The field scientist states that she followed the well development procedures sent to her by the responsible PG. The driller initially surged the well gently, then pumped out the water at a rate of approximately 3 gallons per minute. Approximately 7 to 12 minutes were required for the well to recharge completely at which point it was pumped dry again. This was repeated from approximately 1:40 PM until approximately 4:20 PM when observed parameters of temperature, pH, conductivity, turbidity, dissolved oxygen and oxidation/reduction potential sufficiently stabilized. Water quality parameters were similar to those observed during the development of the previous three monitoring wells at this site, except it could be argued that monitoring well MW01 was better developed and resulted in lower turbidity readings than the other three previously completed wells. No particularly anomalous parameter readings were observed in any of the wells and as yet there is no indication that the well construction may have been compromised, particularly not to the extent that would affect analytical results for VOCs.

### **Conclusions and Recommendations**

The SAP clearly states on page 37 that soil "classifications will be made in the field by the on site geologist or engineer..." Although the SAP does not specifically require a California licensed professional geologist or engineer, neither a geologist nor engineer, licensed or otherwise, performed the soil classification for monitoring well MW01. Regardless of the faith the responsible PG may have had in the field scientist's soil classification and well construction oversight capabilities, he failed to exercise good judgment in allowing a relatively inexperienced, albeit competent environmental scientist to take responsibility for the logging and well installation, particularly since it was known that the State regulator would be on site that day. It was inappropriate not to have had a State-licensed professional available on site even if the regulator wasn't expected to be there. Similarly, it was inappropriate not to have notified the Project Manager to not inform him of the PG's planned absence that day. This issue will be addressed within the context of the ISO 9001 quality control protocol in accordance with SulTech standard practices and procedures.

Although there are legitimate reasons to question the quality of the boring log and amount of sand emplaced as a filter pack around the well screen, there is no reason as yet to suspect that analytical data obtained from groundwater samples properly collected from this well would be questionable. Groundwater parameters of temperature, pH, conductivity, turbidity, dissolved oxygen and oxidation/reduction potential should be carefully monitored when sampling all four of the monitoring wells at AOC 23 and anything anomalous should be reported, particularly for monitoring well MW01. Analysis of anions by EPA method 300 could be requested for groundwater samples from all four wells to help verify similar water quality. Any obviously anomalous reading would suggest water quality issues that might have resulted from problems with well construction. After sampling each well, the depth from the top of the casing to the bottom of the well sump should be measured taking care to tag the bottom without stirring up any silt that might have collected. Any anomalous accumulation of silt at the bottom

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of any monitoring well might suggest a problem with the well construction that could render analytical data obtained from it unreliable.

Copies of the original, hand-written boring logs and well completion reports for all four monitoring wells installed in AOC 23 have been signed and stamped by Doug Grant, the responsible California PG. By doing so he vouches for the accuracy of all four boring logs and well installation reports, including those for monitoring well AOC23-MW01, which was completed in his absence by Hannah Thompson on January 7, 2008.

SulTech appreciates the opportunity to address the legitimate concerns of DTSC on the logging and construction of monitoring well AOC 23-MW01. If you have any questions about the contents of this report, please do not hesitate to contact me.

Sincerely yours,



Dan B. McCullar  
Sullivan International Group  
California PG No. 4253

Attachments (2)

Cc: John Kowalczyk, LRPM Alameda Point  
Craig Hunter, Project Manager (Tetra Tech)  
Deanna Rhoades, Program Manager (Sullivan)  
Steve Bradley, Program Manager (Tetra Tech)  
Dennis Kelly, Alameda Point Director (Tetra Tech)

Sheet 1 of 2

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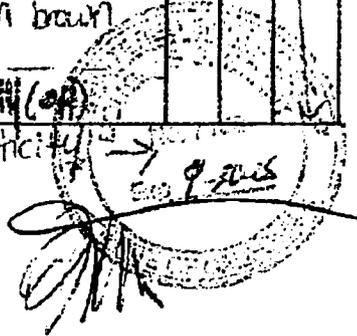
**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**

CTO: 130  
Bldg./Site: ACC 23, Site 35  
Project Name: Alameda Data Ctr

Boring Number: <u>ACC 23-MW-01</u>	Date Started: <u>01-07-08</u>
Drilling Method: (Circle one) HSA Continuous Core/Direct-Push/Hand Auger/ Air Rotary/Mud Rotary/Dual Tube Percussion/Sonic/Vacuum	Date Completed: <u>01-07-08</u>
Outer Diameter of Boring: <u>6"</u>	Logged By: <u>Hannah Thomason</u>
Inner Diameter of Well Casing: <u>2"</u>	Drilling Subcontractor: <u>Vitorex</u>
Depth to Water (feet bgs): <u>0-7'</u>	Driller: <u>Tim, Joel &amp; Justin</u>
Location Sketch:	

Time	Depth (feet bgs)	Drive Interval	Recovered Interval	Sample ID	Blow Count (per 6 inches) / V.B. Utility Type Diameter	Description	USCS Soil Symbol	Well Construction	OMV (ppm)
	0					Concrete 24" dia BASE COURSE 4" to 1' bgs			
	1					Well graded sand w/ silt & gravel (SW-SM)			
	2					25/70/5, coarse to medium (10 YR 5/6) light yellowish brown, moist, fill, no odor, no reaction with HCL			
	3		100%						
	4								
	5					STW SAND (SM): 0/75/25, grades to pore fine & dark yellowish brown (10 YR 4/4), moist, no odor, no reaction with HCL			
	6					at 6' 9" grades to a dark grayish brown			
	7		90%			at 7' 3" - 8' 9" Sandy organic clay (OH)			
	8					0130/70, fine, medium plasticity			

\* Note: Initialed all markups according to Doug's comments on boring log.



Sheet 2 of 2

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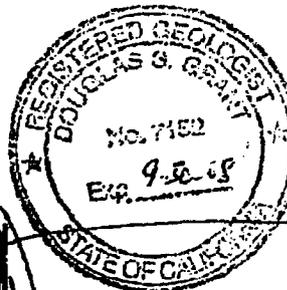
SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG

CTO: 130

Bldg./Site: ACC 23, Site 35

Project Name: Alameda data gap

Time	Depth (feet bgs)	Drive Interval	Recovered Interval	Sample ID	Blow Count (per 6 inches) / V.B. utility type dia	Description	USCS Soil Symbol	Well Construction	OVM (ppm)
	7	Continuous from 5'-10'	100%			Medium dry strength, no dilatancy, medium toughness, very dark gray (2.54 3/1) wet, Bay Sediment Unit (upper), no react. w/ HCL at 8' 9" Silty Sand / clayey Sand (SC-SM): 0.7930, moist, very dark greenish gray (Gley 3/1), no odor, no reactivity w/ HCL			0.0
	12	Continuous	100%			at 12' 7" Clayey Sand (SC) 0.160/40 HCL greenish gray (Gley 4/1), moist, no odor, no reactivity w/ HCL			
	13	H.T. from 10'-14'	N.T.			Base of Boring at 14'			



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Sheet 1 of 1

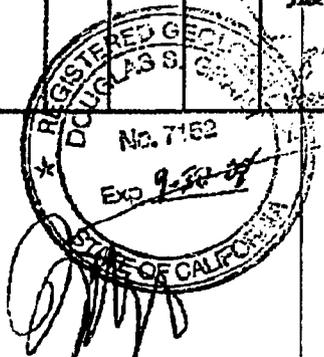
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**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**

CTO: 01306  
Bldg./Site: RR 32  
Project Name: AAAFDA DETRAP

Boring Number: <u>ASC 23-MW-02</u>	Date Started: <u>12/21/07</u>
Drilling Method: (Circle one) <u>HSA Continuous Core</u> Direct-Push/Mand Auger/ Air Rotary/Mud Rotary/Dual Tube Percussion/Sonic/Vacuum	Date Completed: <u>3/21/08</u>
Outer Diameter of Boring: <u>6"</u>	Logged By: <u>DSG</u>
Inner Diameter of Well Casing: <u>2"</u>	Drilling Subcontractor: <u>VIRDEX</u>
Depth to Water (feet bgs): <u>4.5' SPINDLE BAND AUGERING</u>	Driller: <u>TIM REYNOLDS</u>
Location Sketch:	

Time	Depth (feet bgs)	Drive Interval	Recovered Interval	Sample ID	Blow Count (per 6 inches) / V.B. Utility-Type Diameter	Description	USCS Soil Symbol	Well Construction	QVM (ppm)
	1					ACCOMPT DRIVE CHARGE (3/4") TO 12" BGS			
	2					SILTY SAND (SA): 5/15/15, FINE TO COARSE, LIGHT YELLOW TO BROWN (10YR 6/4)			
	3					1/2" CRABES TO MOSTLY FINE, YELLOWED BROWN (10YR 5/4), POINT			
	4					NET (2 1/2')			
	5					0.5' CLAYE SAND (SC): 0/50/40 TO 0/10/50			
	6					FINE, YELOW (10YR 6/4) TO BLACK, MEDIUM FINES, WET (10YR 3/1 - 3/1 1/2 TO 2/4 N3)			
	7					SILT WITH (MAYBE SAND) (SL-SM) 5/70/30, WET BLACK @ 10" FROM SURFACE (10YR 2/1 1/2 TO 2/4)			
	8					1-1 1/2' FINE MEDIUM SOIL (OM) (LH)			
	9								
	10								
	11								
	12								
	13								



ALL DATA, as per  
the [unclear] report



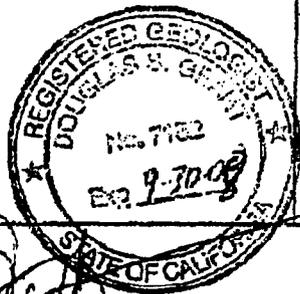
TETRA TECH EM INC.

SOIL BORING AND WELL INSTALLATION LOG

DO: 130  
 Site: ALHAMBRA 13075 Ave. 25  
 Project: DATA GAP

Boring Number: A0223-MW-03	Date Started/Completed: 12-12-07
Drilling Method: TRIPLE WASH & H.S.P.	Location Sketch:
Outer Diameter of Boring: 6"	
Inner Diameter of Well Casing: 2"	
Depth to Water (ft. bgs., date): 7' (12/12/07) @ 12-12-07	
Driller: VIRONSE	
Logged By: PSL/LFH	

Depth (ft) bgs	Sample Number	Drive Interval / Recovered Interval	Blow Count (per 6 inches)	Soil Boring A0223-MW-03 Lithologic Description	USCS Soil Symbol	Well Construction	OVN (ppm)
1		100%	X	ASPHALT - 1/4" THICK			0.0
2		0		SANDY SAND (SM); 0/75/25, fine, yellowish brown (10YR 5/6), moist, fill.			PERCENT HYDRATE 2.10
3				gravel - fine to medium, trace shells			41
4				gravel to grayish brown (10YR 5/2)			
5		100%		ORGANIC SILT ~ 3-6" LENS, 0/0/100, high plasticity, medium dry strength, nodular, low toughness			
6				SILTY SANDY (SM), 0/60/40, FINE, DARK GRAY (10YR 4/1) TO (2.5YR 4/3) BLACK			4.0/6
7				ORGANIC CLAY ~ FAT CLAY (OH - CH); 0/6/95 FINE, MED - HIGH PLASTICITY, NO DILATANCY			
8				CLAY SAND (SC); 0/60/40, FINE, FEW SILT, BLACK (2.5YR 4/1) ORGANIC ODR (SILT) WITH SAND			
9			X	END OF BORING @ 14" WELL CONST. 12-12-07			



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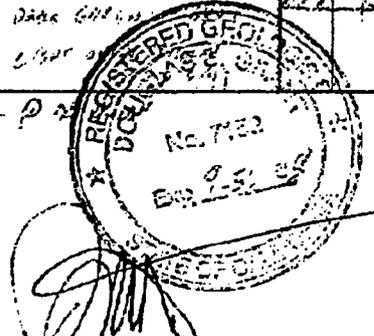
**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**

CTO: 130  
Bldg./Site: NOC23 (IRP-33)  
Project Name: DATA BANK ASSESS.

Boring Number: <u>AOC 23-MW 64</u>	Date Started: <u>12-12-07</u>
Drilling Method: (Circle one) <u>MCA Continuous Core</u> <u>Direct-Push/Hand Auger</u> <u>Air Rotary/Mud Rotary/Dual Tube Percussion/Sonic/Vacuum</u>	Date Completed: <u>12-12-07</u>
Outer Diameter of Boring: <u>6"</u>	Logged By: <u>DBK</u>
Inner Diameter of Well Casing: <u>2"</u>	Drilling Subcontractor: <u>VIRANEX</u>
Depth to Water (feet bgs): <u>1.7' ±</u>	Driller: <u>JOHN J. JAVAN</u>
Location Sketch:	

Time	Depth (feet bgs)	Drive Interval	Recovered Interval	Sample ID	Blow Count (per 6 inches) / V.B. Utility Type Diameter	Description	USCS Soil Symbol	Well Construction	OVIM (ppm)
2					N/A	LOCATION DESCRIPTION: SOUTH SIDE OF BUILDING 66 APPROX 45' WEST ATLANTIC BLVD. ON ASPHALT DRIVEWAY. 36' SSE OF BLDG 66, 9' WEST OF DRIVEWAY & 2' NORTH OF ROAD.			0.0
4			10.0			4" AUGER + 2" CORE COURSE (24") SANDY SAND (SC): 5/75/10, FINE TO MEDIUM, LOW MOIST, YELLOWISH BROWN (WET) (M), MOIST, FILL BELOW TO MEDIUM SAND 0/85/15			
6						GRUBS TO DARK GRAY, FINE 0/70/30			0.0
8						SANDY ORGANIC SOIL (OL): 0/50/70, FINE, MED PLASTICITY, MED TO HIGH MOIST, NO DUCTILITY, MED TOUGHNESS, WET OR GRAY (WET) (S), WET, TAN SEDIMENT UNITS (UPPER)			
10						ORGANIC CLAY (CL): 0/0/100, HIGH MOIST, MED TO HIGH PLASTICITY, NO DUCTILITY, MED TO HIGH TENSILE, VERY TOUGH (WET) (S), WET, TAN SEDIMENT UNITS (UPPER)			
12						CLAY SAND (SC): 0/85/15, FINE, DARK GRAY (WET) (S), WET @ 14" GRUBS TO CLAY			
14									

IF SAND BOUNDING OCCURS - LOGS W/ REMOVED, REMOVED LOG - BL P 23



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AOC23-MW01

### MONITORING WELL COMPLETION RECORD

#### DRILLING INFORMATION

DRILLING BEGAN:  
 DATE 01-07-08 TIME 8:50  
 WELL INSTALLATION BEGAN:  
 DATE 01-07-08 TIME 9:05  
 WELL COMPLETION FINISHED:  
 DATE 01-07-08 TIME 12:05  
 DRILLING CO. Viralex  
 DRILLER Tom Bell & Justin  
 LICENSE 705987  
 DRILL RIG Geacore Systems  
 DRILLING METHOD:  
 HOLLOW STEM AUGER  
 AIR ROTARY  
 Direct Push Lithology  
 DIAMETER OF AUGERS:  
 ID 4 OD 6"

#### SURFACE COMPLETION

FLUSH MOUNT  
 ABOVE GROUND WBUMPER POST  
 CONCRETE  ASPHALT

#### MONITORING WELL

MONITORING WELL NO. AOC23-MW01  
 PROJECT Alameda Pt. Total Cap ASSTSS  
 SITE Site 35, AOC23  
 BOREHOLE NO. \_\_\_\_\_  
 WELL PERMIT NO. \_\_\_\_\_  
 TOC TO BOTTOM OF WELL 214'

#### BENTONITE SEAL

AMOUNT CALCULATED 7'  
 AMOUNT USED 2 bags  
 PELLETS, SIZE \_\_\_\_\_  
 CHIPS, SIZE 3/8"  
 \_\_\_\_\_  
 PRODUCT Wingua Halldorson  
 MFG. BY Wingua  
 METHOD INSTALLED:  
 POURED  TREMIE  
 AMOUNT OF WATER USED 10 gallons

#### ANNULAR SEAL

AMOUNT CALCULATED \_\_\_\_\_  
 AMOUNT USED \_\_\_\_\_  
 GROUT FORMULA \_\_\_\_\_  
 PORTLAND CEMENT \_\_\_\_\_  
 BENTONITE \_\_\_\_\_  
 WATER \_\_\_\_\_  
 PREPARED MIX \_\_\_\_\_  
 PRODUCT Shallow well completion method  
 MFG. BY \_\_\_\_\_  
 METHOD INSTALLED:  
 POURED  TREMIE

#### FILTER PACK

AMOUNT CALCULATED 4 sacks  
 AMOUNT USED 4 sacks (#2/12)  
 SAND, SIZE \_\_\_\_\_  
 FORMATION COLLAPSE:  
 FROM 13 TO 14  
 PRODUCT Lapis Lustre  
 MFG. BY ABC Pacific Minerals  
 METHOD INSTALLED:  
 POURED  TREMIE

#### CASING

SCHEDULE 40 PVC  
 \_\_\_\_\_  
 PRODUCT \_\_\_\_\_  
 MFG. BY \_\_\_\_\_  
 CASING DIAMETER:  
 ID 2" OD 2 9/16"  
 LENGTH OF CASING 21 1/4'

#### WELL SCREEN

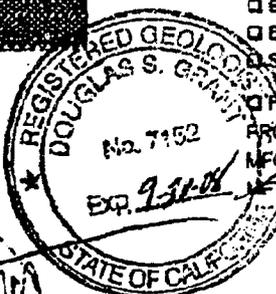
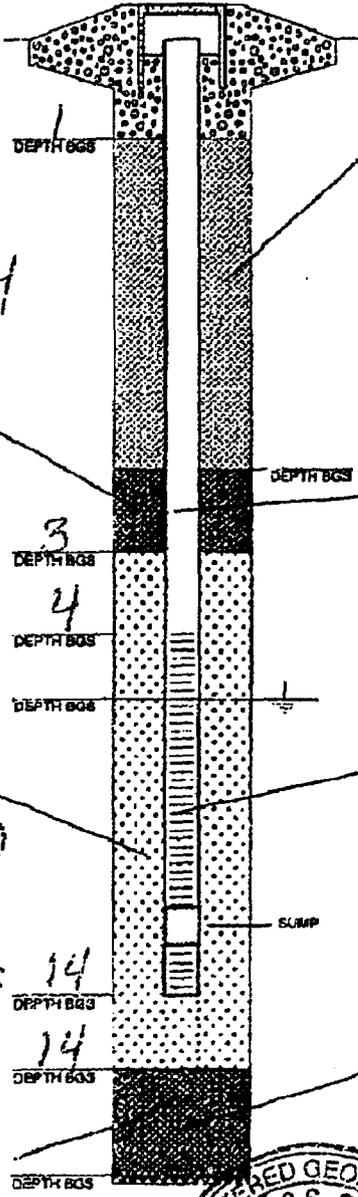
SCHEDULE 40 PVC  
 \_\_\_\_\_  
 PRODUCT \_\_\_\_\_  
 MFG. BY Johnson Screen  
 CASING DIAMETER:  
 ID 2" OD 2 9/16"  
 SLOT SIZE 0.018  
 LENGTH OF SCREEN 10'

#### SURVEY INFORMATION

TOC ELEVATION TBD  
 GROUND ELEVATION \_\_\_\_\_  
 NORTHING CORD. \_\_\_\_\_  
 EASTING CORD. \_\_\_\_\_  
 DATE SURVEYED \_\_\_\_\_  
 SURVEY CO. \_\_\_\_\_

#### BOREHOLE BACKFILL

AMOUNT CALCULATED \_\_\_\_\_  
 AMOUNT USED NA  
 BENTONITE CHIPS, SIZE \_\_\_\_\_  
 BENTONITE PELLETS, SIZE \_\_\_\_\_  
 SLURRY \_\_\_\_\_  
 FORMATION COLLAPSE \_\_\_\_\_  
 PRODUCT \_\_\_\_\_  
 MFG. BY \_\_\_\_\_  
 METHOD INSTALLED:  
 POURED  TREMIE





# MONITORING WELL COMPLETION RECORD

ACC 23-MW02

### DRILLING INFORMATION

DRILLING BEGAN:  
 DATE 13 DEC 07 TIME 1030  
 WELL INSTALLATION BEGAN:  
 DATE 13 DEC 07 TIME 1100  
 WELL COMPLETION FINISHED:  
 DATE 13 DEC 07 TIME 1505  
 DRILLING CO. VIBRAX  
 DRILLER TIM RYAN  
 LICENSE \_\_\_\_\_  
 DRILL RIG ROPAK 615  
 DRILLING METHOD:  
 HOLLOW STEM AUGER  
 AIR ROTARY  
 DP  
 DIAMETER OF AUGERS:  
 ID 6 OD 4

\* RIG DOWN FOR SEVERAL DAYS

### BENTONITE SEAL

AMOUNT CALCULATED 1 sack  
 AMOUNT USED 1 sack  
 PELLETS, SIZE 1/4"  
 CHIPS, SIZE \_\_\_\_\_  
 \_\_\_\_\_  
 PRODUCT HOLE PUCK  
 MFG. BY BARROD  
 METHOD INSTALLED  
 POURED  TREMIE  
 AMOUNT OF WATER USED 5 gallons

### FILTER PACK

AMOUNT CALCULATED 5 sacks  
 AMOUNT USED \_\_\_\_\_  
 SAND, SIZE #20  
 FORMATION COLLAPSE:  
 FROM \_\_\_\_\_ TO \_\_\_\_\_  
 PRODUCT 3/8" S LIME  
 MFG. BY RHC  
 METHOD INSTALLED:  
 POURED  TREMIE

### SURVEY INFORMATION

TOC ELEVATION \_\_\_\_\_  
 GROUND ELEVATION \_\_\_\_\_  
 NORTHING COORD. \_\_\_\_\_  
 EASTING COORD. \_\_\_\_\_  
 DATE SURVEYED \_\_\_\_\_  
 SURVEY CO. \_\_\_\_\_

### CENTRALIZERS USED?

YES  NO  
 CENTRALIZER DEPTHS: \_\_\_\_\_

### SURFACE COMPLETION

FLUSH MOUNT  
 ABOVE GROUND W/ BUMPER POST  
 CONCRETE  ASPHALT

### MONITORING WELL

MONITORING WELL NO. ACC 23-MW-02  
 PROJECT ALAMEDA PT DATA CAMP  
 SITE 12012  
 BOREHOLE NO. WEST OF DD413  
 WELL PERMIT NO. \_\_\_\_\_  
 TOC TO BOTTOM OF WELL \_\_\_\_\_

### ANNULAR SEAL

AMOUNT CALCULATED \_\_\_\_\_  
 AMOUNT USED \_\_\_\_\_  
 GROUT FORMULA  
 PORTLAND CEMENT \_\_\_\_\_  
 BENTONITE \_\_\_\_\_  
 WATER \_\_\_\_\_  
 PREPARED MIX PRODUCT  
 MFG. BY \_\_\_\_\_  
 METHOD INSTALLED  
 POURED  TREMIE

### CASING

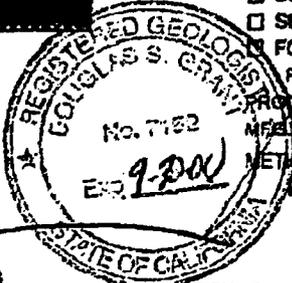
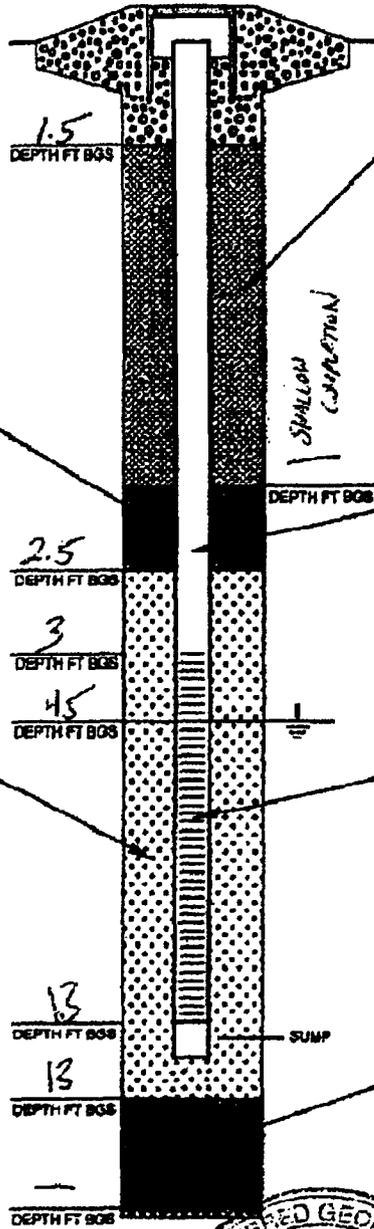
SCHEDULE 40 PVC  
 \_\_\_\_\_  
 PRODUCT \_\_\_\_\_  
 MFG. BY \_\_\_\_\_  
 CASING DIAMETER (in):  
 ID 2" OD 2 1/4"  
 LENGTH OF CASING 2.5'

### WELL SCREEN

SCHEDULE 40 PVC  
 \_\_\_\_\_  
 PRODUCT \_\_\_\_\_  
 MFG. BY \_\_\_\_\_  
 CASING DIAMETER (in):  
 ID 2" OD 2 1/4"  
 SLOT SIZE 0.010"  
 LENGTH OF SCREEN 10'

### BOREHOLE BACKFILL

AMOUNT CALCULATED \_\_\_\_\_  
 AMOUNT USED \_\_\_\_\_  
 BENTONITE CHIPS, SIZE \_\_\_\_\_  
 BENTONITE PELLETS, SIZE \_\_\_\_\_  
 SLURRY  
 FORMATION COLLAPSE  
 FROM \_\_\_\_\_ TO \_\_\_\_\_  
 PRODUCT \_\_\_\_\_  
 MFG. BY \_\_\_\_\_  
 METHOD INSTALLED:  
 POURED  TREMIE



*[Handwritten signature]*

AOC 23 MW 03

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MW CR #1

MONITORING WELL COMPLETION RECORD

DRILLING INFORMATION

DRILLING BEGAN: DATE 12-12-07 TIME 1300
WELL INSTALLATION BEGAN: DATE 12-12-07 TIME 1410
WELL COMPLETION FINISHED: DATE 12-12-07 TIME
DRILLING CO. VIRONCI
DRILLER TOM F. REYAN
LICENSE
DRILL RIG GEORGE SYSTEMS
DRILLING METHOD:
HOLLOW STEM AUGER
AIR ROTARY
DIGS WITH WITHOUT
DIAMETER OF AUGERS: ID 4" OD 6"

BENTONITE SEAL

AMOUNT CALCULATED 2'
AMOUNT USED 2'
PELLETS, SIZE 1/4"
CHIPS, SIZE
PRODUCT HOLE PLUG
MFG. BY BROAD
METHOD INSTALLED: POURED TREMIE
AMOUNT OF WATER USED 5+5.12 gal

FILTER PACK

AMOUNT CALCULATED 5 SACKS #100
AMOUNT USED 5 SACKS (#100)
SAND, SIZE #20
FORMATION COLLAPSE: FROM TO
PRODUCT LAPIS WARE
MFG. BY SOUTHERN PACIFIC MATERIALS
METHOD INSTALLED: POURED TREMIE

SURVEY INFORMATION

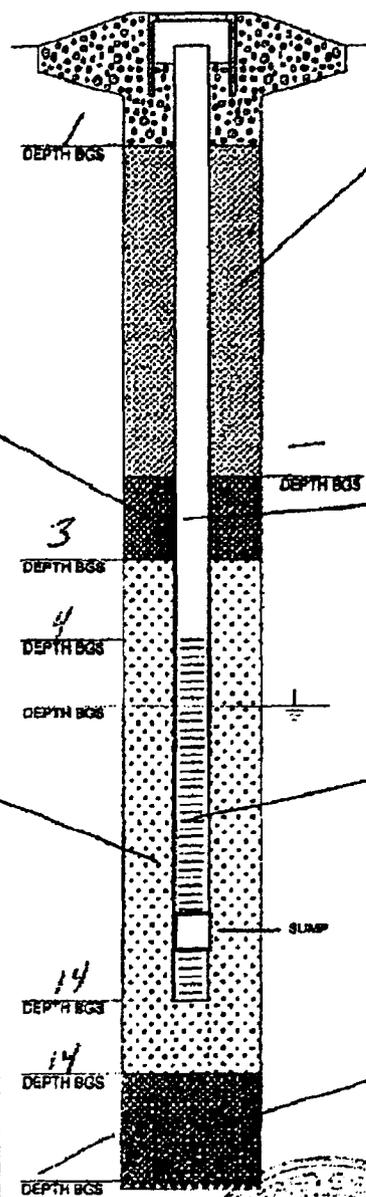
TOC ELEVATION
GROUND ELEVATION (70)
NORTHING CORD.
EASTING CORD.
DATE SURVEYED
SURVEY CO.

SURFACE COMPLETION

FLUSH MOUNT
ABOVE GROUND W/ BUMPER POST
CONCRETE ASPHALT

MONITORING WELL

MONITORING WELL NO. AOC 23-MW-03
PROJECT BRANCA AT DATA LAB ASHLEY
SITE 104 35 AOC 23
BOREHOLE NO. AT 457 W. SEASIDE AVE.
WELL PERMIT NO.
TOG TO BOTTOM OF WELL 180 +/- 14'



ANNULAR SEAL

AMOUNT CALCULATED
AMOUNT USED
GROUT FORMULA
PORTLAND CEMENT
BENTONITE
WATER
PREPARED MIX
PRODUCT
MFG. BY

METHOD INSTALLED:

POURED TREMIE

CASING

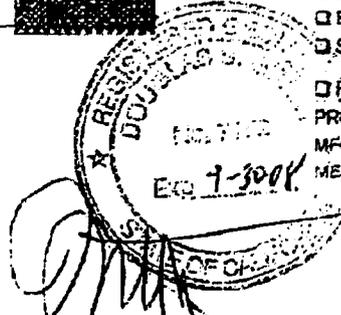
SCHEDULE 40 PVC
PRODUCT
MFG. BY
CASING DIAMETER: ID 2" OD 2 1/16"
LENGTH OF CASING 5' - 15 1/2"

WELL SCREEN

SCHEDULE 40 PVC
PRODUCT
MFG. BY JANJUN SCREEN / BOUNTE
CASING DIAMETER: ID 2" OD 2 1/16"
SLOT SIZE 0.010
LENGTH OF SCREEN 10'

BOREHOLE BACKFILL

AMOUNT CALCULATED N/A
AMOUNT USED
BENTONITE CHIPS, SIZE
BENTONITE PELLETS, SIZE
SLURRY
FORMATION COLLAPSE
PRODUCT
MFG. BY
METHOD INSTALLED: POURED TREMIE



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APC 23-MW-04

MWCR # 2

MONITORING WELL COMPLETION RECORD

DRILLING INFORMATION

DRILLING BEGAN: DATE 13 DEC 07 TIME 0730
WELL INSTALLATION BEGAN: DATE 13 DEC 07 TIME 0800
WELL COMPLETION FINISHED: DATE 13 DEC 07 TIME 0745
DRILLING CO. VIRONEX
DRILLER TOM & RYAN
LICENSE
DRILL RIG GLOPOLL
DRILLING METHOD:
[X] HOLLOW STEM AUGER
[ ] AIR ROTARY
DIAMETER OF AUGERS: ID 4" OD 6"

BENTONITE SEAL

AMOUNT CALCULATED 2 SACKS
AMOUNT USED 2 SACKS
PELLETS, SIZE 3/4"
[ ] CHIPS, SIZE
PRODUCT GOLS-FLUX
MFG. BY ISARION
METHOD INSTALLED:
[X] POURED [ ] TREMIE
AMOUNT OF WATER USED 10 GALLONS

FILTER PACK

AMOUNT CALCULATED 5 SACKS
AMOUNT USED 5 SACKS
[ ] SAND, SIZE #20/30
[ ] FORMATION COLLAPSE: FROM N/A TO
PRODUCT LUCKY LUCK
MFG. BY RMC
METHOD INSTALLED:
[ ] POURED [X] TREMIE

SURVEY INFORMATION

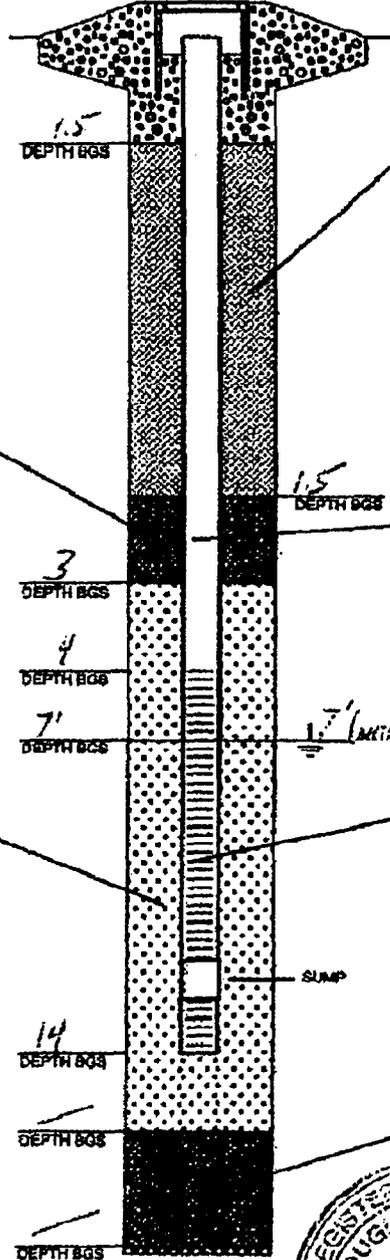
TOC ELEVATION
GROUND ELEVATION
NORTHING CORD.
EASTING CORD.
DATE SURVEYED
SURVEY CO.

SURFACE COMPLETION

[X] FLUSH MOUNT
[ ] ABOVE GROUND W/BUMPER POST
[ ] CONCRETE [X] ASPHALT

MONITORING WELL

MONITORING WELL NO. APC 23-MW-04
PROJECT DATA SRP
SITE IRR 25
BOREHOLE NO.
WELL PERMIT NO.
TOC TO BOTTOM OF WELL



ANNULAR SEAL

AMOUNT CALCULATED
AMOUNT USED
[ ] GROUT FORMULA
PORTLAND CEMENT
BENTONITE
WATER
[ ] PREPARED MIX
PRODUCT
MFG. BY
METHOD INSTALLED:
[ ] POURED [ ] TREMIE

CASING

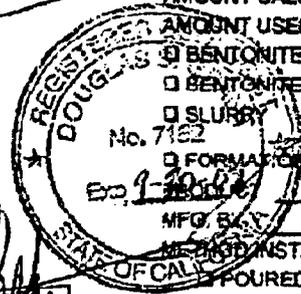
[X] SCHEDULE 40 PVC
[ ]
PRODUCT
MFG. BY
CASING DIAMETER:
ID 2" OD 2 1/4"
LENGTH OF CASING 5 - 1/4' cur. = 3.5'

WELL SCREEN

[X] SCHEDULE 40 PVC
[ ]
PRODUCT
MFG. BY
CASING DIAMETER:
ID 2" OD 2 1/4"
SLOT SIZE 0.010"
LENGTH OF SCREEN 10'

BOREHOLE BACKFILL

AMOUNT CALCULATED
AMOUNT USED
[ ] BENTONITE CHIPS, SIZE
[ ] BENTONITE PELLETS, SIZE
[ ] SLURRY
[ ] FORMATION COLLAPSE
MFG. BY
METHOD INSTALLED:
[ ] POURED [ ] TREMIE



Well Development Data Sheet

Boring No.: AOC 23-MW-03 Well No.: AOC 23-MW-03

Project: ALAMEDA IT DATA CAP Casing Diameter/Type: 2" PVC  
 Project No.: CTG 30 Borehole Diameter: 2.206"  
 Date(s) of Installation: 12 DEC 07 Screened Interval(s): 7-14' BGS  
 Date(s) of Development: 14 DEC 07 Total Length of Well Casing: 13' 7" - 13.583' - 14.583'  
 Personnel/Company: TIM VIBONIX Measured Total Depth (TOC) Initial: 14.19'  
 Final: 14.19'

Type of Rig Used: GEORUSE Initial Depth to Water (TOC): 4.21' Date: 14 DEC 07 Time: 0840  
 Final Stabilized Depth to Water (TOC): 6.05' + Date: 14 DEC 07 Time: 1032

**Development Techniques**

<input type="checkbox"/>	Jetting (Airlift)	
<input checked="" type="checkbox"/>	Surge Block	
<input checked="" type="checkbox"/>	Bailing	
<input checked="" type="checkbox"/>	Pumping	<u>5 GPM PUMP</u>
<input type="checkbox"/>	Other	

**Purge Volume Calculation**

Casing Volume: 10.998 Feet of Water  
 x 0.163 Gallons per Foot  
 = 1.628 Gallons per Single Casing Volume

Sand Pack Volume: 11 Feet of Saturated Sand Pack  
 x 1.968 Gallons per Foot (Borehole Dia.)  
 = 16.148 Gallons (in Borehole)  
 - 1.628 Gallons of Casing Volume  
 = 14.52 Gallons within Sand Pack  
 x 0.3 (assuming porosity = 30%)  
 = 4.356 Gallons within Sand Pack

Single Purge Volume: 5.98 Gallons (Casing Volume + Sand Pack Volume + Fluids Added)  
 Minimum Purge Volume: 5.98 Gallons x 3 = 18 Gallons  
 Actual Purge Volume: 22 Gallons  
 Volume Measured By: 55" dia  
 Rate of Development: AVE Gallons per Minute - Hour - Day  
 Pumping Rate/Depth: 5 GPM @ 12.5 feet bgs  
 Immiscible Phases Present: Yes  No  Thickness: \_\_\_\_\_

*Recharging*  
 22 sec @ 5 GPM  
 w/ 7-11 minute recovery  
 over 54 minutes

**Fluids Added**

Lost Drilling Fluid (gallon): 10 gallons - hydrated chips  
 Lost Purge Water (gallon): \_\_\_\_\_  
 Water During Installation (gallon): +10  
 Total Fluids Added (gallon): +10  
 Source of Added Water: DRAWERS (TAP)

Groundwater Quality Parameters of Added Water Measured: Yes  No   
 Sample Collected of Added Water: Yes  No   
 Sample Designation of Added Water: N/A

pH Meter: SEE CALIBRATION SHEETS FROM EI Instrument Calibration: SEE EI CALIBRATION SHEETS FOR USE & TURS.  
 pH 4.0 = \_\_\_\_\_ @ \_\_\_\_\_ °C Spec. Conductance Meter: \_\_\_\_\_  
 pH 7.0 = \_\_\_\_\_ @ \_\_\_\_\_ °C Standard: \_\_\_\_\_ μmhos/cm @ 25°C  
 pH 10.0 = \_\_\_\_\_ @ \_\_\_\_\_ °C Reading: \_\_\_\_\_ μmhos/cm @ \_\_\_\_\_ °C  
 Dissolved Oxygen Meter: \_\_\_\_\_ Turbidity Meter: 0.94 = 1 ; 10.05 = 10  
 Other: \_\_\_\_\_

DRUM ID: D006

Total Volume Discharged	Rate of Discharge	Time	°C Temp	pH	MS/cm Specific Conductance	Turbidity of DO	Clarity, Odor, ORP PID Readings, Other
0	-	0907	18.16	7.27	3.583	EP3#2	262.2 10.8% 0.94
7	5 GPM	0929	17.96	7.46	3.759	"	111.2 12.7% 1.18
11	5 GPM	0938	-	-	-	-	-
14	5 GPM	0943	18.55	7.49	5.500	EP3#2	162.2 46.3% 4.23
17	5 GPM	0956	18.31	7.58	5.77	340	179.2 58.1 5.37
20	5 GPM	1014	19.08	7.67	4.783	8.3	183.2 54.0 4.91
22	5 GPM	1025	18.57	7.39	4.344	661	197.9 57.2 5.26
(A) SURGE BLOCK 17'-11" IN 10 STROKES, 11'-7" IN 10 STROKES, 7'-4" IN 10 STROKES (B) BAIL (C) PUMP - 5 GPM TO 20 GALLONS							

Development Completed: 14 DEC 07 Gallons Discharged: 22 Date: 14 DEC 07 Time: 1025  
 Criteria: pH, Temp, Cond Personnel: DJB

\* Specific conductance readings are temperature-compensated to 25°C; if not, report temperatures at which reading is obtained.  
 \* INTERMITTENT FLOW - WELL PUMP DRY \* 2 OFF-SCALE SCALE  
 PUMPS 22 sec \* 3 CLEARING OUT W/ SCALE

MDDS # 2

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Well Development Data Sheet

Boring No.: A0023-MW-Ø4 Well No.: A0123-MW-Ø4

Project: ALAMEDA PT DATA GAP ASSESS Casing Diameter/Type: 6"Ø 2"  
 Project No.: CTD 018 Borehole Diameter: 6"  
 Date(s) of Installation: 13 DEC 07 Screened Interval(s): 4' - 14' BGS  
 Date(s) of Development: 14 DEC 07 Total Length of Well Casing: 10' + 4.5' = 14.5'  
 Personnel/Company: TIM / VIKORIS X Measured Total Depth (TOC): Initial: 13.97  
 Final: 17.07  
 Type of Rig Used: GEORJOE Initial Depth to Water (TOC): 4.26 Date: 14 DEC 07 Time: 1043  
 Stabilized Depth to Water (TOC): 7.517 Date: 14 DEC 07 Time: 1144

Techniques

- Jetting (Airlift)
- Surge Block
- Bailing
- Pumping
- Other

Development Equipment Type/Capacity

15" Ø  
1.5Ø BY 5'  
3-5 GPM 1" Ø

Purge Volume Calculation

Casing Volume: 9.71 Feet of Water  
 x 0.163 Gallons per Foot  
 = 1.582 Gallons per Single Casing Volume  
 Sand Pack Volume: 9.71 Feet of Saturated Sand Pack  
 x 1.46 Gallons per Foot (Borehole Dia.)  
 = 14.18 Gallons (in Borehole)  
 x 1.53 Gallons of Casing Volume  
 = 12.6 x 0.3 (assuming porosity = 30%)  
 = 2.78 Gallons within Sand Pack  
 Single Purge Volume: 5.36 Gallons (Casing Volume + Sand Pack Volume + Fluids Added)  
 Minimum Purge Volume: 5.36 Gallons  
 Actual Purge Volume: 21 Gallons  
 Volume Measured By: 55 Gall drum  
 Rate of Development: 5 Gallons per Minute - Hour - Day  
 Pumping Rate/Depth: 5 GPM @ 12.5 feet bgs  
 Immiscible Phases Present: Yes No Thickness

Fluids Added

Lost Drilling Fluid (gallon): -10 (HYDRATED BENT.)  
 Lost Purge Water (gallon): +10  
 Water During Installation (gallon): +10  
 Total Fluids Added (gallon): +10  
 Source of Added Water: DRILLERS (TAP)  
 Groundwater Quality Parameters of Added Water Measured:  Yes  No  
 Sample Collected of Added Water:  Yes  No  
 Sample Designation of Added Water: N/A

Instrument Calibration

pH Meter:  Spec. Conductance Meter:  SEE MDDS #1  
 pH 4.0 = 7.0 Standard: µmhos/cm @ 25°C  
 pH 7.0 = 7.0 Reading: µmhos/cm @ °C  
 pH 10.0 = 7.0 Turbidity Meter: SEE MDDS #1  
 Dissolved Oxygen Meter: SEE MDDS #1 Other: SEE MDDS #1

SEE MDDS #1 FOR PROCEDURE A-C

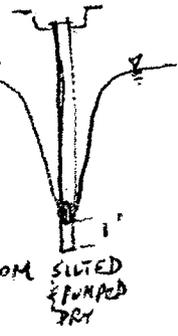
Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity of DO	Clarity, Odor, etc.		
							ORP	PID Readings	Other
<u>Ø2Ø</u>	-	<u>1051</u>	<u>18.13</u>	<u>7.60</u>	<u>2.616</u>	<u>6.3*</u>	<u>183.4</u>	<u>16.1</u>	<u>1.70</u>
<u>3Ø</u>	<u>5 GPM</u>	<u>1108</u>	<u>17.74</u>	<u>7.63</u>	<u>3.188</u>	<u>6.3*</u>	<u>160.0</u>	<u>13.3</u>	<u>1.27</u>
<u>15</u>	<u>3 GPM</u>	<u>1124</u>	<u>17.47</u>	<u>7.57</u>	<u>1.795</u>	<u>5.76</u>	<u>162.9</u>	<u>43.1</u>	<u>4.12</u>
<u>18</u>	<u>3 GPM*</u>	<u>1133</u>	<u>17.57</u>	<u>7.71</u>	<u>2.083</u>	<u>2.23</u>	<u>171.9</u>	<u>51.3</u>	<u>4.85</u>
<u>19 1/2</u>	<u>3 GPM</u>	<u>1137</u>	<u>17.69</u>	<u>7.76</u>	<u>3.522</u>	<u>2.10</u>	<u>184.3</u>	<u>43.6</u>	<u>4.10</u>
<u>21</u>	<u>"</u>	<u>1143</u>	<u>17.70</u>	<u>7.49</u>	<u>2.010</u>	<u>1.70</u>	<u>178</u>	<u>51.5</u>	<u>4.85</u>

Development Completed:  Gallons Discharged: 21 Date: 14 DEC 07 Time: 1145  
 Criteria: Temp pH, spc + asp, 30' D, 1' D, 1' D Personnel: DGC

\* Specific conductance readings are temperature-compensated to 25°C; if not, report temperatures at which reading is obtained.

DRUM ID D006

\* OFF SCALE - TURBID





Well Development Data Sheet

Project: Alameda Pt. Data Gap Sampling Casing Diameter/Type: 3"  
 Project No.: 2148-2000 Borehole Diameter: \_\_\_\_\_  
 Date(s) of Installation: 01-08-08 Screened Interval(s): 4'-4"  
 Date(s) of Development: 01-08-08 Total Length of Well Casing: \_\_\_\_\_  
 Personnel/Company: H. Thompson (Sullivan) Measured Total Depth (TOC): \_\_\_\_\_  
 Initial: 14:15  
 Final: 14:15  
 Type of Rig Used: \_\_\_\_\_ Initial Depth to Water (TOC): 4.54 Date: 01-08-08 Time: 13:05  
 Stabilized Depth to Water (TOC): 4.51 Date: 01-08-08 Time: 16:30

**Development Techniques**  
 Equipment Type/Capacity  
 Jetting (Airlift)  
 Surge Block  
 Bailing  
 Pumping 3 GPM  
 Other

**Fluids Added**  
 Lost Drilling Fluid (gallon): \_\_\_\_\_  
 Lost Purge Water (gallon): \_\_\_\_\_  
 Water During Installation (gallon): \_\_\_\_\_  
 Total Fluids Added (gallon): NO FLUIDS ADDED  
 Source of Added Water: \_\_\_\_\_  
 Groundwater Quality Parameters of Added Water Measured: Yes No  
 Sample Collected of Added Water: Yes No  
 Sample Designation of Added Water: \_\_\_\_\_

**Purge Volume Calculation**  
 Casing Volume: 9.6 Feet of Water  
 x 1.53 Gallons per Foot  
 = 14.58 Gallons per Single Casing Volume  
 Sand Pack Volume: 9.0 Feet of Saturated Sand Pack  
 x 1.46 Gallons per Foot (Borehole Dia.)  
 = 13.14 Gallons (in Borehole)  
 - 1.56 Gallons of Casing Volume  
 = 11.58 x 0.3 (assuming porosity = 30%)  
 = 3.47 Gallons within Sand Pack  
 Single Purge Volume: 5.30 Gallons (Casing Volume + Sand Pack Volume + Fluids Added)  
 Minimum Purge Volume: 15.40 Gallons  
 Actual Purge Volume: 23.00 Gallons  
 Volume Measured By: calibrated bucket  
 Rate of Development: \_\_\_\_\_ Gallons per Minute - Hour - Day  
 Pumping Rate/Depth: 3 GPM @ 12.5 feet bgs  
 Immiscible Phases Present: Yes  No  Thickness \_\_\_\_\_

pH Meter: YSI 556  
 pH 4.0 = 4.0 @ 25 °C  
 pH 7.0 = 7.0 @ 25 °C  
 pH 10.0 = 10.0 @ 25 °C  
 Dissolved Oxygen Meter: YSI 556

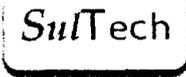
**Instrument Calibration**  
 Spec. Conductance Meter: YSI 556  
 Standard: 1413  $\mu\text{mhos/cm}$  @ 25 °C  
 Reading: 1413  $\mu\text{mhos/cm}$  @ 25 °C  
 Turbidity Meter: Micro TPI  
 Other: \_\_\_\_\_

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity of DO	Clarity (DO) PID Reading, Other
1 Gallon	Bailing	13:40	15.03	7.19	1350	2100	2.95
2 Gallons	3 GPM	14:30	15.51	7.35	987	252.0	5.50
5 Gallons	3 GPM	15:24	16.39	7.34	1140	291.7	5.22
10 Gallons	3 GPM	15:30	16.32	7.04	1057	223.0	5.40
15 Gallons	3 GPM	15:42	14.78	7.40	1140	173.8	5.98
20 Gallons	3 GPM	16:01	14.33	7.45	1138	172.4	5.20
22 Gallons	3 GPM	16:10	14.38	7.41	1140	13.0	5.31

Development Completed: 16:20 Gallons Discharged: 23 Date: 08-08-08 Time: 16:20  
 Criteria: \_\_\_\_\_ Personnel: H. Thompson (Sullivan) & Tom McGinley (Viconet)  
 \* Specific conductance readings are temperature-compensated to 25 °C; if not, report temperatures at which reading is obtained.

240 secs of straight pumping with 12 mg/l car

in fact



A Joint Venture of Sullivan Consulting Group and Tetra Tech EM Inc.

**TRANSMITTAL/DELIVERABLE RECEIPT**

Contract No. **N68711-03-D-5104**

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TO: Contracting Officer  
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Naval Facilities Engineering Command  
Southwest Division  
1220 Pacific Highway, Bldg 127  
San Diego, CA 92132-5190

DATE: 02/01/08  
CTO: B130  
LOCATION: Alameda Point, Alameda, California

FROM:

**Steven Bradley, Contract Manager**

DOCUMENT TITLE AND DATE:

**Alameda Point Monitoring Well AOC 23-MW01 Letter Report**

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