SH-Exh-X–31
Docket UW 170924
Sarah Hand

BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION

SARAH HAND AND GRETCHEN HAND, a married couple Complainant, v. RAINIER VIEW WATER COMPANY, INC., Respondent.	DOCKET UW 170924 **SARAH HAND'S EXHIBIT 31 TO CROSS EXAMINATION**

EXHIBIT 31

TO CROSS EXAMINATION OF BOB BLACKMAN AND RACHEL STARK

July 25, 2018

Excerpt from 2009 DOH Water System Design Manual,
"Secondary Contaminant Treatment Requirements and Options"

NIGEL S. MALDEN LAW, PLLC
711 Court A, Suite 200
Tacoma, Wa. 98402
253-627-0393 *p*
844-273-6067 *f*

Secondary Contaminant Treatment Requirements and Options
Washington State Department of Health

This document helps to define the conditions that determine DOH requirements for secondary contaminant treatment (primarily iron and manganese treatment). It further addresses considerations on treatment requirements that may be imposed on a water system. "Treatment" means either removing a secondary contaminant from the source water or rendering a contaminant to reduce or eliminate its aesthetic effect (most often referred to as "sequestering" for iron and manganese treatment).

"The purveyor of any public water system providing service that has secondary inorganic MCL exceedances shall take follow-up action as required by the department. Follow-up action shall be commensurate with the degree of consumer acceptance of the water quality and their willingness to bear the costs of meeting the secondary standard. For new community water systems and new nontransient noncommunity water systems without active consumers, treatment for secondary contaminant exceedances will be required" (WAC 246-290-320(3)(d)).

Treatment by sequestering only be considered only if the combined iron and manganese levels are no more than 1.0 mg/l, and the manganese level is no more than 0.1 mg/l as Mn. If sequestering is considered for new sources, pilot testing to determine the appropriate treatment chemical dosage and treatment process requirements will be necessary. See Item III below for specific treatment considerations.

DOH will determine that a secondary contaminant problem may exist through evidence provided in customer complaints or by reviewing information provided by a purveyor. DOH will require action by the purveyor when the purveyor receives five or more specific complaints associated with a secondary contaminant from different customers in a 12-month period. DOH may receive the complaints individually or through a petition signed by five or more customers. When a problem is determined to be significant, the requirements below apply.

I. Iron and Manganese (Fe/Mn)

Compliance with the secondary standards for Fe/Mn is not required for water systems in existence prior to January 15, 1992, unless the iron or manganese is creating a "significant" problem as defined previously.

If a water system has a "significant" problem, it will be required to take the following actions:

1. The water supplier must prepare an engineering report with recommended corrective actions necessary to bring the water system into compliance with the Fe/Mn standards. The report must evaluate all reasonable alternatives and determine the costs associated with each alternative. The study must be prepared by a professional engineer registered in Washington State.
2. The results of the study conducted by the water supplier should be made available to the customer at an appropriately noticed public meeting, or by document distribution.

3. The water system must prepare a proposed survey of the regularly billed customers, which provides for questionnaires to be sent to each service connection to determine the customer preference regarding the quality of the water and the cost of compliance. The questionnaire should be as objective as possible and be based on the engineering report. The estimated capital and operation costs to the consumer should be based on the most cost-effective alternative presented in the engineering report. This alternative must also be acceptable to DOH.
4. The proposed survey questionnaire and the engineering report must be submitted to DOH for review and approval prior to its distribution.
5. Upon approval of the survey questionnaire, the water supplier must distribute it to the consumers. Customer responses to the questionnaire should be tabulated by the water system for submission to DOH.
6. Water systems that do not serve regularly billed customers similar to a community, will be reviewed and evaluated in a manner determined to be appropriate by DOH.

Special Allowances for Standby or Emergency Sources

Water systems may use existing untreated sources that exceed the MCLs for secondary constituents for standby service or to meet peak demands, without the need for an engineering report or customer survey, if all of the following occur:

1. The monthly production from such sources is metered and is not used for more than five consecutive days or a total of 15 days per year (use for any part of a day constitutes a day's use).
2. Secondary constituents do not generally exceed twice the MCL anywhere in the distribution system.
3. Public notification is made, with the notification being prior to use, whenever possible.

A. Basis for DOH Decisions

1. If the customer survey adequately demonstrates that most consumers (over 50 percent) that respond to the survey questionnaire do not wish to pay the costs necessary to attain compliance with the Fe/Mn standards, the water supplier may submit a written application requesting DOH to allow operation without treatment. DOH will then issue a letter, which states that treatment for iron or manganese will not be required. This allowance will be effective for five years beginning on the date of the letter.

Note: *Although it would be desirable for all water system customers to respond to the survey, a 100 percent response rate is not expected. DOH considers that validation of the survey would require at least 50 percent of the total current customer base to respond to the survey. The purveyor must pursue this level of response to the extent that an additional survey questionnaire must be sent to all customers that did not respond to the*

initial survey if less than 50 percent of all customers responded. If, after the second survey, less than 50 percent of the customers respond, DOH will use a simple majority of the responses received to determine the treatment requirement.

Whenever the survey shows clearly that more than 50 percent of all possible customers have stated either a willingness or unwillingness to pay for treatment, this information can be immediately presented to the state without waiting for additional customer responses.

2. At the end of the five-year period, DOH may re-evaluate the water system's status. The water supplier may be required to conduct a new survey if DOH determines that substantial changes have occurred (for example, a large increase in new customers or significant changes in water quality), which would warrant a re-survey of customers.

   Regardless of the five-year period covered by DOH's decision, the water supplier must re-survey its customers if DOH receives a petition signed by at least 25 percent of the water system's billed customers requesting a new survey. This will only be required, however, if a survey has not been conducted within the past 24 months.

B. Procedures for Enforcement

All water systems determined to be in violation of the standard for Fe/Mn may be issued a directive or, if needed, a department order to come into compliance with the standards, unless the criteria and procedures previously presented in this document are followed and DOH has determined that treatment is not warranted.

II. Other Secondary Contaminants

DOH will pursue action regarding secondary contaminants other than iron or manganese in a manner similar to that presented for iron and manganese. However, the degree of problem significance may vary. Depending on the constituent in question and the numbers and types of customer complaints, DOH will determine the most appropriate course of action on a case-by-case basis.

III. Treatment Considerations

Iron/Manganese Removal

When removal of iron or manganese is required, the most common method for removal employs oxidation followed by sedimentation and filtration. Oxidation may be affected by aeration, chlorination (chlorine or chlorine dioxide), or with use of potassium permanganate. Treatment is most effective at higher pH levels, usually in excess of pH 7.5. The best oxidant for manganese removal is potassium permanganate, which has been shown to be effective over wide ranges of pH.

Ion exchange technologies can also be used for Fe/Mn removal. With these methods, special care must be taken to ensure that the iron and manganese is not oxidized before application through the exchange media. Fouling of the exchange bed can occur if the iron or manganese is not maintained in a chemically reduced state.

Lime Softening processes can be used for iron/manganese removal, but this practice is normally used adjunct to water softening, which is not common in Washington State.

Treatment Waste Disposal

Wastes (for example, brine discharges or filter backwash wastewater) associated with treatment applications must be disposed of properly. The Department of Ecology should be contacted to determine the disposal requirements.

Iron/Manganese Sequestering

When sequestering (also called stabilization, chelation, or dispersion) is used as treatment method, certain limitations need to be recognized. Sequestering is not considered appropriate whenever the combined iron/manganese level is in excess of 1.0 milligram per liter (mg/L), with the manganese level being no more than 0.1 mg/l as Mn. In no case will sequestering be considered for combined iron/manganese levels above 1.0 mg/L, or when manganese levels are reported above 0.1 mg/l.

Addition of sequestering agents such as the polyphosphates (hexametaphosphate, trisodium phosphate) must be done prior to any oxidation influence. Concentrations of polyphosphate cannot exceed 10 mg/L as PO_4. The polyphosphate must be added at doses lower than those allowed under ANSI/NSF Standard 60 for the specific product.

Because polyphosphate is a bacterial nutrient and can lead to bacterial growth in distribution lines, disinfection must be applied following the sequestering treatment.

To prevent oxidation of the iron or manganese before they are stabilized, the polyphosphate should be added into, or near, the well on the suction side of the pump to minimize oxidation by aeration. The application point for the disinfectant should be more than 10 feet downstream of the pump discharge. A greater distance may be required by manufacturer's recommendations.

Sequestering agents are effective in cold water, but lose their capability in heated or boiled water. It should be recognized that this form of treatment may not resolve customer concerns for hot water portions of domestic service.

If it is determined that sequestering, after a year from its initiation as evidenced by complaints of the water system customers, is ineffective in eliminating a secondary contaminant problem, then removal treatment must be instituted.

Pilot Testing for Sequestering – Laboratory Bench Scale Tests

When sequestering is considered for iron/manganese control, the following process can be used to determine the dosage of sequestering agent needed for proper operation:

1. Treat a series of samples with a standard chlorine solution to determine the chlorine dose required to produce the desired chlorine residual.
2. Prepare a standard sequestering agent solution by dissolving 1.0 gram of agent in a liter of distilled water in a volumetric flask.
3. Treat a separate series of samples with varying amounts of the sequestering agent. One milliliter (ml) of the standard agent solution, prepared as per item 2 previously, is equivalent to a 0.1 percent solution. One ml of this stock solution in one liter of sample is equivalent to 8.34 pounds of sequestering agent per million gallons. Stir the various dosages to ensure good mixing in the series of samples; and continue to stir while adding the previously determined chlorine dosage to minimize creation of localized high chlorine concentrations.
4. Observe the series of treated samples against a white background to note the degree of discoloration. The proper dose of sequestering agent is will delay noticeable discoloration for a 4-day period.

Note: *Samples for the above bench test should be collected freshly, kept away from direct sunlight to avoid heating, and maintained at room temperature for the duration of the test.*

Notification Required

Whenever sequestering treatment is used for management of iron or manganese problems in a water system, the customers must be notified that this form of control is being used and that they may still experience problems with the hot water portion of their home plumbing. In addition, customers located in more remote portions of the water distribution system must be informed that iron/manganese may still pose a problem if their water is not routinely flushed through their lines. The form, method of delivery, and frequency for this notification will be determined in consultation with the Office of Drinking Water authority regarding secondary contaminants.

IV. Distribution System Related Problems

Occasionally, complaints about aesthetic concerns are not directly attributable to source water levels of iron or manganese. The water quality may be corroding the system distribution piping, leading to high iron levels at consumer taps. Some water systems may have problems associated with lengthy dead-end lines that are not flushed routinely. Existing water systems should examine the nature of any consumer complaints to determine if the problem is water source or distribution system related. The water purveyor should develop a report that identifies the nature of the problem and submit it to DOH for review. If distribution system corrosion is determined to be the problem, any treatment options examined to remediate the aesthetic concern should address ways to mitigate problems associated with water corrosivity.

Note: *Sequestering is not considered appropriate for distribution system related problems for either primary or secondary contaminants.*

Recommended References

AWWA and American Society of Civil Engineers (ASCE). 1990. *Water Treatment Plant Design*, 2nd Edition, Chapter 11: "Iron and Manganese Removal," McGraw-Hill. New York, NY.

HDR Engineering, Inc. 2001. *Handbook of Public Water Supplies*, 2nd Edition, Chapter 14: "Iron and Manganese Removal," John Wiley & Sons, New York, NY.

Sommerfeld, E.O. 1999. *Iron and Manganese Removal Handbook*, AWWA, Denver, CO.