APPENDIX 4.13

CECorps Design Report for Schoch Road

June 2017

546 – Design Report for Community Engineering Corps Projects

PROJECT TEAM: Engineers Without Borders - Kansas City Professional Chapter
STATE: California
COMMUNITY: Schoch Rd.
PROJECT: Salinas River Valley Water System Evaluation and Design

PREPARED BY:

ENGINEERS WITHOUT BORDERS USA
Kansas City Professional Chapter

June 2017

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2.0 PROJECT DISCIPLINE(S):

Water Supply
____ Source Development
__x__ Water Storage
__x__ Water Distribution
__x__ Water Treatment
__x__ Water Pump

Sanitation
____ Latrine
____ Gray Water System
____ Black Water System

Structures
____ Bridge
____ Building

Information Systems
____ Computer Service

Civil Works
____ Roads
____ Drainage
____ Dams

Energy
____ Fuel
____ Electricity

Agriculture
____ Irrigation Pump
____ Irrigation Line
____ Water Storage
____ Soil Improvement
____ Fish Farm
____ Crop Processing Equipment

3.0 PROJECT LOCAITON

Latitude: 36.748935
Longitude: -121.660513
Nearest Population Center: Salinas, California

4.0 PURPOSE OF REPORT

____ Report Prepared for Review by Regulatory Authority
Name of Regulatory Authority:_____

__x__ Design Submittal for Partner Community

PART 2 – TECHNICAL INFORMATION

1.0 INTRODUCTION

The United States Department of Agriculture (USDA) has awarded the Community Engineering Corps (CECorps) a grant to conduct studies to evaluate solutions to water related problems in small, rural, disadvantaged communities in the United States. The Environmental Justice Coalition for Water (EJCW) with the help of the CECorps has identified multiple communities in the Salinas River Valley of California that are in need of engineering services. The unincorporated community of Schoch Rd., located in North Monterey County outside of Salinas, is experiencing compliance issues regarding excessive nitrates in a number of their small water systems and domestic wells.

The Kansas City Professional Chapter of Engineers Without Borders (EWB-KC) was selected by the CECorps to provide engineering services for the community by evaluating potential solutions to address the issues with the community's water system. This report presents the findings of that evaluation and recommends a preferred alternative solution. When provided to the community, the report can be included with applications for financial assistance to fund the capital improvements being pursued by the community.

2.0 DESCRIPTION OF COMMUNITY

The Schoch Rd. community is a small, rural neighborhood located within the Salinas River Valley in California. The community is in North Monterey County, located north of the City of Salinas near U.S. Route 101. The population of this community was estimated using approximately 44 homes and 4 people per home for a total of 176 residents. Many of the homes within this community are disadvantaged and do not have the financial resources to hire engineering expertise using their own funds.

3.0 DESCRIPTION OF EXISTING WATER SYSTEMS

3.1 OVERVIEW

The primary source of water supply for the homes within the Schoch Rd. community is from privately owned domestic wells. The community contains six state small water systems and a number of unclassified water systems. Each system is owned and operated by the property owner(s) being served by the well, and all costs associated with maintaining the system are the responsibility of these property owner(s). Figure 1 below shows the boundaries of the Schoch Rd. community and the approximate locations of these six state small water systems.

Figure 1 - Locations of State Small Water Systems within Community

Table 1 below summarizes each of the state small water systems within the community.

Table 1 - Summary of State Small Water Systems within Community

Water System	Well Specifications			Permitted Number of Connections
	Total Depth	Sealed Depth	Well Capacity	
El Camino Real WS #33	400 ft	300 ft	8 gpm	4
El Camino Real WS #34	232 ft	48 ft	Unknown	5
El Camino Real WS #35	420 ft	300 ft	100 gpm	5
El Camino Real WS #37	321 ft	170 ft	31 gpm	4
El Camino Real WS #43	210 ft	Unknown	18 gpm	2
White Rd WS #01	209 ft	Unknown	47 gpm	13

Some of the residents within the community currently receive bottled water through a grant from the State Water Resources Control Board. This grant provides bottled water to qualifying disadvantaged families whose water supply is contaminated. The bottled water program is intended to be an interim solution until a long term solution is provided.

3.2 WATER QUALITY

3.2.1 HISTORICAL DATA

The Monterey County Health Department has been performing water quality testing for nitrate levels in the Schoch Rd. community since the early 1980s. A summary of historical nitrate levels for the water systems within the Schoch Rd. area are shown below in Table 2.

Table 2 - Historical Nitrate Results

Water System Name	Well Depth	Nitrate (as NO_3) Concentration		Sample Date of Peak Concentration
El Camino Real WS #33	400 ft	Average Peak	15.6 mg/L 37 mg/L	3/11/2016
El Camino Real WS #34	232 ft	Average Peak	45 mg/L 75 mg/L	4/29/2011
El Camino Real WS #35	420 ft	Average Peak	1.86 mg/L 3 mg/L	4/15/2005
El Camino Real WS #37	321 ft	Average Peak	91 mg/L 105 mg/L	1/5/2015
El Camino Real WS #43	210 ft	Average Peak	85 mg/L 109 mg/L	12/11/2015
White Rd WS #01	209 ft	Average Peak	2.7 mg/L 4 mg/L	7/28/1994

This historical data shows that three of the six state small water systems have an average nitrate concentration that meets or exceeds the California Maximum Contaminant Level (MCL) of 45 mg/L (as NO_3). The data also shows a trend of increasing nitrate levels over time, with the most recent samples showing nitrate over two times the state MCL. A more complete summary of the historical nitrate concentrations for the Schoch Rd. community can found in Appendix A.

3.2.2 DATA FROM PROJECT SAMPLING

During the site condition assessment for this project, additional water samples were collected from El Camino Real WS #34. A more comprehensive water quality analysis was completed to confirm the type and concentrations of constituents present so as to identify appropriate treatment technologies and related costs. Budget constraints limited the number of wells that could be tested for this project, but additional sampling should be conducted as part of the preliminary design phase.

Multiple samples were collected to perform testing for nitrates, hexavalent chromium (chromium VI), bacteria, and numerous others covered under Title 22 testing procedures. A time series of nitrate contaminants was also collected to determine whether the concentration of

nitrate varied over a 2 hour period. Appendix D shows the complete lab reports from the project sampling, and Table 3 below shows a summary of the results.

Table 3 - Summary of Water Quality from Project Sampling

Contaminant		Result	MCL (California)
Nitrate (as NO_3)	**Range** **Average**	51 - 58 mg/L 55 mg/L	45 mg/L
Total Dissolved Solids		400 mg/L	500 mg/L
Chromium VI		2.2 µg/L	10 µg/L
Organics(1)		ND	Varies
E. Coli		<1 MPN/100 mL	0 MPN/100 mL(2)
Total Coliform		<1 MPN/100 mL	0 MPN/100 mL(2)

(1) Includes chlorinated acid herbicides, semi-volatile organics, carbamates, diquat, and trichloropropane.
(2) Violation of E. Coli and Total Coliform MCL does not occur unless consecutive samples indicate positive coliform presence

The most recent water sampling at El Camino Real Water System #34 showed nitrate results ranging from 51 to 58 mg/L nitrate (as NO_3). The 2016 sampling results also revealed that Total Dissolved Solids (TDS), E. Coli, and total coliform were all below the MCL. No other water quality constituent tested exceeded their respective MCL.

3.2.3 DESCRIPTION OF WATER QUALITY ISSUES

The historical water quality data show that the nitrate concentrations are more than two times the state MCL. These excessive concentrations of nitrate in the community's water supply subject the community members to health risks such as methemoglobinemia, a disorder which hinders the blood's ability to effectively deliver oxygen throughout the body. Infants under six months of age are especially at risk in developing serious health problems from this disorder.

The community should consider the alternative solutions presented in this report to determine a feasible long term solution to the issues with their water quality. Regardless of the preferred alternative, it will be necessary for the community to come together to advocate the need for a solution that works for the majority of the community members.

4.0 ALTERNATIVE SOLUTIONS

The alternative solutions evaluated in this report will consist of either providing an alternate water supply to the community through consolidation with a nearby public water system or treatment of the contaminated water source to reduce the contaminants to safe levels. The four alternative solutions evaluated in this report are as follows:

- Alternative 1: Consolidation
  - 1A: Consolidation with California Water Service
  - 1B: Consolidation with California American Water
- Alternative 2: Community Treatment Facility
- Alternative 3: Wellhead Treatment
- Alternative 4: Point of Entry (POE) Treatment

A contamination source study was not performed as part of this assessment, but the nitrate contamination is likely due to the agricultural activity that has taken place throughout the Salinas River Valley for the past century. This prolonged pollution of nitrates into the groundwater is assumed to have resulted in widespread contamination for this area. Regardless of the proposed location or depth for any new wells, it is assumed that the continued draw toward the well's screen will eventually result in the presence of nitrates in the water supply. For the purpose of this evaluation, any alternative that includes a well within the community will be assumed to have the same contaminant concentrations as those present in the water samples collected for this project.

The available treatment technologies to reduce these contaminants include ion exchange, reverse osmosis, and biological denitrification. Ion exchange is the most common method of nitrate treatment in drinking water applications and typically has a waste flow stream around 2-3% of the influent flow. Reverse osmosis systems typically have a waste stream of approximately 25% of the process influent. Without the presence of a sewer system in the community, this technology was not considered as a feasible solution. Biological denitrification is a proven treatment method in wastewater applications, but has limited active installations in drinking water applications. Treatment involves a more complicated process train which includes substrate addition, aeration, filtration, and disinfection. This treatment technology was ruled out primarily due to its operational complexity. Of these available technologies, ion exchange is the preferred treatment method for this application due to its lowest comparative cost and operational simplicity.

The Safe Water Drinking Act states that public water systems which use only groundwater sources are not required to disinfect if serving less than 4,900 people. Since total coliform and E. Coli were not detected in the water samples taken during the site visit, disinfection is assumed to not be required for each treatment alternative. However, in accordance with the Title 22 of the California Code of Regulations (Title 22), periodic samples are required to be tested and reported to indicate continued compliance. Additional sampling and analysis for total coliform and E. Coli should be conducted during the design phase.

The design flow for each of the alternatives was developed based upon peaking factors provided in Title 22. No population growth is expected for this community, and the design future demands for this report are assumed to be equal to the existing calculated demands. The Average Day Demand (ADD) was calculated based upon an assumed 60 gpdc (gallons per day per capita), 4 people per home, and 44 homes. The Max Day Demand (MDD) is assumed to be 2.25 times the ADD, while the Peak Hour Demand (PHD) is assumed to be 1.5 times the MDD. As indicated by the Monterey County Regional Fire District, this area will be required to provide 1,000 gpm for 1 hour at 20 psi. Table 4 below shows a summary of the design demands assumed for each of the alternatives evaluated within this section.

Table 4 - Design Demands

Description	Flow (gpm)
Average Day Demand (ADD)	7.3
Max Day Demand (MDD)	16.5
Peak Hour Demand (PHD)	24.8
Required Fire Flow	1,000

It should be noted that the listed fire flow requirement is over 40 times as much as the calculated PDH for the community. Meeting this requirement will significantly impact the costs of the evaluated alternatives. California Fire Code, Section B103.1 provides the local fire chief with the authority to reduce fire-flow requirements in rural areas or small communities where the development of full fire flow requirements is impractical. Additionally, General Order 103-A from the California Public Utilities Commission (PUC) states that if an existing community system is under the jurisdiction of the PUC and already provides potable water for fire protection, then new portions shall meet the MDD plus the required fire flow. Therefore, it may be possible that if the existing system does not provide potable water for fire protection and modifications will not be serving new applicants then perhaps the fire flow condition may not apply. A more thorough analysis of this requirement should be investigated prior to final design. However, the alternatives evaluated in this report were based upon meeting this requirement.

4.1 DESCRIPTION OF ALTERNATIVES

4.1.1 ALTERNATIVE 1A – CONSOLIDATION WITH CAL WATER

Alternative 1A is the consolidation of each of the Schoch Rd. water systems with a nearby public water system, California Water Service (Cal Water). Cal Water's existing service area is approximately 0.75 miles northeast of the Schoch Rd. community, near the intersection of Harrison Rd. and Country Meadows Rd. However, a Proposed Decision was recently issued which recommends approval for a project that will construct a new 8" water main along Harrison Rd. The new water main will pass through the intersection of Harrison Rd. and Martines Rd which is adjacent to the Schoch Rd. community. The construction for this main is anticipated to be completed in 2018 and will provide a potential tie in location for this alternative.

This alternative will assume that Cal Water's proposed water main will be constructed as scheduled and will be available to serve the residents within the Schoch Rd. community by the end of 2018. The final design for this alternative would need to conform to all Cal Water standards, but it is assumed the system would be sized to provide fire flow plus MDD and would include fire hydrants spaced in accordance with California Fire Code. For Cal Water to be able to serve this area, a specific process must be followed which is started by a "Request to Serve" letter from the community. Because the ADD for this community is less than 10% of the maximum day production of the Salinas Water Treatment Plant, a water supply assessment will likely not be required. If approved by Cal Water, a "Will Serve" letter will be returned to the community. The community will then need to provide a deposit along with a basic engineering plan which will include a map showing each of the proposed locations and sizes for service

connections.

The new 8 inch water main is proposed to tie into Cal Water's system at the intersection of Martines Rd. and Harrison Rd. This alternative would include the construction of approximately 4,350 feet of new water main along with new flow meters, isolation valves, and backflow preventers on each service lateral. Figure 2 below shows the proposed water main alignment and location of connection to Cal Water's distribution system.

Figure 2 - Proposed Water Main Alignment for Alternative 1A

Cal Water's preliminary design suggests that the water pressure at this location will be between 70 and 100 psi. At the design peak flow of 1,013 gpm, the calculated headloss at the end of the distribution system will be approximately 20 psi for an 8 inch main. The resulting pressure range of 50-80 psi meets the pressure requirements of the California Public Utilities Commission and Title 22. This high system pressure may cause the need for pressure reducing valves at each home to protect appliances that require lower pressures.

Once installed, the system would be owned and operated by Cal Water. All costs associated with maintaining the system would be included in the water service and commodity charges that are paid by each home owner. It should be noted that Cal Water institutes a Low-Income Rate Assistance (LIRA) program which offers a discount to qualifying low-income customers. The O&M cost estimate for this alternative will assume that 50% of the residents will qualify for the LIRA program and will pay a reduced rate.

4.1.2 ALTERNATIVE 1B – CONSOLIDATION WITH CAL AM

Alternative 1B is the consolidation of each of the Schoch Rd. water systems with another nearby public water system, California American Water (Cal Am). The Cal Am - Ralph Lane District is located approximately 0.25 miles north of the Schoch Rd. community. Cal Am's existing pump station is located at the north end of Ralph Lane and includes a 590 ft deep well, chlorine injection, 60,000 gallon ground storage tank, and a booster pump. Cal Am staff has also reported they are considering drilling a new well to increase capacity. A source capacity assessment would need to be performed to determine whether the existing well is able to meet the increased demand from the Schoch Rd. community. This alternative will assume that sufficient source capacity will be available by the time these improvements are implemented.

To convey the water to the community, a new 8 inch water main is proposed to tie into Cal Am's system near the southern end of Ralph Lane. This alternative would include the construction of approximately 6,470 feet of new water main along with new flow meters, isolation valves, and backflow preventers on each service lateral. Figure 3 below shows the proposed water main alignment and location of connection to Cal Am's distribution system.

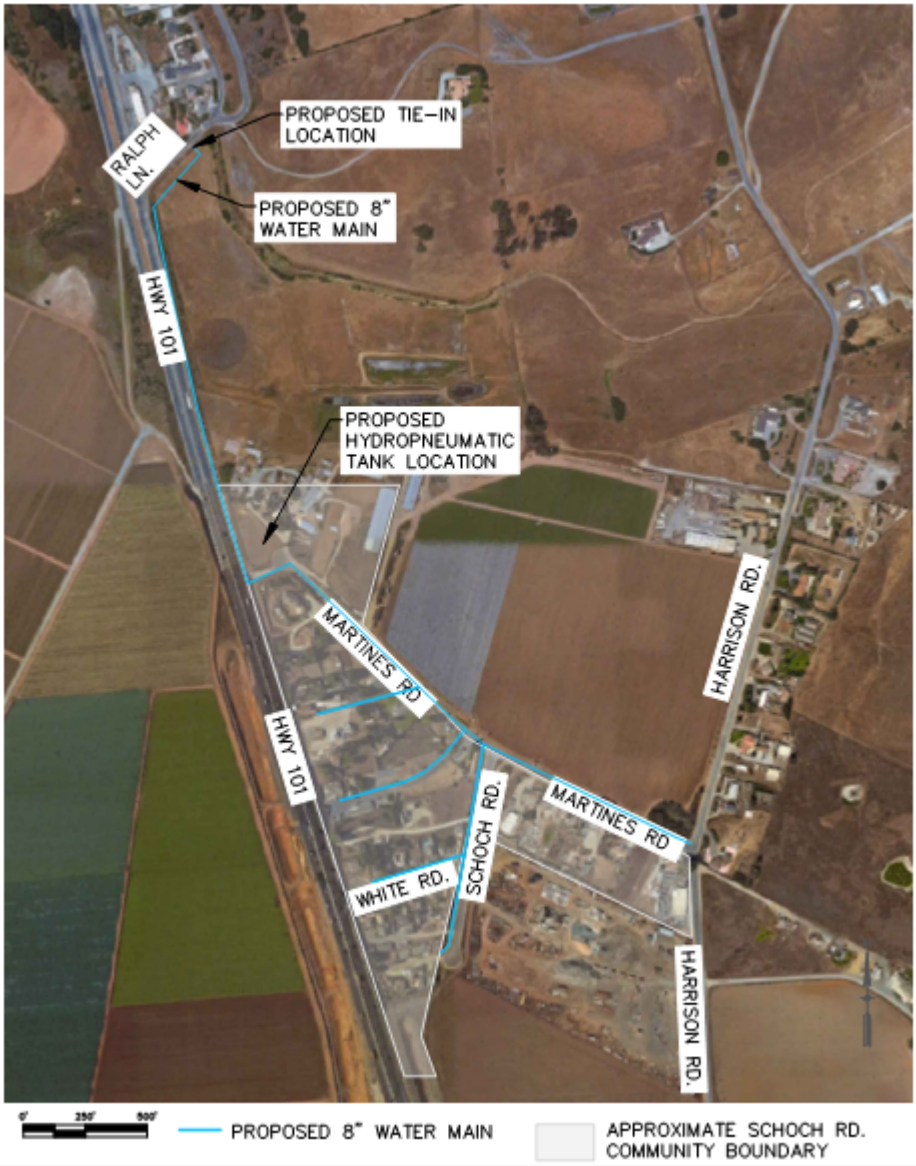


Figure 3 - Proposed Water Main Alignment for Alternative 1B

Cal Am's existing booster pump currently operates at a total dynamic head between 40-60 psi. The Schoch Rd community is nearly 100 ft higher than the pump station, and the existing booster pump would not be able to serve the Schoch Rd community while meeting the minimum pressure requirements of the California Public Utilities Commission and Title 22. A new high pressure booster pump would need to be installed to boost the pressures in the Schoch Rd community. A hydropneumatic would also be needed to maintain the pressures in the community during low flow periods to avoid excessive pump cycling. The location of the tank would be dependent on land availability, but could potentially be installed near the northern end of Martines Rd.

To provide fire flow for the Schoch Rd community, it is proposed to extend the new 8 inch water main to Harrison Rd and make a connection to the future 8 inch Cal Water main. Cal

Water currently serves as the backup water supply to Cal Am's Ralph Lane District. In the past when Cal Am's system is out of service, a temporary connection to Cal Water has been made. This alternative would provide a permanent connection to Cal Water's system which would provide an immediate backup water supply to Cal Am's system. The connection would include a control valve that would only open when pressures in the Schoch Rd community droped below a minimum pressure setpoint.

Once installed, the system would be owned and operated by Cal Am. All costs associated with maintaining the system would be included in the water service and commodity charges that are paid by each home owner. Similar to Cal Water, Cal Am institutes a Low-Income Rate Assistance (LIRA) program which offers a discount to qualifying low-income customers. The O&M cost estimate for this alternative will assume that 50% of the residents will qualify for the LIRA program and will pay a reduced rate.

4.1.3 ALTERNATIVE 2 - COMMUNITY TREATMENT FACILITY

Alternative 2 includes the construction of a new water treatment facility to provide treated water to the entire community. The facility would be located within the community and would include the construction of two new wells, an ion exchange treatment system to remove contaminants from the groundwater, a hydropneumatic storage tank, backup electric generator, and new distribution water mains. This alternative will also include a separate system for providing the required fire flow. This system will include a ground storage tank, two new fire protection pumps, and new fire flow water mains which run parallel to the distribution water mains and will convey untreated groundwater to hydrants throughout the community.

Title 22 requires each well to be sized be sized to meet the MDD of the community. The pumps would operate in a 1 firm/ 1 standby operation, with the standby pump considered as a backup source of water. The location of the new wells and treatment facility will be highly dependent on land availability. Potential location will be assessed and determined during the preliminary design phase, which would ideally include additional groundwater sampling, soil borings, and an aquifer pumping test to confirm well capacity. For the purpose of this evaluation, a well depth of 600 ft was assumed based upon the available historical water quality data for the community. The wells are also assumed to be gravel packed with an 8" casing and sanitary seal to a depth of approximately 400 ft. The well pumps will have a common discharge header which connects to the treatment system.

The recommended treatment strategy for this application will be treating a side stream and blending to achieve the desired nitrate reduction. The treatment train will utilize ion exchange vessels to reduce the nitrate concentrations from the groundwater. This technology is offered from a number of manufacturers, including Evoqua and Ionex. While each manufacturer may have varying vessel sizes and configurations, the general treatment strategy is the same. The proposed system is offered by Evoqua and will include a bag filtration system to reduce the TDS prior to entering the ion exchange vessels. The ion exchange system will include two vessels in a lead/lag configuration. The lead vessel is sized to provide the needed nitrate reduction, and the lag vessel is available as a standby unit to treat any residual nitrates. As shown in Figure 4 below, a nitrate monitor will be located between the lead and lag vessels to monitor the nitrate concentration of the flow exiting the lead vessels. An additional nitrate monitor will be included downstream of the blended flow. This will be used to control a

modulating valve on the bypass line to adjust the amount of flow to bypass the system in order to maintain a target concentration of nitrate in the system effluent. These nitrate monitors provide a continuous reading of the nitrate concentration and are an operational necessity for the system. They will not be used for compliance monitoring. Instead, the system's operator will be responsible for taking grab samples of the systems influent and effluent for testing and reporting to the permitting agency.

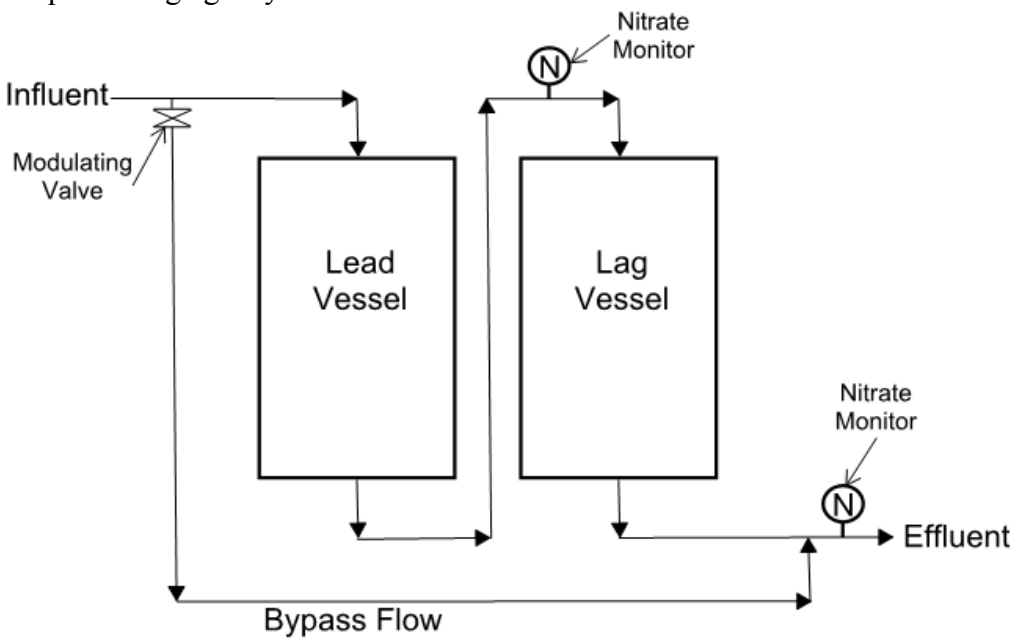


Figure 4 - Schematic of Proposed Ion Exchange Treatment System

When the resin is exhausted in the lead vessel and the nitrate monitor reaches a set point concentration, a signal will be sent to the manufacturer and a vessel exchange will be scheduled. The manufacturer will modify valve positions to reassign the lag vessel to the lead position. A new vessel with regenerated resin will be installed and assigned to the lag position, and the spent vessel will be hauled back to the manufacturer's facility for regeneration. The frequency of this vessel exchange will be dependent on the contaminant levels in the influent, but could be as frequent as once a month. Effluent from the treatment system will discharge into a hydropneumatic tank which will be pressurized with a single compressor to regulate distribution system pressures and prevent excessive pump cycling.

The size of the distribution water mains will be controlled by Title 22 requirements for minimum water main size, which is 4 inches. This alternative includes costs for new water mains, service laterals, water meters, and backflow preventers to deliver the treated water to each of the 44 homes in the community.

To provide fire flow under this alternative, it is recommended that a 60,000 gallon above ground storage tank be utilized to store untreated groundwater. By opening a valve on the discharge header of the new well pumps, the storage tank could be filled to provide adequate storage for fire protection. A 1,000 gpm pump would then be used to convey flow to the fire hydrants through a separate water main dedicated for the fire flow. The fire pump would be designed to provide at least 20 psi at each of the hydrants throughout the community. Since the

fire flow will be classified as non-potable water, consideration must be given to the required distance between the fire flow piping and the finished water piping.

This alternative would require the formation for a new public water system, such as a Mutual Water Company (MWC), which would encompass the entire Schoch Rd. community. The permitting process for an initial permit for a public water system in outlined in Title 22 and could take over a year to obtain all necessary permits. Appedix B shows the permit application form that would need to be completed by the new public water system. Once formed, the MWC would be responsible for setting water rates, collecting fees, operating and maintaining the system, including energy bills and staffing costs to have a certified operator monitor the system.

The level of operator required will be dependent on the water treatment facility classification as defined in Title 22. Based upon preliminary assumptions, the proposed treatment facility would be classified as a T1 or T2 facility, which would require a T1 or T2 chief operator. The public water system must designate at least 1 chief operator that meets the certification requirements for the treatment facility classification. The chief operator may not be required to remain on-site if the system can demonstrate reliability while under unmanned operation. As indicated by the manufacturer, the proposed treatment system should require no more than 2 hours per day of operator attention. If the system is properly maintained by the chief operator, the treatment equipment could last approximately 20 years before requiring major rehabilitation or replacement.

4.1.4 ALTERNATIVE 3 - WELLHEAD TREATMENT

Alternative 3 consists of the addition of a treatment system to each of the six existing state small water systems within the community. This alternative assumes that all existing wells are in good condition and can provide the required flow and pressure as needed for the improved system. The design conditions for each treatment system would be specific to each water system based upon the water quality from its source. For the purpose of this report, a single water system, El Camino Real WS #34, will be evaluated to determine overall feasibility. The alternative comparison in Section 4.2 will assume each of the other five state small water systems within the community will be similar in nature and will have similar costs.

The treatment system at El Camino Real WS #34 would be installed in an accessible area near the wellhead, and would include a 3-vessel ion exchange treatment system similar to system described in Alternative 2. The treated water will tie back into the existing water main for distribution to each of the existing service connections. Based upon the recent water quality lab reports for this water system, the manufacturer will be required to exchange vessels approximately every two months.

Because each of these water systems has less than 15 permitted connections, they are not classified as public water systems and will not be required to provide fire flow. In addition, the regulatory requirements these systems are much less stringent than those described in Alternative 2. Each water system will be required to submit an application for an amended permit which outlines the proposed improvements to the water system. The amended permit application must be submitted in accordance with Title 22, Section 64211, and shall identify the party responsible for day to day operations of the system. Once the amended permit is issued by the local health officer, the water system will be required to continue all bacteriological and chemical quality monitoring requirements as required by its existing permit. The costs associated with operating and maintaining the system will be the responsibility of the system's

owner.

4.1.5 ALTERNATIVE 4 - POINT OF ENTRY (POE) TREATMENT

Alternative 4 consists of a POE treatment system to be installed at each of the 44 homes in the Schoch Rd. community. This alternative will utilize the same ion exchange treatment technology as was evaluated in Alternatives 2 and 3, but this system is small enough to be installed within or adjacent to each home requiring approximately 10 sf of floor area. It is assumed that each system has an average influent nitrate concentration of 55 mg/L (as NO_3). The POE system will have a treatment capacity of 10 gpm and reduce the nitrate concentration to below the state MCL. This alternative assumes that formation of a public water system will not be required, as the number of service connections will remain unchanged. However, the addition of these treatment systems will require each of the existing state small water systems to apply for an amended permit.

The treatment system is offered by Culligan and utilizes a twin alternating tank design where one tank is in service and the other in standby. Each of the two nitrate tanks contains a nitrate selective strong base anion exchange resin. The twin tanks are furnished with a brine tank for onsite resin regeneration. When the resin in a nitrate exchanger tank is depleted, a regeneration cycle is initiated and the brine solution flushes through the tank to recharge the resin. As indicated by the manufacturer, the waste solution will contain dilute brine solution, similar to a water softener, and concentrated nitrates. For a single dwelling residence, this flow is typically sent to the property's septic system and is estimated to be approximately 140 gallons per month based upon the assumed consumption of brine solution. Figure 5 below shows a schematic of this treatment system.

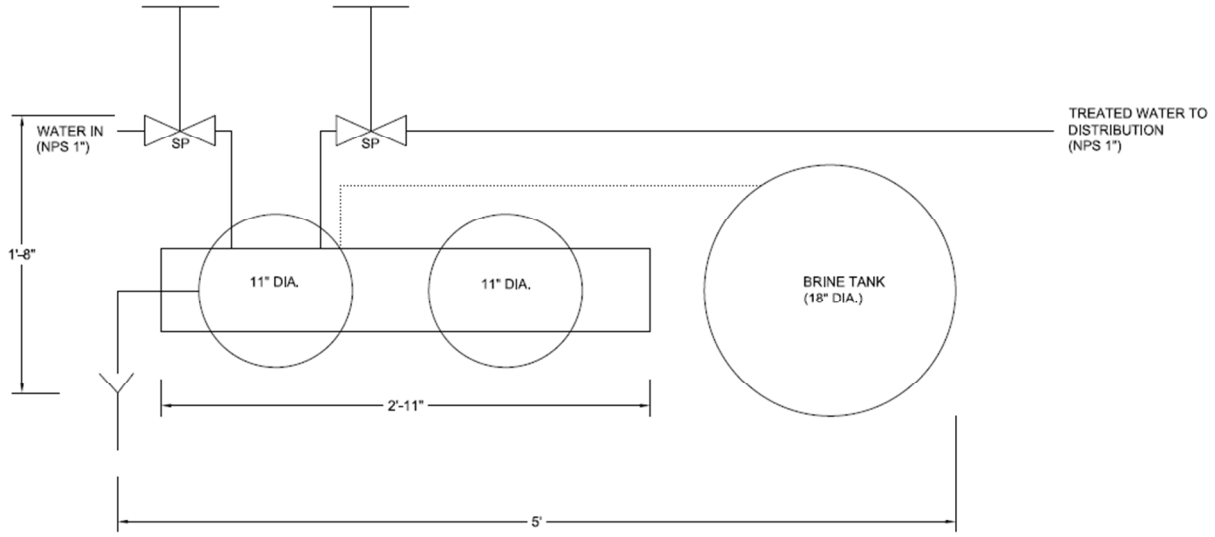


Figure 5 - Schematic of Proposed POE Treatment System

This alternative will not include provisions for providing fire protection to the community, as it does not include formation of a new public water system. The costs for operating this system will be responsibility of the property owner and will primarily consist of

costs for monthly service from the manufacturer. Monthly service will include filling the salt tank for the nitrate exchangers, testing influent and effluent for nitrate, and system inspection.

4.2 ANALYSIS OF ALTERNATIVES

The presented alternative solutions were evaluated using both economic and non-economic criteria. For the economic evaluation, the capital and O&M costs were developed using vendor proposals for major equipment. Smaller equipment and material costs were developed using typical industry unit costs. When necessary, general assumptions were made in efforts to provide a complete cost estimate. The costs presented in this report should not be considered as an engineer's estimate of probable cost and are intended to be used to provide a comparison of the available alternatives in efforts to identify feasible solutions. It should be noted that final project costs will vary.

The economic evaluation also includes a comparison of the Net Present Value (NPV) of each alternative, which assumes an O&M inflation rate of 1.9% and annual discount rate of 3.1% over a 20 year term. The costs presented in this evaluation are in 2017 dollars, and the backup for these cost estimates can be found in Appendix C. A summary of the economic evaluation is shown in the Table 5 below.

Table 5 - Economic Evaluation of Alternatives

	Alt. 1A[(1)] Consolidation w/ Cal Water	Alt. 1B[(1)] Consolidation w/ Cal Am	Alt. 2[(1)] Community Treatment	Alt. 3 Wellhead Treatment	Alt. 4 POE Treatment
Capital Cost	$1,305,000	$2,035,000	$3,370,000	$2,583,000	$340,000
Annual O&M Cost	$27,810	$20,710	$128,000	$189,000	$39,000
Net Present Value (NPV)	$1,792,000	$2,398,000	$5,613,000	$5,894,000	$1,023,000

(1) Includes costs associated with providing fire protection.

To evaluate each alternative's cost impact on the community members, the estimated annual O&M costs were divided to the show the amount that would be paid by each household on a monthly basis. Table 6 below shows the projected monthly cost per home for each alternative.

Table 6 - Projected Monthly Cost per Home

	Alt. 1A[(1)] Consolidation w/ Cal Water	Alt. 1B[(1)] Consolidation w/ Cal Am	Alt. 2[(1)] Community Treatment	Alt. 3 Wellhead Treatment	Alt. 4 POE Treatment
Estimated Average Monthly Cost per Home	$52.67	$39.22	$242.42	$357.95	$73.86

(1) Includes costs associated with providing fire protection.

The non-economic evaluation is intended to cover the aspects of the alternative that do not have a direct impact on cost. Alternatives were compared based upon their water quality, sustainability, system reliability, and ease of regulatory acceptance. A summary of the considerations for each of these aspects is as follows:

Water Quality

- Alternative 1A/1B - Consolidation
  - Supplied from a public water system that has higher testing standards and operator training in operating permit
  - Includes residual disinfectant
- Alternative 2 - Community Treatment Facility
  - Significant TDS reduction
  - No residual disinfectant
- Alternative 3 - Wellhead Treatment
  - Significant TDS reduction
  - No residual disinfectant
- Alternative 4 - POE Treatment
  - Limited treatment flexibility
  - Limited TDS reduction
  - No residual disinfectant

Sustainability

- Alternative 1A/1B - Consolidation
  - Proposed restructured water system (Cal Water/Cal Am) has staff and resources to maintain system
- Alternative 2 - Community Treatment Facility
  - System allows target effluent nitrate concentration to be adjusted, allowing continued compliance under potential future MCL reductions
  - Dependent on availability of manufacturer provided services
- Alternative 3 - Wellhead Treatment
  - System allows target effluent nitrate concentration to be adjusted, allowing continued compliance under potential future MCL reductions
  - Dependent on availability of manufacturer provided services
- Alternative 4 - POE Treatment
  - Dependent on availability of manufacturer provided services

System Reliability

- Alternative 1A/1B - Consolidation
  - Operated and maintained full time by experienced operators with high certification level
  - System protected by backup power supply
  - Additional staff available to promptly perform repairs
- Alternative 2 - Community Treatment Facility
  - Operated and maintained part time by operators with a lower certification level

    - System protected by backup power supply
- Alternative 3 - Wellhead Treatment
    - Less experienced staff maintaining the system
    - No backup power supply
- Alternative 4 - POE Treatment
    - Individual homeowners will be responsible for scheduling service at the required intervals, which could result in unkempt treatment systems and contaminants in the effluent
    - No backup power supply

Ease of Regulatory Acceptance

- Alternative 1A/1B - Consolidation
    - Includes closure of 6 state small water systems
    - Does not require new permit application
- Alternative 2 - Community Treatment Facility
    - Includes closure of 5 state small water systems
    - Requires permit application for a new public water system
- Alternative 3 - Wellhead Treatment
    - Requires amended permit applications for 6 state small water systems
- Alternative 4 - POE Treatment
    - Requires amended permit applications for 6 state small water systems
    - State Water Resources Control Board may only considered POE treatment if centralized treatment is economically unfeasible

4.3 RECOMMENDATION

Based upon the results of the economic and non-economic evaluations, the recommendation of EWB-KC is that the Schoch Rd. community moves forward with Alternative 1A for consolidation with Cal Water. While the initial capital cost is high, the O&M costs are significantly lower than the other alternatives. Additionally, the potential maintenance needs of the other alternatives could arise suddenly and take a big financial toll on the community members.

Further, the California Department of Public Health administers programs which fund improvements to small community water systems and encourages consolidation. These programs are a potential funding source that should be pursued by the EJCW and the Schoch Rd. community.

APPENDIX A
SUMMARY OF HISTORIC WATER QUALITY DATA

Monterey County Health Department Water Testing Data

El Camino Real WS #33

Well depth 400 ft

Date	Nitrate (as NO3) Concentration (mg/L)	
12/9/1983	95	
5/2/1984	104	
10/24/1985	105	
8/11/1986	175	
8/18/1986	72	
8/27/2001	3	New well drilled
4/15/2005	4	
5/16/2008	5	
2/6/2012	29	
3/11/2016	37	
Min[1]	**3**	
Max[1]	**37**	
Average[1]	**15.6**	

Notes:

1. Includes only data from new well

Monterey County Health Department Water Testing Data

El Camino Real WS #34

Well depth 232 ft

Date	Nitrate (as NO3) Concentration (mg/L)
5/8/1986	52
5/27/1986	52
10/9/1986	60
8/27/2001	3
4/3/2006	12
5/23/2008	8
2/25/2011	41
4/29/2011	75
6/27/2011	52
7/29/2011	47
12/9/2011	42
2/6/2012	44
5/25/2012	53
8/17/2012	54
11/26/2012	44
5/7/2013	53
11/25/2013	61
5/30/2014	62
Min	**3**
Max	**75**
Average	**45.3**

Monterey County Health Department Water Testing Data

El Camino Real WS #35

Well depth 420 ft

Date	Nitrate (as NO3) Concentration (mg/L)
4/15/2005	3
6/12/2008	0
8/23/2010	2
5/23/2013	2
11/15/2016	2.2
1/9/2015	2
Min	**0**
Max	**3**
Average	**1.9**

Monterey County Health Department Water Testing Data

El Camino Real WS #37

Well depth 312 ft

Date	Nitrate (as NO3) Concentration (mg/L)
5/13/2005	73
4/3/2006	84
5/16/2008	88
7/14/2008	83
2/22/2011	92
2/26/2012	92
2/7/2014	101
1/5/2015	105
11/16/2015	100
Min	**73**
Max	**105**
Average	**90.9**

Monterey County Health Department Water Testing Data

El Camino Real WS #43

Well depth 210 ft

Date	Nitrate (as NO3) Concentration (mg/L)
8/15/2001	55
8/6/2002	64
5/13/2005	77
4/3/2006	78
5/23/2008	84
3/4/2009	82
8/23/2010	84
6/6/2012	90
2/7/2014	100
12/11/2015	109
12/18/2015	109
Min	**55**
Max	**109**
Average	**84.7**

Monterey County Health Department Water Testing Data

White Rd WS #01

Well depth 209 ft

Date	Nitrate (as NO3) Concentration (mg/L)
3/25/1991	1
3/24/1992	2
12/10/1992	3
6/7/1993	3
7/28/1994	4
5/31/1995	3
12/9/1996	3
11/23/1998	3
8/2/2001	3
5/6/2005	2
6/3/2008	2
8/16/10	3
8/2/2013	3
5/29/2015	3
8/28/2015	3
Min	**1**
Max	**4**
Average	**2.7**

APPENDIX B
PERMIT APPLICATION FOR A NEW PUBLIC WATER SYSTEM

MONTEREY COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH BUREAU
DRINKING WATER PROTECTION SERVICES

APPLICATION FOR A NEW OR AMENDED
WATER SYSTEM PERMIT

Return Application to: Monterey County Health Department
Drinking Water Protection Services
1270 Natividad Road
Salinas, CA 93906

Date:_____

1a. Legal Owner of System_____ phone no. (___) ____-_____
(Individual or Association)
1b. Operator of system_____ phone no. (___) ____-_____

2. Mailing Address _____
Street/P.O. Box

_____
City State Zip Code

3. Location Description of Water System _____
(e.g., road name and distance to nearest crossroad, etc.) _____

Number of Connections (attach list)_____
(each habitable structure (house, caretakers, senior unit, etc.) requires a separate connection

4. New water system ☐, modification of an existing water system ☐, or change of ownership ☐?

If modification or change in ownership,

1. Give name of water system (as it appears on Health Permit)_____

_____ computer no. _____

2. Describe proposed modifications(s)_____

_____

Submit detailed plans and specifications on proposed modifications before construction.

5. Qualified Engineer (experienced in water system design) or other person designing the construction or modification of the water system

_____
Name Company Name Mailing Address

phone no. (_____)_____-_____

(_____)_____-_____

6. Submit the following documents with the application:

(1) New system - Results from a source production test performed by a drilling contractor or other person approved by the Health Department on the source(s). This test must be witnessed by a representative of the Health Department. For non-alluvial formations the pumping shall be a minimum of 72 hours with a recovery period equal to the length of time of pumping. For alluvial formations, pumping shall be a minimum of 8 hours with a recovery period equal to the pumping length. Consult with Health Department prior to initiating the test to determine if the length of time for the test needs to be increased due to site specific factors including: distance to bedrock, known problems in the area, large fluctuating groundwater levels, drought conditions, etc. See website for more details: http://www.mtyhd.org/index.php?option=com_content&view=article&id=669%3Asource-capacity-testing-procedures-for-water-wells&catid=174%3Awell-construction--repair--destruction&Itemid=594&lang=en
Existing system (previously unpermitted system with no new connections)– consult with Department

(2) *Inorganic Chemical Analysis: Aluminum, antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, chromium VI, cyanide, fluoride, mercury, nickel, nitrate (NO_3), nitrite, (NO2), perchlorate, selenium, and thallium. Asbestos and cyanide may be waived if determined to not be vulnerable.

(3) *Secondary Standards: Total dissolved solids, specific conductance, chloride, sulfate, calcium, magnesium, potassium, sodium, iron, manganese, carbonate, bicarbonate, hydroxide alkalinity, total hardness, MBAS, copper, zinc, silver, color, odor, turbidity, pH. MTBE and thiobencarb are also required, but may be waived if determined to not be vulnerable.

(4) *Coliform Bacteria Analysis

(5) *Volatile Organic Chemical Analysis (EPA Method 502.2)(if determined to be vulnerable)

(6) *Synthetic Organic Chemical Analysis (Atrazine, Alachlor, Bentazon, Carbofuran, Diquat, Simazine, 2,4-D) (if determined to be vulnerable)

* Analyses must be performed by a lab certified by the State of California

(7) Recorded Water Agreement between all users of the system. (not required if system on one parcel) Incorporation also required for 5-14 connections.

(8) Construction plan(s) – New construction must be designed and stamped by a State certified engineer; approved by the local fire agency. Show location of tanks, wells, connections, all lengths and sizes of pipelines, shut-off valves, thrust block detail, connection detail at tanks and wells, trench detail and pressures within the system on a topographical map. If septic envelopes have been required, include them on the plan(s); also show location of other active, inactive, or abandoned water wells within the subdivision or boundaries of the water system, tank lot, well lot and other easements.

(9) Written approval from the local fire agency after completion of construction/modification.

(10) Well log(s).

(11) Emergency Notification Plan (form enclosed).

(12) Final Inspection of Water System.

(13) Connection List (form enclosed). Supply the required information, including the Assessor Parcel Number (APN) for each connection to be served by the water system.

(14) Obtain Use Permit from the Planning Department (755-5025) for each additional connection beyond the existing permitted connections (5-199 connections).

(15) Obtain Building Permit for storage tank(s) over 5,000 gallon capacity (if applicable).

(16) Contact Monterey Peninsula Water Management District at (831) 658-5600 for permit requirements (if within district boundary). http://www.mpwmd.dst.ca.us/wrd/wells/general%20info/geninfo_052407.htm

(17) Financial Capacity/Budget Projection analysis (form enclosed).

(18) Operation and Maintenance Plan (guidance enclosed).

7. SOURCE ☐ WELL ☐ SPRING ☐ Other (specify) _____

WELL:	WELL 1	WELL 2	WELL 3
a) Date drilled			
b) Location			
c) Dimensions of lot easement			
d) Well depth			
e) Capacity (GPM)			
f) Annular seal depth			
g) Perforation locations			
h) Conductor diameter			
i) Gravel packed (yes/no)			
j) 2nd casing diameter			
k) 2nd casing depth			
l) Type of casing			
m) Water level (static)			
n) Water level (pumping)			
o) Concrete slab			
p) Sounding tube/access hole			
q) P.G.& E. number			
r) Distance to:			
sewer			
septic tanks			
leach lines			
seepage pits			
abandoned well(s)			
hazardous chemical			
any other possible contamination sources within ¼ mile radius from each water source (e.g., gas station, agricultural activities, etc.)			
s) Use:			
Residential			
Commercial			
Agricultural			

7. continued:

	WELL 1	WELL 2	WELL 3
t) Approved backflow valve (Ag wells)			
Make			
Model			
Testing frequency			
u) Frequency of Use			

SPRING/OTHER (specify) _____

a) Location _____
b) Type of development _____
c) Flow (pump or gravity) _____
d) Average yield (GPM) _____
e) Surface drainage outlet screen _____
f) Topography _____
g) Exposure (residential/commercial/agricultural) _____
h) Sanitation measures _____

PUMP

a) Make _____
b) Type (submersible, jet, turbine) _____
c) Power (hp)_____
d) Capacity (GPM) range _____
e) Lubrication _____

8. STORAGE

a) Tank lot dimensions _____
b) Type (steel, wood, concrete, plastic) _____
c) Capacity (total gallons) _____
d) Feeds distribution system by: Check the appropriate box
☐ Booster Pump ☐ Pressure Tank ☐ Gravity ☐ Combination
e) Elevation _____
(height above/depth below ground surface)
f) Distance to source _____
g) Interior coating _____
h) Use: Domestic/Fire _____
Commercial _____
Other (specify) _____

9. DISTRIBUTION

a) Main Line: Size_____
Type of material _____
Dead ends _____

b) Meters: Size_____
Type material _____
Make/Model_____

c) Number of shut-off valves_____

d) Billing procedure: Metered _____
Flat rate _____

10. TREATMENT

a) Nature of treatment (e.g., NO_3, Fe, Mn, etc.) _____
b) Type equipment (e.g., RO, IE, etc.) _____
Manufacturer _____ Model _____
c) Location _____
d) Capacity (G.P.M.) _____
e) Waste discharge and handling _____
f) Operator's name _____ CA Certification # _____ Expiration date: _____
g) Maintenance schedule _____
h) Test frequency _____

I (We) declare under penalty of perjury that the statements on this application and on the accompanying attachments are correct to my (our) knowledge and that I (we) are acting under authority and direction of the responsible legal entity under whose name this application is made.

Applicant's Name (print:_____

Applicant's Signature: _____

Title: _____

Address: _____

_____

Telephone: _____

9/09

APPENDIX C
COST ESTIMATE BACKUP

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Capital Cost Summary
Alternative 1A - Consolidation (with Cal Water)

Item Description	Units	Unit Cost	Quantity	Total Cost
Distribution Piping				
Project Cost (Cal Water Estimate)	LF	$300	4,350	$1,305,000
Subtotal				***$1,305,000***
Adders				
Mobilization[(1)]	LS	0%		$0
Subtotal				***$1,305,000***
Material Contingency[(1)]	LS	0%		$0
Subtotal				***$1,305,000***
Engineering[(1)]	LS	0%		$0
Total Capital Cost				***$1,305,000***

(1) Mobilization, contingency, and engineering costs are included in $300/LF estimate provided by Cal Water.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Capital Cost Summary
Alternative 1B - Consolidation (with Cal Am)

Item Description	Units	Unit Cost	Quantity	Total Cost
Pumping Improvements				
High Pressure Booster Pump	LS	$40,000	1	$40,000
Hydropneumatic Tank	LS	$35,000	1	$35,000
Installation	LS	25%	1	$19,000
Subtotal				***$94,000***
Distribution Piping				
Project Cost	LF	$300	6,470	$1,941,000
Subtotal				***$1,941,000***
Subtotal				***$2,035,000***
Adders				
Mobilization[(1)]	LS	0%		$0
Subtotal				***$2,035,000***
Material Contingency[(1)]	LS	0%		$0
Subtotal				***$2,035,000***
Engineering[(1)]	LS	0%		$0
Total Capital Cost				***$2,035,000***

(1) Mobilization, contingency, and engineering costs are included in $300/LF unit cost.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Capital Cost Summary
Alternative 2 - Community Treatment Facility

Item Description	Units	Unit Cost	Quantity	Total Cost
Treatment Facility				
50 GPM Wells (Casing and Pump)	EA	$100,000	2	$200,000
Ion Exchange Equipment	LS	$185,000	1	$185,000
Hydropneumatic Tank	EA	$35,000	1	$35,000
Backup Electric Generator	LS	$50,000	1	$50,000
Concrete Pad (10'x'10)	CY	$750	4	$3,000
Fencing	LF	$30	150	$5,000
Installation	LS	25%		$120,000
Misc. Site Work	LS	$50,000	1	$50,000
Land Acquisition	LS	$20,000	1	$20,000
Subtotal				**$668,000**
Distribution Piping				
4" PVC (C-900)	LF	$35	4,350	$152,000
Service Connections	EA	$3,000	44	$132,000
Air Release Valves (w/ Manhole)	EA	$6,000	3	$18,000
Water Meters	EA	$1,500	44	$66,000
Isolation Valves	EA	$400	44	$18,000
Backflow Preventers	EA	$500	44	$22,000
Installation	LS	25%		$102,000
Subtotal				**$510,000**
Fire Protection				
Above Ground Storage Tank (60,000 Gal)	LS	$75,000	1	$75,000
Fire Pumps (1,000 GPM)	EA	$110,000	2	$220,000
8" PVC (C-900)	LF	$60	4,350	$261,000
Air Release Valves (w/ Manhole)	EA	$6,000	3	$18,000
Fire Hydrants	EA	$6,000	6	$36,000
Isolation Valves	EA	$2,500	6	$15,000
Installation	LS	25%		$156,000
Subtotal				**$781,000**
Subtotal				***$1,959,000***
Miscellaneous				
Mobilization	LS	5%		$97,950
Permitting	LS	$100,000	1	$100,000
Subtotal				***$2,157,000***
Contingency	LS	25%		$539,000
Subtotal				***$2,696,000***
Engineering	LS	25%		$674,000
Total Capital Cost				***$3,370,000***

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Capital Cost Summary
Alternative 3 - Wellhead Treatment

Item Description	Units	Unit Cost	Quantity	Total Cost
Treatment Facilities				
Ion Exchange Equipment	EA	$143,000	6	$858,000
Concrete Pad (12'x12')	CY	$750	8	$6,000
Installation	LS	25%		$216,000
Misc. Site Work (Excavation, Finished Grading)	EA	$15,000	6	$90,000
Misc. Piping and Fittings	LS	$10,000	6	$60,000
Installation	LS	25%		$15,000
Electrical, I&C		25%		$215,000
Subtotal				**$1,460,000**
Subtotal				***$1,460,000***
Miscellaneous				
Mobilization	LS	5%		$73,000
Permitting	LS	$20,000	6	$120,000
Subtotal				***$1,653,000***
Contingency	LS	25%		$413,000
Subtotal				***$2,066,000***
Engineering	LS	25%		$517,000
Total Capital Cost				***$2,583,000***

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Capital Cost Summary
Alternative 4 - Point of Entry (POE) Treatment

Item Description	Units	Unit Cost	Quantity	Total Cost
Treatment Equipment				
POE Packaged System(1)	EA	$5,000	44	$220,000
Subtotal				**$220,000**
Piping				
1" Copper Pipe	LF	$20	1,320	$26,000
1" Copper Pipe Fittings	LS	20%		$5,200
Installation	LS	25%		$8,000
Subtotal				**$39,200**
Subtotal				***$259,000***
Miscellaneous				
Mobilization	LS	5%		$12,950
Subtotal				***$272,000***
Contingency	LS	25%		$68,000
Total Capital Cost				***$340,000***

(1) Includes twin nitrate exchangers, brine storage tank, installation, and initial fill of brine solution.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Annual O&M Cost Summary
Alternative 1A - Consolidation (with Cal Water)

Item Description	Units	Unit Cost	Quantity	Total Cost
Service and Usage Costs				
Service Charge(1) (12 Months)	EA	$20.81	528	$10,990
Usage Rate (12 Months)	CCF	$3.18	5,153	$16,390
Annual Hydrant Service Charge	EA	$72	6	$430
Subtotal				***$27,810***
Total Annual O&M Cost				***$27,810***

(1) Based upon 2017 Cal Water Service changes for 3/4-inch meter. Assumes 50% of community will qualify for Low Income Ratepayer Assistance (LIRA) program.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Annual O&M Cost Summary
Alternative 1B - Consolidation (with Cal Am)

Item Description	Units	Unit Cost	Quantity	Total Cost
Service and Usage Costs				
Service Charge(1) (12 Months)	EA	$7.14	528	$3,770
Usage Rate, First 59.8 CGL (12 Months)	CGL	$0.41	31,574	$12,860
Usage Rate, Exceeding 59.8 CGL (12 Months)	CGL	$0.49	6,442	$3,150
Surcharge for Cal Am Water Conservation (12 Months)	CGL	$0.02	38,016	$930
Subtotal				***$20,710***
Total Annual O&M Cost				***$20,710***

(1) Based upon 2017 Cal Am - Ralph Lane service changes for 3/4-inch meter. Assumes 50% of community will qualify for Low Income Ratepayer Assistance (LIRA) program.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Annual O&M Cost Summary
Alternative 2 - Community Treatment Facility

Item Description	Units	Unit Cost	Quantity	Total Cost
Treatment System Costs				
Vessel Exchange	EA	$2,300	8	$18,000
Well Pump Energy Cost(1)	LS	$4,300	1	$4,000
Annual Repair and Replacement (3% Equipment Cost)	LS	$10,000	1	$10,000
Certified Operator (quarter time)	LS	$10,000	1	$10,000
Sampling and Testing (Monthly)	EA	$3,000	12	$36,000
Subtotal				***$78,000***
Distribution Maintenance Costs				
Preventative/Corrective Maintenance	LS	$30,000	1	$30,000
Subtotal				***$30,000***
Administrative Costs(2)				
Misc (Meter Reading, Bill Preparation, etc)	LS	$20,000	1	$20,000
Subtotal				***$20,000***
Total Annual O&M Cost				***$128,000***

(1) Assumes 35 hp motor at 3 hours per day and $0.15 per kWh.
(2) Office space is assumed to not be required.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Annual O&M Cost Summary
Alternative 3 - Wellhead Treatment

Item Description	Units	Unit Cost	Quantity	Total Cost
Treatment System Costs				
Vessel Exchange	EA	$2,300	36	$83,000
Well Pump Energy Cost(1)	EA	$1,300	6	$8,000
Annual Repair and Replacement (3% Equipment Cost)	LS	$26,000	1	$26,000
Sampling and Testing (Quarterly)	EA	$3,000	24	$72,000
Subtotal				***$189,000***
Total Annual O&M Cost				***$189,000***

(1) Assumes 10 hp motor at 3 hours per day and $0.15 per kWh.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Annual O&M Cost Summary
Alternative 4 - Point of Entry (POE) Treatment

Item Description	Units	Unit Cost	Quantity	Total Cost
Treatment System Costs				
Well Pump Energy Cost(1)	EA	$1,100	6	$7,000
Scheduled Service Contract (2)	EA	$660	44	$29,000
Chemical (Salt) Consumption	EA	$60	44	$3,000
Annual Repair and Replacement (3% Equipment Cost)	LS	$7,000	1	$7,000
Subtotal				***$39,000***
Total Annual O&M Cost				***$39,000***

(1) Assumes 10 hp motor at 3 hours per day and $0.15 per kWh.

(2) Assumes certified operator is not required.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Net Present Value (NPV)
Alternative 1A - Consolidation (with Cal Water)

Base Year for Cost Estimate	**2017**
First Year of Service	**2019**
Mid-Point of Construction	**2018**

Economic Assumptions

O&M Escalation (Inflation) Rate	1.90%
Annual Interest (Discount) Rate	3.10%

Capital Costs (Modify as Required)

Total NPV of Capital Costs(1)		$1,305,000

O&M Costs (Modify As Required)

		Base Year Cost	Mid-Point of Construction	First Year of Service																		
		2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**
Total O&M Cost		$27,810	-	$28,877	$29,425	$29,985	$30,554	$31,135	$31,726	$32,329	$32,943	$33,569	$34,207	$34,857	$35,519	$36,194	$36,882	$37,583	$38,297	$39,024	$39,766	$40,521	$41,291
NPV of O&M Cost at Base Year				$27,166	$26,850	$26,538	$26,229	$25,924	$25,622	$25,324	$25,029	$24,738	$24,450	$24,165	$23,884	$23,606	$23,331	$23,059	$22,791	$22,526	$22,264	$22,004	$21,748

Total NPV of O&M Costs		$487,000

NPV Summary	
Capital Cost	$1,305,000
O&M	$487,000
Total NPV	**$1,792,000**

Notes:
(1) NPV Capital Cost is calculated in 2017 dollars.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Net Present Value (NPV)
Alternative 1B - Consolidation (with Cal Am)

Base Year for Cost Estimate	**2017**
First Year of Service	**2019**
Mid-Point of Construction	**2018**

Economic Assumptions

O&M Escalation (Inflation) Rate	1.90%
Annual Interest (Discount) Rate	3.10%

Capital Costs (Modify as Required)

Total NPV of Capital Costs(1)		$2,035,000

O&M Costs (Modify As Required)

		Base Year Cost	Mid-Point of Construction	First Year of Service																		
		2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**
Total O&M Cost		$20,710	-	$21,504	$21,913	$22,329	$22,754	$23,186	$23,626	$24,075	$24,533	$24,999	$25,474	$25,958	$26,451	$26,954	$27,466	$27,988	$28,519	$29,061	$29,613	$30,176	$30,749
NPV of O&M Cost at Base Year				$20,231	$19,995	$19,763	$19,532	$19,305	$19,080	$18,858	$18,639	$18,422	$18,208	$17,996	$17,786	$17,579	$17,375	$17,172	$16,972	$16,775	$16,580	$16,387	$16,196

Total NPV of O&M Costs		$363,000

NPV Summary	
Capital Cost	$2,035,000
O&M	$363,000
Total NPV	**$2,398,000**

Notes:
(1) NPV Capital Cost is calculated in 2017 dollars.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Net Present Value (NPV)
Alternative 2 - Community Treatment Facility

Base Year for Cost Estimate	**2017**
First Year of Service	**2019**
Mid-Point of Construction	**2018**

Economic Assumptions

O&M Escalation (Inflation) Rate	1.90%
Annual Interest (Discount) Rate	3.10%

Capital Costs (Modify as Required)

Total NPV of Capital Costs(1)		$3,370,000

O&M Costs (Modify As Required)

		Base Year Cost	Mid-Point of Construction	First Year of Service																		
		2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**
Total O&M Cost		$128,000	-	$132,910	$135,436	$138,009	$140,631	$143,303	$146,026	$148,800	$151,627	$154,508	$157,444	$160,435	$163,484	$166,590	$169,755	$172,980	$176,267	$179,616	$183,029	$186,506	$190,050
NPV of O&M Cost at Base Year				$125,038	$123,582	$122,144	$120,722	$119,317	$117,928	$116,556	$115,199	$113,858	$112,533	$111,223	$109,929	$108,649	$107,385	$106,135	$104,900	$103,679	$102,472	$101,279	$100,100

Total NPV of O&M Costs		$2,243,000

NPV Summary	
Capital Cost	$3,370,000
O&M	$2,243,000
Total NPV	**$5,613,000**

Notes:
(1) NPV Capital Cost is calculated in 2017 dollars.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Net Present Value (NPV)
Alternative 3 - Wellhead Treatment

Base Year for Cost Estimate	**2017**
First Year of Service	**2019**
Mid-Point of Construction	**2018**

Economic Assumptions

O&M Escalation (Inflation) Rate	1.90%
Annual Interest (Discount) Rate	3.10%

Capital Costs (Modify as Required)

Total NPV of Capital Costs(1)		$2,583,000

O&M Costs (Modify As Required)

		Base Year Cost	Mid-Point of Construction	First Year of Service																		
		2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**
Total O&M Cost		$189,000	-	$196,250	$199,979	$203,779	$207,650	$211,596	$215,616	$219,713	$223,887	$228,141	$232,476	$236,893	$241,394	$245,980	$250,654	$255,416	$260,269	$265,214	$270,253	$275,388	$280,621
NPV of O&M Cost at Base Year				$184,626	$182,477	$180,353	$178,254	$176,179	$174,129	$172,102	$170,099	$168,119	$166,162	$164,228	$162,317	$160,428	$158,560	$156,715	$154,891	$153,088	$151,306	$149,545	$147,805

Total NPV of O&M Costs		$3,311,000

NPV Summary	
Capital Cost	$2,583,000
O&M	$3,311,000
Total NPV	**$5,894,000**

Notes:
(1) NPV Capital Cost is calculated in 2017 dollars.

Salinas River Valley Water System Evaluation and Design
Schoch Rd. Community
Net Present Value (NPV)
Alternative 4 - Point of Entry (POE) Treatment

Base Year for Cost Estimate	**2017**
First Year of Service	**2019**
Mid-Point of Construction	**2018**

Economic Assumptions

O&M Escalation (Inflation) Rate	1.90%
Annual Interest (Discount) Rate	3.10%

Capital Costs (Modify as Required)

Total NPV of Capital Costs(1)		$340,000

O&M Costs (Modify As Required)

		Base Year Cost	Mid-Point of Construction	First Year of Service																		
		2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**
Total O&M Cost		$39,000	-	$40,496	$41,266	$42,050	$42,848	$43,663	$44,492	$45,338	$46,199	$47,077	$47,971	$48,883	$49,811	$50,758	$51,722	$52,705	$53,706	$54,727	$55,767	$56,826	$57,906
NPV of O&M Cost at Base Year				$38,097	$37,654	$37,216	$36,783	$36,354	$35,931	$35,513	$35,100	$34,691	$34,287	$33,888	$33,494	$33,104	$32,719	$32,338	$31,962	$31,590	$31,222	$30,859	$30,499

Total NPV of O&M Costs		$683,000

NPV Summary	
Capital Cost	$340,000
O&M	$683,000
Total NPV	**$1,023,000**

Notes:
(1) NPV Capital Cost is calculated in 2017 dollars.

APPENDIX D
WATER QUALITY LAB REPORTS

Engineers Without Borders USA
Lauren Butner
1031 33rd St, Suite 210
Denver, CO 80205
Lauren.Butner@EWB-USA.org

Monterey Bay Analytical Services
4 Justin Court Suite D, Monterey, CA 93940
831.375.MBAS
www.MBASinc.com
ELAP Certification Number: 2385

 Thursday, July 07, 2016

Lab Number: AB49094

Collection Date/Time: 6/21/2016 11:32 Sample Collector: LUKACS, HEATHER Client Sample #: Schoch Road
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation:

Sample Description: 11650 Schoch Road, Well - Startup

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Nitrate as NO3	EPA300.0	mg/L	**57**		2.0	45	6/21/2016	HM
Nitrate as NO3-N	EPA300.0	mg/L	**12.9**		0.2	10	6/21/2016	HM

Sample Comments:

Lab Number: AB49095

Collection Date/Time: 6/21/2016 11:37 Sample Collector: LUKACS, HEATHER Client Sample #: Schoch Road
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation:

Sample Description: 11650 Schoch Road, Well - 5 Minutes

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Nitrate as NO3	EPA300.0	mg/L	**58**		2.0	45	6/21/2016	HM
Nitrate as NO3-N	EPA300.0	mg/L	**13.0**		0.2	10	6/21/2016	HM

Sample Comments:

Lab Number: AB49096

Collection Date/Time: 6/21/2016 11:47 Sample Collector: LUKACS, HEATHER Client Sample #: Schoch Road
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation:

Sample Description: 11650 Schoch Road, Well - 15 Minutes

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Nitrate as NO3	EPA300.0	mg/L	**56**		2.0	45	6/21/2016	HM
Nitrate as NO3-N	EPA300.0	mg/L	**12.6**		0.2	10	6/21/2016	HM

Sample Comments:

Lab Number: AB49097

Collection Date/Time: 6/21/2016 12:02 Sample Collector: LUKACS, HEATHER Client Sample #: Schoch Road
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation:

Sample Description: 11650 Schoch Road, Well - 30 Minutes

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Nitrate as NO3	EPA300.0	mg/L	**55**		2.0	45	6/21/2016	HM
Nitrate as NO3-N	EPA300.0	mg/L	**12.5**		0.2	10	6/21/2016	HM

Sample Comments:

Lab Number: AB49098

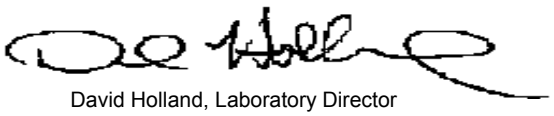
Collection Date/Time: 6/21/2016 12:32 Sample Collector: LUKACS, HEATHER Client Sample #: Schoch Road
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation:

Sample Description: 11650 Schoch Road, Well - 1 Hour

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Nitrate as NO3	EPA300.0	mg/L	**54**		2.0	45	6/21/2016	HM
Nitrate as NO3-N	EPA300.0	mg/L	**12.1**		0.2	10	6/21/2016	HM

Sample Comments:

Report Approved by:



David Holland, Laboratory Director

mg/L: Milligrams per liter ug/L : Micrograms per liter PQL : Practical Quantitation Limit MCL: Maximum Contamination Level
H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See Report attachments. T = Temperature Exceedance

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ELAP Certification Number: 2385

 Thursday, July 07, 2016

Lab Number: AB49099

Collection Date/Time: 6/21/2016 13:32 Sample Collector: WEIDNER-HOLLAND, MASON Client Sample #: Schoch Road
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation: Special

Sample Description: 11650 Schoch Road, Well - 2 Hours

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Aggressivity Index	Calculation		**11.6**				7/1/2016	MW
Alkalinity, Total (as CaCO3)	SM2320B	mg/L	**172**		10		6/24/2016	BS
Aluminum, Total	EPA200.8	µg/L	**Not Detected**		10	1000	6/23/2016	SM
Antimony, Total	EPA200.8	µg/L	**Not Detected**		1.0	6	6/23/2016	SM
Arsenic, Total	EPA200.8	µg/L	**1**		1	10	6/23/2016	SM
Barium, Total	EPA200.8	µg/L	**51**		10	1000	6/23/2016	SM
Beryllium, Total	EPA200.8	µg/L	**Not Detected**		1	4	6/23/2016	SM
Bicarbonate (as HCO3-)	SM2320B	mg/L	**210**		10		6/27/2016	LRH
Bromide	EPA300.0	mg/L	**0.3**	LM	0.2		6/21/2016	HM
Cadmium, Total	EPA200.8	µg/L	**Not Detected**		0.5	5	6/23/2016	SM
Calcium	EPA200.7	mg/L	**63**		0.5		6/29/2016	MW
Carbonate as CaCO3	SM2320B	mg/L	**Not Detected**		10		6/27/2016	LRH
Chloride	EPA300.0	mg/L	**57**		2.0	250	6/21/2016	HM
Chlorine Residual (Field Test)	SM4500-Cl G	mg/L	**Not Detected**		0.05	4.00	6/21/2016	HL/MWH
Chromium VI	EPA 218.6	µg\L	**2.2**	E	0.2		6/22/2016	BSK
Chromium, Total	EPA200.8	µg/L	**9**		2	50	6/23/2016	SM
Color, Apparent (Unfiltered)	SM2120B	Color Units	**Not Detected**		3	15	6/23/2016	MP
Copper, Total	EPA200.8	µg/L	**Not Detected**		4	1300	6/23/2016	SM
Cyanide	QuikChem 10-20	µg/L	**Not Detected**		5	200	6/27/2016	LRH
E. Coli (Quantitray)	SM9223B	MPN/100mL	**<1**		1		6/21/2016	MW
Fluoride	EPA300.0	mg/L	**0.3**		0.2	2.0	6/21/2016	HM
Hardness (as CaCO3)	SM2340B/Calc	mg/L	**219**		10		7/1/2016	MW
Hydroxide	SM2320B	mg/L	**Not Detected**		10		6/27/2016	LRH
Iron	EPA200.7	µg/L	**Not Detected**		10	300	6/29/2016	MW
Langlier Index, 15°C	SM2330B		**-0.28**				7/1/2016	MW
Langlier Index, 60°C	SM2330B		**0.32**				7/1/2016	MW
Lead, Total	EPA200.8	µg/L	**Not Detected**		5	15	6/23/2016	SM
Magnesium	EPA200.7	mg/L	**15**		0.5		6/29/2016	MW
Manganese, Total	EPA200.7	µg/L	**Not Detected**		10	50	6/29/2016	MW
MBAS (Surfactants)	SM5540C	mg/L	**Not Detected**		0.05	0.50	6/23/2016	HM
Mercury, Total	EPA200.8	µg/L	**Not Detected**		0.5	2	6/23/2016	SM
Nickel, Total	EPA200.8	µg/L	**Not Detected**		10	100	6/23/2016	SM

mg/L: Milligrams per liter ug/L : Micrograms per liter PQL : Practical Quantitation Limit MCL: Maximum Contamination Level
H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See Report attachments. T = Temperature Exceedance

Lab Number: AB49099

Collection Date/Time: 6/21/2016 13:32 Sample Collector: WEIDNER-HOLLAND, MASON Client Sample #: Schoch Road

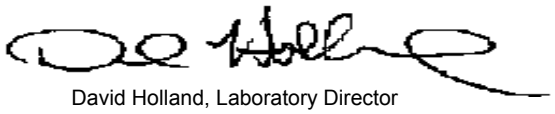
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation: Special

Sample Description: 11650 Schoch Road, Well - 2 Hours

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Nitrate as NO3	EPA300.0	mg/L	**51**		2.0	45	6/21/2016	HM
Nitrate as NO3-N	EPA300.0	mg/L	**11.6**		0.2	10	6/21/2016	HM
Nitrate+Nitrite as N	EPA300.0	mg/L	**11.6**		0.20		6/21/2016	HM
Nitrite as NO2-N	EPA300.0	mg/L	**Not Detected**	IA	0.2	1.0	6/21/2016	HM
Odor Threshold at 60 C	SM2150B	TON	**1**		1	3	6/23/2016	MP
o-Phosphate-P, Dissolved	EPA300.0	mg/L	**Not Detected**		0.2		6/21/2016	HM
Perchlorate	EPA314	µg/L	**Not Detected**	E	2.0		6/28/2016	BSK
pH (Laboratory)	SM4500-H+B	pH (H)	**7.2**		0.1		6/21/2016	BS
Potassium	EPA200.7	mg/L	**2.2**		0.5		6/29/2016	MW
QC Anion Sum x 100	Calculation	%	**100%**				6/27/2016	LRH
QC Anion-Cation Balance	Calculation	%	**-3**				7/1/2016	MW
QC Cation Sum x 100	Calculation	%	**95%**				7/1/2016	MW
QC Ratio TDS/SEC	Calculation		**0.63**				6/27/2016	MP
Selenium, Total	EPA200.8	µg/L	**Not Detected**		2	50	6/23/2016	SM
Silica as SiO2, Total	EPA200.7	mg/L	**38**		0.5		6/29/2016	MW
Silver, Total	EPA200.8	µg/L	**Not Detected**		10	100	6/23/2016	SM
Sodium	EPA200.7	mg/L	**36**		0.5		6/29/2016	MW
Specific Conductance (E.C)	SM2510B	µmhos/cm	**633**		1	900	6/26/2016	LJ
Sulfate	EPA300.0	mg/L	**22**		2.0	250	6/21/2016	HM
Synthetic Organic Compounds - Mont		µg/L	**Not Detected**	E			7/5/2016	BSK
TCP Low Level	SRL524M-TCP	ug/L	**Not Detected**	E	0.0007		6/30/2016	BSK
Thallium, Total	EPA200.8	µg/L	**Not Detected**		1.0	2	6/23/2016	SM
Total Coliform (Quantitray)	SM9223B	MPN/100mL	**<1**		1		6/21/2016	MW
Total Diss. Solids	SM2540C	mg/L	**400**		10	500	6/23/2016	BS/MP
Turbidity	EPA180.1	NTU	**0.90**		0.05	5.0	6/23/2016	BS
Zinc	EPA200.7	µg/L	**Not Detected**		10		6/29/2016	MW

Sample Comments: LM: MS and/or MSD above acceptance limits; IA: Results are valid even though CCV

Report Approved by:



David Holland, Laboratory Director

mg/L: Milligrams per liter ug/L : Micrograms per liter PQL : Practical Quantitation Limit MCL: Maximum Contamination Level

H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See Report attachments. T = Temperature Exceedance

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ELAP Certification Number: 2385

 Thursday, July 07, 2016

Lab Number: AB49100

Collection Date/Time: 6/21/2016 13:20 Sample Collector: WEIDNER-HOLLAND, MASON Client Sample #: Schoch Road
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation: Special

Sample Description: 11650 Schoch Road, Unit #2

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Chlorine Residual (Field Test)	SM4500-Cl G	mg/L	**Not Detected**		0.05	4.00	6/21/2016	HL/MWH
E. Coli (Quantitray)	SM9223B	MPN/100mL	**<1**		1		6/21/2016	MW
Total Coliform (Quantitray)	SM9223B	MPN/100mL	**<1**		1		6/21/2016	MW

Sample Comments:

Lab Number: AB49101

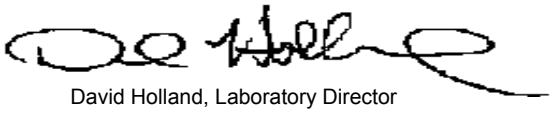
Collection Date/Time: 6/21/2016 13:43 Sample Collector: WEIDNER-HOLLAND, MASON Client Sample #: Schoch Road
Submittal Date/Time: 6/21/2016 15:31 Sample ID EL CAMINO REAL WS #34 Coliform Designation: Special

Sample Description: 11650 Schoch Road, Unit #4

Analyte	Method	Unit	Result	Qual	PQL	MCL	Date Analyzed	Analyst:
Chlorine Residual (Field Test)	SM4500-Cl G	mg/L	**Not Detected**		0.05	4.00	6/21/2016	HL/MWH
E. Coli (Quantitray)	SM9223B	MPN/100mL	**<1**		1		6/21/2016	MW
Total Coliform (Quantitray)	SM9223B	MPN/100mL	**<1**		1		6/21/2016	MW

Sample Comments:

Report Approved by:



David Holland, Laboratory Director

mg/L: Milligrams per liter ug/L : Micrograms per liter PQL : Practical Quantitation Limit MCL: Maximum Contamination Level
H = Analyzed ouside of hold time E = Analysis performed by External Laboratory; See Report attachments. T = Temperature Exceedance

BSK Associates Fresno
1414 Stanislaus St
Fresno, CA93706
559-497-2888 (Main)
559-485-6935 (FAX)

A6F2361
7/06/2016
Invoice: A614747

David Holland
Monterey Bay Analytical
4 Justin Court Suite D
Monterey, CA 93940

RE: Report for A6F2361 General

Dear David Holland,

Thank you for using BSK Associates for your analytical testing needs. In the following pages, you will find the test results for the samples submitted to our laboratory on 6/22/2016. The results have been approved for release by our Laboratory Director as indicated by the authorizing signature below.

The samples were analyzed for the test(s) indicated on the Chain of Custody (see attached) and the results relate only to the samples analyzed. BSK certifies that the testing was performed in accordance with the quality system requirements specified in the 2009 TNI Standard. Any deviations from this standard or from the method requirements for each test procedure performed will be annotated alongside the analytical result or noted in the Case Narrative. Unless otherwise noted, the sample results are reported on an "as received" basis.

If additional clarification of any information is required, please contact your Project Manager, John Montierth , at (800) 877-8310 or (559) 497-2888 x201.

Thanks again for using BSK Associates. We value your business and appreciate your loyalty.

Sincerely,

John Montierth, Project Manager

Accredited in Accordance with NELAP
ORELAP #4021

BSK ASSOCIATES

Case Narrative

Project and Report Details		Invoice Details	
Client:	Monterey Bay Analytical	**Invoice To:**	Monterey Bay Analytical
Report To:	David Holland	**Invoice Attn:**	David Holland
Project #:	Engineers Without Borders - Schoch Road	**Project PO#:**	-
Received:	6/22/2016 - 09:00		
Report Due:	7/07/2016		

Sample Receipt Conditions

Cooler: Default Cooler
Temperature on Receipt ºC: 0.6

Containers Intact
COC/Labels Agree
Received On Wet Ice
Received On Blue Ice
Packing Material - Other
Sample(s) were received in temperature range.
Initial receipt at BSK-FAL

Data Qualifiers

The following qualifiers have been applied to one or more analytical results:

BS	Blank spike recoveries did not meet acceptance limits.
BS1.0	Blank spike recovery for this analyte was biased high; no material impact on reported result as sample is ND for this parameter.
BS3.0	BS/BSD RPD exceeded the acceptance limit. Recovery met acceptance criteria.
MS1.0	Matrix spike recoveries exceed control limits.

Report Distribution

Recipient(s)	Report Format	CC:
David Holland	FINAL.RPT	
Mason Weidner	FINAL.RPT	

Certificate of Analysis

Sample ID: A6F2361-01
Sampled By: Mason Holland
Sample Description: Well-2 Hour // AB49099

Sample Date - Time: 06/21/16 - 13:32
Matrix: Drinking Water
Sample Type: Grab

BSK Associates Fresno

General Chemistry

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Conductivity @ 25C	SM 2510B	**630**	1.0	umhos/cm	1	A607723	06/23/16	06/23/16	
Hexavalent Chromium	EPA 218.6	**2.2**	0.20	ug/L	1	A607633	06/22/16	06/22/16	
Perchlorate	EPA 314.0	ND	2.0	ug/L	1	A607967	06/28/16	06/28/16	

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Chlorinated Acid Herbicides by GC-ECD									
2,4,5-T	EPA 515.3	ND	1.0	ug/L	1	A607998	06/30/16	07/05/16	
2,4,5-TP (Silvex)	EPA 515.3	ND	1.0	ug/L	1	A607998	06/30/16	07/05/16	
2,4-D	EPA 515.3	ND	10	ug/L	1	A607998	06/30/16	07/05/16	
Bentazon	EPA 515.3	ND	2.0	ug/L	1	A607998	06/30/16	07/05/16	
Dalapon	EPA 515.3	ND	10	ug/L	1	A607998	06/30/16	07/05/16	
Dicamba	EPA 515.3	ND	1.5	ug/L	1	A607998	06/30/16	07/05/16	
Dinoseb	EPA 515.3	ND	2.0	ug/L	1	A607998	06/30/16	07/05/16	
Pentachlorophenol	EPA 515.3	ND	0.20	ug/L	1	A607998	06/30/16	07/05/16	
Picloram	EPA 515.3	ND	1.0	ug/L	1	A607998	06/30/16	07/05/16	
Surrogate: DCPAA	EPA 515.3	103 %	*Acceptable range: 70-130 %*						
Semi-Volatile Organics by GC-MS									
Alachlor	EPA 525.2	ND	1.0	ug/L	1	A608109	06/30/16	07/05/16	
Atrazine	EPA 525.2	ND	0.50	ug/L	1	A608109	06/30/16	07/05/16	
Benzo(a)pyrene	EPA 525.2	ND	0.10	ug/L	1	A608109	06/30/16	07/05/16	
Bis(2-ethylhexyl) adipate	EPA 525.2	ND	3.0	ug/L	1	A608109	06/30/16	07/05/16	
Bis(2-ethylhexyl) phthalate	EPA 525.2	ND	3.0	ug/L	1	A608109	06/30/16	07/05/16	
Bromacil	EPA 525.2	ND	10	ug/L	1	A608109	06/30/16	07/05/16	
Butachlor	EPA 525.2	ND	0.38	ug/L	1	A608109	06/30/16	07/05/16	
Diazinon	EPA 525.2	ND	0.25	ug/L	1	A608109	06/30/16	07/05/16	
Dimethoate	EPA 525.2	ND	10	ug/L	1	A608109	06/30/16	07/05/16	
Metolachlor	EPA 525.2	ND	0.50	ug/L	1	A608109	06/30/16	07/05/16	
Metribuzin	EPA 525.2	ND	0.50	ug/L	1	A608109	06/30/16	07/05/16	
Molinate	EPA 525.2	ND	2.0	ug/L	1	A608109	06/30/16	07/05/16	
Propachlor	EPA 525.2	ND	0.50	ug/L	1	A608109	06/30/16	07/05/16	
Simazine	EPA 525.2	ND	1.0	ug/L	1	A608109	06/30/16	07/05/16	
Thiobencarb	EPA 525.2	ND	1.0	ug/L	1	A608109	06/30/16	07/05/16	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	EPA 525.2	97 %	*Acceptable range: 70-130 %*						
Carbamates by HPLC									
3-Hydroxycarbofuran	EPA 531.1	ND	3.0	ug/L	1	A608095	06/30/16	07/01/16	
Aldicarb	EPA 531.1	ND	3.0	ug/L	1	A608095	06/30/16	07/01/16	
Aldicarb Sulfone	EPA 531.1	ND	2.0	ug/L	1	A608095	06/30/16	07/01/16	
Aldicarb Sulfoxide	EPA 531.1	ND	3.0	ug/L	1	A608095	06/30/16	07/01/16	
Carbaryl	EPA 531.1	ND	5.0	ug/L	1	A608095	06/30/16	07/01/16	
Carbofuran	EPA 531.1	ND	5.0	ug/L	1	A608095	06/30/16	07/01/16	

Certificate of Analysis

Sample ID: A6F2361-01
Sampled By: Mason Holland
Sample Description: Well-2 Hour // AB49099

Sample Date - Time: 06/21/16 - 13:32
Matrix: Drinking Water
Sample Type: Grab

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
Carbamates by HPLC									
Methomyl	EPA 531.1	ND	2.0	ug/L	1	A608095	06/30/16	07/01/16	
Oxamyl	EPA 531.1	ND	20	ug/L	1	A608095	06/30/16	07/01/16	
Diquat by HPLC									
Diquat	EPA 549.2	ND	4.0	ug/L	1	A607984	06/28/16	07/01/16	
1,2,3-Trichloropropane by GC-MS SIM									
1,2,3-Trichloropropane	SRL 524M-TCP	ND	0.00070	ug/L	1	A608084	06/30/16	06/30/16	BS1.0

BSK Associates Fresno

General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
EPA 218.6 - Quality Control											
Batch: A607633										Prepared: 6/22/2016	
Prep Method: Method Specific Preparation										Analyst: RCN	
Blank (A607633-BLK1)											
Hexavalent Chromium	ND	0.20	ug/L							06/22/16	
Blank Spike (A607633-BS1)											
Hexavalent Chromium	2.1	0.20	ug/L	2.0		104	90-110			06/22/16	
Blank Spike Dup (A607633-BSD1)											
Hexavalent Chromium	2.1	0.20	ug/L	2.0		105	90-110	1	10	06/22/16	
Matrix Spike (A607633-MS1), Source: A6F1970-01											
Hexavalent Chromium	6.7	0.20	ug/L	2.0	4.8	94	90-110			06/22/16	
Matrix Spike (A607633-MS2), Source: A6F2426-01											
Hexavalent Chromium	6.9	0.20	ug/L	2.0	4.9	99	90-110			06/22/16	
Matrix Spike Dup (A607633-MSD1), Source: A6F1970-01											
Hexavalent Chromium	6.9	0.20	ug/L	2.0	4.8	105	90-110	3	10	06/22/16	
Matrix Spike Dup (A607633-MSD2), Source: A6F2426-01											
Hexavalent Chromium	6.9	0.20	ug/L	2.0	4.9	100	90-110	0	10	06/22/16	
EPA 314.0 - Quality Control											
Batch: A607967										Prepared: 6/28/2016	
Prep Method: Method Specific Preparation										Analyst: RCN	
Blank (A607967-BLK1)											
Perchlorate	ND	2.0	ug/L							06/28/16	
Blank Spike (A607967-BS1)											
Perchlorate	16	2.0	ug/L	15		106	85-115			06/28/16	
Matrix Spike (A607967-MS1), Source: A6F2609-03											
Perchlorate	8.7	2.0	ug/L	5.0	4.1	93	80-120			06/28/16	
Matrix Spike Dup (A607967-MSD1), Source: A6F2609-03											
Perchlorate	9.0	2.0	ug/L	5.0	4.1	99	80-120	4	15	06/28/16	
SM 2510B - Quality Control											
Batch: A607723										Prepared: 6/23/2016	
Prep Method: Method Specific Preparation										Analyst: CEG	
Blank Spike (A607723-BS1)											
Conductivity @ 25C	1400	1.0	umhos/cm	1400		98	90-110			06/23/16	
Blank Spike Dup (A607723-BSD1)											

BSK Associates Fresno

General Chemistry Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
SM 2510B - Quality Control											
Batch: A607723										Prepared: 6/23/2016	
Prep Method: Method Specific Preparation										Analyst: CEG	
Blank Spike Dup (A607723-BSD1)											
Conductivity @ 25C	1400	1.0	umhos/cm	1400		97	90-110	1		06/23/16	
Duplicate (A607723-DUP1), Source: A6F2452-01											
Conductivity @ 25C	1000	1.0	umhos/cm		1000			1	20	06/23/16	

BSK Associates Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
EPA 515.3 - Quality Control											
Batch: A607998										Prepared: 6/30/2016	
Prep Method: EPA 515.3										Analyst: AAR	
Blank (A607998-BLK1)											
2,4,5-T	ND	1.0	ug/L							07/05/16	
2,4,5-TP (Silvex)	ND	1.0	ug/L							07/05/16	
2,4-D	ND	10	ug/L							07/05/16	
Bentazon	ND	2.0	ug/L							07/05/16	
Dalapon	ND	10	ug/L							07/05/16	
Dicamba	ND	1.5	ug/L							07/05/16	
Dinoseb	ND	2.0	ug/L							07/05/16	
Pentachlorophenol	ND	0.20	ug/L							07/05/16	
Picloram	ND	1.0	ug/L							07/05/16	
Surrogate: DCPAA	*57*			*58*		*99*	*70-130*			07/05/16	
Blank Spike (A607998-BS1)											
2,4,5-T	4.2	1.0	ug/L	4.0		104	70-130			07/05/16	
2,4,5-TP (Silvex)	0.84	1.0	ug/L	0.80		105	70-130			07/05/16	
2,4-D	0.41	10	ug/L	0.40		103	70-130			07/05/16	
Bentazon	8.2	2.0	ug/L	8.0		103	70-130			07/05/16	
Dalapon	3.9	10	ug/L	4.0		99	70-130			07/05/16	
Dicamba	0.86	1.5	ug/L	0.80		108	70-130			07/05/16	
Dinoseb	0.84	2.0	ug/L	0.80		104	70-130			07/05/16	
Pentachlorophenol	0.16	0.20	ug/L	0.16		102	70-130			07/05/16	
Picloram	0.42	1.0	ug/L	0.40		105	70-130			07/05/16	
Surrogate: DCPAA	*59*			*58*		*101*	*70-130*			07/05/16	
Blank Spike Dup (A607998-BSD1)											
2,4,5-T	4.0	1.0	ug/L	4.0		101	70-130	3	20	07/05/16	
2,4,5-TP (Silvex)	0.80	1.0	ug/L	0.80		100	70-130	5	20	07/05/16	
2,4-D	0.39	10	ug/L	0.40		96	70-130	7	20	07/05/16	
Bentazon	8.0	2.0	ug/L	8.0		100	70-130	3	20	07/05/16	
Dalapon	3.5	10	ug/L	4.0		88	70-130	12	20	07/05/16	
Dicamba	0.78	1.5	ug/L	0.80		98	70-130	9	20	07/05/16	
Dinoseb	0.82	2.0	ug/L	0.80		102	70-130	2	20	07/05/16	
Pentachlorophenol	0.16	0.20	ug/L	0.16		102	70-130	1	20	07/05/16	
Picloram	0.31	1.0	ug/L	0.40		78	70-130	29	20	07/05/16	BS3.0
Surrogate: DCPAA	*58*			*58*		*101*	*70-130*			07/05/16	
Matrix Spike (A607998-MS1), Source: A6F2361-01											
2,4,5-T	4.2	1.0	ug/L	4.0	ND	104	70-130			07/05/16	
2,4,5-TP (Silvex)	0.82	1.0	ug/L	0.80	ND	103	70-130			07/05/16	
2,4-D	0.41	10	ug/L	0.40	ND	103	70-130			07/05/16	
Bentazon	8.1	2.0	ug/L	8.0	ND	101	70-130			07/05/16	
Dalapon	4.4	10	ug/L	4.0	ND	111	70-130			07/05/16	
Dicamba	0.84	1.5	ug/L	0.80	ND	105	70-130			07/05/16	
Dinoseb	0.81	2.0	ug/L	0.80	ND	101	70-130			07/05/16	
Pentachlorophenol	0.16	0.20	ug/L	0.16	ND	102	70-130			07/05/16	
Picloram	0.43	1.0	ug/L	0.40	ND	108	70-130			07/05/16	
Surrogate: DCPAA	*58*			*58*		*101*	*70-130*			07/05/16	

BSK Associates Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
EPA 515.3 - Quality Control											
Batch: A607998										Prepared: 6/30/2016	
Prep Method: EPA 515.3										Analyst: AAR	
Matrix Spike Dup (A607998-MSD1), Source: A6F2361-01											
2,4,5-T	4.1	1.0	ug/L	4.0	ND	102	70-130	2	20	07/05/16	
2,4,5-TP (Silvex)	0.82	1.0	ug/L	0.80	ND	102	70-130	1	20	07/05/16	
2,4-D	0.40	10	ug/L	0.40	ND	101	70-130	2	20	07/05/16	
Bentazon	7.9	2.0	ug/L	8.0	ND	99	70-130	2	20	07/05/16	
Dalapon	4.3	10	ug/L	4.0	ND	107	70-130	4	20	07/05/16	
Dicamba	0.82	1.5	ug/L	0.80	ND	102	70-130	3	20	07/05/16	
Dinoseb	0.81	2.0	ug/L	0.80	ND	101	70-130	1	20	07/05/16	
Pentachlorophenol	0.16	0.20	ug/L	0.16	ND	100	70-130	2	20	07/05/16	
Picloram	0.40	1.0	ug/L	0.40	ND	100	70-130	7	20	07/05/16	
Surrogate: DCPAA	*59*			*58*		*101*	*70-130*			07/05/16	
EPA 525.2 - Quality Control											
Batch: A608109										Prepared: 6/30/2016	
Prep Method: EPA 525.2										Analyst: MTM	
Blank (A608109-BLK1)											
Alachlor	ND	0.20	ug/L							07/05/16	
Atrazine	ND	0.10	ug/L							07/05/16	
Benzo(a)pyrene	ND	0.020	ug/L							07/05/16	
Bis(2-ethylhexyl) adipate	ND	0.60	ug/L							07/05/16	
Bis(2-ethylhexyl) phthalate	ND	0.60	ug/L							07/05/16	
Bromacil	ND	0.80	ug/L							07/05/16	
Butachlor	ND	0.25	ug/L							07/05/16	
Diazinon	ND	0.020	ug/L							07/05/16	
Dimethoate	ND	0.20	ug/L							07/05/16	
Metolachlor	ND	0.50	ug/L							07/05/16	
Metribuzin	ND	0.50	ug/L							07/05/16	
Molinate	ND	0.50	ug/L							07/05/16	
Propachlor	ND	0.50	ug/L							07/05/16	
Simazine	ND	0.070	ug/L							07/05/16	
Thiobencarb	ND	0.10	ug/L							07/05/16	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*4.7*			*5.0*		*93*	*70-130*			07/05/16	
Blank Spike (A608109-BS1)											
Alachlor	1.1	0.20	ug/L	1.0		111	70-130			07/05/16	
Atrazine	0.52	0.10	ug/L	0.50		104	70-130			07/05/16	
Benzo(a)pyrene	0.11	0.020	ug/L	0.10		109	70-130			07/05/16	
Bis(2-ethylhexyl) adipate	2.2	0.60	ug/L	2.0		110	70-130			07/05/16	
Bis(2-ethylhexyl) phthalate	1.7	0.60	ug/L	1.5		114	70-130			07/05/16	
Bromacil	1.2	0.80	ug/L	1.0		122	70-130			07/05/16	
Butachlor	1.1	0.25	ug/L	1.0		113	70-130			07/05/16	
Diazinon	0.18	0.020	ug/L	0.20		92	70-130			07/05/16	
Dimethoate	1.0	0.20	ug/L	1.0		101	70-130			07/05/16	
Metolachlor	2.2	0.50	ug/L	2.0		109	70-130			07/05/16	
Metribuzin	1.1	0.50	ug/L	1.0		110	70-130			07/05/16	
Molinate	1.0	0.50	ug/L	1.0		100	70-130			07/05/16	

BSK Associates Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
EPA 525.2 - Quality Control											
Batch: A608109										Prepared: 6/30/2016	
Prep Method: EPA 525.2										Analyst: MTM	
Blank Spike (A608109-BS1)											
Propachlor	0.52	0.50	ug/L	0.50		105	70-130			07/05/16	
Simazine	0.35	0.070	ug/L	0.35		101	70-130			07/05/16	
Thiobencarb	0.54	0.10	ug/L	0.50		108	70-130			07/05/16	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*4.8*			*5.0*		*97*	*70-130*			07/05/16	
Blank Spike Dup (A608109-BSD1)											
Alachlor	1.0	0.20	ug/L	1.0		102	70-130	9	30	07/05/16	
Atrazine	0.49	0.10	ug/L	0.50		98	70-130	6	30	07/05/16	
Benzo(a)pyrene	0.10	0.020	ug/L	0.10		101	70-130	8	30	07/05/16	
Bis(2-ethylhexyl) adipate	2.0	0.60	ug/L	2.0		100	70-130	10	30	07/05/16	
Bis(2-ethylhexyl) phthalate	1.6	0.60	ug/L	1.5		105	70-130	8	30	07/05/16	
Bromacil	1.1	0.80	ug/L	1.0		110	70-130	11	30	07/05/16	
Butachlor	1.1	0.25	ug/L	1.0		113	70-130	0	30	07/05/16	
Diazinon	0.18	0.020	ug/L	0.20		89	70-130	4	30	07/05/16	
Dimethoate	0.92	0.20	ug/L	1.0		92	70-130	9	30	07/05/16	
Metolachlor	2.2	0.50	ug/L	2.0		108	70-130	1	30	07/05/16	
Metribuzin	1.1	0.50	ug/L	1.0		107	70-130	3	30	07/05/16	
Molinate	1.0	0.50	ug/L	1.0		101	70-130	1	30	07/05/16	
Propachlor	0.52	0.50	ug/L	0.50		103	70-130	2	30	07/05/16	
Simazine	0.35	0.070	ug/L	0.35		99	70-130	2	30	07/05/16	
Thiobencarb	0.50	0.10	ug/L	0.50		100	70-130	7	30	07/05/16	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*5.1*			*5.0*		*102*	*70-130*			07/05/16	
Matrix Spike (A608109-MS1), Source: A6F2807-01											
Alachlor	1.1	0.20	ug/L	1.0	ND	110	70-130			07/05/16	
Atrazine	0.48	0.10	ug/L	0.50	ND	97	70-130			07/05/16	
Benzo(a)pyrene	0.15	0.020	ug/L	0.10	ND	147	70-130			07/05/16	MS1.0 ***High***
Bis(2-ethylhexyl) adipate	2.1	0.60	ug/L	2.0	ND	104	70-130			07/05/16	
Bis(2-ethylhexyl) phthalate	1.4	0.60	ug/L	1.5	ND	95	70-130			07/05/16	
Bromacil	1.3	0.80	ug/L	1.0	ND	130	70-130			07/05/16	
Butachlor	1.2	0.25	ug/L	1.0	ND	124	70-130			07/05/16	
Diazinon	0.20	0.020	ug/L	0.20	ND	98	70-130			07/05/16	
Dimethoate	1.1	0.20	ug/L	1.0	ND	112	70-130			07/05/16	
Metolachlor	2.2	0.50	ug/L	2.0	ND	112	70-130			07/05/16	
Metribuzin	1.0	0.50	ug/L	1.0	ND	105	70-130			07/05/16	
Molinate	1.1	0.50	ug/L	1.0	ND	107	70-130			07/05/16	
Propachlor	0.56	0.50	ug/L	0.50	ND	112	70-130			07/05/16	
Simazine	0.33	0.070	ug/L	0.35	ND	96	70-130			07/05/16	
Thiobencarb	0.54	0.10	ug/L	0.50	ND	109	70-130			07/05/16	
Surrogate: 1,3-Dimethyl-2-nitrobenzene	*4.8*			*5.0*		*97*	*70-130*			07/05/16	
EPA 531.1 - Quality Control											
Batch: A608095										Prepared: 6/30/2016	
Prep Method: EPA 531.1										Analyst: ZZZ	
Blank (A608095-BLK1)											

BSK Associates Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
EPA 531.1 - Quality Control											
Batch: A608095										Prepared: 6/30/2016	
Prep Method: EPA 531.1										Analyst: ZZZ	
Blank (A608095-BLK1)											
3-Hydroxycarbofuran	ND	3.0	ug/L							07/01/16	
Aldicarb	ND	3.0	ug/L							07/01/16	
Aldicarb Sulfone	ND	2.0	ug/L							07/01/16	
Aldicarb Sulfoxide	ND	3.0	ug/L							07/01/16	
Carbaryl	ND	5.0	ug/L							07/01/16	
Carbofuran	ND	5.0	ug/L							07/01/16	
Methomyl	ND	2.0	ug/L							07/01/16	
Oxamyl	ND	20	ug/L							07/01/16	
Blank Spike (A608095-BS1)											
3-Hydroxycarbofuran	3.6	3.0	ug/L	4.0		91	80-120			07/01/16	
Aldicarb	3.5	3.0	ug/L	4.0		88	80-120			07/01/16	
Aldicarb Sulfone	3.5	2.0	ug/L	4.0		88	80-120			07/01/16	
Aldicarb Sulfoxide	3.5	3.0	ug/L	4.0		89	80-120			07/01/16	
Carbaryl	3.6	5.0	ug/L	4.0		91	80-120			07/01/16	
Carbofuran	3.9	5.0	ug/L	4.0		97	80-120			07/01/16	
Methomyl	3.3	2.0	ug/L	4.0		84	80-120			07/01/16	
Oxamyl	3.5	20	ug/L	4.0		88	80-120			07/01/16	
Blank Spike Dup (A608095-BSD1)											
3-Hydroxycarbofuran	4.1	3.0	ug/L	4.0		102	80-120	11	20	07/01/16	
Aldicarb	3.8	3.0	ug/L	4.0		95	80-120	7	20	07/01/16	
Aldicarb Sulfone	4.0	2.0	ug/L	4.0		101	80-120	13	20	07/01/16	
Aldicarb Sulfoxide	3.8	3.0	ug/L	4.0		96	80-120	8	20	07/01/16	
Carbaryl	3.9	5.0	ug/L	4.0		99	80-120	8	20	07/01/16	
Carbofuran	4.0	5.0	ug/L	4.0		101	80-120	4	20	07/01/16	
Methomyl	3.7	2.0	ug/L	4.0		94	80-120	11	20	07/01/16	
Oxamyl	3.9	20	ug/L	4.0		97	80-120	10	20	07/01/16	
Matrix Spike (A608095-MS1), Source: A6F2165-02											
3-Hydroxycarbofuran	4.1	3.0	ug/L	4.3	ND	93	65-135			07/01/16	
Aldicarb	3.6	3.0	ug/L	4.3	ND	83	65-135			07/01/16	
Aldicarb Sulfone	4.2	2.0	ug/L	4.3	ND	97	65-135			07/01/16	
Aldicarb Sulfoxide	4.0	3.0	ug/L	4.3	ND	92	65-135			07/01/16	
Carbaryl	4.1	5.0	ug/L	4.3	ND	95	65-135			07/01/16	
Carbofuran	4.0	5.0	ug/L	4.3	ND	93	65-135			07/01/16	
Methomyl	3.9	2.0	ug/L	4.3	ND	82	65-135			07/01/16	
Oxamyl	4.2	20	ug/L	4.3	ND	89	65-135			07/01/16	
EPA 549.2 - Quality Control											
Batch: A607984										Prepared: 6/28/2016	
Prep Method: EPA 549.2										Analyst: ZZZ	
Blank (A607984-BLK1)											
Diquat	ND	4.0	ug/L							07/01/16	

BSK Associates Fresno

Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual	
EPA 549.2 - Quality Control												
Batch: A607984										Prepared: 6/28/2016		
Prep Method: EPA 549.2										Analyst: ZZZ		
Blank Spike (A607984-BS1)												
Diquat	2.9	4.0	ug/L	4.0		72	70-130			07/01/16		
Blank Spike Dup (A607984-BSD1)												
Diquat	3.0	4.0	ug/L	4.0		76	70-130	6	30	07/01/16		
Matrix Spike (A607984-MS1), Source: A6F2361-01												
Diquat	2.9	4.0	ug/L	4.0	ND	72	70-130			07/01/16		
Matrix Spike (A607984-MS2), Source: A6F2382-01												
Diquat	1.2	4.0	ug/L	4.0	ND	31	70-130			07/01/16	MS1.0	***Low***
SRL 524M-TCP - Quality Control												
Batch: A608084										Prepared: 6/30/2016		
Prep Method: no prep-volatiles										Analyst: ZZZ		
Blank (A608084-BLK1)												
1,2,3-Trichloropropane	ND	0.00070	ug/L							06/30/16		
Blank Spike (A608084-BS1)												
1,2,3-Trichloropropane	0.0062	0.00070	ug/L	0.0050		123	80-120			06/30/16	BS	***High***
Blank Spike Dup (A608084-BSD1)												
1,2,3-Trichloropropane	0.0061	0.00070	ug/L	0.0050		121	80-120	1	30	06/30/16	BS	***High***
Matrix Spike (A608084-MS1), Source: A6F2657-01												
1,2,3-Trichloropropane	0.0060	0.00070	ug/L	0.0050	ND	120	0-200			06/30/16		

Certificate of Analysis

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of according to BSK's sample retention policy unless other arrangements are made in advance.
- All positive results for EPA Methods 504.1 and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.
- Due to the subjective nature of the Threshold Odor Method, all characterizations of the detected odor are the opinion of the panel of analysts. The characterizations can be found in Standard Methods 2170B Figure 2170:1.
- The MCLs provided in this report (if applicable) represent the primary MCLs for that analyte.

Definitions

mg/L:	Milligrams/Liter (ppm)	MDL:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit: DL x Dilution	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)	ND:	None Detected at RL	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	pCi/L:	Picocuries per Liter	Absent:	Less than 1 CFU/100mLs
%:	Percent Recovered (surrogates)	RL Mult:	RL Multiplier	Present:	1 or more CFU/100mLs
NR:	Non-Reportable	MCL:	Maximum Contaminant Limit		

Please see the individual Subcontract Lab's report for applicable certifications.

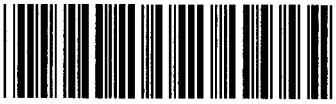
BSK is not accredited under the NELAC program for the following parameters:

1,2,3-Trichloropropane

Certifications: Please refer to our website for a copy of our Accredited Fields of Testing under each certification.

San Bernardino - CA ELAP	2993		
Fresno			
State of California - ELAP	1180	State of Hawaii	4021
State of Nevada	CA000792016-1	State of Oregon - NELAC	4021
EPA - UCMR3	CA00079	State of Washington	C997-16
Sacramento			
State of California - ELAP	2435		
Vancouver			
State of Oregon - NELAC	WA100008-008	State of Washington	C824-15

A6F2361



06222016

Monte6227

Turnaround: Standard

Due Date: 7/7/2016

Monterey Bay Analytical

BSK Associates Engineers & Laboratories
1414 Stanislaus St., Fresno, CA 93706
(559) 497-2888 · Fax (559) 497-2893
www.bskassociates.com

Turnaround Time Request
☒ Standard - 10 business days
☐ Rush (Surcharge may apply)
Date needed:

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Monte6227 10

*Required Fields Temp: 0.6

Company/Client Name*:	Report Attention*:	Invoice To*:	Phone*:	Fax:
Monterey Bay Analytical Services	Mason Weidner-Holland Additional cc's: David Holland	David Holland PO#:	831-375-6227	831-641-0734
			E-mail*: mweidner@mbasinc.com, dholland@mbasinc	

Address*:	City*:	State*:	Zip*:
4 Justin Court, Suite D	Monterey	CA	93940

Project: Engineers Without Borders-Schoch Road
Project #:
How would you like to receive your completed results?* ☒ E-Mail ☐ Fax ☐ Mail

Reporting Options: ☐ Trace (J-Flag) ☐ Swamp ☐ EDD Type: _____

Sampler Name (Printed/Signature)*: Mason Holland/Heather Lukacs

Regulatory Carbon Copies: ☐ SWRCB (Drinking Water) ☐ Merced Co ☐ Fresno Co ☐ Madera Co ☐ Tulare Co ☐ Other: _____

Regulatory Compliance: ☐ EDT to California SWRCB (Drinking Water) System Number*: _____ ☐ Geotracker #: _____

Matrix Types: SW=Surface Water BW=Bottled Water GW=Ground Water WW=Waste Water STW=Storm Water DW=Drinking Water SO=Solid

#	Sample Description*	Sampled* Date	Sampled* Time	Matrix*	Comments / Station Code / WTRAX	Mfry. SOC EPA 525, 515, 531.1	1,2,3 TCP low level	Perchlorate	Cr 6					
1.	Well-2 Hour	6/21/16	1332	DW	AB49099	X	X	X	X					

Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
David Holland	MBAS	6/21/16	1600		
Relinquished by: (Signature and Printed Name)	Company	Date	Time	Received by: (Signature and Printed Name)	Company
Received for Lab by: (Signature and Printed Name)		Date: 6/22/16	Time: 0810	Payment Received at Delivery: Date: Amount: PIA#:	Check / Cash Init.

Shipping Method: ONTRAC UPS GSO WALK-IN FED EX Courier: _____
Cooling Method: Wet Blue None paper & Bubble wrap
Custody Seal: Y / N
Chilling Process Begun: Y / N

A6F2361
Monte6227

06/22/2016
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Sample Integrity

BSK Bottles: (Yes) No Page ____ of ____

COC Info

Was temperature within range? Chemistry ≤ 6°C Micro < 10°C	(Yes) No NA	Were correct containers and preservatives received for the tests requested?	(Yes) No NA
If samples were taken today, is there evidence that chilling has begun?	Yes (No) NA	Were there bubbles in the VOA vials? (Volatiles Only)	Yes (No) NA
Did all bottles arrive unbroken and intact?	(Yes) No	Was a sufficient amount of sample received?	(Yes) No
Did all bottle labels agree with COC?	(Yes) No	Do samples have a hold time <72 hours?	Yes (No)
Was sodium thiosulfate added to CN sample(s) until chlorine was no longer present?	Yes No (NA)	Was PM notified of discrepancies? PM: By/Time:	Yes No (NA)

Bottles Received

"—" means preservation/chlorine checks are either N/A or are performed in the lab

250ml(A) 500ml(B) 1Liter(C) 40ml VOA(V)	Checks	Passed?	
Bacti $Na_2S_2O_3$	—	—	
None (P) White Cap	—	—	1A
Cr6 (P) Br. Green Label/Blue Cap $NH_4OH(NH_4)_2SO_4$ DW	Cl, pH > 8	Y N	1A
Cr6 (P) Pink Label/Blue Cap $NH_4OH(NH_4)_2SO_4$ WW	pH 9.3-9.7	Y N	
Cr6 (P) Black Label/Blue Cap $NH_4OH(NH_4)_2SO_4$ 7199 ***24 HOUR HOLD TIME***	pH 9.0-9.5	Y N	
HNO_3 (P) Red Cap	—	—	
H_2SO_4 (P) or (AG) Yellow Cap/Label	pH < 2	Y N	
NaOH (P) Green Cap	Cl, pH >10	Y N	
NaOH + ZnAc (P)	pH > 9	Y N	
Dissolved Oxygen 300ml (g)	—	—	
None (AG) 608/8081/8082, 625, 632/8321, 8151, 8270	—	—	
HCl (AG) Lt. Blue Label O&G, Diesel	—	—	
Na_2O_3S+HCl (AG) Lt. Pink Label 525	—	—	2
$Na_2S_2O_3$ 1 Liter (Brown P) 549	—	—	1
$Na_2S_2O_3$ (AG) Blue Label 547,515,548,THM,524	—	—	
$Na_2S_2O_3$ (CG) Blue Label 504, 505	—	—	1
$Na_2S_2O_3$ + MCAA (CG) Orange Label 531	pH < 3	Y N	1VOA
NH_4Cl (AG) Purple Label 552	—	—	
EDA (AG) Brown Label DBPs	—	—	
HCL (CG) 524.2,BTEX,Gas, MTBE, 8260/624	—	—	3VOA
Buffer pH 4 (CG)	—	—	
None (CG)	—	—	
H_3PO_4 (CG) Salmon Label	—	—	
Other:			
Asbestos 1Liter Plastic w/ Foil	—	—	
Low Level Hg / Metals Double Baggie	—	—	
Bottled Water	—	—	
Clear Glass Jar: 250 / 500 / 1 Liter	—	—	
Soil Tube Brass / Steel / Plastic	—	—	
Tedlar Bag / Plastic Bag	—	—	

Split

	Container	Preservative	Date/Time/Initials		Container	Preservative	Date/Time/Initials
S P				S P			
S P				S P			

Comments

Labeled by: ____ @ 1452 Labels checked by: JHD @ 15:12 RUSH Paged by: ____ @ ____

06/22/16