



OLYMPIC VALLEY PUBLIC SERVICE DISTRICT



WATER AND SEWER COMMITTEE AGENDA

Tuesday, September 22nd, 2026 at 10:00 A.M.
305 Olympic Valley Road, Room 212, Olympic Valley, CA

Public comments will be accepted by the Board in-person until the close of public comment on each item. Comments may also be submitted to the Board Secretary at info@ovpsd.org or by mail at P.O. Box 2026, Olympic Valley, California 96146. The final mail and e-mail collection will be the business day before the meeting at 2:00 p.m. The public will be allowed to speak on any agenda item as it is considered, which may not be taken in the order stated herein. Times, where provided, are approximate only.

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the Board Secretary at 530-583-4692 at least 48 hours preceding the meeting.

Documents presented for an open session to the governing body after distribution of the agenda packet are available for public inspection at the District office during normal District business hours and at the meeting.

A. Call to Order

B. Public Comment

Any person may briefly address the Committee on any subject matter within the jurisdiction of the Committee that does not appear elsewhere on the Agenda.

C. Full-Time Chlorination Feasibility Study

D. Adjourn

Olympic Valley Public Service District
FULL-TIME CHLORINATION FEASIBILITY STUDY
September 2026



Prepared for: **Olympic Valley Public Service District**

Prepared By: Hydros Engineering



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9/17/2026

Table of Contents

Executive Summary.....	1
1.0 Purpose and Scope	1-1
2.0 System Description	2-1
2.1 District Overview	2-1
2.2 Sources of Supply.....	2-2
2.3 Distribution System — Pressure Zones and Storage	2-4
2.4 Existing Operations — Disinfection Practice	2-4
3.0 Bacteriological Water Quality Review	3-1
3.1 November 2008 Total Coliform Positive	3-1
3.2 November 2018 Total Coliform Positive	3-1
3.3 October 2023 Total Coliform Positive.....	3-2
3.4 January 2024 Total Coliform Positive.....	3-2
4.0 Survey of Regional Systems	4-1
4.1 Chlorinated Systems — Bacteriological and DBP Outcomes	4-1
4.2 Non-Chlorinated Systems — Bacteriological Outcomes.....	4-2
4.3 Chlorinated vs Non-Chlorinated Service Count.....	4-3
4.4 Summary of Tahoe System Observations	4-4
5.0 Assessment of Chlorination - Positives and Negatives.....	5-1
5.1 Potential Benefits of Full-Time Chlorination	5-1
5.1.1 Inactivation of Waterborne Pathogens	5-1
5.1.2 Biofilm Control	5-2
5.1.3 Seasonal Demand Fluctuations and Water Quality.....	5-2
5.2 Potential Drawbacks to Full-Time Chlorination.....	5-3
5.2.1 Operations and Maintenance	5-3
5.2.2 Capital and Operating Costs	5-3
5.2.3 Taste, Odor, and Public Perception	5-3
5.2.4 Regulatory Reporting Requirements	5-4
5.2.5 Disinfection Byproduct (DBP) Monitoring	5-4
5.2.6 Chemical Handling and Safety	5-5
6.0 Bench-Top Water Quality Testing	6-1
6.1 Testing Objectives.....	6-1
6.2 Testing Protocol.....	6-1

6.3	Testing Results	6-2
6.3.1	Disinfection Byproduct Formation Potential	6-2
6.4	Summary and Implications	6-4
7.0	Chlorination Facilities — Conceptual Design and Costs	7-1
7.1	Design Approach and Assumptions	7-1
7.2	Well Site 2R — Chlorination System (Wells 1R, 2R, 3)	7-1
7.3	Well Site 5R — Chlorination System	7-6
7.4	Horizontal Well Nos. 1 & 2	7-9
7.5	Zone 3 Booster Station — Chlorine Monitoring and Emergency Injection	7-9
8.0	Capital and Operation and Maintenance Costs	8-1
8.1	Capital Costs	8-1
8.2	Operation and Maintenance Costs	8-4

List of Tables

Table 2-1-	OVPSPD Service Category Summary	2-1
Table 2-2-	OVPSPD Active Groundwater Sources	2-3
Table 2-3 -	Annual Production – All Sources	2-3
Table 2-4-	OVPSPD Pressure Zone Configuration	2-4
Table 3-1 –	Total Coliform Sample Summary	3-3
Table 4-1 –	Tahoe-Truckee Regional Systems Chlorination Practices	4-4
Table 6-1 –	Hold Study Water Quality Results	6-2
Table 7-1-	Well Site 2R — Chlorination System Design Criteria	7-5
Table 7-2 -	Well Site 5R - Chlorination System Design Criteria	7-8
Table 8-1 -	Administrative Costs	8-1
Table 8-2 -	Well Site 2R Capital Costs	8-2
Table 8-3 -	Well Site 5R Capital Costs	8-2
Table 8-4 -	Horizontal Well Nos. 1 & 2	8-3
Table 8-5 -	Zone 3 Booster Pump Capital Cost	8-4
Table 8-6	Estimated Annual Operation and Maintenance Costs	8-5

List of Figures

Figure 6-1 -	Projected Chlorine Decay vs Time	6-3
Figure 6-2 -	Projected Total Trihalomethane Formation vs Time	6-4
Figure 7-1 –	Well Site 2R System Conceptual Layout	7-4
Figure 7-2 –	Well Site 5R Conceptual Layout	7-7

List of Appendices

Appendix A	Literature References – Section 5
Appendix B	Bench-Top Testing Protocol and Laboratory Results
Appendix C	ProMinent Chlorination Equipment Package and Quote

List of Abbreviations

BSSP	Bacteriological Sample Siting Plan
CBC	California Building Code
CCR	California Code of Regulations
CCR	Consumer Confidence Report
CDC	Centers for Disease Control and Prevention
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
Cl ₂	Chlorine (residual)
CWS	Community water system
DBP	Disinfection byproduct
DDW	Division of Drinking Water (within the SWRCB)
EAR	Electronic Annual Report
EPA	U.S. Environmental Protection Agency
EWG	Environmental Working Group
GPD	Gallons per day
GPH	Gallons per hour
gpm	Gallons per minute
GWR	Ground Water Rule
GWUDI	Groundwater under the direct influence of surface water
HAA5	Haloacetic acids (five regulated)
HDPE	High-density polyethylene
HMBP	Hazardous Material Business Plan
LRAA	Locational running average annual
mA	Milliamperes
MCL	Maximum contaminant level
MG	Million gallons
mg/L	Milligrams per liter
MMWR	Morbidity and Mortality Weekly Report
MPN	Most probable number
MRDL	Maximum Residual Disinfectant Level

NaOCl	Sodium hypochlorite
NaOH	Sodium hydroxide (caustic soda)
ND	Not detected / non-detect
NOM	Natural organic matter
NRC	National Research Council
NSF/ANSI	NSF International / American National Standards Institute
NTPUD	North Tahoe Public Utility District
O&M	Operations and maintenance
OVMWC	Olympic Valley Mutual Water Company
OVPSD	Olympic Valley Public Service District
ppb	Parts per billion
PRV	Pressure reducing valve
psi	Pounds per square inch
PUD	Public Utility District
PWS	Public Water System
RP	Reduced pressure (backflow preventer)
RTCR	Revised Total Coliform Rule
SCADA	Supervisory Control and Data Acquisition
SDWIS	State Drinking Water Information System
SWRCB	State Water Resources Control Board
TC	Total coliform
TOC	Total organic carbon
TCPUD	Tahoe City Public Utility District
TDPUD	Truckee-Donner Public Utility District
TTHM	Total trihalomethanes
VFD	Variable frequency drive

Executive Summary

This Chlorination Feasibility Study was prepared for the Olympic Valley Public Service District (OVPSD or District). This study was conducted in response to a requirement by the California State Water Resources Control Board, Division of Drinking Water (DDW), included in the September 2025 compliance inspection report for the Olympic Valley Public Service District (OVPSD or District), PWS No. CA3110020. The requirement followed a history of four total coliform detections in the OVPSD distribution system. DDW directed the District to evaluate the feasibility of implementing full-time chlorination of its potable water distribution system.

The purpose of this study is to provide the District, regulators and the public with an objective evaluation of the feasibility, water quality implications, operational requirements, regulatory considerations, and estimated costs associated with implementing full-time chlorination.

OVPSD operates a community groundwater system serving approximately 908 metered connections. The District's potable water supply is derived entirely from groundwater wells in Olympic Valley. Four wells are currently active: Wells 1R, 2R, 3, and 5R. Wells 1R, 2R, and 3 discharge through a common manifold at Well Site 2R, while Well 5R operates from a separate well house. The Horizontal Wells are approved sources that are currently maintained as needed to supplement the system capacity, and Well 4 has been abandoned. The active wells provide an estimated combined production capacity of approximately 1,200 to 1,300 gallons per minute.

The District's groundwater is high quality and has low natural organic matter, which is important because organic matter is the primary precursor for regulated disinfection byproducts. The wells are not classified as groundwater under the direct influence of surface water, and no surface water sources are used. The District currently adjusts pH using sodium hydroxide for corrosion control, but under normal operations it does not continuously disinfect the water or maintain a chlorine residual in the distribution system.

OVPSD does periodically chlorinate the system during annual flushing and as needed for corrective or emergency response, such as after a main repair or bacteriological detection. Temporary chlorination equipment is available at Well Sites 2R and 5R, but the existing equipment is not intended for continuous operation. No permanent chlorination system is currently installed at the Zone 3 Booster Station.

Historical bacteriological results reviewed for this study identified four total coliform events between 2008 and 2024. *E. coli* was absent in all samples associated with these events. The absence of *E. coli* indicates that the historical detections do not show evidence of fecal contamination; rather, the available information suggests that the detections were likely associated with sampling conditions, localized distribution system conditions, stagnant water, or other environmental sources. The 2008 and 2018 events resulted in total coliform MCL violations. The 2023 and 2024 events did not result in documented MCL violations, but they were significant enough to prompt DDW direction to evaluate full-time chlorination.

A regional survey was completed to compare OVPSD's experience with other public water systems in the Tahoe-Truckee area. Twenty systems were identified: eleven that operate with continuous or routine chlorination and nine that operate without continuous disinfection. Chlorination is common in the region but not universal, and it is concentrated among the larger systems.

The chlorinated systems surveyed serve 24,872 connections, more than 90 percent of the connections in the survey area, and include the region's major utilities; their median size is about 670 connections. The non-chlorinated systems are generally small, with a median of about 140 connections. OVPSD is the clear exception. At 908 connections, it is the largest non-chlorinated system of those surveyed, more than twice the size of the next largest, and it accounts for about 40 percent of all non-chlorinated connections in the survey group.

Chlorinated systems generally showed strong bacteriological performance, although chlorination does not eliminate the possibility of coliform detections, particularly when distribution system disturbances occur. The unchlorinated systems reviewed were not generally in persistent non-compliance; however, as a group they experienced coliform events more frequently than chlorinated systems.

The regional survey also indicates that disinfection byproduct formation is not a significant concern for chlorinated Tahoe-Truckee area systems based on the available data. Total trihalomethane concentrations in the surveyed chlorinated systems were generally low, with most reported values well below the 80 microgram per liter MCL. Haloacetic acid concentrations were also low, with most systems reporting values below 5 micrograms per liter. No chlorinated Tahoe-Truckee area system reviewed for this study had a documented TTHM or HAA5 MCL violation during the period evaluated. These results are consistent with the low organic matter typically present in Tahoe-Truckee area groundwater.

The primary benefit of full-time chlorination would be the addition of a continuous disinfectant residual throughout the distribution system. This residual would provide an added barrier against microbial contamination after the water leaves the wells, including potential contamination associated with main breaks, seasonal fluctuations in water demand associated with a high number of vacation homes, pressure fluctuations, cross-connections, storage facilities, or localized distribution system conditions. Chlorination would also help control biofilm growth inside pipes and storage facilities. While the District has historically operated successfully without continuous chlorination, maintaining a disinfectant residual would provide an additional layer of public health protection and a measurable indicator of distribution system integrity.

The primary drawbacks of full-time chlorination are additional capital cost, ongoing operation and maintenance requirements, regulatory reporting, chemical handling, and potential customer perception issues related to chlorine taste and odor. If implemented, OVPSD would need to obtain a water supply permit amendment from DDW, prepare supporting engineering documentation, update its Operations and Maintenance Plan, prepare a disinfection byproduct monitoring plan, incorporate residual monitoring and alarms into SCADA, and update its Hazardous Materials Business Plan.

Quarterly DBP monitoring would likely be required initially, with the potential to request reduced monitoring if results remain below regulatory thresholds.

Bench-top water quality testing was conducted using an EPA-based free chlorine hold study protocol to evaluate chlorine decay and DBP formation potential in OVPSD source water. The test was conducted using water collected from the Well Site 2R manifold, representing a blend of Wells 1R and 2R. The initial chlorine dose was 0.56 mg/L. After seven days, the free chlorine residual remained at 0.43 mg/L, the measured TTHM concentration was 2.7 micrograms per liter, and HAA5 compounds were not detected. Total organic carbon was measured at 1.3 mg/L, which is consistent with low DBP formation potential.

The EPA hold study model projected that a detectable chlorine residual would persist for approximately 29 days and that TTHM concentrations at that simulated water age would be approximately 6.9 micrograms per liter. This projected TTHM concentration is far below the 80 microgram per liter MCL. Actual distribution system conditions may differ from the sealed bottle test because chlorine will also react with pipe walls, storage tank surfaces, and biofilm in the system. Therefore, actual chlorine residuals may be lower, and actual TTHM concentrations may be somewhat higher than the model predicts. Even with that limitation, the testing strongly indicates that DBP formation is unlikely to be a limiting factor for OVPSD if full-time chlorination is implemented.

The conceptual chlorination improvements would include permanent sodium hypochlorite feed systems at Well Site 2R and Well Site 5R, including chemical feed pumps, storage tanks, containment, injection equipment, online chlorine analyzers, and SCADA integration. Well Site 2R is relatively favorable for implementation because the building was designed with space to accommodate future chlorine feed equipment. Well Site 5R would require modifications to the existing chemical storage and feed arrangement. At the Zone 3 Booster Station, the conceptual design includes chlorine residual monitoring and a small supplemental hypochlorite feed system intended for contingency use, not routine continuous chlorination.

The estimated capital cost to implement the conceptual improvements is approximately \$260,000, including administrative, engineering, permitting, construction, and contingency costs. The major components include approximately \$74,000 for Well Site 2R, \$70,000 for Well Site 5R, \$46,000 for Horizontal Well Nos. 1 & 2, \$36,000 for the Zone 3 Booster Station, and \$32,000 in administrative and planning costs, including the chlorination study, permit amendment, engineering report, DBP siting and sampling plan, and Operations Plan update. These estimates are budget-level and should be refined during detailed design.

Estimated annual operation and maintenance costs are approximately \$10,600 per year. This includes sodium hypochlorite, laboratory testing, analyzer reagents and maintenance. The estimate assumes a nominal chlorine dose of 0.5 mg/L, annual production similar to recent years, quarterly DBP monitoring, and approximately two hours per week of additional operator time for chemical handling, equipment inspection, calibration, testing, and reporting.

Overall, the study finds that full-time chlorination of the OVPSD potable water system is feasible using conventional sodium hypochlorite feed equipment and monitoring systems. The District's source water quality is favorable for chlorination, and bench-scale testing indicates low DBP formation potential. Implementation would provide an added barrier for public health protection and distribution system water quality, but would also introduce new regulatory, operational, cost, and public communication responsibilities.

Implementation of full-time chlorination would involve the following steps: confirm the regulatory path with DDW, proceed with detailed design, prepare the required permit amendment and monitoring plans, conduct customer outreach, and complete construction and startup and monitoring of chlorine residuals and DBP concentrations in the system.

1.0 Purpose and Scope

This study was conducted in response to a requirement by the California State Water Resources Control Board, Division of Drinking Water (DDW), included in the September 2025 compliance inspection report for the Olympic Valley Public Service District (OVPSD or District), PWS No. CA3110020. The requirement followed a history of four total coliform detections in the OVPSD distribution system. DDW directed the District to evaluate the feasibility of implementing full-time chlorination of its potable water distribution system.

The study addresses the following:

- A description of the existing water system, including sources of supply, pressure zones, storage, and current disinfection practice;
- A review of the District's bacteriological water quality history, including the coliform events that preceded this study;
- A survey of potable water systems in the Tahoe-Truckee area, examining the bacteriological and disinfection byproduct (DBP) experience of both chlorinated and unchlorinated systems in the region;
- An assessment of the potential benefits and drawbacks of transitioning to full-time chlorination;
- Bench-top water quality testing conducted to characterize chlorine decay and DBP formation potential using OVPSD source water; and
- Conceptual design and capital and operations and maintenance cost estimates for chlorination facilities at Well Site 2R, Well Site 5R, Horizontal Well Nos. 1 & 2 and the Zone 3 Booster Station.

2.0 System Description

This section provides an overview of the OVPSD water system including its service area, water sources, existing chemical addition, distribution system, pressure zones, and storage facilities. This background is intended to provide context for the chlorination feasibility evaluation presented in subsequent sections of this report.

2.1 District Overview

The Olympic Valley Public Service District (OVPSD or District) is a California Special District. The OVPSD is responsible for providing potable water and sanitary sewer service within its service area. The service area comprises Olympic Valley which is located approximately seven miles northwest of Lake Tahoe and forty miles southwest of Reno, Nevada.

The OVPSD operates as a community water system (CWS) under California's Drinking Water Program (PWS No. CA3110020) and is regulated by the State Water Resources Control Board, Division of Drinking Water (DDW), Sacramento District.

As of 2025, the District provides service to 908 metered customers. With the Valley being a resort community, the District serves a mix of residential and commercial customers. The District tracks meter types for all its customers, breaking them down into commercial, residential, and multi-family residential categories and subcategories, including irrigation-only meters, fire services, meters for homeowner associations (HOA), and metered connections to the Tahoe City Public Utility District (TCPUD) Tahoe Truckee Forest Tract Water System. A breakdown of customer service categories is presented in Table 2-1

Table 2-1- OVPSD Service Category Summary

Meter Type	Number of Services
Commercial	42
Commercial – Fire Service	16
Commercial – Irrigation	31
H/L (Compound Meters)	3
HOA – Irrigation	14
HOA – Laundry	6
Multi-Family	302
Multi-Family – HOA	2
Multi-Unit Buildings	6
Residential	413
Residential – Multi-Unit	36
Residential – Irrigation	31
Residential – Pool/Spa	2
Split – Commercial/Condo	2
TCPUD	2
System Total	908

Source: Draft Water Master Plan

The District's service area is adjacent to the Olympic Valley Mutual Water Company (OVMWC), a separate privately operated water system. In 2024, OVPSD and OVMWC completed construction of an emergency intertie connecting the two water systems. The intertie includes a booster pump station capable of transferring water from the OVPSD distribution system into the OVMWC system under higher-pressure conditions, and a pressure reducing valve (PRV) station to allow water to flow from the OVMWC system into OVPSD at a regulated pressure. The interties are for emergency conditions and not routinely used.

2.2 Sources of Supply

OVPSD's water supply is derived entirely from groundwater. The system draws from the aquifer underlying Olympic Valley. The water is high quality with low natural organic matter (NOM) content - directly relevant to the disinfection byproduct (DBP) formation potential discussion in Section 6 of this report. There are no surface water sources and the wells are not classified as groundwater under the direct influence of surface water (GWUDI), which would require treatment.

Four wells are currently in active service: Well 1R, Well 2R, Well 3, and Well 5R. Wells 1R and 3 discharge to a common manifold at the Well 2R site. The OVPSD measures well production at each well. Well 5R operates independently from its own well house. The District also operates two (2) horizontal well sources, Horizontal Wells 1 and 2.

The active wells collectively provide an estimated production capacity of approximately 1,200 to 1,300 gpm (2025 Water and Sewer System Report). Well capacity at Well 2R varies seasonally, influenced by local aquifer levels. When in operation, the horizontal wells provide a combined capacity of up to 60 gpm based on historical SCADA data.

The District currently adds sodium hydroxide (caustic soda) to the water supply to adjust pH which is normally adjusted to approximately 7.5 for corrosion control. Caustic soda is injected at the manifold at Well Building 2R (serving Wells 1R, 2R, and 3) and at the discharge line at Well Building 5R. Both well buildings are equipped with SCADA telemetry, and existing chemical feed infrastructure for caustic soda (day tanks, metering pumps, and an injector). Secondary containment is provided for the caustic soda storage facilities.

The Well 2R building was designed and constructed with space provisions to accommodate future addition of chlorine feed equipment, which reduces the complexity of adding sodium hypochlorite injection at that site. Well 5R will require modification to the existing caustic soda storage and feed systems if full time chlorination is implemented. Table 2-2 summarizes the active production sources.

Table 2-2- OVPSD Active Groundwater Sources

Source ID	Status	Avg. Capacity (gpm)	Zone Served/Discharge Point	Existing Chemical Feed
Well 1R	Active	420	Zone 1/Well 2R Building (manifold)	(a)
Well 2R	Active	340	Zone 1/Well 2R Building	NaOH (at manifold)
Well 3	Active	115	Zone 1/Well 2R Building (manifold)	(a)
Well 5R	Active	425	Zone 1/Well 5R Building	NaOH (at discharge)
Horizontal Wells 1 & 2 ^(b)	Active	60	Zone 2/Zone 2 Distribution	None

Notes:

- a) Well water is treated at Well Site 2R.
- b) Horizontal wells are approved sources with active status but are currently used as a standby source. Capacity is based on review of historical SCADA data.

Annual production from all sources for 2023 through 2025 is included in Table 2-3. This information was used to estimate chemical costs in Section 8. Data was obtained from the OVPSD Annual Water and Sewer Reports.

Table 2-3 - Annual Production – All Sources

Year	Production, Mgal
2023	97.8
2024	101.1
2025	103.5

2.3 Distribution System — Pressure Zones and Storage

The OVPSD distribution system operates across three pressure zones designated Zone 1, Zone 2, and Zone 3, which correspond to progressively higher elevations within the service area. Each zone is served by dedicated storage. Table 2-4 summarizes the pressure zone configuration.

Table 2-4- OVPSD Pressure Zone Configuration

Zone	Pressure Range (psi)	Water Sources	Storage Tank	Storage (gal)
Zone 1	100–120	Wells 1R, 2R, 3, 5R	West Tank	1,130,000
Zone 2	115–140	Horizontal Well; Zone 2 (East) Booster Pump Station from Zone 1	East Tank	500,000
Zone 3	100–105	Zone 3 Booster Pump Station from Zone 2	Zone 3 Tank	135,000

2.4 Existing Operations — Disinfection Practice

OVPSD operates as an unchlorinated groundwater system. Under normal operating conditions, no disinfectant is added and no chlorine residual is maintained in the distribution system. The District's wells discharge directly into the distribution system following pH adjustment with caustic soda; no further treatment is applied on a continuous basis. This operating mode has been the District's practice since its inception.

Periodically the OVPSD does add chlorine to the water supply. The addition of chlorine is limited in frequency and duration. Historically the addition of sodium hypochlorite occurs under two conditions.

- 1) 12.5% Sodium hypochlorite is added during annual system flushing over an approximately one-month period each year. Reported distribution system residuals ranged from 0.08 to 0.47 mg/L during flushing operations in 2025.
- 2) Sodium hypochlorite may be applied on an emergency or corrective basis when system conditions warrant, such as following a main break, repair, or positive bacteriological detection event requiring remediation.

Temporary/emergency chlorination equipment is in place at both Well sites 2R and 5R. Temporary sodium hypochlorite metering pumps and tanks are installed at Well Building 2R (serving the Wells 1R, 2R, and 3 manifold) and at Well Building 5R. The equipment supports temporary and emergency chlorination but is not intended to operate continuously. No chlorination equipment is currently installed at the Zone 3 Booster Pump Station, which is served downstream of Zones 1 and 2. Zone 3 chlorine residual is achieved by increasing the chlorine dose in Zone 1 and that water is pumped into Zone 3 during normal operations.

3.0 Bacteriological Water Quality Review

Routine bacteriological monitoring is conducted monthly in accordance with the District's Bacteriological Sample Siting Plan (BSSP). Over the period reviewed (2008–2024), four positive total coliform events have been recorded in the distribution system; *E. coli* was absent from all samples collected in each event. Each event is briefly described below, with additional sample data, regulatory actions, and corrective measures presented in Table 3-1.

E. coli and fecal coliform originate from the intestinal tracts of warm-blooded animals and indicate potential fecal contamination. The consistent absence of *E. coli* in samples from the OVPSD system suggests that positive detections reflect environmental or sampling-related sources rather than fecal contamination of the water supply in the four historical positive sampling events.

3.1 November 2008 Total Coliform Positive

Routine distribution system samples collected in November 2008 returned total coliform positive results at the Everline Resort (formerly Resort at Squaw Creek) sample sites. Investigation by the District identified inadequate sample tap flushing and compromised sample site conditions during the routine sample that tested total coliform positive at 400 Resort Road during the routine monthly sampling event. A repeat sample was collected at 410 Resort Road which also had a positive total coliform.

The cause of the positive sample at 400 Resort Road was believed to be insufficient flushing of the service line prior to the sample collection; the District formally requested invalidation of the sample from CDPH (then operating as California Department of Public Health). The positive result at the repeat location was thought to have been due to improper flushing of a bypass line at the sample site and the District requested the sample be invalidated. There is no record that the CDPH invalidated the samples in the project file. A public notification was issued by the OVPSD. Follow up samples were absent of total coliform; however, the CDPH issued a MCL violation of the Total Coliform Rule that was resolved and closed by the CDPH and the system was considered in compliance. No citation was issued by the CDPH.

3.2 November 2018 Total Coliform Positive

A total coliform positive result occurred during November 2018 routine sampling and a second positive result occurred during the repeat sampling and triggered a RTCR Level 1 Assessment completed November 28, 2018. The assessment identified inadequate flushing of the routine sample tap at 410 Forest Glen Road and a leaking tap stem at 390 Forest Glen Road as the probable cause of the contamination. No system contamination was identified. DDW determined that the two positive results constituted a violation of the total coliform MCL under CCR Title 22, Section 64426.1, and issued Citation No. 01-02-19C-003 on March 13, 2019, directing the District to comply with

monitoring requirements and notify all customers of the MCL violation. No *E. coli* was detected in any sample.

3.3 October 2023 Total Coliform Positive

Routine sampling in October 2023 returned a total coliform positive result at the Zone 3 Booster Station and the other at the Everline Resort sample site. An RTCR Level 1 Assessment was completed and submitted to DDW; repeat and source samples at Wells 1R, 2R, and 5R all returned absent results. No *E. coli* was detected in any sample.

Three deficiencies were identified in the Level 1 Assessment:

- Possible stagnant water in Zones 2 and 3
- Possible loss of “cookie” from contractor hot-tap on ductile iron pipe
- Possible contamination from tank divers/inspectors

District staff flushed and applied temporary chlorine into system. No citation or MCL violation was issued.

3.4 January 2024 Total Coliform Positive

A single total coliform positive result was detected at the Zone 3 Booster Station during routine sampling on January 2, 2024, with zero chlorine residual recorded at the sample site. All six repeat and triggered source samples collected on January 4, 2024 returned absent results for both total coliform and *E. coli*. No *E. coli* was detected. The positive total coliform sample did not cause an MCL violation. The project files did not include information regarding likely cause. No MCL violation or citation issued.

Table 3-1 – Total Coliform Sample Summary

Date	Initial Positive Sample	TC / E. coli Result	Cl ₂ Residual	Repeat Samples (Location, Date, TC Result)	Triggered Source Samples (GWR)	Coliform Type	MCL Violation?	Probable Cause	Corrective Action	DDW Actions / Response	Outcome / Resolution	Source Documents
November 8, 2008	400 Squaw Creek Rd Routine sample	TC: Present E. coli: Absent	Not reported Presumed ND—zero Cl ₂ system-wide	10 repeat samples collected 11/8/2008 1 TC+ at 390 Forest Glenn Rd; E. coli absent Original routine site and all other 9 repeats: TC absent Triggered well source samples: TC absent	Pre-GWR era—GWR not in effect; no triggered source sampling required	TC only (E. coli absent)	YES — MCL violated SDWIS Viol. No. 2009-902001 Period: Nov 1–30, 2008	Inadequate flushing of routine tap at 400 Squaw Creek Rd prior to sampling. Leaking stem valve at repeat sample tap at 410 Squaw Creek Rd (downstream of RP backflow preventer with corrosion inhibitor injection point) District requested sample invalidation for Sample No. 9172 (410 Squaw Creek Rd repeat)—DDW response not in project file	Notified CDPH 11/9/2008 upon receiving lab results Flushed distribution system in affected pressure zone Requested invalidation of Sample No. 9172 (repeat tap at 410 Squaw Creek Rd) Committed to re-plumb both sample sites and conduct operator retraining	Violation recorded with determination date 12/1/2008 No formal citation issued Compliance achieved 12/22/2008 per SDWIS Tier 2 public notification required (Note this predates the RTCR – no Level 1 or 2 Assessment) No citation issued.	Resolved SDWIS compliance achieved 12/22/2008 Invalidation outcome not confirmed in project file	Sample invalidation letter (J. McGraw to CDPH, 11/19/2008) Nov 2008 Monthly Summary of Distribution System Coliform Monitoring SDWIS Viol. No. 2009-902001 (CA Drinking Water Watch)
November 8, 2018	410 Forest Glen Rd Routine sample <i>Collected 11/6/2018</i>	TC: Present E. coli: Absent	Not reported in lab results Presumed ND—zero Cl ₂ system-wide	7 repeat samples collected 11/8/2018 1 TC+ at 390 Forest Glenn Rd; E. coli absent Original routine site re-sample: TC absent All remaining 5 repeats: TC absent Additional check samples collected 11/13/2018: all TC absent	4 triggered source samples from active supply wells collected 11/8/2018 All TC absent, E. coli absent	TC only (E. coli absent)	YES — MCL violated SDWIS Viol. No. 2019-902002 Period: Nov 1–30, 2018 Determination date: 12/10/2018	Inadequate flushing of routine tap for initial routine positive sample. Water leaking around stem of repeat sample tap at 390 Forest Glenn Rd (also TC+) on the repeat.	Notified DDW 11/7/2018 upon receiving lab results Collected additional check samples 11/13/2018 (all TC absent) Submitted Level 1 Assessment 11/28/2018 Addressed both deficient sample taps Issued Tier 2 public notification to customers	Citation 01-02-19C-003 issued 3/13/2019 (S.W. Watson, P.E., Lassen District Engineer) District directed to: (1) comply with §64426/64426.1 in all future periods; (2) notify all customers of MCL violation by 4/10/2019 Level 1 Assessment submitted 11/28/2018 Tier 2 public notification required Compliance achieved 4/1/2019 per SDWIS	Resolved SDWIS compliance achieved 4/1/2019 Citation closed	Nov 2018 Monthly Summary of Distribution System Coliform Monitoring Lab results (Cranmer Engineering, Work Order 239625) State Citation No. 01-02-19C-003 (3/13/2019) SDWIS Viol. No. 2019-902002 (CA Drinking Water Watch) Tier 2 notice (project file)
Oct 2023	(1) Zone 3 Booster Station Routine; Sample GFJ0070-04 <i>Collected 10/3/2023, 8:25 AM</i> (2) Resort at Squaw Creek	TC: Present (both sites) E. coli: Absent (both sites) <i>2 of 3 routine sites positive</i>	ND at all 3 routine sample sites pH range: 7.20–7.32	9 repeat samples collected 10/5/2023 (Work Order GFJ0293): 1 TC+ at 3103 Sierra Ridge Place (GFJ0293-01); E. coli absent; Cl ₂ ND 8 remaining repeats: all TC absent Additional repeats collected 10/9/2023 (1	3 triggered source samples collected 10/5/2023 (Work Order GFJ0293): Well 1R (GFJ0293-02): TC absent, E.	TC only (E. coli absent all samples)	UNCERTAIN — see note Monthly Summary form indicates MCL violated (box checked “No” for monthly MCL compliance); however, no	Three deficiencies identified in Level 1 Assessment: (1) Possible stagnant water in Zones 2 and 3 (2) Possible loss of “cookie” from contractor hot-tap on ductile iron pipe	Emergency disinfection of entire distribution system (completed 10/7/2023) Flushed all dead-end mains in each pressure zone (completed 10/16/2023) Required tank divers to perform future dives only during routine annual chlorination event (implemented 10/7/2023)	DDW received Level 1 Assessment prepared and submitted 10/26/2023 Tier 2 public notification issued DDW review of Oct 2023 and Jan 2024 events by S.W. Watson, P.E. and No formal citation issued; no SDWIS MCL violation recorded for this event	Chlorination feasibility study (this report) is DDW-directed outcome <i>⚠ MCL violation status to be confirmed with DDW</i>	Oct 2023 Monthly Summary of Distribution System Coliform Monitoring (GWR Triggered) Lab Work Orders GFJ0070 and GFJ0293 (Cranmer Engineering, Inc.) RTCR Level 1 Assessment form (signed 10/23/2023) BSSP Review Letter (DDW, 9/5/2023) CA Drinking Water Watch—no SDWIS violation recorded for 2023

Date	Initial Positive Sample	TC / E. coli Result	Cl ₂ Residual	Repeat Samples (Location, Date, TC Result)	Triggered Source Samples (GWR)	Coliform Type	MCL Violation?	Probable Cause	Corrective Action	DDW Actions / Response	Outcome / Resolution	Source Documents
	Routine; Sample GFJ0070-03 Collected 10/3/2023, 8:45 AM 1810 Olympic Valley Rd: TC absent			site) and 10/11/2023 (2 sites): all TC absent Repeat sites included Zone 3 Booster, 272 Sierra Crest Tr, 3103 Sierra Ridge, Everline Resort, Everline Midrise, 3122 Mountain Links, 3013 Sierra Risge, 250 Sierra Crest	coli absent, Cl ₂ ND Well 2R: TC absent, E. coli absent, Cl ₂ ND Well 5 (GFJ0293-04): TC absent, E. coli absent, Cl ₂ ND		violation recorded in SDWIS for 2023	(3) Possible contamination from Tank divers/inspectors				
Jan 2024	Zone 3 Booster Station Routine Sample Collected 1/2/2024 Other 2 routine sites (1810 Olympic Valley Rd; Everline Resort): TC absent	TC: Present E. coli: Absent Cl ₂ : ND, pH 7.61	ND at all 3 routine sample sites	Six repeat/triggered samples collected 1/4/2024 Zone 3 Booster TC absent, Cl ₂ ND 272 Sierra Crest Trail : TC absent, Cl ₂ ND 3103 Sierra Ridge Place: TC absent, Cl ₂ ND All E. coli absent across all repeat samples	Triggered source samples collected 1/4/2024 Well 1R: TC absent, E. coli absent, Cl ₂ ND Well 2R: TC absent, E. coli absent, Cl ₂ ND Well 5R: TC absent, E. coli absent, Cl ₂ ND	TC only (E. coli absent all samples)	NO MCL violation No SDWIS violation recorded	Probable cause not documented in project file for the January 2024 event Same location (Zone 3 Booster Station) as October 2023 event.	Repeat and triggered source sampling completed within 24-hour window required by RTCR All follow-up results negative No additional corrective actions separately documented for this event	DDW correspondence (Watson/Peterson) identified Jan 2024 TC+ as second treatment technique trigger within rolling 12-month period No formal citation issued; no SDWIS MCL violation recorded	Chlorination feasibility study (this report) is DDW-directed outcome	Jan 2024 Monthly Summary of Distribution System Coliform Monitoring (GWR Triggered) CA Drinking Water Watch—no SDWIS violation recorded for Jan 2024

Notes: All E. coli results were absent across all four events and all sample types. Chlorine residual was not detected (ND) at all distribution system sample sites in all events where reported, consistent with the District operating as an unchlorinated system. SDWIS data accessed May 2025 via CA Drinking Water Watch (PWS No. CA3110020). Abbreviations used in this table: TC = total coliform; ND = not detected; Cl₂ = chlorine residual; MPN = most probable number (col/100 mL); RP = reduced pressure (backflow preventer); GWR = Ground Water Rule.

4.0 Survey of Regional Systems

As part of this feasibility study, Hydros Engineering conducted a survey of potable water systems serving the Tahoe area. The intent of this survey was to investigate the effect of chlorination on bacteriological and DBP water quality in systems in the area with similar source water and operating environment.

Initial outreach to system operators by telephone was attempted but produced limited responses. The survey was therefore conducted primarily through review of publicly available regulatory data. Data sources included the California DDW State Drinking Water Information System (SDWIS), accessed through the DDW Drinking Water Watch portal; Consumer Confidence Reports (CCRs) retrieved directly from agency websites and the California DDW Electronic Annual Report (EAR) portal; and multi-year water quality averages from the Environmental Working Group (EWG) Tap Water Database.

A total of 20 public water systems were identified in the Tahoe-Truckee area for this survey. Of these, eleven systems operate with continuous or routine chlorination and nine operate without continuous disinfection. The size and number of connections served vary as discussed below.

4.1 Chlorinated Systems — Bacteriological and DBP Outcomes

Eleven of systems surveyed in the Tahoe-Truckee area were identified as operating with continuous chlorination. These included:

- Truckee-Donner Public Utility District (TDPUD), which serves the largest population in the region across its Truckee Main system and a small separate system in Hirschdale;
- Northstar Community Services District, which operates the Northstar system and the Martis Valley system;
- Tahoe City Public Utility District (TCPUD), which operates the Tahoe City Main, McKinney/Quail around the western and north shore of Lake Tahoe;
- North Tahoe Public Utility District (NTPUD) Dollar Cove system, which receives pre-chlorinated water from TCPUD and North Tahoe PUD's Carnelian Woods system
- Alpine Springs County Water District, and
- Olympic Valley Mutual Water Company (OVMWC) also applies chlorination as a preventative measure when the production wells are operated due to the age and conditions of the wells. The OVMWC relies on the horizontal well during low demand periods in the winter. The horizontal well is not chlorinated.

The bacteriological water quality record for the continuously chlorinated systems is generally strong. The largest systems - TDPUD Main, TDPUD Hirschdale, TCPUD Tahoe City Main, and NTPUD Dollar Cove - reported zero total coliform detections. Northstar's two systems have similar records with no coliform violations identified in available data. Alpine Springs County Water District chlorinates and had a total coliform violation in 2019.

OVMWC accumulated seven coliform MCL violations between 2003 and 2010 before implementing its current operational practices which include chlorination of the wells. The OVMWC implemented major capital improvement projects including replacement of old pipelines, replacement of a redwood tank with a new steel tank and rehabilitation of their wells. All these factored into the improved bacteriological water quality. The OVMWC chlorinates water from the two production wells when in use during the higher demand periods. During low demand periods through the cooler months the OVMWC system relies primarily on the horizontal well for water supply and the wells are used only periodically. The horizontal well is not chlorinated during that time.

Disinfection byproducts are a concern when a disinfectant is used. When chlorine is used for disinfection, the disinfection byproducts of most concern include total trihalomethanes (TTHMs) and haloacetic acids (HAA5s). TTHM and HAA5s form when chlorine reacts with naturally occurring organic material in water. The federal and state MCLs are 80 parts per billion (ppb) for TTHMs and 60 ppb for HAA5s. Among the surveyed chlorinated systems, measured TTHM concentrations ranged from non-detect to approximately 24 ppb, with most systems reporting values well below 30 ppb. HAA5 concentrations were similarly low, with the majority of systems reporting values under 5 ppb. No chlorinated system in the survey had a TTHM or HAA5 MCL violation in the period reviewed.

The low DBP concentrations observed across the region are consistent with the well-documented water quality characteristics of the Tahoe-Truckee area. The groundwater systems in this area draw from aquifers with very low concentrations of NOM - the primary precursor to DBP formation. TDPUD's Truckee Main system, for example, reported a 2024 average TTHM of 12 ppb. Even Tahoe City PUD's Tahoe City Main system with source water from wells (Highlands #1, Highlands #2, TC Well #2, TC Well #3, Well #4, Tahoe Tavern Well) that are chlorinated reported non-detect for disinfection byproducts in 2024.

4.2 Non-Chlorinated Systems — Bacteriological Outcomes

Nine of the 20 Tahoe-Truckee area systems surveyed operate without continuous disinfection. These include:

- OVPSD (the subject of this study),
- TCPUD Alpine Peaks, Tahoe Swiss Village, Glenridge, and Kilner Park.
- A number of smaller private and special district water companies serving the west and north shore communities. Together these systems serve a broad range of population sizes, from systems of fewer than 50 connections to OVPSD's approximately 900 connections.

Many of the unchlorinated systems have good bacteriological compliance records. TCPUD Alpine Peaks, McKinney Water District, and Ward Well Water Company all show either no coliform violations or only a single isolated event in the period reviewed. Where isolated events have occurred, the violations were generally resolved within weeks and have not recurred.

TCPUD's Timberland system, which applies chlorination only for corrective purposes and is not continuously disinfected, recorded three separate coliform MCL violations between 2018 and 2020 as well as a Level 1 Assessment trigger in 2024 related to a compromised storage tank vent.

However, a pattern does emerge when the violation history of the surveyed systems is reviewed. The non-chlorinated systems as a group have recorded coliform violations more frequently than the continuously chlorinated systems. Timberland recorded three MCL violations three between 2018 and 2020 and again in 2024), and all four were resolved with a single compliance agreement in 2024. Talmont Resort Improvement District recorded a coliform MCL violation in 2023. Tahoe Park Water Company recorded coliform violations in 2017 and earlier years. OVPSD itself recorded a coliform MCL violation in November 2018, followed by Level 1 Assessment triggers in October 2023 and January 2024.

It would be an overstatement to say that unchlorinated systems in the Tahoe-Truckee area are in persistent non-compliance - many have operated for years without incident. However, the data does suggest that, as a group, non-chlorinated systems in this region have experienced coliform events at a higher rate than their continuously chlorinated counterparts. Most of those events are isolated and attributable to specific triggering conditions such as distribution system disturbances, seasonal high flows, or infrastructure deficiencies rather than to the absence of chlorination alone. Nonetheless, the absence of a disinfectant residual means there is a persistent barrier against microbial regrowth or recontamination within the distribution system once water leaves the source.

Because the non-chlorinated systems do not apply disinfectant, they are not required to monitor for TTHMs or HAA5s.

4.3 Chlorinated vs Non-Chlorinated Service Count

Counted by the number of systems, the systems surveyed look almost evenly split between the two practices. That count, however, gives the same weight to a system serving one connection as to one serving more than 13,000. It does not reflect how many customers actually receive chlorinated water.

When the systems are compared by service connections, the picture changes considerably. The 20 systems serve approximately 27,100 connections in total. About 24,900 of these (92 percent) are served by systems that chlorinate full-time, and about 2,200 (8 percent) receive non-chlorinated water. The result does not depend on the region's largest system. Excluding Truckee-Donner PUD's Main system, chlorinated systems still serve about 11,100 connections, or 83 percent of the remaining total. Table 4-1 shows the breakdown based on the number of services within the systems.

Table 4-1 –Tahoe-Truckee Regional Systems Chlorination Practices

District Name	Connections	Water Source ^(b)	District Name	Connections	Water Source ^(b)
Truckee-Donner PUD (TDPUD) – Main	13,764	GW	Olympic Valley PSD (OVPSD)	908	GW
North Tahoe PUD (NTPUD) – Main	3,763	SW	TCPUD Tahoe Swiss Village	385	GW
Tahe City PUD (TCPUD) Tahoe City – Main	2,921	GW	Talmon Resort Improvement District	347	GW
Northstar CSD – Martis Valley	1,343	GW	Ward Well Water Company	226	GW
Northstar CSD	959	GW	TCPUD – Timberland	138	GW
Alpine Springs County Water District	672	GW	TCPUD – Alpine Peaks	98	GW
TCPUD - McKinney/Quail	571	SW	Tahoe Park Water Company	96	GW
NTPUD – Carnelian Woods	298	GW	TCPUD – Glenridge	46	GW
NTPUD – Dollar Cove	286	GW	TCPUD – Kilner Park	1	GW
Olympic Valley Mutual Water Co. (OVMWC)	270	GW			
TDPUD – Hirschdale	25	GW			
Total	24,872		Total	2,245	
Notes:					
a) Data source California Drinking Water System Area Boundaries (SABL) date range 2021-2026					
b) SW - Surface Water; GW - Ground Water					

The chlorinated systems include the region's largest utilities, and their median size is about 670 connections. The non-chlorinated systems are mostly small, with a median of about 140 connections; eight of the nine serve fewer than 400. OVPSD is the clear exception. At 908 connections, it is the largest non-chlorinated system in the survey, more than twice the size of the next largest (TCPUD Tahoe Swiss Village, 385). OVPSD alone accounts for about 40 percent of all non-chlorinated connections in the survey area. It is also larger than six of the eleven chlorinated systems.

Non-chlorinated service is concentrated in small systems, and OVPSD is an outlier among them in size. By connection count, OVPSD more closely resembles the systems that chlorinate than those that do not.

4.4 Summary of Truckee-Tahoe Systems Surveyed

The regional survey yields several observations that are relevant to OVPSD's evaluation:

- The 20 systems surveyed serve about 27,100 service connections in total. Systems that chlorinate full-time account for about 24,900 of them (92 percent), and the remaining 2,200 (8 percent) receive unchlorinated water.
- Routine chlorination is more common among the larger systems surveyed. Seven of the eight systems with more than 500 service connections utilize routine or continuous chlorination; OVPSD is the exception. This observation is specific to the systems surveyed and should not be interpreted as a regulatory requirement or universal industry practice.
- Positive coliform events occur in both chlorinated and unchlorinated systems. Chlorination reduces but does not eliminate the possibility of a coliform detection - distribution system conditions, infrastructure condition, and operational practices also play important roles. Among the surveyed systems, the coliform MCL violation rate was lower for continuously chlorinated systems than for unchlorinated systems, though the sample sizes are modest and the difference should not be overstated.
- DBP formation is not a significant concern in the Tahoe Region. Every chlorinated groundwater system for which data was available reported TTHM concentrations well

below the 80 ppb MCL, with most values below 25 ppb. HAA5 concentrations were similarly low. No chlorinated Tahoe-Truckee area system has recorded a TTHM or HAA5 MCL violation based on the data set evaluated.

- Sodium hypochlorite is the disinfectant of choice across the chlorinated systems in the region.

5.0 Assessment of Chlorination - Positives and Negatives

This section provides an evaluation of the potential benefits and drawbacks of transitioning to continuous, year-round chlorination as a primary disinfection strategy. The assessment is provided as information for consideration and is not a recommendation for or against implementation for full-time chlorination.

5.1 Potential Benefits of Full-Time Chlorination

The primary benefit of continuous chlorination is the addition of a sustained barrier against microbial contamination within the distribution system. The following summarizes the key protective benefits supported by the published literature. A summary of the references cited in this section is included in Appendix A.

5.1.1 Inactivation of Waterborne Pathogens

While OVPSD's groundwater sources have historically produced high-quality water, the absence of a disinfectant residual means there is no ongoing disinfectant defense against microbial contamination events (e.g. main or service line breaks, low system pressure and backflow events) after the well water enters the distribution system piping. The OVPSD has measures and emergency plans in place to prevent these events from occurring and means to respond to these types of situations to protect water quality within the system. Historically these procedures have been effective protecting water quality. The addition of full-time disinfection would provide an additional barrier against microbial contamination.

Chlorine has been used as a primary drinking water disinfectant for over a century and is widely regarded as the standard against which other disinfectants are measured (NRC, 1980 [Ref. 1]). It is effective against a broad range of bacteria and viruses under typical groundwater conditions. The CDC notes that low concentrations of chlorine used in drinking water treatment do not pose a health risk to consumers and are specifically intended to kill germs before water reaches the tap (CDC, 2024 [Ref. 2]).

A chlorine residual maintained throughout the distribution system provides additional protection against contamination that may be introduced at the source or after the point of treatment. This includes intrusion events associated with source contamination at wells, main and service line breaks, and cross-connections. Research cited by the EPA confirms that maintaining a disinfectant residual reduces the risk of contamination reaching customers and provides an indicator of system integrity (EPA, 2006 [Ref. 3]); (EPA, 2023 [Ref. 4]).

National CDC surveillance data covering 2015–2020 identified 214 drinking water outbreaks resulting in 2,140 illnesses, 563 hospitalizations, and 88 deaths. Among enteric illness outbreaks where the water source was known, wells accounted for 93 percent of cases. No disinfection was reported in the large majority of those enteric illness outbreaks (CDC/MMWR, 2024 [Ref. 5]). While OVPSD's well

infrastructure is of a different character than private wells or small noncommunity systems, the data underscore that groundwater is not inherently pathogen-free, particularly when the distribution or storage facilities have been compromised, and that the absence of disinfection is a recurring contributing factor in outbreak investigations. A continuous chlorine residual provides a safety margin that reduces, though does not eliminate, this risk.

5.1.2 Biofilm Control

All distribution systems develop biofilm communities on pipe interior surfaces over time. Without a disinfectant residual, biofilm can harbor and sustain pathogenic organisms, including *Legionella* and other pathogens. AWWA guidance identifies biofilm control as a critical function of a maintained disinfectant residual, and recent peer-reviewed research confirms that even low levels of chlorine meaningfully suppress bacterial communities within distribution system biofilms (AWWA, July 2025 [Ref. 6]). The District flushes the entire system annually and adds chlorine during the flushing to control biofilm in the system. This practice has been effective in managing water quality in the system.

5.1.3 Seasonal Demand Fluctuations and Water Quality

As a resort community, OVPSD sees large swings in water demand over the year. Demand is highest in summer, when irrigation drives usage, and spikes again during the winter ski season, when visitors occupy hotels, condominiums, and second homes. In between, the spring and fall shoulder seasons bring sharply lower demand. Much of the Valley's housing is second homes that sit unoccupied for extended periods, and hotels and short-term lodging serve a transient population whose water use rises and falls with visitation.

During low-demand periods, water moves slowly through the system and stays in the distribution mains, storage tanks, and service lines longer. EPA identifies this increased "water age" as a condition that raises the potential for microbial growth and degrades water quality; decreased water demand and dead-end mains are among its listed causes (EPA, 2023 [Ref. 4]). AWWA similarly identifies reducing water age, including during seasonal low-demand periods, as a primary strategy for protecting distribution system water quality (AWWA, July 2025 [Ref. 6]). OVPSD's own sampling history is consistent with this concern:

Timing of positive events. Three of the four total coliform positive events occurred during the fall shoulder season (November 2008, November 2018, and October 2023).

Stagnation cited as a cause. The October 2023 Level 1 Assessment identified possible stagnant water in Zones 2 and 3 as a contributing deficiency.

The same stagnation occurs on the customer side of the meter. Water can sit for weeks in:

- Service lines
- Plumbing in second homes that are vacant between visits
- Piping, storage, and hot water systems in large commercial buildings and hotels during periods of low occupancy.

Stagnant, warm water in building plumbing creates conditions favorable to bacterial growth, including opportunistic pathogens such as *Legionella*. CDC surveillance data for 2015–2020 identify stagnation from sporadic occupancy as a contributing factor in *Legionella* and other biofilm-associated drinking water outbreaks, and link hotels, motels, and lodges to 16 percent of those outbreaks (CDC/MMWR, 2024 [Ref. 5]).

A low chlorine residual maintained throughout the distribution system would help limit and slow bacterial growth during low-demand periods. It would also provide an ongoing barrier in the mains, tanks, and service lines, where water age is highest in the shoulder seasons (EPA, 2023 [Ref. 4]). Inside buildings, a residual entering from the distribution system will dissipate as water stagnates, so it is not a complete safeguard for customer plumbing. However, water that enters a building with a disinfectant residual starts from a better baseline than water that enters with none. Building owners remain responsible for managing water quality within their own plumbing systems.

5.2 Potential Drawbacks to Full-Time Chlorination

Transitioning to full-time chlorination will result in additional capital and operational costs, additional regulatory requirements and additional work for operations staff. A summary of drawbacks associated with full time chlorination is included below.

5.2.1 Operations and Maintenance

Continuous chlorination adds ongoing operator responsibilities: daily or weekly residual checks at monitoring points, chemical inventory management, equipment inspection, and periodic calibration of feed pumps and analyzers. The overall increase in O&M burden is expected to be modest and would integrate easily based on current operations. Estimated time and expenses related to staff time, purchase of chemicals and ongoing instrumentation costs are included in Section 8. – Implementation Costs.

5.2.2 Capital and Operating Costs

Implementing continuous chlorination requires capital investment in chemical feed and monitoring equipment, chemical storage tanks, and associated site modifications at Wells 2R and 5R and the Zone 3 Booster Pump Station. Ongoing costs for sodium hypochlorite purchases, routine equipment maintenance, and operator time will be necessary. A cost estimate for operation and maintenance is provided in Section 8.

5.2.3 Taste, Odor, and Public Perception

Some customers may notice a chlorine taste or odor, particularly at higher residual concentrations or at points of low water age in the system. Taste and odor sensitivity varies widely among individuals. Chlorine taste and odor is a common source of customer concern in communities with high-quality source water and can be a factor in customer concerns around chlorination decisions. At typical residual target levels considered by the OVPSD (e.g., 0.5 to 1.0 mg/L at the system entry point), minimal or no perceptible change is anticipated. Community outreach and providing information regarding improved water quality protection would be key to successful implementation.

5.2.4 Regulatory Reporting Requirements

A number of regulatory related items would be necessary as identified below.

- Water Supply Permit Amendment. A water supply permit amendment will be necessary prior to implementation of full-time chlorination. The amendment would include engineering documentation for the proposed system including engineering report and improvement plans. The amendment must be submitted to and approved by the DDW.
- Preparation of DBP Monitoring Plan. The DBP monitoring plan documents sample locations, the collection schedule, and the method for calculating compliance with TTHM and HAA5 MCLs based on the locational running average annual (LRAA). Once approved by DDW, the plan must be made available for public inspection, and any future revisions require DDW approval.
- Update the existing Operation and Maintenance Plan (O&M Plan). The O&M Plan must be updated to reflect the operational requirements associated with full-time chlorination and would include operating and maintenance guidance for the new system.
- Water Quality Testing. Additional water quality testing related to DBPs. DBP monitoring will be the most significant change to the current monitoring and reporting requirements.
- Regulatory Reporting. Additional residual reporting, monitoring for DBPs and public notification requirements will be required. The District will also be subject to the Maximum Residual Disinfectant Level (MRDL) for free chlorine of 4.0 mg/L. The SCADA and alarming system will need to incorporate the new monitoring and alarming functionality.
- Environmental. The installation of chlorination equipment at existing well sites should fall under CEQA Categorical Exemption Class 2 (Replacement or Reconstruction) or, more likely, Class 1 (Existing Facilities), as it involves minor alteration to existing public water utility structures with no expansion of use or capacity - a category DDW-directed water quality improvement projects routinely qualify under. Under an exemption the District is not required to prepare an Initial Study, Negative Declaration, or Environmental Impact Report, which eliminates a significant cost. The District should seek input from a qualified CEQA consultant.

These regulatory requirements are manageable, but will require additional staff time and coordination with DDW.

5.2.5 Disinfection Byproduct (DBP) Monitoring

When chlorine is added to water, it can react with naturally occurring organic carbon to form DBPs including TTHMs and HAA5. DBPs are subject to EPA and DDW MCL requirements. Quarterly monitoring will be necessary initially. If DBP levels are less than 50-percent of the MCLs for both TTHMs and HAA5s as calculated as the LRAA then reduced monitoring may be possible if approved by DDW. The quarterly monitoring would be reduced to once annually during the warmest month of the year if reduced monitoring were approved. Monitoring for DBP will be in accordance with the DBP Monitoring Plan which will be required.

5.2.6 Chemical Handling and Safety

Sodium hypochlorite (liquid bleach, typically 10 to 12.5-percent) is a moderately corrosive material requiring proper secondary containment, personal protective equipment, and safe storage practices. Although safety precautions must be in place, sodium hypochlorite does not pose a significant risk to the surrounding area like chlorine gas does. The District has a Hazardous Material Business Plan (HMBP) with Placer County and facilities are inspected annually by Placer County. The HMBP will need to be updated. District operators are already familiar with hypochlorite handling through the existing emergency and flushing chlorination protocols. Emergency eye wash and shower stations are already in place.

6.0 Bench-Top Water Quality Testing

The chlorination evaluation included an assessment of the potential for the decay of the chlorine residual over time and the formation of disinfection by products resulting from the interaction between chlorine and dissolved organic matter in the water.

6.1 Testing Objectives

Bench-top testing was conducted to characterize chlorine demand and decay in OVPSD source water and to assess the potential for disinfection byproduct formation following chlorination. The chlorine decay rate affects the initial chlorine dose necessary to ensure the chlorine residual remains present throughout the distribution system and as the chlorine reacts with organic matter DBPs are formed. DBPs have been shown to cause cancer and reproductive effects in lab animals, and epidemiological studies suggest an association with bladder cancer and reproductive effects in humans. An evaluation of both of these reactions was considered important if full-time chlorination is being considered.

The testing protocol used is based on the 2019 U.S. EPA Free Chlorine Distribution System Influent Hold Protocol, included in Appendix B along with the laboratory results from the testing.

6.2 Testing Protocol

The EPA Free Chlorine Distribution System Influent Hold Study (hold study) is a laboratory simulation used to predict how chlorine behaves and how disinfection byproducts form over time. Water is collected at the point where it enters the distribution system, divided into sealed amber glass bottles, and stored in the dark at the same temperature as the distribution system to closely mimic actual conditions. Each bottle is then opened and analyzed at progressively longer time intervals - from a few hours up to several days.

The following parameters are measured:

- Free and total chlorine residual
- pH
- DBP concentrations
- Total organic carbon
- Temperature

The data collected are entered into a spreadsheet developed by the EPA that generates projected chlorine decay curves and DBP formation over time. The testing provides an estimate of how long a measurable chlorine residual will persist throughout the system and the DBP concentrations that might develop at the far reaches of the distribution system. This information is used to determine whether the chlorine dose applied at the source is sufficient to maintain water quality protection at the customer's tap and a predictor of potentially high concentrations of TTHMs in the water.

HAA5 compounds are subject to biodegradation by bacteria naturally present in distribution system piping. Their concentrations can decrease over time in ways that a sealed bottle test cannot predict reliably and are not part of the predictive model, but were measured as part of the hold study.

6.3 Testing Results

Testing was conducted between May 18 and May 25, 2026. Samples were collected at Well 2R site after the addition of caustic soda for pH adjustment. Water from Wells 1R and 2R comingles through a common manifold at the Well 2R site and was composited as part of the sample tested. Water from Well 5R was not tested but has similar water quality characteristics to the other well water that was included in the sample.

OVPSD staff measured and recorded the field measurements and BSK, a certified laboratory, tested and reported the TOC and DBP results. Results are summarized in Table 6-1. The initial chlorine dose added to the sample was 0.56 mg/L. The samples were held and sampled over a seven-day period. The initial TTHM concentration was non-detect, meaning that the concentration of the TTHMs was lower than the laboratory's instrument's detection limit. After seven days the TTHM concentration increased to 2.7 ug/L. No HAA5s formed at concentrations that could be measured with the laboratory instruments.

Table 6-1 – Hold Study Water Quality Results

Date	Time	Sample Interval	Free Cl ₂ (mg/L) ^(a)	Total Cl ₂ (mg/L) ^(a)	Temp (F) ^(a)	pH ^(a)	TOC (mg/L) ^(b)	TTHM (ug/L) ^(b)	HAA5 (ug/L) ^(b)
5/18/2026	830	Initial	0.56	0.63	49.3	7.52	1.3	---	---
5/18/2026	1430	6-HR	0.54	0.6	50	7.62	---	ND	ND
5/18/2026	2030	12-HR	0.57	0.58	52.9	7.48	---	ND	ND
5/19/2026	830	1-DAY	0.55	0.58	50.5	7.57	---	0.57	ND
5/21/2026	830	3-DAY	0.55	0.57	51.4	7.84	---	1.6	ND
5/25/2026	830	7-DAY	0.43	0.46	51	7.88	---	2.7	ND
Notes:									
(a) Field measurements									
(b) Laboratory measurements									

6.3.1 Disinfection Byproduct Formation Potential

When chlorine is added to drinking water, it reacts with naturally occurring organic matter to form disinfection byproducts, including total trihalomethanes (TTHMs). The hold study quantifies the chlorine consumption and TTHM concentrations in the samples at each time interval. The relationship between chlorine consumption and TTHM formation is determined by plotting measured TTHM concentrations against the amount of chlorine consumed at each sample time interval.

A best-fit line is drawn through those data points, and the slope of that line represents the TTHM formed per unit of chlorine consumed. That relationship is used to estimate TTHM concentrations forward in time. As the model predicts how much chlorine will be consumed by the time water

reaches the most remote point in the distribution system, it applies that same relationship to estimate the corresponding TTHM concentration at that time. The underlying assumption is that TTHM formation is proportional to chlorine demand - the more chlorine the water consumes, the more TTHMs it produces - and that this proportionality measured in the hold study provides an indication of the TTHM concentration in the distribution system.

An important limitation of this approach is that the test is conducted entirely in sealed glass bottles, so it only captures the reaction occurring within the water itself. In an actual distribution system, chlorine is also consumed by reactions with the interior surfaces of pipes, storage tanks, and other system infrastructure. That demand is not represented in the bottle test.

In practical terms the hold study will generally underestimate how quickly chlorine is consumed in the actual distribution system and will then likely underestimate TTHM formation at the far reaches of the distribution system with the greatest water age. For a groundwater system like OVPSD's, with relatively low organic carbon levels, this distinction is less critical than it would be for a surface water system but should be considered when interpreting the results.

Chlorine decay testing results and predicted decay are shown in Figure 6-1. The model predicts that free chlorine residuals would be maintained around 0.2 mg/L after 30-days. TTHM testing results and predicted concentrations are shown in Figure 6-2. The TTHM concentration was calculated to be about 7 ug/L at a water age of 30 days.

The actual chlorine residual will likely be lower, and TTHM concentration would likely be higher due to the reactions with organic material on the pipe and storage tank walls.

Figure 6-1 - Projected Chlorine Decay vs Time

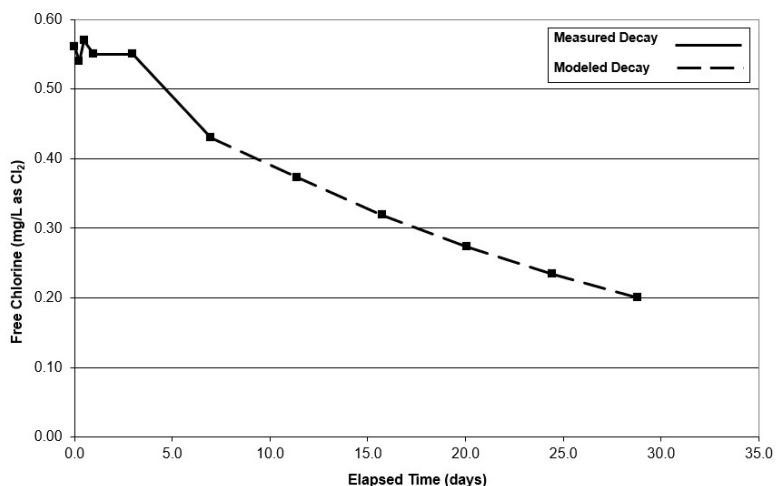
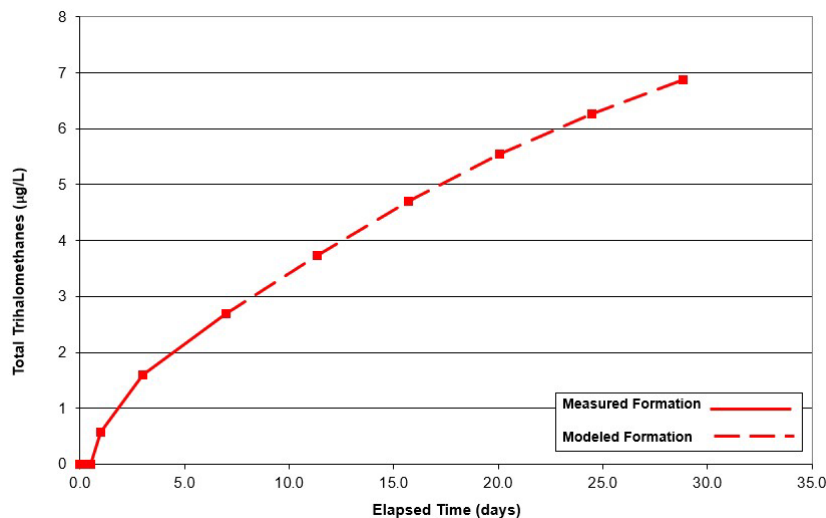


Figure 6-2 - Projected Total Trihalomethane Formation vs Time



6.4 Summary and Implications

Hold study results showed a measured TTHM concentration of 2.7 µg/L and a free chlorine residual of 0.43 mg/L after seven days. The chlorine residual used in this study is similar to the chlorine residual measured during annual flushing of the District's distribution system which ranged from 0.08 to 0.47 mg/L. Similar chlorine residual is anticipated if full-time chlorination is implemented in the system, and DBP formation is anticipated to be similar to results of this benchtop study. No HAA5 concentrations were detected at levels above the laboratory detection limit at any sample interval.

The EPA hold study spreadsheet model projected that a detectable free chlorine residual would persist at a simulated water age of approximately 29 days, and that TTHM concentrations at that water age would be approximately 6.9 µg/L - well below the regulatory MCL of 80 µg/L. It should be noted that the hold study is a predictive tool, not a substitute for field sampling, and that actual chlorine residuals in the distribution system will likely be somewhat lower - and TTHM concentrations somewhat higher - than model projections due to chlorine demand exerted by pipe walls, storage tank surfaces, and associated infrastructure not represented in the bottle test.

OVPD's distribution system average water age is expected to be below the 30-day simulation period, though this has not been formally quantified as part of this evaluation. Given this, the hold study projections represent a conservative upper bound on TTHM formation potential under normal operating conditions. The low TOC content of OVPD's source water is consistent with conditions observed across the Tahoe-Truckee region, where no chlorinated groundwater system has recorded a TTHM or HAA5 MCL violation based on the data reviewed in Section 4. Those regional results provide additional context for interpreting the hold study findings, and suggest that DBP formation following

chlorination of OVPSD's water supply would be expected to remain well within regulatory limits. Water from Well 5R was not included in the hold study sample but has similar source water quality characteristics to Wells 1R, 2R, and 3; comparable DBP formation potential would be expected when Well 5R is incorporated into full-system chlorination.

It is possible that upon initial startup of continuous chlorination, a temporary elevation in DBP concentrations is possible due to the mobilization of organic material accumulated in biofilms on pipe and tank walls. The significance of this effect is difficult to predict in advance and would depend on the condition of system infrastructure at the time chlorination is initiated. Annual flushing conducted by District staff reduces the accumulation of organic material in the distribution system and is expected to moderate this effect. The regional survey findings - where established chlorinated systems in the Tahoe-Truckee area consistently report very low DBP concentrations - suggest that long-term DBP formation in OVPSD's system would similarly stabilize at low levels once any initial transition period has passed.

7.0 Chlorination Facilities — Conceptual Design and Costs

This section presents the conceptual design for continuous chlorination at the four OVPSD facilities identified for chemical feed and monitoring: Well Site 2R, Well Site 5R, the Zone 3 Booster Station and Horizontal Well Nos. 1 & 2. Conceptual layout of the facilities is presented and will need to be confirmed as part of the detailed design of the systems.

7.1 Design Approach and Assumptions

Sodium hypochlorite (NaOCl, 12.5% concentration) will be used as the disinfectant at all four sites. This form of chlorine is widely used in small and medium water systems, is commercially available in the Tahoe region and does not require specialized handling equipment beyond standard chemical feed and storage improvements. Caustic soda is currently stored and dosed at both the Well 2R and 5R sites. The sodium hypochlorite should be stored in a separate containment area to prevent the chemicals from mixing in the event of a spill.

The chemical feed systems will operate on a flow-paced basis at Well Sites 2R and 5R, using the existing flow meter signal to adjust pump speed in proportion to flow while maintaining a fixed operator-set dose. The Zone 3 Booster Station chlorine feed system is controlled on a simple on/off basis tied to booster pump operation. Monitoring and control points are integrated into the existing SCADA system where available, allowing remote monitoring and adjustment of residual readings, pump status, and speed settings; the horizontal wells are the one exclusion. Improvements at each site are summarized below.

7.2 Well Site 2R — Chlorination System (Wells 1R, 2R, 3)

Well Site 2R serves as the primary collection point for water produced by Wells 1R, 2R, and 3, which discharge into a common manifold before entering the distribution system. This site has been previously configured for chlorination as part of a project completed in 2011. Facilities already in place include the chemical storage containment basin for secondary storage and conduits for the wiring and chemical feed tubing. Table 7-1 includes design criteria for the system.

The chlorine feed system would be installed within the designated containment area, physically separated from the existing caustic soda feed equipment. A single flow meter on the common manifold will provide the flow signal for dose pacing. A Hach CL17 colorimetric free chlorine analyzer would continuously monitor residual at the point of application. Analyzer sample water will be discharged to the sanitary sewer adjacent to the site. Discharge from the analyzer will be approximately 200 to 300 gallons per day from the instrument.

Chemical Feed Pump. The existing caustic feed system equipment is manufactured by ProMinent Pump. This brand is a reliable brand with good support. For consistency, ProMinent Pump was considered for this installation. Pre-manufactured skids are available that include:

- Strainer
- Backpressure valve
- Pressure gauges
- Pulsation dampener
- Pressure relief valve
- Calibration column
- Pump(s) (simplex and duplex are available)

Pre-manufactured skids are built at the factory on a mounting system. All the equipment is laid out neatly and includes all the appurtenances necessary. The ProMinent equipment package and quote are included in Appendix C. Simplex or duplex systems are available. Determination of the layout and preferred configuration can be made during detailed design. If a simplex configuration is utilized, keeping a spare pump on hand is recommended.

An optional flow monitor is also available and recommended on the chemical feed pump discharge. A pump malfunction or equipment failure or loss of prime would trigger an alarm notifying operations staff of a low flow condition which would underdose the chlorine in the system.

Mounting the pumps above the tank is recommended to avoid numerous penetrations in the chemical storage tank. Suction lifts from a tank up to the pump can cause issues maintaining prime to pump, but routine maintenance such as switching out the suction tubing, cleaning the strainer and ball checks minimize the problem. Figure 7-1 includes a conceptual layout of the equipment.

Chemical Storage Tank. The 120-gallon, double-contained tank is manufactured by Snyder Industries. The tank measures 34 inches in diameter by 49 inches in height and includes a 14-inch-diameter hatch. Opaque tanks are recommended for sodium hypochlorite to limit light exposure and reduce chemical degradation. A vent line will be routed from the tank to an exterior discharge point to minimize corrosion in the building from off-gassing. The inner tank and outer tanks are constructed of high-density linear polyethylene and are NSF/ANSI 61 compliant.

Although Well Site 2R was previously configured with a concrete secondary containment basin, a double-wall storage tank is still recommended for the hypochlorite system. The existing chemical storage area consists of a concrete containment basin with a fiberglass grating deck. The proposed hypochlorite tanks are relatively small in relation to the available containment footprint, which presents an opportunity for a practical installation arrangement.

A concrete pedestal would be poured within the containment basin, sized to support the tank at an elevation such that a portion of the tank projects above the grating deck. The grating would be cut to accommodate the tank diameter, with the tank seated through the opening and bearing on the pedestal below. This configuration offers two advantages. First, it provides a convenient and secure attachment point for seismic restraints at the grating elevation. Second, raising the pump skid to approximately chest height improves operator access for routine maintenance, chemical connections, and pump inspection.

Sodium hypochlorite is typically delivered in 5-gallon cube containers, 30 or 53-gallon drums, 275-330 gallons totes or bulk tank truck deliveries. For the purpose of this study utilizing drums and a drum pump to transfer sodium hypochlorite to the tanks is envisioned. A drum-dolly would be useful.

An ultrasonic level sensor is recommended for monitoring the level in the tanks. A scale would be complicated due to the seismic restraint system that would place a variable load on the tank. Flowline EchoPod or Endress + Hauser Prosonic units would be applicable.

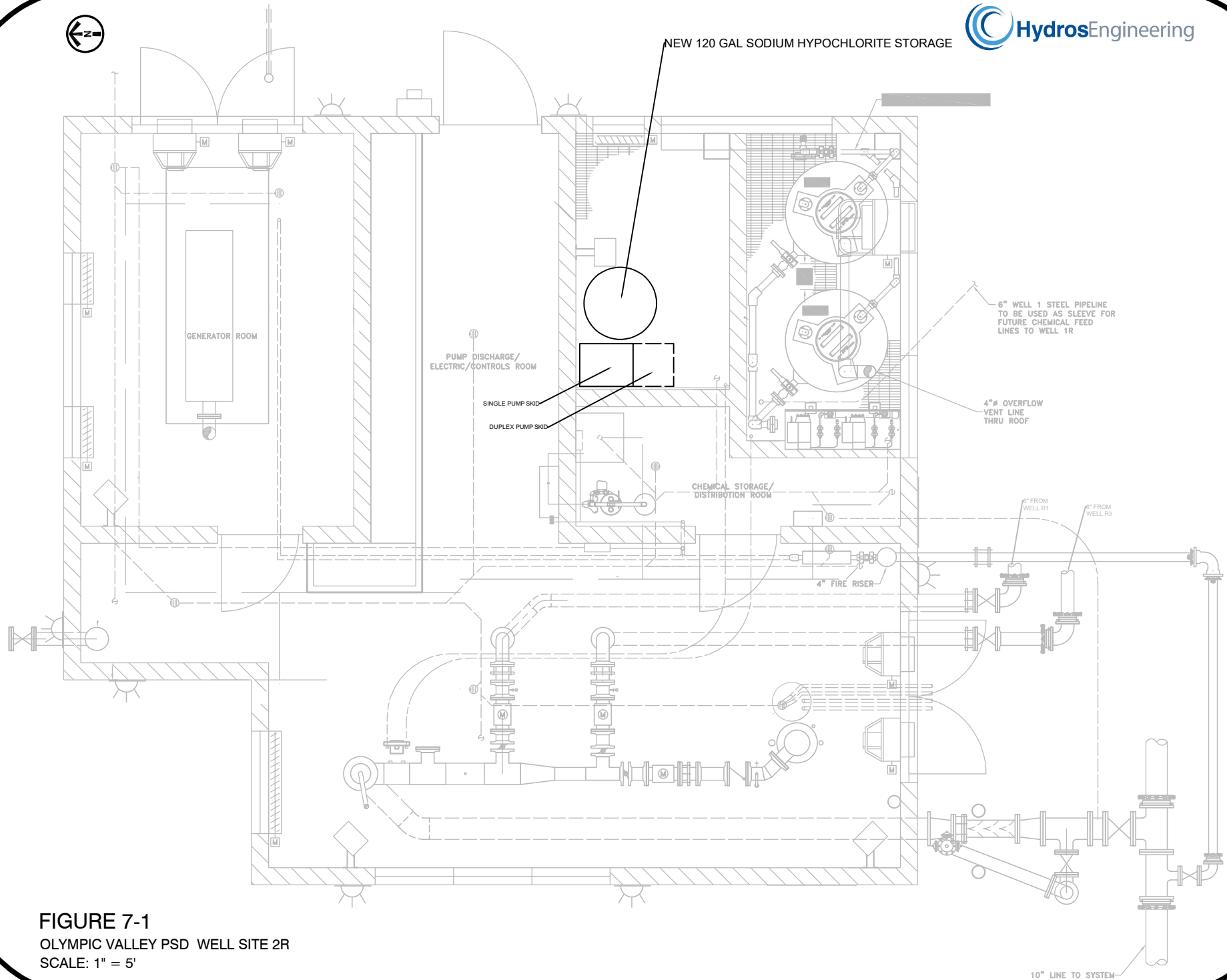


FIGURE 7-1
OLYMPIC VALLEY PSD WELL SITE 2R
SCALE: 1" = 5'

Table 7-1- Well Site 2R — Chlorination System Design Criteria

Parameter	Design Value / Basis
System description	
Water source	Wells 1R, 2R, and 3 — combined discharge to common manifold
Disinfectant	Sodium hypochlorite (NaOCl), 12.5% trade concentration
Site status	Previously configured for continuous chlorination — double-containment basin and chemical feed piping provisions in place
Flow criteria	
Maximum month demand	9.8 MG/month
Maximum day demand	515,000 gallons/day
Maximum instantaneous flow (Max Q)	875 gpm — Wells 1R, 2R and 3 pumping simultaneously
Flow metering for dose control	Single common manifold flow meter
Dose design	
Target applied dose	0.5 mg/L free chlorine – adjustable
Max Chem Feed ^(b)	
Based on Historical Max Day @ 12 hrs of runtime and 1 mg/L	20 mL/min
Based on Max Output of 875 gpm @ 1 mg/L	50 mL/min
Dose control method	Flow-paced — pump speed varies proportionally with manifold flow meter signal; fixed dose set point
Remote dose adjustment	Yes — via SCADA
Chemical storage	
Maximum monthly NaOCl consumption (12.5%)	90 gallons/month
Storage volume (nominal)	120 gallons
Storage basis	30-day supply at maximum month consumption
Tank type	HDPE, within existing double-containment basin
Secondary containment volume ^(a)	≥110% of tank volume
Seismic restraint	Tank tie-downs per California CBC
Chemical feed pump	
Pump type	Variable-speed peristaltic or diaphragm metering pump
Number of pumps	1 duty; 1 standby (confirm in detailed design)
Speed control signal	4–20 mA from manifold flow meter
Chlorine Residual Analyzer	
Hach Cl 17 with SC200	Colorimetric – discharge sample water to sanitary sewer

a) Notes: A dual containment tank is recommended due to seismic restraint requirement which is not available on the single wall tanks from the manufacturer.

b) Anticipated target does is 0.5 mg/L; design based on 1 mg/L to provide operational flexibility.

7.3 Well Site 5R — Chlorination System

Well Site 5R is a standalone site with one variable frequency drive (VFD) well pump. The site is space-constrained, and the existing caustic soda feed system occupies the same equipment room. The conceptual design provides for installation of a hypochlorite storage tank and chemical feed pump, with physical separation from the caustic soda system. The specific separation arrangement — whether by partition, dedicated secondary containment, or spatial segregation — would be confirmed during detailed design in coordination with applicable fire code. A Hach CL17 colorimetric free chlorine analyzer will monitor residual, with sample discharge to the existing sanitary sewer. A new sampling location will be necessary downstream of the injection point to allow for mixing for a representative sample. The OVPSD plans to add the ability of flow-pace using the flow meter signal as part of the SCADA upgrades project.

Chemical Feed Pump. The pumping equipment for Well Site 5R would be similar to that described for Well Site 2R. The space limitations at Well Site 5R may preclude the use of a duplex pump layout. In which case a simplex system could be installed with a spare pump kept on hand that could be easily switched out if the chemical feed pump failed. A conceptual equipment layout is included in Figure 7-2.

Chemical Storage Tank. The 60-gallon, double-contained tank is manufactured by Snyder Industries. The tank measures 26 inches in diameter by 41 inches in height and includes a 14-inch-diameter hatch. A vent line would be routed from the tank to an exterior discharge point to minimize corrosion in the building from off-gassing. The inner tank and outer tanks are constructed of high-density linear polyethylene and is NSF/ANSI 61 compliant.

A concrete pad to elevate the tank would aid in housekeeping along with a 6-8-inch curb around to ensure any leaks from the caustic storage and feed equipment do not mix with the sodium hypochlorite. The existing caustic storage tank piping will need to be modified and worked out during detailed design.

An ultrasonic level sensor is recommended for monitoring the level in the tank, similar to Well Site 2R.



WINDOW (TYP OF 4)

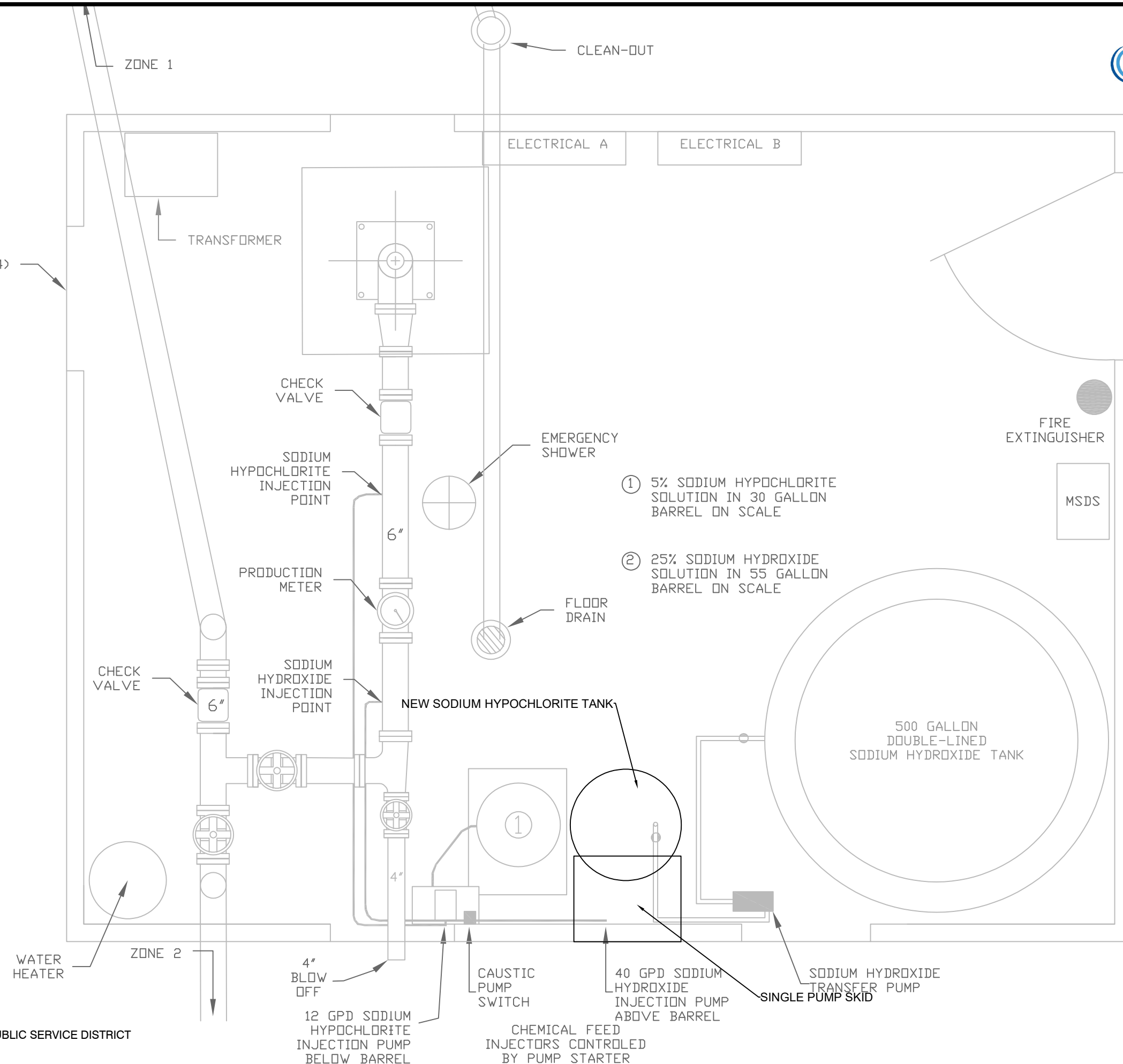


FIGURE 7-2
OLYMPIC VALLEY PUBLIC SERVICE DISTRICT
WELL SITE 5R
SCALE 1" = 2'

Table 7-2 - Well Site 5R - Chlorination System Design Criteria

Parameter	Design Value / Basis
System description	
Water source	Well 5R — standalone facility with VFD pump
Disinfectant	Sodium hypochlorite (NaOCl), 12.5% trade concentration
Site status	Space-constrained; chemical storage and feed to be installed within existing equipment room with physical separation from existing chemical system
Flow criteria	
Maximum month demand	5.0 MG/month
Maximum day demand	350,000 gallons/day
Maximum instantaneous flow (Max Q)	425 gpm
Flow metering for dose control	VFD pump flow meter
Dose design	
Target applied dose	0.5 mg/L free chlorine – adjustable
Max Chem Feed	
Based on Historical Max Day @ 12 hrs of runtime and 1 mg/L	13 ml/min
Based on Max Output of 425 gpm @ 1 mg/L	24 ml/min
Dose control method	Flow-paced — pump speed varies proportionally with VFD flow meter signal; fixed dose set point
Remote dose adjustment	Yes — via SCADA
Chemical storage	
Maximum monthly NaOCl consumption (12.5%)	50 gallons/month
Storage volume (nominal)	60 gallons
Storage basis	30-day supply at maximum month consumption
Tank type	HDPE, within new double-containment basin
Secondary containment volume	≥110% of tank volume
Seismic restraint	Tank tie-downs per California CBC
Chemical feed pump	
Pump type	Variable-speed peristaltic or diaphragm metering pump
Number of pumps	1 duty; 1 standby (confirm in detailed design)
Speed control signal	4–20 mA from manifold flow meter
Chlorine Residual Analyzer	
Hach Cl 17 with SC200	Colorimetric – discharge sample water to sanitary sewer

7.4 Horizontal Well Nos. 1 & 2

The existing horizontal wells are currently used as a stand-by source of water for the system. Improvements to provide chlorination when the wells are operated are identified below. Minimal controls are proposed at this time and they will not be integrated into the SCADA system. Operation will be simplified and basic on/off controls are proposed with manual measurement of the chlorine residual. Consideration should be given to integrating the chlorination system into the SCADA system and adding an analyzer if the horizontal wells will be used more frequently in the future.

Chemical Feed Pump. A ProMinent diaphragm pump with a capacity of 3 to 5 ml/min (0.05 gph) would be needed assuming sodium hypochlorite is fed at 100-percent strength. ProMinent has a number of pumps within this capacity range. The pump will be started manually and operated at a constant rate to provide the desired dose. The chemical pump would be mounted on a stand located in a hot-box with insulation and a small heater. Use of a fiberglass type enclosure with a flip top lid would prevent corrosion and allow for easy access to the equipment (including the chlorine as discussed below). Hubble Power Systems manufactures several models – the HB3000 is 35”W x 44”L x 35”H and would likely be adequately sized and configured for operation and maintenance activities. Confirmation of the size and configuration of the enclosure should be made during design of the facilities.

Chemical Storage. Storage would be minimal due to the limited space in the pump station. Less than 1 gallon per day of sodium hypochlorite would be needed to dose at 1 mg/L. A five-gallon cube would provide plenty of storage and be easy to manage by operators. The suction line would extend directly into the container. Venting the container to the outside is not necessary due to the limited use. The chlorine container would be set on a spill-tray to contain any liquid chlorine leaks.

Chlorine Analyzer. No chlorine analyzer is proposed for this site. The horizontal wells are rarely operated and provide a stand-by source for additional capacity. Operators would collect grab samples at a new sampling station that would be installed about 20-feet from the injection point. If an analyzer were to be needed in the future, a zero discharge type instrument would be necessary due to a lack of sanitary sewer to dispose of the sample water. A non-discharge type unit is discussed in Section 7.5 for the Zone 3 Booster Pump chlorination system.

7.5 Zone 3 Booster Station — Chlorine Monitoring and Emergency Injection

The Zone 3 Booster Station pumps water from Zone 2 up into the Zone 3 Tank. The Zone 3 Tank is located at the far end of the distribution system. Water entering this zone will have already been chlorinated at the Well 2R/5R sites; however, the chlorine residual may decay to a low enough level through the system to necessitate re-chlorination. A chlorine analyzer is required in the pump station to monitor the chlorine residual. Boosting chlorine at this site is not anticipated to be necessary often, so a small simple temporary system is recommended. Improvements are described below.

Chemical Feed Pump. A ProMinent diaphragm pump with a capacity of 3 to 5 ml/min (0.05 gph) would be needed assuming sodium hypochlorite is fed at 100-percent strength. ProMinent has a

number of pumps within this capacity range. The pump would be set to start when the booster pump starts, and water is being pumped to the Zone 3 tank. This could be accomplished through SCADA or simply an outlet that energizes when the booster pump starts that energizes the chemical feed pump. The chemical pump would be mounted on a shelf with the suction line extending down to the storage container and the discharge to a saddle with an injection quill on the outlet line. All the equipment would be installed inside the pump station to avoid freezing.

Chemical Storage. Storage would be minimal due to the limited space in the pump station. Less than 1 gallon per day of sodium hypochlorite would be needed to dose at 1 mg/L. A five-gallon cube would provide plenty of storage and be easy to manage by operators. The suction line would extend directly into the container. Venting the container to the outside is not necessary due to the limited use. The chlorine container would be set on a spill-tray to contain any liquid chlorine leaks.

Chlorine Analyzer. There is no sewer to discharge sample water; therefore, a zero-discharge analyzer is necessary. Halogen Systems (Reno, NV) manufactures an inline probe for chlorine. The unit continuously monitors residual on the pump discharge. When the booster pumps are off, the probe sees static water and residual will drift; low and high chlorine alarms are locked out when the booster pump(s) is off to prevent nuisance alarms. Once flow through the pump station begins the analyzer and alarms would be active. The manufacturer confirmed that installing the probe in a pipe with intermittent flow is not a problem for the accuracy and longevity of the probe.

Chlorine feed at Zone 3 is intended as a contingency boost capability rather than a continuous process. The conceptual design provides for a small hypochlorite supply - nominally a five-gallon container on a secondary containment pallet - with a peristaltic feed pump that activates when the booster pumps run. Given the infrequent anticipated use, permanent tank installation is not planned at this time. The dose will be set manually by the operator based on observed residual trends. This arrangement will be reviewed during detailed design.

8.0 Capital and Operation and Maintenance Costs

Capital and O&M costs associated with converting the system to full-time chlorination are presented in this section. Costs are considered budget level until detailed design of the facilities is complete. Soft costs for design and administration are included in the capital costs. A 20-percent contingency was included for capital costs, along with a 20-percent allowance for design, administration and construction management.

8.1 Capital Costs

Capital costs encompass administrative, engineering and construction costs for modifying existing systems and constructing the improvements.

Administrative Costs

Administrative costs associated with project implementation are included in the capital cost estimate as shown in Table 8-1. These include:

- Cost of this study
- Permit Amendment to DDW for modification of facilities
- Engineering report to support the amendment
- Updating the operations plan to incorporate full-time chlorination and creation of a DBP Siting and Sampling Plan

Table 8-1 - Administrative Costs

Item		Cost
Chlorination Study ^(a)		\$ 20,000
Permit Amendment		\$ 1,000
Engineering Report		\$ 5,000
Plan Updates		
DBP Siting and Sampling Plan		\$ 1,000
Update Operations Plan		\$ 5,000
Notes:		\$ 32,000
(a) Current chlorination evaluation study.		

Well Site 2R Capital costs

Capital costs for the improvements at Well 2R are included in Table 8-2. The capital cost is based on outsourcing the construction of the work to a private contractor and assuming a crew is onsite for 2.5 days and assisted by OVPSD staff for approximately 20-hours. The estimated cost is \$74,000.

Table 8-2 - Well Site 2R Capital Costs

Item	Quantity	Units	Unit Price	Cost Ext
Equipment				
Prominent Chemical Feed Skid w/ Flow Sensor	1	EA	\$ 19,038	\$ 19,100
Chlorine Analyzer Hach CL17/SC200	1	EA	\$ 8,624	\$ 8,700
120 gal Double Contained Storage Tank w/Stand	1	EA	\$ 5,951	\$ 6,000
Ultrasonic Level	1	LS	\$ 710	\$ 800
Injector and Tubing	1	EA	\$ 2,000	\$ 2,000
SCADA Integration	1	LS	\$ 5,000	\$ 5,000
Labor				
Contractor	2.5	Day	\$ 3,000	\$ 7,500
Staff	2.5	Day	\$ 640	\$ 1,600
Construction Total				\$ 50,700
Contingency @ 20%				\$ 10,200
Total with Contingency				\$ 60,900
20-Percent - Administrative, Engineering, Construction Management, and Permitting				\$ 13,000
Total				\$ 73,900
Notes:				
a) 20-Cities ENR August 2026 - 14,350				
b) Equipment includes tax, shipping and 10-percent mark-up				
c) Assumed 20-hours of staff time at \$80/hr				

Well Site 5R Capital costs

Capital costs for the improvements at Well 5R are included in Table 8-3. The capital cost is based on outsourcing the construction of the work to a private contractor and assuming a crew is onsite for 2 days and assisted by OVPSD staff for approximately 12-hours. The estimated cost is approximately \$71,000.

Table 8-3 - Well Site 5R Capital Costs

Item	Quantity	Units	Unit Price	Cost Ext
Equipment				
Prominent Chemical Feed Skid w/ Flow Sensor	1	EA	\$ 19,038	\$ 19,100
Chlorine Analyzer Hach CL17/SC200	1	EA	\$ 8,624	\$ 8,700
60 gal Double Contained Storage Tank w/Stand	1	EA	\$ 5,951	\$ 6,000
Ultrasonic Level	1	LS	\$ 710	\$ 800
Injector and Tubing	1	EA	\$ 2,000	\$ 2,000
SCADA Integration	1	LS	\$ 5,000	\$ 5,000
Labor				
Contractor	2.0	Day	\$ 3,000	\$ 6,000
Staff	1.5	Day	\$ 640	\$ 1,000
Construction Total				\$ 48,600
Contingency @ 20%				\$ 9,800
Total with Contingency				\$ 58,400
20-Percent - Administrative, Engineering, Construction Management, and Permitting				\$ 12,000
Total				\$ 70,400
Notes:				
a) 20-Cities ENR August 2026 - 14,350				
b) Equipment includes tax, shipping and 10-percent mark-up				
c) Assumed 20-hours of staff time at \$80/hr				

Horizontal Well Nos. 1 & 2

Capital costs for the improvements at the wells are included in Table 8-4. Chlorine would be added when the horizontal wells are placed in service. No permanent storage facilities are planned; sodium hypochlorite would be stored in a 5-gallon cube.

Table 8-4 - Horizontal Well Nos. 1 & 2

Item	Quantity	Units	Unit Price	Cost Ext
Equipment				
Prominent Chemical Feed Pump	1	EA	\$ 3,311	\$ 3,400
Spill Tray	1	EA	\$ 250	\$ 250
Enclosure	1	EA	\$ 10,260	\$ 10,300
Injector and Tubing	1	EA	\$ 1,000	\$ 1,000
Sample Station	1	EA	\$ 5,000	\$ 5,000
Feed Line - approx 120'	1	EA	\$ 3,000	\$ 3,000
Labor				
Contractor (Feed line and sampling station installation)	1	Day	\$ 8,000	\$ 8,000
Staff	1	Day	\$ 640	\$ 700
Construction Total				\$ 31,650
Contingency @ 20%				\$ 6,400
Total with Contingency				\$ 38,050
20-Percent - Administrative, Engineering, Construction Management, and Permitting				\$ 8,000
Total				\$ 46,050
Notes:				
a) 20-Cities ENR August 2026 - 14,350				
b) Equipment includes tax, shipping and 10-percent mark-up				
c) Assumed 20-hours of staff time at \$80/hr				

Zone 3 Booster Pump Station

Capital costs for the improvements at the Zone 3 Booster Pump Station are included in Table 8-5. Addition of chlorine at the pump station would be as needed if low chlorine residuals at the far end of the system drop below the desired concentration. No permanent storage facilities are planned; sodium hypochlorite would be stored in 5-gallon cubes and sit in a containment tray to capture any spills. The estimated cost for the installation of the equipment is \$36,000.

Table 8-5 - Zone 3 Booster Pump Capital Cost

Item	Quantity	Units	Unit Price	Cost Ext
Equipment				
Prominent Chemical Feed Pump w/ Flow Sensor	1	EA	\$ 3,311	\$ 3,400
Spill Tray	1	EA	\$ 250	\$ 250
Chlorine Analyzer Halogen Non-Discharge Probe	1	EA	\$ 10,879	\$ 10,900
Injector and Tubing	1	EA	\$ 1,000	\$ 1,000
Misc Fittings for Chlorine Probe	1	LS	\$ 500	\$ 500
SCADA Integration	1	LS	\$ 5,000	\$ 5,000
Labor				\$ -
Contractor	1.0	Day	\$ 3,000	\$ 3,000
Staff	1.0	Day	\$ 640	\$ 700
Construction Total				\$ 24,750
Contingency @ 20%				\$ 5,000
Total with Contingency				\$ 29,750
20-Percent - Administrative, Engineering, Construction Management, and Permitting				\$ 6,000
Total				\$ 35,750
Notes:				
a) 20-Cities ENR June 2026 - 14,350				
b) Equipment includes tax, shipping and 10-percent mark-up				
c) Assumed 20-hours of staff time at \$80/hr				

The total estimated capital cost, including the one-time administrative costs, for the improvements is \$260,000 to retrofit the sites for full-time chlorination.

8.2 Operation and Maintenance Costs

Costs associated with operation and maintenance are estimated in this section on an annual basis. Primary O&M duties consist of the following:

- Chemical purchases
- Reagents for instruments
- Laboratory costs for additional water quality testing
- Increased labor for operating and maintaining the sodium hypochlorite systems.

A summary of each of the components and assumptions are presented below and Table 8-6 includes a summary of O&M costs.

Chemical Costs

The chemical use depends on the total amount of water produced and the dosage. To estimate chemical use the production data from 2023 to 2025 was used and ranged from 98 to 104 Mgal of water produced. Chemical dose is based on a nominal concentration of 0.5 mg/L of chlorine and would vary in direct proportion of the dose. Thatcher Chemical quoted a price of \$10.50 per gallon when purchasing 53 gallon drum of 12.5-percent sodium hypochlorite.

Monitoring/Laboratory Costs

Quarterly DBP sampling for TTHM and HAA5 would be required. If results are less than half of the MCL, the OVPSD could request reduced sampling. If approved by the DDW the sampling frequency could be reduced to once per year. A unit cost of \$300 per test was used each quarter.

The online chlorine analyzers at Well 2R and 5R will require reagents from Hach. The current cost is \$90/month for each site. The analyzer at the Zone 3 Site would require annual probe replacement at a cost of \$1,200 per year.

Labor Costs

Operations staff would be required to operate and maintain the chlorine injection systems including filling chemicals, calibrating and verifying equipment and maintaining the pumps and storage facilities. Some additional time would also be necessary for testing and reporting water quality. An average of two hours per week is estimated. Existing staff will be able to complete the additional labor, and no additional labor costs are anticipated for annual operation and maintenance.

Summary of Annual O&M Costs

Table 8-6 includes a summary of the estimated O&M costs based on the assumptions presented above.

Table 8-6 Estimated Annual Operation and Maintenance Costs

Item	Cost
Chemical Costs	\$ 6,000
Monitoring/Lab Costs	\$ -
Laboratory	\$ 1,200
Reagents	\$ 3,400
Total	\$ 10,600

Appendix A

Literature References – Section 5

Ref. 1

National Research Council (US) Safe Drinking Water Committee. (1980). Drinking Water and Health: Volume 2, Chapter II – The Disinfection of Drinking Water. Washington, DC: National Academies Press.

Cited in-text as “NRC, 1980.”

Ref. 2

Centers for Disease Control and Prevention (CDC). (2024). Water Treatment – Healthy Water. Atlanta, GA: U.S. Department of Health and Human Services.

Cited in-text as “CDC, 2024.”

Ref. 3

U.S. EPA, Office of Water, Office of Ground Water and Drinking Water. (2006). The Effectiveness of Disinfectant Residuals in the Distribution System. Total Coliform Rule (TCR) Issue Paper. Prepared by HDR Engineering, Inc. and The Cadmus Group, Inc. (EPA Contract No. 68-C-00-113, Work Assignment No. 2-10).

Cited in-text as “EPA, 2006.”

Ref. 4

U.S. EPA, Office of Water. Distribution System Water Quality: Maintaining a Disinfectant Residual. EPA 815-F-21-003.

Cited in-text as “EPA, 2023.”

Ref. 5

Centers for Disease Control and Prevention (CDC). Surveillance of Waterborne Disease Outbreaks Associated with Drinking Water — United States, 2015–2020. Morbidity and Mortality Weekly Report (MMWR) Surveillance Summaries, 73(1), March 14, 2024.

Cited in-text as “CDC/MMWR, 2024.”

Ref. 6

American Water Works Association (AWWA). Maintaining a Numeric Minimum Disinfectant Residual in the Distribution System: A Framework for Strategy Selection and Evaluation. Denver, CO: AWWA.

Cited in-text as “AWWA, July 2025.”

Appendix B

Bench-Top Testing Laboratory Results



Sample Results

Olympic Valley P.S.D
PO Box 2026
Olympic Valley, CA 96146

Work Order: GIE1382
Received: 05/28/26 15:56
Reported: 06/09/26 14:31
System Number: 3110020

Non Compliance Chemical

Term and Qualifier Definitions

Item	Definition
ND	None detected at or above the reporting limit
Field testing falls outside the scope of laboratory accreditation, and no certification is available for such activities. Accordingly, CEI cannot validate or endorse any field testing results conducted by non-CEI personnel.	

Integrating people, land and water.

1188 East Main Street, Grass Valley, CA 95945
Phone: (530) 273-7284 | Fax: (530) 273-9507 | www.cranmerengineeringinc.com | E.L.A.P. Certification No. 1936
Sampling • Analytical Testing • Courier Service • System Operators • Engineering • Surveying • Technical Reporting • Planning • Construction Mgmt.

Subcontracted Analyses**Sample Site:** Well 1 Treated Initial**Sample Number** GIE1382-01

Source Type:

Date Collected: 5/18/2026 8:30:00AM**Collected by:** NM

Title 22 Designation:

Analyzing Laboratory: 49er Water

Report with Method References attached.

Analysis Total Organic Carbon (TOC)**Sample Site:** 6-HR**Sample Number** GIE1382-02

Source Type:

Date Collected: 5/18/2026 2:30:00PM**Collected by:** NM

Title 22 Designation:

Analyzing Laboratory: BSK Laboratory

Report with Method References attached.

Analysis Trihalomethanes (THMs)**Analysis** Haloacetic Acids (HAA5s)**Sample Site:** 12-HR**Sample Number** GIE1382-03

Source Type:

Date Collected: 5/18/2026 8:30:00PM**Collected by:** NM

Title 22 Designation:

Analyzing Laboratory: BSK Laboratory

Report with Method References attached.

Analysis Trihalomethanes (THMs)**Analysis** Haloacetic Acids (HAA5s)**Sample Site:** 1-DAY**Sample Number** GIE1382-04

Source Type:

Date Collected: 5/19/2026 8:30:00AM**Collected by:** NM

Title 22 Designation:

Analyzing Laboratory: BSK Laboratory

Report with Method References attached.

Analysis Trihalomethanes (THMs)**Analysis** Haloacetic Acids (HAA5s)**Sample Site:** 3-DAY**Sample Number** GIE1382-05

Source Type:

Date Collected: 5/21/2026 8:30:00AM**Collected by:** NM

Title 22 Designation:

Analyzing Laboratory: BSK Laboratory

Report with Method References attached.

Analysis Trihalomethanes (THMs)**Analysis** Haloacetic Acids (HAA5s)**Sample Site:** 7-DAY**Sample Number** GIE1382-06

Source Type:

Date Collected: 5/25/2026 8:30:00AM**Collected by:** NM

Title 22 Designation:

Analyzing Laboratory: 49er Water

Report with Method References attached.

Analysis Total Organic Carbon (TOC)*Integrating people, land and water.*

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Analyzing Laboratory: BSK Laboratory

Report with Method References attached.

Analysis Trihalomethanes (THMs)

Analysis Haloacetic Acids (HAA5s)

Sample Site: 305 Distribution

Sample Number GIE1382-07

Source Type:

Date Collected: 5/28/2026 8:00:00AM

Collected by: NM

Title 22 Designation:

Analyzing Laboratory: BSK Laboratory

Report with Method References attached.

Analysis Trihalomethanes (THMs)

Analysis Haloacetic Acids (HAA5s)



Michelle Harlin For Justin Smith

Laboratory Manager

Integrating people, land and water.

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1188 East Main Street Grass Valley, CA 95945
Phone: (530) 273-7284
Email: lab@cranmerengineeringinc.com

Cranmer Engineering, Inc.
Integrated Engineering Services

Turn Around Time Request
Standard - 10 Business days
Rush (Surcharge may apply)
Date needed: _____

ANALYT
CHAIN OF C



GIE1382

Required Fields*

Company/Client Name: <i>Olympic Valley PSD</i>		Report Attention: <i>Nic Massetani</i>		Invoice To:		Phone: 530-583-4692	
Address: P.O. Box 2026		City: Olympic Valley		State: CA		Email: nmassetani@ovpsd.org	
Project Name: <i>Cla Hold Study</i>		Project #:		Zip: 96146		Analysis Required*	
Notes: NON-REGULATORY		*Regulatory Carbon Copies Yes / No		Regulatory Compliance* ☐ YES ☒ NO			
Sampler Name (Printed/Signature): <i>Nic Massetani</i>		Agency: _____		System Number: CA 3110020			
				Geotracker #			
Matrix Types: VW=Vaste Water DW=Drinking Water SO=Solid							
Comments/Station Code/VITRAX / Title 22 Designation							
Matrix*							
Sample Descriptions*							
#	Well Treated Initial	Date	Time	Sampled*	Matrix*	Preservation	
3	Well Treated Initial	5/18/26	0830	DW		A	X
4	6-HR	5/18/26	1430				X
4	12-HR	5/18/26	2030				X
4	1-DAY	5/19/26	0830				X
4	3-DAY	5/21/26	0830				X
7	7-DAY	5/25/26	0830				X
4	305 Distribution	5/28/26	0800	DW		A	X
Relinquished By: (Signature and Printed Name) <i>Nic Massetani</i>		Company	Date	Time	Received by: (Signature and Printed Name) <i>STANT</i>	Company	Date/Time
Relinquished By: (Signature and Printed Name)		Company	Date	Time	Received by: (Signature and Printed Name)	Company	Date/Time
Received for Lab: (Signature and Printed Name)		Company	Date	Time	Payment Received at Delivery	Card	Check
Shipping Method: ONTRAC		UPS	GSO	WALK-IN	FED EX	Amount	PIA#
Cooling Method		Blue	None	Temp: 2.5 °C, Probe ID: 10505	1520	Custody Seal: Y/N	Chilling Begun: N

CEI strives for excellence and would appreciate your feedback. Please email the lab at lab@cranmerengineeringinc.com or call our office.

CEI-DOC-CR027 Revision Date: 3/28/2023 Revision number 1.4 - Active Date: TBA



Sample Receiving and Integrity Log

CEI-DOC-CR066

Sample Receiving/Integrity

Received by: S

Logged by: S

*Sample Acceptance Yes ☒ No ☐

*(If sample is not accepted, explain in the comment section below the reason for rejection of the sample)

Any answer of "No" should be accompanied by a comment in the comment section.

☒ Verify Sample Date, Time, and Sampler on CofC.

Sample Received within Hold Time? No ☐ Yes ☒ If no, did client approve analysis outside hold time?

Sample taken today? No ☐ Yes ☒ If No, does sample meet temp Requirements**? No ☐ Yes ☐

**Micro <10 C and Chemicals <6 C (except metals)

Surface Water Bacteria Sample within Temp Range***? No ☐ Yes ☐ N/A ☒

***A sample that has a temp, upon receipt, of >10 C, whether iced or not, shall be qualified unless the time since sample collection has been less than two hours.

Bottle/Sample Analysis Information

Do the number of bottles agree with the CoC? No ☐ Yes ☒

Were the samples received intact? (i.e., no broken bottles, leaks, etc.) No ☐ Yes ☒

Was the correct preservation used for Analysis Requested? No ☐ Yes ☒ N/A ☐

If no, did Client approve CEI to preserve and qualify Sample? No ☐ Yes ☐

*If no, sample shall be rejected.

Circle Preservation used: HNO3 H2SO4 HCl NaOH Other: VOA Preservation Lot # _____

Confirm Preservation: pH<2 pH>12 pH Strip ID: _____ AMM. CHLORIDE

Sufficient sample volume provided? No ☐ Yes ☒ If no, did client approve analysis with possible qualifiers?

If Orthro-phosphate was requested was the PO4 filtered within 15 minutes after sampling event?

No ☐ Yes ☐ N/A ☒ If no, did client approve analysis with possible qualifiers?

Was headspace present in microbiology samples of at least ≥1inch? No ☐ Yes ☐ N/A ☒ If no, did client approve analysis with possible qualifiers?

Were VOA Vials free of bubbles or <1cm? No ☐ Yes ☒ N/A ☐

Additional Comments/Instructions: _____

CEI-DOC-CR066

Effective Date: 1/29/2026

Revision Date: 1/29/2026

Approved By: JS

Revision 1.4



BSK Associates Sacramento
9332 Tech Center Dr, Suite 100
Sacramento, CA 95826
916.853.9293 (Main)

SJF0041

6/08/2026

Invoice: SJ03701

Justin Smith
Cranmer Analytical Laboratory
1188 E. Main St.
Grass Valley, CA 95945

RE: Report for SJF0041 General

Dear Justin Smith,

Thank you for using BSK Associates for your analytical testing needs. In the following pages, you will find the test results for the samples submitted to our laboratory on 6/1/2026. The results have been approved for release by our Laboratory Director as indicated by the authorizing signature below.

The samples were analyzed for the test(s) indicated on the Chain of Custody (see attached) and the results relate only to the samples analyzed. BSK certifies that the testing was performed in accordance with the quality system requirements specified in the 2016 TNI Standard. Any deviations from this standard or from the method requirements for each test procedure performed will be annotated alongside the analytical result or noted in the Case Narrative. Unless otherwise noted, the sample results are reported on an "as received" basis.

This certificate of analysis shall not be reproduced except in full, without written approval of the laboratory.

If additional clarification of any information is required, please contact your Client Services Representative, Sarah K. Guenther, at (916) 853-9293.

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

Sincerely,

A handwritten signature in black ink that reads "Sarah K. Guenther".

Sarah K. Guenther, Senior Project Manager

Case Narrative

Project and Report Details		Invoice Details
Client:	Cranmer Analytical Laboratory	Invoice To: Cranmer Analytical Laboratory
Report To:	Justin Smith	Invoice Attn: Michelle Harlin
Project #:	GIE1382 - #3110020	Project PO#: -
Received:	6/01/2026 - 13:50	
Report Due:	6/15/2026	

Sample Receipt Conditions

Cooler: Default Cooler
Temperature on Receipt °C: 1.7
 Containers Intact
 COC/Labels Agree
 Received On Ice
 Sample(s) were received in temperature range.
 Initial receipt at BSK-SAC

Data Qualifiers

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

HT1.1 Holding time exceeded. Sample was received at the lab with inadequate time remaining to meet the holding time.
 HT1.3 Holding time exceeded. Sample was analyzed past the holding time.

Report Distribution

Recipient(s)	Report Format	CC:
Justin Smith	FINAL.RPT	
Reporting	FINAL.RPT	

Certificate of Analysis

Sample ID: SJF0041-01
Sampled By: Client
Sample Description: GIE1382-02 // 6-HR

Sample Date - Time: 05/18/2026 - 14:30

Matrix: Drinking Water

Sample Type: Grab

BSK Associates Laboratory Fresno

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
<u>Trihalomethanes by GC-MS</u>						Analysis Qualifier(s): HT1.3			
Bromodichloromethane	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Bromoform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Chloroform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Dibromochloromethane	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Total Trihalomethanes		ND	0.50	ug/L					
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.4	103 %	Acceptable range: 70-130 %						
Surrogate: Methyl tert-butyl ether-d3	EPA 524.4	92 %	Acceptable range: 70-130 %						
Surrogate: Bromofluorobenzene	EPA 524.4	99 %	Acceptable range: 70-130 %						
<u>Haloacetic Acids by GC-MS</u>						Analysis Qualifier(s): HT1.1			
Dibromoacetic Acid (DBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Dichloroacetic Acid (DCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monobromoacetic Acid (MBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monochloroacetic Acid (MCAA)	EPA 552.3	ND	2.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Trichloroacetic Acid (TCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Total Haloacetic Acids		ND	2.0	ug/L					
Surrogate: 2-Bromobutanoic Acid	EPA 552.3	120 %	Acceptable range: 70-130 %						

Certificate of Analysis

Sample ID: SJF0041-02
Sampled By: Client
Sample Description: GIE1382-03 // 12-HR

Sample Date - Time: 05/18/2026 - 20:30
Matrix: Drinking Water
Sample Type: Grab

BSK Associates Laboratory Fresno

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
<u>Trihalomethanes by GC-MS</u>					Analysis Qualifier(s): HT1.3				
Bromodichloromethane	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Bromoform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Chloroform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Dibromochloromethane	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Total Trihalomethanes		ND	0.50	ug/L					
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.4	103 %	Acceptable range: 70-130 %						
Surrogate: Methyl tert-butyl ether-d3	EPA 524.4	103 %	Acceptable range: 70-130 %						
Surrogate: Bromofluorobenzene	EPA 524.4	98 %	Acceptable range: 70-130 %						
<u>Haloacetic Acids by GC-MS</u>					Analysis Qualifier(s): HT1.1				
Dibromoacetic Acid (DBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Dichloroacetic Acid (DCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monobromoacetic Acid (MBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monochloroacetic Acid (MCAA)	EPA 552.3	ND	2.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Trichloroacetic Acid (TCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Total Haloacetic Acids		ND	2.0	ug/L					
Surrogate: 2-Bromobutanoic Acid	EPA 552.3	119 %	Acceptable range: 70-130 %						

Certificate of Analysis

Sample ID: SJF0041-03
Sampled By: Client
Sample Description: GIE1382-04 // 1-DAY

Sample Date - Time: 05/19/2026 - 08:30

Matrix: Drinking Water

Sample Type: Grab

BSK Associates Laboratory Fresno

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
<u>Trihalomethanes by GC-MS</u>						Analysis Qualifier(s): HT1.3			
Bromodichloromethane	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Bromoform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Chloroform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Dibromochloromethane	EPA 524.4	0.57	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Total Trihalomethanes		0.57	0.50	ug/L					
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.4	104 %	Acceptable range: 70-130 %						
Surrogate: Methyl tert-butyl ether-d3	EPA 524.4	103 %	Acceptable range: 70-130 %						
Surrogate: Bromofluorobenzene	EPA 524.4	95 %	Acceptable range: 70-130 %						
<u>Haloacetic Acids by GC-MS</u>						Analysis Qualifier(s): HT1.1			
Dibromoacetic Acid (DBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Dichloroacetic Acid (DCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monobromoacetic Acid (MBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monochloroacetic Acid (MCAA)	EPA 552.3	ND	2.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Trichloroacetic Acid (TCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Total Haloacetic Acids		ND	2.0	ug/L					
Surrogate: 2-Bromobutanoic Acid	EPA 552.3	115 %	Acceptable range: 70-130 %						

Certificate of Analysis

Sample ID: SJF0041-04
Sampled By: Client
Sample Description: GIE1382-05 // 3-DAY

Sample Date - Time: 05/21/2026 - 08:30

Matrix: Drinking Water

Sample Type: Grab

BSK Associates Laboratory Fresno

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
<u>Trihalomethanes by GC-MS</u>									
Bromodichloromethane	EPA 524.4	0.68	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Bromoform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Chloroform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Dibromochloromethane	EPA 524.4	0.88	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Total Trihalomethanes		1.6	0.50	ug/L					
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.4	103 %	Acceptable range: 70-130 %						
Surrogate: Methyl tert-butyl ether-d3	EPA 524.4	103 %	Acceptable range: 70-130 %						
Surrogate: Bromofluorobenzene	EPA 524.4	98 %	Acceptable range: 70-130 %						
<u>Haloacetic Acids by GC-MS</u>									
Dibromoacetic Acid (DBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Dichloroacetic Acid (DCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monobromoacetic Acid (MBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monochloroacetic Acid (MCAA)	EPA 552.3	ND	2.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Trichloroacetic Acid (TCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Total Haloacetic Acids		ND	2.0	ug/L					
Surrogate: 2-Bromobutanoic Acid	EPA 552.3	117 %	Acceptable range: 70-130 %						

Certificate of Analysis

Sample ID: SJF0041-05

Sampled By: Client

Sample Description: GIE1382-06 // 7-DAY

Sample Date - Time: 05/25/2026 - 08:30

Matrix: Drinking Water

Sample Type: Grab

BSK Associates Laboratory Fresno

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
<u>Trihalomethanes by GC-MS</u>									
Bromodichloromethane	EPA 524.4	0.92	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Bromoform	EPA 524.4	0.68	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Chloroform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Dibromochloromethane	EPA 524.4	1.1	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Total Trihalomethanes		2.7	0.50	ug/L					
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.4	103 %	Acceptable range: 70-130 %						
Surrogate: Methyl tert-butyl ether-d3	EPA 524.4	86 %	Acceptable range: 70-130 %						
Surrogate: Bromofluorobenzene	EPA 524.4	98 %	Acceptable range: 70-130 %						
<u>Haloacetic Acids by GC-MS</u>									
Dibromoacetic Acid (DBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Dichloroacetic Acid (DCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monobromoacetic Acid (MBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monochloroacetic Acid (MCAA)	EPA 552.3	ND	2.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Trichloroacetic Acid (TCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Total Haloacetic Acids		ND	2.0	ug/L					
Surrogate: 2-Bromobutanoic Acid	EPA 552.3	116 %	Acceptable range: 70-130 %						

Certificate of Analysis

Sample ID: SJF0041-06
Sampled By: Client
Sample Description: GIE1382-07 // 305 Distribution

Sample Date - Time: 05/28/2026 - 08:00

Matrix: Drinking Water

Sample Type: Grab

BSK Associates Laboratory Fresno

Organics

Analyte	Method	Result	RL	Units	RL Mult	Batch	Prepared	Analyzed	Qual
<u>Trihalomethanes by GC-MS</u>									
Bromodichloromethane	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Bromoform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Chloroform	EPA 524.4	ND	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Dibromochloromethane	EPA 524.4	0.73	0.50	ug/L	1	AJF0414	06/03/26	06/03/26	
Total Trihalomethanes		0.73	0.50	ug/L					
Surrogate: 1,2-Dichlorobenzene-d4	EPA 524.4	102 %	Acceptable range: 70-130 %						
Surrogate: Methyl tert-butyl ether-d3	EPA 524.4	100 %	Acceptable range: 70-130 %						
Surrogate: Bromofluorobenzene	EPA 524.4	99 %	Acceptable range: 70-130 %						
<u>Haloacetic Acids by GC-MS</u>									
Dibromoacetic Acid (DBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Dichloroacetic Acid (DCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monobromoacetic Acid (MBAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Monochloroacetic Acid (MCAA)	EPA 552.3	ND	2.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Trichloroacetic Acid (TCAA)	EPA 552.3	ND	1.0	ug/L	1	AJF0412	06/03/26	06/04/26	
Total Haloacetic Acids		ND	2.0	ug/L					
Surrogate: 2-Bromobutanoic Acid	EPA 552.3	117 %	Acceptable range: 70-130 %						

BSK Associates Laboratory Fresno
Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
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EPA 524.4 - Quality Control
Batch: AJF0414

Prepared: 6/3/2026

Prep Method: no prep-volatiles

Analyst: JIR

Blank (AJF0414-BLK1)

Bromodichloromethane	ND	0.50	ug/L							06/03/26	
Bromoform	ND	0.50	ug/L							06/03/26	
Chloroform	ND	0.50	ug/L							06/03/26	
Dibromochloromethane	ND	0.50	ug/L							06/03/26	
Total Trihalomethanes	ND	0.50	ug/L							06/03/26	
Surrogate: 1,2-Dichlorobenzene-d4	51			50		103	70-130			06/03/26	
Surrogate: Methyl tert-butyl ether-d3	46			50		91	70-130			06/03/26	
Surrogate: Bromofluorobenzene	51			50		103	70-130			06/03/26	

Duplicate (AJF0414-DUP1), Source: BJF0025-01

Bromodichloromethane	ND	0.50	ug/L		ND			30		06/03/26	
Bromoform	ND	0.50	ug/L		ND			30		06/03/26	
Chloroform	ND	0.50	ug/L		ND			30		06/03/26	
Dibromochloromethane	ND	0.50	ug/L		ND			30		06/03/26	
Surrogate: 1,2-Dichlorobenzene-d4	52			50		103	70-130			06/03/26	
Surrogate: Methyl tert-butyl ether-d3	42			50		84	70-130			06/03/26	
Surrogate: Bromofluorobenzene	49			50		98	70-130			06/03/26	

Matrix Spike (AJF0414-MS1), Source: BJF0025-02

Bromodichloromethane	9.1	0.50	ug/L	10	ND	91	50-150			06/03/26	
Bromoform	8.9	0.50	ug/L	10	ND	89	50-150			06/03/26	
Chloroform	9.4	0.50	ug/L	10	ND	94	50-150			06/03/26	
Dibromochloromethane	8.8	0.50	ug/L	10	ND	88	50-150			06/03/26	
Surrogate: 1,2-Dichlorobenzene-d4	51			50		102	70-130			06/03/26	
Surrogate: Methyl tert-butyl ether-d3	48			50		96	70-130			06/03/26	
Surrogate: Bromofluorobenzene	50			50		100	70-130			06/03/26	

EPA 552.3 - Quality Control
Batch: AJF0412

Prepared: 6/3/2026

Prep Method: EPA 552.3

Analyst: RXD

Blank (AJF0412-BLK1)

Dibromoacetic Acid (DBAA)	ND	1.0	ug/L							06/04/26	
Dichloroacetic Acid (DCAA)	ND	1.0	ug/L							06/04/26	
Monobromoacetic Acid (MBAA)	ND	1.0	ug/L							06/04/26	
Monochloroacetic Acid (MCAA)	ND	2.0	ug/L							06/04/26	
Trichloroacetic Acid (TCAA)	ND	1.0	ug/L							06/04/26	
Total Haloacetic Acids	ND	2.0	ug/L							06/04/26	
Surrogate: 2-Bromobutanoic Acid	11			10		107	70-130			06/04/26	

Duplicate (AJF0412-DUP1), Source: AJE3016-02

Dibromoacetic Acid (DBAA)	ND	1.0	ug/L		ND			30		06/04/26	
Dichloroacetic Acid (DCAA)	17	1.0	ug/L		17			1	30	06/04/26	
Monobromoacetic Acid (MBAA)	ND	1.0	ug/L		ND			30		06/04/26	

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

SJF0041 FINAL 06082026 1336

BSK Associates Laboratory Fresno
Organics Quality Control Report

Analyte	Result	RL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Date Analyzed	Qual
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EPA 552.3 - Quality Control

Batch: AJF0412

Prepared: 6/3/2026

Prep Method: EPA 552.3

Analyst: RXD

Duplicate (AJF0412-DUP1), Source: AJE3016-02

Monochloroacetic Acid (MCAA)	ND	2.0	ug/L		ND			30	06/04/26
Trichloroacetic Acid (TCAA)	23	1.0	ug/L		22			2 30	06/04/26
Total Haloacetic Acids	40	2.0	ug/L		39			1 30	06/04/26
Surrogate: 2-Bromobutanoic Acid	11			10		107	70-130		06/04/26

Matrix Spike (AJF0412-MS1), Source: AJE3016-01

Dibromoacetic Acid (DBAA)	9.6	1.0	ug/L	10	ND	96	70-130		06/04/26
Dichloroacetic Acid (DCAA)	26	1.0	ug/L	10	16	99	70-130		06/04/26
Monobromoacetic Acid (MBAA)	9.3	1.0	ug/L	10	ND	93	70-130		06/04/26
Monochloroacetic Acid (MCAA)	20	2.0	ug/L	20	2.3	87	70-130		06/04/26
Trichloroacetic Acid (TCAA)	31	1.0	ug/L	10	21	102	70-130		06/04/26
Surrogate: 2-Bromobutanoic Acid	11			10		105	70-130		06/04/26

Certificate of Analysis

Notes:

- The Chain of Custody document and Sample Integrity Sheet are part of the analytical report.
- Any remaining sample(s) for testing will be disposed of according to BSK's sample retention policy unless other arrangements are made in advance.
- All positive results for EPA Methods 504.1 and 524.2 require the analysis of a Field Reagent Blank (FRB) to confirm that the results are not a contamination error from field sampling steps. If Field Reagent Blanks were not submitted with the samples, this method requirement has not been performed.
- Samples collected by BSK Analytical Laboratories were collected in accordance with the BSK Sampling and Collection Standard Operating Procedures.
- J-value is equivalent to DNQ (Detected, not quantified) which is a trace value. A trace value is an analyte detected between the MDL and the laboratory reporting limit. This result is of an unknown data quality and is only qualitative (estimated). Baseline noise, calibration curve extrapolation below the lowest calibrator, method blank detections, and integration artifacts can all produce apparent DNQ values, which contribute to the un-reliability of these values.
- (1) - Residual chlorine and pH analysis have a 15 minute holding time for both drinking and waste water samples as defined by the EPA and 40 CFR 136. Waste water and ground water (monitoring well) samples must be field filtered to meet the 15 minute holding time for dissolved metals.
- Field tests are outside the scope of laboratory accreditation and there is no certification available for field testing.
- Summations of analytes (i.e. Total Trihalomethanes) may appear to add individual amounts incorrectly, due to rounding of analyte values occurring before or after the total value is calculated, as well as rounding of the total value.
- RL Multiplier is the factor used to adjust the reporting limit (RL) due to variations in sample preparation procedures and dilutions required for matrix interferences.
- Due to the subjective nature of the Threshold Odor Method, all characterizations of the detected odor are the opinion of the panel of analysts. The characterizations can be found in Standard Methods 2170B Figure 2170:1.
- The MCLs provided in this report (if applicable) represent the primary MCLs for that analyte.
- (2) - Formerly known as Bis(2-Chloroisopropyl) ether.
Unless otherwise noted, TOC results by SM 5310C method do not include purgeable organic carbon, which is removed along with the inorganic carbon interference. The POC contribution to TOC is considered to be negligible.

Certificate of Analysis

Definitions

mg/L:	Milligrams/Liter (ppm)	MDL:	Method Detection Limit	MDA95:	Min. Detected Activity
mg/Kg:	Milligrams/Kilogram (ppm)	RL:	Reporting Limit: DL x Dilution	MPN:	Most Probable Number
µg/L:	Micrograms/Liter (ppb)	ND:	None Detected below MRL/MDL	CFU:	Colony Forming Unit
µg/Kg:	Micrograms/Kilogram (ppb)	pCi/L:	PicoCuries per Liter	Absent:	Less than 1 CFU/100mLs
%:	Percent	RL Mult:	RL Multiplier	Present:	1 or more CFU/100mLs
NR:	Non-Reportable	MCL:	Maximum Contaminant Limit	U:	The analyte was not detected at or above the reported sample quantitation limit.

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

Certificate of Analysis

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

Bakersfield

State of California - ELAP 1180-S3

Fresno

State of California - ELAP 1180

Los Angeles CSD 9254479

State of Nevada NV-C25-00264

EPA UCMR5 CA00079

State of Hawaii 4021

NELAP certified 4021-027

State of Oregon - NELAP 4021-027

State of Washington C997-26

Sacramento

State of California - ELAP 1180-S1

San Bernardino

State of California - ELAP 1180-S2

NELAP certified 4119-010

Los Angeles CSD 9254478

State of Oregon - NELAP 4119-010

Vancouver

NELAP certified WA100008-022

State of Washington C824-25

State of Oregon - NELAP WA100008-022



Cranmer Engineering, Inc.
Integrated Engineering Services

SJF0041 Cranm7284 06/01/2026



10

SUBCONTRACT ORDER

Sending Laboratory:

CEI
PO Box 1240
Grass Valley, CA 95945
Phone: 530-273-7284
Fax: -

Project Manager: Justin Smith

Subcontracted Laboratory:

BSK Laboratory
687 N Laverne Avenue
Fresno, CA 93706
Phone: (559) 497-2888
Fax:

md

non compliance

EDT Upload YES ☐ NO ☒

Alexander Ortiz
Released By

6/1/26 13:50
Date

[Signature]
Received By

6/1/26 13:50
Date



Cranmer Engineering, Inc.
Integrated Engineering Services

SJF0041 Cranm7284 06/01/2026



10

17°C
at Top
walk In
IR 71

SUBCONTRACT ORDER

(Continued)

Work Order: GIE1382

Project # 3110020

Analysis	Comments	Source ID
Sample ID: GIE1382-02 6-HR <i>Drinking Water Sampled: 05/18/2026 14:30</i>	NO TRIP BLANK PROVIDED BY CLIENT	
Trihalomethanes (THMs) Haloacetic Acids (HAA5s) <i>Containers Supplied:</i> 125 mL Amber Glass w/Amn VOA, amber w/NaThio (B) VOA, amber w/NaThio (C) VOA, amber w/NaThio (D)		
Sample ID: GIE1382-03 12-HR <i>Drinking Water Sampled: 05/18/2026 20:30</i>	NO TRIP BLANK PROVIDED BY CLIENT	
Trihalomethanes (THMs) Haloacetic Acids (HAA5s) <i>Containers Supplied:</i> 125 mL Amber Glass w/Amn VOA, amber w/NaThio (B) VOA, amber w/NaThio (C) VOA, amber w/NaThio (D)		
Sample ID: GIE1382-04 1-DAY <i>Drinking Water Sampled: 05/19/2026 08:30</i>	NO TRIP BLANK PROVIDED BY CLIENT	
Trihalomethanes (THMs) Haloacetic Acids (HAA5s) <i>Containers Supplied:</i> 125 mL Amber Glass w/Amn VOA, amber w/NaThio (B) VOA, amber w/NaThio (C) VOA, amber w/NaThio (D)		
Sample ID: GIE1382-05 3-DAY <i>Drinking Water Sampled: 05/21/2026 08:30</i>	NO TRIP BLANK PROVIDED BY CLIENT	
Trihalomethanes (THMs) Haloacetic Acids (HAA5s) <i>Containers Supplied:</i> 125 mL Amber Glass w/Amn VOA, amber w/NaThio (B) VOA, amber w/NaThio (C) VOA, amber w/NaThio (D)		
Sample ID: GIE1382-06 7-DAY <i>Drinking Water Sampled: 05/25/2026 08:30</i>	NO TRIP BLANK PROVIDED BY CLIENT	
Trihalomethanes (THMs) Haloacetic Acids (HAA5s) <i>Containers Supplied:</i> 125 mL Amber Glass w/Amn VOA, amber w/NaThio (D) VOA, amber w/NaThio (E) VOA, amber w/NaThio (F)		

EDT Upload YES ☐ NO ☒

Alexander Ortiz *[Signature]*
Released By

6/1/26 13:50
Date

[Signature] Jack Stables
Received By

6/1/26 13:50
Date



Cranmer Engineering, Inc.
Integrated Engineering Services

SJF0041 Cranm7284 06/01/2026



SUBCONTRACT ORDER (Continued)

Work Order: GIE1382 (Continued)

Project # 3110020

Analysis	Comments	Source ID
Sample ID: GIE1382-07 305 Distribution <i>Drinking Water Sampled: 05/28/2026 08:00</i>		
Trihalomethanes (THMs) Haloacetic Acids (HAA5s)	NO TRIP BLANK PROVIDED BY CLIENT	
<i>Containers Supplied:</i> 125 mL Amber Glass w/Amn VOA, amber w/NaThio (B) VOA, amber w/NaThio (C) VOA, amber w/NaThio (D)		

EDT Upload YES ☐ NO ☒

Alexander Ortiz 6/1/26 13:50
Released By Date

Jack Stables 6/1/26 13:50
Received By Date

Sample Integrity

BSK Bottles: Yes No

Page 1 of 1



COC Info	Was temperature within range? Chemistry $\leq 6^{\circ}\text{C}$ Micro $< 8^{\circ}\text{C}$	Yes	No	NA	Were correct containers and preservatives received for the tests requested?	Yes	No	NA
	If samples were taken today, is there evidence that chilling has begun?	Yes	No	NA	Bubbles Present VOAs (VOCs/TTHM/TCP)?	Yes	No	NA
	Did all bottles arrive unbroken and intact?	Yes	No	NA	TB Received?	Yes	No	NA
	Did all bottle labels agree with COC?	Yes	No	NA	Was a sufficient amount of sample received?	Yes	No	NA
	Was sodium thiosulfate added to CN sample(s) until chlorine was no longer present?	Yes	NA	NA	Do samples have a hold time <72 hours?	Yes	No	NA
Bottles Received means preservation/chlorine checks are either N/A or are performed in the lab	250ml(A) 500ml(B) 1Liter(C) 40mlVOA(V) 125ml(D)	Checks*	Passed?	1-6 each				
	Bacti $\text{Na}_2\text{S}_2\text{O}_3$	—	—					
	None (P) White Label	—	—					
	Cr6 (P) Lt. Green Label/Blue Cap $\text{NH}_4\text{OH}/(\text{NH}_4)_2\text{SO}_4$ DW	Cl, pH > 8	P F					
	Cr6 (P) Pink Label/Blue Cap $\text{NH}_4\text{OH}/(\text{NH}_4)_2\text{SO}_4$ WW	pH 9.3-9.7	P F					
	Cr6 (P) Black Label/Blue Cap $\text{NH}_4\text{OH}/(\text{NH}_4)_2\text{SO}_4$ 7199 ***24 HOUR HOLD TIME***	pH 9.0-9.5	P F					
	HNO_3 (P) Red Label or HCl (P) Purple Cap/Lt. Blue Label	—	—					
	H_2SO_4 (P) or (AG) Yellow Label	pH < 2	P F					
	NaOH (P) Green Cap/Label	Cl, pH > 10	P F					
	NaOH + ZnAc (P)	pH > 9	P F					
	Dissolved Oxygen 300ml (g)	—	—					
	None (AG) 608/8081/8082, 625, 632/8321, 8151, 8270	—	—					
	HCl (AG) Lt. Blue Label O&G, Diesel	—	—					
	Ascorbic, EDTA, KH_2Ct (AG) Pink Label 525	—	—					
	Na_2SO_3 (AG) Neon Green Label 515	—	—					
	$\text{Na}_2\text{S}_2\text{O}_3$ 1 Liter (Brown P) 549	—	—					
	$\text{Na}_2\text{S}_2\text{O}_3$ (AG) Blue Label 548	—	—	3V				
	$\text{Na}_2\text{S}_2\text{O}_3$ (CG) Blue Label 504, 505, 547	—	—					
	$\text{Na}_2\text{S}_2\text{O}_3$ + MCAA (CG) Orange Label 531	pH < 3	P F					
	NH_4Cl (AG) Purple Label 552	—	—	ID				
	EDA (P) or (AG) Brown Label DBPs	—	—					
	HCL (CG) BTEX, Gas, MTBE, 8260/624	—	—					
	Ascorbic Acid (AG) TCP DWRL	—	—					
	Maleic + Ascorbic (AG) 524.4 & THM	—	—					
	Buffer pH 4 (CG)	—	—					
	H_3PO_4 (CG) Salmon Label	—	—					
	Trizma - EPA 537.1 Light Blue Label FB	---	---					
	Ammonia Acetate - EPA 533 Purple Label FB	---	---					
	Bottle Water	—	—					
	Clear Glass: Jar / VOA	—	—					
OTHER:	—	—						
Split	Container	Preservative	Lot #	Initials	Date/Time	Preservation	Check	
	S P					pH Lot #		
Comments	S P					CI Lot #		
	*Preservation check completed by lab performing analysis.			Labeled by:		Checked by:		



SAMPLE TRANSIT ORDER

SJF0041

Sarah K. Guenther



Receipt temp @ FAL: 5.0 Thermometer/ IR Gun ID: 63

SENDING LABORATORY:

BSK Associates Sacramento
3140 Gold Camp Drive #160
Rancho Cordova, CA 95670
916.853.9293 (Main)
916.853.9297 (FAX)

Project Manager: Sarah K. Guenther
E-mail: sguenther@bskassociates.com

RECEIVING LABORATORY:

BSK Associates Laboratory Fresno
687 N. Laverne Avenue
Fresno, CA 93727
559-497-2888 (Main)

Turnaround (Days): Standard
QC Deliverables: I Std III IV

Client: Cranmer Analytical Laboratory

Sample ID	Samp Desc	Sample Date
SJF0041-01	GIE1382-02	05/18/2026 14:30
Lab Matrix: Water		Client Matrix Drinking Water
Analysis:		
EPA 524.4 - THMs		
EPA 552.3 - Haloacetic Acid Subtest		
SJF0041-02	GIE1382-03	05/18/2026 20:30
Lab Matrix: Water		Client Matrix Drinking Water
Analysis:		
EPA 524.4 - THMs		
EPA 552.3 - Haloacetic Acid Subtest		
SJF0041-03	GIE1382-04	05/19/2026 08:30
Lab Matrix: Water		Client Matrix Drinking Water
Analysis:		
EPA 524.4 - THMs		
EPA 552.3 - Haloacetic Acid Subtest		
SJF0041-04	GIE1382-05	05/21/2026 08:30
Lab Matrix: Water		Client Matrix Drinking Water
Analysis:		
EPA 524.4 - THMs		
EPA 552.3 - Haloacetic Acid Subtest		
SJF0041-05	GIE1382-06	05/21/2026 08:30
Lab Matrix: Water		Client Matrix Drinking Water
Analysis:		
EPA 524.4 - THMs		
EPA 552.3 - Haloacetic Acid Subtest		
SJF0041-06	GIE1382-07	05/28/2026 08:00
Lab Matrix: Water		Client Matrix Drinking Water
Analysis:		
EPA 524.4 - THMs		
EPA 552.3 - Haloacetic Acid Subtest		

Containers Included

SJF0041-01	A	40mL VOA AG / Na2S203
SJF0041-01	B	40mL VOA AG / Na2S203
SJF0041-01	C	40mL VOA AG / Na2S203
SJF0041-01	D	125mL AG / NH4CL
SJF0041-02	A	40mL VOA AG / Na2S203
SJF0041-02	B	40mL VOA AG / Na2S203
SJF0041-02	C	40mL VOA AG / Na2S203
SJF0041-02	D	125mL AG / NH4CL
SJF0041-03	A	40mL VOA AG / Na2S203
SJF0041-03	B	40mL VOA AG / Na2S203
SJF0041-03	C	40mL VOA AG / Na2S203
SJF0041-03	D	125mL AG / NH4CL
SJF0041-04	A	40mL VOA AG / Na2S203
SJF0041-04	B	40mL VOA AG / Na2S203
SJF0041-04	C	40mL VOA AG / Na2S203
SJF0041-04	D	125mL AG / NH4CL
SJF0041-05	A	40mL VOA AG / Na2S203
SJF0041-05	B	40mL VOA AG / Na2S203
SJF0041-05	C	40mL VOA AG / Na2S203
SJF0041-05	D	125mL AG / NH4CL
SJF0041-06	A	40mL VOA AG / Na2S203
SJF0041-06	B	40mL VOA AG / Na2S203
SJF0041-06	C	40mL VOA AG / Na2S203
SJF0041-06	D	125mL AG / NH4CL

Released By

Date

Received By

Date

Released By

Date

Received By

Date

SR-FL-0052-02

Page 19 of 20

SAMPLE TRANSIT INTEGRITY

PM: Sarah K. Guenther

SJF0041

06/01/2026

Cranm7284

10



BSK Bottles: Yes No Page 1 of 1

COC Info	Was temperature within range? Chemistry $\leq 6^{\circ}\text{C}$ Micro $\leq 8^{\circ}\text{C}$	Yes No NA	Were correct containers and preservatives received for the tests requested?	Yes No NA		
	Did all bottles arrive unbroken and intact?	Yes No	Bubbles Present VOAs (524.2/TCP/TTHM)?	Yes No NA		
	Was a sufficient amount of sample received?	Yes No	TB Received? (Check Method Below)	Yes No NA		
	Do samples have a hold time <72 hours?	Yes No	Was PM notified of discrepancies?	Yes No NA		
	Was sodium thiosulfate added to CN sample(s) until chlorine was no longer present?	Yes No NA	PM: By/Time:	Yes No NA		
Bottles Received	250ml(A) 500ml(B) 1Liter(C) 125ml(D) 40ml VOA(V)	Checks Passed?	1-6			
	Bacti Na2S2O3	---	---			
	None (P) White Cap	---	---			
	Cr6 (P) Lt. Green Label/Blue Cap NH4OH(NH4)SO4 DW	Cl, pH > 8	P F			
	Cr6 (P) Pink Label/Blue Cap NH4OH(NH4)SO4 WW	pH 9.3 - 9.7	P F			
	Cr6 (P) Black Label/Blue Cap NH4OH(NH4)SO4 7199 ***24 HOUR HOLD TIME***	pH 9.0 - 9.5	P F			
	HNO3 (P) Red Cap or HCl (P) Purple Cap/Lt. Blue Label	---	---			
	H2SO4 (P) or (AG) Yellow Cap/Label	pH < 2	P F			
	NaOH (P) Green Cap	Cl, pH > 10	P F			
	NaOH + ZnAc (P)	pH > 9	P F			
	Dissolved Oxygen 300ml (g)	---	---			
	None (AG) 608/8081/8082, 625, 632/8321, 8151, 8270	---	---			
	HCl (AG) Lt. Blue Label O&G, Diesel	---	---			
	Ascorbic, EDTA, KH2Ct (AG) Pink Label 525	---	---			
	Na2SO3 (AG) Neon Green Label 515	---	---			
	Na2S2O3 1 Liter (Brown P) 549	---	---			
	Na2S2O3 (AG) Blue Label 548, THM, 524	---	---	3U		
	Na2S2O3 (CG) Blue Label 504, 505, 547	---	---			
	Na2S2O3 + MCAA (CG) Orange Label 531	pH < 3	P F			
	NH4Cl (AG) Purple Label 552	---	---	1D		
	EDA (AG) Brown Label DBPs	---	---			
	HCL (CG) 524.2, BTEX, Gas, MTBE, 8260/624	---	---			
	Buffer pH 4 (CG)	---	---			
	H3PO4 (CG) Salmon Label	---	---			
	250mL P / Trizma 537.1	---	---			
	250mL P/Ammonium Acetate - EPA533	---	---			
	Asbestos 1L (P) / LL Metals Bottle	---	---			
	Bottled Water	---	---			
	Clear Glass Jar/VOA	---	---			
	Solids: Brass / Steel / Plastic Bag	---	---			
Ascorbic Acid (AG) TCP DWRL	---	---				
Other:	---	---				
Split	Container	Preservative/Lot#	Date/Time/Initials	Container	Preservative/Lot#	Date/Time/Initials
	S P			S P		
	S P			S P		
Comments				✓ Indicates Blanks Received 504_____ 524.2_____ TCP_____ TTHM_____ 537_____ 8260/624_____		

Preservation Check: pH Lot#

Cl Lot#

Labels

Checked by: YH @ 19/15

Scanned by: KH @

RUSH

Paged by: _____ @ _____



245 New York Ranch Rd, Suite A, Jackson, CA 95642 (209) 868-2100
email: shane@49erwaterlab.com / www.49erwaterlab.com

06/09/2026

Cranmer Engineering
1188 East Main Street
Grass Valley, CA 95945

Please find the attached report for your water analysis for **Order #36083**. Your sample(s) were received on 06/02/2026 14:00. Your sample(s) were analyzed in accordance with your request with use of AWWA, EPA, ISO/IEC 17025:2017, 2016 TNI Standard and/or approved ELAP methods. All Quality Control results are within acceptable limits except where noted as a notation and/or case summary.

Please feel free to contact us if you have any questions regarding your report(s) or invoice.

We value and thank you for your business.

Sincerely,

Shane Burr
Lab Director

CA ELAP Certification #3036



245 New York Ranch Rd, Suite A, Jackson, CA 95642 (209)868-2100
shane@49erwaterlab.com / www.49erwaterlab.com

Client: Cranmer Engineering
Report To: 1188 East Main Street
Grass Valley, CA 95945

Reported: 06/09/2026
Order No: 36083

Analysis Report

Sample Description: Cranmer Engineering - Drinking Water
Location: Laboratory Sample ID: GIE1382-01
Point of Collection: Client Sample ID: Well 1 Treated Initial
Sampled: 05/18/2026 08:30

Sample No: 93507
Received: 06/02/2026 14:00

<u>Analyte</u>	<u>Category</u>	<u>Results</u>	<u>Units</u>	<u>MDL</u>	<u>RL</u>	<u>Prepared</u>	<u>Analyzed</u>	<u>Method</u>
Total Organic Carbon	Wet Chemistry	1.25	mg/l	0.3	0.5	06/05/26 16:30	06/06/26 13:16	SM5310B-2014/2000

Sample Description: Cranmer Engineering - Drinking Water
Location: Laboratory Sample ID: GIE1382-06
Point of Collection: Client Sample ID: 7-Day
Sampled: 05/25/2026 08:30

Sample No: 93508
Received: 06/02/2026 14:00

<u>Analyte</u>	<u>Category</u>	<u>Results</u>	<u>Units</u>	<u>MDL</u>	<u>RL</u>	<u>Prepared</u>	<u>Analyzed</u>	<u>Method</u>
Total Organic Carbon	Wet Chemistry	1.30	mg/l	0.3	0.5	06/05/26 16:30	06/06/26 13:16	SM5310B-2014/2000

Quality Control Data

<u>Analyte</u>	<u>Result</u>	<u>RL</u>	<u>Units</u>	<u>Spike Level</u>	<u>Source Result</u>	<u>MDL</u>	<u>% REC</u>	<u>% REC Limits</u>	<u>RPD</u>	<u>RPD Limit</u>	<u>Notes</u>
----------------	---------------	-----------	--------------	--------------------	----------------------	------------	--------------	---------------------	------------	------------------	--------------

Signature of Completion: 

Shane Burr
Lab Director

Definitions

J - Detection of analyte above MDL but below RL

ND - Non-Detection of analyte at MDL

MDL - Method detection limit for analyte

RL - Reporting limit for analyte

RPD - Recovery % Different

LCS/BS - Laboratory Control Sample or Blank Standard

MS/MSD - Matrix Spike

ICV - Initial Calibration Value

CCV - Completion Calibration Value

TNTC - Too Numerous to Count



Cranmer Engineering, Inc.
Integrated Engineering Services

SUBCONTRACT ORDER

Sending Laboratory:

CEI
PO Box 1240
Grass Valley, CA 95945
Phone: 530-273-7284
Fax: -

Project Manager: Justin Smith

Subcontracted Laboratory:

49er Water
245 New York Ranch Rd, Ste A
Jackson, CA 95642
Phone: (209) 418-3175
Fax:

JS

Work Order: GIE1382

Project # 3110020

Analysis	Comments	Source ID
----------	----------	-----------

Sample ID: GIE1382-01 Well 1 Treated Initial

Drinking Water Sampled: 05/18/2026 08:30

non compliance

Total Organic Carbon (TOC)

Containers Supplied:

VOA w/HCl (A)

VOA w/HCl (B)

VOA w/HCl (C)

Sample ID: GIE1382-06 7-DAY

Drinking Water Sampled: 05/25/2026 08:30

Total Organic Carbon (TOC)

Containers Supplied:

VOA w/HCl (B)

VOA w/HCl (C)

VOA w/HCl (G)

EDT Upload

YES

☐

NO

☒

Released By

Date

6/2/26

Received By

Date

6/4/26

49er Water Laboratory Forms	Doc. No.: FNW-FR035
	Revision No.: 1.4 Initials: SB
	Active Date: 10/1/2024 Approved by: LT
	Reference SOP: FNW-QM22
TITLE: SAMPLE RECEIVING AND INTEGRITY LOG SHEET	

Work Order # (Sample #): _____

Sample Receiving/Integrity

Received By: _____ Logged By: _____ Sample Accepted: ☒ Yes/☐ No (If No explain in Comment/Status section reason for rejection of sample)

Date/Time: 6/2/26 1400

Customer Info: OEI

Sample Transport: ☐ ONTRAC ☐ UPS ☐ USPS ☐ Walk-in ☒ Courier ☐ FedEx ☐ Other: _____

Transported in: ☒ Ice Chest ☐ Box ☐ Ziploc/Plastic Bag ☐ Hand Delivery ☐ Other: _____

Has Chilling Process begun: ☒ Y/☐ N Samples Received: ☐ Chilled to Touch ☐ Ambient ☒ On Ice
☐ In Storage Fridge

Temperature of Sample (°C): 3.6 Ice Chest Temperature: 0.8 Field Temperature: _____

*Corrected temperature is recorded, after taking temp, make the +/- from IR1 label & record temperature. (O) Observed (C) Corrected

Bottle/Sample Analysis Information

	Yes	No	N/A	Comments
Did bottles arrive unbroken and intact?	X			
Sample is within Hold Time?	X			
Did bottle labels agree with COC?	X			
Correct containers used?	X			Bottle Lot# if from Lab:
Were correct preservatives used for tests requested?	X			
Was there a sufficient sample volume?	X			
Were bubbles present in VOA Vials? (Volatile methods only)		X		
Chlorine Residual Check (Bacteriological ONLY)			X	

Turn-Around Time: ☐ 1 Day Rush ☐ 5 Day Rush ☒ Standard COC completed: ☒ Y/☐ N/☐ N/A

Payment Information: Paid ☐ Y/☒ N Bill ☒ Y/☐ N

Report Request via: ☐ Mail ☒ Email ☒ Portal Email: _____

	Comments/Status
Due Date:	
Samples in Order:	COC/Sample Receiving and Integrity: Scanned and Attached
Notification needed? (for bacteria and exceed of limits for Drinking H2O)	☐ Yes ☐ No ☐ N/A

Active Date: 10/1/2024

Page 1 of 1

Confidential Controlled Document



245 New York Ranch Rd. Suite A, Jackson, CA 95842 (209) 418-3175
email: atranle@49erwaterlab.com / www.49erwaterlab.com

Batch #: 14060 Prepared - 6/5/2026 Analyzed - 6/6/2026

Total Organic Carbon SM 5310B-2000/SM 5310B-2011

Analyte	Results	Units	Spike	Source				% REC			RPD	Source/Notes
			Level	Results	RL	MDL	% REC	Limits	RPD	Limits		
Blank	0.536	mg/L	0		0.5	0.3						B
BS1	1.95	mg/L	2		0.5	0.3	97.5	80-120		20		
BS2	5.06	mg/L	5		0.5	0.3	101	90-110		20		
BS3		mg/L	10		0.5	0.3	0	85-115		20		
MS	12.4	mg/L	10	2.58	0.5	0.3	98.2	80-120		20		92905
MSD	13.1	mg/L	10	2.58	0.5	0.3	105	80-120	5.5	20		92905
MSD		mg/L	10		0.5	0.3	0	80-120		20		
Dup1	1.8	mg/L		1.78	0.5	0.3	101	85-115	1.1	20		93479
Dup2	0.453	mg/L		0.66	0.5	0.3	68.6	85-115	37	20		93646-D
Dup3		mg/L			0.5	0.3	#####	85-115	###	20		
BS CCV	9.86	mg/L	10		0.5	0.3	98.6	85-115	1.4	20		

B - Blank value out of acceptable limits

D - Duplicate value out of acceptable limits

C - CCV value out of acceptable limits

S - Standard spike level out of acceptable limits

M- Matrix spike level out of acceptable limits

- denotes no value/results for calculations in section

Appendix C

Chlorination Equipment Packages and Quote

Prominent Package



PRICE QUOTE

April 28, 2026

To: Hydros Engineering

Attn: Gerry LaBudde

Subject: ProMinent Gamma X Pump Metering Skid

GENERAL NOTES:

A) This proposal is based on information and specifications you provided. Completeness and accuracy of scope of supply, and fulfillment of specification requirements, is ultimately your responsibility.

B) Field startup and training are not included in this quotation. Typical start-up charges are \$2000/day .

C) Drawing Submittals:

Allow 15 days ARO for engineering drawings to be created. Our Price includes one set of shop drawings and component cut sheets (available in electronic format from our website). One set of standard equipment manuals will be shipped with equipment. Customer is responsible for binder assembly and special documentation. A full submittal package is additional and price will be based on actual documentation requirements. Material procurement/production will not begin until submittal drawings are returned and marked approved.

Should you have any additional questions, please do not hesitate to contact us immediately.

TERMS & CONDITIONS

Payment: Net 30 days

Price: US Dollars, Ex Works,

Delivery: 4-6 Weeks ARO and Drawing/Submittal Approvals.

Offer Validity: 90 Days

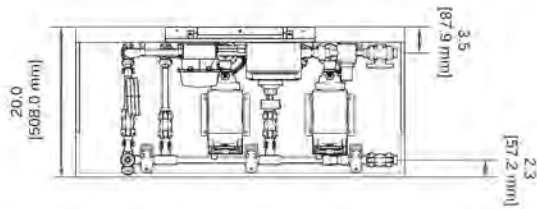
Price overview

#	Material #	Description	Qty	Ext. Net
Prominent Configurable Dosing Skid System				
1	DSSASS2GXKE0APCV11F1PBRSDTB SS2-GXA-A-PCV-PD1-CC1-F1-PB-RS-RD-TB			\$15,277.90
1.1	GMXA1009PVT70000UVC030BEN07			
1.1.1			1	
1.1.2			1	
1.1.3			1	
1.1.4			1	
1.1.5			1	
1.2	SS2_A_PB_RS_RD_F	STAND, SS2, 46" X 44" X 20", BLACK PP/PE	1	
1.3				
1.3.1	DPA_A2A_PCV_PB_F1			
1.3.1.1	BPV_PCV_A	1/2in PVC/Teflon Back Pressure Valve	1	
1.3.1.2	PGI_160_PCV_A	160PSI CPVC/Teflon Pressure Gauge and Isolator 1/2in	1	
1.3.2	PPA_A_X_050OD_PCV_F1			
1.3.2.1	PD_164_PCV	164ML PVC/Viton Pulsation Dampener	2	
1.3.2.2	PRV_PCV_A	1/2in PVC/Teflon Pressure Relief Valve	2	
1.3.3	SPA_A2A_PCV_F1			
1.3.3.1	YS_PCV_A	1/2in PVC/Viton Wye Strainer	1	
1.3.4	BV_PCV_A1	PVC/Viton Ball Valves (Vented)	1	
1.3.5	CCA_PCV_A_F1			
1.3.5.1	CC_100_PCV_A	100ML PVC Calibration Column	1	

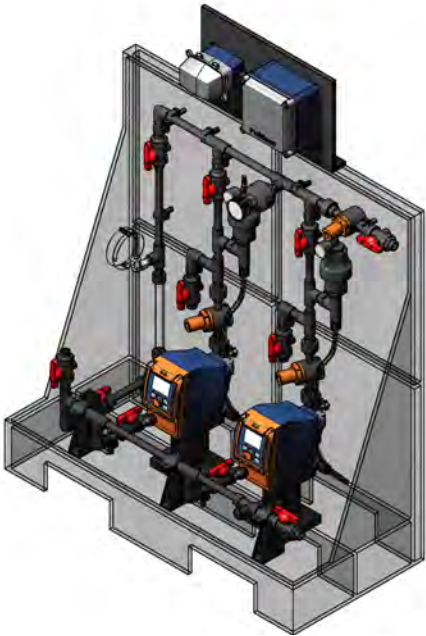
#	Material #	Description	Qty	Ext. Net
1.4	CP_TB_2F	Two Pump Terminal Box Assy	1	
Prominent Configurable Dosing Skid System				
2	DSSASS1GXKE0APCV11F1SDRSRDTB SS1-GXA-A-PCV-PD1-CC1-F1-SD-RS-RD-TB			\$10,320.30
2.1	GMXA1009PVT70000UVC030BEN07			
2.1.1			1	
2.1.2			1	
2.1.3			1	
2.1.4			1	
2.2	SS1_A_SD_RS_RD_F	STAND, SS1-A, 46" X 25" X 20", BLACK PP/PE	1	
2.3				
2.3.1	DPA_A1A_PCV_SD_F1			
2.3.1.1	BPV_PCV_A	1/2in PVC/Teflon Back Pressure Valve	1	
2.3.1.2	PGI_160_PCV_A	160PSI CPVC/Teflon Pressure Gauge and Isolator 1/2in	1	
2.3.2	PPA_A_X_050OD_PCV_F1			
2.3.2.1	PD_164_PCV	164ML PVC/Viton Pulsation Dampener	1	
2.3.2.2	PRV_PCV_A	1/2in PVC/Teflon Pressure Relief Valve	1	
2.3.3	SPA_A1A_PCV_F1			
2.3.3.1	YS_PCV_A	1/2in PVC/Viton Wye Strainer	1	
2.3.4	BV_PCV_A1	PVC/Viton Ball Valves (Vented)	1	
2.3.5	CCA_PCV_A_F1			
2.3.5.1	CC_100_PCV_A	100ML PVC Calibration Column	1	
2.4	CP_TB_1F	One Pump Terminal Box Assy	1	

#	Material #	Description	Qty	Ext. Net
Total price				\$25,598.20

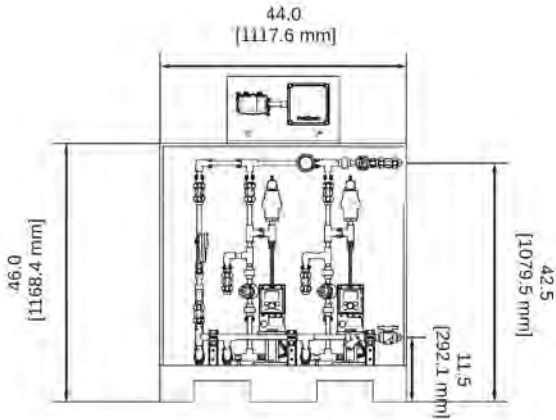
- NOTES:
1. CHEMICAL SERVICE: Sodium Hypochlorite (12.5%)
 2. PIPING MATERIAL: PVC / Viton SEALS UNLESS OTHERWISE REQUIRED BY COMPONENTS.
 3. PUMPS: Solenoid Control, GMXA1009PVT70000UVC030BEN07, Rated 1.59 gph @ 145.00 psi / 6.00 lph @ 10.00 bar
 4. TOLERANCES ON ALL DIMENSIONS ARE +/- 3/8" (10mm).



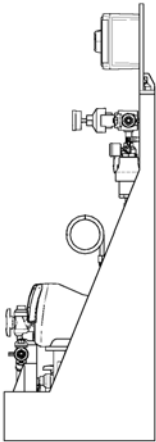
PLAN VIEW



ISOMETRIC VIEW

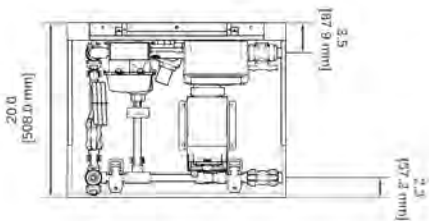


FRONT VIEW



SIDE VIEW

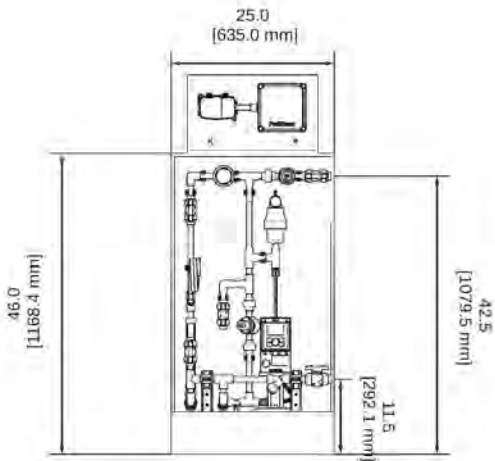
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REV	DATE	DESCRIPTION	BY	APPD	REVD
REVISIONS					
CUSTOMER Customer Not Specified					
JOB No		PURCHASE ORDER No			
TITLE SS2-GXA-A-PCV-PD1-CC1-F1-PB-RS-RD-TB					
GENERAL ARRANGMENT					
THIS DRAWING IS THE PROPERTY OF PROMINENT FLUID CONTROLS INC. AND SHALL NOT BE COPIED OR TRANSFERRED WITHOUT THE WRITTEN CONSENT OF PROMINENT FLUID CONTROLS INC.					
ENGINEERS SEAL					
		PITTSBURGH, PA USA WWW.PROMINENT.US			
		PROMINENT FLUID CONTROLS LTD. 490 SOUTHGATE DRIVE. GUELPH, ONTARIO, CANADA N1H 6J3 TEL. 519 836 5692 FAX. 519 836 5226		PROMINENT FLUID CONTROLS INC. RIDC PARK WEST 136 INDUSTRY DRIVE. PITTSBURGH P.A., USA. 15275 TEL. 412 787 2484 FAX. 412 787 0704	
		DESIGNED	GJS	APPROVED	KH
		DRAWN	GJS	SCALE	N. T. S.
		CHECKED	KH	DATE	04/28/26
DWG No	SS2-GXA-A-PCV-PD1-CC1-F1-PB-RS-RD-TB-200				REV 0
					PAGE 1/1



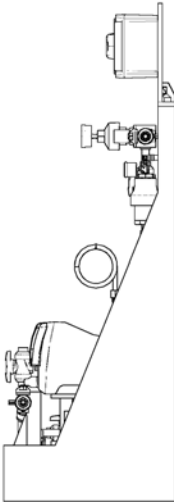
PLAN VIEW



ISOMETRIC VIEW



FRONT VIEW



SIDE VIEW

- NOTES:
- CHEMICAL SERVICE: Sodium Hypochlorite (12.5%)
 - PIPING MATERIAL: PVC / Viton SEALS UNLESS OTHERWISE REQUIRED BY COMPONENTS.
 - PUMPS: Solenoid Control, GMXA1009PVT70000UVC030BEN07, Rated 1.59 gph @ 145.00 psi / 6.00 lph @ 10.00 bar
 - TOLERANCES ON ALL DIMENSIONS ARE +/- 3/8" (10mm).

0	04/28/26	FIRST ISSUE	GIS		
REV	DATE	DESCRIPTION	BY	APPD	REV
REVISIONS					
CUSTOMER		Customer Not Specified			
JOB No		PURCHASE ORDER No			
TITLE		SS1-GXA-A-PCV-PD1-CC1-F1-SD-RS-RD-TB			
		GENERAL ARRANGMENT			
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ENGINEERS SEAL					
		PITTSBURGH, PA USA WWW.PROMINENT.US			
		PROMINENT FLUID CONTROLS LTD. 490 SOUTHGATE DRIVE GUELPH, ONTARIO, CANADA N1H 6J3 TEL. 519 836 5692 FAX. 519 836 5226		PROMINENT FLUID CONTROLS INC. RIDC PARK WEST 136 INDUSTRY DRIVE, PITTSBURGH, P.A. USA. 15275 TEL. 412 787 2484 FAX. 412 787 0704	
DESIGNED		GIS		APPROVED KH	
DRAWN		GIS		SCALE N. T. S.	
CHECKED		KH		DATE 04/28/26	
DWG No	SS1-GXA-A-PCV-PD1-CC1-F1-SD-RS-RD-TB-200				REV 0
					PAGE 1/1

Technical Data

GMXA1009PVT70000UVC030BEN07GMXaXXXXPVT7.docx

ProMod Systems Designer

System Component Data Sheets

ProMod Systems Designer

Component Data Sheets

Metering Pumps

ProMinent® gamma/ X Solenoid Diaphragm Metering Pumps

Overview: gamma/ X

The gamma/ X solenoid diaphragm metering pump incorporates a wealth of eXcellent ingenuity! With integrated pressure measurement, it ensures the smooth running of your metering process. The gamma/ X is ideal for all chemical metering applications. (see [page 143](#) for spare parts)

- Capacity range from 0.24 GPH to 11.9 GPH, maximum discharge pressure up to 363 psi
- Simple adjustment of the capacity directly in GPH
- Configurable discharge stroke, continuous or pulsed dosing
- Configurable suction stroke duration
- Stroke rate adjustable from 1 – 12,000 strokes per hour
- Electronic stroke length adjustment, continuous from 0 - 100% (recommended range 30 - 100%)
- Suitable for continuous micro-metering from 1 ml/hr thanks to the innovative solenoid control
- Integrated pressure measurement allows for detection of blocked discharge line, broken discharge lines and air or gas bubbles trapped in the dosing head
- Acrylic/PVC, PVT (PVDF) and Stainless Steel liquid end material versions
- Auto degassing liquid ends in Acrylic/ PVC and PVT
- High viscosity liquid ends (PVT4) for viscosities of up to 3000 cP
- Large backlit graphic display and status LED's
- External control via voltage-free contacts with pulse multiplier/divider function
- External control via standard 4-20 mA signal, and scalable adjustment of mA signal to stroke rate
- Standard internal programmable timer for real-time dependent dosing routines i.e biocides, cooling towers etc.
- Standard pump capable of accepting 2-stage tank level sensor input, flow monitor input, diaphragm rupture sensor input and control cable input.
- NSF/ANSI 61 Approved Liquid ends
- Bluetooth, PROFIBUS, CANbus interface as an optional feature (see [page 151](#) for PROFIBUS)



ProMinent® gamma/ X Solenoid Diaphragm Metering Pumps

Capacity Data

Capacity data: gamma/ X

Pump Version	Capacity at Maximum Backpressure					Max. Stroking Rate	Tubing Connectors O.D. x I.D	Pre-Primed Suction Lift **		SS Liquid end connections FNPT	Shipping Weight lbs
	psig	(bar)	GPH* (l/h)	ml/stroke	Strokes/min	in	ft	(m)	in	NP/PV	SS
gamma/ X: with standard liquid ends											
1602	232	(16)	0.61 (2.3)	0.19	200	1/4 x 3/16	19.6	(6)	1/4	7.9	9
1604	232	(16)	0.95 (3.6)	0.30	200	1/4 x 3/16	16.4	(5)	1/4	7.9	9
0708	102	(7)	2.0 (7.6)	0.63	200	1/2 x 3/8	13.1	(4)	1/4	8.1	11
0414	58	(4)	3.56 (13.5)	1.13	200	1/2 x 3/8	9.8	(3)	1/4	8.1	11
0220	29	(2)	5.2 (19.7)	1.64	200	1/2 x 3/8	6.5	(2)	3/8	8.1	11
2504	363	(25)	1.0 (3.8)	0.32	200	(8 x 4mm)	13.1	(4)	1/4	10.8	12.1
1009	145	(10)	2.38 (9.0)	0.75	200	1/2 x 3/8	9.8	(3)	1/4	11.2	14.3
0715	102	(7)	3.83 (14.5)	1.21	200	1/2 x 3/8	9.8	(3)	1/4	11.2	14.3
0424	58	(4)	6.34 (24)	2.00	200	1/2 x 3/8	9.8	(3)	3/8	11.2	14.3
0245	29	(2)	11.9 (45)	3.70	200	1/2 x 3/8	6.5	(2)	3/8	11.5	15.4
gamma/ X: with auto-degassing liquid ends NPB9/ NPE9											
1602	232	(16)	0.34 (1.30)	0.11	200	1/4 x 3/16	6.9	(2.1)	~	7.9	~
1604	232	(16)	0.63 (2.40)	0.21	200	1/2 x 3/8	8.8	(2.7)	~	7.9	~
0708	101	(7)	1.8 (6.80)	0.57	200	1/2 x 3/8	6.5	(2)	~	8.1	~
0414	58	(4)	3.17 (12)	1.00	200	1/2 x 3/8	6.5	(2)	~	8.1	~
0220	29	(2)	4.75 (18)	1.5	200	1/2 x 3/8	6.5	(2)	~	8.1	~
1009	145	(10)	2.11 (8)	0.67	200	1/2 x 3/8	9.8	(3)	~	11.2	~
0715	101	(7)	3.56 (13.5)	1.00	200	1/2 x 3/8	8.2	(2.5)	~	11.2	~
0424	58	(4)	5.28 (20)	1.67	200	1/2 x 3/8	8.2	(2.5)	~	11.2	~
gamma/ X: with self-bleeding liquid ends, 2-port without bypass (PVT7)											
1604	232	(10)	0.42 (1.6)	0.13	200	1/4 x 3/16	6	(1.8)	~	7.9	~
0708	101	(7)	1.50 (5.7)	0.48	200	1/2 x 3/8	6	(1.8)	~	8.1	~
0414	58	(4)	3.17 (12.0)	1.00	200	1/2 x 3/8	6	(1.8)	~	8.1	~
0220	29	(2)	4.60 (17.4)	1.45	200	1/2 x 3/8	6	(1.8)	~	8.1	~
1009	145	(10)	1.58 (6.0)	0.50	200	1/2 x 3/8	6	(1.8)	~	11.2	~
0715	101	(7)	3.40 (12.9)	1.08	200	1/2 x 3/8	6	(1.8)	~	11.2	~
0424	58	(4)	5.07 (19.2)	1.60	200	1/2 x 3/8	6	(1.8)	~	11.2	~

gamma/ X metering pumps with high viscosity liquid ends (PVT 4) have a 10 – 20 % lower capacity rating and are not self-priming.

Positive suction is recommended and pumps supplied with 1/2" MNPT connections.

Permissible ambient temperature: 14 °F to 113 °F | Average power consumption: 78 W | Degree of protection: IP 66

* Capacity data represents minimum values, tested using water at 68 °F (room temperature)

** Suction lift with pre-primed suction line and liquid end

Materials In Contact With Chemicals

Liquid end materials in contact with media

	Pump head	Suction/discharge valve	Ball seat	Seals	Balls
NPE	Clear Acrylic	PVC	EPDM	EPDM	Ceramic
NPB	Clear Acrylic	PVC	FKM	FKM	Ceramic
PPT	Polypropylene	PVDF	PTFE	PTFE	Ceramic
PVT	PVDF	PVDF	PVDF	PTFE	Ceramic
SST	Stainless Steel	Stainless Steel	Ceramic	PTFE	Ceramic

Auto-degassing liquid ends in NP with a valve spring made of Hastelloy C and a PVDF valve insert. PVT7 version with PVDF/PTFE wetted parts.

Diaphragm with a PTFE face.

Permissible ambient temperature: 14 °F - 113 °F | Average power consumption: 25/30 W | Degree of protection: IP 66/NEMA 4X

FKM =fluorine rubber

ProMinent®

precision
control

solenoid-driven
unattended

motor-driven
unattended

pump spare parts &
accessories

DIAGNOSTIC
instrumentation

PLC/DCS/SCADA
systems

polymer blending &
dry feed solutions



ProMinent® gamma/ X
Solenoid Diaphragm Metering Pumps

Specifications

Maximum stroke length:	For 70mm solenoid approx. .05" For 85mm solenoid approx. .06"													
Materials of construction														
Housing:	Fibreglass reinforced PPE (Polyphenylene Ether)													
Diaphragm:	PTFE faced EPDM with plastic core													
Liquid end options:	Acrylic/PVC, PVDF, Stainless Steel													
Enclosure rating:	IP 65													
Power supply:	100 – 230 VAC 1 Phase 50 / 60 Hz ± 10%													
Power consumption:	1602 / 1604 / 0708 / 0414 / 0220 25 W 2504 / 1009 / 0715 / 0424 / 0245 30 W													
Check valves:	Double ball suction / discharge (PVT4 with spring loaded single ball)													
Power cord:	6ft													
Relay cable (optional):	6ft													
Relay Options														
Identcode Option 1:	Relay contact rated 230 VAC 2 A Max													
Identcode Option 4:	Both relay contacts rated 24 V, 100 mA Max													
Identcode Option C:	Isolated 4 – 20 mA output can drive up to 300 Ω maximum impedance Relay contact rated 24 V 100 mA													
Ambient temperature range														
In operation:	14 °F to 113 °F													
Storage & Transport:	-4 °F to 140 °F													
Max. fluid operating temp:	<table><tr><td>Material</td><td>Constant</td><td>Short Term*</td></tr><tr><td>Acrylic/PVC</td><td>113 °F</td><td>140 °F</td></tr><tr><td>PVDF</td><td>113 °F</td><td>248 °F</td></tr><tr><td>SS</td><td>113 °F</td><td>248 °F</td></tr></table> *15 minutes at 29 psi maximum		Material	Constant	Short Term*	Acrylic/PVC	113 °F	140 °F	PVDF	113 °F	248 °F	SS	113 °F	248 °F
Material	Constant	Short Term*												
Acrylic/PVC	113 °F	140 °F												
PVDF	113 °F	248 °F												
SS	113 °F	248 °F												
Climate:	95% Relative humidity – non-condensing													
Sound pressure level:	LpA < 70 dB according to EN ISO 20361													
Warranty:	2 years on pump drive, 1 year on liquid end													
Valve threads:	NP / PVT M20 x 1.5 (provided with adapters for tubing)													
Standard production test:	All pumps are tested for capacity at maximum pressure prior to shipment													
Max solids size in fluid:	Versions 1602 / 1604 / 2504 = 15µ Versions 0708 / 0414 / 0220 / 1009 / 0715 / 0424 / 0245 = 50 µ													
Contact input														
Minimum pulse duration:	20 ms													
Maximum pulse input:	25 pulses / second													
Analog Input Impedance:	120 Ohms													
Recommended Viscosity:	Max. 200 cPs for standard liquid end Max. 500 cPs for valve with springs Max. 50 cPs for auto-degassing liquid ends Max. 3000 cPs for high-viscosity liquid ends													

ProMinent® gamma/ X Solenoid Diaphragm Metering Pumps

Identcode Ordering System

ProMinent®

GMXa	Gamma X																
Version	Capacity				Version	Capacity				Version	Capacity						
1602	0.61 gph (2.3 l/h), 232 psi (16 bar)				0220	5.2 gph (19.7 l/h), 29 psi (2 bar)				0424	6.34 gph (24 l/h), 58 psi (4 bar)						
1604	0.95 gph (3.6 l/h), 232 psi (16 bar)				2504	1.0 gph (3.8 l/h), 363 psi (25 bar)				0245	11.9 gph (45 l/h), 29 psi (2 bar)						
0708	2.0 gph (7.6 l/h), 102 psi (7 bar)				1009	2.38 gph (9.0 l/h), 145 psi (10 bar)											
0414	3.56 gph (13.5 l/h), 58 psi (4 bar)				0715	3.83 gph (14.5 l/h), 102 psi (7 bar)											

Liquid end material:																	
NP		Clear acrylic /PVDF, for auto-degassing version Clear acrylic / PVC															
PP		Polypropylene															
PV		PVDF/PVDF															
SS		Stainless Steel															
TT		PTFE Carbon-loaded															
O-rings:																	
B		FKM-B/PTFE coated															
E		EPDM/PTFE coated															
T		PTFE/PTFE coated															
Liquid end version:																	
0		Non-bleed version, no valve spring only with NP, TT and SS and type 0245															
1		Non-bleed version, with valve spring only with NP, TT and SS and type 0245															
2		Bleed function, no valve springs only with PV, NP not for type 0245															
3		Bleed function, with valve springs only with PV, NP not for type 0245															
4		Version for highly viscous media only with PV, types 1604, 0708, 0414, 2504, 1009, 0715, 0424															
7		Self-bleeding without bypass, only with PV, not for versions 2504, 0245, and 1602															
9		Auto-degassing with bypass (SEK), only with NP, not for types 2504 and 0245															
Hydraulic connections:																	
6		Standard (SS/TT)															
M		1/4" x 3/16"															
N		3/8" x 1/4"															
O		1/2" x 1/4" for 2504 only															
Q		1/2" x 3/8"															
Diaphragm rupture indicator:																	
0		Without diaphragm rupture indicator															
1		With diaphragm rupture indicator, optical sensor															
Version:																	
0		Standard															
Logo:																	
0		Standard, with logo															
Electrical Connection:																	
U		100-230 V, ±10 %, 50/60 Hz															
Cable and plug with 6ft (2m) power cord, single phase:																	
A		European plug															
D		N. American plug, 115 V															
Relay, pre-set to:																	
0		Without relay															
1		1 x changeover contact 230 V – 2 A, fault indicating relay N/C															
4		2 x N/O 24 V – 100 mA, such as 1 + pacing relay															
C		1 x N/O 24 V – 100 mA, such as 1 + 4 – 20 mA output															
F		Auto degassing module (not available for version 2504)															
G		Auto degassing module + fault relay (not available for version 2504), comes with panel															
Accessories:																	
0		Not included (for PVDF, TT, SS)															
1		With foot and injection valve, 5 ft PVC suction tubing, 10 ft PE discharge tubing															
Control Variants:																	
0		Manual + external 1:1 with pulse control															
3		Manual + external with pulse control + analogue 0/4 - 20 mA															
S		Options 3 + 4 week process timer															
C		Options 3 + CANopen															
R		Options 3 + PROFIBUS® DP interface, M12															
Note: no relay with PROFIBUS® version "R"																	
Metering Monitor:																	
0		Pulse signal input															
Bluetooth connection:																	
0		Not included															
B		Included															
Language:																	
EN		Standard															

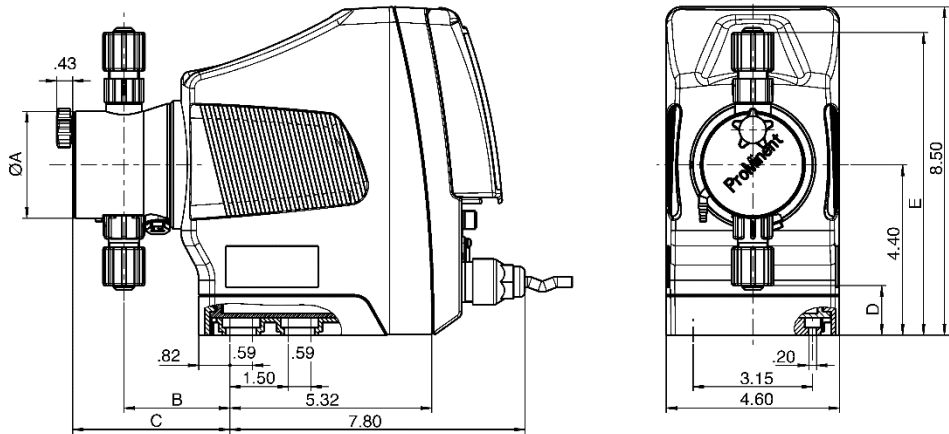
GMXa	1601	PP	E	1	M	0	0	0	0	U	D	1	0	0	0	0	0	EN
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2023 - gamma/ X

43

ProMinent® gamma/ X
Solenoid Diaphragm Metering Pumps

Dimensional Drawings



Material design PPT

Type	Ø A	B	C	D	E
0245	4.30	3.00	—	.55	8.22
0424, 0220	3.50	3.00	4.33	.95	7.95
0715, 0414	3.50	2.91	4.21	.95	7.95
1009, 0708	3.50	2.91	4.25	.95	7.95
1604	2.75	2.80	4.17	1.25	7.80
1602	2.75	2.80	4.17	1.25	7.80

Material design NPT

Type	Ø A	B	C	D	E
0245	4.30	3.00	4.13	.55	8.27
0424, 0220	3.50	3.00	4.09	.90	7.87
0715, 0414	3.50	3.00	4.09	.90	7.87
1009, 0708	3.50	2.91	4.01	.90	7.87
1604	2.75	3.03	4.13	1.30	7.52
1602	2.75	3.03	4.13	1.30	7.52

Material design PVT

Type	Ø A	B	C	D	E
0245	4.30	3.00	—	.55	8.22
0424, 0220	3.50	3.11	3.50	.98	8.00
0715, 0414	3.50	2.87	3.50	.98	8.00
1009, 0708	3.50	2.95	3.62	.98	8.00
1604	2.75	2.80	3.31	1.42	7.72
1602	2.75	2.80	3.31	1.42	7.72

ProMod Systems Designer

Component Data Sheets

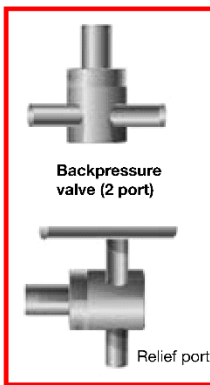
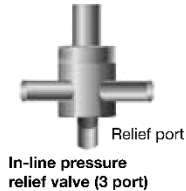
Backpressure & Pressure Relief Valves

Pump & Systems Accessories

Backpressure Valves

Pressure Relief Valves

Backpressure, antisiphon and pressure relief valves



Backpressure valve on tee for pressure relief

Technical data

Size:

1/2"

Diaphragm

Materials:

PTFE-faced EPDM

Liquid Handling

Materials:

PP, PVC, PTFE, PVDF
316 Stainless Steel

Pressure Adjustment:

0-150 psig (0-10.3 bar)

Flow rates @ 45 psig (3.1 bar):

1/4" - 132 U.S. gph (500 L/h)

1/2" - 132 U.S. gph (500 L/h)

Flow rates @ 150 psig:

1/2" (PP, PVC) - 200 U.S. gph (757 L/h)

1/2" (PVDF, TT, SS) - 300 U.S. gph (1135 L/h)

3/4" - 300 U.S. gph (1135 L/h)

1" - 500 U.S. gph (1893 L/h)

1-1/2" - 900 U.S. gph (3407 L/h)

2" - 1200 U.S. gph (4542 L/h)

Max. Temperature:

PP - 195°F (90°C)

PVC - 140°F (60°C)

PTFE - 250°F (121°C)

PVDF - 250°F (121°C)

316 Stainless - 250°F (121°C)

Max. Pressure Rating 170 psig @ 120°F

148

Backpressure (2-port) valves may be used in-line to provide a constant discharge pressure for protection from siphoning, or they may be teed off of the discharge line for pressure relief, discharging back to the source tank or to the pump suction line to create a bypass.

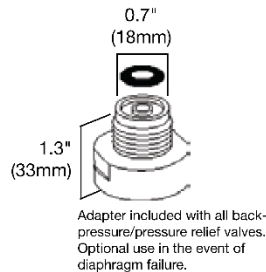
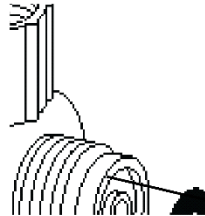
Pressure relief (3-port) valves are mounted in the discharge line, featuring a separate relief port which discharges back to the source tank or to the pump suction line to create a bypass.

Backpressure valves provide several functions: they improve repeatability by providing a constant discharge pressure; they provide antisiphon protection for discharge into pressurized water lines or vacuums, or where suction head exceeds discharge head; and they minimize pulsation when used in conjunction with a pulsation dampener.

In-line backpressure/antisiphon and pressure relief valves

These adjustable backpressure (2-port) and pressure relief (3-port) valves have FNPT ports and require tubing adapters for use with flexible tubing.

Can be adjusted with screwdriver.



DIMENSIONS: 1/4" to 2" valves

D	A (in)	B (in)	C (in)
1/4"	4.90	2.6	1.2
*1/4"	*3.5	*2.375	*0.75
1/2"	4.9	2.6	1.2
*1/2"	*5.5	*3.5	*1.125
3/4"	5.4	3.5	1.1
1"	5.7	3.9	1.4
1-1/2"	8.5	4.6	2.2
2"	8.5	4.6	2.2v

*Note: Dimensions apply to SS and PTFE valves only.

DIMENSIONS (for replacement valves only): 1/4" to 2" valves - SEE PG. 8

D	A (in)	B (in)	C (in)
1/4"	3.9	2.375	0.75
*1/4"	*3.5	*2.375	*0.75
1/2"	4.6	2.375	1.125
*1/2"	*5.5	*3.5	*1.125
3/4"	5.5	3.5	1.125
1"	5.8	3.5	1.25
1-1/2"	9.0	4.5	2.1
2"	9.0	5.0	2.1

*Note: Dimensions apply to SS, PVDF and PTFE valves only.

Technical Data
PGI_160_PCV_A

ProMod Systems Designer

Component Data Sheets

Pressure Gauge with Isolator



BOTTOM CONNECTED ALL STAINLESS GAUGES



Model BR301L

RANGE	CODE	MAJOR INC.	MINOR INC.
30/0" VAC	A	5	0.5
30/0/15	CB	5	0.5
30/0/30	CC	10	1
30/0/60	CD	10	1
30/0/100	CE	20	2
30/0/150	CF	20	2
30/0/300	CH	50	10
0/15	B	2	0.2
0/30	C	5	0.5
0/60	D	10	1
0/100	E	20	2
0/160	F	20	2
0/200	G	40	4
0/300	H	50	5
0/400	I	50	5
0/500	J	100	10
0/600	K	100	10
0/800	L	100	10
0/1000	M	200	20
0/1500	N	200	20
0/2000	O	400	50
0/3000	P	500	50
0/4000	Q	500	50
0/5000	R	1000	100
0/6000	S	2000	200
0/10,000	U	2000	200
0/15,000	V	2000	200

MODEL BR301L

FEATURES:

The Model BR301L Series from Blue Ribbon Corporation is a high-quality line of liquid-filled bottom connected all stainless steel gauges. Their glycerine filling helps to dampen the effects of vibration, which will extend the life of the gauge.

This gauge is typically used on hydraulic & pneumatic systems, as well as any commercial or industrial application not corrosive to 316L stainless steel wetted parts, or where glycerine filling is suitable for use.

SPECIFICATIONS:

- Stainless Steel Case and Bezel
- Stainless Steel Internals
- 316 Stainless Steel Bourdon Tube & Connection
- IP65 Enclosure
- Liquid Filled (Dry Available)
- Accuracy
 - 2½" Dial: 1.6%
 - 4" and 6" Dials: 1%
- Dual Scale: PSI & BAR (x100=kPa)
- Single Scale (PSI) Available
- Ambient Temperature
 - Filled: +30 °F to +160 °F
 - Dry: -30 °F to +180 °F

FIELD OPTIONS:

- Dial Sizes
 - 2½", 4", and 6"
- Connection Sizes
 - ¼"(M) NPT on 2½" and 4"
 - ½"(M) NPT on 4" and 6"
- Safety Glass Lens
- Welded Socket
- Overpressure Limit: 30% FSO
- Working Pressure: 75% FSO



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BR-Gauges-BR301L-062015



PRESSURE GAUGE ISOLATOR with switch



Provides Isolation From Hazardous Or Corrosive Liquids

SIGMAMOTOR Pressure Gauge Isolators allow standard pressure gauges to be used in corrosive services.

The upper section (gauge side) is filled with glycerin, mineral oil, silicone or halocarbon. A diaphragm separates the glycerin from the lower section which connects to the pressure source.

A 1/2" port is provided for connection to the pressure source.

Features

- CNC precision machined parts
- Variety of materials available
- Various pressure ranges available
- Cost effective and reliable
- 2.5" Dial (4" dial optional)
- Pre-filled with glycerin between gauge and diaphragm
- Optional adjustable pressure switch* can be adjusted from 2% to 90% of full scale value. Reed switch. Max switching voltage: 75VDC / 50 VAC. Max switching current: 0.5A DC or AC with resistive load. Max switching hysteresis: 2.5%.

**Front facing gauge only*

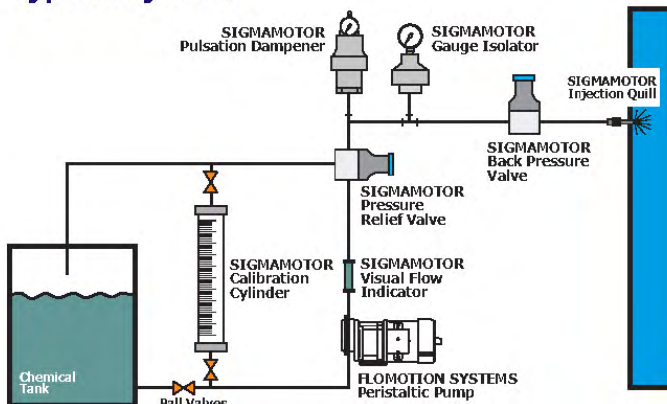


316 SS



POLYPROPYLENE

Typical System



Shown with optional pressure switch

Bayonet ring twists off for easy pressure switch adjustment. Simply move the red indicator.

SIGMAMOTOR PRESSURE GAUGE ISOLATOR

NSF-61 Approved Materials

GI: N - 160 - CP - T - CBM
 1 2 3 4 5

Example: GI-N-030C-P-V-SS

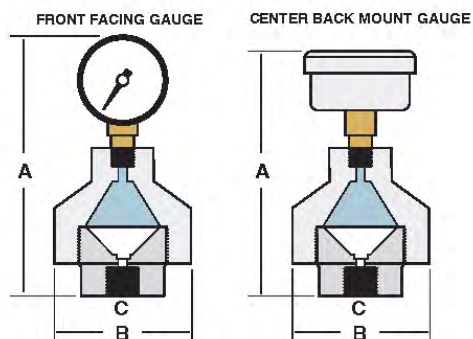
INLET CONNECTION TYPE 1	
NPT	N
SOCKET	S
FLANGED	F
UNION	U

SIZE 2								
SELECT:	C030	030	060	100	160	200	200S	300
PSI RATING	-30,0,30	0-30	0-60	0-100	0-160	0-200	0-200	0-300
A-Height (in) front facing gauge	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
A-Height (in) top facing gauge	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
B-Diameter (in)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
C-Connection (in)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
SPECIAL	Compound						With Switch*	

ISOLATOR BODY MATERIAL 3	
PVC	P
POLYPROPYLENE	PP
CPVC	CP
PTFE	T
Kynar® PVDF	K
316 SS	S
ALLOY 20	A
HASTELLOY C276	H

DIAPHRAGM MATERIAL 4	
VITON	V
EPDM	E
PTFE	T

OPTIONS 5	
STANDARD GAUGE	
ALL 316 STAINLESS STEEL GAUGE	SS
CENTER BACK MOUNT GAUGE	B
HALOCARBON	H
SILICONE	S
MINERAL OIL	M



* Front facing gauge only

Material:	PVC	CPVC	PP	PVDF	PTFE	METAL
Maximum Pressure:	150 psi	150 psi	150 psi	150 psi	150 psi	350 psi
Maximum Temperature:	140 °F	195 °F	195 °F	285 °F	480 °F	300 °F

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Technical Data

ProMod Systems Designer

Component Data Sheets

Pulsation Dampener

PD_164_PCV



PULSATION DAMPENERS

NSF

Minimize pulsating output on positive displacement pumps

SIGMAMOTOR FL Series Pulsation Dampeners offer an inexpensive solution to protect chemical feed systems from harmful effects of pulsating flows.

- Simple chargeable design
- Robust CNC precision machined body
- Provides steady flows for better flow metering accuracy
- Eliminates vibrations in pipes reducing the potential for leaks
- Smooths flows in spray applications

Features

- Capacity - 12, 40 or 85 cu in
- Variety of materials available
- Various Bladder materials
- Charging Valve - Schrader Type

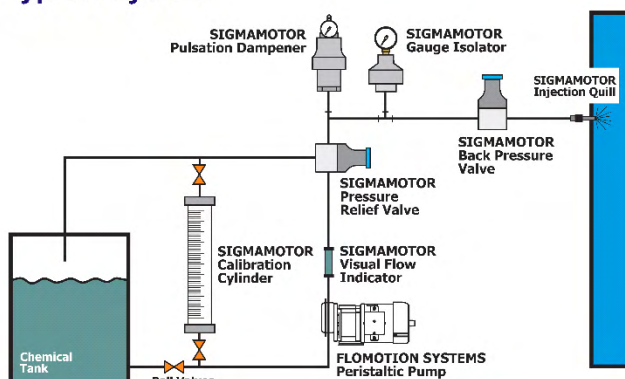


85 cu in



40 cu in

Typical System



12 cu in

SIGMAMOTOR PULSATION DAMPENER

NSF-61 Approved Materials

FL: N - 12 - CP - E -
 1 2 3 4 5

Example: FL-N-12-P-V-SS

INLET CONNECTION TYPE 1	
NPT	N
SOCKET	S
FLANGED	F
UNION	U

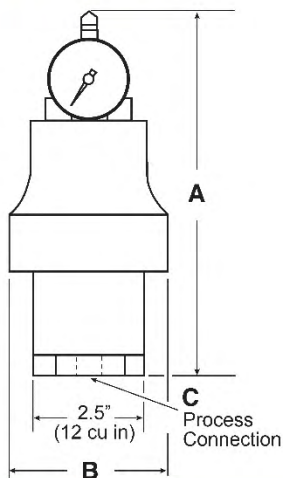
SIZE 2			
SELECT:	12	40	85
CU IN SIZE	12	40	85
ML SIZE (in)	200	660	1400
A-Height (in)	7.8	8.25	11.5
B-Diameter (in)	3.45	5.5	5.5
C-Connection (in)	1/2	1	1

DAMPENER BODY MATERIAL 3	
PVC	P
POLYPROPYLENE	PP
CPVC	CP
PTFE	T
Kynar® PVDF	K
316 SS	S
ALLOY 20	A
HASTELLOY C276	H

BLADDER MATERIAL 4	
VITON	V
EPDM	E
PTFE (12 CU IN ONLY)	T

GAUGE OPTIONS 5	
STANDARD GAUGE	
ALL STAINLESS STEEL	SS

DIMENSIONS



Material:	PVC	CPVC	PP	PVDF	METAL
Maximum Pressure:	150 psi	150 psi	150 psi	150 psi	350 psi
Maximum Temperature:	140 °F	195 °F	195 °F	300 °F	300 °F

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Technical Data

ProMod Systems Designer

Component Data Sheets

Wye Strainer

YS_PCV_A



**YS Series
Y-Strainers**

1/2" - 2" PVC, CLEAR PVC AND CPVC
2-1/2" - 4" PVC AND CPVC

KEY FEATURES

- Available in PVC, CPVC and Clear PVC
- Horizontal or Vertical Installation
- FPM O-Ring Seals
- 2:1 Open Area Ratio
- Hex Cap for Easy Access to Screen
- Standard Screen has 1/32" Perforation

OPTIONS

- Stainless Steel Perforated or Mesh Strainer
Screens Available in Various Sizes and Alloy Materials

MATERIALS

- PVC Cell Class 12454 per ASTM D1784
- Clear PVC Cell Class 12454 per ASTM D1784
- CPVC Cell Class 23447 per ASTM D1784
- FPM and EPDM O-Ring Seals

STRAINERS AND FILTERS

TECHNICAL INFORMATION

SELECTION CHART

SIZE	MATERIAL	END CONNECTION	SEALS	PRESSURE RATING
1/2" - 1" (DN15 - DN25)	PVC, CPVC or Clear PVC			
1-1/4" (DN32)	PVC and Clear PVC	Socket or Threaded		
1-1/2" (DN40)	PVC, CPVC or Clear PVC		FPM and EPDM	150 PSI @ 70°F 10 Bar @ 21°C Non-Shock
2" (DN50)				
2-1/2" (DN65)	PVC	Socket, Threaded or Flanged		
3-4" (DN80-DN100)	PVC and CPVC			

* PVC and CPVC socket ends available to ISO 727-1 and threaded ends to BS21.
Flanged ends available in DIN / EN PN10.

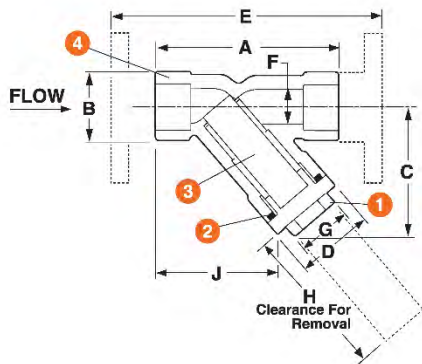
YS Series
Y-Strainers

1/2" - 2" PVC, CLEAR PVC AND CPVC
2-1/2" - 4" PVC AND CPVC

TECHNICAL INFORMATION, CONTINUED

PARTS LIST

- 1. Cap
- 2. O-Ring Seal
- 3. Screen
- 4. Body



SCREEN OPTIONS

PERFORATION SIZES	MESH SIZES	SCREEN MATERIAL
1/32"	20	SSTL, Hastelloy, Monel and Titanium
1/16"	40	
1/8"	60	
5/32"	80	
3/16"	100	
1/4"	200	
3/8"	325	
1/32"	N/A	PVC and CPVC
1/16"		
1/8"		
3/16"		

DIMENSIONS

SIZE in / DN	A in / mm	B in / mm	C in / mm	D in / mm	E in / mm	F in / mm	G in / mm	H in / mm	J in / mm	WEIGHT lbs / kg	
										SOC / THD	FLANGED
1/2 / 15	3.38 / 86	1.38 / 35	2.25 / 57	1.50 / 38	N/A	.56 / 14	1.00 / 25	2.13 / 54	2.50 / 64	.25 / .11	N/A
3/4 / 20	4.18 / 106	1.69 / 43	2.88 / 73	2.00 / 51	N/A	.81 / 21	1.25 / 32	2.75 / 70	3.00 / 76	.63 / .29	N/A
1 / 25	5.19 / 132	2.00 / 51	3.63 / 92	2.16 / 55	N/A	1.00 / 25	1.50 / 38	3.30 / 84	3.32 / 84	.88 / .40	N/A
1-1/4 / 32	6.63 / 168	2.63 / 67	4.50 / 114	2.94 / 75	N/A	1.25 / 32	2.00 / 51	4.50 / 114	4.45 / 113	1.75 / .79	N/A
1-1/2 / 40	6.63 / 168	2.63 / 67	4.50 / 114	2.94 / 75	N/A	1.56 / 40	2.00 / 51	4.50 / 114	4.45 / 113	1.63 / .74	N/A
2 / 50	7.63 / 194	3.38 / 86	5.38 / 137	3.75 / 95	11.00 / 279	2.00 / 51	2.38 / 60	5.06 / 129	4.88 / 124	3.00 / 1.36	5.00 / 2.27
2-1/2 / 65	10.31 / 262	4.69 / 119	7.25 / 184	5.25 / 133	N/A	2.90 / 74	3.50 / 89	6.60 / 168	6.54 / 166	7.75 / 3.52	N/A
3 / 80	10.31 / 262	4.69 / 119	7.25 / 184	5.50 / 140	14.37 / 365	2.90 / 74	3.50 / 89	6.60 / 168	6.54 / 166	7.50 / 3.40	12.25 / 5.56
4 / 100	12.81 / 325	5.75 / 146	8.88 / 226	6.18 / 157	17.73 / 450	3.78 / 96	4.25 / 108	8.00 / 203	8.58 / 218	9.50 / 4.30	17.50 / 7.94

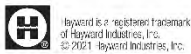
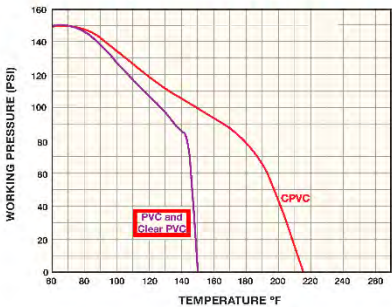
Dimensions are subject to change without notice – consult factory for installation information

Cv VALUES*

SIZE in / DN	Cv VALUES	SIZE in / DN	Cv VALUES
1/2 / 15	4.0	2 / 50	28
3/4 / 20	6.8	2-1/2 / 65	40
1 / 25	9.0	3 / 80	65
1-1/4 / 32	12	4 / 100	100
1-1/2 / 40	28		

* With 1 / 32" elastic screen

OPERATING TEMPERATURE/PRESSURE



USA: 1.888.429.4635 • Fax: 1.888.778.8410 • One Hayward Industrial Drive • Clemmons, NC 27012 • Email: hfcsales@hayward.com
Canada: 1.888.238.7665 • Fax: 1.905.829.3636 • 2880 Plymouth Drive • Oakville, ON L6H 5R4 • Email: hfowcanada@hayward.com
Visit us at: haywardflowcontrol.com

ProMod Systems Designer

Component Data Sheets

Ball Valves

BV_PCV_A1



Standard Features (Sizes 1/2" – 6")

- Pressure rated up to 230psi [PVC, CPVC, PVDF]
- Double O-ring seals on stem for added protection
- Full bore, sizes 1/2" – 2"
- Full vacuum rated, all sizes
- Blocks in two directions, upstream and downstream, leaving full pressure on the opposite end of the valve
- Integrally molded ISO mounting pad for both manual and actuated operations
- Integrally molded base pad to mount valves securely or panel mounting
- PTFE seats with elastomeric backing cushions ensure bubble tight shut-off and a low fixed torque, while at the same time compensating for wear
- True union design for easier installation or repairs without expanding the pipe system
- Built-in spanner wrench on the handle for valve disassembly and assembly
- Two sets of end connectors (socket and threaded) included with all PVC and CPVC valves in sizes 1/2" – 2"
- CPVC threaded end connectors on sizes 1/2" – 1" come with stainless steel reinforcing rings
- New PTFE seat design – Facilitates easier field maintenance if required
- Tapered O-ring groove – Helps to keep the end connector O-rings on the valve body during installation
- Body flats – Flats have been added to either side of the valve body where a wrench can be applied to prevent the valve body from turning when the union nuts are tightened
- 1/2 - 2 " PVC and CPVC T-21A design

Options

- Pneumatic and electric actuators and accessories
- Stem extensions
- 2" square operating nut or "T" nut
- Locking handles
- Limit switches
- Vented ball

Specifications

Sizes: 1/2" – 6"

Models: PVC & CPVC: Socket Threaded and Flanged (ANSI)
PP & PVDF: IPS and Metric (DIN)
Socket, Threaded, Butt and Flanged (ANSI)

Bodies: PVC, CPVC, PP and PVDF

Seats: PTFE backed with EPDM or FKM

Seals: EPDM or FKM or AFLAS[®]†

Sizes 1/2" - 4" PVC/EPDM/FKM Models

NSF-61 Certified

† Trademark of Asahi Glass Co., Ltd.

Parts List (Sizes 1/2" – 2")

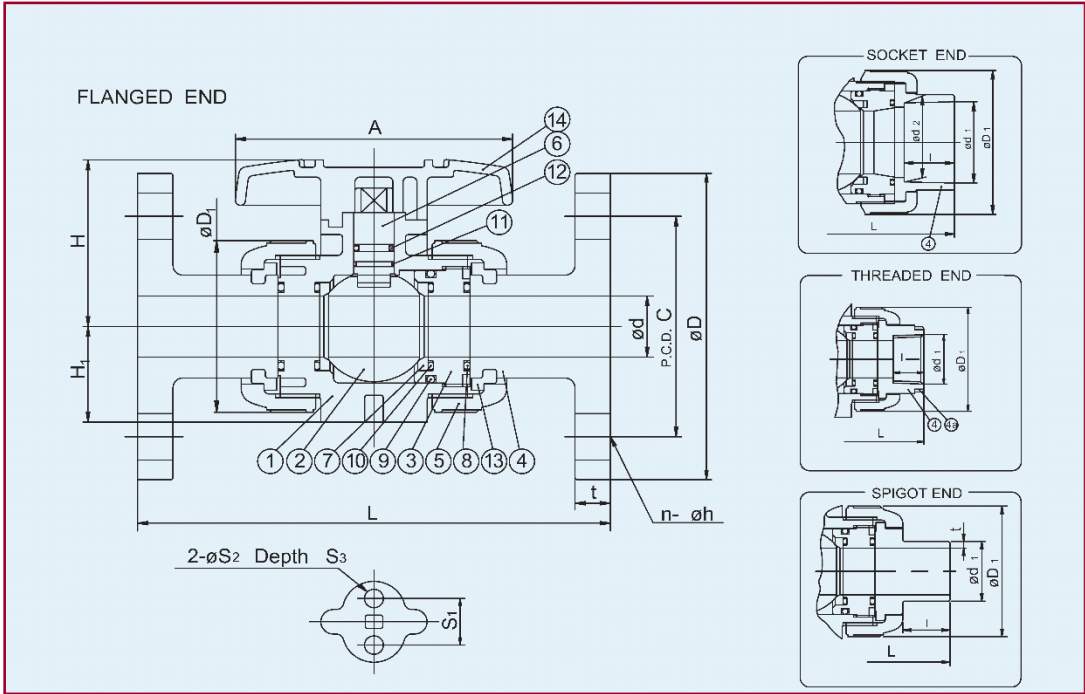
PARTS			
NO.	DESCRIPTION	PCS.	MATERIAL
1	Body	1	PVC, CPVC, PP, PVDF
2	Ball	1	PVC, CPVC, PP, PVDF
3	Carrier	1	PVC, CPVC, PP, PVDF
4	End Connector	2	PVC, CPVC, PP, PVDF
5	Union Nut	2	PVC, CPVC, PP, PVDF
6	Stem	1	PVC, CPVC, PP, PVDF
7	Seat	2	PTFE
8	O-Ring (A)	2	EPDM FKM, Others
9	O-Ring (B)	1	EPDM FKM, Others
10	O-Ring (C)	2	EPDM FKM, Others
11	O-Ring (D)	1	EPDM FKM, Others
12	O-Ring (E)	1	EPDM FKM, Others
13	Stop Ring*	2	PVDF
14	Handle	1	ABS
4a	Ring**	2	304 Stainless Steel

* Used for flanged end.

** Used for CPVC body, threaded end, 1/2"-1".



Type-21/21ABall Valves



Dimensions (Sizes 1/2" – 2") (in.)

NOMINAL SIZE		d	FLANGED						SOCKET										
			ANSI CLASS 150				L	t	PVC, CPVC				PP, PVDF (DIN)				PP, PVDF (IPS)		
			D	C	n	h			ASTM SCH 80				DIN 16962				d1	/	L
									d1	d2	/	L	d1	d2	/	L			
INCHES	mm		D	C	n	h	L	t	d1	d2	/	L	d1	d2	/	L	d1	/	L
1/2	15	0.59	3.50	2.38	4	0.62	5.63	0.47	0.848	0.836	0.875	4.45	0.768	0.760	0.57	3.90	0.83	0.87	4.45
3/4	20	0.79	3.88	2.75	4	0.62	6.77	0.55	1.058	1.046	1.000	5.08	0.965	0.957	0.63	4.45	1.03	1.00	5.08
1	25	0.98	4.25	3.12	4	0.62	7.36	0.55	1.325	1.310	1.125	5.75	1.240	1.232	0.71	4.84	1.30	1.13	5.75
1-1/4	32	1.26	4.62	3.50	4	0.62	7.48	0.63	1.670	1.655	1.250	6.46	1.553	1.543	0.81	5.47	1.65	1.25	6.46
1-1/2	40	1.57	5.00	3.88	4	0.62	8.35	0.63	1.912	1.894	1.375	7.24	1.947	1.937	0.93	5.87	1.89	1.37	7.24
2	50	2.01	6.00	4.75	4	0.75	9.21	0.63	2.387	2.369	1.500	8.23	2.461	2.445	1.08	6.93	2.36	1.50	8.23

NOMINAL SIZE		THREADED				SPIGOT (BUTT END)													
						PP,PVDF													
						DIN 3442		PP	PVDF										
						d1	/	t	t						L				
INCHES	mm	d1				/	L	d1	/	t	t	L	D1	H	H1	A	S1	S2	S3
1/2	15	1/2 - 14 NPT				0.59	4.02	0.787	0.728	0.098	0.075	4.882	1.89	2.03	1.14	3.62	0.75	0.29	0.43
3/4	20	3/4 - 14 NPT				0.67	4.72	0.984	0.866	0.106	0.075	5.669	2.36	2.34	1.38	3.94	0.75	0.29	0.43
1	25	1 - 11-1/2 NPT				0.79	5.16	1.260	0.886	0.118	0.094	6.063	2.76	2.68	1.54	4.33	0.75	0.29	0.43
1-1/4	32	1-1/4 - 11-1/2 NPT				0.87	5.91	1.575	1.024	0.146	0.094	6.850	3.23	3.17	1.85	4.76	1.18	0.35	0.59
1-1/2	40	1-1/2 - 11-1/2 NPT				0.98	6.42	1.968	1.260	0.181	0.118	7.638	3.94	3.50	2.17	5.16	1.18	0.35	0.59
2	50	2 - 11-1/2 NPT				1.10	7.76	2.480	1.417	0.228	0.118	8.819	4.96	4.04	2.60	6.26	1.18	0.35	0.59

Note: The shape and appearance of assembly differ a little with nominal size compared to this drawing.

Type-21/21A

Ball Valves

Pressure vs. Temperature (psi, water, non-shock)

NOMINAL SIZE		PVC				CPVC						PP				PVDF				
		30° F 70° F	71° F 105° F	106° F 120° F	121° F 140° F	30° F 70° F	71° F 105° F	106° F 120° F	121° F 140° F	141° F 175° F	176° F 195° F	- 5° F 85° F	86° F 120° F	121° F 140° F	141° F 175° F	- 5° F 70° F	71° F 105° F	106° F 140° F	141° F 175° F	176° F 210° F
INCHES	mm																			
1/2-2	15-50	230	170	150	30	230	170	150	120	75	55	150	110	90	55	230	185	150	115	85
2-1/2	65	230	170	150	NA	230	170	150	120	75	55	150	95	70	40	230	185	150	115	85
3	80	230	170	150	NA	230	170	150	85	55	40	150	95	70	40	230	185	150	100	70
4-6	100-150	150	150	150	NA	150	150	150	85	55	40	150	95	70	40	150	150	150	100	70

Sample Specification

All Type-21/21A ball valves, sizes 1/2" to 4", shall be of true union design with two-way blocking capability. All O-rings shall be EPDM or FKM with PTFE seats. PTFE seats shall have elastomeric backing cushion of the same material as the valve seals. Stem shall have double O-rings and be of blowout-proof design. The valve handle shall double as carrier removal and/or tightening tool. ISO mounting pad shall be integrally molded to valve body for actuation. PVC conforming to ASTM D1784 Cell Classification 12454A, CPVC conforming to ASTM D1784 Cell Classification 23567-A, PP conforming to ASTM D4101 Cell Classification PP0210B67272 and PVDF conforming to ASTM D3222 Cell Classification Type II. The ball valves, except PP, shall have a pressure rating of 230psi for sizes 1/2" to 3" and 150psi for 4" (150psi for PP, all sizes) at 70° F. Type-21/21A ball valves must carry a two year guarantee, as manufactured by Asahi/America, Inc.

Caution

- Do not use ball valves where media has suspended particles. Use the following valves:
 - Butterfly valves – PVDF disc is most abrasion resistant. Make sure of chemical compatibility.
 - Diaphragm valves – Elastomeric diaphragm is designed for handling suspended particles.
- Volatile fluids such as sodium hypochlorite (NaClO) and hydrogen peroxide (H₂O₂) could be trapped and gasified within the valve. We can provide you with a Type-21 ball valve with a vented ball to relieve pressure build-up inside the valve.

Troubleshooting

What if the fluid still flows when valve is closed?

- Carrier is not properly tightened. Tighten it.
- PTFE seat is damaged or worn. Replace seat.
- Foreign material is caught between ball and PTFE seat. Remove material and clean.
- Ball is damaged or worn. Change ball.

What if fluid leaks outside of valve?

- Union nut not properly tightened. Retighten.
- Carrier is not properly tightened. Thread it in firmly.
- Carrier or face O-ring is damaged, worn, or missing. Replace O-ring.

What if handle does not rotate smoothly?

- Foreign material has formed on the ball or seat. Clean both.
- Internal part(s) chemically attacked or swollen. Refer to Asahi/America Chemical Resistance Chart for compatibility. Replace part(s) as required.
- Carrier overtightened. Retighten properly.

What if handle rotates too freely?

- Stem is damaged. Replace stem.
- Handle is not engaged with stem. Disassemble and reengage. Inspect.
- Engaging part of stem and/or ball is damaged. Change stem and/or ball.

Cv Values

Weight (lbs.)

NOMINAL SIZE		Cv	NOMINAL SIZE		SOCKET THREADED	FLANGED
INCHES	mm		INCHES	mm		
1/2	15	14	1/2	15	0.44	1.10
3/4	20	29	3/4	20	0.66	1.54
1	25	47	1	25	1.1	2.70
1-1/4	32	72	1-1/4	32	1.54	3.30
1-1/2	40	155	1-1/2	40	2.64	4.40
2	50	190	2	50	4.4	8.15
2-1/2	65	365	2-1/2	65	6.17	8.80
3	80	410	3	80	9.7	13.00
4	100	680	4	100	24.00	26.67

Caution

- Never remove valve from pipeline under pressure.
- Always wear protective gloves and goggles.
- Watch out for trapped fluid in valve. It is safe to close valve before removing it from the pipeline.

ASAHI/AMERICA
Rev. H 1-18

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9

ProMod Systems Designer

Component Data Sheets

Calibration Column

CC_100_PCV_A



PVC CALIBRATION CYLINDERS

Graduated Calibration Cylinders for Accurate Calibration of Chemical Metering Pumps

Verified Accuracy

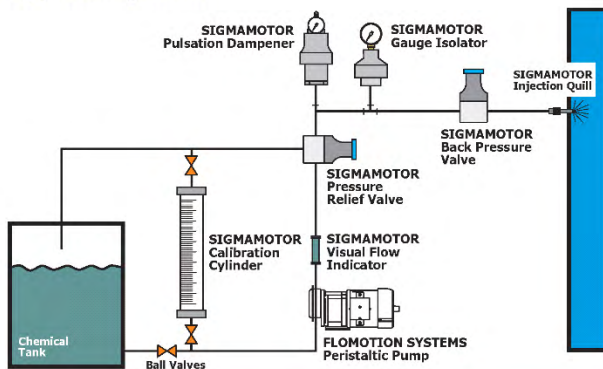
SIGMAMOTOR Calibration Cylinders will enhance your feed systems by allowing verification of the flow rate of the feed pump.

- CNC precision machined ends
- Clear tube for easy GPH reading
- Sealed top
- Quick-off top for cleaning (optional)
- Loose top (optional)
- NSF-61 Approved materials

Calibration Cylinders are installed on the suction side of the metering pump. The top of the cylinder is vented back to the supply tank or drain. The calibration cylinder is filled to the top mark then the valve from the tank is closed. Turning on the metering pump will draw down the liquid providing a simple means to verify the accuracy of the pump flow rate. USGPH (Gallons Per Hour) and ML (Milliliters) are shown on the cylinder.

SIGMAMOTOR Calibration Cylinders are critical to accurate determination of your system flow rate, either at start-up or following maintenance. Sigmamotor Calibration Cylinders are made from clear PVC with gray PVC ends.

Typical System



Rugged PVC Sigmamotor Calibration Cylinders are clearly marked in US GPH and milliliters for accurate drawdown calibrations.

Glass cylinders are also available.

SIGMAMOTOR PVC CALIBRATION CYLINDERS

NSF-61 Approved Materials

PROCESS CONNECTION TYPE 1	
NPT	N
SOCKET	S
FLANGED	F
UNION	U

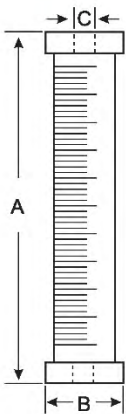
CP: S - 100 - S -
 1 2 3 4

Example: CP-N-100-S-V

SIZE 2												
SELECT:	100	200	250	500	500S	1K	2K	4K	5K	7K	10K	20K
Size (ml)	100	200	250	500	500	1000	2000	4000	5000	7000	10,000	20,000
A-Height (in)	11	19	10.75	13	7	22.25	20.25	37.5	29.25	19.5	25.75	47.75
B-Diameter (in)	1.5	1.5	2.1	2.5	3.7	2.5	3.7	3.7	4.88	7.25	7.25	7.25
C-Connection (in)	1/2	1/2	1/2	3/4	1/2	3/4	1	1	1.5	2	2	2
Capacity (GPH)	3.2	6.4	8	16	16	32	64	128	158	220	320	640
Scale (ml)	1	2	2	5	10	5	10	10	100	100	100	100
Scale (gph)	0.1	0.1	0.25	0.2	1	0.2	1	1	5	5	5	5

CAP STYLE 3	
SEALED	S
LOOSE	L
QUICK OFF	Q

O-RING MATERIAL Quick Off & Union Only 4	
VITON	V
EPDM	E
PTFE ENCAPSULATED	T



SEALED CAP (S)



Cap is permanently fixed to the top of the cylinder and includes a vent or NPT process connection. Used in applications requiring a positive suction head.

LOOSE CAP (L)



Cap is loose and easily removed for cleaning and manual filling. Used in applications where the cylinder must be filled from the top with no positive suction head.

QUICK OFF CAP (Q)



Cap is sealed with an O-ring and includes an NPT vent connection. Used in applications where frequent cleaning is required, such as polymer, alum, ferric chloride or chlorine.

Maximum Pressure:	150 psi
Maximum Temperature:	140 °F

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 www.SigmamotorInc.com



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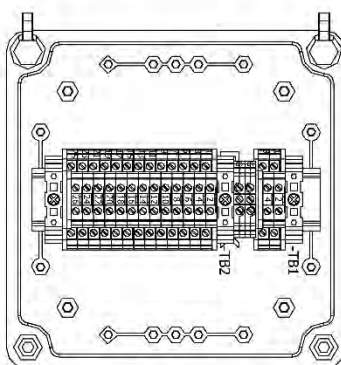
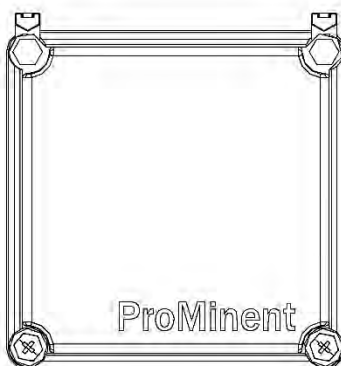
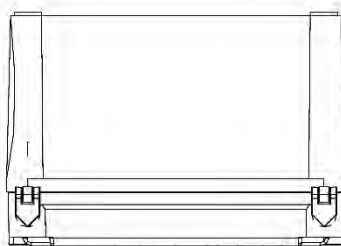
Technical Data

ProMod Systems Designer

Component Data Sheets

Control Panels and/or Terminal Boxes

CP_TB_2F



3D REPRESENTATION

LEFT SIDE

FRONT VIEW
PC ENCLOSURE, 7.5" X 7.5" X 5"
1919 13 G-2FSH

PANEL LAYOUT

Bill Of Materials

Manufacturer	Quantity	Description	Part Number	PFC P/N, USA	Device Tag
AUTOID	1	3D, red	1061773	7746503	-10U, 94L, <
RFID64	1	7.5 x 7.5 x 5.5 C ENCLOSE	PC1919 13 6 2P5H	7746535	-ENCL 1
PFC	2	Cross connector for terminal block	10203250	1174950	-WPS 1L, WPS 2
PFC	1	4 BLUE PROMINENT LOGO W/SPACE "O"	7746777	7741777	-4PC 1050L
PFC	2	2 SETTING PARTITION 3/4" IN. FOR DOUBLE LEVEL TERMINAL	31710294	7746746	-1B4L 1B2
PFC	3	Five terminal for terminal block	10505065	7746551	-1B4L 1B2
PFC	2	ARMING PROTECTION PLATE FOR DOUBLE LABEL TERMINAL	2770024	7746727	-1B4L 1B2
PFC	15	DOUBLE 3 TRACK TERMINAL BLOCK	3770077	7746764	-1B4L 1B2
PFC	2	Ground terminal block	10441594	7746755	-1B1

NOTES:

1. ALARM CABLE COLOR CODE DEPENDANT ON THE CABLE SELECTED FOR PROJECT. LABEL ATTACHED TO CABLE WILL INDICATE THE COLOR CODE AND SIGNAL DESIGNATION.
2. POWER CONNECTION JUMPERS DEPENDANT ON APPLICATION. ADD JUMPER ON TERMINALS 1 & 2 FOR SINGLE POWER SUPPLY.

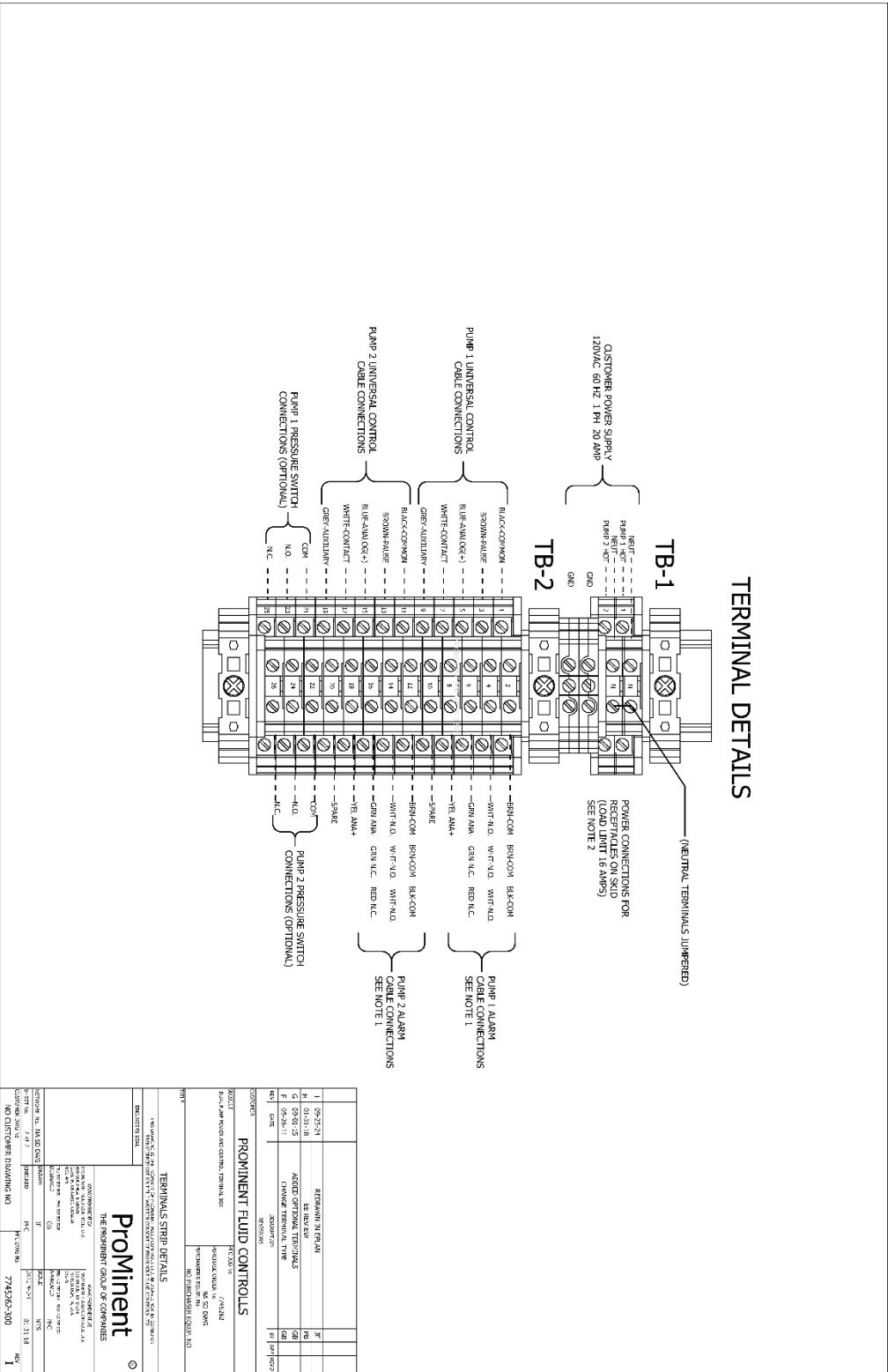
REV	DATE	DESCRIPTION	BY	CHK
1	09-15-21	REWORKING 31.00000	Y	
2	01-11-18	LEAVE FOR LEAD	NS	
3	03-01-15	ACCORD ORIGINAL TECHNIQUES	CB	
4	05-26-11	CHANGED TECHNICAL TYPE	CB	

PROMINENT FLUID CONTR

[illegible]

BOM & TERMINAL BOX LAYOUT

[illegible][illegible]



Technical Data
GMXA1009PVT70000UVC030BEN07GMXaXXXXPVT7.docx

ProMod Systems Designer

System Component Data Sheets

ProMod Systems Designer

Component Data Sheets

Metering Pumps

ProMinent® gamma/ X Solenoid Diaphragm Metering Pumps

Overview: gamma/ X

The gamma/ X solenoid diaphragm metering pump incorporates a wealth of eXcellent ingenuity! With integrated pressure measurement, it ensures the smooth running of your metering process. The gamma/ X is ideal for all chemical metering applications. (see [page 143](#) for spare parts)

- Capacity range from 0.24 GPH to 11.9 GPH, maximum discharge pressure up to 363 psi
- Simple adjustment of the capacity directly in GPH
- Configurable discharge stroke, continuous or pulsed dosing
- Configurable suction stroke duration
- Stroke rate adjustable from 1 – 12,000 strokes per hour
- Electronic stroke length adjustment, continuous from 0 - 100% (recommended range 30 - 100%)
- Suitable for continuous micro-metering from 1 ml/hr thanks to the innovative solenoid control
- Integrated pressure measurement allows for detection of blocked discharge line, broken discharge lines and air or gas bubbles trapped in the dosing head
- Acrylic/PVC, PVT (PVDF) and Stainless Steel liquid end material versions
- Auto degassing liquid ends in Acrylic/ PVC and PVT
- High viscosity liquid ends (PVT4) for viscosities of up to 3000 cP
- Large backlit graphic display and status LED's
- External control via voltage-free contacts with pulse multiplier/divider function
- External control via standard 4-20 mA signal, and scalable adjustment of mA signal to stroke rate
- Standard internal programmable timer for real-time dependent dosing routines i.e biocides, cooling towers etc.
- Standard pump capable of accepting 2-stage tank level sensor input, flow monitor input, diaphragm rupture sensor input and control cable input.
- NSF/ANSI 61 Approved Liquid ends
- Bluetooth, PROFIBUS, CANbus interface as an optional feature (see [page 151](#) for PROFIBUS)



ProMinent® gamma/ X Solenoid Diaphragm Metering Pumps

Capacity Data

Capacity data: gamma/ X

Pump Version	Capacity at Maximum Backpressure				Max. Stroking Rate	Tubing Connectors O.D. x I.D.	Pre-Primed Suction Lift **		SS Liquid end connections FNPT	Shipping Weight lbs	
	psig	(bar)	GPH* (l/h)	ml/stroke	Strokes/min	in	ft	(m)	in	NP/PV	SS
gamma/ X: with standard liquid ends											
1602	232	(16)	0.61 (2.3)	0.19	200	1/4 x 3/16	19.6	(6)	1/4	7.9	9
1604	232	(16)	0.95 (3.6)	0.30	200	1/4 x 3/16	16.4	(5)	1/4	7.9	9
0708	102	(7)	2.0 (7.6)	0.63	200	1/2 x 3/8	13.1	(4)	1/4	8.1	11
0414	58	(4)	3.56 (13.5)	1.13	200	1/2 x 3/8	9.8	(3)	1/4	8.1	11
0220	29	(2)	5.2 (19.7)	1.64	200	1/2 x 3/8	6.5	(2)	3/8	8.1	11
2504	363	(25)	1.0 (3.8)	0.32	200	(8 x 4mm)	13.1	(4)	1/4	10.8	12.1
1009	145	(10)	2.38 (9.0)	0.75	200	1/2 x 3/8	9.8	(3)	1/4	11.2	14.3
0715	102	(7)	3.83 (14.5)	1.21	200	1/2 x 3/8	9.8	(3)	1/4	11.2	14.3
0424	58	(4)	6.34 (24)	2.00	200	1/2 x 3/8	9.8	(3)	3/8	11.2	14.3
0245	29	(2)	11.9 (45)	3.70	200	1/2 x 3/8	6.5	(2)	3/8	11.5	15.4
gamma/ X: with auto-degassing liquid ends NPB9/ NPE9											
1602	232	(16)	0.34 (1.30)	0.11	200	1/4 x 3/16	6.9	(2.1)	~	7.9	~
1604	232	(16)	0.63 (2.40)	0.21	200	1/2 x 3/8	8.8	(2.7)	~	7.9	~
0708	101	(7)	1.8 (6.80)	0.57	200	1/2 x 3/8	6.5	(2)	~	8.1	~
0414	58	(4)	3.17 (12)	1.00	200	1/2 x 3/8	6.5	(2)	~	8.1	~
0220	29	(2)	4.75 (18)	1.5	200	1/2 x 3/8	6.5	(2)	~	8.1	~
1009	145	(10)	2.11 (8)	0.67	200	1/2 x 3/8	9.8	(3)	~	11.2	~
0715	101	(7)	3.56 (13.5)	1.00	200	1/2 x 3/8	8.2	(2.5)	~	11.2	~
0424	58	(4)	5.28 (20)	1.67	200	1/2 x 3/8	8.2	(2.5)	~	11.2	~
gamma/ X: with self-bleeding liquid ends, 2-port without bypass (PVT7)											
1604	232	(10)	0.42 (1.6)	0.13	200	1/4 x 3/16	6	(1.8)	~	7.9	~
0708	101	(7)	1.50 (5.7)	0.48	200	1/2 x 3/8	6	(1.8)	~	8.1	~
0414	58	(4)	3.17 (12.0)	1.00	200	1/2 x 3/8	6	(1.8)	~	8.1	~
0220	29	(2)	4.60 (17.4)	1.45	200	1/2 x 3/8	6	(1.8)	~	8.1	~
1009	145	(10)	1.58 (6.0)	0.50	200	1/2 x 3/8	6	(1.8)	~	11.2	~
0715	101	(7)	3.40 (12.9)	1.08	200	1/2 x 3/8	6	(1.8)	~	11.2	~
0424	58	(4)	5.07 (19.2)	1.60	200	1/2 x 3/8	6	(1.8)	~	11.2	~

gamma/ X metering pumps with high viscosity liquid ends (PVT 4) have a 10 – 20 % lower capacity rating and are not self-priming.

Positive suction is recommended and pumps supplied with 1/2" MNPT connections.

Permissible ambient temperature: 14 °F to 113 °F | Average power consumption: 78 W | Degree of protection: IP 66

* Capacity data represents minimum values, tested using water at 68 °F (room temperature)

** Suction lift with pre-primed suction line and liquid end

Materials In Contact With Chemicals

Liquid end materials in contact with media

	Pump head	Suction/discharge valve	Ball seat	Seals	Balls
NPE	Clear Acrylic	PVC	EPDM	EPDM	Ceramic
NPB	Clear Acrylic	PVC	FKM	FKM	Ceramic
PPT	Polypropylene	PVDF	PTFE	PTFE	Ceramic
PVT	PVDF	PVDF	PVDF	PTFE	Ceramic
SST	Stainless Steel	Stainless Steel	Ceramic	PTFE	Ceramic

Auto-degassing liquid ends in NP with a valve spring made of Hastelloy C and a PVDF valve insert. PVT7 version with PVDF/PTFE wetted parts.

Diaphragm with a PTFE face.

Permissible ambient temperature: 14 °F - 113 °F | Average power consumption: 25/30 W | Degree of protection: IP 66/NEMA 4X

FKM = fluorine rubber

ProMinent®

precision
overview

solenoid-driven
standard

motor-driven
standard

pump spare parts &
accessories

DIAGNOSTIC
instrumentation

DIAGNOSTIC
sensors

polymer blending &
dry feed solutions

ProMinent®

product overview

solenoid-driven metering pumps

mote-driven metering pumps

pump spare parts & accessories

DULCOMETER instrumentation

DUI COTEST sensors

polymer blending & dry feed solutions

ProMinent® gamma/ X
Solenoid Diaphragm Metering Pumps

Specifications

Maximum stroke length:	For 70mm solenoid approx. .05" For 85mm solenoid approx. .06"													
Materials of construction														
Housing:	Fibreglass reinforced PPE (Polyphenylene Ether)													
Diaphragm:	PTFE faced EPDM with plastic core													
Liquid end options:	Acrylic/PVC, PVDF, Stainless Steel													
Enclosure rating:	IP 65													
Power supply:	100 – 230 VAC 1 Phase 50 / 60 Hz ± 10%													
Power consumption:	1602 / 1604 / 0708 / 0414 / 0220 25 W 2504 / 1009 / 0715 / 0424 / 0245 30 W													
Check valves:	Double ball suction / discharge (PVT4 with spring loaded single ball)													
Power cord:	6ft													
Relay cable (optional):	6ft													
Relay Options														
Identcode Option 1:	Relay contact rated 230 VAC 2 A Max													
Identcode Option 4:	Both relay contacts rated 24 V, 100 mA Max													
Identcode Option C:	Isolated 4 – 20 mA output can drive up to 300 Ω maximum impedance Relay contact rated 24 V 100 mA													
Ambient temperature range														
In operation:	14 °F to 113 °F													
Storage & Transport:	-4 °F to 140 °F													
Max. fluid operating temp:	<table><tr><th>Material</th><th>Constant</th><th>Short Term*</th></tr><tr><td>Acrylic/PVC</td><td>113 °F</td><td>140 °F</td></tr><tr><td>PVDF</td><td>113 °F</td><td>248 °F</td></tr><tr><td>SS</td><td>113 °F</td><td>248 °F</td></tr></table> *15 minutes at 29 psi maximum		Material	Constant	Short Term*	Acrylic/PVC	113 °F	140 °F	PVDF	113 °F	248 °F	SS	113 °F	248 °F
Material	Constant	Short Term*												
Acrylic/PVC	113 °F	140 °F												
PVDF	113 °F	248 °F												
SS	113 °F	248 °F												
Climate:	95% Relative humidity – non-condensing													
Sound pressure level:	LpA < 70 dB according to EN ISO 20361													
Warranty:	2 years on pump drive, 1 year on liquid end													
Valve threads:	NP / PVT M20 x 1.5 (provided with adapters for tubing)													
Standard production test:	All pumps are tested for capacity at maximum pressure prior to shipment													
Max solids size in fluid:	Versions 1602 / 1604 / 2504 = 15µ Versions 0708 / 0414 / 0220 / 1009 / 0715 / 0424 / 0245 = 50 µ													
Contact input														
Minimum pulse duration:	20 ms													
Maximum pulse input:	25 pulses / second													
Analog Input Impedance:	120 Ohms													
Recommended Viscosity:	Max. 200 cPs for standard liquid end Max. 500 cPs for valve with springs Max. 50 cPs for auto-degassing liquid ends Max. 3000 cPs for high-viscosity liquid ends													

ProMinent® gamma/ X
Solenoid Diaphragm Metering Pumps

Identcode Ordering System

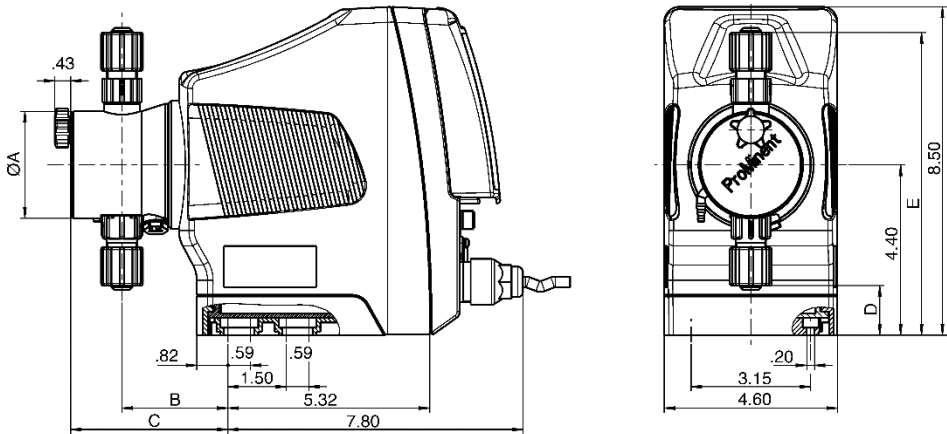
ProMinent®

GMXa	Gamma/ X																	
Version	Capacity	Version	Capacity	Version	Capacity													
1602	0.61 gph (2.3 l/h), 232 psi (16 bar)	0220	5.2 gph (19.7 l/h), 29 psi (2 bar)	0424	6.34 gph (24 l/h), 58 psi (4 bar)													
1604	0.95 gph (3.6 l/h), 232 psi (16 bar)	2504	1.0 gph (3.8 l/h), 363 psi (25 bar)	0245	11.9 gph (45 l/h), 29 psi (2 bar)													
0708	2.0 gph (7.6 l/h), 102 psi (7 bar)	1009	2.38 gph (9.0 l/h), 145 psi (10 bar)															
0414	3.56 gph (13.5 l/h), 58 psi (4 bar)	0715	3.83 gph (14.5 l/h), 102 psi (7 bar)															
Liquid end material:																		
NP Clear acrylic /PVDF, for auto-degassing version Clear acrylic / PVC																		
PP Polypropylene																		
PV PVDF/PVDF																		
SS Stainless Steel																		
TT PTFE Carbon-loaded																		
O-rings:																		
B FKM-B/PTFE coated																		
E EPDM/PTFE coated																		
T PTFE/PTFE coated																		
Liquid end version:																		
0 Non-bleed version, no valve spring only with NP, TT and SS and type 0245																		
1 Non-bleed version, with valve spring only with NP, TT and SS and type 0245																		
2 Bleed function, no valve springs only with PV, NP not for type 0245																		
3 Bleed function, with valve springs only with PV, NP not for type 0245																		
4 Version for highly viscous media only with PV, types 1604, 0708, 0414, 2504, 1009, 0715, 0424																		
7 Self-bleeding without bypass, only with PV, not for versions 2504, 0245, and 1602																		
9 Auto-degassing with bypass (SEK), only with NP, not for types 2504 and 0245																		
Hydraulic connections:																		
6 Standard (SS/TT)																		
M 1/4" x 3/16"																		
N 3/8" x 1/4"																		
O 1/2" x 1/4" for 2504 only																		
Q 1/2" x 3/8"																		
Diaphragm rupture indicator:																		
0 Without diaphragm rupture indicator																		
1 With diaphragm rupture indicator, optical sensor																		
Version:																		
0 Standard																		
Logo:																		
0 Standard, with logo																		
Electrical Connection:																		
U 100-230 V, ±10 %, 50/60 Hz																		
Cable and plug with 6ft (2m) power cord, single phase:																		
A European plug																		
D N. American plug, 115 V																		
Relay, pre-set to:																		
0 Without relay																		
1 1 x changeover contact 230 V – 2 A, fault indicating relay N/C																		
4 2 x N/O 24 V – 100 mA, such as 1 + pacing relay																		
C 1 x N/O 24 V – 100 mA, such as 1 + 4 – 20 mA output																		
F Auto degassing module (not available for version 2504)																		
G Auto degassing module + fault relay (not available for version 2504), comes with panel																		
Accessories:																		
0 Not included (for PVDF, TT, SS)																		
1 With foot and injection valve, 5 ft PVC suction tubing, 10 ft PE discharge tubing																		
Control Variants:																		
0 Manual + external 1:1 with pulse control																		
3 Manual + external with pulse control + analogue 0/4 - 20 mA																		
5 Options 3 + 4 week process timer																		
C Options 3 + CANopen																		
R Options 3 + PROFIBUS® DP interface, M12																		
Note: no relay with PROFIBUS® version "R"																		
Metering Monitor:																		
0 Pulse signal input																		
Bluetooth connection:																		
n Not included																		
B Included																		
Language:																		
EN Standard																		
GM/Xa	1601	PP	E	1	M	0	0	0	U	D	1	0	0	0	0	0	0	EN

product
solenoid-driven
metering
pumps
accessories
cable and plug
instrumentation
PULCOTEST
sensors
polymer blending &
dry feed solutions

ProMinent® gamma/ X
Solenoid Diaphragm Metering Pumps

Dimensional Drawings



Material design PPT

Type	Ø A	B	C	D	E
0245	4.30	3.00	—	.55	8.22
0424, 0220	3.50	3.00	4.33	.95	7.95
0715, 0414	3.50	2.91	4.21	.95	7.95
1009, 0708	3.50	2.91	4.25	.95	7.95
1604	2.75	2.80	4.17	1.25	7.80
1602	2.75	2.80	4.17	1.25	7.80

Material design NPT

Type	Ø A	B	C	D	E
0245	4.30	3.00	4.13	.55	8.27
0424, 0220	3.50	3.00	4.09	.90	7.87
0715, 0414	3.50	3.00	4.09	.90	7.87
1009, 0708	3.50	2.91	4.01	.90	7.87
1604	2.75	3.03	4.13	1.30	7.52
1602	2.75	3.03	4.13	1.30	7.52

Material design PVT

Type	Ø A	B	C	D	E
0245	4.30	3.00	—	.55	8.22
0424, 0220	3.50	3.11	3.50	.98	8.00
0715, 0414	3.50	2.87	3.50	.98	8.00
1009, 0708	3.50	2.95	3.62	.98	8.00
1604	2.75	2.80	3.31	1.42	7.72
1602	2.75	2.80	3.31	1.42	7.72

ProMod Systems Designer

Component Data Sheets

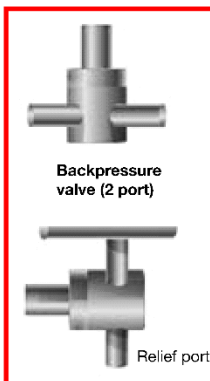
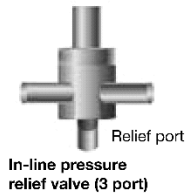
Backpressure & Pressure Relief Valves

Pump & Systems Accessories

Backpressure Valves

Pressure Relief Valves

Backpressure, antisiphon and pressure relief valves



Backpressure valve on tee for pressure relief

Technical data

Size:

1/2"

Diaphragm

Materials:
PTFE-faced EPDM

Liquid Handling

Materials:
PP, PVC, PTFE, PVDF
316 Stainless Steel

Pressure Adjustment:

0-150 psig (0-10.3 bar)

Flow rates @ 45 psig (3.1 bar):

1/4" - 132 U.S. gph (500 L/h)

1/2" - 132 U.S. gph (500 L/h)

Flow rates @ 150 psig:

1/2" (PP, PVC) - 200 U.S. gph (757 L/h)

1/2" (PVDF, TT, SS) - 300 U.S. gph (1135 L/h)

3/4" - 300 U.S. gph (1135 L/h)

1" - 500 U.S. gph (1893 L/h)

1-1/2" - 900 U.S. gph (3407 L/h)

2" - 1200 U.S. gph (4542 L/h)

Max. Temperature:

PP - 195°F (90°C)

PVC - 140°F (60°C)

PTFE - 250°F (121°C)

PVDF - 250°F (121°C)

316 Stainless - 250°F (121°C)

Max. Pressure Rating 170 psig @ 120°F

148

Backpressure (2-port) valves may be used in-line to provide a constant discharge pressure for protection from siphoning, or they may be teed off of the discharge line for pressure relief, discharging back to the source tank or to the pump suction line to create a bypass.

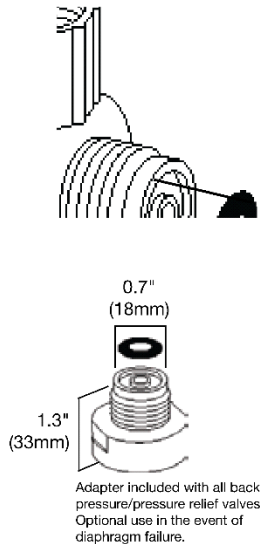
Pressure relief (3-port) valves are mounted in the discharge line, featuring a separate relief port which discharges back to the source tank or to the pump suction line to create a bypass.

Backpressure valves provide several functions: they improve repeatability by providing a constant discharge pressure; they provide antisiphon protection for discharge into pressurized water lines or vacuums, or where suction head exceeds discharge head; and they minimize pulsation when used in conjunction with a pulsation dampener.

In-line backpressure/antisiphon and pressure relief valves

These adjustable backpressure (2-port) and pressure relief (3-port) valves have FNPT ports and require tubing adapters for use with flexible tubing.

Can be adjusted with screwdriver.



DIMENSIONS: 1/4" to 2" valves

D	A (in)	B (in)	C (in)
1/4"	4.90	2.6	1.2
*1/4"	*3.5	*2.375	*0.75
1/2"	4.9	2.6	1.2
*1/2"	*5.5	*3.5	*1.125
3/4"	5.4	3.5	1.1
1"	5.7	3.9	1.4
1-1/2"	8.5	4.6	2.2
2"	8.5	4.6	2.2v

*Note: Dimensions apply to SS and PTFE valves only.

DIMENSIONS (for replacement valves only): 1/4" to 2" valves - SEE PG. 8

D	A (in)	B (in)	C (in)
1/4"	3.9	2.375	0.75
*1/4"	*3.5	*2.375	*0.75
1/2"	4.6	2.375	1.125
*1/2"	*5.5	*3.5	*1.125
3/4"	5.5	3.5	1.125
1"	5.8	3.5	1.25
1-1/2"	9.0	4.5	2.1
2"	9.0	5.0	2.1

*Note: Dimensions apply to SS, PVDF and PTFE valves only.

Technical Data
PGI_160_PCV_A

ProMod Systems Designer

Component Data Sheets

Pressure Gauge with Isolator



BOTTOM CONNECTED ALL STAINLESS GAUGES



Model BR301L

RANGE	CODE	MAJOR INC.	MINOR INC.
30/0" VAC	A	5	0.5
30/0/15	CB	5	0.5
30/0/30	CC	10	1
30/0/60	CD	10	1
30/0/100	CE	20	2
30/0/150	CF	20	2
30/0/300	CH	50	10
0/15	B	2	0.2
0/30	C	5	0.5
0/60	D	10	1
0/100	E	20	2
0/160	F	20	2
0/200	G	40	4
0/300	H	50	5
0/400	I	50	5
0/500	J	100	10
0/600	K	100	10
0/800	L	100	10
0/1000	M	200	20
0/1500	N	200	20
0/2000	O	400	50
0/3000	P	500	50
0/4000	Q	500	50
0/5000	R	1000	100
0/6000	S	2000	200
0/10,000	U	2000	200
0/15,000	V	2000	200

MODEL BR301L

FEATURES:

The Model BR301L Series from Blue Ribbon Corporation is a high-quality line of liquid-filled bottom connected all stainless steel gauges. Their glycerine filling helps to dampen the effects of vibration, which will extend the life of the gauge.

This gauge is typically used on hydraulic & pneumatic systems, as well as any commercial or industrial application not corrosive to 316L stainless steel wetted parts, or where glycerine filling is suitable for use.

SPECIFICATIONS:

- Stainless Steel Case and Bezel
- Stainless Steel Internals
- 316 Stainless Steel Bourdon Tube & Connection
- IP65 Enclosure
- Liquid Filled (Dry Available)
- Accuracy
 - 2½" Dial: 1.6%
 - 4" and 6" Dials: 1%
- Dual Scale: PSI & BAR (x100=kPa)
- Single Scale (PSI) Available
- Ambient Temperature
 - Filled: +30 °F to +160 °F
 - Dry: -30 °F to +180 °F

FIELD OPTIONS:

- Dial Sizes
 - 2½", 4", and 6"
- Connection Sizes
 - ¼"(M) NPT on 2½" and 4"
 - ½"(M) NPT on 4" and 6"
- Safety Glass Lens
- Welded Socket
- Overpressure Limit: 30% FSO
- Working Pressure: 75% FSO



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Toll Free: +1.877.774.4751 Tel: +1.716.773.9300 Fax: +1.716.773.5019 Email: BRsales@blueribboncorp.com Web: www.blueribboncorp.com

BR-Gauges-BR301L-062015



PRESSURE GAUGE ISOLATOR with switch

NSF

Provides Isolation From Hazardous Or Corrosive Liquids

SIGMAMOTOR Pressure Gauge Isolators allow standard pressure gauges to be used in corrosive services.

The upper section (gauge side) is filled with glycerin, mineral oil, silicone or halocarbon. A diaphragm separates the glycerin from the lower section which connects to the pressure source.

A 1/2" port is provided for connection to the pressure source.

Features

- CNC precision machined parts
- Variety of materials available
- Various pressure ranges available
- Cost effective and reliable
- 2.5" Dial (4" dial optional)
- Pre-filled with glycerin between gauge and diaphragm
- Optional adjustable pressure switch* can be adjusted from 2% to 90% of full scale value. Reed switch. Max switching voltage: 75VDC / 50 VAC. Max switching current: 0.5A DC or AC with resistive load. Max switching hysteresis: 2.5%.

**Front facing gauge only*

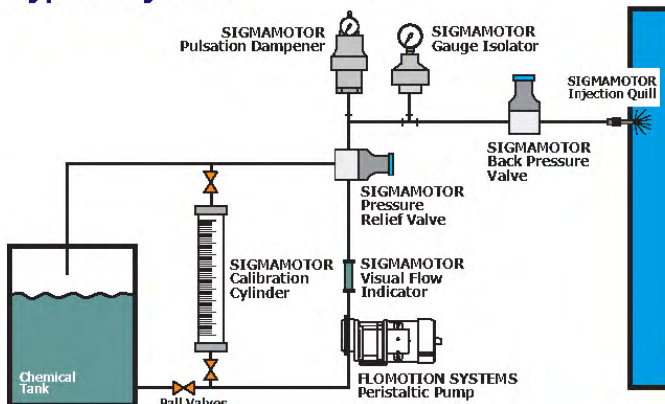


316 SS



POLYPROPYLENE

Typical System



Shown with optional pressure switch

Bayonet ring twists off for easy pressure switch adjustment. Simply move the red indicator.

SIGMAMOTOR PRESSURE GAUGE ISOLATOR

NSF-61 Approved Materials

GI: N - 160 - CP - T - CBM
 1 2 3 4 5

Example: GI-N-030C-P-V-SS

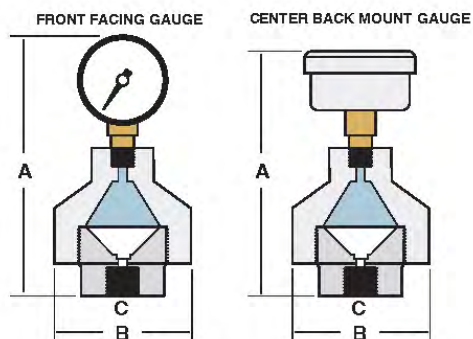
INLET CONNECTION TYPE 1	
NPT	N
SOCKET	S
FLANGED	F
UNION	U

SIZE 2								
SELECT:	C030	030	060	100	160	200	200S	300
PSI RATING	-30,0,30	0-30	0-60	0-100	0-160	0-200	0-200	0-300
A-Height (in) front facing gauge	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
A-Height (in) top facing gauge	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
B-Diameter (in)	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
C-Connection (in)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
SPECIAL	Compound						With Switch*	

ISOLATOR BODY MATERIAL 3	
PVC	P
POLYPROPYLENE	PP
CPVC	CP
PTFE	T
Kynar® PVDF	K
316 SS	S
ALLOY 20	A
HASTELLOY C276	H

DIAPHRAGM MATERIAL 4	
VITON	V
EPDM	E
PTFE	T

OPTIONS 5	
STANDARD GAUGE	
ALL 316 STAINLESS STEEL GAUGE	SS
CENTER BACK MOUNT GAUGE	B
HALOCARBON	H
SILICONE	S
MINERAL OIL	M



* Front facing gauge only

Material:	PVC	CPVC	PP	PVDF	PTFE	METAL
Maximum Pressure:	150 psi	150 psi	150 psi	150 psi	150 psi	350 psi
Maximum Temperature:	140 °F	195 °F	195 °F	285 °F	480 °F	300 °F

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 Middleport, NY 14105
 Tel: 716.735.3115 Fax: 716.735.3425
 info@sigmamotorinc.com
 www.SigmamotorInc.com



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ProMod Systems Designer

Component Data Sheets

Pulsation Dampener

PD_164_PCV



PULSATION DAMPENERS

NSF

Minimize pulsating output on positive displacement pumps

SIGMAMOTOR FL Series Pulsation Dampeners offer an inexpensive solution to protect chemical feed systems from harmful effects of pulsating flows.

- Simple chargeable design
- Robust CNC precision machined body
- Provides steady flows for better flow metering accuracy
- Eliminates vibrations in pipes reducing the potential for leaks
- Smooths flows in spray applications

Features

- Capacity - 12, 40 or 85 cu in
- Variety of materials available
- Various Bladder materials
- Charging Valve - Schrader Type

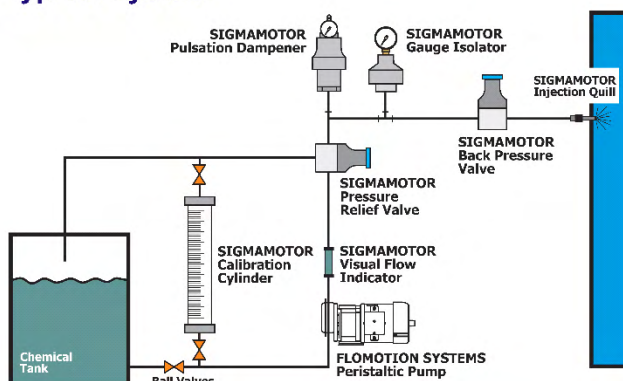


85 cu in



40 cu in

Typical System



12 cu in

SIGMAMOTOR PULSATION DAMPENER

NSF-61 Approved Materials

FL: N - 12 - CP - E -
 1 2 3 4 5

Example: FL-N-12-P-V-SS

INLET CONNECTION TYPE 1	
NPT	N
SOCKET	S
FLANGED	F
UNION	U

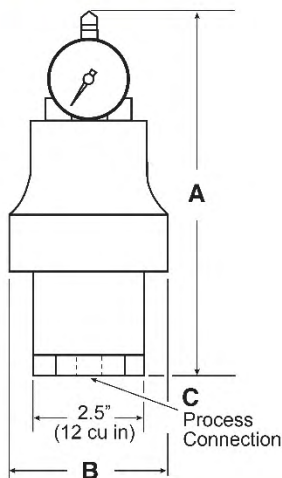
SIZE 2			
SELECT:	12	40	85
CU IN SIZE	12	40	85
ML SIZE (in)	200	660	1400
A-Height (in)	7.8	8.25	11.5
B-Diameter (in)	3.45	5.5	5.5
C-Connection (in)	1/2	1	1

DAMPENER BODY MATERIAL 3	
PVC	P
POLYPROPYLENE	PP
CPVC	CP
PTFE	T
Kynar® PVDF	K
316 SS	S
ALLOY 20	A
HASTELLOY C276	H

BLADDER MATERIAL 4	
VITON	V
EPDM	E
PTFE (12 CU IN ONLY)	T

GAUGE OPTIONS 5	
STANDARD GAUGE	
ALL STAINLESS STEEL	SS

DIMENSIONS



Material:	PVC	CPVC	PP	PVDF	METAL
Maximum Pressure:	150 psi	150 psi	150 psi	150 psi	350 psi
Maximum Temperature:	140 °F	195 °F	195 °F	300 °F	300 °F

SigmaMotor Inc.

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Technical Data

ProMod Systems Designer

Component Data Sheets

Wye Strainer

YS_PCV_A



YS Series
Y-Strainers

1/2" - 2" PVC, CLEAR PVC AND CPVC
2-1/2" - 4" PVC AND CPVC

KEY FEATURES

- Available in PVC, CPVC and Clear PVC
- Horizontal or Vertical Installation
- FPM O-Ring Seals
- 2:1 Open Area Ratio
- Hex Cap for Easy Access to Screen
- Standard Screen has 1/32" Perforation

OPTIONS

- Stainless Steel Perforated or Mesh Strainer
Screens Available in Various Sizes and Alloy
Materials

MATERIALS

- PVC Cell Class 12454 per ASTM D1784
- Clear PVC Cell Class 12454 per ASTM D1784
- CPVC Cell Class 23447 per ASTM D1784
- FPM and EPDM O-Ring Seals

STRAINERS AND FILTERS

TECHNICAL INFORMATION



SELECTION CHART

SIZE	MATERIAL	END CONNECTION	SEALS	PRESSURE RATING
1/2" - 1" (DN15 - DN25)	PVC, CPVC or Clear PVC			
1-1/4" (DN32)	PVC and Clear PVC	Socket or Threaded		
1-1/2" (DN40)	PVC, CPVC or Clear PVC		FPM and EPDM	150 PSI @ 70°F 10 Bar @ 21°C Non-Shock
2" (DN50)				
2-1/2" (DN65)	PVC	Socket, Threaded or Flanged		
3-4" (DN80-DN100)	PVC and CPVC			

* PVC and CPVC socket ends available to ISO 727-1 and threaded ends to BS21.
Flanged ends available in DIN / EN PN10.

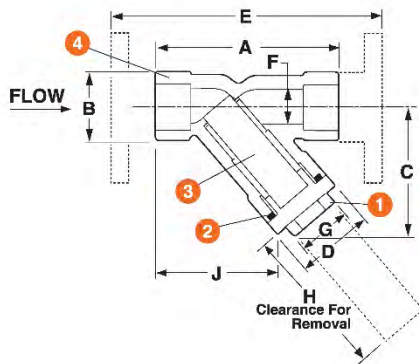
YS Series
Y-Strainers

1/2" - 2" PVC, CLEAR PVC AND CPVC
2-1/2" - 4" PVC AND CPVC

TECHNICAL INFORMATION, CONTINUED

PARTS LIST

- 1. Cap
- 2. O-Ring Seal
- 3. Screen
- 4. Body



SCREEN OPTIONS

PERFORATION SIZES	MESH SIZES	SCREEN MATERIAL
1/32"	20	SSTL, Hastelloy, Monel and Titanium
1/16"	40	
1/8"	60	
5/32"	80	
3/16"	100	
1/4"	200	
3/8"	325	PVC and CPVC
1/32"	N/A	
1/16"		
1/8"		
3/16"		

DIMENSIONS

SIZE in / DN	A in / mm	B in / mm	C in / mm	D in / mm	E in / mm	F in / mm	G in / mm	H in / mm	J in / mm	WEIGHT lbs / kg	
										SOC / THD	FLANGED
1/2 / 15	3.38 / 86	1.38 / 35	2.25 / 57	1.50 / 38	N/A	.56 / 14	1.00 / 25	2.13 / 54	2.50 / 64	.25 / .11	N/A
3/4 / 20	4.18 / 106	1.69 / 43	2.88 / 73	2.00 / 51	N/A	.81 / 21	1.25 / 32	2.75 / 70	3.00 / 76	.63 / .29	N/A
1 / 25	5.19 / 132	2.00 / 51	3.63 / 92	2.16 / 55	N/A	1.00 / 25	1.50 / 38	3.30 / 84	3.32 / 84	.88 / .40	N/A
1-1/4 / 32	6.63 / 168	2.63 / 67	4.50 / 114	2.94 / 75	N/A	1.25 / 32	2.00 / 51	4.50 / 114	4.45 / 113	1.75 / .79	N/A
1-1/2 / 40	6.63 / 168	2.63 / 67	4.50 / 114	2.94 / 75	N/A	1.56 / 40	2.00 / 51	4.50 / 114	4.45 / 113	1.63 / .74	N/A
2 / 50	7.63 / 194	3.38 / 86	5.38 / 137	3.75 / 95	11.00 / 279	2.00 / 51	2.38 / 60	5.06 / 129	4.88 / 124	3.00 / 1.36	5.00 / 2.27
2-1/2 / 65	10.31 / 262	4.69 / 119	7.25 / 184	5.25 / 133	N/A	2.90 / 74	3.50 / 89	6.60 / 168	6.54 / 166	7.75 / 3.52	N/A
3 / 80	10.31 / 262	4.69 / 119	7.25 / 184	5.50 / 140	14.37 / 365	2.90 / 74	3.50 / 89	6.60 / 168	6.54 / 166	7.50 / 3.40	12.25 / 5.56
4 / 100	12.81 / 325	5.75 / 146	8.88 / 226	6.18 / 157	17.73 / 450	3.78 / 96	4.25 / 108	8.00 / 203	8.58 / 218	9.50 / 4.30	17.50 / 7.94

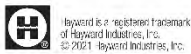
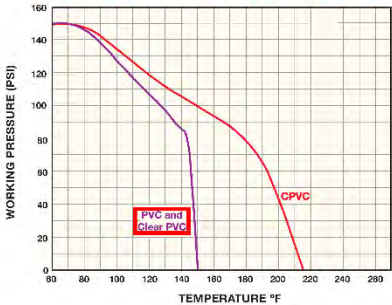
Dimensions are subject to change without notice – consult factory for installation information

Cv VALUES*

SIZE in / DN	Cv VALUES	SIZE in / DN	Cv VALUES
1/2 / 15	4.0	2 / 50	28
3/4 / 20	6.8	2-1/2 / 65	40
1 / 25	9.0	3 / 80	65
1-1/4 / 32	12	4 / 100	100
1-1/2 / 40	28		

* With 1 / 32" elastic screen

OPERATING TEMPERATURE/PRESSURE



USA: 1.888.429.4635 • Fax: 1.888.778.8410 • One Hayward Industrial Drive • Clemmons, NC 27012 • Email: hfcsales@hayward.com
Canada: 1.888.238.7665 • Fax: 1.905.829.3636 • 2880 Plymouth Drive • Oakville, ON L6H 5R4 • Email: hflowcanada@hayward.com
Visit us at: haywardflowcontrol.com

ProMod Systems Designer

Component Data Sheets

Ball Valves

BV_PCV_A1



Standard Features (Sizes 1/2" – 6")

- Pressure rated up to 230psi [PVC, CPVC, PVDF]
- Double O-ring seals on stem for added protection
- Full bore, sizes 1/2" – 2"
- Full vacuum rated, all sizes
- Blocks in two directions, upstream and downstream, leaving full pressure on the opposite end of the valve
- Integrally molded ISO mounting pad for both manual and actuated operations
- Integrally molded base pad to mount valves securely or panel mounting
- PTFE seats with elastomeric backing cushions ensure bubble tight shut-off and a low fixed torque, while at the same time compensating for wear
- True union design for easier installation or repairs without expanding the pipe system
- Built-in spanner wrench on the handle for valve disassembly and assembly
- Two sets of end connectors (socket and threaded) included with all PVC and CPVC valves in sizes 1/2" – 2"
- CPVC threaded end connectors on sizes 1/2" – 1" come with stainless steel reinforcing rings
- New PTFE seat design – Facilitates easier field maintenance if required
- Tapered O-ring groove – Helps to keep the end connector O-rings on the valve body during installation
- Body flats – Flats have been added to either side of the valve body where a wrench can be applied to prevent the valve body from turning when the union nuts are tightened
- 1/2 - 2 " PVC and CPVC T-21A design

Options

- Pneumatic and electric actuators and accessories
- Stem extensions
- 2" square operating nut or "T" nut
- Locking handles
- Limit switches
- Vented ball

Specifications

Sizes: 1/2" – 6"

Models: PVC & CPVC: Socket Threaded and Flanged (ANSI)
PP & PVDF: IPS and Metric (DIN)
Socket, Threaded, Butt and Flanged (ANSI)

Bodies: PVC, CPVC, PP and PVDF

Seats: PTFE backed with EPDM or FKM

Seals: EPDM or FKM or AFLAS[‡]

Sizes 1/2" - 4" PVC/EPDM/FKM Models

NSF-61 Certified

[‡] Trademark of Asahi Glass Co., Ltd.

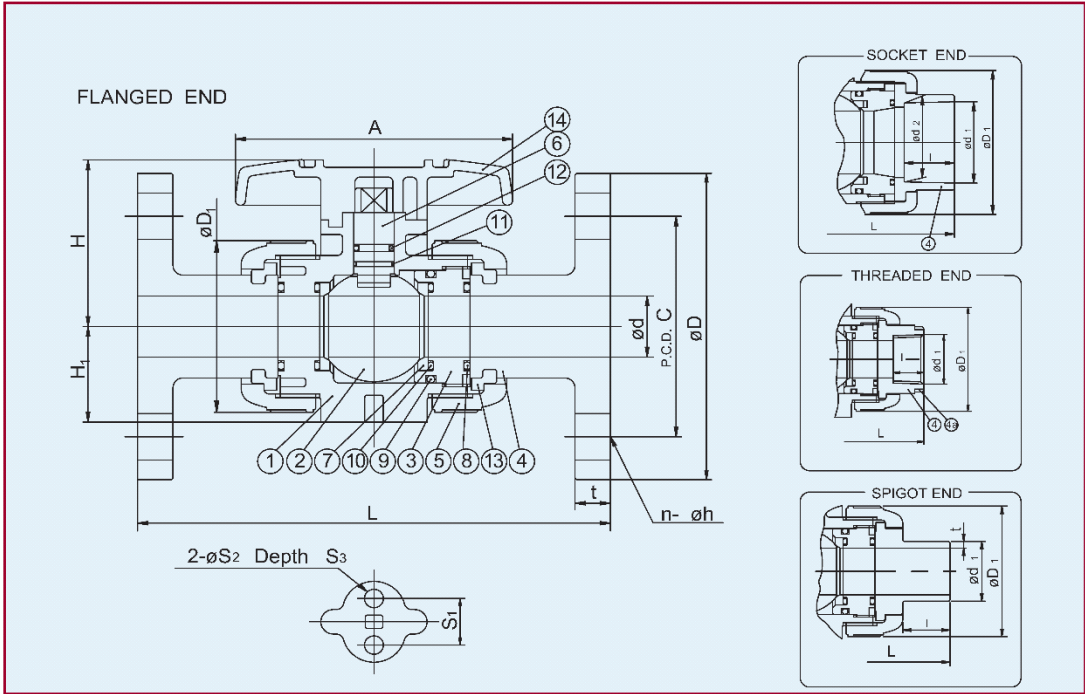
Parts List (Sizes 1/2" – 2")

PARTS			
NO.	DESCRIPTION	PCS.	MATERIAL
1	Body	1	PVC, CPVC, PP, PVDF
2	Ball	1	PVC, CPVC, PP, PVDF
3	Carrier	1	PVC, CPVC, PP, PVDF
4	End Connector	2	PVC, CPVC, PP, PVDF
5	Union Nut	2	PVC, CPVC, PP, PVDF
6	Stem	1	PVC, CPVC, PP, PVDF
7	Seat	2	PTFE
8	O-Ring (A)	2	EPDM FKM, Others
9	O-Ring (B)	1	EPDM FKM, Others
10	O-Ring (C)	2	EPDM FKM, Others
11	O-Ring (D)	1	EPDM FKM, Others
12	O-Ring (E)	1	EPDM FKM, Others
13	Stop Ring*	2	PVDF
14	Handle	1	ABS
4a	Ring**	2	304 Stainless Steel

* Used for flanged end.
** Used for CPVC body, threaded end, 1/2"-1".



Type-21/21ABall Valves



Dimensions (Sizes 1/2" – 2") (in.)

NOMINAL SIZE		d	FLANGED						SOCKET										
			ANSI CLASS 150				L	t	PVC, CPVC				PP, PVDF (DIN)				PP, PVDF (IPS)		
			D	C	n	h			ASTM SCH 80				DIN 16962				d1	/	L
									d1	d2	/	L	d1	d2	/	L			
INCHES	mm		D	C	n	h	L	t	d1	d2	/	L	d1	d2	/	L	d1	/	L
1/2	15	0.59	3.50	2.38	4	0.62	5.63	0.47	0.848	0.836	0.875	4.45	0.768	0.760	0.57	3.90	0.83	0.87	4.45
3/4	20	0.79	3.88	2.75	4	0.62	6.77	0.55	1.058	1.046	1.000	5.08	0.965	0.957	0.63	4.45	1.03	1.00	5.08
1	25	0.98	4.25	3.12	4	0.62	7.36	0.55	1.325	1.310	1.125	5.75	1.240	1.232	0.71	4.84	1.30	1.13	5.75
1-1/4	32	1.26	4.62	3.50	4	0.62	7.48	0.63	1.670	1.655	1.250	6.46	1.553	1.543	0.81	5.47	1.65	1.25	6.46
1-1/2	40	1.57	5.00	3.88	4	0.62	8.35	0.63	1.912	1.894	1.375	7.24	1.947	1.937	0.93	5.87	1.89	1.37	7.24
2	50	2.01	6.00	4.75	4	0.75	9.21	0.63	2.387	2.369	1.500	8.23	2.461	2.445	1.08	6.93	2.36	1.50	8.23

NOMINAL SIZE		THREADED				SPIGOT (BUTT END)													
						PP,PVDF													
						DIN 3442			PP								PVDF		
						d1	/	L	d1								/		t
INCHES	mm	d1				/	L	d1	/	t	t	L	D1	H	H1	A	S1	S2	S3
1/2	15	1/2 - 14 NPT				0.59	4.02	0.787	0.728	0.098	0.075	4.882	1.89	2.03	1.14	3.62	0.75	0.29	0.43
3/4	20	3/4 - 14 NPT				0.67	4.72	0.984	0.866	0.106	0.075	5.669	2.36	2.34	1.38	3.94	0.75	0.29	0.43
1	25	1 - 11-1/2 NPT				0.79	5.16	1.260	0.886	0.118	0.094	6.063	2.76	2.68	1.54	4.33	0.75	0.29	0.43
1-1/4	32	1-1/4 - 11-1/2 NPT				0.87	5.91	1.575	1.024	0.146	0.094	6.850	3.23	3.17	1.85	4.76	1.18	0.35	0.59
1-1/2	40	1-1/2 - 11-1/2 NPT				0.98	6.42	1.968	1.260	0.181	0.118	7.638	3.94	3.50	2.17	5.16	1.18	0.35	0.59
2	50	2 - 11-1/2 NPT				1.10	7.76	2.480	1.417	0.228	0.118	8.819	4.96	4.04	2.60	6.26	1.18	0.35	0.59

Note: The shape and appearance of assembly differ a little with nominal size compared to this drawing.

Type-21/21A

Ball Valves

Pressure vs. Temperature (psi, water, non-shock)

NOMINAL SIZE		PVC				CPVC						PP				PVDF				
		30° F 70° F	71° F 105° F	106° F 120° F	121° F 140° F	30° F 70° F	71° F 105° F	106° F 120° F	121° F 140° F	141° F 175° F	176° F 195° F	- 5° F 85° F	86° F 120° F	121° F 140° F	141° F 175° F	- 5° F 70° F	71° F 105° F	106° F 140° F	141° F 175° F	176° F 210° F
INCHES	mm																			
1/2-2	15-50	230	170	150	30	230	170	150	120	75	55	150	110	90	55	230	185	150	115	85
2-1/2	65	230	170	150	NA	230	170	150	120	75	55	150	95	70	40	230	185	150	115	85
3	80	230	170	150	NA	230	170	150	85	55	40	150	95	70	40	230	185	150	100	70
4-6	100-150	150	150	150	NA	150	150	150	85	55	40	150	95	70	40	150	150	150	100	70

Sample Specification

All Type-21/21A ball valves, sizes 1/2" to 4", shall be of true union design with two-way blocking capability. All O-rings shall be EPDM or FKM with PTFE seats. PTFE seats shall have elastomeric backing cushion of the same material as the valve seals. Stem shall have double O-rings and be of blowout-proof design. The valve handle shall double as carrier removal and/or tightening tool. ISO mounting pad shall be integrally molded to valve body for actuation. PVC conforming to ASTM D1784 Cell Classification 12454A, CPVC conforming to ASTM D1784 Cell Classification 23567-A, PP conforming to ASTM D4101 Cell Classification PP0210B67272 and PVDF conforming to ASTM D3222 Cell Classification Type II. The ball valves, except PP, shall have a pressure rating of 230psi for sizes 1/2" to 3" and 150psi for 4" (150psi for PP, all sizes) at 70° F. Type-21/21A ball valves must carry a two year guarantee, as manufactured by Asahi/America, Inc.

Caution

- Do not use ball valves where media has suspended particles. Use the following valves:
 - Butterfly valves – PVDF disc is most abrasion resistant. Make sure of chemical compatibility.
 - Diaphragm valves – Elastomeric diaphragm is designed for handling suspended particles.
- Volatile fluids such as sodium hypochlorite (NaClO) and hydrogen peroxide (H₂O₂) could be trapped and gasified within the valve. We can provide you with a Type-21 ball valve with a vented ball to relieve pressure build-up inside the valve.

Troubleshooting

What if the fluid still flows when valve is closed?

- Carrier is not properly tightened. Tighten it.
- PTFE seat is damaged or worn. Replace seat.
- Foreign material is caught between ball and PTFE seat. Remove material and clean.
- Ball is damaged or worn. Change ball.

What if fluid leaks outside of valve?

- Union nut not properly tightened. Retighten.
- Carrier is not properly tightened. Thread it in firmly.
- Carrier or face O-ring is damaged, worn, or missing. Replace O-ring.

What if handle does not rotate smoothly?

- Foreign material has formed on the ball or seat. Clean both.
- Internal part(s) chemically attacked or swollen. Refer to Asahi/America Chemical Resistance Chart for compatibility. Replace part(s) as required.
- Carrier overtightened. Retighten properly.

What if handle rotates too freely?

- Stem is damaged. Replace stem.
- Handle is not engaged with stem. Disassemble and reengage. Inspect.
- Engaging part of stem and/or ball is damaged. Change stem and/or ball.

Cv Values

Weight (lbs.)

NOMINAL SIZE		Cv	NOMINAL SIZE		SOCKET THREADED	FLANGED
INCHES	mm		INCHES	mm		
1/2	15	14	1/2	15	0.44	1.10
3/4	20	29	3/4	20	0.66	1.54
1	25	47	1	25	1.1	2.70
1-1/4	32	72	1-1/4	32	1.54	3.30
1-1/2	40	155	1-1/2	40	2.64	4.40
2	50	190	2	50	4.4	8.15
2-1/2	65	365	2-1/2	65	6.17	8.80
3	80	410	3	80	9.7	13.00
4	100	680	4	100	24.00	26.67

Caution

- Never remove valve from pipeline under pressure.
- Always wear protective gloves and goggles.
- Watch out for trapped fluid in valve. It is safe to close valve before removing it from the pipeline.

ASAHI/AMERICA
Rev. H 1-18

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9

ProMod Systems Designer

Component Data Sheets

Calibration Column

CC_100_PCV_A



PVC CALIBRATION CYLINDERS

Graduated Calibration Cylinders for Accurate Calibration of Chemical Metering Pumps

Verified Accuracy

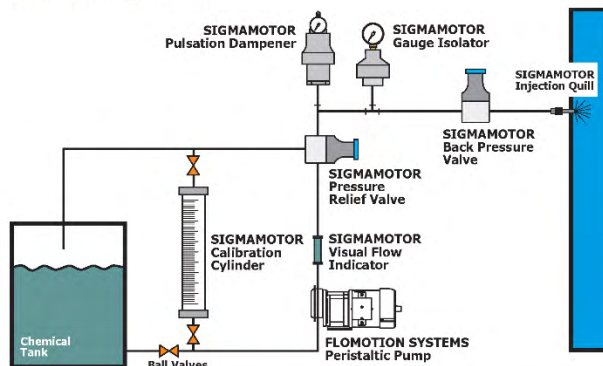
SIGMAMOTOR Calibration Cylinders will enhance your feed systems by allowing verification of the flow rate of the feed pump.

- CNC precision machined ends
- Clear tube for easy GPH reading
- Sealed top
- Quick-off top for cleaning (optional)
- Loose top (optional)
- NSF-61 Approved materials

Calibration Cylinders are installed on the suction side of the metering pump. The top of the cylinder is vented back to the supply tank or drain. The calibration cylinder is filled to the top mark then the valve from the tank is closed. Turning on the metering pump will draw down the liquid providing a simple means to verify the accuracy of the pump flow rate. USGPH (Gallons Per Hour) and ML are shown on the cylinder.

SIGMAMOTOR Calibration Cylinders are critical to accurate determination of your system flow rate, either at start-up or following maintenance. Sigmamotor Calibration Cylinders are made from clear PVC with gray PVC ends.

Typical System



Rugged PVC Sigmamotor Calibration Cylinders are clearly marked in US GPH and milliliters for accurate drawdown calibrations.

Glass cylinders are also available.

SIGMAMOTOR PVC CALIBRATION CYLINDERS

NSF-61 Approved Materials

PROCESS CONNECTION TYPE 1	
NPT	N
SOCKET	S
FLANGED	F
UNION	U

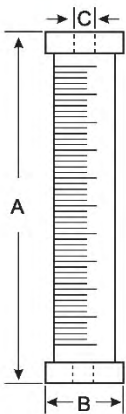
CP: S - 100 - S -
 1 2 3 4

Example: CP-N-100-S-V

SIZE 2												
SELECT:	100	200	250	500	500S	1K	2K	4K	5K	7K	10K	20K
Size (ml)	100	200	250	500	500	1000	2000	4000	5000	7000	10,000	20,000
A-Height (in)	11	19	10.75	13	7	22.25	20.25	37.5	29.25	19.5	25.75	47.75
B-Diameter (in)	1.5	1.5	2.1	2.5	3.7	2.5	3.7	3.7	4.88	7.25	7.25	7.25
C-Connection (in)	1/2	1/2	1/2	3/4	1/2	3/4	1	1	1.5	2	2	2
Capacity (GPH)	3.2	6.4	8	16	16	32	64	128	158	220	320	640
Scale (ml)	1	2	2	5	10	5	10	10	100	100	100	100
Scale (gph)	0.1	0.1	0.25	0.2	1	0.2	1	1	5	5	5	5

CAP STYLE 3	
SEALED	S
LOOSE	L
QUICK OFF	Q

O-RING MATERIAL Quick Off & Union Only 4	
VITON	V
EPDM	E
PTFE ENCAPSULATED	T



SEALED CAP (S)



Cap is permanently fixed to the top of the cylinder and includes a vent or NPT process connection. Used in applications requiring a positive suction head.

LOOSE CAP (L)



Cap is loose and easily removed for cleaning and manual filling. Used in applications where the cylinder must be filled from the top with no positive suction head.

QUICK OFF CAP (Q)



Cap is sealed with an O-ring and includes an NPT vent connection. Used in applications where frequent cleaning is required, such as polymer, alum, ferric chloride or chlorine.

Maximum Pressure:	150 psi
Maximum Temperature:	140 °F

SigmaMotor Inc.

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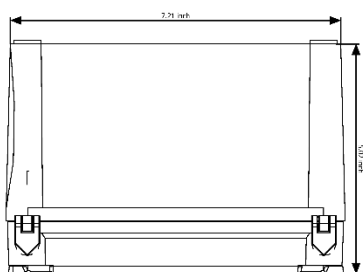
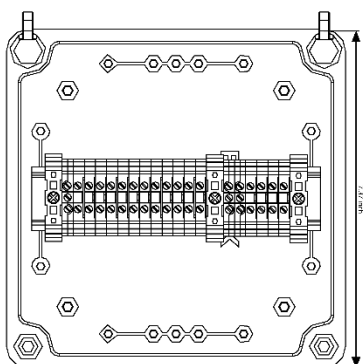
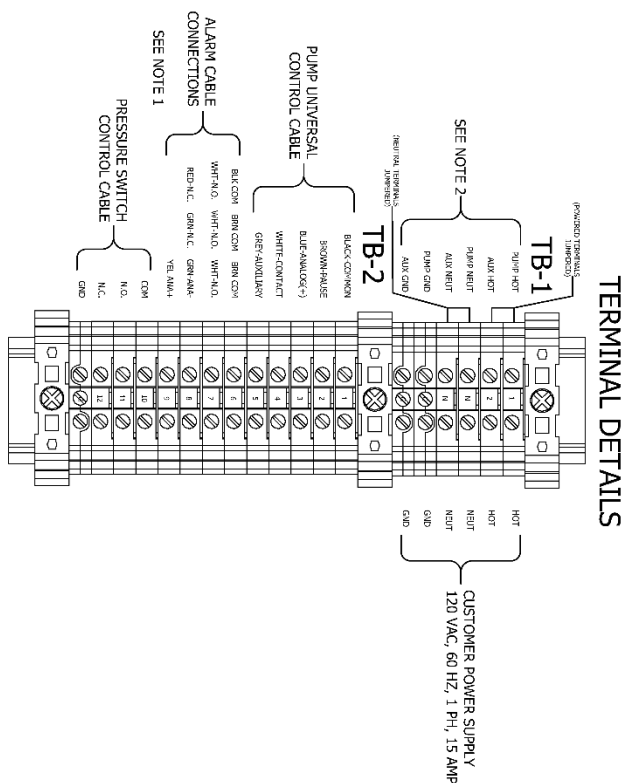
Technical Data

ProMod Systems Designer

Component Data Sheets

Control Panels and/or Terminal Boxes

CP_TB_1F



TERMINAL BOX LAYOUT
FIBOX UL PC1919 13 G-2FSH
7.5 X 7.5 X 5

NOTES:
1. ALARM CABLE COLOR CODE DEPENDANT ON THE CABLE SELECTED FOR PROJECT. LABEL ATTACHED TO CABLE WILL INDICATE THE COLOR CODE AND SIGNAL DESIGNATION.
2. POWER CONNECTION JUMPERS DEPENDANT ON APPLICATION. ADD JUMPER ON TERMINALS 1, & 2 FOR SINGLE POWER SUPPLY.

[illegible]

COMPETITOR	PROXIMATE
2002-03 SINGLE PUMP POWER AND CONTROL	7/2003 FUEL/OIL CHECKING TDO MECHANICAL REPAIR TO

BOM, TERMINAL BOX LAYOUT & TERMINAL STRIP DETAILS

Bill Of Materials					
Manufacturer	Quantity	Description	Part Number	PFC P/N USA	Device Tag
RIBOX	1	7.5 x 7.5 x .5 PC ENCL050406	PC1010 13 6-25H	7746220	-1
AUTOD	1	DNH 6H	0801773	7746033	-4
PFC	3	Leaf bracket for terminal block	9800868	7746251	-11H-112
PFC	16	Feedthrough screw at back	3004362	7746248	-11H-112
PFC	3	Ground terminal block	9941550	7746250	-11H-112

[illegible]



TERMS AND CONDITIONS

The following Terms and Conditions are an integral part of Goble Sampson Associates, Inc., attached offer to sell equipment or services stated in this Proposal for use specifically on this project.

- A. **SHIPMENT:** Estimated shipment is per Manufacturer's estimate. Goble Sampson Associates, Inc. is not responsible for delays in shipment or delivery of any kind beyond our control.
- B. **TERMS:** The prices quoted by Goble Sampson Associates, Inc. are subject to the following payment terms:
1. Net amount is due in thirty (30) days after date of each invoice on all orders. Purchaser's payment of invoices shall not be contingent or dependent upon prior receipt of any payment to Purchaser from third parties.
 2. Any invoice unpaid after 30 days from invoice date will be subject to interest charges of 1.5% per month, compounded.
 3. No Retainer is Allowed per the Terms and Conditions of this offer to sell.
 4. Lien laws and Bonding Company requirements are such that Goble Sampson Associates, Inc. must file claim with City, Bonding Company and Engineer within 60 days from date of invoice on unpaid accounts in order to protect reserve of amounts to cover supplier's unpaid invoice. This is in no way reflective of Contractor's ability to pay only a required action dictated by State Lien Laws and Bonding Companies. Therefore, Goble Sampson claim forms will be filed with the City, Bonding Company and Engineer 10 days before any account receivable becomes 60 days old.
 5. Equipment cannot be returned and an order, once accepted and approved, cannot be canceled, without prior written consent. In case of cancellation, Buyer agrees to reimburse Goble Sampson Associates, Inc. for all costs incurred plus a mark-up of 20% for overhead expenses.
- C. **TAXES:** We do not include in this Quotation any Federal, State or Municipal Sales, Use or Gross Income Tax which may be chargeable against the equipment offered. Any such tax which the Seller shall be liable for the payment or collection of shall be paid by the Buyer, although not specifically set out as an Item in this Proposal.
- D. **PENALTIES:** There are no penalties or liquidated damages assessed except as may be specifically provided for in this Proposal.
- E. **CLAIMS FOR LOSS OR DAMAGE IN TRANSIT:** Since material is sold "FOB Factory" or "FOB Factory, freight allowed to destination", the responsibility for filing claims for loss or damage in transit is the Buyers. We will assist and cooperate with the Buyer in handling such problems.
- F. **WARRANTY & SERVICE:** Goble Sampson Associates, Inc. warranties on equipment are limited to the warranty provided to the Purchaser by the Manufacturer of the specific equipment contained in this Proposal. Start-up or operation of equipment containing electrical or electronic components by unauthorized persons and damage resulting from unauthorized operation will be sufficient grounds to void all warranties on that equipment unless it has been previously checked out and operated by qualified personnel of the manufacturer or their representatives. If such failure is attributable to defects in the material furnished and found to have existed at the time of delivery, the Seller's liability shall be limited to furnishing necessary replacement material or parts. No liability is assumed by Goble Sampson Associates, Inc. under any conditions for installation, labor or materials associated with the installation of Seller's materials, unless installation is an integral part of this Proposal and are supplied by Goble Sampson Associates, Inc. This Proposal is for equipment only, and unless stipulated otherwise, does not include field service of any kind. Two weeks minimum advance notice in writing for start-up service is required. Start-up or supervision service will not be provided by Manufacturer or Goble Sampson Associates, Inc. on equipment covered by this Proposal if payment for equipment is not current, per Item B(1) of these Terms and Conditions.
- G. **ACCEPTANCE OF THE PROPOSAL:** This proposal is subject to Buyer's offer to purchase and to the subsequent acceptance of an Officer of Goble Sampson Associates, Inc. Thereupon it will become the entire Agreement between Buyer and the Seller notwithstanding any previous communications or negotiations, whether oral or written. There are no covenants, agreements, inducements, guarantees, warranties, additions or considerations other than as set out specifically in this Proposal. The parties intend to be legally bound by this Agreement and to be governed by Utah law upon the execution of this instrument as a contract. In the event the Buyer issues his own purchase order or prepares a contract based on this Proposal, the Terms and Conditions of this Proposal shall be deemed to be incorporated in the said purchase order or contract unless exception is specifically taken.
- H. **SPECIAL CONDITIONS:** No back charges or delay in payment of equipment shipped or services performed will be accepted by Goble Sampson Associates, Inc. unless authorized in advance and confirmed in writing by Goble Sampson Associates, Inc. We wish to assure you that Goble Sampson Associates, Inc., will do its utmost to meet your required delivery dates; however, we cannot be held responsible for delays and shortages of material caused by conditions beyond our control.

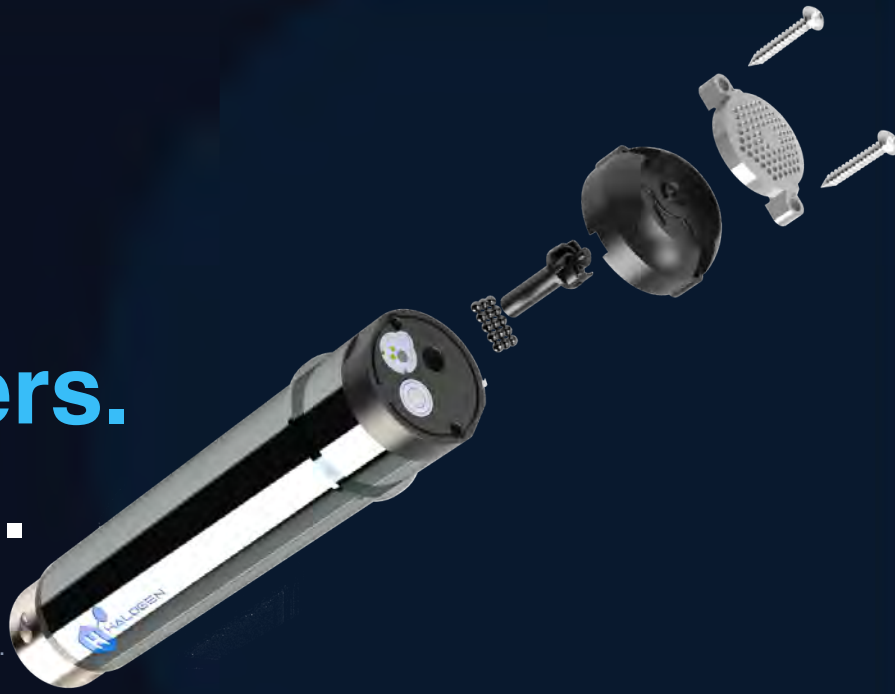
HALOGEN PACKAGE



MULTIPARAMETER CHLORINE ANALYZER

The MP5-A. Five parameters. Zero reagents.

Bare-electrode amperometric technology with SensiCLEN^E self-cleaning. EPA Method 334.0 compliant. NSF-61 certified.



10ppb

DETECTION LIMIT

±5%

ACCURACY(DPD)

6 mo

CAL STABILITY

Why operators are switching to MP5-A

01

No Reagents. No Membranes.

Bare-electrode amperometric measurement eliminates consumable costs and the risk of running dry between visits.

02

No Waste Stream

Saves up to 70,000 gallons of non-revenue water per year. No sample line, no drain connection.

03

Self-Cleaning

SensiCLEN^E captive beads continuously polish electrodes and pH glass for months of unattended operation.

04

Free Chlorine

Real-time compensation for pH, temperature, and conductivity gives you the real free chlorine number.

05

Flow Independent

Integrated micro-pump delivers accurate readings regardless of line velocity (0-4 m/s).

06

NSF-61 & EPA 334.0

Certified for direct drinking water contact. Report-ready compliance data.



Wet Tap
D-H2WT-P



Immersion
D-H2LF-P



PVC Tee
D-H2MF-P



Panel Mount Kit
MKIT-0001

Technical Specifications

Measurement Method	Bare electrode amperometric	pH (chlorine) Range	6.5 - 8.75
Chlorine Range	0 - 20 ppm	Conductivity Range	50 - 10,000 uS
Limit of Detection	10 ppb (0.01 ppm)	Pressure Rating	10 bar (145 psi)
Limit of Quantitation	40 ppb (0.04 ppm)	Operating Temp	1 - 50C (33 - 122F)
Resolution	0.001 ppm (1 ppb)	Storage Temp	-20 - 60C (-4 - 140F)
Chlorine Accuracy	±5% (DPD) pH 6.5-8.75	Max Flow Velocity	0 - 4 m/s
Temp Accuracy	±4% from 15-45C	Max Immersion Depth	130 ft+ / 145 psi
Conductivity Accuracy	±4% from 200-10K uS	Power	24VDC +/-10% @ 50mA
Calibration Stability	6 months typical	Cable Length	M12 4-pin, 5ft std (100ft max)
Measurement Interval	60 seconds	Dimensions Weight /	1.75" x 12" (45 mm x 305 mm)
pH range (chlorine)		Warranty	12 months
		Weight	400 grams



MKIT-0001 - Complete Panel Mount System

Flowcell assembly, wall-mount panel, and D20 controller with 120 VAC power everything for a turnkey side-stream installation. Pair with D20-C cellular option for cloud monitoring and mobile alerts.

Accessories & Options

D20-H

D20 Controller 120/240V

PT-01

CPVC Pipe Adapter (2" Tee)

D20-OTA-H

D20 OTA Controller

RMR-WT

Wet Tap Remover (2" Corp Stop)

RMVRTL

Sensor Remover Tool

SensiCLEN Self-Cleaning Technology

The MP5-A features an integrated long-life pump that maintains consistent flow across the sensor electrodes, delivering accurate readings even in pipes with varying or zero flow.

Captive cleaning beads continuously polish electrode surfaces and pH glass, enabling months of unattended, maintenance-free operation. Combined with electrochemical cleaning cycles, the MP5-A maintains calibration accuracy far longer than membrane or reagent-based systems.



NSF-61/372 Certified | EPA Method 334.0 Compliant | CE Compliant | BABA Compliant | Factory Calibrated

Wet Tap Sensor Installation Manual



Critical Safety Information

NOTICE

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental, and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator and/or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

Use of hazard information



DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

Contents

Product Description.....	3
1. Features.....	4
1.1 Specifications.....	4
2. Sensor Installation.....	5
2.1 Component Labels	6
2.2 Vertical Installation	7
2.3 Horizontal Installation	8
2.4 Initial Installation	10
3. Replacement Part Descriptions	14
4. Limited Warranty	14

Product Description

The Wet Tap Sensor consists of the sensor probe, and a drinking water mounting system, referred to as the remover assembly.

The sensor can be connected or implemented to a system by either:

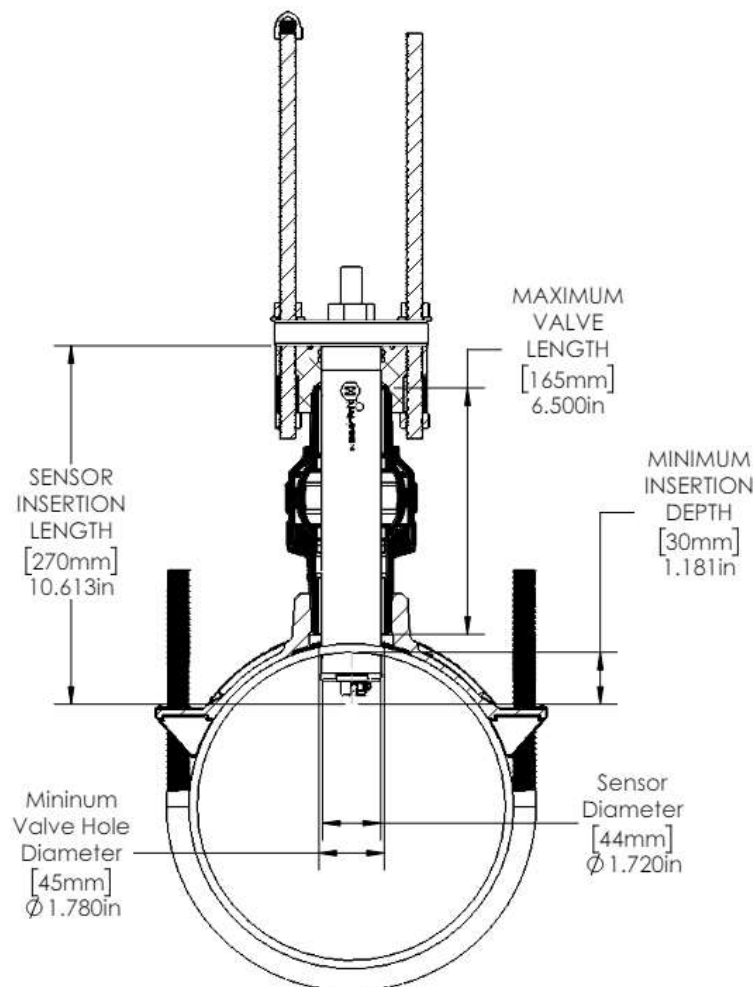
1. Using a Display/Transmitter powered with 24VDC
2. To a SCADA system using Modbus RTU protocol and 24VDC

Depending on your product configuration, you can mount the remover assembly onto a **Corp Stop Male x Male valve** with British Standard Pipe – Tapered (BSPT) threads or National Pipe – Tapered (NPT) threads.

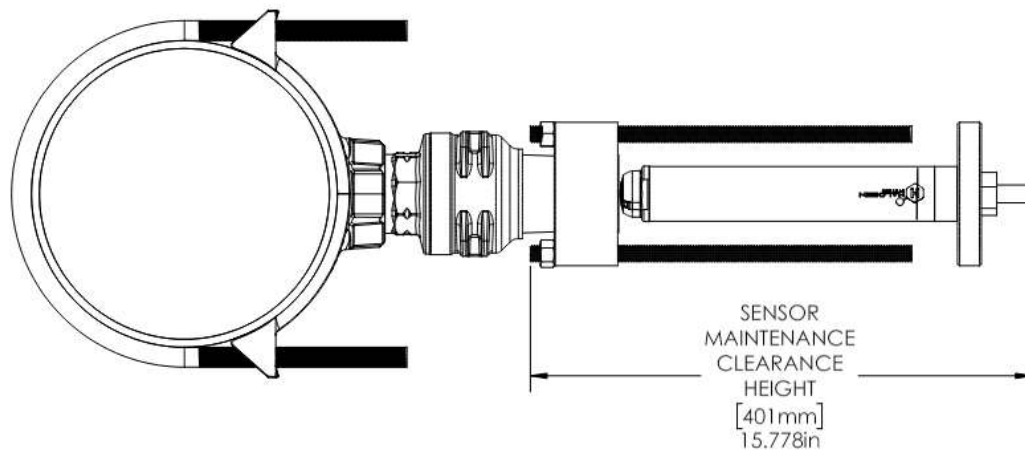
KITS-WT10: Remover Assembly with **2" Female NPT Threads**

KITS-WT20: Remover Assembly with Female **Rc 2 BSPT Threads**

The minimum insertion depth of the sensor must be 30mm from the sensor end to the inner diameter of the process pipe as shown below:



Install the wet tap sensor in a location where it can be maintained, refer below for the clearance height of the wet tap sensor.



1. Features

- Minimal maintenance.
- Reduced downtime with replaced wear parts
- No membrane and electrolyte required.
- No waste stream or flow control needed.
- Direct pipe insertion.
- Self-cleaning.
- 316 stainless steel sensor housing.

1.1 Specifications

Sensor Sample Requirements

Sample Pressure	-0.7 to 10 Bar
Sample Temperature	1 to 50° C
Sample pH	pH 6.5 to 8.75
Suspended Solids	Up to 3,000 ppm
Sample Flowrate	Variable from 0 to 5 m/Second
Sample Conductivity	50 to 10,000 μ S at 0 to 25°C

2. Sensor Installation



DANGER

Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

Location of Components

Outlet Port

The outlet port, or ejection port, is responsible for ejecting the process water back into the system. The orientation of the outlet port within a pipe must be carefully considered. Instructions for the alignment of the outlet port have been laid out in **sections 2.2 and 2.3**. The image below displays how to identify the sensor outlet port.



TRO Sensor

1. Located in a straight length of pipe at least 1.5 times the pipe diameter.
2. The tip of the sensor should protrude into the pipe a minimum of 30mm.

2.1 Component Labels

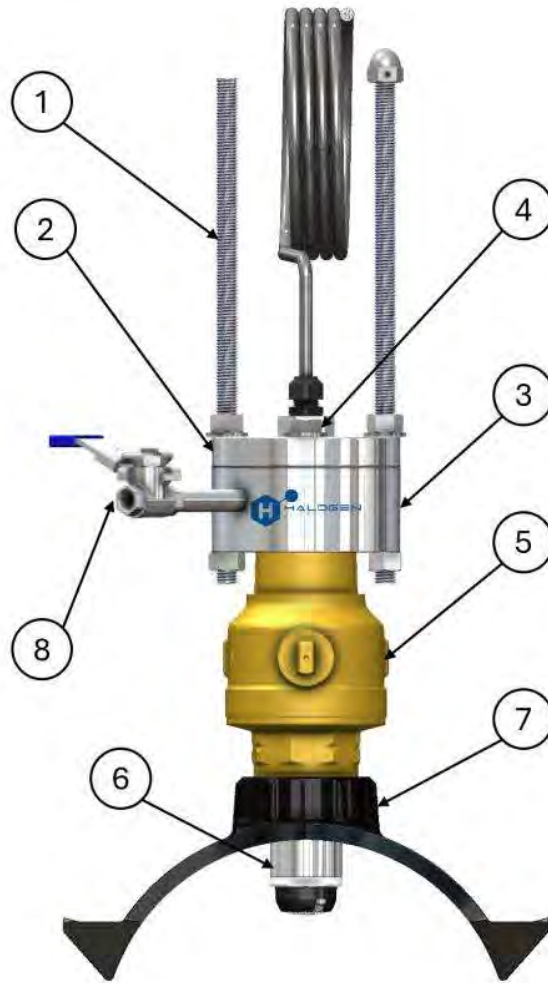


Figure 1. Drinking Water unit installed in pipe and detail of installation components.

No.	Part Description
1	Threaded Rod
2	Cap Mater
3	Remover Cap (configurable to NPT or BSPT threads)
4	Hex Bolt and Washer
5	Corp Stop Male x Male Valve (not included)
6	Sensor
7	Female Pipe Saddle (not included)
8	Sample Port

Depending on your product configuration, the Drinking water Assembly is designed to be installed in a Corp Stop Male x Male valve with 2" NPT threads or Rc 2 BSPT threaded valve. These instructions assume that a Wet Tap Valve and the appropriate saddle have been successfully installed.

2.2 Vertical Installation

For vertical installations, where a pipe is installed along a vertical wall, the sensor must not be inserted into a segment of the pipe where the water flows downward Figure 2 (b).

For vertical installations, water must flow upwards, and the Wet Tap Sensor must align with the direction of flow as shown in Figure 2 (a).

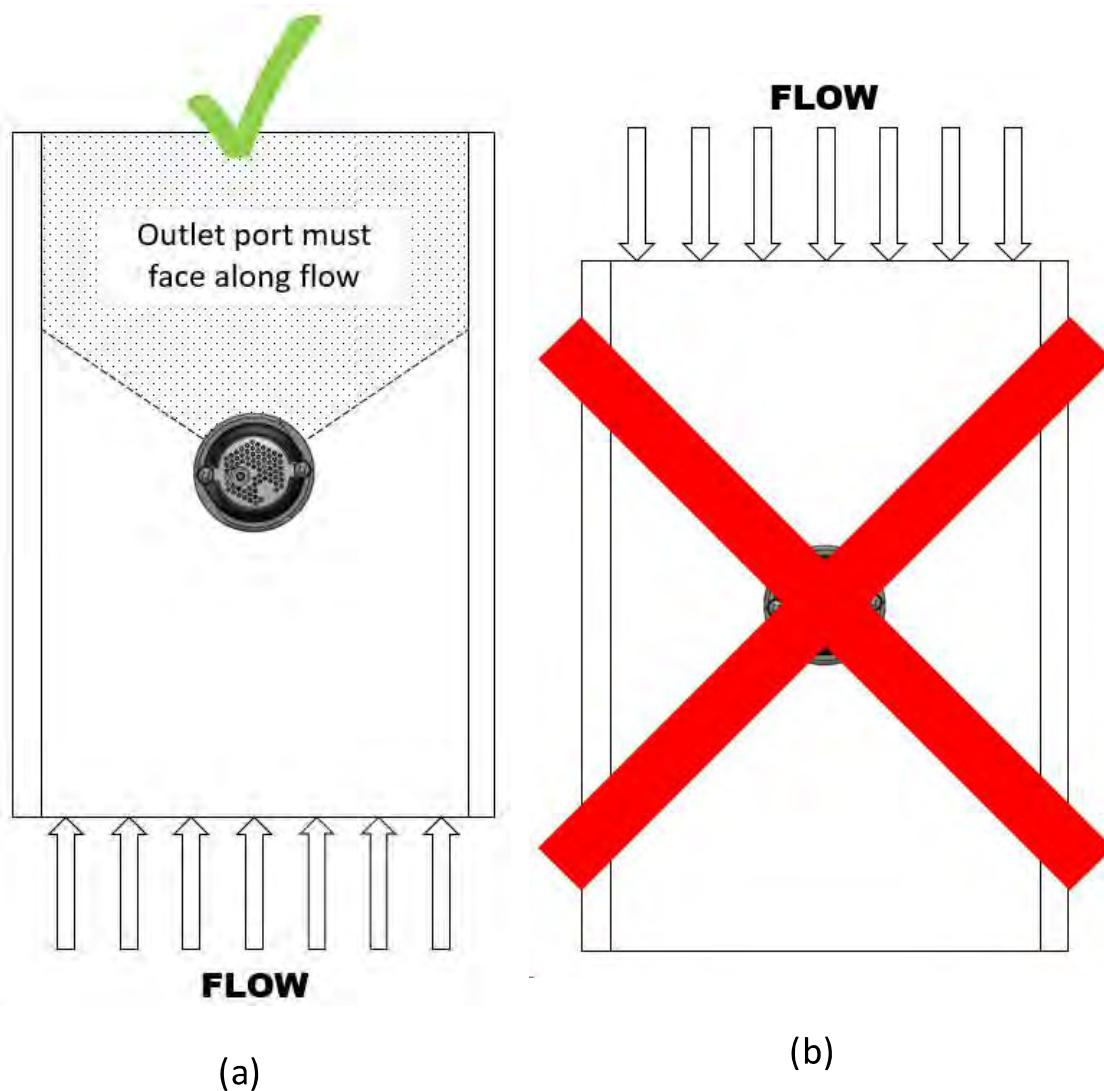


Figure 2. Front-facing cross-sectional views of vertical pipe installations. (a) Displays a correct installation of a Wet Tap Sensor, the outlet port must face in the marked region, along the direction of water flow. For clarity, (b) Depicts an incorrect installation of a Wet Tap Sensor, the direction of water flow must be upward.

2.3 Horizontal Installation

For horizontal installations, the Wet Tap Sensor must not be installed vertically as shown in flow-facing views of Figure 2 (c), and (d). The sensor must be installed **within $\pm 45^\circ$ from horizontal** as shown in figure 3 (a), and (b).

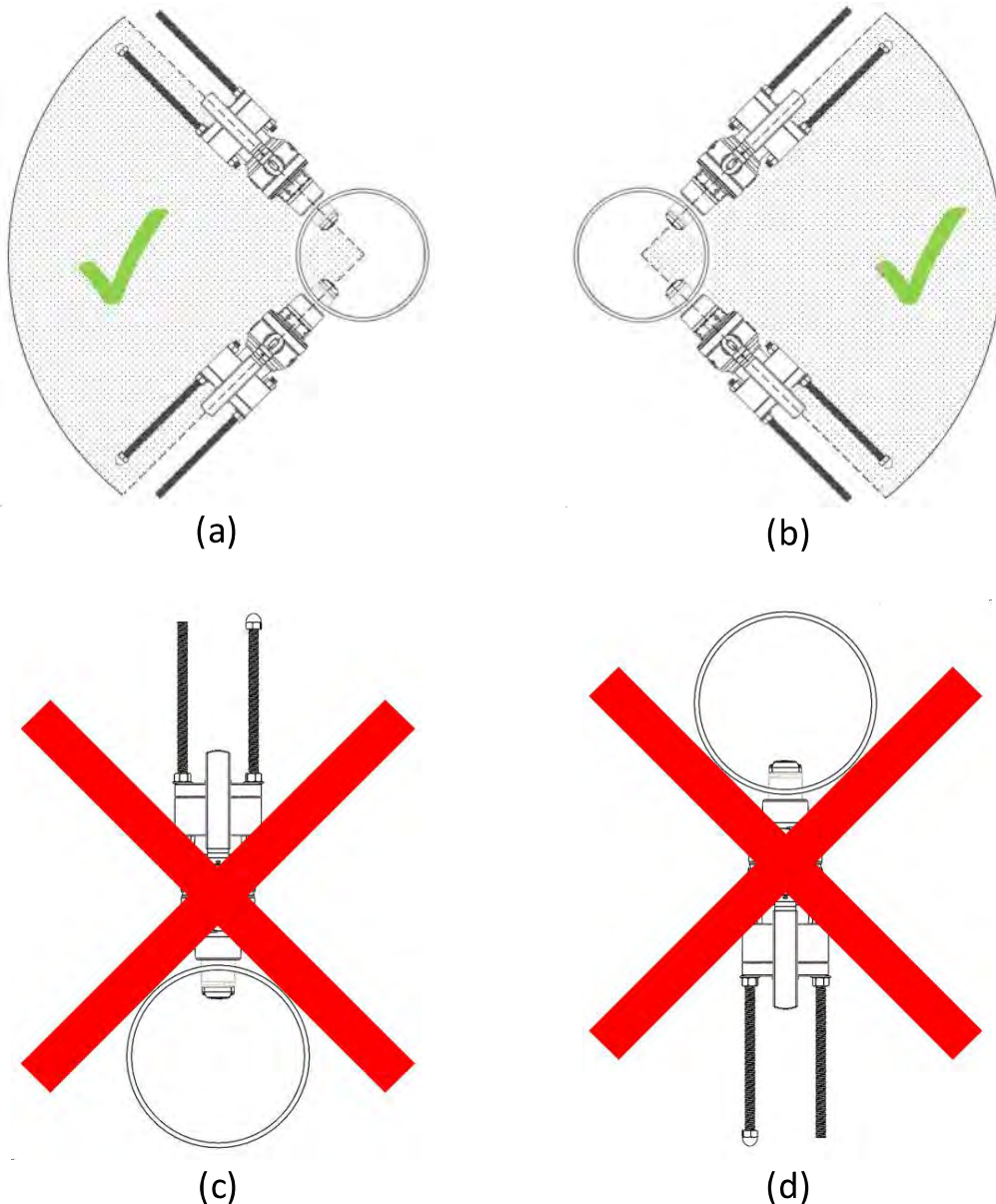


Figure 3. Flow-facing cross-sectional views of horizontal pipe installations. (a) and (b) display the acceptable range in which the Wet Tap Sensor can be installed onto a horizontal pipe. The Wet Tap Sensor must be installed within $\pm 45^\circ$ from horizontal. For clarity, (c) and (d) display incorrect installations of a Wet Tap Sensor.

Additionally, the outlet port must align with the direction of water flow and upwards, given the direction of flow, Figure 4 demonstrates where the outlet port should point.

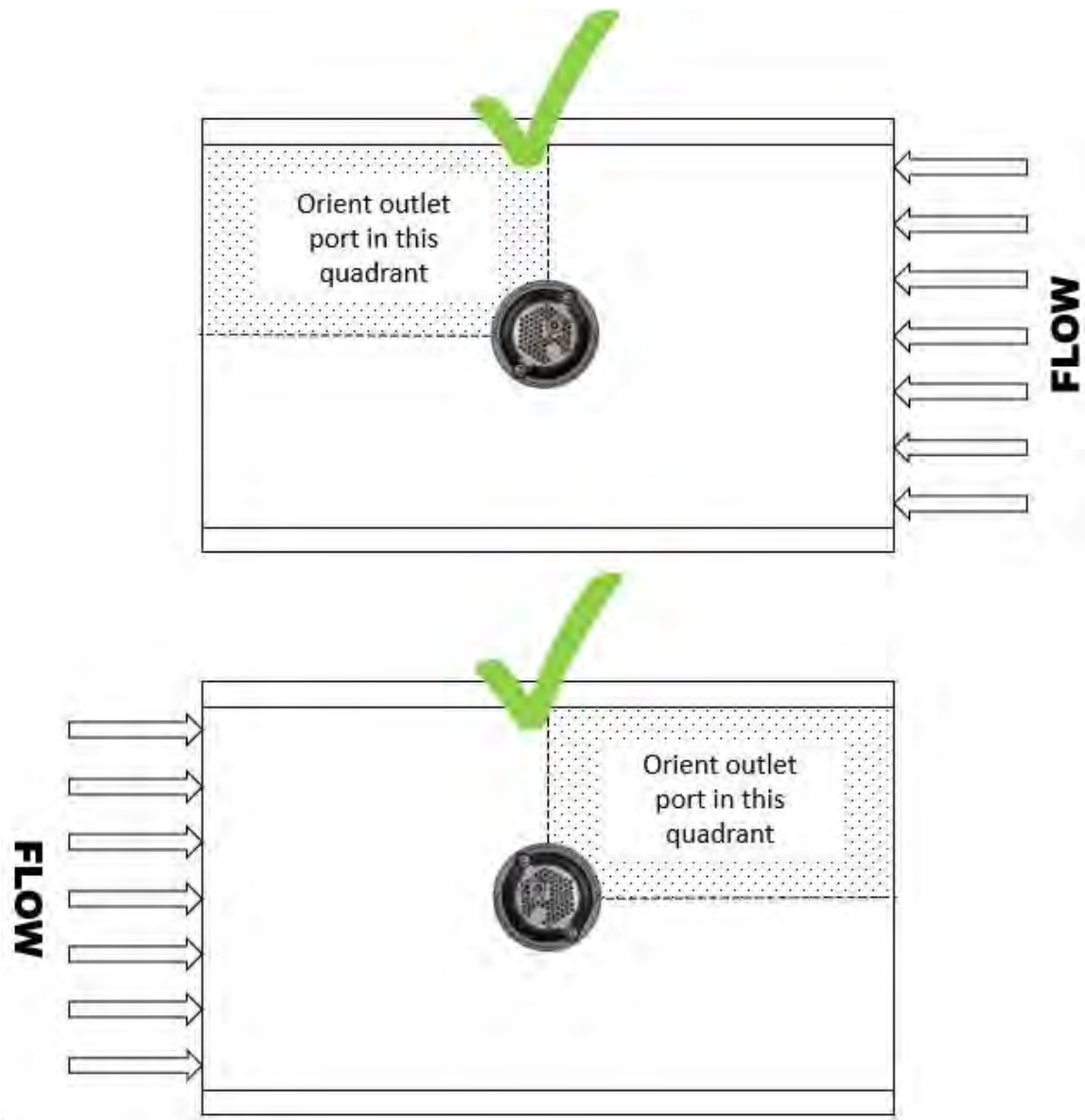


Figure 4. Front-facing cross-sectional views of correct outlet port orientation. The outlet must be directed upwards and along the flow.

2.4 Initial Installation

This installation assumes that a ⑤ **Valve** and ⑦ **Pipe Saddle** have been installed in the desired location in the pipeline. Ensure that the threads on the Corp Stop Male x Male Valve and Female Pipe Saddle are compatible. Valve I.D. must be 2" [50mm]

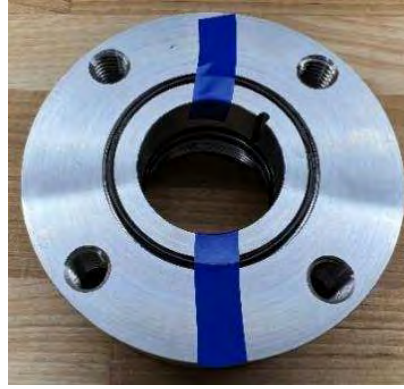


Figure 5. Blue tape location on cap.

1. Remove blue tape from the ③ **Remover Cap**.
2. Install ③ **Remover Cap** onto ⑤ **Corp Stop Male x Male Valve**.
3. Install ⑧ **Sampling Port** onto ③ **Remover Cap**.



Figure 6. Installation of sampling port fitting.



WARNING

To avoid leaking or damaging the sealing O-ring. Do NOT overtighten the sampling port fitting onto the remover cap

Note: When sampling water, please allow a minimum of 200mL of water to be dispensed before collecting a sample.

4. Install the two ① **All-thread Rods** into the ③ **Remover Cap** until protruding from the other side by about 3/4" [19mm]. Thread hex nuts onto protruding threads.



Figure 7. Demonstration of All-thread Rod protruding ¾" from the other side of the Remover Cap.

5. The outlet port aligns with the sticker shown in Figure 9. Correctly orient ⑥ **Sensor** by rotating the ② **Cap Mater**. Review sections 2.2 and 2.3 for correct outlet port orientation.



Figure 8. The outlet port aligns with the sticker shown.



Figure 9. How to identify the outlet port in a Wet Tap Sensor.

6. Slide ⑥ **Sensor** assembly into cap using ③ **All-thread Rods** as guide. Ensure sensor sleeves are pushed past the two O-rings located inside mater.

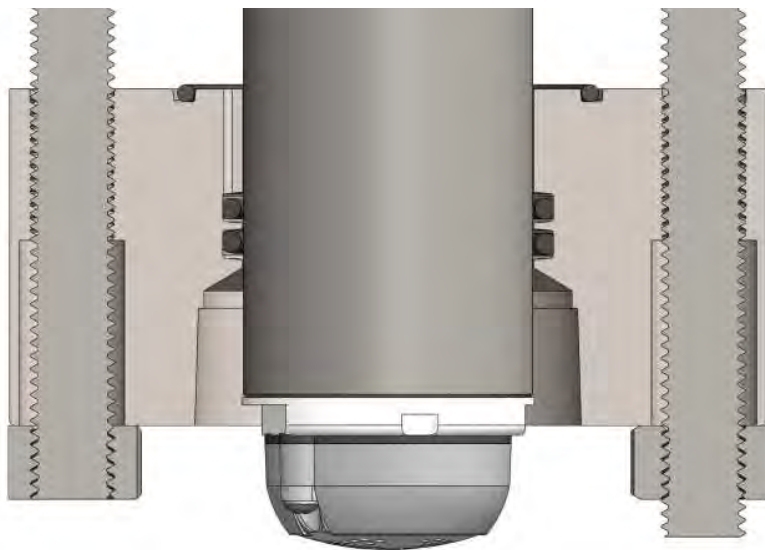


Figure 10. Cross-Section of Cap with sensor end pushed passed both internal O-rings.

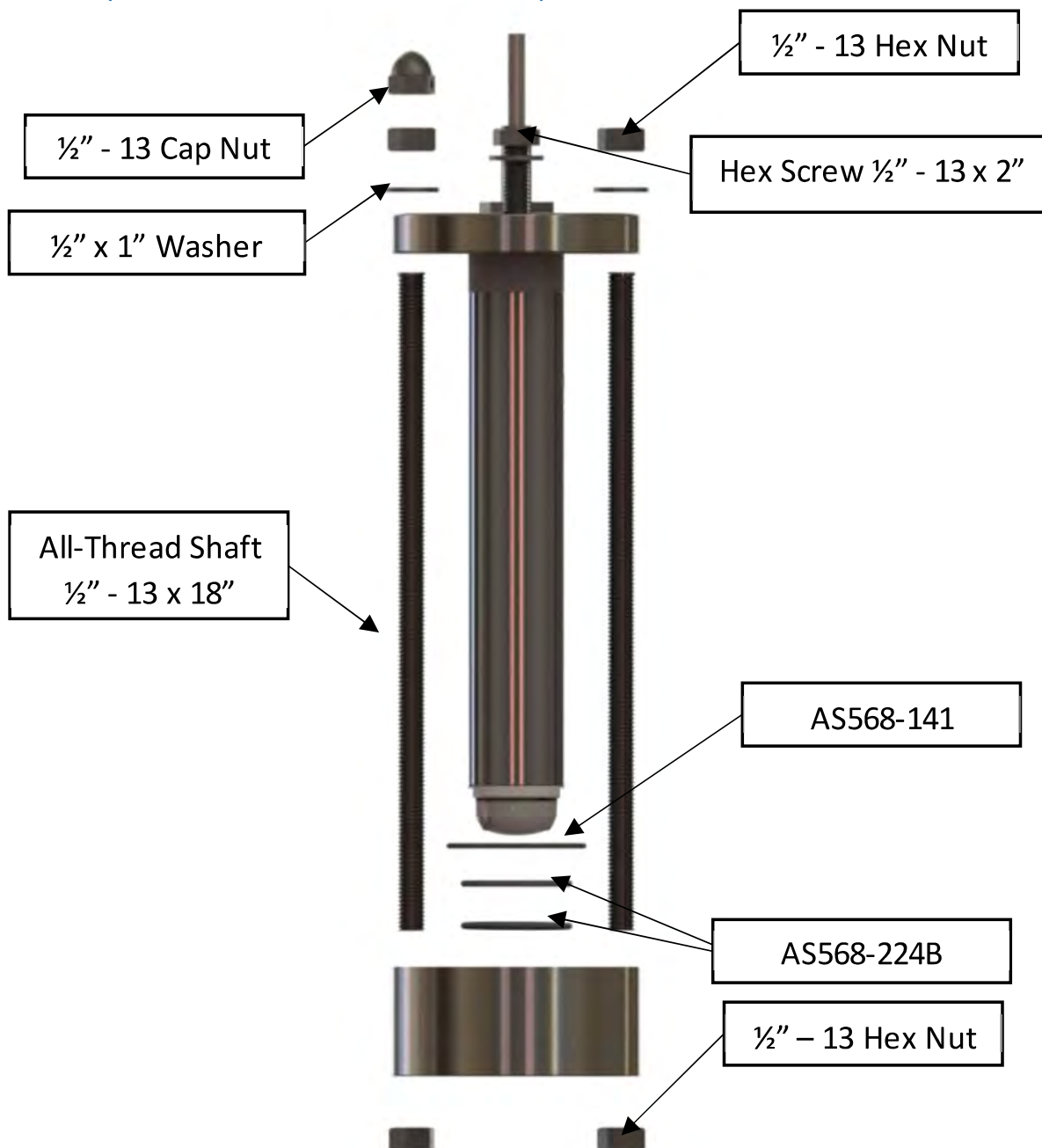
7. While the valve is still closed, place the washers and nuts onto the ① **All-thread Rods** until they are flush with ② **Cap mater**.



Figure 11. Orientation arrow depicting location of ejection port on sensor end. Line up perpendicular to flow direction.

8. Open ⑤ **Valve** and insert ⑥ **Sensor/Mater** assembly. completely into process stream. The ② **Cap Mater** should be completely flush with ③ **Remover Cap** (as shown in figure 1).
9. Secure the ③ **Cap** and ② **Mater** using the ④ **two hex nuts** and washers. Tighten hex nuts all the way to mater wrench tight.
10. Add locking cap nut to one threaded rod. This serves to prevent accidentally removing the retaining nuts completely.

3. Replacement Part Descriptions



4. Limited Warranty

Halogen Systems warrants its products against material workmanship defects for a period of one (1) year from the date of shipment.

In the event that a defect is discovered during the warranty period, Halogen Systems agrees, at its option, to repair or replace the defective product. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

Products may not be returned without authorization from Halogen Systems. To obtain authorization, please call Halogen Systems for a return material authorization number.

Limitations:

This warranty does not cover:

- 1) Damage caused by misuse, neglect (lack of appropriate maintenance), alteration, accident, or improper application or installation.
- 2) Damage caused by any repair or attempted repair not authorized by Halogen Systems.
- 3) Any product not used in accordance with the instructions furnished by Halogen Systems.
- 4) Damage caused by acts of God, natural disaster, acts of war (declared or undeclared), acts of terrorism, work actions, or acts of any governmental jurisdiction.
- 5) Freight charges to return merchandise to Halogen Systems.
- 6) Travel fees associated with on-site warranty repair.

This warranty is the sole expressed warranty made by Halogen Systems in connection with its product. All other warranties, whether expresses or implied, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

The liability of Halogen Systems shall be limited to the cost of the item giving rise to the claim. In no event shall Halogen Systems be liable for incidental or consequential damages.

This warranty is the sole and complete warranty for Halogen Systems. No person is authorized to make any warranties or representations on behalf of Halogen Systems.

Halogen Systems reserves the right to change or modify this warranty at any time.

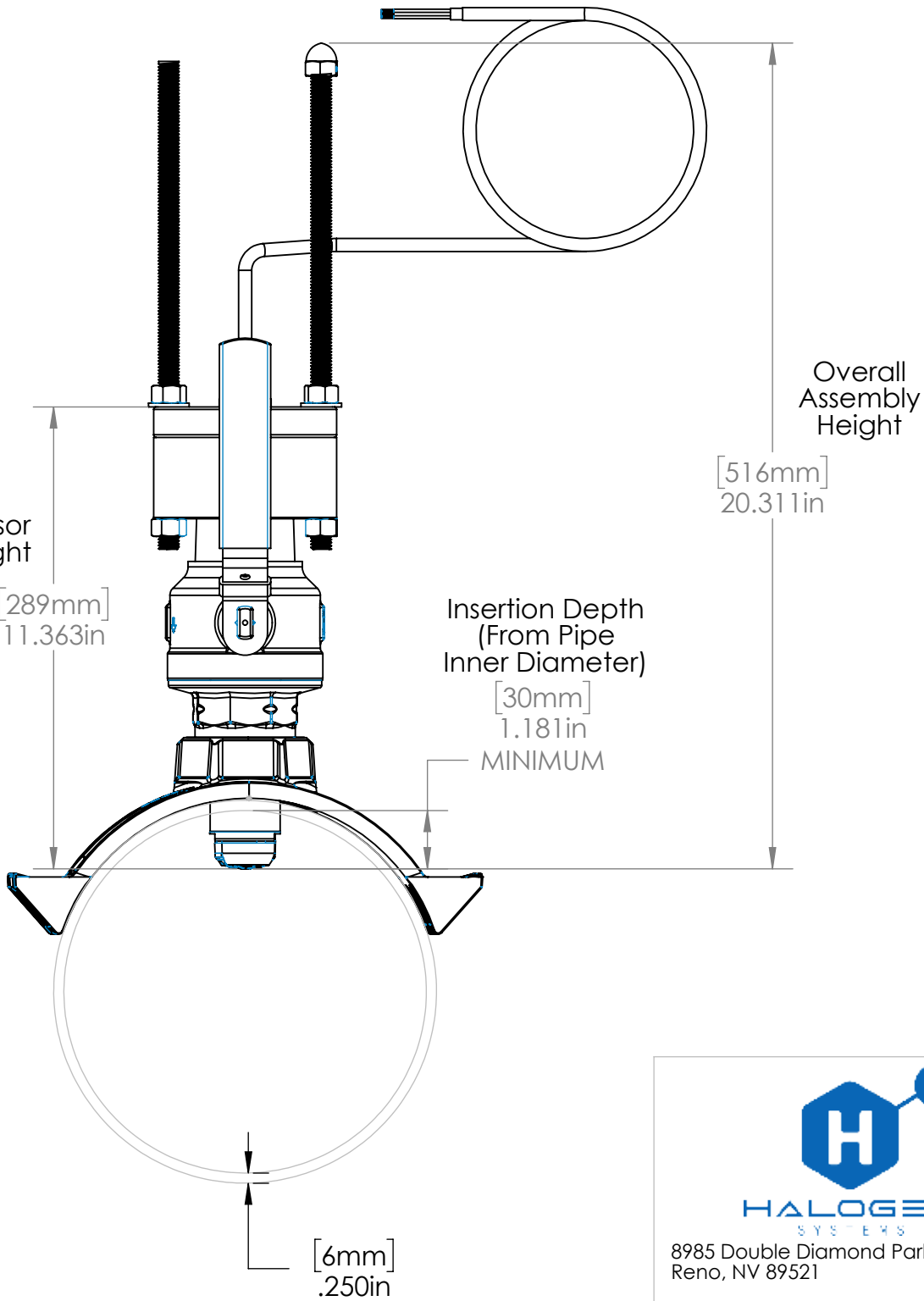
- NOTE:
- 1. Parts must be cleaned before assembly
 - 2. Incoming Inspection at AQL Level I

D

C

B

A





HALOGEN
SYSTEMS

8985 Double Diamond Parkway, Unit B-10
Reno, NV 89521

Fax: (775)-548-8558
Voice: (775)-832-0495
Email: mikes@halogensys.com

Weight: g
Volume: in³
Density: lb/in³

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PARENT ASSEMBLY: XXXX-####	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/8" ANGULAR: MACH ± .5 BEND ± TWO PLACE DECIMAL ±.020" THREE PLACE DECIMAL ±.005"		NAME	DATE
		DRAWN	JL	01/19/2024
PART CATEGORY		CHECKED	MS	01/19/2024
		ENG APPR.	MS	01/19/2024
		MFG APPR.	MS	01/19/2024
		Q.A.	MS	01/19/2024
		REGULATORY APPROVAL	MS	01/19/2024
		Comments:		
MATERIAL				
	FINISH			

Description:		
FULLY ASSEMBLY OVERVIEW		
SIZE	Part No.	REV
B	D-H1WT-P	A1
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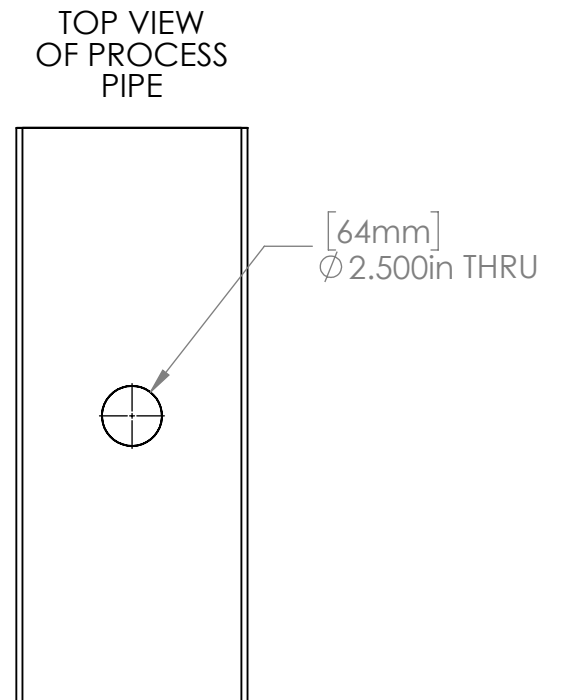
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1. MIP threads are compatible with NPT Threads, sealing compound must used between all thread interactions.



 HALOGEN SYSTEMS 8985 Double Diamond Parkway,Unit B-10 Reno, NV 89521 Fax: (775)-548-8558 Voice: (775)-832-0495 Email: mikes@halogensys.com	Weight: g Volume: in^3 Density: lb/in^3	PARENT ASSEMBLY: XXXX-###	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ± 1/8" ANGULAR: MACH ± .5 BEND ± TWO PLACE DECIMAL ±.020" THREE PLACE DECIMAL ±.005"	NAME DATE <table><tr><td>DRAWN</td><td>JL</td><td>01/19/2024</td></tr><tr><td>CHECKED</td><td>MS</td><td>01/19/2024</td></tr><tr><td>ENG APPR.</td><td>MS</td><td>01/19/2024</td></tr><tr><td>MFG APPR.</td><td>MS</td><td>01/19/2024</td></tr><tr><td>Q.A.</td><td>MS</td><td>01/19/2024</td></tr><tr><td>REGULATORY APPROVAL</td><td>MS</td><td>01/19/2024</td></tr></table>	DRAWN	JL	01/19/2024	CHECKED	MS	01/19/2024	ENG APPR.	MS	01/19/2024	MFG APPR.	MS	01/19/2024	Q.A.	MS	01/19/2024	REGULATORY APPROVAL	MS	01/19/2024	Description: ASSEMBLY EXPLODED VIEW
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REGULATORY APPROVAL	MS	01/19/2024																					
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