



State Water Resources Control Board

Division of Drinking Water

February 16, 2024

PWS# 3210011

Plumas Eureka CSD
200 Lundy Lane
Blairsden, CA 96103

Attention: Jamar Tate – General Manager

Subject: Arsenic Treatment Pilot Study Results & Recommendations

Our office has reviewed the Technical Memorandum (Memorandum), dated October 10, 2023, prepared by DOWL Engineering. This Memorandum reported the findings of the pilot study conducted to determine the ability the De Nora Omni-SORB Oxidation/Filtration system to remove iron, manganese and arsenic from Well 2. In addition, it provided process design recommendations based on the study results.

Please review the enclosed memorandum prepared by staff engineer Nick McGann, which summarizes our review and comments on the study results and recommendations. It appears that this treatment strategy will be capable of reducing the concentration of the target elements to levels below current maximum contaminant levels. Therefore, our office takes no exception to the District proceeding with this approach for treatment.

If you have any questions regarding this matter, please contact Nick McGann at (530) 224-3269, or me at (530) 224-4828.

A handwritten signature in blue ink that reads "Stephen Watson".

Stephen W. Watson, P.E.
Lassen District Engineer
Drinking Water Field Operations Branch


Enclosure

cc: Luke Tipton, DOWL

njm \ 3210011 PECSD \ File: Permit

State Water Resources Control Board
Division of Drinking Water

TO: Stephen Watson, P.E.
Lassen District Engineer

FROM: Nick McGann 
Water Resource Control Engineer
SWRCB Division OF Drinking Water- Redding Field Office

DATE: January 31, 2024

SUBJECT: PECSD Pilot Study review

On October 19, 2023, our office received an email on behalf of Plumas Eureka Community Services District (PECSD) from Luke Tipton, P.E., of DOWL Engineering. The email contained a cover letter and the accompanying technical memorandum. The technical memorandum, dated October 10, 2023, provided a report and recommendations following the completion of a pilot study which utilized Omni-SORB System media by De Nora Water Technologies to reduce iron, manganese, arsenic, and phosphates from the source water provided by PECSD Well 02. The pilot study and summation report were done in response to the letter from DDW on September 23, 2022, for a proposed pilot study.

The pilot study used 4, 4-inch filters to operate an oxidation, coagulation, and filtration treatment system to test for compliance with arsenic, iron, and manganese MCLs. The water was treated with either sodium hypochlorite (NaOCL) or potassium permanganate (KMnO₄) as an oxidant, with each oxidant tested with both no coagulant and with polyaluminum chloride (PAC) as a coagulant. Ferric chloride (FeCl₃) was also tested, but it was found to result in an increase in iron in the treated water samples, so it was not a recommended addition for a full-scale plant.

Filter loading rates were varied to determine the maximum loading rate which could produce effluent below the respective MCLs coupled with long enough filter run times to maximize efficiency of the system. The filters were first operated with a flow from the well of 1.40 gpm which equated to a filter loading rate of 4.0 gpm/ft² per filter, the source flow rate was increased incrementally by 0.5 gpm for up to a maximum loading rate of 12.0 gpm/ft².

Water samples were collected for each iteration which sampled for pH, Mn, PO₄, As, and Fe from raw and individual post-filter sample taps. Field samples were tested every 2 hours during each filter run which were ceased when either an iron breakthrough occurred or a headloss across the filters reached 10 psi. Before the end of the proposed filter loading rate test, water samples were collected for analyses by an ELAP Accredited lab to determine potential compliance with aluminum, arsenic, iron, and manganese MCLs, and for ortho-phosphate to determine the potential interference with arsenic removal.

Results of pilot study:

The study recommended that the preferred treatment combination for the OMNI-Sorb filter system to be minimum doses of 2.5 mg/L of NaOCl, 3.0 mg/L of PAC, and a filter loading rate of 6 gpm/ft². Under these conditions the filter run time was 6 hours before pressure differential exceeded 10 psi. Field tests showed the pH decreased from 7.7 in the raw water to 7.0 in the treated water, and lab results showed levels of arsenic were 5 ug/L, iron was ND, and manganese was 31.4 ug/L; each below their respective MCLs.

DDW Notes:

While the recommended treatment regimen appears to show a probable compliance with the MCLs and addresses the points made by DDW in the September 2022 letter, there may be operational changes required after the plant is completed. There will be a need for ongoing chemical dosage optimization, especially since the pilot test was not able to take into account potential seasonal variations in water quality concentrations of arsenic, iron, manganese, and phosphate in the raw water, and temperature that might affect the formation of floc.

On page 6, the report states that the injection of KMnO₄ raised the Mn concentration such that the concentration of Mn in the filtrate exceeded the MCL for Mn. KMnO₄ is commonly used for manganese treatment in conjunction with greensand or other adsorbent medias. While the plausibility of this explanation is unknown, the PECSO should be able to change the oxidant used, if found necessary, after beginning to operate the treatment plant.

To reiterate, just because the pH remained between 6.5 and 8.5, that does not mean that the water won't be corrosive. Provisions for potential corrosion control treatment including additional chemical injection ports post filtration, and space for additional equipment should be planned for in the event they are found necessary.

Backwash disposal using the PECSO's wastewater disposal system is mentioned as the preferred method. If the arsenic levels are too high, sludge disposal could be a problem so an important factor to consider will be the arsenic concentrations in the backwash water and the method of supplying the backwash waste, whether that be via water or sludge, to the wastewater system.

Conclusions:

The pilot study showed the probable efficacy of a full scale treatment plant to facilitate oxidation, coagulation, and filtration by a treatment system consisting of Omni-SORB System media by De Nora Water Technologies with sodium hypochlorite as the oxidant and polyaluminum chloride (PAC) as a coagulant.