Pacific Gas and Electric Company

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January 29, 2012

Mr. Harold J. Singer
Executive Officer
California Regional Water Quality Control Board
Lahontan Region
2501 Lake Tahoe Boulevard
South Lake Tahoe, California 96150-7704

Re: Feasibility Study Status Report Pursuant to Ordering Paragraph 2.b. of Amended Cleanup and Abatement Order No. R6V-2011-0005A1

Dear Mr. Singer:

Pacific Gas and Electric (PG&E) submits the following report in compliance with Paragraph 2.b. of Amended Cleanup and Abatement Order No. R6V-2011-0005A1 (the "Order"), issued October 11, 2011 for the Hinkley Compressor Station. This letter provides a summary of results through the first 3 months of PG&E's Feasibility Study of methods to provide permanent replacement water supply for all indoor uses for impacted wells within the affected area and provides an update on the alternatives and their viability. Based on the first three months of analysis, PG&E has determined that all of the methods we are currently analyzing remain possible options and we are continuing to conduct the pilot studies and data collection. PG&E's complete analysis of available methods for providing permanent whole house water will be presented in the Feasibility Study report due on April 8, 2012. PG&E will provide a status update to the Hinkley Community Advisory Committee (CAC) during their February 2012 meeting.

PG&E has for many years acknowledged with genuine regret its responsibility for chromium contamination in the Hinkley community. PG&E is committed to working cooperatively with the Lahontan Regional Water Quality Control Board to expeditiously clean up groundwater contamination resulting from PG&E's historical operations at the Hinkley Compressor Station. We share the mutual goal of ensuring safe, reliable drinking water for the residents of Hinkley to ease their concerns for community health and well-being.

PG&E will continue to work diligently to and gather the data required to comply with the Order; however, we have concerns that some of the Order provisions set infeasible technical and timing requirements for bottled water and permanent whole-house replacement water. In addition, as we previously advised you in our comment letter on the draft CAO, PG&E believes that the CAO requirements are not supported by state law and PG&E has serious concerns that the CAO, as written, sets a troubling precedent for determination of replacement water in cases of

groundwater contamination that has implications for water providers and consumers statewide. To that end, PG&E submitted a petition and request for emergency stay to the State Water Resources Control Board (State Board) on October 25, 2011. We received notice on January 20, 2012 from the State Board that they will begin review of our petition and have initiated a 30-day public comment period. . In the meantime, PG&E will continue to honor our commitment to provide safe drinking water to the community through our voluntary bottled water program, and through the feasibility study work described in this summary report. We also continue to carry through on our commitment to support an Independent Review Panel (IRP). As you know, PG&E signed a Memorandum of Agreement with the Community Advisory Committee (CAC) to establish the IRP. The CAC is currently in the process of selecting their technical manager.

Paragraph 2.b. Requirements

Paragraph 2.b. requires that PG&E submit a status report on the progress to prepare a feasibility study to evaluate alternatives and methods to provide a permanent replacement water supply for indoor domestic uses for impacted wells in the affected area, as described in Paragraph 2.c. The status report should include the following items:

- A summary of results through the first three months;
- Any indications that alternatives may or may not be viable.

Feasibility Study Status Update

a. *Identification and Evaluation of Future Water Supply Alternatives*

Based on the available background information and an initial assessment of the existing and projected future water demands, PG&E identified candidate permanent water supply alternatives. The candidate alternatives are based on technologies and strategies used in similar situations where groundwater has been known to contain one or more constituents with concentrations greater than the allowable limits. On September 28, 2011, PG&E presented future water supply opportunities to the Community Advisory Committee and Water Board (Exhibit 1) that considered the following:

- Replacing individual wells with deeper individual wells;
- Hauling water to individual residences, including installing storage tanks at each residence;
- Providing individual whole house water treatment systems;
- Implementing an area wide or community water system by:
    - Tying into an existing system operated by a public or private water purveyor;
    - Installing and operating a new system (either public or private); or

- Developing a system for two or more residences that may involve a regulated water purveyor.

PG&E presented initial advantages and disadvantages of each alternative, including the ability to meet current drinking water standards, water quality implications, and qualitative assessments on the timeframe and cost to implement each permanent replacement water supply method. Since the presentation, PG&E has continued to actively collect and analyze data pertinent to the permanent replacement water supply options, including operation and maintenance requirements, waste generation and disposal practices, implementation timelines, and implementation considerations. A summary table of example advantages and disadvantages of the basic alternatives (there are sub-alternatives of some) are shown below.

Alternative	Advantages	Disadvantages
1. Tie into Golden State Water Company	• Source is public water system with known water quality • Water is treated and monitored for drinking water standards	• Substantial time and cost required to construct transmission line and network of distribution pipelines • Additional water quality monitoring may be required • Long transit may cause water quality deterioration • Loss of independent water supply
2. Central water treatment and distribution	• Water is treated and monitored for drinking water standards • Treatment can be tailored to the water quality of the new wells • New infrastructure for the area • New infrastructure for the community	• Challenge to locate and develop reliable, long-term supply wells • Substantial time and cost required to construct transmission line and network of distribution pipelines • State law requires system to be managed as a formal water utility • Long times for water to travel through parts of the system could affect water quality
3. Whole house water treatment	• Relatively less implementation time and cost • Equipment is typically federal/state certified • Water equipment vendor maintains the equipment • Local control	• Water quality varies well to well • May require multiple treatment stages (pre-filter, core treatment, post-filter) • Some systems can generate waste streams that may need to be disposed to the septic tanks • Must be installed on the property • Requires performance testing • Agencies currently have no basis for certifying performance of the units other than using the 50 ppb state total chromium drinking water standard
4. Deeper wells	• Familiar approach • Maintains existing plumbing • May possibly produce better quality water	• Construction impacts • Groundwater yield (sustainable amount of production) may vary • Experts unsure about yield on west side of project area • May not produce better quality water

5. Trucking water	• Easy to start-up • Obtain high quality water	• Uses large quantities of fuel and generates additional air emissions • Poses traffic, safety and disruption impacts • Requires regular deliveries to homes • Must ensure quality is maintained during delivery • Storage tanks may be needed at houses, or more frequent deliveries may be required

Pending the outcome of pilot testing and other studies/evaluations currently in progress, PG&E will revise the advantages/disadvantages and estimated costs for each alternative and present the findings in the Feasibility Study Report. Because many evaluations are still in progress, PG&E has not ruled out any of the permanent replacement water supply alternatives.

PG&E acknowledges that each alternative has certain strengths and weaknesses. Throughout the course of its evaluation, PG&E has been working to develop each alternative in such a way as to minimize environmental impacts and public health and safety risks to the residents that will receive the permanent whole house water service.

b. Whole House Water Treatment Pilot Testing

Whole house water treatment was identified as one of the permanent replacement water supply alternatives. PG&E has contacted more than two dozen vendors of the whole house water treatment systems. Only a few of the vendors claimed to have treatment systems that were capable of removing hexavalent chromium to the low concentrations (0.02 parts per billion (ppb) Cr-6, with non-detect at 0.06 ppb defined as compliant) for the whole house water supply. PG&E selected three whole house water treatment systems for pilot testing.

PG&E developed a pilot-scale test plan designed to collect additional data needed to select a permanent replacement water supply, which was submitted to the Water Board for review and comments on September 27, 2011 (Exhibit 2). A summary of the testing plan was presented to the CAC and Water Board on November 2, 2011 (Exhibit 3). The pilot test objectives include the following:

- Assess the ability of whole house treatment systems to safely, effectively, and reliably remove hexavalent chromium from groundwater to very low concentrations;
- Assess the operability and durability of these systems to perform under extreme conditions. As each installation would be unique, heat, pressure, and water demand will vary from house to house;
- Identify any potential secondary water quality issues associated with leaching of by-products or other materials from the treatment systems, which may affect the treated water quality;

- Confirm the design and operating criteria for the treatment systems, including quantities and qualities of wastes that would be generated and require proper disposal.

The pilot test was initiated in early November, 2011. The Water Board provided comments on the pilot test in a letter dated December 16, 2011. Because the pilot study was already well underway, it was not possible to address all of the comments received within the context and schedule of the current study. PG&E is preparing a formal response to the Water Board's comments which will be submitted within the next two weeks.

Pilot Study Results

To date, the pilot systems have been operating for over two months. During this time, PG&E has been collecting water quality and performance information. Our ranking of overall system performance and preference will be based on a consideration of removal effectiveness and other criteria such as operations and maintenance, ability to consistently meet primary and secondary standards as stated in the Order, waste handling and disposal, system reliability, and annualized system cost. PG&E is continuing to evaluate and optimize the operation of the whole house treatment systems. Pilot testing is scheduled to be completed in February 2012. PG&E will complete its final analysis and summarize its results in the Feasibility Study.

c. *Issues That May Affect the Viability of Alternatives*

As required by the Order, PG&E has identified some conditions that may affect the viability of certain permanent replacement water supply alternatives. While PG&E has not ruled out any alternative, the following conditions may ultimately affect which alternatives are selected for implementation:

- The performance of treatment technologies is highly dependent on the source water quality. Water quality varies significantly across the area, and includes exceedances of California primary and secondary standards unrelated to PG&E's operations. This may affect treatment efficiency, waste generation handling requirements, cost and implementation schedule (e.g., domestic well monitoring may be required to establish specific treatment criteria).
- None of the whole house treatment technologies are currently certified by the California Department of Public Health (CDPH) for treatment to Order-specified levels for hexavalent chromium. Furthermore, other than the existing chromium drinking water standard (maximum contaminant level) of 50 ppb for total chromium, CDPH has no basis for such certification. Use of these technologies may require special permission from CDPH. While we are hopeful that such permission is obtainable, we cannot be certain, nor can we guarantee, timeframes.

- Special-status species (e.g., desert tortoise, Mohave ground squirrel, burrowing owl) habitat in the region may significantly constrain routing of pipelines and schedules for construction if a centralized distribution system alternative is constructed.
- If a reverse osmosis technology is employed, brine volume generation and disposal may require unacceptably high truck hauling frequencies.
- Additional hydrogeologic studies may be necessary to confirm uncertainties with respect to water yield and water quality of new deeper replacement water supply wells.

d. Next Steps

PG&E continues to analyze alternatives for providing permanent replacement water and to evaluate the results of the pilot study. An update will be given to the CAC at their February meeting. PG&E will submit the Feasibility Study Report on April 8, 2012. The report will include recommendations for permanent replacement water supply for the impacted wells in the affected area. In addition to these recommendations, PG&E will also address key steps, including community acceptance, needed to implement the recommended permanent replacement water supply alternative.

I hereby certify that I have examined this report, and based on my examination and my inquiries of those individuals who assisted in the preparation of the report, I believe the report to be true, complete and accurate.

Please do not hesitate to contact me if you have any questions regarding this report, or if you need additional information.

Sincerely,

Robert C. Doss

Enclosures:

Exhibit 1: Presentation to the Community Advisory Committee Regarding Permanent Water Supply Conceptual Level Assessment (presented September 28, 2011)
Exhibit 2: Pilot-Scale Test Plan (submitted September 27, 2011)
Exhibit 3: Presentation to the Community Advisory Committee Regarding Testing of Whole House Treatment Technologies (presented November 2, 2011)

Exhibit 1

Presentation to the Community
Advisory Committee Regarding
Permanent Water Supply
Conceptual Level Assessment

Fresh Water Supply Alternatives and Technologies

Community Advisory Committee Meeting

September 28, 2011
Hinkley, California

PG&E

MALCOLM PIRNIE ARCADIS

ARCADIS & Malcolm Pirnie

- Malcolm Pirnie's Water Division is a subsidiary of ARCADIS, a global science and engineering consulting firm working in more than 100 countries
- Over 100 years experience designing, building and managing water treatment and water supply systems
- Broad experience at all scales of water supply applications, from rural systems to municipal and regional networks

MALCOLM PIRNIE ARCADIS

Basic Fresh Water Supply Alternatives

1) Tie into Golden State Water Company
2) Central water treatment and distribution
3) Whole house water treatment
4) Add option of deeper wells
5) Trucking water

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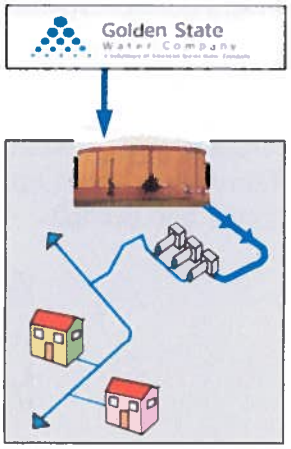
Option 1
Tie into Golden State Water Company (GSWC)

- GSWC supplies potable water to Barstow
- Water is treated and meets current drinking water standards
- Build a 12-mile pipeline to carry water from Barstow to Hinkley
- Store and distribute water using a network of pipelines, tanks and pumps



ARCADIS

Option 1
Tie into Golden State Water Company

ADVANTAGES

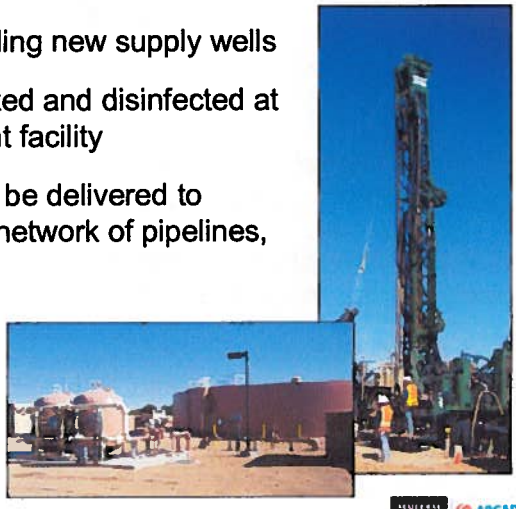
- Source is public water system with known water quality
- Water is treated and monitored for drinking water standards

DISADVANTAGES

- Substantial time and cost required to construct transmission line and network of distribution pipelines
- Additional water quality monitoring may be required
- Long transit may cause water quality deterioration
- Loss of independent water supply

Option 2
Central Treatment and Distribution

- Would require drilling new supply wells
- Water will be treated and disinfected at a central treatment facility
- Treated water will be delivered to homes through a network of pipelines, tanks and pumps



Option 2
Central Treatment and Distribution

ADVANTAGES

- Water is treated and monitored for drinking water standards
- Treatment can be tailored to the water quality of the new wells
- New infrastructure for the area
- New infrastructure for the community

DISADVANTAGES

- Challenge to locate and develop reliable, long-term supply wells
- Substantial time and cost required to construct transmission line and network of distribution pipelines
- State law requires system to be managed as a formal water utility

Option 3
Whole House Water Treatment

- Treat and disinfect water entering the homes
- Treatment would include ion exchange media or reverse osmosis (RO) filters that are placed outside the homes and connect to the existing supply lines
- Equipment provider would conduct the necessary monitoring and maintenance

Option 3
Whole House Water Treatment

ADVANTAGES

- Relatively less implementation time and cost
- Equipment Federal/State certified
- Water equipment vendor maintains the equipment
- Local control

DISADVANTAGES

- Water quality varies well to well
- May require multiple treatment stages (pre-filter, core treatment, post-filter)
- Some systems can generate waste streams that may need to be disposed to the septic tanks
- Must be installed on the property
- Requires performance testing

Option 3
Whole House Water Treatment

Next steps to pilot test equipment:

- Evaluate range of options for whole house water treatment
- Select candidate systems for pilot testing
- Pilot testing to begin in November 2011

Option 4
Deeper wells

ADVANTAGES

- Familiar approach
- Maintain existing plumbing
- May produce better quality?

DISADVANTAGES

- Construction impacts
- Groundwater is in an "over draft" condition in many parts of the Mojave Basin
- Experts unsure about yield on west side
- May not produce better quality?

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Option 5
Trucking of Water

ADVANTAGES

- Easy to start-up
- Obtain high quality water

DISADVANTAGES

- Uses lots of gas
- Traffic impacts
- Regular deliveries
- Must insure quality is maintained during delivery
- Tanks needed at houses or more frequent deliveries

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Next Steps in Evaluation Process

- Gather stakeholder views
- Continue evaluation of options
- Coordinate with Regional Water Quality Control Board
- Coordinate with California Department of Public Health
- Conduct pilot testing of treatment devices
- Refine construction and time estimates

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Exhibit 2

Pilot-Scale Test Plan

ARCADIS

ARCADIS U.S., Inc.
1410 Rocky Ridge Drive
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Roseville
California 95661
Tel 916 786 0320
Fax 916 786 0366

MEMO

To:
Lauri Kemper, Assistant Executive Officer
California Regional Water Quality Control Board
Lahontan Region

Copies:
Kevin Sullivan
Jeff McCarthy
Drew Page
Bob Doss
Edward Means
Jennifer Beatty

From:
Sunil Kommineni
Bhavana Karnik

Date:
September 27, 2011

ARCADIS Project No.:
RC000699.0074

Subject:
Pilot Testing of Whole House Water Treatment Systems
PG&E Hinkley Compressor Station, Hinkley, California

1. Introduction

This plan describes proposed procedures to evaluate the feasability of using commercially available whole house treatment systems for chromium removal in Hinkley, California. This test is necessary as there is very little data available on the ability and efficiency of these systems to remove levels of chromium in the range of less than 10 micrograms per liter (µg/L).

Based on literature review, desktop assessment, and discussions with several vendors on product availability and applicability, ARCADIS has recommended pilot testing three systems: one ion exchange (IX), one reverse osmosis (RO) and one hybrid RO – IX. Pilot testing of these systems will be conducted for a period of up to three months at a location near the Hinkley Compressor Station. Three months of pilot testing will allow obtaining critical performance information such as run times or run lengths for breakthrough of Cr(VI) for IX systems. Pilot testing will be performed using water from one of the active Gorman wells (Gorman 1R) and the systems will be designed to treat 1-10 gallons per minute (gpm), indicative of a whole house treatment system.

The California Department of Public Health (CDPH), Title 22 requirements do not apply to private wells with no interconnects. The CDPH requirements are only applicable for systems that supply water to more than 15 connections with a central treatment and

distribution system or for interconnects among the private wells. The CDPH compliance requirements for whole house treatment systems are listed under Title 22, Division 4, Chapter 15, Article 2.5, Section 64417. According to CDPH, the equipment used in the pilot study will have to conform to the American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and chemicals have to be ANSI/NSF Standard 60 certified for potable water use. In addition, CDPH requires that the RO systems used for whole house treatments have Standard 58 device certification and ion exchange systems have Standard 53 certification prior to residential installations. ARCADIS has requested the whole house equipment vendors to acquire and provide these certifications prior to residential installation.

1.1. Testing Objectives

The pilot testing objectives include the following:

- Assess the ability of whole house treatment systems to safely, effectively, and reliably remove Cr(VI) from groundwater to very low concentrations.
- Assess the operability and durability of these systems to perform under extreme conditions. As each installation would be unique, heat, pressure, and water demand will vary from house to house.
- Identify any potential secondary water quality issues associated with leaching of by-products or other materials from the treatment systems, which may affect the treated water quality.
- Confirm the design and operating criteria for the treatment systems and their disposal options, including quantities and qualities of residuals that would be generated and their ulitmate disposal options.

1.2. Source Water Quality

Table 1 summarizes the water quality results for the Gorman 1R test well from a grab sample collected in August 2011. In addition to the general water quality parameters, known parameters that may impact the IX and RO performance were analyzed. Silica, phosphate, nitrate and sulfate are some of the known parameters that impact the IX performance by competing with contaminants on the ion exchange media. Similarly, key parameters that impact RO performance include hardness, total dissolved solids (TDS), chloride, and metals (e,g., aluminum, barium, boron, iron, manganese, silica, and strontium). Gorman 1R well water can be categorized as groundwater containing high nitrate, sulfate, TDS, radionuclides (uranium) and metals. The sulfate and nitrate will impact the run lengths for breakthrough for IX systems. The high concentrations of

calcium, barium, strontium and silica impact the RO performance by fouling the membranes and limiting the membranes recoveries (product water to feed water ratio). Total chromium and Cr(VI) concentrations from the sampled well were 3.5 µg/L and 4.2 µg/L, respectively. Water quality data indicates exceedances of current maximum contaminant level (MCL) for uranium and gross alpha activity. Results also indicate exceedances of aesthetic goals or secondary MCLs for TDS, chloride and sulfate.

In preliminary discussions with the Water Board staff, there was interest expressed in locating the pilot test on another supply well. The concern expressed was that the use of the lower-quality Gorman 1R well might produce results that underestimate the performance of the treatment system(s). ARCADIS understands this concern,and reviewed the water quality of the wells along the Sommerset and Thompson Road. The TDS concentrations in the monitoring wells along the Sommerset and Thompson Road varied between 1,100-2,000 milligrams per liter (mg/L). The TDS concentration in the Gorman 1R well is 1,900 mg/L which is within the range of TDS observed in the wells along Sommerset and Thompson. The whole house treatment systems should be able to handle variability in water quality including TDS.

2. Pilot System Description

This section provides a description of the proposed pilot units.

2.1. Test Site Overview

Pilot testing will be conducted near the Hinkley Compressor Station using water from the Gorman 1R well, currently used for agricultural irrigation. While actual ground water quality for a given domestic well in the Town of Hinkley may vary, the Gorman 1R was selected based on its challenging water chemistry, respresentative of a "worst case scenario". The Gorman 1R well is currently pumped at 50 gallons per minute (gpm) at a pressure of 60-100 pounds per square inch (psi). Figure 1 illustrates the current piping configuration of Gorman 1R well.

During pilot study, the influent and effluent streams will be monitored for key water quality parameters to determine the performance of each whole house treatment system. Following sampling, the treated water and brine streams from the pilot units will be collected, blended, monitored and disposed. Because the treated and brine streams will be combined, the blended stream will have similar water quality to the water initially pumped from the well. Figure 2 provides an overview of the pilot facility connections for the three pilot systems.

2.2. Envirogen Anionic Exchange System

Envirogen Technologies, Inc. (Envirogen) will provide the IX treatment system (Model # A-0142, utilizing FlexSorb^{TM}) for pilot testing. The proposed Envirogen unit is an IX system configured in a lead-lag setup, capable of treating a flow up to 8 gpm. The system will have a pre-filter prior to the unit for any particulate removal. The selected resin, SBG1 manufactured by Resintech, Inc., is a high capacity, shock resistant, gel, Type 1, strongly base anion exchange resin supplied in the chloride or hydroxide form. Exhausted resin will be returned to Envirogen for appropriate analysis and disposal. Resintech SBG1 is NSF/ANSI 61 certified. Envirogen's system is constructed with NSF 61 certified materials. Envirogen has to apply for the CDPH device certification using the information collected from the pilot study. Attachment A has additional details of the Envirogen whole house water treatment system.

2.3. Kinetico Reverse Osmosis System

Kinetico Water Systems (Kinetico) will provide a two-pass RO system for pilot testing. A carbon pre-filter and softener will be installed prior to the RO to remove particulate matter and calcium, respectively. Water from the softener will pass through the first pass RO. Permeate from the first pass will be collected and pumped through a second pass RO. Kinetico's Mach 2060 S and Dechlorinator 1060 are NSF 61 certified. Kinetico's commercial grade RO system TX 1440 does not have NSF 61 certification. Kinetico will have to apply for the CDPH device certification and possibly use the information collected from this pilot study for the application. Attachment A provides system details for the Kinetico's whole house water treatment system.

2.4. Purolite/ACWA Hybrid System

Purolite, Inc. and ACWA Clear, LLC will provide a hybrid RO – IX system for pilot testing in a lead-lag configuration. A pre-filter will be installed to remove particulate matter prior to RO – IX treatment. The RO unit will be single pass RO (L-84A); the IX system will use Purolite's A600E/9149 (A600 HC) resin. A600 HC is a clear gel Type 1 strong base anion exchange resin with high operating capacity supplied in the chloride form as spherical beads. The exhausted resin will be returned to Purolite/ACWA for appropriate testing and disposal. Purolite's A600E/9149 resin is NSF/ANSI 61 certified. ACWA's proposed whole house treatment system is NSF 61 certified. Purolite/ACWA will have to apply for the CDPH device certification and possibly use the test results from this study for the application. Attachment A provides system details for the Purolite/ACWA's whole house water treatment system.

3. Pilot Test Program

The three whole house water treatment systems will be tested over a period of three months (see Table 2 for detailed schedule). PG&E may extend the pilot testing of one or more units beyond three months if deemed necessary to evaluate the performance of the treatment systems for same, similar or different source waters or if required to satisfy any additional requirements of CDPH or Regional Water Quality Control Board.

This section provides details of the proposed pilot test program.

3.1. Sampling and Monitoring Plan

The water quality monitoring parameters to track the treatment systems performance are shown in Table 3. Supplies needed to conduct the field monitoring, including names of suppliers and catalog numbers are summarized in Table 4. ARCADIS field technicians will be responsible for procuring the necessary supplies for testing and conducting the field monitoring. ARCADIS field technicians will also collect, prepare chain of custodies, and send laboratory samples for analysis to the Underwriters Laboratory (Southbend, IN) .

Figure 3 shows sampling and monitoring locations for the pilot study. Table 5 provides sampling and monitoring plan for the raw water and the blended water (prior to disposal). Table 6 provides the sampling and monitoring plan for the Envirogen's whole house water treatment system. Table 7 provides the sampling and monitoring plan for the Kinetico's whole house water treatment system. Table 8 provides the sampling and monitoring plan for the Purolite/ ACWA's whole house water treatment system.

Critical water quality parameters for ion exchange systems that will be measured include Cr(VI), total chromium, nitrate, sulfate, silicate, phosphate, uranium, and pH. Other chemical and physical parameters, including temperature, conductivity, turbidity, and alkalinity will be routinely measured to fully characterize water quality and evaluate system performance. Nitrosamines (including N-ntirosodimethylamine (NDMA)) and formaldehyde, which have been found to leach from ion exchange resins, will also be measured during startup (after 4 and 24 hours) and at midpoint through operation to assess any leaching that may occur. In addition, a broad scan for tentatively identified compounds (TICs) for both volatile organic compounds (VOCs) and synthetic volatile organic compounds (SVOCs) will be conducted initially and at midpoint through operation to ensure that IX treatment does not introduce any additional contaminants of concern. Besides chemical and physical water quality analyses, operating parameters

will be recorded to monitor operating conditions for the ion exchange systems. Monitored operating parameters include flow rate, empty bed contact time (EBCT), and breakthrough bed volumes.

Critical water quality parameters for RO systems that will be measured include Cr(VI), total chromium, alkalinity, total hardness, total organic carbon (TOC), total dissolved solids (TDS), total suspended solids (TSS), chloride, radionuclides and select metals. Other chemical and physical parameters, including permeate and brine flow, feed pressure, concentrate pressure and permeate pressure, temperature, conductivity and pH will be routinely measured to fully characterize water quality and evaluate system performance.

3.1.1. Additional Monitoring

RO Brine

One round of special monitoring will be conducted for the RO brine streams. The water quality information from special monitoring will facilitate brine disposal evaluation. Table 9 lists the laboratory parameters that will be monitored during special monitoring of RO brine.

Spent Ion Exchange Resin

The spent ion exchange resins will be analyzed for leachates using the toxicity characteristic leaching procedure (TCLP) and California Waste Extraction Test (CWET). Additional tests will also be conducted for radionuclides and uranium. Spent resin will be classified as a regulated radioactive waste if the uranium concentration exceeds 0.05 percent by weight. The results of the spent resin tests will assist in the evaluation of alternatives for waste handling and disposal.

3.2. Data Analysis

3.2.1. Data Collection

All the data field and laboratory data will be collected in accordance with the plan described in this document. Operational logs will be maintained during testing to track system operation. The operational logs will include any data collected during the bi-weekly field monitoring and any changes in operating parameters, as well as documentation of any significant events or shutdowns.

3.2.2. Data Processing

Data collected from the field and laboratory monitoring will be processed and reviewed on a weekly basis. Senior technical experts from the project team will review the data for quality assurance/quality control (QA/QC) purposes. This information will be transcribed into an electronic database. The data will be summarized in tables and graphs and presented in a final report.

3.2.3. Quality Assurance/Quality Control (QA/QC)

Cr(VI) and total Cr will be analyzed using ion chromatography (EPA Method 218.6) and ICP-MS methods (EPA Method 200.8), respectively, by an Environmental Laboratory Accreditation Program (ELAP)-certified laboratory. For Cr(VI), the method detection limit (MDL) is 0.020 µg/L and the method reporting limit (MRL) is 0.05 µg/L. The total Cr MRL should be 1 µg/L or lower.

All field and laboratory parameters will be analyzed using approved methods. All field and process equipment will be calibrated in accordance with manufacturer specifications for each instrument. Certified standard solutions and QA/QC procedures will be used to test the functionality and accuracy of each instrument within the range of measurements and a frequency specified by the manufacturer, or at least once per month. Process equipment, such as pumps and flow meters, will be calibrated by the equipment vendors before the pilot units are brought online to avoid disturbing the operation of the units during the test period unless unexpected results warrant recalibration.

3.3. Pilot Report

The information collected during the pilot study will be documented by ARCADIS in a draft pilot report submitted to PG&E. Comments will be incorporated into the draft and a final report prepared for submittal to the California Regional Water Quality Control Board.

Attachments

A.	Cutsheets and Layout for Whole House WaterTreatment Systems
B.	NSF Certificates for Whole House Water Treatment Systems

Tables

1	Gorman 1R Well Water Quality (August 2011)
2	Pilot Test Schedule
3	Field and Laboratory Water Quality Monitoring Parameters
4	Field Monitoring Instruments and Test Kits
5	Sampling and Monitoring Plan for Raw Water and Blended Water
6	Sampling and Monitoring Plan for Envirogen's Whole House Water Treatment System
7	Sampling and Monitoring Plan for Kinetico's Whole House Water Treatment System
8	Sampling and Monitoring Plan for Purolite/ACWA's Whole House Water Treatment System
9	RO Comprehensive Brine Water Quality Monitoring Plan

Figures

1	Gorman 1R Well Connection to Connection Details
2	Pilot System Schematic
3	Pilot Sampling and Monitoring Locations

Tables

ARCADIS

Lauri Kemper
September 27, 2011

Table 1 Gorman 1R Well Water Quality (August 2011)

Parameters	Unit	Result	MCL/ SMCL[1]
General			
Alkalinity, Total	mg/L as $CaCO_3$	161	-
Color	Pt/Co units	5	15[2]
Hardness, Total	mg/L as $CaCO_3$	1,100	-
Specific Conductance	µS/cm	3,100	900[2]
pH	pH units	7.4	7.4
Total Dissolved Solids (TDS)	mg/L	1,900	500[2]
Total Suspended Solids (TSS)	mg/L	10	-
Total Organic Carbon (TOC)	mg/L	1.39	-
Turbidity	NTU	1.00	1
Total Ammonia -N	mg/L	0.10	-
Anions			
Chloride	mg/L	520	250[2]
Fluoride	mg/L	0.2	2.0
Nitrate-N	mg/L	8.4	10
Nitrite-N	mg/L	< 0.01	1
Sulfate	mg/L	450	250[2]
Metals – Total			
Aluminum	µg/L	2	1,000
Barium	µg/L	72	1,000
Boron	µg/L	340	-
Calcium	mg/L	340	-
Chromium	µg/L	3.50	50
Copper	µg/L	1.40	1,300[3]
Iron	mg/L	0.02	0.3[2]
Lead	µg/L	1.00	15[3]
Magnesium	mg/L	56	-
Manganese	µg/L	2	0.5[2]
Nickel	µg/L	5.2	100
Potassium	mg/L	5.2	-
Silica, Total	mg/L	29	-
Sodium	mg/L	160	-

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Parameters	Unit	Result	MCL/ SMCL[1]
Strontium	µg/L	3,800	-
Uranium	µg/L	46	30
Zinc	µg/L	88	5,000
Radionuclides			
Gross Alpha	pCi/L	43.6 +/- 3.2	15
Gross Beta	pCi/L	9.4 +/- 1.1	4
Radium-226	pCi/L	0.84 +/- 0.52	combined < 5pCi/L
Radium-228	pCi/L	0.64 +/- 0.53	
Radon-222	pCi/L	372 +/- 22	-
Additional			
Phosphorus, Total as P	mg/L	< 0.05	-
Cyanide, Total	mg/L	0.02	0.15
Hexavalent Chromium	µg/L	4.20	0.02[4]
Mercury	µg/L	0.1	0.002
Perchlorate	µg/L	0.76	6
Arsenic, Total	µg/L	2	6
Arsenic, Dissolved	µg/L	2	-
Atrazine	µg/L	0.1	1
Simazine	µg/L	0.07	4

Notes:

1. MCLs and SMCLs are from CDPH's Titles 17 and 22 California Code of Regulations for Drinking Water.
2. SMCL for the listed contaminant.
3. Action Level.
4. CDPH's Public Health Goal.

Table 2 Pilot Test Schedule

Tasks	Anticipated Timelines
Pilot Test Plan Preparation	Weeks of September 12, 2011 – September 19, 2011
Pilot Unit Fabrication	Weeks of September 19, 2011 – October 17, 2011
Pilot Unit Delivery and Setup	Weeks of October 24, 2011 – October 31, 2011
Pilot System Startup, Leak Testing and Troubleshooting	Week of October 31, 2011
Conduct Pilot Testing	November 4, 2011 – February 4, 2012 (3 months)
Receive Final Laboratory Results	Week of February 13, 2012
Submit Pilot Test Draft Report	Week of March 12, 2012

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Table 3 Field and Laboratory Water Quality Monitoring Parameters

Field Parameters	Laboratory Parameters
• Alkalinity • Total Hardness • Conductivity • Chlorine • pH • Temperature • Turbidity	• Aluminum • Barium • Boron • Chloride • Chromium (Total) • Copper • Hexavalent Chromium • Iron • Manganese • Nitrate • Nitrosamines • Strontium • Silicate • Sulfate • Total Dissolved Solids (TDS) • Total Organic Carbon (TOC) • Total Suspended Solids (TSS) • Total Phosphate • Turbidity • Uranium • BNA SVOCs • VOCs and TICS • Aldehydes / Ketones

Notes:

BNA SVOC = base, neutral, acid semi-volatile organic compounds including phenol and tentatively identified compounds (TICs)

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Table 4 Field Monitoring Instruments and Test Kits

Item	Test Kit/Reagent	Catalog Number
pH, Temperature, Conductivity and TDS		
1	Myron L Company, Ultrameter II	6PIISI
Chlorine		
2	Hach DR-890	4847000
3	Hach DPD Free Chlorine Reagent	2105569
Alkalinity and Total Hardness		
4	Hach AL-DT Digital Titrator	2063700
5	Hach Hardness Reagent Set	2272100
6	Hach Alkalinity Reagent Set	2271900
Turbidity		
7	Hach 2100Q Portable Turbidimeter	2100Q01

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Table 5 Sampling and Monitoring Plan for Raw Water and Blended Water

Parameter	Monitoring Location	
	Raw Water	Blended Water
Field Monitoring		
Flow	2xW	2xW
Alkalinity	W	W
Conductivity	W	W
pH	W	W
Temperature	W	W
Total Hardness	W	W
Turbidity	W	W
Laboratory Monitoring		
Aldehydes/Ketones	S,MP	–
Anions - Chloride, Sulfate, Nitrate	BW	BW
BNA SVOCs	S,MP	–
Cr(VI)	2xW	2xW
Metals – Al, Ba, B, Ca, Fe, Mg, Mn, Si, Sr, U	BW	BW
Nitrosamines	S,MP	–
Phosphate (PO_4^{3-})	BW	BW
Radionuclides	M	M
Total Cr	2xW	2xW
TOC	M	M
TDS	M	M
TSS	M	M
VOCs and TICs	S,MP	–

Notes:
W: Weekly; BW: Once every two weeks; M: Monthly; S: Start-up (first 2 days);
MP – Midpoint through test period.
Radionuclides analysis will be conducted on water samples to measure gross alpha, gross beta particles radium and uranium.

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Table 6 Sampling and Monitoring Plan for Envirogen's Whole House Water Treatment System

Parameter	Monitoring Location	
	TU1_S1	TU1_S2
Location Description	**Effluent from Lead IX Vessel**	**Effluent from Lag IX Vessel**
Field Monitoring		
Flow	2xW	2xW
Alkalinity	W	W
Conductivity	W	W
pH	W	W
Temperature	W	W
Total Hardness	W	W
Turbidity	W	W
Laboratory Monitoring		
Aldehydes/Ketones	–	S,MP
Anions - Chloride, Sulfate, Nitrate	BW	BW
BNA SVOCs	–	S,MP
Cr(VI)	2xW	2xW
Metals – Al, Ba, B, Ca, Fe, Mg, Mn, Si, Sr, U	M	BW
Nitrosamines	–	S*,MP
Phosphate (PO_4^{3-})	BW	BW
Radionuclides	M	M
Total Cr	2xW	2xW
VOCs and TICs	–	S,MP

Notes:
W: Weekly; BW: Once every two weeks; M: Monthly; S: Start-up (first 2 days);
MP – Midpoint through test period.
* Nitrosamines sampling will be conducted at first flush, after 4 hours, after 24 hours, and midpoint through the test period.
Radionuclides analysis will be conducted on water samples to measure gross alpha, gross beta particles radium and uranium.

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Table 7 Sampling and Monitoring Plan for Kinetico's Whole House Water Treatment System

Parameter	Monitoring Location			
	TU2_S1	TU2_S2	TU2_S3	TU2_S4
Location Description	**Effluent from Softener**	**Permeate from First Pass RO**	**Permeate from Second Pass RO**	**Combined Brine Stream from Two Pass RO**
Field Monitoring				
Flow	–	2xW	2xW	2xW
Alkalinity	–	W	W	W
Conductivity	–	W	W	W
pH	–	W	W	W
Temperature	–	W	W	W
Total Hardness	W	W	W	W
Laboratory Monitoring				
Anions - Chloride, Sulfate, Nitrate	–	–	BW	–
Cr(VI)	–	2xW	2xW	2xW
Metals – Al, Ba, B, Ca, Fe, Mg, Mn, Si, Sr, U	W‡	M	M	M
Phosphate (PO_4^{3-})	–	–	M	–
Radionuclides	–	–	BW	M
Total Cr	–	2xW	2xW	2xW
TOC	–	–	M	M
TDS	–	W	W	W
TSS	–	–	M	M

Notes:
W: Weekly; BW: Once every two weeks; M: Monthly; S: Start-up (first 2 days); MP – Midpoint through test period.
* Nitrosamines sampling will be conducted at first flush, after 4 hours, after 24 hours, and midpoint through the test period.
Radionuclides analysis will be conducted on water samples to measure gross alpha, gross beta particles radium and uranium.
‡Softener effluent will be moniotored for Ca and Mg on a weekly basis.

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Table 8 Sampling and Monitoring Plan for Purolite/ACWA's Whole House Water Treatment System

Parameter	Monitoring Locations			
	TU3_S1	TU3_S2	TU3_S3	TU3_S4
Location Description	**Permeate from RO**	**Brine from RO**	**Effluent from Lead IX Vessel**	**Effluent from Lag IX Vessel**
Field Monitoring				
Flow	2xW	2xW	2xW	2xW
Alkalinity	W	W	W	W
Conductivity	W	W	W	W
pH	W	W	W	W
Temperature	W	W	W	W
Total Hardness	W	W	W	W
Turbidity	–	–	W	W
Laboratory Monitoring				
Aldehydes/Ketones	–	–	–	S,MP
Anions - Chloride, Sulfate, Nitrate	BW	–	BW	BW
BNA SVOCs	–	–	–	S,MP
Cr(VI)	2xW	2xW	2xW	2xW
Metals – Al, Ba, B, Ca, Fe, Mg, Mn, Si, Sr, U	M	M	M	BW
Nitrosamines	–	–	–	S*,MP
Phosphate (PO_4^{3-})	BW	–	BW	BW
Radionuclides	BW	M	M	M
Total Cr	2xW	2xW	2xW	2xW
TOC	–	M	–	–
TDS	W	W	–	–
TSS	–	M	–	–
VOCs and TICs	–	–	–	S,MP

Notes: W: Weekly; BW: Once every two weeks; M: Monthly; S: Start-up (first 2 days); MP – Midpoint through test period.
* Nitrosamines sampling will be conducted at first flush, after 4 hours, after 24 hours, and midpoint through the test period. Radionuclides analysis will be conducted on water samples to measure gross alpha, gross beta particles radium and uranium.

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Table 9 RO Comprehensive Brine Water Quality Monitoring Plan

General Parameters

- Biological Oxygen Demand (BOD) - 5 day
- Chemical BOD (5 day)
- Chemical Oxygen Demand (COD)
- Chlorine residual
- Color (PCU)
- Fecal Coliforms
- pH
- Solids, Dissolved
- Temperature
- Total Organic Carbon (TOC)
- Total Organic Nitrogen
- Total Phosphorus

Nitrification Parameters

- Ammonia-N
- Nitrate – N
- Nitrite-N

Anions

- Bromide
- Chloride
- Fluoride
- Sulfate

Metals

- Total Aluminum
- Total Antimony
- Total Arsenic
- Total Barium
- Total Beryllium
- Total Boron
- Total Cadmium
- Total Calcium
- Total Chromium
- Total Cobalt
- Total Copper
- Total Iron
- Total Lead
- Total Magnesium
- Total Manganese
- Total Mercury
- Total Molybdenum
- Total Nickel
- Total Potassium
- Total Selenium
- Total Silica
- Total Silver
- Total Sodium
- Total Strontium
- Total Thallium
- Total Tin
- Total Titanium
- Total Zinc

Additional Parameters

- Cyanide
- Oil and Grease
- Sulfide as S
- Sulfite as SO_3
- Surfactants
- Hexavalent Chromium

Figures

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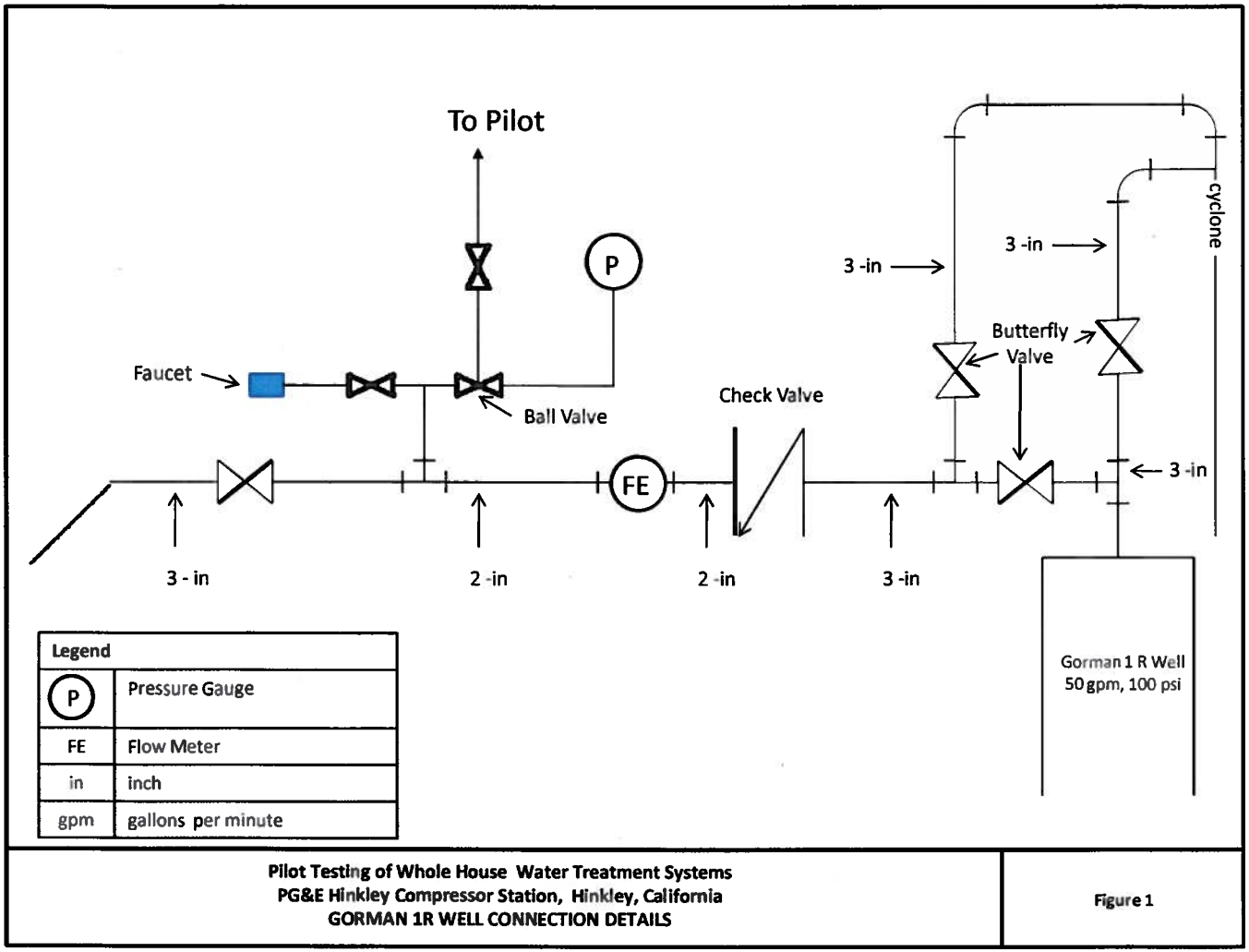

Pilot Testing of Whole House Water Treatment Systems
PG&E Hinkley Compressor Station, Hinkley, California
GORMAN 1R WELL CONNECTION DETAILS

Figure 1

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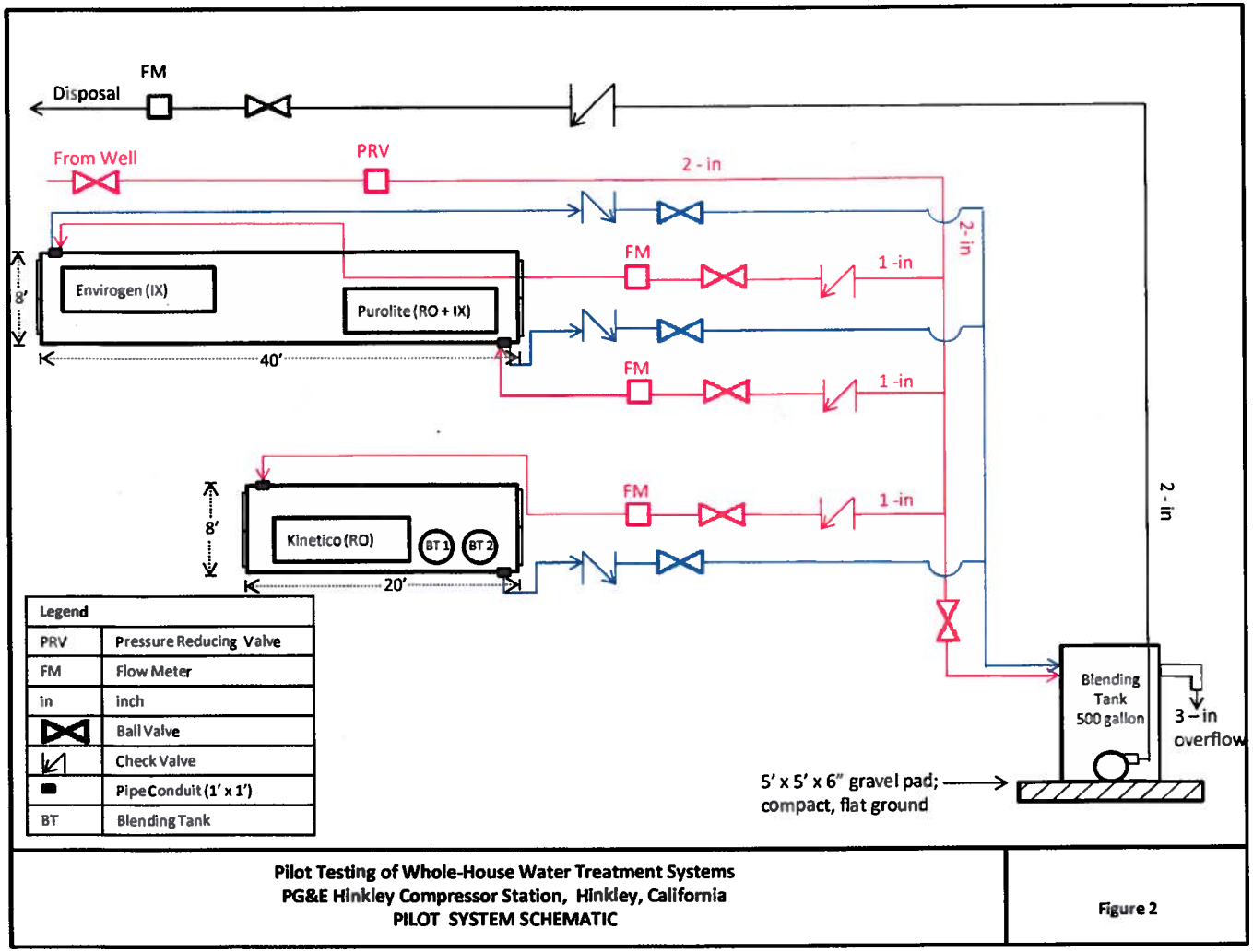

Pilot Testing of Whole-House Water Treatment Systems
PG&E Hinkley Compressor Station, Hinkley, California
PILOT SYSTEM SCHEMATIC

Figure 2

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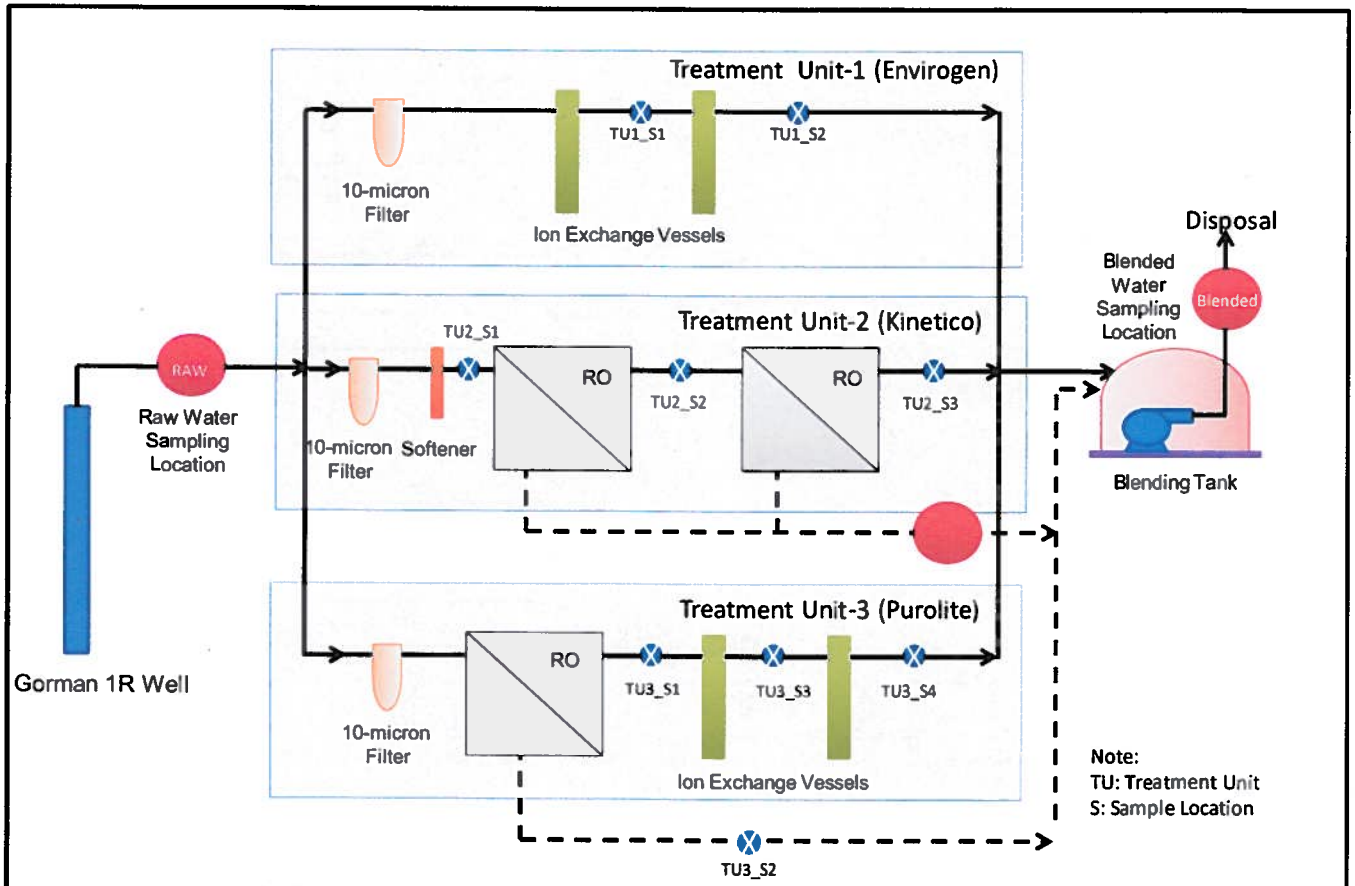

Pilot Testing of Whole House Water Treatment Systems,
PG&E Hinkley Compressor Station, Hinkley, California
PILOT SAMPLING AND MONITORING LOCATIONS

Figure 3

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Attachment A

Cutsheets and Layouts for Whole House Water Treatment Systems

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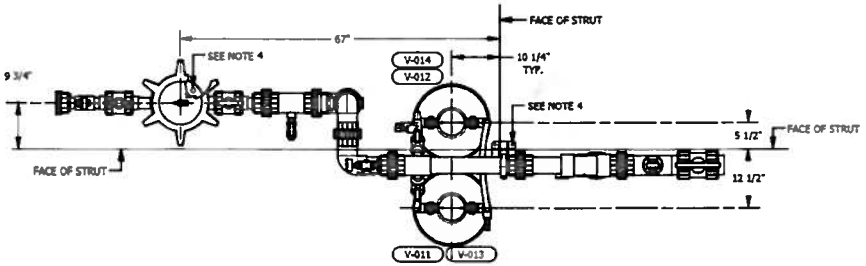
Envirogen Pilot System

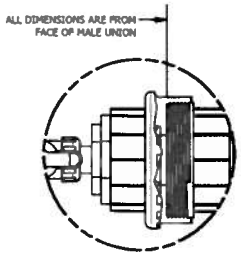
A-0142

NOTES:
1) 3" INFLUENT
2) 3" EFFLUENT
3) TYPICAL FILTER MEDIA VOLUME PER VESSEL IS 6 CU/FT.
4) CONTRACTOR SHALL ANCHOR TO FLOOR AS REQUIRED.
5) (XXX-XXX) INDICATES REQUIRED COMPONENT LABEL.
6) LABEL COMPONENTS AS SHOWN, USE LABEL MAKER WITH 1/2" WIDE TAPE AND 1/4" LETTERS.

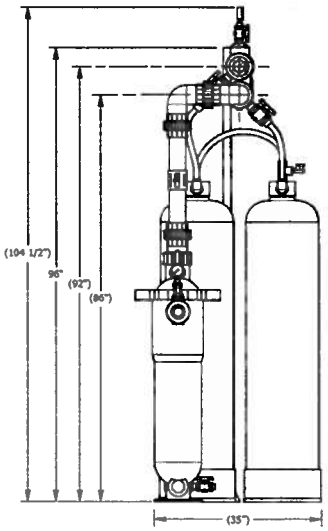
ITEM	PART NUMBER	DESCRIPTION	QTY
1	A1-0152	INFLUENT PIPING ASSEMBLY 16" VESSELS 1/ FIL"ER (SMALL SYS"EMS)	1
2	A1-0155	Y-S"RAINER / EFFLUENT PIPING ASSEMBLY (SMALL SYS"EMS)	1
3	A1-0160	HEADER, 3" INFLUENT 1 BED (SMALL SYSTEMS)	1
4	A1-0161	HEADER, 3" EFFLUENT 1 BED (SMAL. SYS"EMS)	1
5	A2-0357	VESSEL ASSEMBLY 16"x65" (W/ 2 POR" MANIFOLD & DISTRIBUTOR)	2
6	A2-0369	GAUGE / UNION ASSEMBLY MALE 0-160 PSI (SMALL SYSTEMS)	1
7	A2-0370	GAUGE / UNION ASSEMBLY FEMALE 0-160 PSI (SMALL SYS"EMS)	1
8	A2-0382	STRUT SUPPORT ASSEMBLY SINGLE (LENGTH AS REQUIRED)	1
9	A2-0389	SMALL SYS"EMS, VESSEL TO VESSEL HOSE CONNEC"ION	1
10	GENERAL SUPPLIER	CLAMP, 3" PIPE	2



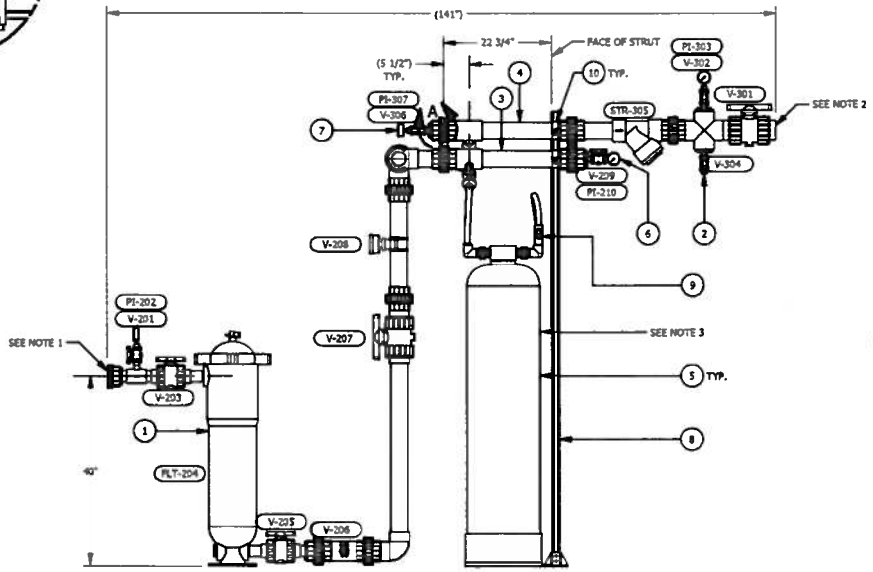
TOP VIEW



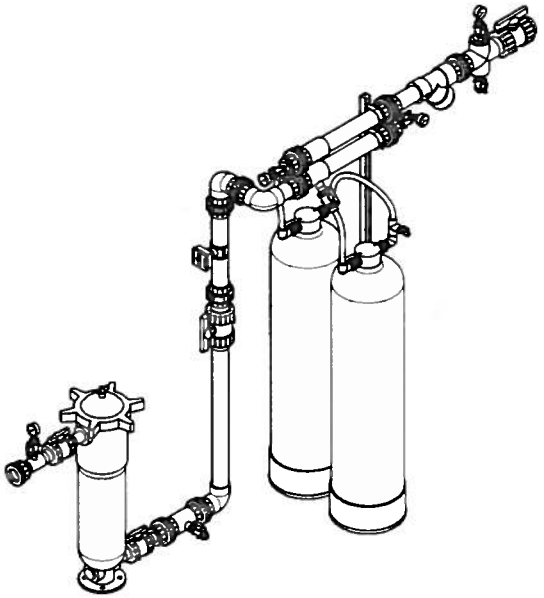
DETAIL A
SCALE 1:5



SIDE VIEW



FRONT VIEW


ISOMETRIC VIEW

REV	DATE	DESCRIPTION	DRN	CHK
A	10/08/08	UPDATED COMPANY BORDER	AIN	AWS
NC	01/18/08	ORIGINAL DRAWING	DFL	DAS

ENVIROGEN TECHNOLOGIES — A Lifecycle Performance Company
A Member of The Arcadis Group

DAS
DFL
DAS

SMALL SYSTEMS, 10 GPM (2 BED) 16" VESSEL STAGGERED LEAD-LAG W/ FILTER

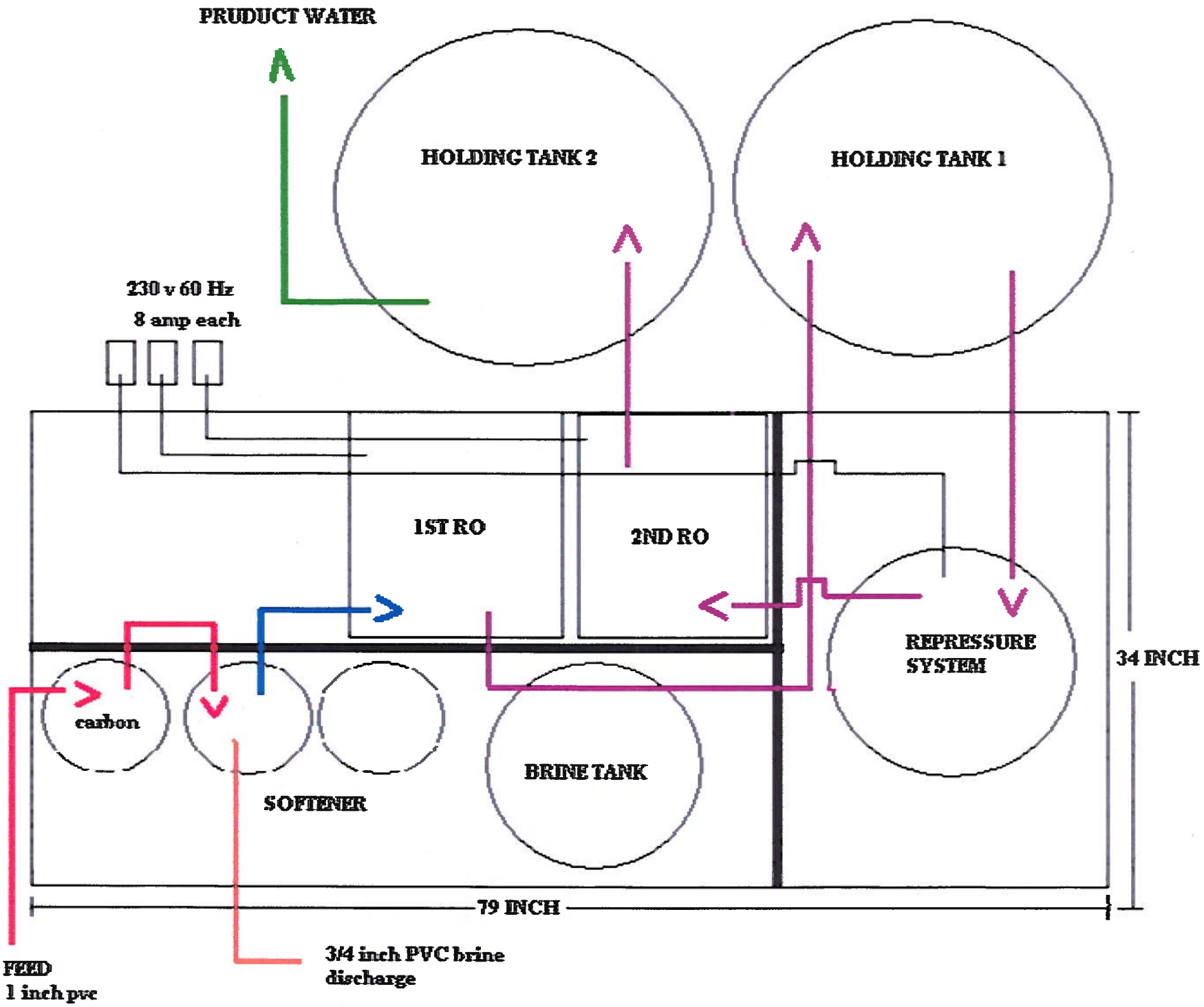
B A

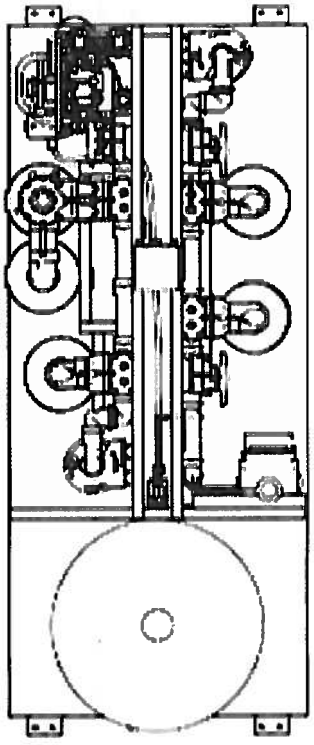
1 1

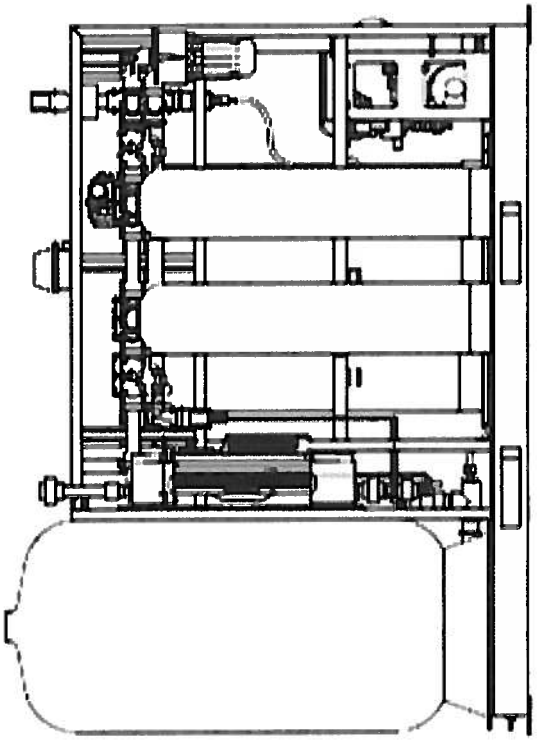
A-0142

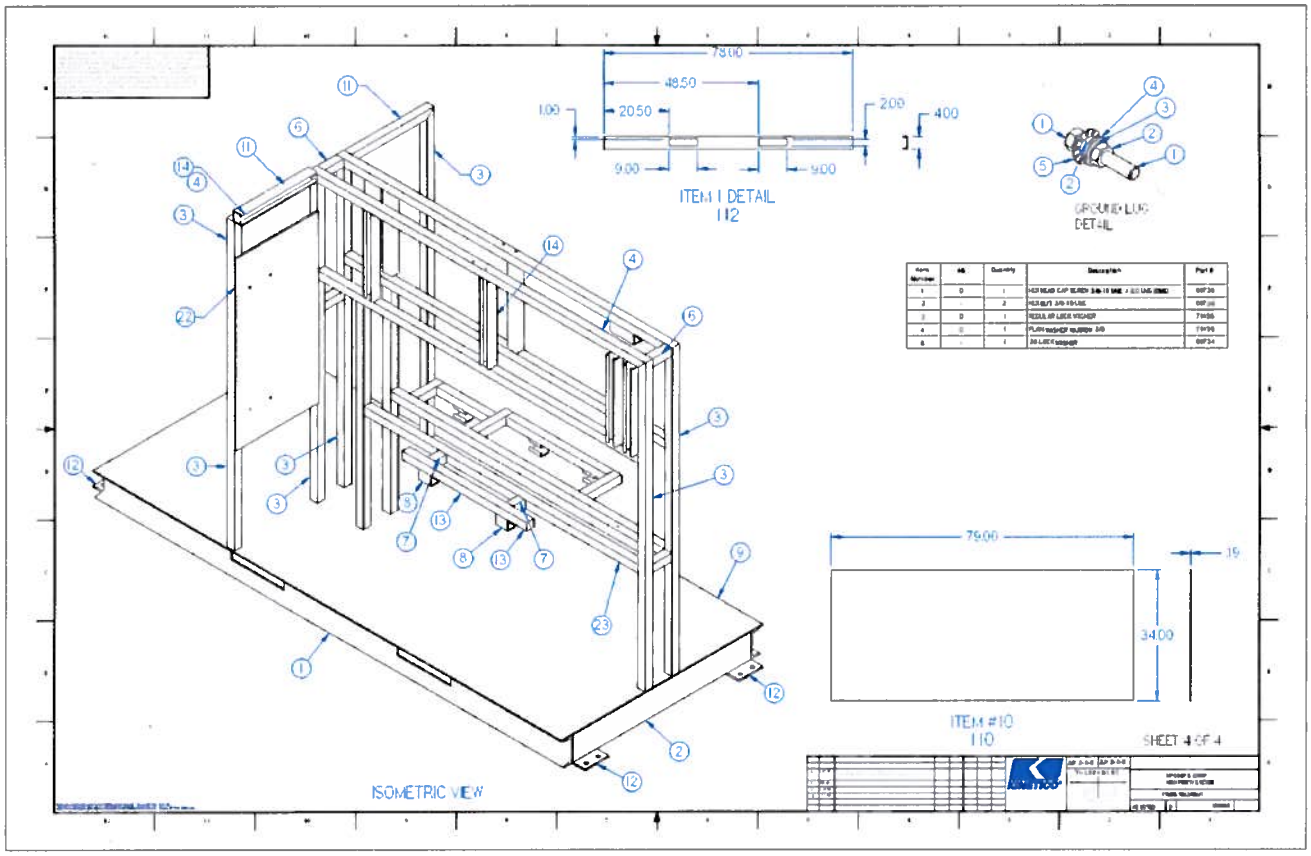
ARCADIS

Kinetico Pilot System


PRUDUCT WATER
HOLDING TANK 2
HOLDING TANK 1
230 v 60 Hz
8 amp each
1ST RO
2ND RO
REPRESSURE SYSTEM
34 INCH
carbon
SOFTENER
BRINE TANK
79 INCH
FEED
1 inch pvc
3/4 inch PVC brine discharge



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20.50
1.00
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ITEM 1 DETAIL
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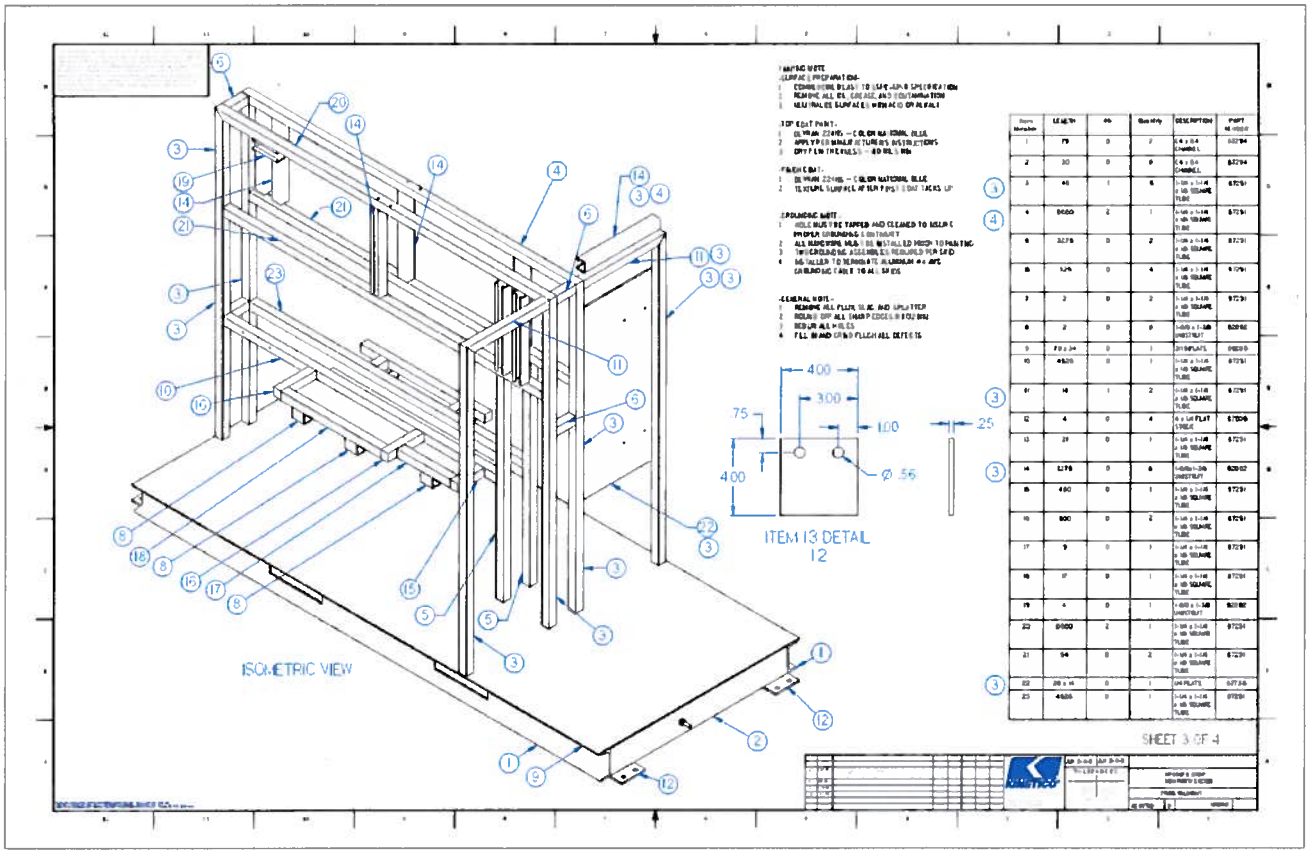
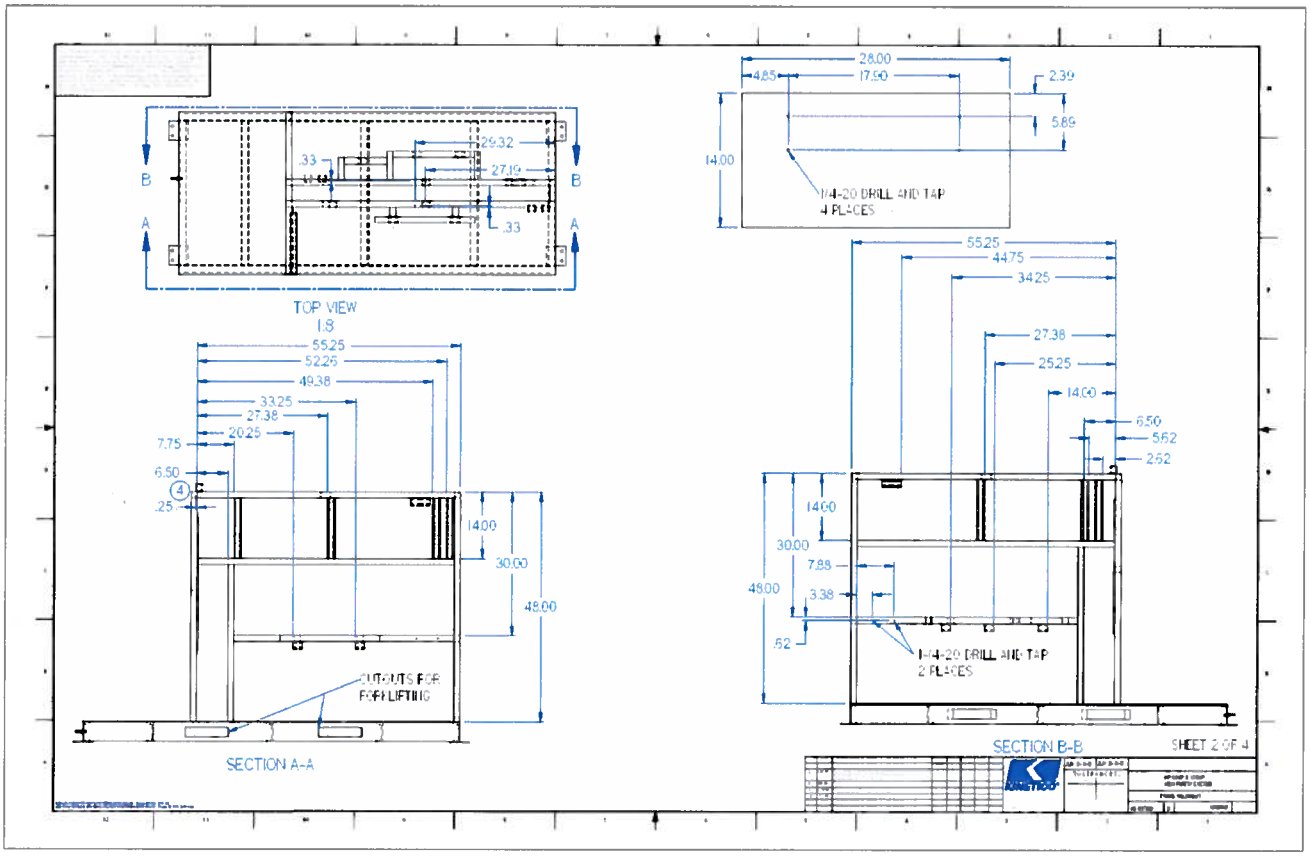
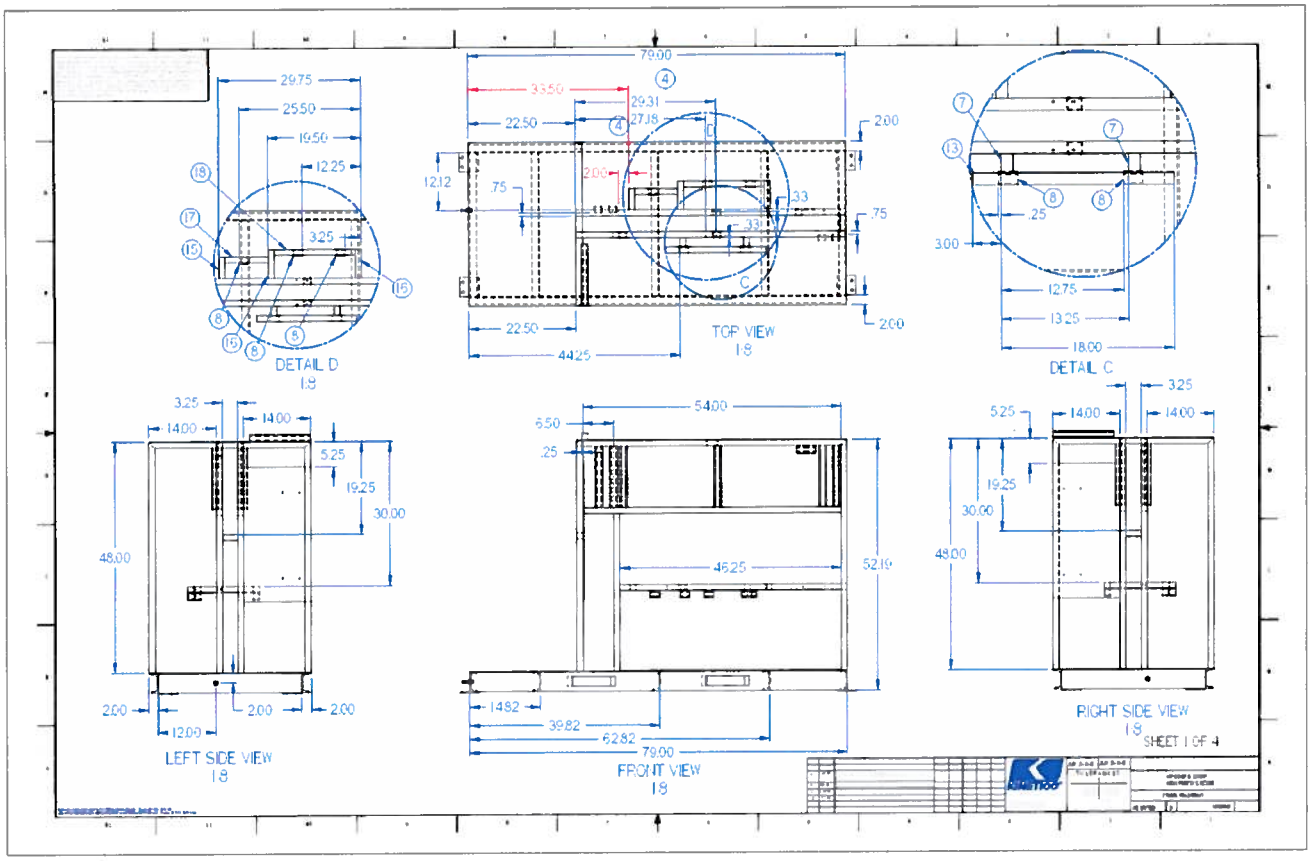
GROUND LUG
DETAIL
ISOMETRIC VIEW
79.00
34.00
.19
ITEM #10
1:10
SHEET 4 OF 4



SHEET 3 OF 4


TOP VIEW
1:8
SECTION A-A
SECTION B-B
CUT-OUTS FOR FORK LIFTING
1/4-20 DRILL AND TAP 4 PLACES
1/4-20 DRILL AND TAP 2 PLACES
SHEET 2 OF 4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12.25
3.25
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79.00
33.50
29.31
27.18
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2.00
12.12
.75
.33
.75
2.00
22.50
44.25
TOP VIEW
1.8
DETAIL C
1.8
.25
3.00
12.75
13.25
18.00
3.25
14.00
14.00
5.25
19.25
30.00
48.00
2.00
2.00
2.00
12.00
LEFT SIDE VIEW
1.8
54.00
6.50
.25
46.25
52.19
14.82
39.82
62.82
79.00
FRONT VIEW
1.8
5.25
14.00
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RIGHT SIDE VIEW
1.8
SHEET 1 OF 4

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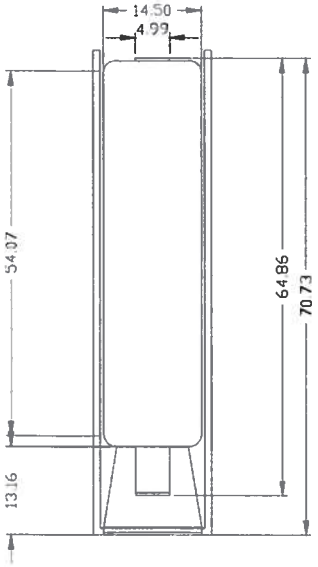
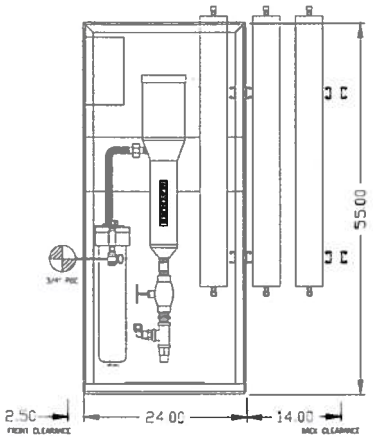
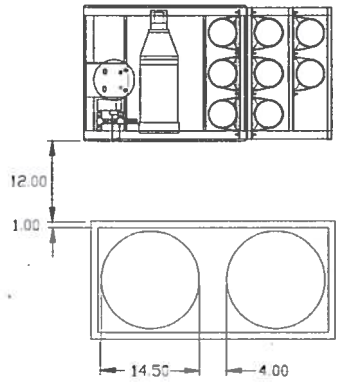
Purolite/ACWA Pilot System



ELEVATION OF ION EXCHANGE SKID



ELEVATION OF RO SKID



PLAN VIEW

11-14 101 | 0

FOR TENDER PURPOSES ONLY

ACWA CLEAR, LLC
4104 UNION AVENUE,
BAKERSFIELD, CA 93305
Email: enquiry@acwaclear.com Web: www.acwaclear.com
Tel: 877 702 2094 Fax: 661 322 4206

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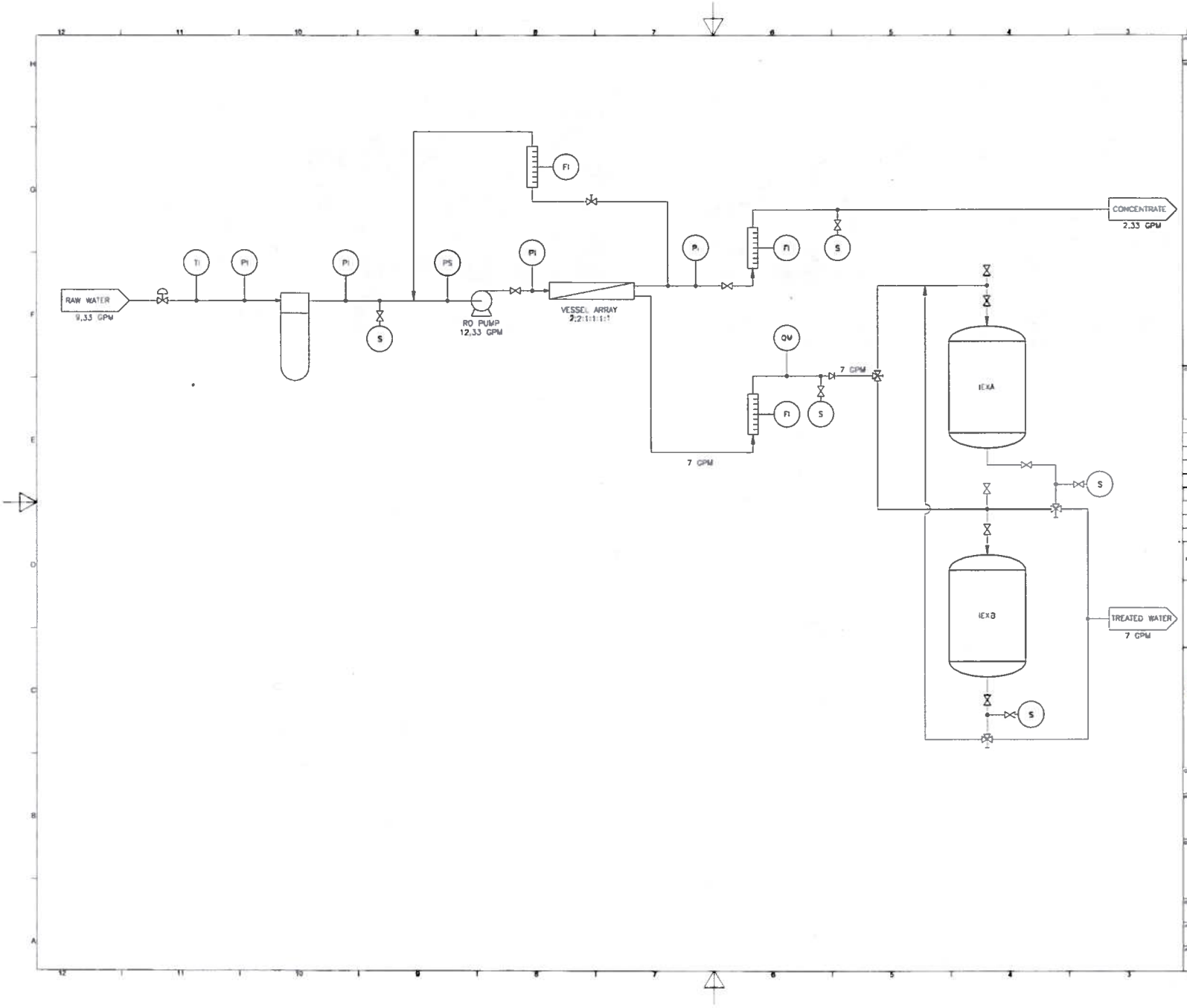
PILOT PLANT PROPOSED LAYOUT

11-14 | NTS | A1

11-14 101 | 0



11-14 001 0

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BAKERSFIELD, CA 93305
Email: enquiry@acwaclear.com Web: www.acwaclear.com
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PMD FOR PILOT PLANT

11-14 | NTS | A1

11-14 001 0

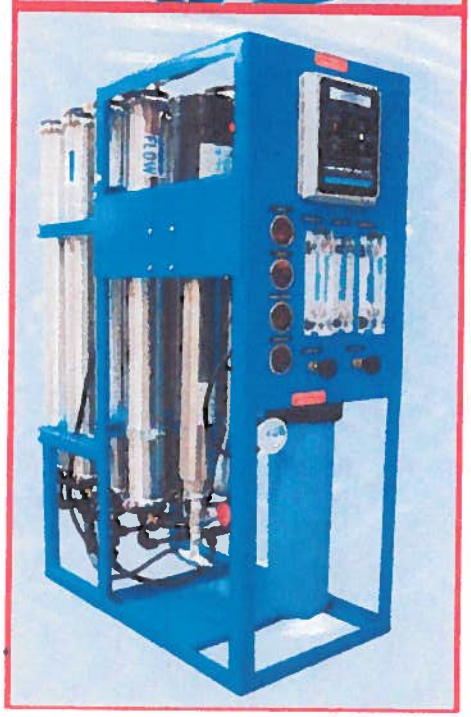
APPLIED® SYSTEMS

Series L – 300 to 19,000 GPD RO Systems

Reverse Osmosis Systems 300 to 19,000 Gallons/Day For feed water TDS 500 to 1000 PPM

Designed to produce low dissolved solids water from tap or well water, these RO systems use high efficiency reverse osmosis membranes. Part of the L-series family (other systems include XL and HL series), these RO systems are designed to work at pressures of 200-250 psi for higher TDS water and use TW reverse osmosis membranes. The TW RO membranes offer higher salt removal and the higher operating pressure overcomes the loss of membrane flow due to higher TDS level.

These reverse osmosis systems use the proven, reliable components and are mounted on a sturdy powder-coated metal frame. There are numerous design details learned from years of experience that are incorporated in our water filtration systems. Our process and fluid design ensures an optimum membrane life and minimizes the membrane fouling.



Key Features

- Over 25 years of experience is reflected in our quality
- Compact, Heavy Duty, Powder Coated Frame
- Proven components used throughout the system
- Conservatively engineered for reliable long term performance
- Factory tested to ensure trouble-free operation

Applications

- Spot Free Rinse/Car Wash
- Water Stores
- Whole House
- Labs
- Large Office
- Institutions
- Ice Makers
- Humidification
- Misting
- Manufacturing
- Rinse Water
- A Wide Variety of Other Applications

Why Applied Membranes?

- Over 10,000 commercial/industrial systems in operation
- Our products are being used in over 100 countries worldwide
- Our customers include major national and international companies in every field of application
- We stock more components for all sizes of RO systems than any other company
- We have earned an enviable reputation for our product quality, performance reliability and business integrity.

APPLIED® SYSTEMS

Series L – 300 to 19,000 GPD RO Systems

Standard Equipment

Microprocessor Controller for Automatic Operation

- Thin Film Composite Membranes
- Stainless steel membrane pressure vessels
- 5 micron 20" cartridge filter & housing
- Feed water temperature gauge
- Automatic inlet feed solenoid valve
- Permeate, Concentrate & Recycle Flowmeters
- System control valve
- Recycle control valve
- Low pressure pump protection
- High pressure RO pump
  - L-12521 – L-24A: Brass Rotary Vane
  - L-34A – L-124A : SS multistage with throttling valve
- Automatic membrane flush
- 4) Liquid filled pressure gauges for filter in/out and system pressures
- Feed and permeate TDS displayed on controller LED with percent rejection
- System on/off with 2-level tank floats
- Powder coated carbon steel frame
- Boxed and palletized for shipment

Monitors and/or Controls:

- Inlet valve
- Delayed start-up of high pressure pump
- Feed water flush at system shut-down
- Low pressure switch
- On/Off with tank level
- Pre-treatment backwash/lockout
- Feed & permeate TDS with % rejection
- Water temperature
- Operating hours

Controller Features:

- Backlit LED Display
- Multi-Function keypad
- Audible alarm & silence key
- Visual indicator alarm light
- Programmable time delays, set-points and flush mode
- Low pressure automatic restart

UL508A Labeled

LED Display:

- Permeate TDS
- Operating Status
- Alarm Condition

Ordering Information

Model No.	System Capacity		Membrane Elements		Line Sizes (NPT, Inches)			System Dimensions (in/cm)			Approx. Shipping Weight (Lb/Kg)
	GPD	m³/day	Qty.	Size (Dia.×L)	Inlet	Perm.	Conc.	Length	Depth	Height	
L-12521A	300	1	1	2.5" × 21"	¾"	⅜"	⅜"	20/51	24/61	55/140	230/104
L-125A	600	2	1	2.5" × 40"	¾"	⅜"	⅜"	20/51	24/61	55/140	240/109
L-225A	1,200	5	2	2.5" × 40"	¾"	⅜"	⅜"	20/51	24/61	55/140	250/113
L-14A	1,800	7	1	4" × 40"	¾"	½"	½"	20/51	24/61	55/140	275/125
L-24A	3,000	12	2	4" × 40"	¾"	½"	½"	20/51	24/61	55/140	300/136
L-34A	5,500	21	3	4" × 40"	¾"	½"	½"	20/51	32/82	55/140	325/147
L-44A	7,000	27	4	4" × 40"	¾"	½"	½"	20/51	32/82	55/140	350/159
L-54A	8,500	32	5	4" × 40"	¾"	½"	½"	20/51	32/82	55/140	375/170
L-64A	10,000	38	6	4" × 40"	¾"	½"	½"	20/51	32/82	55/140	400/181
L-74A	11,500	44	7	4" × 40"	¾"	½"	½"	20/51	40/102	55/140	441/200
* L-84A	13,000	49	8	4" × 40"	¾"	½"	½"	20/51	40/102	55/140	466/211
L-94A	14,400	55	9	4" × 40"	¾"	½"	½"	20/51	40/102	55/140	491/223
L-104A	16,000	60	10	4" × 40"	¾"	½"	½"	20/51	46/117	55/140	516/234
L-114A	17,300	66	11	4" × 40"	¾"	½"	½"	20/51	46/117	55/140	541/245
L-124A	19,000	72	12	4" × 40"	¾"	½"	½"	20/51	46/117	55/140	566/257

Notes and Voltage/ Ordering Information

- **Recommended Pre-Treatment Equipment:** *All pretreatment equipment and SDI test kits are available from Applied Membranes.*
  - **Carbon Filter:** Chlorine must be removed if present in feed water prior to RO.
  - **Water Softener:** Hardness must be removed if present in feed water prior to RO to avoid scaling the membranes.
  - **Multimedia filter:** If feed water exceeds <1 NTU turbidity, or silt density index (SDI) of 3, media filter pretreatment recommended.
- **Capacity Basis:** 24 hrs/day
- **Systems rated at:** 77°F (25°C) using 1000 ppm sodium chloride solution operating at approx. 200 psi (14 kg/cm²) pressure. For feed water with higher TDS refer to our Series HL brochure.
  Minimum feed pressure to RO System: 40-60 PSI. System capacity changes significantly with water temperature
- **Voltage:** *Please add our voltage codes to the end of the model number when ordering. Example: L-12521-116 = 110v, 1 ph, 60 hz.*

  Voltage Codes:
  - **116** = 110v, 1ph, 60hz (up to L-24A only)
  - **216** = 220/230v, 1ph, 60hz
  - **215** = 220/230v, 1ph, 50hz
    Three Phase Not Available
- All dimensions and weights are approximate.

APPLIED MEMBRANES INC.®

ISO 9001:2008 Certified Company

Made in USA

(760) 727-3711 • FX: (760) 727-4427
www.appliedmembranes.com
sales@appliedmembranes.com

ARCADIS

Attachment B

NSF Certificates for Whole House Water Treatment Systems

ARCADIS

Envirogen Certificates

Water Quality Association
International Headquarters & Laboratory

4151 Naperville Road
Lisle, Illinois 60532-3696 USA
Phone 630 505 0160
Fax 630 505 9637
www.wqa.org

A not-for-profit organization

GOLD SEAL CERTIFICATE

This is to certify that the drinking water system component herein has been independently tested and certified by the Water Quality Association in accordance with "Drinking Water System Components - Health Effects," NSF/ANSI-61. The material safety of the component listed has earned the Gold Seal.

Manufacturer:	ResinTech, Inc.
Address:	160 Cooper Road West Berlin, NJ 08091-9243
Model:	SBG1-HP
Brand:	N/A
Product Type:	Ion Exchange Resin
Size:	16 - 50 mesh
Water Contact Temp:	CLD 23
Water Contact Material:	SYN
Listing Notes:	Anion Resin

Certificate Type:	Final
Issue Date:	Wednesday, May 21, 2008
Expiration Date:	Monday, January 21, 2013
Test Unit Number/ Conformance Method:	6179.0803C.02
Certificate Number:	CRT.052108.61790803C02

Joseph F Harrison

Joseph F. Harrison, P.E., CWS-VI

29 May 2008

Effective Date

ARCADIS

Kinetico Certificates

State of California
Department of Public Health

Water Treatment Device
Certificate Number
04 - 1667

Date Issued: October 13, 2009

Trademark/Model Designation
Mach 2060 S

Replacement Elements
None

Manufacturer: Kinetico Incorporated

The water treatment device(s) listed on this certificate have met the testing requirements pursuant to Section 116830 of the Health and Safety Code for the following health related contaminants:

Microbiological Contaminants and Turbidity
None

Inorganic/Radiological Contaminants
Barium
Radium 226/228

Organic Contaminants
None

Rated Service Capacity: Not Applicable

Rated Service Flow: 11.5 gpm

Conditions of Certification:
Do not use with water that is microbiologically unsafe or of unknown quality, without adequate disinfection before or after the system.

NSF Product and Service Listings

These NSF Official Listings are current as of **Monday, September 12, 2011** at 12:15 a.m. Eastern Time. Please contact NSF International to confirm the status of any Listing, report errors, or make suggestions.

Alert: NSF is concerned about fraudulent downloading and manipulation of website text. Always confirm this information by clicking on the below link for the most accurate information:
http://www.nsf.org/Certified/PwsComponents/Listings.asp?Company=21860&Standard=061&

NSF/ANSI STANDARD 61
Drinking Water System Components - Health Effects

NOTE: Unless otherwise indicated for Materials, Certification is only for the Water Contact Material shown in the Listing. Click here for a list of Abbreviations used in these Listings.

Kinetico Incorporated
10845 Kinsman Road
P.O. Box 193
Newbury, OH 44065
United States
440-564-9111
Visit this company's website

Facility : Newbury, OH

Mechanical Devices

Trade Designation	Size	Water Contact Temp	Water Contact Material
Dechlorinators[2]			
1030 Dechlorinator	7" x 35"	CLD 23	MLTPL
1060 Dechlorinator	8" x 40"	CLD 23	MLTPL
1100 Dechlorinator	10" x 54"	CLD 23	MLTPL
1175 Dechlorinator	13" x 54"	CLD 23	MLTPL
Valves			
Hydrus Valve[1] [G]	2"	CLD 23	MLTPL

[2] This product is not Certified for contaminant reduction or structural integrity by NSF International.

ARCADIS

Purolite/ACWA Certificates

Water Quality Association

09/16/2011

NSF/ANSI-61 International Standard for Drinking Water Additives

NSF/ANSI-61 Drinking Water System Components - Health Effects

This Standard establishes minimum health effects requirements for the chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems. This Standard does not establish performance, taste and odor, or microbial growth support requirements for drinking water systems products, components, or materials.

Drinking Water Treatment Products certified to NSF/ANSI 61 have not been tested or evaluated for contaminant reduction performance. Contaminant reduction testing and certification claims shall be evaluated via the industry's residential drinking water treatment standards.

Purolite Company (The)
150 Monument Road
Suite 202
Bala Cynwyd, PA 19004
Phone: (610) 668-9090
http://www.puroliteusa.com

Product Type: Ion Exchange Resin

Brand Name	*Model*	*Water Contact Temp*	*Water Contact Material*	*Size*
	A600E	CLD 23	SYN	N/A
	A860	CLD 23	SYN	16-50 mesh
	S108	CLD 23	SYN	
N/A	A300E	CLD 23	SYN	16 - 50 mesh
N/A	A-400E [1]	CLD23	SYN	16 - 50 mesh
N/A	A-500P	CLD 23	SYN	16 - 50 mesh
N/A	A-520E [2]	CLD 23	SYN	16-50 mesh
N/A	A530E	CLD 23	SYN	16 - 50 mesh
N/A	A532E	CLD 23	SYN	16-50
N/A	A-850FL [1]	CLD 23	SYN	16-50 mesh
N/A	C100 [3]	CLD 23	SYN	16-50 Mesh
N/A	C100E [3]	CLD 23	SYN	16-50 Mesh

N/A	C100E/1420 [3]	CLD 23	SYN	16-50 Mesh
N/A	C100E/9042 [3]	CLD 23	SYN	16-50 Mesh
N/A	C100EB [3]	CLD 23	SYN	16-50 Mesh
N/A	C100EDK [3]	CLD 23	SYN	16 -50 Mesh
N/A	C100EF [3]	CLD 23	SYN	30-40 Mesh
N/A	C100EFLT [3]	CLD 23	SYN	20-40 Mesh
N/A	C100EFM [3]	CLD 23	SYN	30-70 Mesh
N/A	C100EG [3]	CLD 23	SYN	16-35 Mesh
N/A	C100ELT [3]	CLD 23	SYN	20-40 Mesh
N/A	C104E H/9111 [4]	CLD 23	SYN	16 - 50
N/A	D-4170	CLD 23	SYN	16 - 50
N/A	D4600/NCAL	CLD 23	SYN	16 - 50 mesh
N/A	D5130 [3]	CLD 23	SYN	40-70 Mesh
N/A	PFC100 [3]	CLD 23	SYN	25-40 Mesh
N/A	PFC100E [3]	CLD 23	SYN	25-40 Mesh
N/A	SST60 [3]	CLD 23	SYN	16-50 Mesh
N/A	SST60E [3]	CLD 23	SYN	16-50 Mesh
N/A	SST80 [3]	CLD 23	SYN	20-40 Mesh
N/A	SST80DL [3]	CLD 23	SYN	20-40 Mesh
N/A	SST80E [3]	CLD 23	SYN	20-40 Mesh
N/A	ArsenXnp Regenerated [5]	CLD 23	SYN	14 - 52
N/A	C100FM [3]	CLD 23	SYN	30-70 Mesh
N/A	FerrIX™A33E	CLD 23	SYN	-16+40
N/A	FerrIX™A33E Regenerated [5]	CLD 23	SYN	-16+40

[1]: This product is certified with a minimum flow restriction of .64 gpm per cubic foot of media.

[2]: The Certification of this media is only for applications with minimum flow greater than or equal to 0.28 gpm per cubic foot of resin.

[3]: The certification of this media is only for applications with a minimum flow greater than or equal to 0.29 gpm per cubic foot of resin.

[4]: This product is certified with a minimum flow rate requirement of 0.42 gpm per cubic foot of media.

[5]: The Certification of this media is only for applications with minimum flow greater than or equal to 1.0 gpm per cubic foot of resin.

Disclaimer:

Listing in these directories does not constitute an endorsement, guarantee, or warranty of any kind by Water Quality Association or its members of any of the products contained in them.
Every effort has been made to verify the accuracy of all listings in this directory. The association can assume no liability for errors or omissions.

Water Quality Association: Back

Fri, Sep 16, 2011

Water Quality Association
International Headquarters & Laboratory
4151 Naperville Road
Lisle, IL 60532-3696
USA
630 505 0160, Fax 630 505 9637
info@wqa.org, www.wqa.org

Disclaimers

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http://www.nsf.org/Certified/DWTU/Listings.asp?Company=29120&

Note: Certain claims, such as Arsenic (Pentavalent) Reduction, appear as active links, allowing you to access additional information regarding the specific contaminants.

NSF/ANSI STANDARD 058
Reverse Osmosis Drinking Water Treatment Systems

NOTE: All Replacement Modules Are Components.

Applied Membranes Inc.

2325 Cousteau Court
Vista, CA 92081
United States
800-321-9321
760-727-3711
Visit this company's website

Facility : Vista, CA

COMPONENTS: Membranes[1] [2]
100 GPD TFC
110009
110017
110019
110020
12 GPD TFC
18 GPD TFC
24 GPD TFC
36 GPD TFC
50 GPD TFC
75 GPD TFC
F26048
FM110015M
FM110018M
M-T1512A12
M-T1512A18

M-T1512A18-NL
M-T1512A18-WET
M-T1810R12
M-T1810R24
M-T1810R24-RS
M-T1810R50
M-T1810RMU24
M-T1810RMU50
M-T1812A100
M-T1812A100-NL
M-T1812A100DIM
M-T1812A100FI
M-T1812A100ID
M-T1812A24
M-T1812A24-NL
M-T1812A24-WET
M-T1812A36
M-T1812A36-NL
M-T1812A36-WET
M-T1812A50
M-T1812A50-NL
M-T1812A50DIM
M-T1812A75
M-T1812A75-NL
M-T1812A75DIM
M-T1812A75FI
M-T1812A75ID
M-T1812AC24
M-T1812AC36
M-T1812AC36-NL
M-T1812AC50
M-T1812AC75
M-T1812ACMU36
M-T1812AF100
M-T1812AF50
M-T1812AF75
M-T1812ASRL100
M-T1812Q24
M-T1812Q30
M-T1812Q50
TLC-15
TLC-25
TLC-35
TLC-50

[1] Conforms to material requirements only. Membranes require a 24 hour flushing procedure.
[2] These elements have been tested for the reduction of Arsenic, Barium, Cadmium, Chromium (Hexavalent), Chromium (Trivalent), Copper, Cysts, Turbidity, Fluoride, Lead, Radium 226/228, Selenium, and TDS. The test data results may be transferred to other manufacturer's systems, if the systems meet the requirements contained on the document entitled, "Transfer of Performance Claims for Applied Membranes, Inc.™ Reverse Osmosis Elements NSF/ANSI 58", dated 5/18/2009. This document is available from Applied Membranes.

NOTE: These components do not bear the NSF Mark. Evidence of Certification will appear on the manufacturer's literature and packaging.

Number of matching Manufacturers is 1
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Exhibit 3

Presentation to the Community
Advisory Committee Regarding
Testing of Whole House
Treatment Technologies

Testing of Whole House Water Treatment Technologies

Community Advisory Committee Meeting

November 2, 2011
Hinkley, California

PG&E

MALCOLM PIRNIE ARCADIS

ARCADIS & Malcolm Pirnie

- Malcolm Pirnie's Water Division is a subsidiary of ARCADIS, a global science and engineering consulting firm working in more than 100 countries
- Over 100 years experience designing, building and managing water treatment and water supply systems
- Broad experience at all scales of water supply applications, from rural systems to municipal and regional networks

MALCOLM PIRNIE ARCADIS

Basic Fresh Water Supply Alternatives

1) Tie into Golden State Water Company
2) Central water treatment and distribution
3) Whole house water treatment
4) Add option of deeper wells
5) Trucking water

ARCADIS

Whole house water treatment

- Treat water entering the homes
- Treatment could include ion exchange media or reverse osmosis filters placed outside homes and connected to existing supply lines
- Equipment provider would conduct the necessary monitoring and maintenance
- Equipment must be thoroughly tested to prove effective in treating chromium-6

ARCADIS

Whole House Water Treatment

ADVANTAGES

- Relatively less implementation time and cost
- Equipment Federal/State certified
- Water equipment vendor maintains the equipment
- Local control

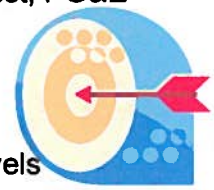
DISADVANTAGES

- Water quality varies well to well
- May require multiple treatment stages (pre-filter, core treatment, post-filter)
- Some systems generate waste water that may need to be disposed to the septic tanks
- Must be installed on the property
- Requires performance testing

5 ARCADIS

Testing
Objectives

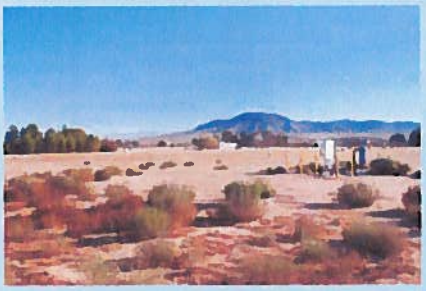
Our test will help us choose the best way to treat Hinkley groundwater for household use. By this test, PG&E hopes to:



- Find out whether the treatment method can reliably remove chromium-6 to low levels
- Study how the systems operate, and how durable they are, in actual use at Hinkley
- Gain information about maintenance needs
- Find the best methods for handling and disposing of any wastes created by the systems

6 ARCADIS

Testing
Location



Test Well

- The pilot test systems are being set up at a well on the former Gorman property
- Water from this well contains about 4-6 parts per billion of Chromium-6
- This well water also contains moderately high levels of naturally occurring minerals

7 ARCADIS

Pilot Testing
Pilot Treatment Systems

Three treatment systems will be pilot tested:

- An ion exchange system
- A reverse osmosis system
- A combined reverse osmosis and ion exchange system

Purolite/ACWA Combined Reverse Osmosis/Ion Exchange System

8 ARCADIS

Testing
Ion Exchange Treatment

- In this process, water is pumped through a series of tanks filled with tiny beads of specially-made material called "resin"
- Chromium-6 and other impurities are trapped by the resin, and removed from the water
- The treated water is stored and supplied for home use
- Ion exchange treatment systems range in size from models that can fit under a kitchen sink to warehouse size systems

Envirogen System

ARCADIS

Testing
Reverse Osmosis Treatment

- In this process, water is pumped at high pressure through a membrane
- Water molecules are small enough to pass through the membrane, but chromium-6 and other impurities that are too large to pass through are removed
- The treated water passing through the membrane is stored and supplied for home use
- Water and impurities trapped behind the membrane are called "brine". The brine is collected and disposed of
- Like with ion exchange systems, reverse osmosis systems are available in a range of sizes, from household units to huge industrial systems

Kinetico System

ARCADIS

Testing
Schedule

▪ Vendors produce systems	Oct. 2011
▪ Site preparation	Ongoing
▪ Receive and install systems	Nov. Second Week
▪ Systems start-up	Nov. Third Week
▪ Testing period	Nov. through Feb. 2012
▪ Community tours of systems	Nov. through Feb 2012
▪ Report on testing	Mar. 2012

ARCADIS