



September 10, 2021

Tom Ferrell, PE

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**Re: On-site Generated Sodium Hypochlorite, Plan Review # 146-2021  
Crystal Springs Water District (PWS ID # 00386)  
Conditional Approval**

Dear Mr. Ferrell:

Thank you for your submittal to the Oregon Health Authority's Drinking Water Services (DWS) of plan review information for the on-site generated sodium hypochlorite system that is to replace the existing calcium hypochlorite system used to maintain a residual disinfectant at Crystal Springs Water District. On September 8, 2021, I received an e-mail containing the plans, equipment specification, and narrative of the project. A review fee of \$825 was submitted on September 9, 2021.

The project consists of changing from calcium hypochlorite to on-site sodium hypochlorite generation, for the same purpose of maintaining a chlorine residual concentration in the water system. Because the calcium hypochlorite system had previously replaced an on-site generated sodium hypochlorite system, two 6-month lead and copper demonstration rounds normally required for treatment changes will not be required. 4-log viral disinfection is not required for this system; however, 17.2 minutes of contact time is available through 4,325-ft of 14" diameter pipe (34,584 gallons) using a 2025 peak hour demand flow of 2,010 gpm from Table E5 of the November 2015 master plan. A chlorine residual of 0.35 mg/l would yield a CT of 6 with 17.2 minutes of contact time (a CT of 6 is required for 4-log viral disinfection).

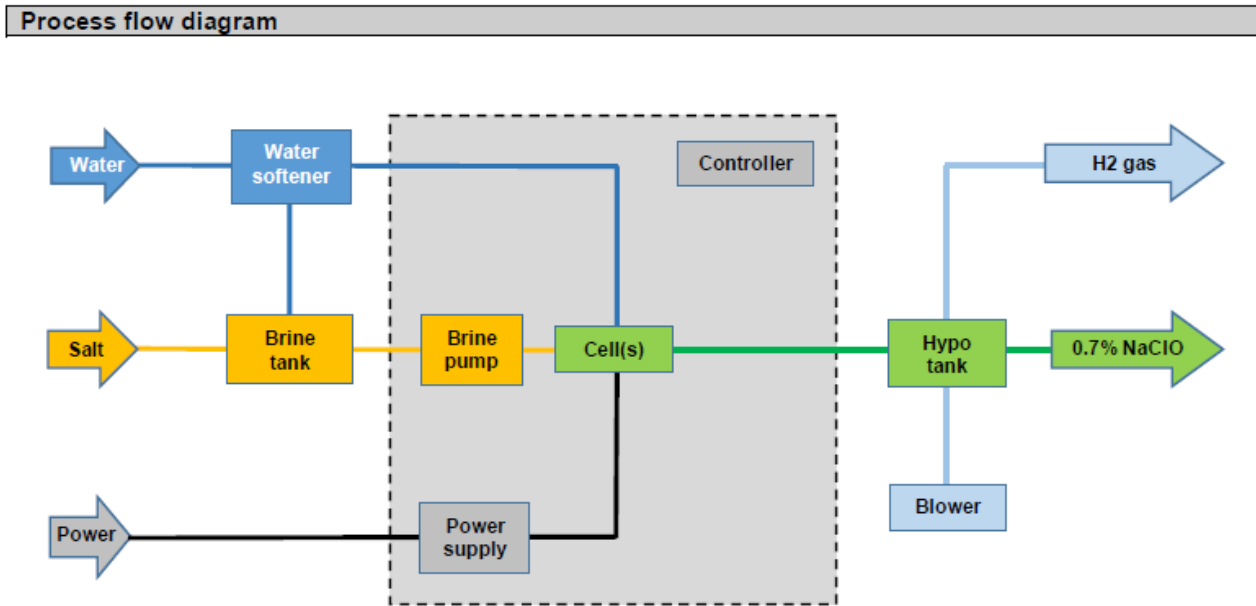
**The plans are approved with the following condition:**

- 1. Raw (unchlorinated) and a treated (chlorinated) sample taps are both provided.**

**Until final approval has been issued, the on-site sodium hypochlorite generation system is not approved for use.** Once construction is complete, please submit written verification that construction was completed according to the submitted plans and condition above, as-builts, and a completed [Final Project Approval Request form](#). submittals should reference Plan Review #146-2021 and can be emailed to me at [evan.e.hofeld@dhsosha.state.or.us](mailto:evan.e.hofeld@dhsosha.state.or.us).

**Project Description:**

The Crystal Springs Water District (District) has been adding sodium hypochlorite, as a disinfectant and for residual maintenance, to their system utilizing diluted bulk 12.5% sodium hypochlorite temporarily after its existing Constant Chlor Plus Cal-Hypo tablet feeder stopped working. As a permanent replacement for the calcium hypochlorite tablet feeder, the District is proposing using an on-site sodium hypochlorite system to generate 0.7% NaClO as shown in the process diagram below.



**CT calculations (not required) – 17.2 minutes of contact time through pipe flow:**

4-log viral disinfection is not required for this system; however, 17.2 minutes of contact time is available through 4,325-ft of 14” diameter pipe (34,584 gallons) using a 2025 peak hour demand flow of 2,010 gpm from Table E5 of the November 2015 master plan. A chlorine residual of 0.35 mg/l would yield a CT of 6 with 17.2 minutes of contact time. A CT of 6 is required for 4-log disinfection.

Year	Water Demands			
	Average	Max. Month	Max. Day	Peak Hour
gallons per day × 1,000				
2014	1,770	1,930	2,140	2,770
2015	1,770	1,930	2,150	2,780
2020	1,800	1,960	2,190	2,840
2025	1,820	1,990	2,230	2,900
2030	1,840	2,020	2,270	2,970
2035	1,870	2,060	2,310	3,040
gallons per minute (gpm)				
2014	1,230	1,340	1,490	1,920
2015	1,230	1,340	1,490	1,930
2020	1,250	1,360	1,520	1,970
2025	1,260	1,380	1,550	2,010
2030	1,280	1,410	1,570	2,060
2035	1,300	1,430	1,600	2,110

<sup>1</sup> Projected customer demand plus annual averages for: Booth Hill overflow of 584,510 gpd, Pine Grove overflow of 120,375 gpd and unaccounted-for water of 441,556 gpd.

Table E5 of the November 2015 Master Plan

**New Chlorine Metering Pump:**

An ANSI/NSF-61 certified Blue-White Flex-Pro A3V Peristaltic Metering Pump will replace the existing electric feed pump and will be used to introduce the disinfectant to the system. The hypochlorite feed equipment is flow-paced from the District’s source water meter. The source of supply is a groundwater spring located next to the chlorine building.

***On-site sodium hypochlorite generation system (0.7% NaClO):***

The on-site sodium hypochlorite system is an ANSI/NSF-61 certified Evoqua/Wallace & Tiernan OSEC L Sodium Hypochlorite Generator 15 PPD (pound per day) System that uses 3 electrolyzer cartridges fed by a 100-gallon brine tank (ANSI/NSF-60 certified Diamond Crystal® Solar Naturals Salt Crystals) and a softened water supply (Kinetico water softener) to generate a  $0.7\% \pm 0.05\%$  hypochlorite solution (NaClO). The 15 PPD (300 gal/hr) system is sized to be able to disinfect up to 1,800 gallons per minute source flow. The mixed solution is stored in dual 160-gallon solution tanks sized to hold one day supply. Roughly 3.1-lbs of salt are needed to make 3.1-lbs of Cl<sub>2</sub>.

**WHAT'S INSIDE?**

