



April 29, 2019

Jesten Brenner, PE
Boeger & Associates, LLC
PO Box 21623
Eugene, Oregon 97402

**Re: New Slow Sand Filtration Plant & Storage (PR #107-2017)
Butte Creek Scout Ranch (WS # 94191)
Final Approval**

Mr. Brenner,

Thank you for your submittal of supplemental plan review information for the new slow sand filters and storage tanks for Butte Creek Scout Ranch to the Oregon Health Authority's Drinking Water Services (DWS). DWS received written verification that the project has been completed and that all conditions of the 2017 conditional approval letter have been met, including coliform counts both before and after the slow sand filter documenting adequate removal. Earlier, our office received plans, rationale, initial sampling regime plan to assure effectiveness. We received a \$825 plan review fee.

The project involves adding a full scale treatment train to replace an existing treatment train which included a cartridge filter, an old membrane filter, and ultraviolet (UV) disinfection. The following unit processes have been added:

- One 1,500 gallon sedimentation tank, 118" x 75"
- 1,000 gallon flow control tank, 99" x 63"
- Two slow sand filters, 76 square feet each, with a 10,000 gallons per day flow capacity for each unit, followed by weir structures/leveling basins.
- Two 6,500 gallon polyurethane water storage tanks used for chlorine contact time for disinfection
- Finished water pumps to pressurize the distribution

The project is granted final approval and you may place the facilities into use.

I do have the following comments on the project:

1. The slow sand filtration plant is credited with 2.0-log *giardia* and 2.0-log cryptosporidium inactivation. The balance of the 3.0-log *giardia* total inactivation

credit, or 1.0-log *giardia* inactivation is achieved through chlorination with contact time. The UV unit, membrane filter, and cartridge filter are not credited with any pathogen inactivation as they do not meet current surface water treatment rule requirements.

2. I have reviewed the March 14th chlorine contact time tracer study report for the two 6,500 gallon reservoirs with the following conclusions:
 - a. Measured contact time = 280 minutes
 - b. Simulated peak flow leaving the reservoirs = 14.6 gallons per minute (gpm)
 - c. Volume in reservoirs at beginning of test = 11,050 gallons
 - d. Volume in reservoirs at end of test = 9,370 gallons
 - e. Estimated baffling factor of reservoirs = 0.40, note that the average of the beginning and ending volumes, or 10,210 gallons, is used in this calculation.
3. I have the following comments regarding the turbidity monitoring and disinfection calculations that you are required to report daily on the attached monthly surface water report:
 - a. Report your daily required turbidity reading from the combined effluent right after both slow sand filters, in the hourly column closest to the actual time of the measurement. You may leave the highest reading of the day column blank. Answer the turbidity compliance questions at the bottom at the end of the month.
 - b. Use 280 minutes as the contact time for determining the amount of disinfection required. Multiply the free chlorine residual measured at the first customer by 280 to determine CT achieved.
 - c. Use the measured free chlorine residual, pH, and temperature at the first customer to determine CT required for the 1.0-log *giardia* inactivation requirement. Use the corresponding 1.0-log column in the attached tables for the residual, pH, and temperature of the day. Be sure to round up for chlorine residual and pH, and down for temperature, for values in between the table values, to be most conservative.
 - d. The CT achieved must be equal to or be greater than the CT required every day for CT requirements to be met for the month. Make this determination daily and answer the compliance question on the form.
 - e. The contact time of 280 minutes is valid for flows up to 10% over the flow and reservoir volumes above 10% of the average reservoir volume, simulated in the study. If the peak hourly demand flow exceeds 16 gpm or the reservoir volume drops below 9,190 gallons, a new tracer study may be required.
 - f. Be sure to include the peak hourly demand flow determined daily after the reservoirs, in the far right column of the disinfection report.
 - g. The free chlorine residual measured and recorded at the first customer daily must be equal to or greater than 0.2 milligrams per liter every day for this

- monthly requirement to be met. Answer the compliance question.
4. You indicated that you would be developing a scraping interval for the slow sand filters based on observations in flow capacity. To assist, DWS is offering a free slow sand filtration class in Keizer on May 31, 2019. Please see DWS' surface water treatment website at www.healthoregon.org/swt for registration information and class materials, or contact me.

If you have any questions or concerns, or would like this in an alternate format, please contact me at (971) 673-0459, or james.b.nusrala@state.or.us. Thank you for your cooperation in completing the project.

Sincerely,



James Nusrala, P.E., Regional Engineer
Drinking Water Services

Enclosures:
Monthly surface water report
Required disinfection CT tables

cc (with enclosures – Bill only):
Bill Hood, Scout Ranger, Butte Creek Scout Ranch, 13462 South Butte Creek Road,
Scotts Mills, OR 97375
Dan Vaage, P.E., Civil West Engineering Services, Inc., 609 SW Hurbert St., Newport,
OR 97365

ec:
Joel Ferguson, REHS, Clackamas County HD