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Calaveras Public Utility District (CPUD)

Jeff Davis Water Treatment Plant Evaluation

Report prepared by

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Appendices

1.0 Introduction

Calaveras Public Utility District's (CPUD) service area includes the communities of San Andreas and Mokelumne Hill, and unincorporated areas of Paloma, Glencoe, and Rail Road Flat. The service area has a total population of approximately 4,500 and there are 2,200 connections. CPUD's sole source of raw water at this time consists of a surface water diversion on the South Fork of the Mokelumne River, just below the confluence of the Licking Fork. The direct filtration water treatment plant (WTP) is located northeast of Mokelumne Hill, near Rail Road Flat.

This report presents an evaluation of the treatment facility, both with regard to recommended capital improvements and operational deficiencies. Recommendations are based upon a site visit made on January 20, 2015, with CPUD staff, coupled with review of the background documentation. Brief descriptions of each process are given in this report, while a more detailed process description can be referenced in the facility's Annual Inspection Report completed by the California State Health Department. This report should be a guiding tool for financial decision-making and a roadmap to implementing the necessary capital and operational improvements. Summary tables of recommended improvements are presented in **Appendix A**.

While the main focus of this effort is evaluation of the Jeff Davis Water Treatment Plant, this report also presents general observations and recommendations of other CPUD facilities, including pumping, distribution, and storage.

The operations staff and their certification level of the CPUD system are as follows:

Staff and Certifications

Donna Leatherman, District Manager	
Andrews Estrada, Senior Treatment Plant Operator	T-3 and D-4
James Moe, Maintenance Operator	T-1 and D-1
John Cunningham, Maintenance Operator	T-2 and D-2
Matthew Roberts, Maintenance Operator	T-2 and D-3

System Classifications

Surface water treatment T-3
Water distribution system D-3

2.0 Jeff Davis Water Treatment Plant - Overview

Raw water is gravity fed from the adjacent Jeff Davis Reservoir to the Water Treatment Plant via a 24-inch steel reinforced concrete pipe. The facility houses a direct filtration plant, rated by the Health Department at 6 MGD. Average daily demands reported by operators are 700,000 gallons in winter and 2.5 million gallons in summer months. Water quality is generally good, with the exception of some seasonal taste and odor complaints discussed in this report, and localized turbidity violations.

In general, direct filtration is well-suited to the high raw water quality and treatment goals of the CPUD system. It has several advantages, including lower chemical costs due to lower coagulant dosages, lower capital costs as the sedimentation and flocculation tanks are not needed, and lower operation and maintenance costs. Membranes, for comparison, would require extensive pretreatment for this surface water source because of the higher suspended solids and biological matter content.

Water quality data for 2014 can be found in **Appendix B**. Backup power for the facility is provided by a pad-mounted generator with an automatic transfer switch.

CPUD's treatment process consists of pre-chlorination, coagulation of particulate contaminants using polymeric coagulation agent, multimedia pressure filtration, post-chlorination, and corrosion control. 2-log Giardia removal and 1-log virus removal is credited for the filtration process, while the remaining 1-log Giardia and 3-log virus reduction is achieved through disinfection.

During our site visit, staff expressed the following two primary challenges relative to operation of the water treatment facility:

- Algae control in the reservoir/filters
- Seasonal taste and odor issues expressed by the water customers (earthy/musky)

Recommendations to address these concerns are provided within subsequent sections of this report.

A. Polymer Feed

The raw water is dosed with a cationic polymer solution (NTU Technologies Pro Pac 914 during the winter months and a Pro Pac 9825/914 blend during the summer months) immediately downstream of a pre-chlorine feed injection point. The Pro Pac 9825 was fed year-round for the previous 10 years until jar testing by NTU Technologies showed superior performance of the 914 polymer during the warmer summer months (see **Appendix C**).

Operators monitor temperature of the incoming water two times per week and indicated influent temperatures can range from 45–78 degrees F. No data was available for daily dosing review, nor was a dosing method observed to indicate use of a mass flux formula for daily dosage rates. The polymer day

tank and feed pump are contained in the lab room. However, the polymer injection point is apparently buried in the ground, making a visual inspection of the injection/diffuser assembly not viable. None of the operations staff have ever seen the injection point; therefore, feed details including diffuser, corporation, plumbing method, or evidence of injection point fouling are not available.

The polymer feed has minimal mixing downstream, relying on pipe elbows to disperse the coagulant in the flow stream. For a direct filtration plant with no coagulation or flocculation basins, the polymer effectiveness depends solely on the amount of dispersal in the flow stream and the amount of pipeline detention time provided, both of which are minimal for this plant. With no coagulation or flocculation basins prior to the filters and minimal pipeline detention time, the only opportunities to optimize the coagulation of contaminants are the polymer feed and mixing steps in the process. This plant also has no visual observation of flocculated water quality being fed onto the filters.

Recommendations

Install a polymer feed system, diffuser ring, and static mixer in a small new building (or vault) over the raw water line, upstream of the filters.

B. Filters

Direct filtration of the raw water is achieve through a parallel configuration of six enclosed filter units, with an average unit loading of 2 gpm/sf. Currently, there is no strainer or screen before the filters to remove algae and to prevent media fouling.

Due to the header configuration, there is currently no method of individual filter flow measurement or differential pressure. The existing Annubar filter flow meters are not functional. Thus, actual clean or dirty filter rates cannot be confirmed; only an average across all six is computed.

Online turbidimeters are installed on the influent raw water line as well as each individual filter effluent. The turbidimeters appear to have been recently purchased and installed. Sampling water for the effluent turbidimeter is piped through a rather long stretch of 1-inch pipe, which creates roughly a half-hour lag in the readings. Real-time raw water turbidity measurement is critical for this direct filtration plant, with very little detention time before the filters. Without such real-time raw water turbidity monitoring, a large volume of high turbidity water could pass onto the filters before operator response or plant shutdown.

Blind flanges are in place on the influent header in the gallery for future filtration expansion. The external surface area of the filters are in need of painting.

In 2005, all tanks were inspected and recoated on the interior, and all media was replaced. In 2011, the top layer of anthracite was fouled and replaced as a result of leafy plant growth intake from the reservoir. Staff indicated the filters were plugged about 6 inches down in the anthracite. In addition to anthracite replacement, staff super-chlorinated in conjunction with backwashing. During this event, there was a

turbidity spike in the effluent, according to the data provided. Details of maintenance and inspection activities are included in **Appendix D**.

During the interview, maintenance staff indicated that Filters #2 and #4 are much more heavily loaded than the others during the backwash for each unit. This may be due to the piping configuration where these two filters receive the bulk of the loading before the other filters. Mud balls have been noted in the upper anthracite layer. It was not noted if mud balls existed in deeper layers or if they were limited to the anthracite. Mud balls of ¼ inch or larger greatly reduce the effectiveness and capacity of the filters. The presence of mud balls containing organic material in the filters indicates the filter backwash may not be adequate to properly expand the media and remove this material. It was confirmed during the inspection that short circuiting is occurring during backwash to some extent, due to the valleys and mounding present. If the material represents media fouling, the media needs to be treated or replaced to restore its original condition.

Core sampling of the media is performed annually by operations staff. A 2-inch-diameter core penetrates the media down to the gravel pack approximately 30–36 inches. Records for 2012, 2014, and 2015 filter inspections are included in **Appendix D**.

Filters #2 and #4 were taken out of service, drained, and presented for inspection during the site visit.

Filter #2

The media inside Filter #2 was relatively even in appearance. When the anthracite was excavated in a small area to a depth of 4 inches, small mud balls were noted. Some mud balls appeared to have been an organic material (rubbery in consistency and possibly the submerged weeds and algae). Others were indicative of polymer balls (clear when pressed between the fingers) or actual mud (an orange-reddish material when pressed between the fingers—the same color as the ground material in the raw water reservoir).

Filter #4

The media inside Filter #4 had a long area that was depressed, which is indicative of mounding caused by plugged/cemented media or by an underdrain failure. When the media was excavated several inches deep, numerous mud balls began appearing. The mud balls were of the same material, type, and consistency observed in Filter #2.

Recommendations

- The organic material should be removed from the direct filtration process prior to the filters, as the presence of the material in the filters has become a chronic operational problem. The presence of organic material in the filters may also be contributing to taste and odor issues in the distribution system, especially in periods of warmer water temperature. With the persistence of plant and

algae growth in the reservoir and negative water quality impacts and filter plugging issues, some form of pretreatment and optimized coagulant application is necessary.

Install an inline strainer, polymer feed system, diffuser ring, and static mixer in a small new building over the raw water line, upstream of the filters. A less desirable but less expensive installation would be placing this equipment in a vault partially below grade.

- The 2012 ERS filter inspection report indicated large perimeter mounds in all filters. Further review is needed to determine the cause. Professionally evaluate each filter for necessary repairs.

- Filter media should be replaced every 10 years on average. In light of the organic material noted during our inspection, in staff's 2015 inspection, and the last media replacement in 2005, media replacement should be planned in the near future. Upstream screening should be installed before this significant investment is completed.

- Evaluate and possibly repair the underdrain system in Filter #4.

- Filter #1 - Replace or repair the malfunctioning surface washer. Re-inspect for the presence of a dead algae layer between the anthracite and sand layer (as noted in the 2015 inspection).

C. Filter Effluent Valve

There is a newly installed butterfly valve that is only open 16 percent. The valve is used to throttle plant effluent flow and replaced a valve that was aged as well as damaged from cavitation. Although the seat and wafer of the new valve continue to cavitate, the magnitude has been greatly reduced through throttling of the downstream valve, just upstream of the clear well. There is also a magnetic water meter measuring plant effluent.

Recommendations

- The butterfly valve should be an actuator control valve based on level readings from a transducer in the clear well. It should be replaced with a globe style valve more suited to throttling. Because of space constraints and size of globe valve, the new valve should be located outside the plant footprint in a vault.

- Mag meters need to be checked for accuracy every year by a firm qualified to perform this service.

D. Backwash Water

The backwash water for one filter is obtained from gravity flows through the five filters that remain online during the backwash cycle. This is accomplished by closure of the main effluent valve to the clearwell,

and the automated sequencing of header valves to obtain an internal flow pattern. The clearwell continues to draw down from normal system demands during the backwash cycle and typically reaches the 10-foot mark. Staff indicated the desire to backwash from the clearwell, which would allow five filters to remain online and replenish the clearwell during the entire backwash cycle.

The backwash scheduling is seasonally adjusted to accommodate varying hydraulic loads and temperatures. Backwashes during winter months are scheduled for Mondays and Fridays, while in the summer the schedule increases to three days per week (Monday, Wednesday, and Friday). Operators indicate each backwash cycle uses 220,000 gallons, with a 10-minute backwash duration per filter. Polymer dosage is increased prior to a backwash to better capture the turbidity in the backwash water in the expanded media above the filters. Staff indicated the backwash waste water quality is dramatically improved after 8 minutes of backwash. Backwash water is discharged to the backwash pond for all but Filter #6's filter to waste, which wastes to the clearwell for approximately 5 minutes.

Operators manually trigger the backwash at 7–8 psi, well before the set differential pressure of 15 psi is achieved. This is consistent with the generally recommended approach of backwashing between 7–10 psi.

The backwash waste valve is in need of replacement. The actuator opens quickly to full after starting slowly. As such, operators have poor control over the backwash initiation and rate. The operators indicated that replacement of this valve is planned.

The backwash water is discharged to a clay-lined stabilization system that has a primary and secondary pond. The ponds are operated in series and each pond is capable of being bypassed for maintenance. Operators reported both ponds were cleaned in 2012. The secondary (or primary pond if the secondary was bypassed) effluent is sent to a drainpipe that empties several hundred yards below the crest of the hill. Backwash water from the plant commingles with the Jeff Davis dam drains before discharging to a creek.

The district is not currently recycling any plant backwash water. However, district staff have expressed considerable interest in recycling a portion of the facility backwash water to the Jeff Davis Reservoir. Although CPUD would like to maximize recycling, they are also cognizant of maintaining the stream flows. A target backwash return of 30–40 gpm was noted by staff.

Recommendations

- Evaluate hydraulic viability of a dedicated water main on the upstream side of the Rail Road Flat Pump Station (adjacent to the WTP) to individually backwash filters with finished water from the clearwell. This line would also provide fire protection and water service to the filter plant building. Equip the line with a flow meter, flow control valve, and fire hydrant. Verify adequate hydraulics from the clearwell for providing pressure and flow for backwash. This would allow five filters to remain online during the entire backwash cycle. An opportunity would also be available to add

filter to waste piping, which would in turn allow discharge of the first filtered water after the backwash, to waste. This would purge any higher turbidity water from the system.

- Replace the backwash valve with a globe pattern control valve more suited to throttling. This will allow gradual and controlled backwash initiation.

- Reconfigure backwash waste piping to allow Filter #6 filter to waste. Tie into Filter #6 effluent line and add a 12-inch control valve piped to a safe air gap discharge to backwash waste. This will eliminate cross connection between the filtered water header and backwash waste line.

- Verify the media is being fully expanded during backwashes. Metered backwash rates will assist in this determination.

- Determine pros and cons of including the dam underdrain flow with the recycle while taking into account ground water quality and additional historical flow information on the stream.

- Maintain operational plan for backwash pond maintenance and solids handling.

- Consider constructing a manhole-style wet well at the pond level equipped with submersible pump(s). The manhole could be installed either upstream or downstream of the dam drain blending point, depending on flow and/or quality constraints. During preparation of this report, we had a brief discussion with a representative from the California Department of Public Health (CDPH) who is familiar with the CPUD system. We presented CPUD's general desire and plan to recycle backwash flows from the backwash ponds to the reservoir. While no initial issues were brought to light with this approach, CDPH advised submitting a detailed plan for discussion and approval. The proposed recycling plan must meet the requirements of California Code of Regulations for drinking water. The specific section pertaining to recycling water treatment backwash water is provided as follows.

Excerpt from California Code of Regulations – Recycle Provisions

§64653.5. Recycle Provisions.
A supplier that uses conventional filtration or direct filtration and recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes shall:

(a) Provide the Department with the following information in writing:

(1) Plant schematic showing the origin of all recycle flows, the hydraulic conveyance used to transport each, and the point at which each is re-introduced into the treatment plant; and

(2) Typical recycle flow in gallons per minute (gpm), the highest observed plant flow experienced in the previous year (gpm), design flow for the treatment plant (gpm), and the approved operating capacity for the plant if the Department has specified one.

(b) Return all recycle flows to the headworks of the treatment plant or an alternative location approved by the Department.

(c) Collect and retain the following information and provide it to the Department upon request:

(1) A copy of the Department notification required pursuant to subsection (a);

(2) A list of all recycle flows and the frequency with which they are returned;

(3) Average and maximum backwash flow rates through the filters and the average and maximum durations of the filter backwash process in minutes;

(4) Typical filter run length and a written summary of how filter run length is determined;

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Last updated July 1, 2014—from Titles 17 and 22 California Code of Regulations
California Regulations Related to Drinking Water

E. Chlorine System

The facility employs both pre-chlorination and post-chlorination with flow-proportioned control. Chlorine residual is not boosted at any point in the distribution system.

The pre-chlorine feed is located in a pit just outside the building. The gas is vacuum-fed through a regulating unit with two rotometers (one for plant effluent and one for plant influent). Then the gas is siphoned through a vacuum inductor. A 1-ton cylinder is being used with a pitot tube for gas withdrawal inside the cylinder, using a Capital Controls Chlorinator for post-chlorination. However, the raw water pre-chlorine feed water is cross-connected with the plant effluent carrier water and to the plant effluent line through the post-chlorine feed line. Raw water could flow through this line and commingle with the finished water line. ?

Staff indicated that 0.5 mg/l of chlorine is fed at the pre-chlorine injection point. However, the chlorine feed rotometer for this injection point was not displaying any chlorine feed while the plant was operating. A calcium hypochlorite feed system is on standby should the gas chlorine system be inoperable. Operations staff indicated only free chlorine is measured at the plant.

During a tour of the site, a chlorine evaporator was noted in a scrap pile on the north side of the stabilization ponds. Operations staff did not have background information about the evaporator or why it was removed from service.

Recommendations

- Separate the cross-connected chlorine carrier water plumbing. (Use raw water for raw water pre-chlorination and finish water for effluent chlorination.)
- Repair the raw water pre-chlorine feed rotometer,
- Determine the effectiveness of pre-chlorination for iron bacteria control; confirm the presence of iron bacteria in media.
- Consider replacing the chlorine evaporator to maximize withdrawal from the 1-ton cylinders. This will save costs on gas chlorine, as roughly 10 percent of the tank is full at change-out. Increased capacity will also provide more operational flexibility as the plant expands.
- Add a second chlorine room alarm light to the opposite side of the building so it is visible from the reservoir access road.

F. Corrosion Control

Zinc is used for corrosion control in the water distribution system and is stored in 30-gallon barrels. The maintenance staff indicated that 0.17 mg/l is being dosed. However, there are no gauges or scales on the product to indicate the use of a mass flux formula.

Recommendation

- Confirm the use of the mass flux formula.

G. Laboratory/Quality Control

A handheld spectrophotometer is used for zinc and chlorine concentrations using powder pillow reagents. There is also a spectrophotometer used for turbidity calibration. A pH meter is also used in the lab. Operators are performing daily/weekly calibration against standards. The plant uses fairly new Hach plant influent and effluent turbidity meters. A chlorine analyzer is also in use that measures continuous free chlorine residuals leaving the plant.

A concern expressed by the maintenance staff is that the plant effluent does not have enough pressure to continuously feed the turbidity meter and chlorine analyzer. Continuous finished water turbidity monitoring is a compliance issue.

The lab needs some cleaning and reorganizing; however, all instrumentation was in the open.

Recommendations

- Correct the filter confluence turbidity averaging and reporting, to average of the six filters in real time. Record and report those values.
- Install a small pump on the plant effluent sample line to the lab so that a constant water supply is achieved for the continuous monitoring equipment.
- Have all the spectrophotometers professionally calibrated annually and obtain a certificate of calibration.
- At least weekly, the total chlorine should be checked with the plant effluent free chlorine residuals to make sure that break point chlorination is achieved. The difference between free and total should be no more than 0.2 mg/l.
- Monitor dosage. Perform periodic jar testing during temperature and season changes.

H. Plant Instrumentation

Initiation of the treatment plant is triggered through the existing supervisory control and data acquisition (SCADA) system when the clearwell level reaches a preset level of 10 feet. At this time, the filter effluent valve opens, allowing gravity flow through the plant. Once the clearwell level reaches 17 feet, the effluent valve closes, which in turn stops filtration. Currently, initiation of the filter backwash is performed manually. Although there should always be staff onsite for backwash events, some level of automation is beneficial to operations. Staff expressed specific desire to integrate backwash controls into their overall SCADA system.

Plant instrumentation is antiquated and should be considered for replacement. Pressure transducers and programmable logic controls are more compact, efficient, and economical for plant SCADA. The original plant alarm control system was replaced with a newer Eurotherm system in 2006. The filter controls are original, and replacement with additions to the Eurotherm system is being considered. The original control components remain in the control cabinet.

Recommendations

- Coordinate with a capable instrumentation provider to convert all WTP controls to a SCADA system that can be accessed by a plant personal computer. Include backwash monitoring and controls in the new SCADA system. The SCADA will allow the operator to have remote access to the plant for alarm events and remote operations.

I. Jeff Davis Reservoir

The raw water reservoir receives water from the South Fork Pump Station via 3 miles of 20-inch steel transmission main. There is a large debris collection screen and a large concrete diffuser structure that captures surface water runoff via a ditch along the drive on the southwestern berm. The WTP intake structure appears sound and functional, with three levels of draw off from the reservoir. The reservoir is 52 feet at its deepest point. Lowest operating levels were reportedly 22 feet below the spillway, which was still well above the uppermost orifice in the 2014 drought. Operations were 9 feet below the spillway during the site visit.

Weed growth and algae are an issue in the reservoir. It was noted in the interview with the maintenance staff that weeds and algae material was discovered in the filters during routine inspections. The operations staff has seasonally varied the operating levels of the reservoir in an attempt to retard the growth of the algae and weeds. The reservoir is usually filled during the winter months, until the levels drop in at the river intake of the South Fork Pump Station, around May. Reservoir fill activities are dormant until the wet season begins in late October to mid-November, or when the intake level/flows in the river are conducive for pumping.

Staff also indicated that iron bacteria have been identified in the reservoir and intake structure, and that the reservoir bypass is used to flush the intake structure and pipe in an effort to minimize the adverse water quality effects of the iron bacteria.

A "Solar Bee" mixing device is located on the southern one-third of the impoundment and runs on solar power with a battery backup. We understand the unit has been in operation for approximately 20 years. These laminar flow mixing devices are intended to control algae blooms, address taste and odor issues, reduce the release of manganese, iron, hydrogen sulfide, and phosphorous from sediment in the lake, increase dissolved oxygen and pH, and reduce aquatic weed growth. Staff reported Solar Bee completed a study of the reservoir including dissolved oxygen (DO) at varying levels in the lake, and concluded one unit is sufficient for the application. This report was not reviewed as part of this evaluation.

At the base of the outlet side of the reservoir is an approximately 35-foot-deep manhole structure for observing dam leakage. There is an allowable leakage from the dam that is regulated by the California Department of Water Resources, Division of Safety of Dams (DSOD). The dam leakage observation piping system proceeds under the backwash stabilization ponds to an outfall several hundred yards beyond them.

There is a newly refurbished dam overflow spillway that runs downslope of the dam and across the eastern side of the property to a creek below and several hundred yards north of the backwash stabilization ponds.

Recommendations

- Consider installing additional "Solar Bee" mixing units to prevent thermal stratification.
- During drought conditions when the South Fork River flows may be too low for pumping, an alternate source of water should be developed to supplement reservoir filling activities.

3.0 Other System Components

A. South Fork Pump Station

The South Fork Pump Station is the only raw water pump station and is the source of supply for the entire district. Located just below the confluence of the Licking Fork and South Fork, this pump station delivers water to the Jeff Davis Reservoir for subsequent treatment. Interior conditions at the pumping facility indicate some minor maintenance requirements, such as pipe painting and general housekeeping.

Two vertical turbine pumps equipped with 400 HP soft start motors are rated for 1,600 gpm each, at 300 psi. The number one motor and pump are currently isolated due to a possible oil seal leak around the thrust bearing. Literature review indicates the pump and motor have been out of service since 2012 and may not have been serviced for 30 years. Maintenance staff indicate the pump and motor can be brought online in case of an emergency. The pump station is run in a manual mode during the months of December through May. Influent turbidities are generally in the range of 1.2−1.7 NTU.

There is a pneumatic surge tank plumbed into the pump discharge piping, with a dedicated compressor for maintaining pressure. This manually operated compressor has not been used for a number of years, and it must be noted that the compressor head itself is oil lubricated.

There are two sluice gates at the pump station intake. Only one gate is open during normal operations. This gate is equipped with a 20-inch x 18-inch debris catching screen, which staff inspect bi-weekly and clean as necessary. Maintenance staff use a backhoe annually to clean away the solids and debris from the inlet to the sluice gates. Equipment reach is limited and does not reach beyond the first/opened gate. There are mercoid failsafe switches on the downstream side of the pump, but there is no low level shut-off on the suction side of the pumps.

Staff indicated the district is in the process of installing transit-time meters on the discharge side of each pump.

Recommendations

- For reliability and redundancy purposes, both motors should be on a regular maintenance schedule and operable.
- Consider replacing one of the pump motors with a variable frequency drive (VFD) ready model, and equip it with a VFD. This will provide energy savings and operational flexibility if the river is not able to sustain full pump flows.
- Both pumps should be equipped with a low level shut-off switch on the intake side in the event the river level drops below the recommended intake suction requirements. The VFD could also be looped with an analog level monitor on the intake and automatically adjust based on intake level.

- CPUD should hire a contractor with a longer reaching excavator to remove debris and solids in front of both sluice gates.
- The compressor should be replaced with an oil-free model.
- The sluice gate at the dam for the pump station backwater will at some point need to be refurbished, along with the spillway and concrete structure. The structure is dated and breaking away from itself.

B. Rail Road Flat Pump Station

This pump station, located just adjacent to the Jeff Davis WTP, was constructed approximately 10 years ago when the Rail Road Flat area needed a new, more dependable source of supply. This pump station is equipped with vertical turbines, with a meter located outside the building in a meter pit.

Recommendations

- If the downstream water is going to be used for backwash, the pumps and motors would likely need to be resized to produce more water or they will draw water from system pressure based on the downstream reservoir level.
- Housekeeping and pipe painting are recommended.

C. Glencoe Pump Station

Constructed in 1988, this pump station serves the Blue Ridge community of 30 to 40 customers. It is equipped with a pneumatic tank with pressure transducers, and a PLC for controlling two 20-HP booster pumps between 120−150 psi. The pneumatic tank has an air compressor that requires manual operation since no level switch is installed. Operators indicate this pump station is volume limited and would benefit from additional capacity. A pad-mounted generator and automatic transfer switch was recently installed at this site.

Recommendations

- Install a high-pressure relief valve on the top of the pneumatic tank with discharge to the outside.
- Install a tank level switch to eliminate manually operating the air compressor.
- The air compressor has oil-lubricated pistons, and the oil-laden air is introduced to the pneumatic tank when it is recharged with air. The oil-laden air is introducing petroleum distillates to the drinking water supply. The petroleum distillates are a known carcinogen. Replace the compressor with an oil-free model.
- Paint the internal piping, pressure tank, and outside of the building.

D. Aboveground Storage Tanks

The treated water from the clearwell, located at the site of the treatment plant, is distributed to five reservoirs located throughout the district, for a total storage capacity of 5.67 MG. Tanks include two 0.5 MG, a 1.5 MG, and a 3 MG, which are all butt-welded steel. Each tank is equipped with a pressure transducer and dialer for transmitting the tank level to the SCADA system. The district recently contracted a diver to inspect the interior of the tanks and vacuum accumulated silt. The contractor recommended blasting and painting all but the Rail Road Flat tanks, which is newer construction. Flaking is noted above the high water level. Staff expressed interest in installing cathodic protection on the tanks.

Recommendation

- Develop a long-term capital plan for recoating tanks, normally on a 15- to 20-year cycle.

E. Transmission/Distribution

There are over 20 miles of pipeline in the CPUD water system that range in age from 50-plus years to new installations. In additional to the potable customer base, CPUD also has raw water customers who tap off the South Fork line upstream of the Jeff Davis Reservoir. Water is only available during winter when the South Fork pump station is active or until the residual in the line is available. A schematic of the distribution system can be found in **Appendix E**.

Staff indicated there are several operational challenges relative to the distribution system, including:

- Taste and odor issues with the water customers (earthy, musky taste and odor; seasonal), which increase with changes in temperature.
- Scaling (white residue on glasses and around water fixtures).
- Plant maintenance concerns. Operators expressed concern regarding time available to perform plant maintenance. They operate only on a day shift and are spread thin with distribution and storage activities. Considerations include on-call contract operations and maintenance for distribution, storage, and pumping, and having operators focus on water treatment plant. This is covered in the operations plan.
- Valve exercising is limited because of the number of branch or dead-end lines. Exercising results in large numbers of customers without water.
- Flushing efforts have been curtailed because of recent conservation efforts. For current operations, flushing is now limited to a complaint basis.

After inquiring about the actual customer complaints, it became apparent that the chorine residuals are not checked at most remote ends of the water distribution system where a large number of water customer complaints are received. The nature of the complaints are indicative of algae byproduct

residuals and possible bio-film development within the water distribution pipes. The scaling issues are indicative of soft water carbonate formation, which is normal under these circumstances.

Recommendations

- Initiate a leak detection study. Develop a capital improvement program for main replacement.
- Evaluate distribution meter compliance with the new 2014 "Lead Law" (NSF/ANSI 372).
- Observe any bio-film growth within the water distribution system when coupons are pulled.
- Develop a Directional Water Distribution System Flushing Plan along with maintenance flushing to maintain residuals at the dead-end lines.
- Develop a phased plan to loop dead-end lines within the water distribution system, where possible.

F. Pressure Reducing/Hydroelectric Stations

Three similar pressure reducing/hydroelectric stations utilize vertical turbines and 480-volt, three-phase motors for electrical generation. The vertical turbine at each station is plumbed backwards, causing the motor to spin in reverse, which in turn energizes the coil windings in the motor to produce alternating current on all three phases. The excess electricity from this station is resold to PG&E.

The vertical turbine and motor also provide enough friction losses to drop the water pressure to manageable levels. A 2-inch pressure-reducing valve (PRV) further reduces pressure in low flows. A 6-inch control valve will open to supply additional water if supply through the 2-inch valve is not sufficient. An 8-inch high-pressure relief valve serves as an emergency backup. Each station generates roughly 80 KW with the 260 to 50 psi reduction in pressure.

Recommendations

- Maintain motors and bearings for best efficiency.
- Paint the interior piping.
- Prepare for upcoming revised fall protection regulations. Install fall protection on the ladder that drops into the pipe gallery.
- Review opportunities to maximize power generation revenues based on operational adjustments such as reservoir fill times.

G. San Andreas Elementary Pressure Reducing Valve Station (Typical of Most)

The San Andreas Elementary pressure-reducing valve station consist of a 2-inch PRV to pilot the 8-inch PRV. There is a 6-inch high pressure relief valve in the vault as well. The 2-inch PRV was isolated and not functioning. The station supplies water to the business district and is a parallel-configured station with another set of PRVs on the other side of the pressure zone. The operator thought surging may have been

an issue and the reason why the 2-inch PRV is isolated. The 6-inch-high PRV is plumbed to a storm water catch basin below grade. This is a cross connection. These stations are set to generally keep pressures below 125 psi.

Recommendations

- Have valve representative set the PRV pressures so that surging is not an issue (if it is).
- Re-plumb the outlet to be above the drain with an air gap and screened opening.

H. Maintenance

A goal for a good maintenance program is for 80 percent of the WTP maintenance to be preventive in nature, rather than reactionary.

Recommendations

- Purchase a software program for tracking and scheduling preventive maintenance. These can generate work orders and account for inventory and time spent by the maintenance staff for performing such work. ESRI's GIS based ArcView software is one industry standard, while Big Foot and EPA's open source CUPSS software are two other options.
- Develop a WTP capital improvements program based on expected equipment life and service.

APPENDIX A

Calaveras Public Utility District
Summary of Recommendations Related to Jeff Davis Treatment Plant

Component	Recommendations	Conceptual Capital Cost	Priority
Polymer Feed 16/17	Install poly feed, diffuser, and static mixer in raw water line - new building/vault.	$ 75,000	X
Filters 15/16	Install in-line strainer in raw water line - also in new building/vault.	see above	X
	All 6 filters should be professionally evaluated for necessary repairs.	$ 10,000	X
	Replace filter media and miscellaneous repairs. 2016/17 completed	$ 120,000	X
	Evaluate/Repair Filter #4 underdrain.	$ 5,000	X
	Replace/Repair Filter #1 surface washer. Follow-up inspections for presence of algae.	$ 1,000	X
Filter Effluent Valve N	Replace main plant control valve with automated globe valve in vault.	$ 20,000	
	Annually check mag meters for accuracy.	$ -	
Backwash Water 15/16	Evaluate viability of dedicated 18" water main from Rail Road Flat, with fire hydrant.	$ 50,000	
	Replace the backwash valve with a 12" globe pattern control valve.	$ 10,000	
	Reconfigure backwash waste piping to allow Filter #6 to waste.	$ 20,000	
	Verify the media is being fully expanded during backwashes.	$ -	
	Determine pros/cons of including dam drain in recycle.	$ -	X
	Design manhole style wet well at the pond level for recycle pumping - line to reservoir.	$ 50,000	X
	Maintain operational plan for backwash pond maintenance and solids handling.	$ -	
Chlorine System in house	Separate the cross-connected chlorine carrier water plumbing.	$ 600	X
	Repair the raw water pre-chlorine feed rotometer.	$ 400	X
	Determine effectiveness of pre-chlorination (iron bacteria in media?).	$ 600	
	Consider replacing the chlorine evaporator.	$ 4,000	
	Add a second chlorine alarm light to opposite side of building.	$ 1,000	
Corrosion Control 16/17?	Confirm use of the mass flux formula.	$ -	
Laboratory/Quality Control in house	Correct the filter confluence turbidity averaging and reporting.	$ -	X
	Install a small pump on the plant effluent sample line to the lab for turbidities.	$ 1,000	X
	Professionally calibrate spectrophotometers on an annual basis.	$ 200	
	Weekly, check total chlorine against plant effluent free chlorine to ensure break point.	$ -	
	Monitor polymer dosage. Perform jar testing during temperature and season changes.	$ -	X
Plant Instrumentation P	Convert all WTP controls to a SCADA system accessed by a plant PC, including backwash.	$ 30,000	X
Jeff Davis Reservoir N	Install additional "Solar Bee" mixing unit(s).	$ 60,000	
	Research an alternate source of water for supplemental filling of reservoir (e.g., Schaads).	TBD	
	TOTAL	$ 458,800	

Calaveras Public Utility District
Summary of Recommendations Related to Other CPUD Facilities

Component	Recommendations	Priority
South Fork Pump Station	Test and maintain both pumps/motors in operable condition, for redundancy.	X
	Consider replacing one existing motor with VFD with looped level sensor on intake.	X
	Install low level shut-offs on intake side.	X
	Hire a contractor with a longer reaching excavator to remove debris from sluice gates. 2017	X
	Replace the compressor with an oil-free model.	
	Refurbish the sluice gate at the dam, spillway, and concrete structure.	
Rail Road Flat Pump Station	Resize pumps if provide backwash water from Rail Road Flat.	
	Conduct housekeeping and paint piping.	
Glenco Pump Station	Install a high-pressure relief valve on the top of the pneumatic tank; direct outside.	
	Install a tank level switch to eliminate manually operating the air compressor.	
	Replace the compressor with an oil-free model.	
	Paint the internal piping (including the tank) and outside of the building.	
Aboveground Storage Tanks	Develop long-term recoating plan for tanks.	X
Transmission/Distribution	Initiate a leak detection study. Develop phased main replacement program.	X
	Evaluate distribution meter compliance with the new "Lead Law."	
	Observe any bio-film growth within the water distribution system when coupons pulled.	
	Develop a Directional Water Distribution System Flushing Plan.	
	Develop a phased plan to loop dead-end lines.	
Pressure Reducing/Hydroelectric Stations	Maintain motors and bearings for best efficiency.	
	Paint the interior piping.	
	Install fall protection on the ladder that drops into the pipe gallery.	
	Review operations for increased power generation revenues.	
Pressure Reducing Valve Stations - General	Open valve and set the PRV pressures so that surging is not an issue (if it is).	
	Re-plumb the outlet of the 6" high pressure relief valve to provide air gap.	
Maintenance	Purchase a software program for developing a preventive maintenance program.	X
	Develop a WTP capital improvements program.	X

APPENDIX B

Sierra Foothill Laboratory, Inc.

255 Scottsville Blvd
PO Box 1268
Jackson, CA 95642

Phone 209/223-2800
Fax 209/223-2747
Email info@sierralab.com

RECEIVED FEB 10 2014

Report Date: 02/06/2014

Client: **CPUD**

Calaveras Public Utility Dist
Attn: Todd Fischer
P O Box 666
San Andreas, CA 95249

Project Report: **234066**

Results for Project 234066

786563 Raw - Annual Liquid Taken: 01/06/2014 1027 By: JW Rec:01/06/2014

Parameter	Result	Unit	Flag	RL	Method	Analyzed	By	CAS
Cation/Anion Balance	0.558 / 0.703	meq/meq				02/06/2014	ANH	
Specific Conductance	73.1	umhos/cm		1.00	EPA120.1/SM2510B	01/06/2014 0900	A&C	
Solids, Total Dissolved	61	mg/L		10	EPA160.1/SM2540C	01/07/2014 1130	LMT	
Turbidity	3.1	NTU		0.10	EPA180.1/SM2130B	01/06/2014 1040	A&C	
Aluminum, ICP	Nd	ug/L		50	EPA200.7	01/16/2014	BSK	
Barium, ICP	ND	ug/L		50	EPA200.7	01/16/2014	BSK	
Iron, ICP	130	ug/L		30	EPA200.7	01/16/2014	BSK	
Manganese, ICP	ND	ug/L		0.010	EPA200.7	01/16/2014	BSK	
Sodium, ICP	3.5	mg/L		1.0	EPA200.7	01/16/2014	BSK	
Boron-total, ICP	ND	mg/L		0.10	EPA200.7	01/16/2014	BSK	
Antimony, ICP/MS	ND	ug/L		2.0	EPA200.8	01/21/2014	BSK	
Arsenic, ICP/MS	ND	ug/L		2.0	EPA200.8	01/21/2014	BSK	
Beryllium, ICP/MS	ND	ug/L		1.0	EPA200.8	01/21/2014	BSK	
Cadmium, ICP/MS	ND	ug/L		1.0	EPA200.8	01/21/2014	BSK	
Chromium, ICP/MS	ND	ug/L		10	EPA200.8	01/21/2014	BSK	
Copper by ICP/MS	ND	ug/L		5.0	EPA200.8	01/21/2014	BSK	
Lead by ICP/MS	ND	ug/L		5.0	EPA200.8	01/21/2014	BSK	
Mercury, ICP/MS	ND	ug/L		0.20	EPA200.8	01/21/2014	BSK	
Nickel, ICP/MS	ND	ug/L		10	EPA200.8	01/21/2014	BSK	
Selenium, ICP/MS	ND	ug/L		2.0	EPA200.8	01/21/2014	BSK	
Silver, ICP/MS	ND	ug/L		10	EPA200.8	01/21/2014	BSK	
Thallium, ICP/MS	ND	ug/L		1.0	EPA200.8	01/21/2014	BSK	
Zinc, ICP/MS	ND	ug/L		50	EPA200.8	01/21/2014	BSK	
Chloride	2.4	mg/L		0.50	EPA300.0/SM4110B	01/07/2014 1458	RK	
Fluoride	0.12	mg/L		0.10	EPA300.0/SM4110B	01/17/2014 1147	RK	
Nitrate + Nitrite as N, Calc.	<0.050	mg/L		0.050	EPA300.0/SM4110B	01/13/2014	KL	
Nitrogen, Nitrate as N	<0.050	mg/L		0.050	EPA300.0/SM4110B	01/07/2014 1458	RK	
Nitrogen, Nitrate as NO3	<0.22	mg/L		0.22	EPA300.0/SM4110B	01/13/2014	KL	
Sulfate	2.1	mg/L		0.50	EPA300.0/SM4110B	01/17/2014 1147	RK	
Alkalinity, Bicarbonate	28	mg/L		5.0	EPA310.1/SM2320B	01/10/2014 1230	AM	
Alkalinity, Carbonate	<5.0	mg/L		5.0	EPA310.1/SM2320B	01/10/2014 1230	AM	
Alkalinity, Hydroxide	<5.0	mg/L		5.0	EPA310.1/SM2320B	01/10/2014 1230	AM	
Alkalinity, Total as CaCO3	28	mg/L		5.0	EPA310.1/SM2320B	01/10/2014 1230	AM	

Continued

Sierra Foothill Laboratory, Inc.

255 Scottsville Blvd
PO Box 1268
Jackson, CA 95642

Phone 209/223-2800
Fax 209/223-2747
Email info@sierralab.com

Results for Project 234066

786563 Raw - Annual

Liquid Taken: 01/06/2014 1027 By: JW Rec:01/06/2014

Parameter	Result	Unit	Flag	RL	Method	Analyzed	By	CAS
VOCs by GC/MS	ALL ND	ug/L		DLR	EPA524.2	01/13/2014	BSK	
Color, Apparent	14	unit		3	SM2120B	01/06/2014 1450	AM	
Odor	1.0	unit		1.0	SM2150B	01/06/2014 1450	AM	
Corrosivity, Langelier Index	-1.92	LSI			SM2330B	01/14/2014	KL	
Hardness as CaCO3	28	mg/L		5.0	SM2340C	01/10/2014 1245	RK	
Calcium, Titrimetric	8.0	mg/L		3.0	SM3500Ca-D	01/13/2014 1400	AM	
Magnesium, Calculation	<2.0	mg/L		2.0	SM3500Mg-E	01/14/2014	KL	
pH, Lab*	7.3	unit		0.1	SM4500-H+B	01/06/2014 1020	A&C	*past hold
Nitrogen, Nitrite as N	<0.050	mg/L		0.050	SM4500-NO2B	01/07/2014 1400	R&C	
Phosphorous, Total as P	<0.050	mg/L		0.050	SM4500-P E	01/15/2014 0930	AM	
Nitrogen, Ammonia-N	<0.50	mg/L		0.50	SM4500NH3C	01/09/2014 0810	NCC	
Silicon, Colorimetric as Si	4.8	mg/L		0.10	SM4500Si-C	01/20/2014 1135	RK	
Foaming Agents (MBAS)	ND	mg/L		0.025	SM5540C	01/07/2014 1915	MCC	

Sample Preparation Steps for Project 234066

786563 Raw - Annual

Liquid Taken: 01/06/2014 1027 By: JW Rec:01/06/2014

Parameter	Result	Unit		Method	Analyzed	By
Receive metals sub lab report	BSK 01/24/14	Date			01/24/2014	ANH
Receive report from sub lab	BSK 1/24/14	Date			01/24/2014	CW
Receive report from sub lab	MCC 1/14/14	Date			01/16/2014	ANH
Ship metals to sub lab	BSK 1/7/14	Date			01/07/2014 1600	ANH
Ship samples to Colusa	01/07/2014	Date			01/07/2014 1415	TG
Ship samples to sub lab	MCC 1/6/14	Date			01/06/2014 1600	ANH
Ship samples to sub lab	BSK 1/8/14	Date			01/07/2014 1600	ANH
Title 22 General Mineral	By SFL	Date	DLR		01/08/2014	SFL
Title 22 Inorganic Chemical	By SFL	Date	DLR		01/08/2014	SFL
Results reported EDT	BSK	WO file#		Custom data export	01/07/2014	BSK
Results reported EDT	MCC	WO file#		Custom data export	01/07/2014	MCC
Results reported EDT	0510002-001	WO file#		Custom data export	01/23/2014	KL
pH prep for Color analysis	7.3	unit	0.1	SM4500-H+B	01/06/2014 1450	AM

SET Quality Control/Quality Assurance for Project 234066

Continued

Sierra Foothill Laboratory, Inc.

255 Scottsville Blvd
PO Box 1268
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Phone 209/223-2800
Fax 209/223-2747
Email info@sierralab.com

Report Date: 01/27/2014

Client: **CPUD**

Calaveras Public Utility Dist
Attn: Todd Fischer
P O Box 666
San Andreas, CA 95249

Project Report: **234067**

Results for Project 234067

786564 Finish - Annual Liquid Taken: 01/06/2014 1042 By: JW Rec:01/06/2014

Parameter	Result	Unit	Flag	RL	Method	Analyzed	By	CAS
Cation/Anion Balance	0.512 / 0.631	meq/meq				01/24/2014	KL	
Specific Conductance	74.7	umhos/cm		1.00	EPA120.1/SM2510B	01/06/2014 0900	A&C	
Solids, Total Dissolved	70	mg/L		10	EPA160.1/SM2540C	01/07/2014 1130	LMT	
Turbidity	0.34	NTU		0.10	EPA180.1/SM2130B	01/06/2014 1040	A&C	
Aluminum, ICP	ND	ug/L		50	EPA200.7	01/16/2014	BSK	
Iron, ICP	ND	ug/L		30	EPA200.7	01/16/2014	BSK	
Manganese, ICP	ND	ug/L		10	EPA200.7	01/16/2014	BSK	
Sodium, ICP	3.5	mg/L		1.0	EPA200.7	01/16/2014	BSK	
Copper by ICP/MS	31	ug/L		5.0	EPA200.8	01/21/2014	BSK	
Silver, ICP/MS	ND	ug/L		10	EPA200.8	01/21/2014	BSK	
Zinc, ICP/MS	ND	ug/L		50	EPA200.8	01/21/2014	BSK	
Chloride	4.3	mg/L		0.50	EPA300.0/SM4110B	01/07/2014 1458	RK	
Fluoride	0.13	mg/L		0.10	EPA300.0/SM4110B	01/17/2014 1147	RK	
Sulfate	2.1	mg/L		0.50	EPA300.0/SM4110B	01/17/2014 1147	RK	
Alkalinity, Bicarbonate	28	mg/L		5.0	EPA310.1/SM2320B	01/10/2014 1230	AM	
Alkalinity, Carbonate	<5.0	mg/L		5.0	EPA310.1/SM2320B	01/10/2014 1230	AM	
Alkalinity, Hydroxide	<5.0	mg/L		5.0	EPA310.1/SM2320B	01/10/2014 1230	AM	
Alkalinity, Total as CaCO3	28	mg/L		5.0	EPA310.1/SM2320B	01/10/2014 1230	AM	
Color, Apparent	<3	unit		3	SM2120B	01/06/2014 1450	AM	
Odor	1.0	unit		1.0	SM2150B	01/06/2014 1450	AM	
Corrosivity, Langelier Index	-2.16	LSI			SM2330B	01/14/2014	KL	
Hardness as CaCO3	24	mg/L		5.0	SM2340C	01/10/2014 1245	RK	
Calcium, Titrimetric	7.2	mg/L		3.0	SM3500Ca-D	01/13/2014 1400	AM	
Magnesium, Calculation	<2.0	mg/L		2.0	SM3500Mg-E	01/14/2014	KL	
pH, Lab*	7.1	unit		0.1	SM4500-H+B	01/06/2014 1020	A&C	*past hold
Foaming Agents (MBAS)	ND	mg/L		0.025	SM5540C	01/07/2014 1925	MCC	

Sample Preparation Steps for Project 234067

Continued

APPENDIX C

Jar Test Dosage

Topic: Jar Testing

Tuesday, December 03, 2013

Objective:

Performing a jar test with three different types of polymer coagulant

- Polymer 9825 is the current polymer we used for a period of seven years Propac 8925 has a specific gravity of 1.2
- Polymer 914 has a specific gravity of 1.3 and has never been used by CPUD
- Polymer 908 Has not been used by the water district and may be used on a trial bases

Polymer 9825 filtered the best on a coagulant solution filter test although each polymer will have different results in the performance test, Freddy recommended we add the 5 gallons of either polymer 914 or 908 to the 100 gallon bin with 15 gallons of polymer 9825 for a total of 20 gallons, each trial should last around two weeks

Freddy Vaziri from NTU Technologies will provide MSDS for the polymer listed above through e-mail

- All raw water jar test samples were taken from Jeff Davis Water Treatment Plant raw water faucet in the laboratory
- The filter flow test was performed on a cone type coffee filter close to our media quality

Jar test results

- 914 polymer preformed had the best jar test as far as coagulation with the raw water with a NTU value of 0.15mg/l, polymer 914 scored second in the filter flow rate test
- 9825 polymer had the second best performance with the coagulation with a NTU value of 0.20mg/l, although polymer 9825 did have the best performance in the filter flow rate test
- Polymer 908 performance was the least effected with a NTU value of 0.26mg/l also polymer had the lowest filter flow rate score
- The raw water NTU valve after running through the filter flow test was 0.80mg/l

Jar Test Dosage

1. This is how to perform a 2mg/L jar test with Propac 9825 polymer
2. Item you will need are
    a. Three 250ml beakers
    b. Three 1ml syringes
    c. Three magnetic battery or electric stirrers
    d. Three 1 liter or 1000ml beakers
    e. Three 3ml syringes
3. Place the 250 glass beakers on the stirrers
4. Fill the 250ml glass beakers with distilled water to the 250 ml mark
5. Add a magnetic stirring device inside the 250 ml beaker
6. Turn on the magnetic rotating control nob till a downward vortex whirlpool is created about 75% of the glass beaker
7. Add 0.02ml of polymer solution form the desired coagulant source
8. The specific gravity of Propac 8925 is 1.2
9. Add the 0.02ml syringe dose to the top corner of the whirlpool vortex in the 250ml beaker
10. This will create a 1 PPM or 1mg/L coagulant jar testing solution
11. Let the 250ml solution mix at the current speed for 1 minute
12. Set up three 1000ml or beakers on a stirrer and fill them with 1000ml of the desired raw water
13. Set the stirrer speed on the lowest setting do not create a whirlpool vortex for this portion of the jar test
14. Fill a 3ml syringes to 2.0ml with the 1mg/l coagulant dosing solution that was created in the 250ml beakers
15. When filling the syringes fill and flush the coagulant solution back and forth several times in the 250ml beaker to allow for adequate mixing with-in the syringe
16. Adding a 2.0ml coagulant solution dose to a 1000ml glass beaker is a dose of 2mg/l dosage
17. The polymer dosage spectrum range for the Jeff Davis water treatment pressure filters is 1.88mg/l to 2.90mg/l most of the time the poly dosage is very close to 2.0mg/l

APPENDIX D

ERS
INDUSTRIAL SERVICES, INC.

ERS Industrial Services Inc.
FACSIMILE TRANSMITTAL SHEET

To:	From:
Gary Goff	Rick D. Langlois-Vice President Sales
FAX NUMBER:	Date:
209-754-0778	1-12-05
COMPANY:	TOTAL NO. OF PG. INCLUDING COVER:
Calaveras Public Utility District	2
PHONE NUMBER:	SENDER'S REFERENCE NUMBER:
209-754-3281	011205-1Q
Re:	YOUR REFERENCE NUMBER:

☐ Urgent ☑ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

NOTES/COMMENTS:

Dear Gary

SCOPE:
1. Abrasive blast the interiors of vessels to a SSPC-SP 10 near white metal blast. Dust collection equipment will be used during all blasting operations. Spent abrasive will be tested and disposed of accordingly.
2. Apply 2 coats of a NSF approved epoxy coating at 5 to 8mils dft per coat.
3. Use low volt holliday detection equipment to check for pinholes in coating, make repairs as needed. Take final DFT readings.
4. Dehumidification equipment will be used on this project to insure ambient conditions are maintained per manufactures recommendations. The equipment will also be used for assisting in the post curing process which will require a min 7 days per.

CLARIFICATIONS:

1. The below price is based on doing one vessel at a time for a total of 6.
2. The owner to supply a power source of minimum 80amp / 208 volt 3 phase power. Jeffco will supply a portable transformer and electrical supply cord. Owner electrician to connect electrical cord to source.

2120 Warm Springs Court Fremont, Ca. 94539
Phone: 510-770-0202 • Fax: 510-490-3024

ERS
INDUSTRIAL SERVICES, INC.

EXCLUSIONS:
1. Dewatering, cleaning or disinfecting of Vessels interiors.
2. Removal or reinstallation of mechanical or electrical equipment to facilitate coating.
3. Hazardous material abatement (lead based paint, asbestos, etc).

Price: If there is 480 volt available $12,267.00 per filter Total: $73,602.00

Price: If there is only 208 volt available an addional charge of
$1,778.00 per filter Total: $10,668.00

Total Project Price: **$84,270.00**

Please review the above information and sign and return so we may get this project started as soon as possible to allow for completion of project before the hot weather comes. If you have any questions please feel free to call me at 510-552-5301 or my office at 510-552-5301.

Thanks

Rick D. Langlois

Gary L. Goff 1/12/05
Gary Goff—Calaveras PUD

NO 480V AVAILABLE

CALAVERAS PUBLIC UTILITY DISTRICT

152 E. St. Charles Street
P. O. Box 666
SAN ANDREAS, CALIFORNIA 95249
TELEPHONE: 209-754-3281

January 11, 2005

Mr. Rick Langlois
ERS Industrial Services
2120 Warm Springs Court
Fremont, CA 94539-6774

FAX 510 490-3024

RE: Calaveras PUD WTP filter media replacement

Dear Rick:

The Calaveras Public Utility District Safety Program requires information from your company and adherence to the attached safety measures and reports. Please provide the information required. As noted in our phone conversation this morning you have already sent some of the information with your quote.

Sincerely,

Gary L. Goffe

Gary L. Goffe, Manager

Attached: noted

CALAVERAS PUBLIC UTILITY DISTRICT

152 E. St. Charles Street
P. O. Box 666
SAN ANDREAS, CALIFORNIA 95249
TELEPHONE: 209-754-3281

January 5, 2005

Mr. Rick Langlois
ERS Industrial Services
2120 Warm Springs Court
Fremont, CA 94539-6774

FAX 510 490-3024

RE: Calaveras PUD WTP filter media replacement

Dear Rick:

The Calaveras Public Utility District accepts your proposal per Quote #112204-IQ to provide TurnKey Service as described in your proposal and as described to our Engineer Bob Rice in the amount of $198,205.55.

Please call me at your earliest convenience to schedule unloading one filter to obtain the underdrain lateral dimensions.

Sincerely,

Gary L. Goffe

Gary L. Goffe, Manager

Memo

To: Gary Goffe, CPUD

From: Bob Rice

Date: 01/04/05

Re: Media Supplier Recommendation
Jeff Davis Reservoir Water Treatment Plant

Gary,

We have reviewed the three vendor proposals provided to us for filter media replacement services for the Jeff Davis Reservoir WTP. We find the proposal from ERS Industrial Services to be both the most responsive to the District's request and offer the lowest price.

A representative from ERS did visit the site prior to the bid and is familiar with the conditions and requirements of the project. The type of work proposed by ERS, media removal and installation is the primary service that they specialize in and therefore we expect ERS to perform in a timely and satisfactory manner on this project.

I did talk with Mr. Rick Langlois, Vice President of Sales for ERS and received confirmation regarding the following questions concerning their proposal:

1. Mr. Langlois confirmed that their proposal included replacement of all existing PVC underdrain laterals with stainless wedgewire style laterals, as manufactured by Johnson Screen.

2. The reference for additional time and materials work pricing would be applicable only if additional work, such as need for repairs within the vessels is discovered and requested of ERS at the time of opening and unloading the vessels.

3. The underdrain lateral slot size will be 0.008 inches which is standard for the garnet gravel and garnet sand layers specified.

4. ERS's proposed gravel design varies from that originally requested, but is proper given the desired wedge wire style underdrain laterals. The 6 inch reduction in support gravel depth is proposed to be replaced with 6 additional inches of filter media. The additional filter media will provide additional

solids retention capacity and specific grain surface area for improved performance. The elimination of multiple gravel layers will provide the benefit of reducing the concern for future gravel layer disruptions.

5. Based on media design information retained from Microfloc Products, (now U.S. Filter) the original developer of mixed media filtration, the additional 6 inches of filter media depth will increase the initial clean bed headloss by approximately 6 to 10 inches. This is partly dependent on the water temperature (viscosity) and exact effective size and uniformity coefficient of the media provided. Regardless, this should be negligible overall to plant performance.

ERS has expressed a willingness to begin work, essentially immediately by unloading of one filter vessel to verify precisely the underdrain lateral overall length and diameter dimensions.

I have attached a summary table comparing the three proposals. Hopefully this will sufficiently clarify the selection of ERS as the lowest priced responsive bidder.

Please call if we can provide any additional information or assistance.

Sincerely,

Bob Rice,

SPH Associates

CALAVERAS PUBLIC UTILITY DISTRICT

FILTER SURVEILLANCE REPORT FOR

CALAVERAS WTP

PERFORMED & PREPARED

By:

ERS INDUSTRIAL SERVICES, INC.

ERS INDUSTRIAL SERVICES, INC.
2120 Warm Springs Ct. 510-770-0202 phone 510-490-3024 fax

GENERAL NOTES:

ERS crews performed an inspection of all six filter vessels. The vessels themselves were uniform in appearance and overall operational characteristics. The following items were either outside the specifications provided or were of particular note.

1. There were large perimeter mounds observed in all filters. This can typically happen when the media does not break-up during backwashing forcing the backwash water to short circuit along the vessel walls.
2. While the overall bed depths have dropped somewhat, it appears that the garnet and silica sand layers have merged as well as smaller anthracite into a single super layer.
3. The individual media sizes appear to be generally with-in the specifications provided.
4. All of the interior coatings were in good condition.
5. The surface wash units in all of the filters are in good condition.
6. Some further review to determine the cause of the mounding that was observed is needed.

If you have any questions regarding this information, how it was obtained or how to interpret it, please feel free to contact me.

Sincerely,

Randolph W. Radonich

FILTER / VESSEL SURVEILLANCE

Filter Evaluation for: Calaveras PUD **Plant:** Calaveras WTP
Filter Type: Vessel **Contact:** Todd Fischer **Phone #** 209-293-7600
Filter Number: 1 **Inspector:** Julio Diaz **Date:** 2/27/2012

Valve Inspection

Valves: No leaking valves

Acceptable

Valve Type: Butterfly

Actuator Type: Pneumatic PSI

Valve Location: Inside

Valves Installed:

Pneumatic Inspection

Air Leaks: None detected

Acceptable

Air Compressor: Good Condition

Acceptable

Pressure Setting:

Water in Tank: No

Air Filters:

Acceptable

Water in Filters:

Air Dryer:

Acceptable

Air Lines:

Acceptable

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-1S-Sand#0001

Location: Calaveras WTP

Material: Sand

Source: ERS Industrial Services Inc.

Date Sampled: 2/28/2012

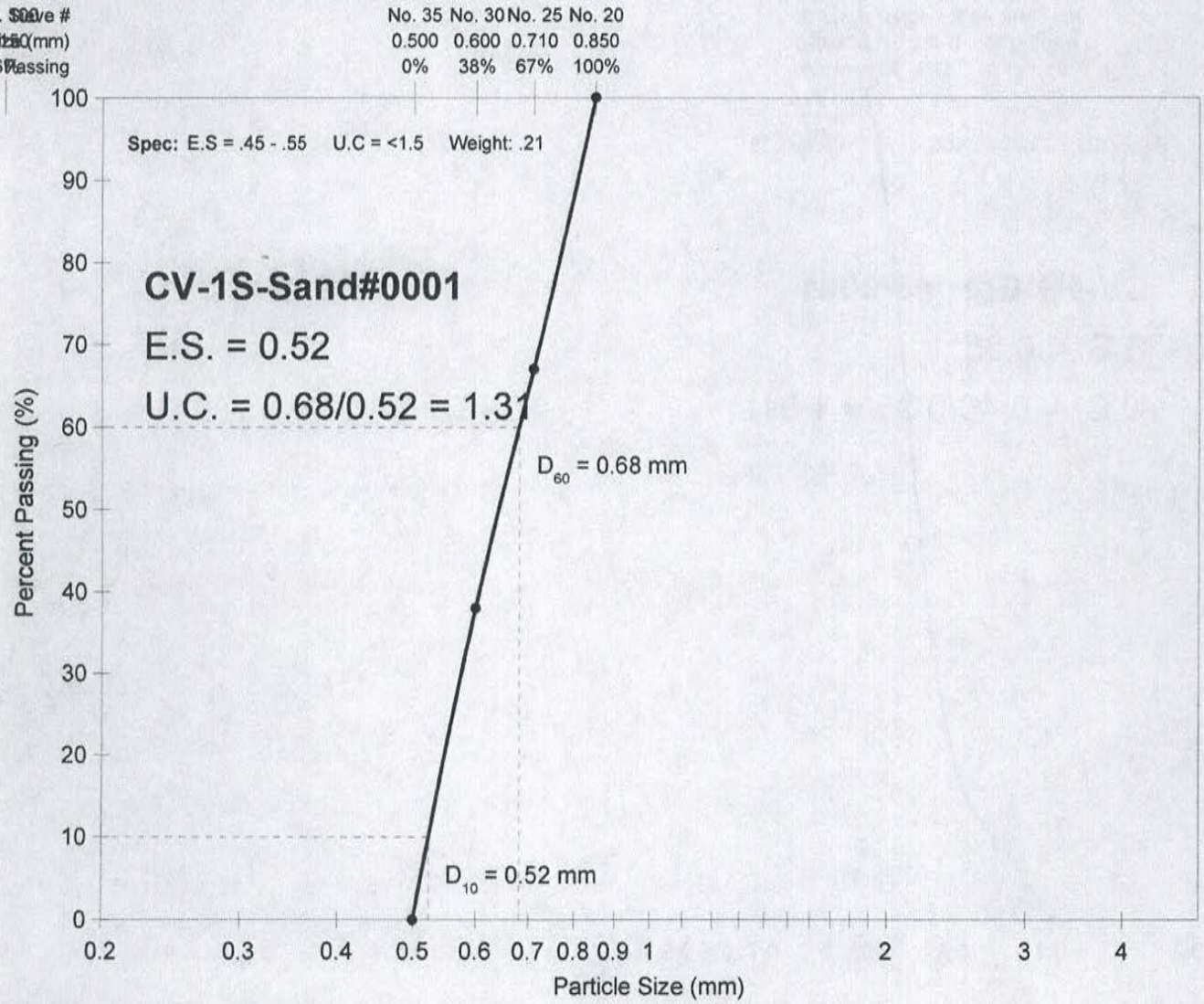
Sampled By: Andrew M.

Date Tested: 3/6/2012

Tested By: Francisco G.

Sieve Set: A.S.T.M C136/CAL 202

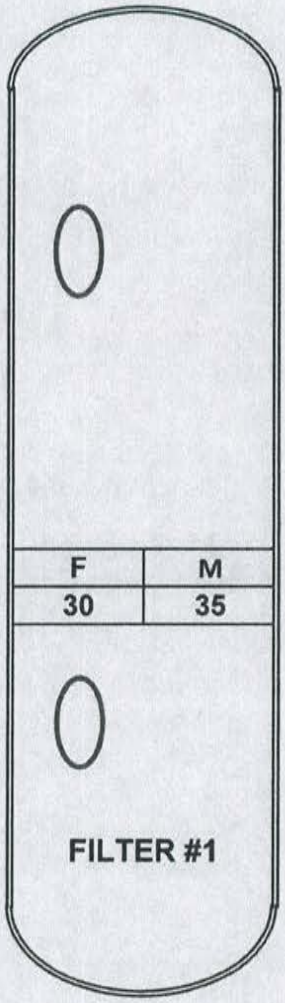
Date Calibrated: 3/16/2010



Remarks: Sieve Analysis

FILTER LAYOUT

Calaveras PUD
1



N

FILTER / VESSEL SURVEILLANCE

Filter Evaluation for:	Calaveras PUD		**Plant:**	Calaveras WTP	
Filter Type:	Vessel	**Contact:**	Todd Fischer	**Phone #**	209-293-7600
Filter Number:	2	**Inspector:**	Julio Diaz	**Date:**	2/27/2012

General Observation

Surface Washers
Yes

Surface wash spin freely with no missing nozzles.

Air Scour:
No

Media Surface Condition

Very thin layer of mud on surface. Very level surface with mounding along the walls.

Tank Coatings:
General Conditions

Good condition no visable rust

Other Conditions:

Surface wash to media is 7".

Media Expansion Test Results:
N/A

Freeboard:	Specified (Inches)	Measured (Inches)
	0	**32**

Media Depth:	Specified (Inches)	Measured (Inches)
GAC/Anthracite:	**19.5**	**11**
Sand:	**12**	**23**
Other:	**4.5**	**0**
Total Depth:	**36**	**34**

Media Interface:
(If Observed)

<2"

Media Test Results:		Specified (Inches)	Measured (Inches)
GAC/Anthracite:	ES	**1.0-1.1**	**1.08**
	UC	**<1.5**	**<1.34**
Sand:	ES	**.45-.55**	**0.57**
	UC	**<1.5**	**<1.23**
Garnet:	ES	**.25-.30**	**0.36**
	US	**<1.6**	**<1.25**

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-2A-Anthracite#0001

Location: Calaveras WTP

Material: Anthracite

Source: ERS Industrial Services Inc.

Date Sampled: 2/28/2012

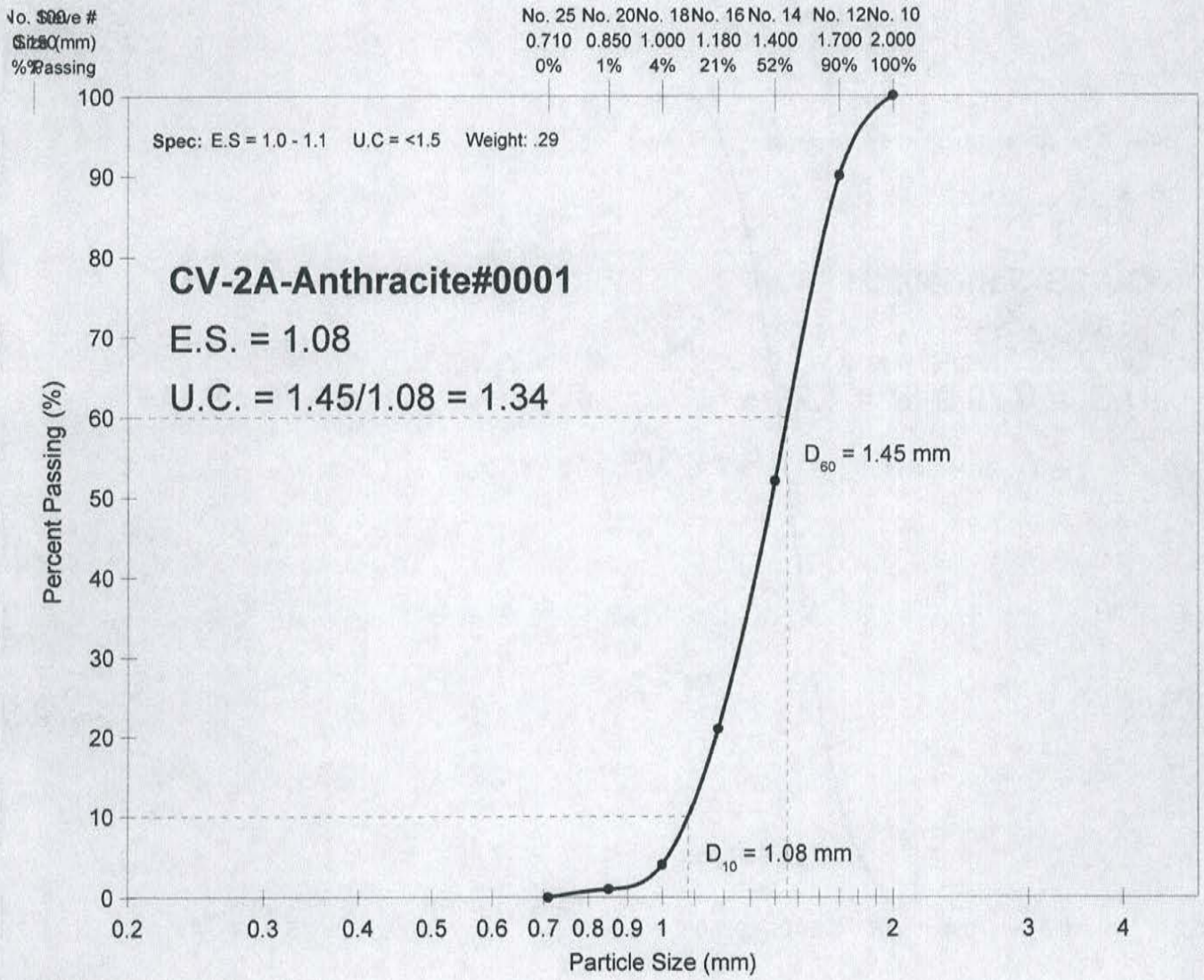
Sampled By: Andrew M.

Date Tested: 3/6/2012

Tested By: Francisco G.

Sieve Set: A.S.T.M C136/CAL 202

Date Calibrated: 3/16/2010



Remarks: Sieve Analysis

S.T.A.R.S.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-2G-Garnet#0001

Location: Calaveras WTP

Material: Garnet

Source: ERS Industrial Services Inc.

Date Sampled: 2/28/2012

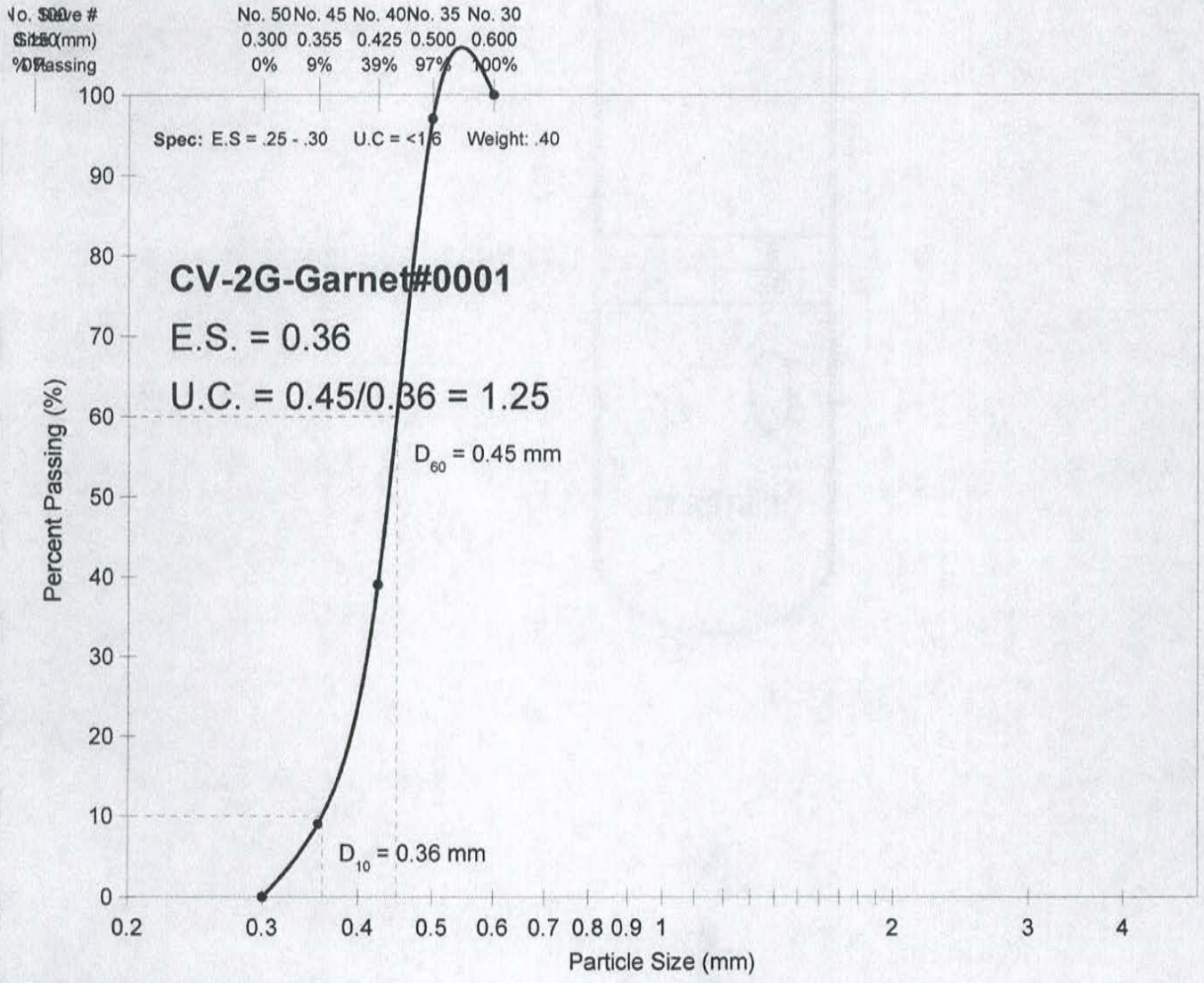
Sampled By: Andrew M.

Date Tested: 3/6/2012

Tested By: Francisco G.

Sieve Set: A.S.T.M C136/CAL 202

Date Calibrated: 3/16/2010



Remarks: Sieve Analysis

FILTER 3
ANALYSIS

ERS INDUSTRIAL SERVICES, INC.
2120 Warm Springs Ct. 510-770-0202 phone 510-490-3024 fax

FILTER / VESSEL SURVEILLANCE

Filter Evaluation for: Calaveras PUD **Plant:** Calaveras WTP
Filter Type: Vessel **Contact:** Todd Fischer **Phone #** 209-293-7600
Filter Number: 3 **Inspector:** Julio Diaz **Date:** 2/27/2012

Valve Inspection

Valves: No leaking valves

Acceptable

Valve Type: Butterfly

Actuator Type: Pneumatic PSI

Valve Location: Inside

Valves Installed:

Pneumatic Inspection

Air Leaks: none detected

Acceptable

Air Compressor: good condition

Acceptable

Pressure Setting:

Water in Tank:

Air Filters:

Acceptable

Water in Filters:

Air Dryer:

Acceptable

Air Lines:

Acceptable

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-3S-Sand#0001

Location: Calaveras WTP

Material: Sand

Source: ERS Industrial Services Inc.

Date Sampled: 2/28/2012

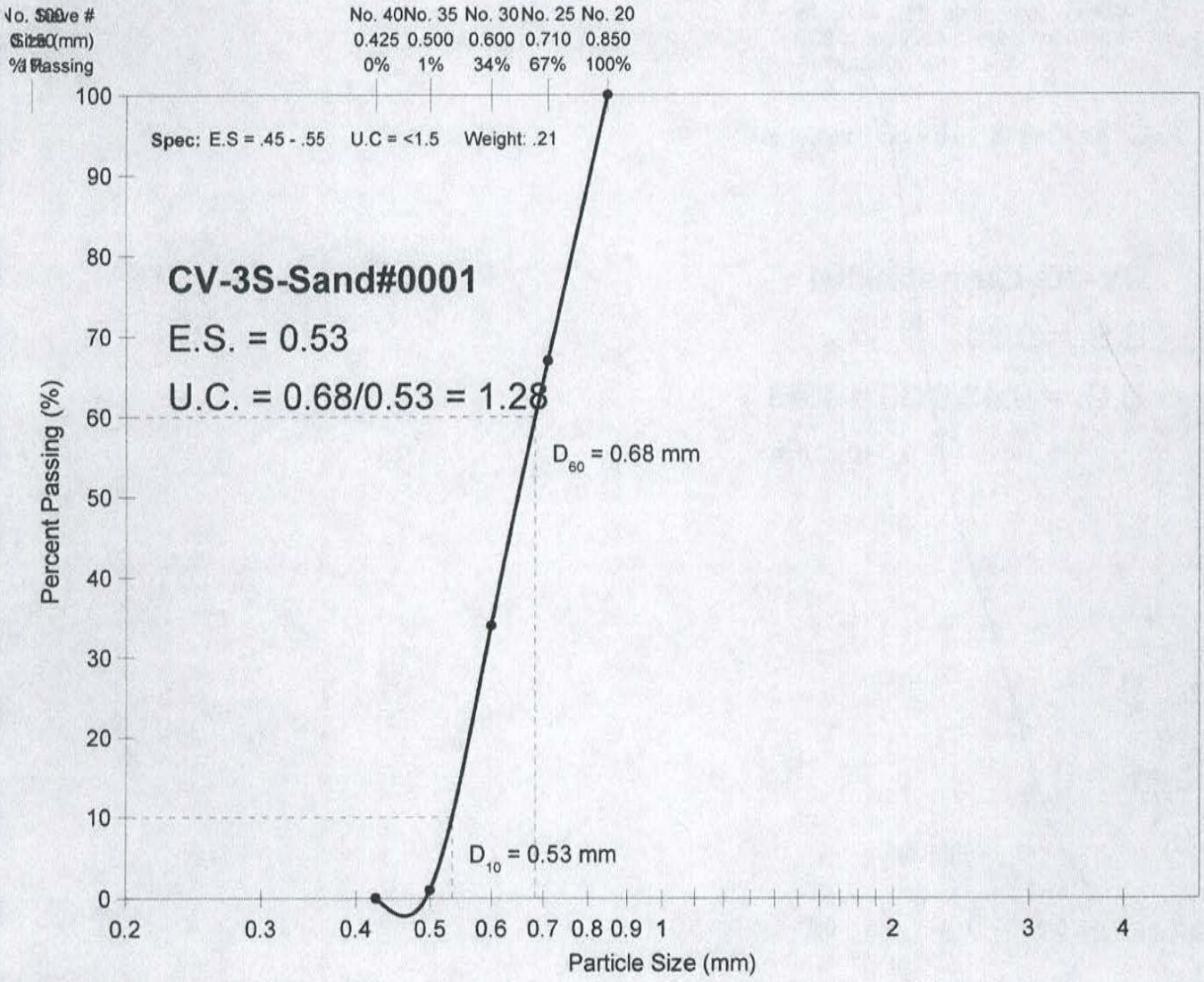
Sampled By: Andrew M.

Date Tested: 3/6/2012

Tested By: Francisco G.

Sieve Set: A.S.T.M C136/CAL 202

Date Calibrated: 3/16/2010

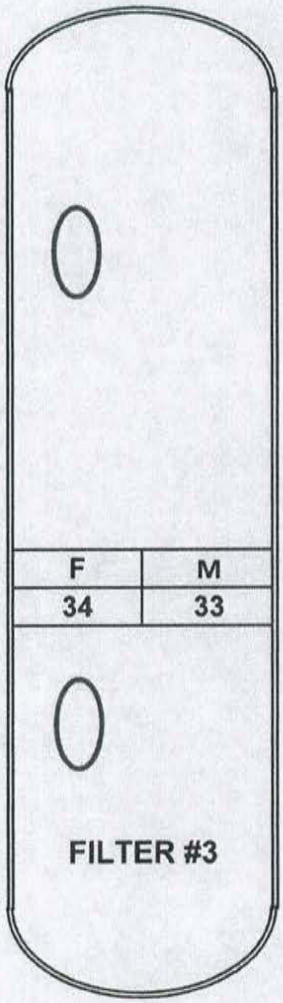


Remarks: Sieve Analysis

S.T.A.R.S.

FILTER LAYOUT

Calaveras PUD
3



N

FILTER / VESSEL SURVEILLANCE

Filter Evaluation for:	Calaveras PUD		**Plant:**	Calaveras WTP	
Filter Type:	Vessel	**Contact:**	Todd Fischer	**Phone #**	209-293-7600
Filter Number:	4	**Inspector:**	Julio Diaz	**Date:**	2/27/2012

General Observation

Surface Washers
Yes

Surface wash spin freely with no missing nozzles.

Air Scour:
No

Media Surface Condition

Very thin layer of mud on surface. Very level surface with mounding along the walls.

Tank Coatings:
General Conditions

Good condition no visable rust

Other Conditions:

Surface wash to media is 7".

Media Expansion Test Results:
N/A

Freeboard:	Specified (Inches)	Measured (Inches)
	0	**32**

Media Depth:	Specified (Inches)	Measured (Inches)
GAC/Anthracite:	**19.5**	**11**
Sand:	**12**	**23**
Other:	**4.5**	**0**
Total Depth:	**36**	**34**

Media Interface:
(If Observed)

<2"

Media Test Results:		Specified (Inches)	Measured (Inches)
GAC/Anthracite:	ES	**1.0-1.1**	**1.12**
	UC	**<1.5**	**<1.36**
Sand:	ES	**.45-.55**	**0.53**
	UC	**<1.5**	**<1.30**
Garnet:	ES	**.25-.30**	**0.3**
	US	**<1.6**	**<1.37**

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-4A-Anthracite#0001

Location: Calaveras WTP

Material: Anthracite

Source: ERS Industrial Services Inc.

Date Sampled: 2/28/2012

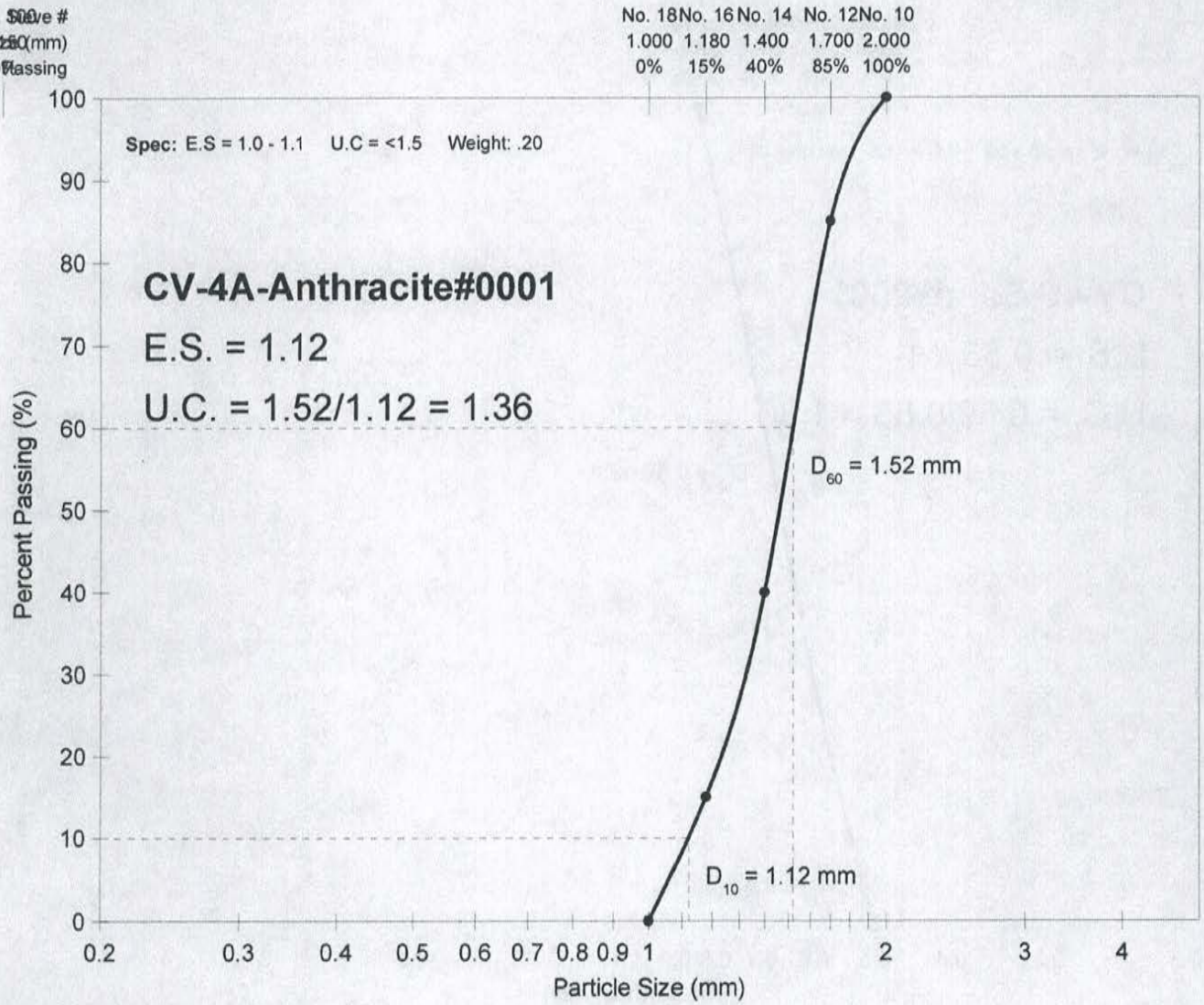
Sampled By: Andrew M.

Date Tested: 3/6/2012

Tested By: Francisco G.

Sieve Set: A.S.T.M C136/CAL 202

Date Calibrated: 3/16/2010



Remarks: Sieve Analysis

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-4G-Garnet#0001

Location: Calaveras WTP

Material: Garnet

Source: ERS Industrial Services Inc.

Date Sampled: 2/28/2012

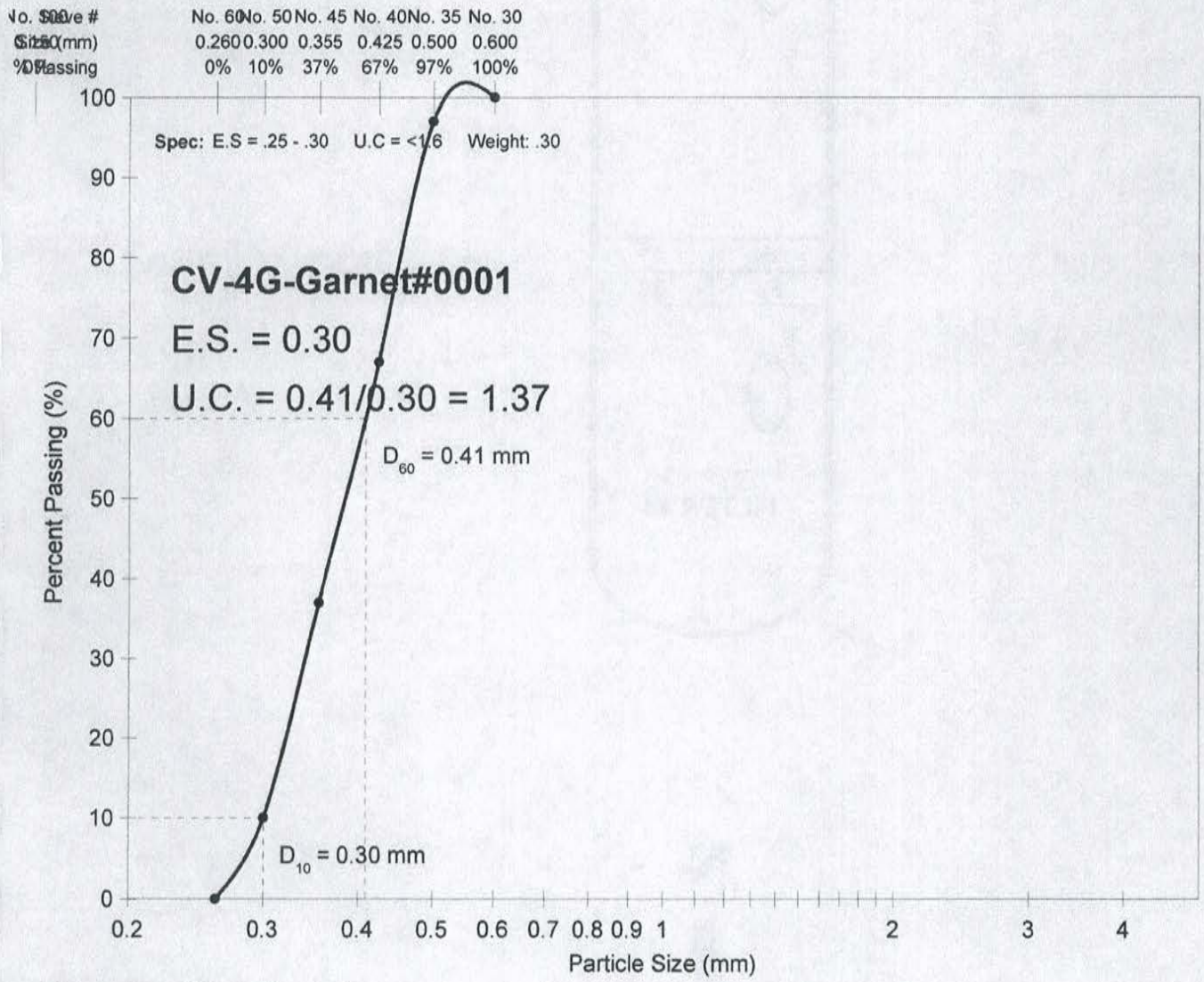
Sampled By: Andrew M.

Date Tested: 3/6/2012

Tested By: Francisco G.

Sieve Set: A.S.T.M C136/CAL 202

Date Calibrated: 3/16/2010



Remarks: Sieve Analysis

FILTER 5
ANALYSIS

ERS INDUSTRIAL SERVICES, INC.
2120 Warm Springs Ct. 510-770-0202 phone 510-490-3024 fax

FILTER / VESSEL SURVEILLANCE

Filter Evaluation for: Calaveras PUD **Plant:** Calaveras WTP
Filter Type: Vessel **Contact:** Todd Fischer **Phone #** 209-293-7600
Filter Number: 5 **Inspector:** Julio Diaz **Date:** 2/27/2012

Valve Inspection

Valves: No leaking valves

Acceptable

Valve Type: Butterfly

Actuator Type: Pneumatic PSI

Valve Location: Inside

Valves Installed:

Pneumatic Inspection

Air Leaks: none detected

Acceptable

Air Compressor: Good condition

Acceptable

Pressure Setting:

Water in Tank:

Air Filters:

Acceptable

Water in Filters:

Air Dryer:

Acceptable

Air Lines:

Acceptable

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-5S-Sand#0001

Location: Calaveras WTP

Material: Sand

Source: ERS Industrial Services Inc.

Date Sampled: 2/28/2012

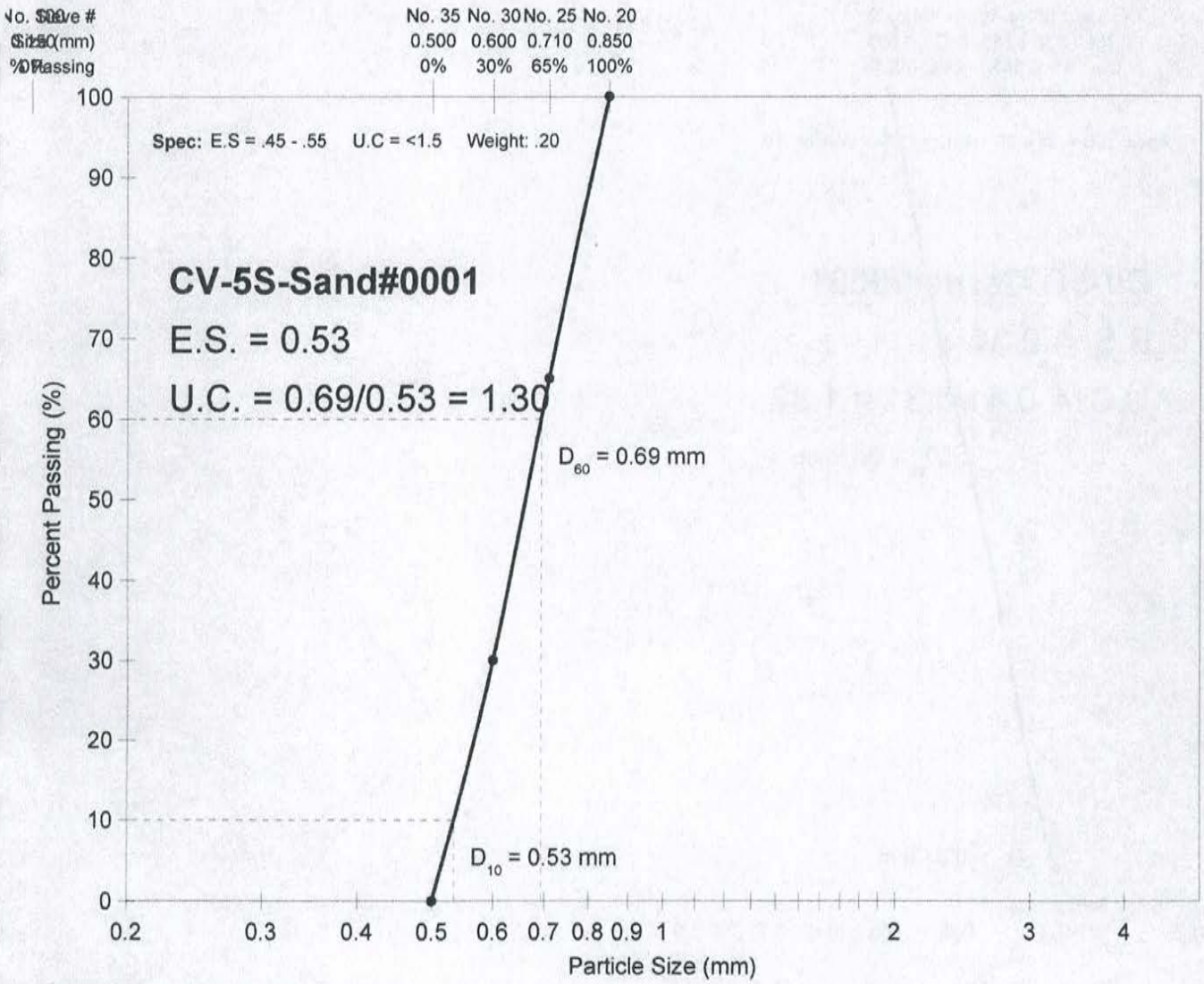
Sampled By: Andrew M.

Date Tested: 3/6/2012

Tested By: Francisco G.

Sieve Set: A.S.T.M C136/CAL 202

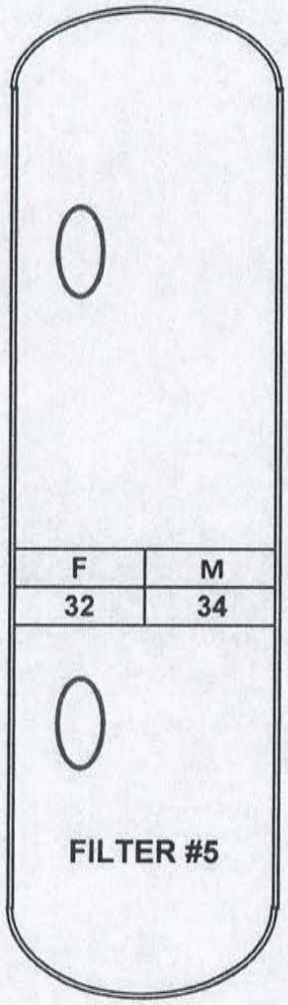
Date Calibrated: 3/16/2010



Remarks: Sieve Analysis

FILTER LAYOUT

Calaveras PUD
5



N

FILTER / VESSEL SURVEILLANCE

Filter Evaluation for:	Calaveras PUD	**Plant:**	Calaveras WTP		
Filter Type:	Vessel	**Contact:**	Todd Fischer	**Phone #**	209-293-7600
Filter Number:	6	**Inspector:**	Julio Diaz	**Date:**	2/27/2012

General Observation

Surface Washers
Yes

Surface wash spin freely with no missing nozzles.

Air Scour:
No

Media Surface Condition

Very thin layer of mud on surface. Very level surface with mounding along the walls.

Tank Coatings:
General Conditions

Good condition no visable rust

Other Conditions:

Surface wash to media is 7".

Media Expansion Test Results:
N/A

Freeboard:	Specified (Inches)	Measured (Inches)
	0	**32**

Media Depth:	Specified (Inches)	Measured (Inches)
GAC/Anthracite:	**19.5**	**10**
Sand:	**12**	**25**
Other:	**4.5**	**0**
Total Depth:	**36**	**35**

Media Interface:
(If Observed)

<2"

Media Test Results:		Specified (Inches)	Measured (Inches)
GAC/Anthracite:	ES	**1.0-1.1**	**1.07**
	UC	**<1.5**	**<1.36**
Sand:	ES	**.45-.55**	**0.54**
	UC	**<1.5**	**<1.31**
Garnet:	ES	**.25-.30**	**0.31**
	US	**<1.6**	**<1.42**

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-6A-Anthracite#0001

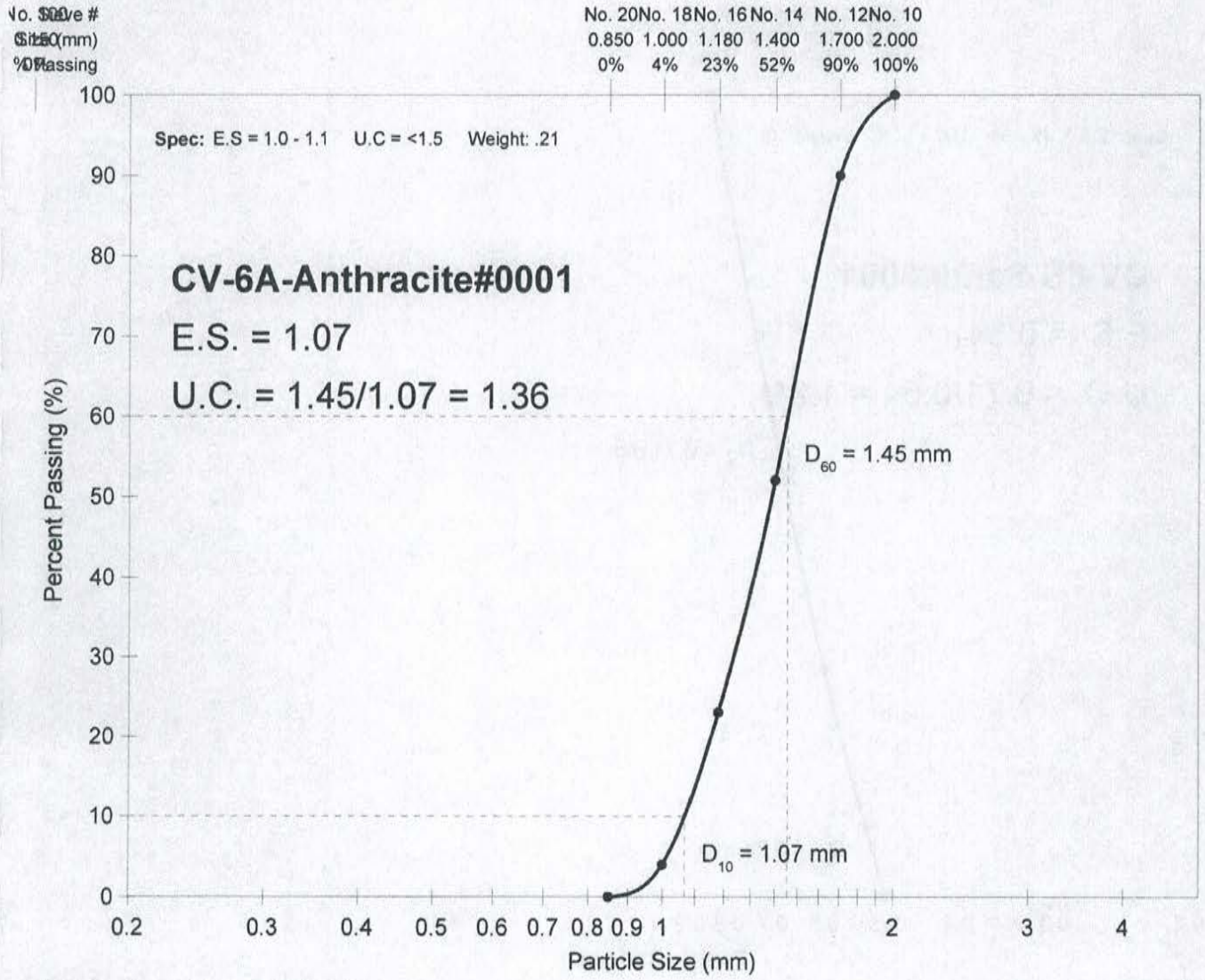
Location: Calaveras WTP

Material: Anthracite **Source:** ERS Industrial Services Inc.

Date Sampled: 2/28/2012 **Sampled By:** Andrew M.

Date Tested: 3/6/2012 **Tested By:** Francisco G.

Sieve Set: A.S.T.M C136/CAL 202 **Date Calibrated:** 3/16/2010



Remarks: Sieve Analysis

S.T.A.R.S.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Filter Media Analysis

Project: Calaveras PUD - Calaveras WTP (6 PV's, Single Cell) 2012

Sample No: CV-6G-Garnet#0001

Location: Calaveras WTP

Material: Garnet

Source: ERS Industrial Services Inc.

Date Sampled: 2/28/2012

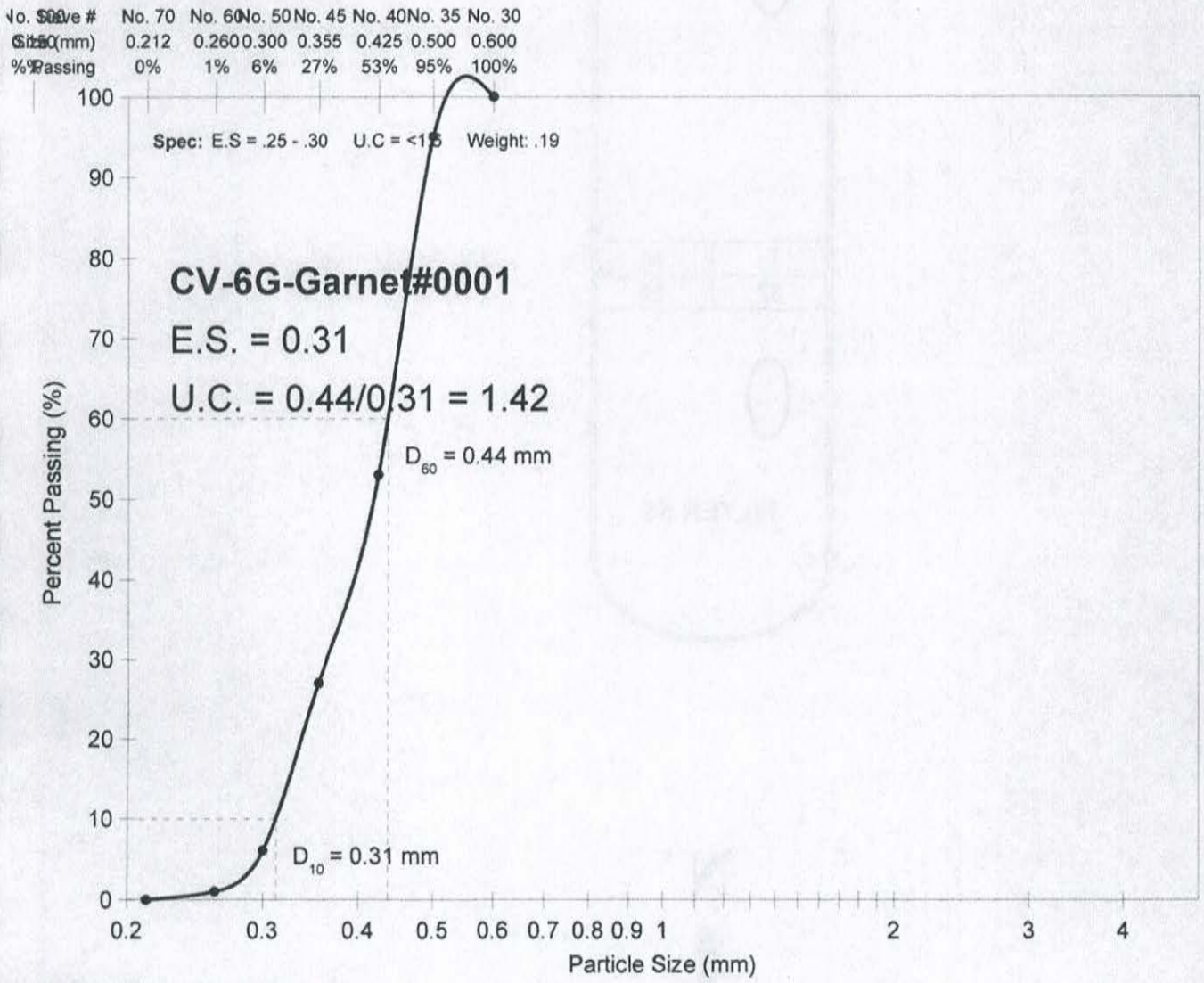
Sampled By: Andrew M.

Date Tested: 3/6/2012

Tested By: Francisco G.

Sieve Set: A.S.T.M C136/CAL 202

Date Calibrated: 3/16/2010



Remarks: Sieve Analysis

S.T.A.R.S.

Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VESSEL NUMBER:	1
DATE OF INSPECTION:	4/8/2014
DATE LAST INSPECTED:	1/1/2013
INSPECTOR:	AE/JC/KD

OPERATIONAL DATA:

Clean Bed Headloss	
Headloss before backwash	3
Backwash Flow rate:	5.5

INSPECTION NOTES:

	Year		Loss	
Media Surface Elevation:	0.5	0.5	0	(Inches)
(Inches below surface wash arm center)				

	YES	NO
Surface was arm free rotartion?	☑	☐

	YES	NO
Surface wash arm nozzles all in place?	☑	☐

Interior paint integrity:	Good
Filter Media Surface Appearance:	Clean
Filter Media Particle Appearance:	Fair

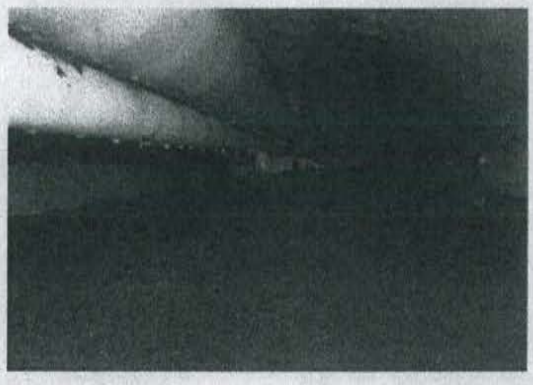
Refer to the zip lock one gallon sample bag marked filter 1

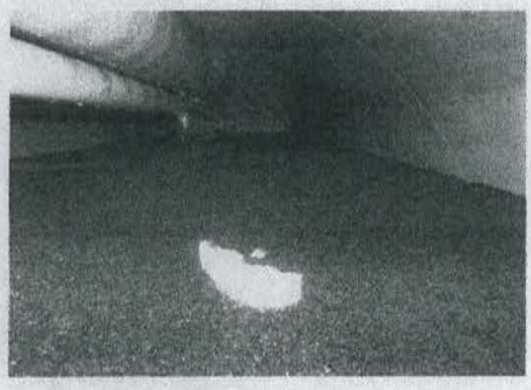
Comments:

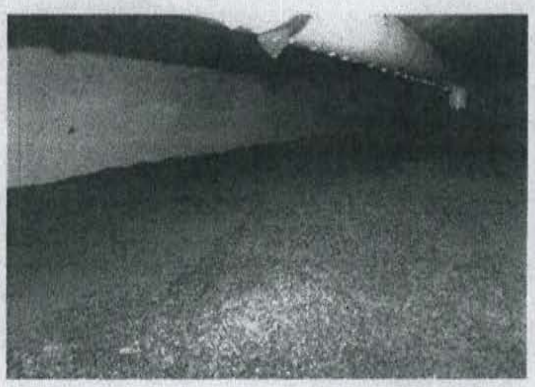
Surface wash inlet Cla-valve didn't open to inspect the surface wash spray arms until we it along. The rotation arm did not spin after freeded up with a shovels, there were some mud 4 to 16 inches down with in the media probably because of intermit surface washer fuctions. most of the mud ball should deisolve from the HTH shock doseage, we may have to inspect this filter again. After a few back washes to see if the surface washers are working properly.

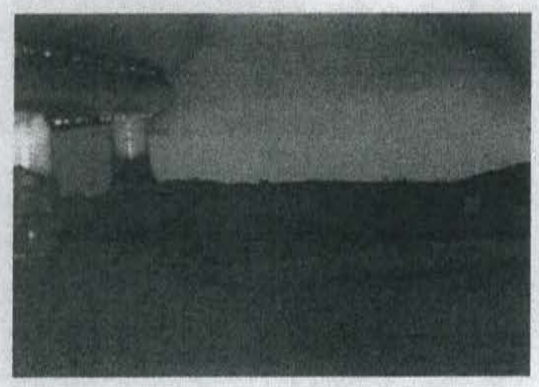
Staff added 3 1cf sacks of anthracite coal to filter 1

Staff added 30 pounds of 68% HTH calcium hypochlorite to filter 3 for a 24 hour shock. Treatment









Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VESSEL NUMBER:	2
DATE OF INSPECTION:	4/9/2014
DATE LAST INSPECTED:	1/1/2013
INSPECTOR:	AE/JC/KD

OPERATIONAL DATA:

Clean Bed Headloss	
Headloss before backwash	3
Backwash Flow rate:	5.5

INSPECTION NOTES:

	Year		Loss	
Media Surface Elevation:	1	2.5	-1.5	(Inches)
(Inches below surface wash arm center)				

	YES	NO
Surface was arm free rotation?	☑	☐

	YES	NO
Surface wash arm nozzles all in place?	☑	☐

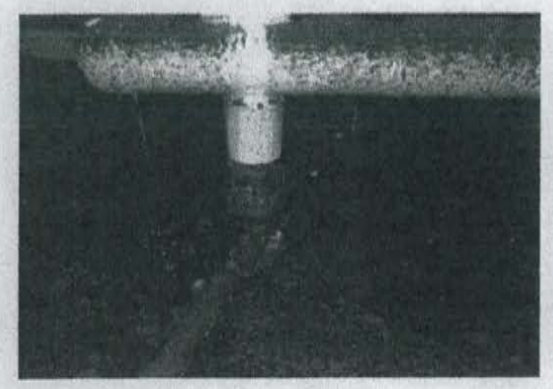
Interior paint integrity: Good

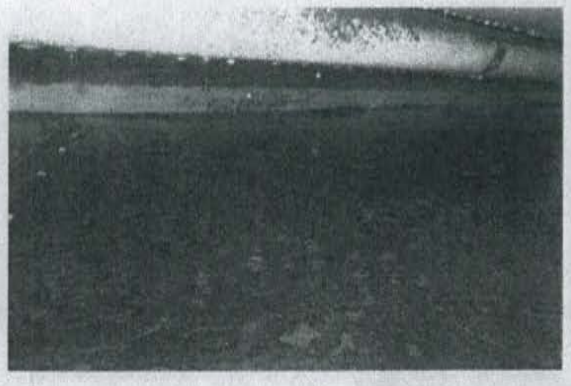
Filter Media Surface Appearance: Clean

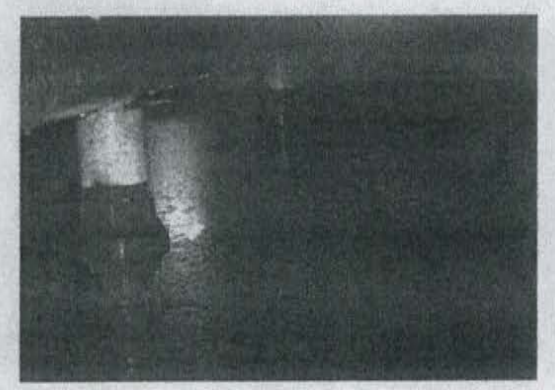
Filter Media Particle Appearance: Clean

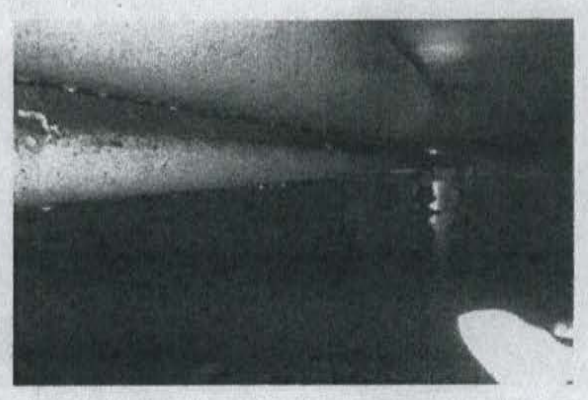
Refer to the zip lock one gallon sample bag marked filter 2

Comments: Filter media looked good,. Added 4 (1CF size) bags anthracite coal and 30 lbs. HTH 68% for 24 hr disinfection soak.









Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VESSEL NUMBER:	3
DATE OF INSPECTION:	4/8/2014
DATE LAST INSPECTED:	1/1/2013
INSPECTOR:	AE/JC/KD

OPERATIONAL DATA:

Clean Bed Headloss	
Headloss before backwash	3
Backwash Flow rate:	5.5

INSPECTION NOTES:

	Year		Loss	
Media Surface Elevation:	1	1.5	-0.5	(Inches)
(Inches below surface wash arm center)				

	YES	NO
Surface was arm free rotation?	☑	☐

	YES	NO
Surface wash arm nozzles all in place?	☑	☐

Interior paint integrity:	Good
Filter Media Surface Appearance:	Clean
Filter Media Particle Appearance:	Clean (Some Mud Balls)

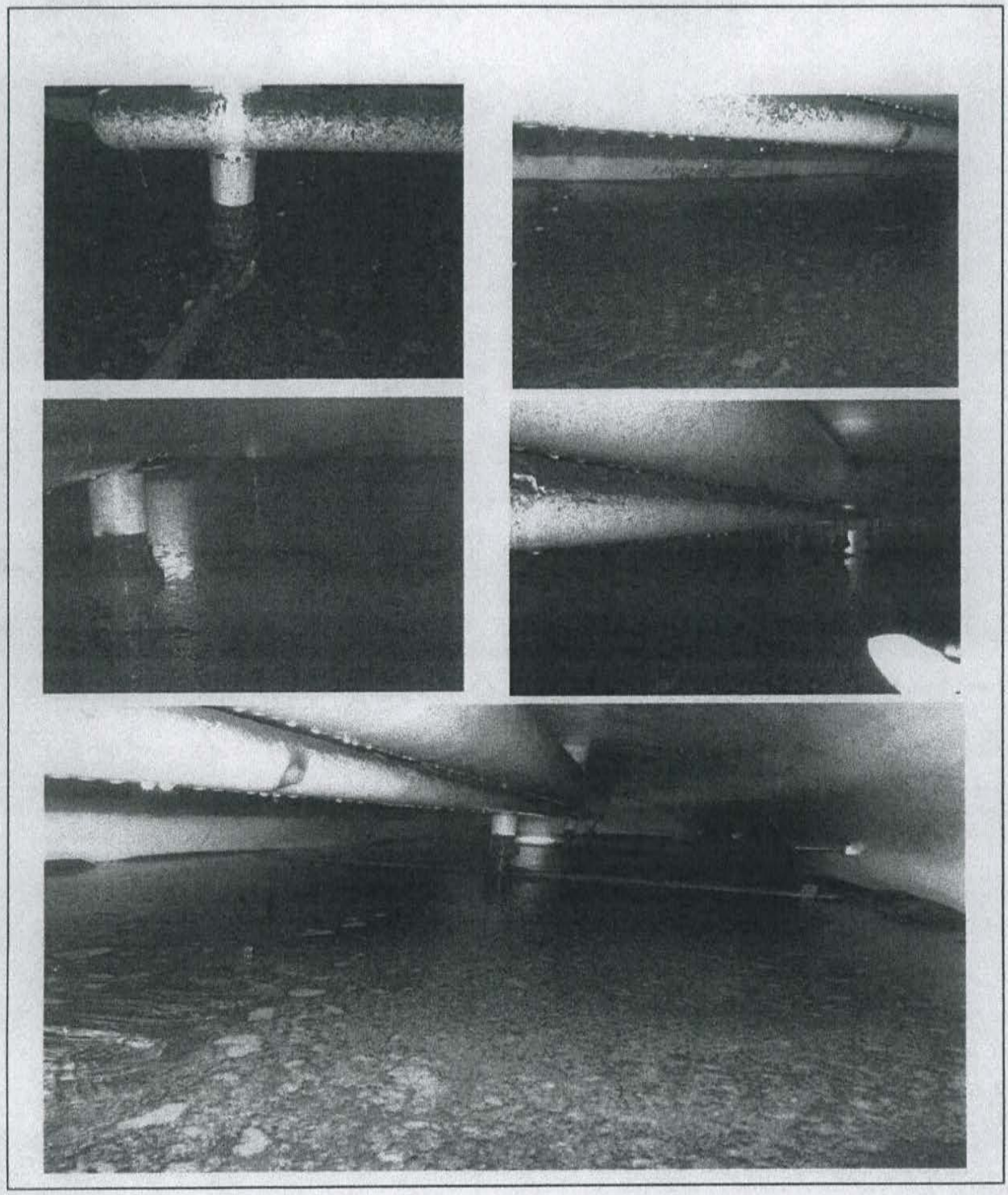
Refer to the zip lock one gallon sample bag marked filter 3

Comments:

Filter media looks clean. Surfaces wash arms are working properly.

Staff added 5 1cf sacks of anthracite coal to filter 3.

Staff added 30 pounds of 68% HTH calcium hypochlorite to filter 3 for a 24 hour shock. treatment



Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VESSEL NUMBER:	4
DATE OF INSPECTION:	4/9/2014
DATE LAST INSPECTED:	1/1/2013
INSPECTOR:	AE/JC/KD

OPERATIONAL DATA:

Clean Bed Headloss	
Headloss before backwash	3
Backwash Flow rate:	5.5

INSPECTION NOTES:

	Year		Loss	
Media Surface Elevation:	1	2	-1	(Inches)
(Inches below surface wash arm center)				

	YES	NO
Surface was arm free rotation?	☑	☐

	YES	NO
Surface wash arm nozzles all in place?	☑	☐

Interior paint integrity:	Good
Filter Media Surface Appearance:	Clean
Filter Media Particle Appearance:	Clean

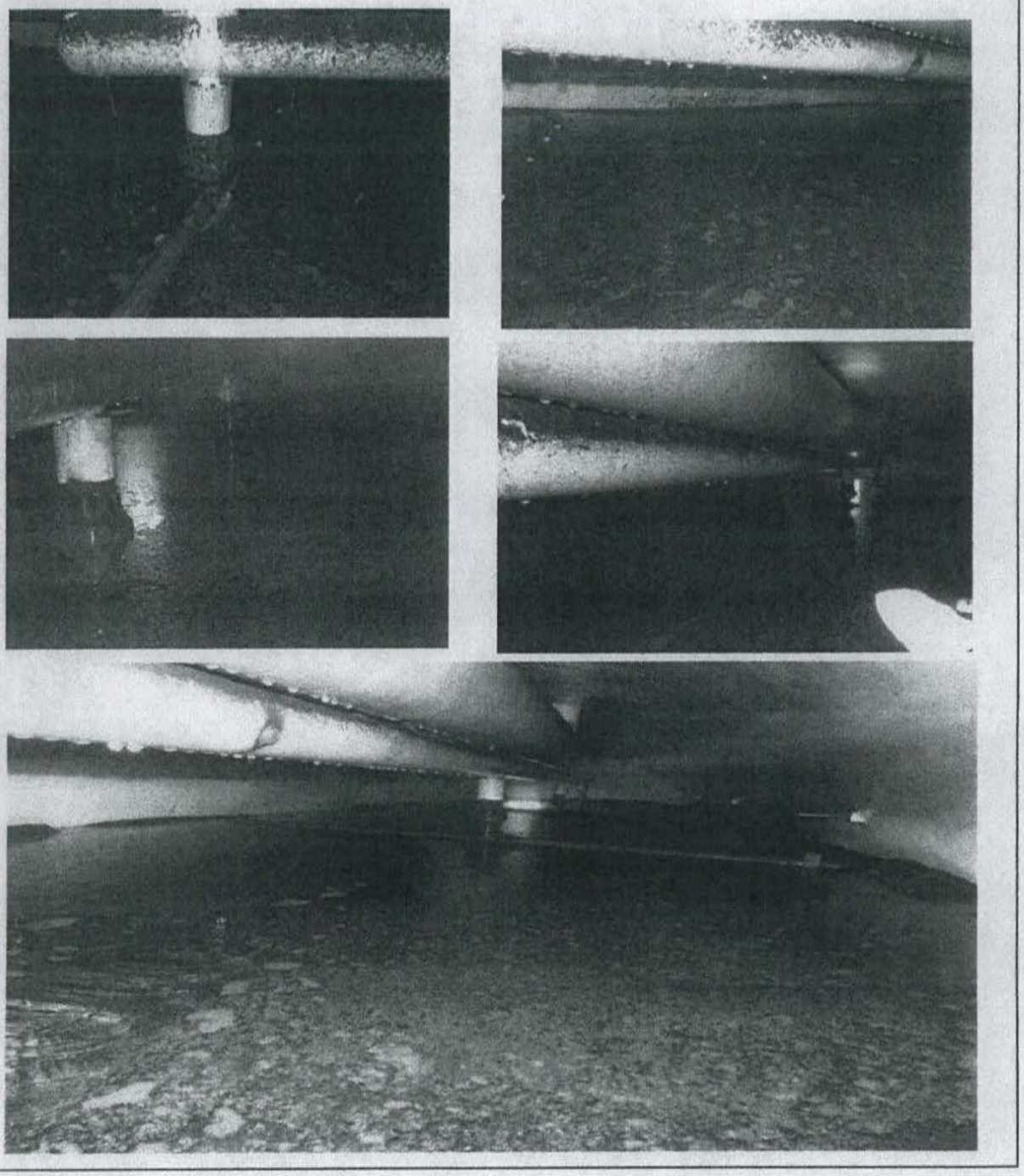
Refer to the zip lock one gallon sample bag marked filter 4

Comments: Surface wash cla-valve needs general maintenance.

Filter media looks clean. Surfaces wash arms are working properly.

Staff added 4 1cf sacks of anthracite coal to filter 3.

Staff added 30 pounds of 68% HTH calcium hypochlorite to filter 4 for a 24 hour shock. treatment



Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VESSEL NUMBER:	5
DATE OF INSPECTION:	4/10/2014
DATE LAST INSPECTED:	1/1/2013
INSPECTOR:	AE/JC/KD

OPERATIONAL DATA:

Clean Bed Headloss	
Headloss before backwash	5.49
Backwash Flow rate:	5.5

INSPECTION NOTES:

	Year		Loss	
Media Surface Elevation: (Inches below surface wash arm center)	1	1.5	-0.5	(Inches)

	YES	NO
Surface was arm free rotartion?	☑	☐

	YES	NO
Surface wash arm nozzles all in place?	☑	☐

Interior paint integrity:	Good
Filter Media Surface Appearance:	Good
Filter Media Particle Appearance:	Good

Comments:

23 sacks of anthrcite coal media is needed for each inch within our pressure filters. Anthrcite is usually considered to be the highest grade of coal and is actually considered to be metamorphic. Compared to other coals it is much harder, has a glassy luster, and is denser and blacker with few impurities. It is largely used for heating domestically as it burns with little smoke.

Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VE 6
DATE OF I 4/10/2014
DATE LAS 1/1/2013
INSPECTC AE/JC/KD

OPERATIONAL DATA:

Clean Bed Headloss
Headloss t 5.49
Backwash 5.5

INSPECTION NOTES:

Year			Loss
Media Surf	2	2.5	-0.5 (Inches)

(Inches below surface wash arm center)

YES NO
Surface was arm free rotartion?

YES NO
Surface wash arm nozzles all in place?

Interior pai Good

Filter Medi Good

Filter Medi Good

Comments:
23 sacks of anthrcite coal media is needed for each inch within our pressure filters. Anthrcite is usually considered to be the highest grade of coal and is actually considered to be metamorphic. Compared to other coals it is much harder, has a glassy luster, and is denser and blacker with few impurities. It is largely used for heating domestically as it burns with little smoke.

CALAVERAS PUBLIC UTILITY DISTRICT

506 W. St. Charles Street
P.O. Box 666
SAN ANDREAS, CALIFORNIA 95249
TELEPHONE: 209-754-9442 FAX: 209-754-9432

December 4, 2013

To: Dave Remmick

From: Donna Leatherman, District Manager

Re: Treatment Plant

Good afternoon Dave:

The district is presently having issues at our treatment plant with high tribubuity perhaps caused by the start of pumps from the Mokelumne River. A new development is the effluent control valve is presently giving problems and in needs repair.

With regards to the high tribuidity we have address this issue by doing some poly adjustments. We had NTU technology complete jar testing of other poly's that may work better with our current situation. NTU recommended that we use the 914. We did a test run of the 914 and this product reacted well and dropped the NTU's to a more comfortable level.

As for the effluent control valve, the bypass butterfly valve is broken, and has a continuous flow of approximately 850 gpm. We have contacted TelStar and indicated that we need to repair ASAP presently working on a technician to evaluate in order to determine length of repairs to the TP and how to respond to the situation.

As for the Treatment plant we are processing water daily and turning the plant off in the evening to avoid any other issues.

We are presently producing _____GPD.
The finished water residual rate is 1.18

Dec. 4, 2013

TP Technique

- Cl2 Feed not on

- Effluent Controll Valve -

850 gpm

Filter - Water Below .1 NTU

no Cl2 Rest to Clearwell

plant off

no treatment or Cl2

or

is it acceptable

Leaving 1.35.

Finish 1.31 -

Manual Operation

JC -

Remotely / Manually

NTU - Turbidmeter Runtime

Alison - NTU - Poly Delivery Tue. 12/10 to TP

Pricing

James - Bro in Law - Scott Leland

Jar Test Dosage

Topic: Jar Testing

Tuesday, December 03, 2013

Objective:

Performing a jar test with three different types of polymer coagulant

- Polymer 9825 is the current polymer we used for a period of seven years Propac ~~8925~~ 9825 has a specific gravity of 1.2
- Polymer 914 has a specific gravity of 1.3 and has never been used by CPUD
- Polymer 908 Has not been used by the water district and will be used on a trial bases

Polymer 9825 filtered the best on a coagulant solution filter test although each polymer will have different results in the performance test, Freddy recommended we add the 5 gallons of either polymer 914 or 908 to the 100 gallon bin with 15 gallons of polymer 9825 for a total of 20 gallons, each trial should last around two weeks

Freddy Vaziri from NTU Technologies will provide MSDS for the polymer listed above through e-mail

athoux Raw -
River -

How is Poly injected to raw water

#2 filter over
Started w/ old poly dropped below 1
new 914 Poly - 2.01 mPL
#2/.056
Flow Controller - working ok still issue to be resolve
Clearwell overfill to River or Ponds?

Jar Test Dosage

1. This is how to perform a 2mg/L jar test with Propac 9825 polymer
2. Item you will need are
    a. Three 250ml beakers
    b. Three 1ml syringes
    c. Three magnetic battery or electric stirrers
    d. Three 1 liter or 1000ml beakers
    e. Three 3ml syringes
3. Place the 250 glass beakers on the stirrers
4. Fill the 250ml glass beakers with distilled water to the 250 ml mark
5. Add a magnetic stirring device inside the 250 ml beaker
6. Turn on the magnetic rotating control nob till a downward vortex whirlpool is created about 75% of the glass beaker
7. Add 0.02ml of polymer solution form the desired coagulant source
8. The specific gravity of Propac 8925 is 1.2
9. Add the 0.02ml syringe dose to the top corner of the whirlpool vortex in the 250ml beaker
10. This will create a 1 PPM or 1mg/L coagulant jar testing solution
11. Let the 250ml solution mix at the current speed for 1 minute
12. Set up three 1000ml or beakers on a stirrer and fill them with 1000ml of the desired raw water
13. Set the stirrer speed on the lowest setting do not create a whirlpool vortex for this portion of the jar test
14. Fill a 3ml syringes to 2.0ml with the 1mg/l coagulant dosing solution that was created in the 250ml beakers
15. When filling the syringes fill and flush the coagulant solution back and forth several times in the 250ml beaker to allow for adequate mixing with-in the syringe
16. Adding a 2.0ml coagulant solution dose to a 1000ml glass beaker is a dose of 2mg/l dosage
17. The polymer dosage spectrum range for the Jeff Davis water treatment pressure filters is 1.88mg/l to 2.90mg/l most of the time the poly dosage is very close to 2.0mg/l

Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VESSEL NUMBER:	1
DATE OF INSPECTION:	2/10/2015
DATE LAST INSPECTED:	2014
INSPECTOR:	AE

Filter 1 video

OPERATIONAL DATA:

Clean Bed Headloss	Yes
Headloss before backwash	4.5
Backwash Flow rate:	5.5

INSPECTION NOTES:

	Year		Loss	
Media Surface Elevation: (Inches below surface wash arm center)	0.5	0.5	0	(Inches)

	YES	NO
Surface was arm free rotartion?	☑	☐
Surface wash arm nozzles all in place?	☑	☐

Insert Photo 2 Here

Interior paint integrity:	Good
Filter Media Surface Appearance:	Good
Filter Media Particle Appearance:	Good

	YES	NO
Confined Space Entry	☑	☐

Comments:

Because the surface washer were Intermittent, as well as a membrane layer of dead algae between the anthracite and sand layer, filter number 1 has restricted flow during production and backwash. Staff was abel to get the surface washer working and will continual to monitor the filter preformance, I recommend we use a root rodder to try to cut up or tangle up the algae membrane on the rooter head this should removal or extraction some of the algae through backwashing.

Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VESSEL NUMBER:	3
DATE OF INSPECTION:	2/10/2015
DATE LAST INSPECTED:	2014
INSPECTOR:	AE

Filter 3 Video

OPERATIONAL DATA:

Clean Bed Headloss	Yes
Headloss before backwash	4.5
Backwash Flow rate:	5.5

INSPECTION NOTES:

	Year		Loss	
Media Surface Elevation: (Inches below surface wash arm center)	1.5	1.5	0	(Inches)

	YES	NO
Surface was arm free rotartion?	☑	☐
Surface wash arm nozzles all in place?	☑	☐

Insert Photo 2 Here

Interior paint integrity:	Good
Filter Media Surface Appearance:	Good
Filter Media Particle Appearance:	Good

	YES	NO
Confined Space Entry	☑	☐

Comments:

Pressure filter #3 was in good shape all the surface washers were working correctly and the media appears to be in good condition we have dosed this pressure filter and will backwash it before bring it back online. Besides add 1 inch of anthracite media to the filter bed no futher maintenance is needed.

Pressure Filter Inspection

A) PRESSURE FILTER INSPECTION LOG

FILTER VESSEL NUMBER:	5
DATE OF INSPECTION:	2/12/2015
DATE LAST INSPECTED:	2014
INSPECTOR:	AE

Filter 5 Video

OPERATIONAL DATA:

Clean Bed Headloss	2.78
Headloss before backwash	3.82
Backwash Flow rate:	5.5

INSPECTION NOTES:

Year	2014	2015	Loss	
Media Surface Elevation: (Inches below surface wash arm center)	1.5	2	-0.5	(Inches)

	YES	NO
Surface was arm free rotartion?	☑	☐
Surface wash arm nozzles all in place?	☑	☐

Insert Photo 2 Here

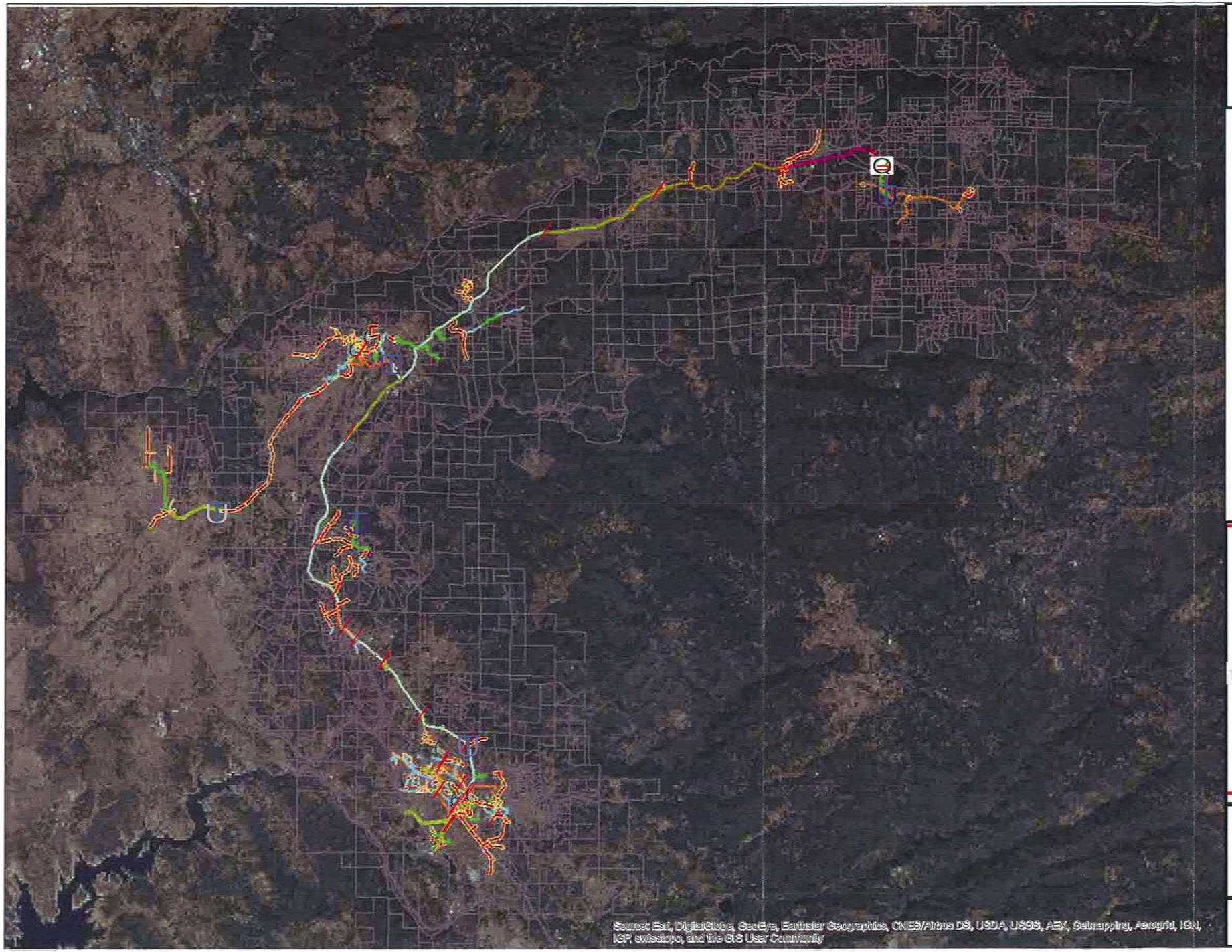
Interior paint integrity:	good
Filter Media Surface Appearance:	good
Filter Media Particle Appearance:	good

	YES	NO
Confined Space Entry	☑	☐

Comments:

Pressure filter number 5 is in good condition he surface washers work with no problem and the media has few small mudballs near the seperation line of the anthracite and sand

APPENDIX E



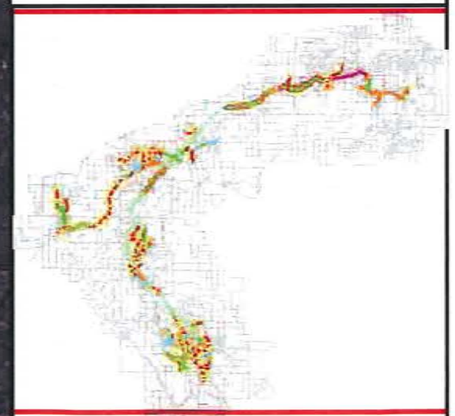
These maps and images are for information purposes only and not for design and construction.

Legend

- Pumps

Label

- Moke Hills Tank
- N. Golden Hill Tank
- Paloma Tank
- Railroad Flat Tank
- San Andreas Tank
- WTP
- PRVs



0 5,000 10,000 20,000

FEET

FORSGREN Associates Inc.

Calaveras Public Utility District
Water System Map