Aquaterra
255 Flynn Avenue
Burlington, VT 05401
(802) 238-0071
roland@luxenberg.us

17 August 2106

Mr. Kendall Chamberlain, Chief Water Operator
Town of Richmond
PO Box 285
Richmond, Vermont 05477

Re: 17 July 2016 fluoride injection evaluation at Richmond's water treatment plant

Dear Mr. Chamberlain

As funded and requested by Vermont's Department of Health, Division of Oral Health (DOH), I evaluated the community water fluoride injection system at Richmond's drinking water treatment plants on the afternoon of 17 July 2016; Operator Alan Carpenter was present.

Based on both observation and historical records, the plant is considered to have an overall good rating; an evaluation form is attached. The following recommendation is offered:

(1) Check to make sure that the appropriate sodium fluoride bed depths are maintained in the saturator tank, as the bed depth was shallower than desired (should be at 20 to 25 gallon mark). Also, the water flowrate into the saturator was lower than the desired 1 to 2 gpm; a very low flowrate may lead to uneven flow distribution through the saturator, and less than desired saturator solution strength. A deeper bed depth, along with the desired make-up water flowrate, should achieve the desired 4.0% solution strength. When this strength is reached, the injection pump delivery rate may require adjustment.

Thank you for your help in accommodating my visit.

Please contact me if you have any questions concerning the content or recommendations in this letter.

Sincerely

Roland Luxenberg

Roland Luxenberg, P.E.

Cc: Ms. Linda Greaves, Division of Oral Health (Burlington, VT)

Aquaterra
255 Flynn Avenue
Burlington, VT 05401
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21 August 2107

Mr. Kendall Chamberlain, Chief Water Operator
Town of Richmond
PO Box 285
Richmond, Vermont 05477

Re: 12 July 2017 fluoride injection evaluation at Richmond's water treatment plant

Dear Mr. Chamberlain

As funded and requested by Vermont's Department of Health, Division of Oral Health (DOH), I evaluated the community water fluoride injection system at Richmond's drinking water treatment plants on the morning of 12 July 2017; Operator Alan Carpenter was present.

Based on both observation and historical records, the plant is considered to have an overall good rating; an evaluation form is attached. The following recommendation is offered:

(1) Check to make sure that the appropriate sodium fluoride bed depths are maintained in the saturator tank, as the bed depth was shallower than desired (should be at 20 to 25 gallon mark). Also, the water flowrate into the saturator (~ 0.4 gpm) was lower than the desired 1 to 2 gpm; a very low flowrate may lead to uneven flow distribution through the saturator, and less than desired saturator solution strength. It is likely that the spider at the bottom of the saturator has become clogged, and needs replacing. A deeper bed depth, along with the desired make-up water flowrate, should achieve the desired 4.0% solution strength. When this strength is reached, the injection pump delivery rate may require adjustment.

Thank you for your help in accommodating my visit.

Please contact me if you have any questions concerning the content or recommendations in this letter.

Sincerely

Roland Luxenberg

Roland Luxenberg, P.E.

Cc: Ms. Linda Greaves, Division of Oral Health (Burlington, VT)

Aquaterra
357 Jockey Lane
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(802) 238-0071
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4 September 2018

Mr. Kendall Chamberlain, Chief Water Operator
Town of Richmond
PO Box 285
Richmond, Vermont 05477

Re: 18 May 2018 fluoride injection evaluation at Richmond's water treatment plant

Dear Mr. Chamberlain

As funded and requested by Vermont's Department of Health, Division of Oral Health (DOH), I evaluated the community water fluoride injection system at Richmond's drinking water treatment plants on the morning of 18 May 2018; Operator Alan Carpenter was present.

Based on both observation and historical records, the plant is considered to have an overall fair rating; an evaluation form is attached. The following recommendation is offered:

(1) Empty the saturator tank (store tank fluid and solids; these can be reused) and replace the spider (given to Alan during the site visit). After the saturator tank is refilled with old solids and then new sodium fluoride, check that the refill rate is 1 gpm; use the make-up water valve to adjust the refill rate. Your injection pump rate may need to be decreased, as the fluoride strength in the saturator will likely be higher than that achieved pre spider replacement.

(2) Maintain the appropriate sodium fluoride bed depth; should be within the 20 to 25 gallon markings on the saturator tank. A deeper bed depth, along with the desired make-up water flowrate, should achieve the desired maximum 4% solution strength.

(3) Clean the saturator tank and replace the spider annually.

Please contact me if you have any questions concerning the content or recommendations in this letter.

Sincerely

Roland Luxenberg

Roland Luxenberg, P.E.

Cc: Ms. Linda Greaves, Division of Oral Health (Burlington, VT)

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29 July 2019

Mr. Kendall Chamberlain, Chief Water Operator
Town of Richmond
PO Box 285
Richmond, Vermont 05477

Re: 2 July 2019 fluoride injection evaluation at Richmond's water treatment plant

Dear Mr. Chamberlain

As funded and requested by Vermont's Department of Health, Division of Oral Health (DOH), I evaluated the community water fluoride injection system at Richmond's drinking water treatment plants on the morning of 2 July 2019; Operator Alan Carpenter was present.

Based on both observation and historical records, the plant is considered to have an overall fair rating; an evaluation form is attached. The following recommendation is offered:

(1) Check that the refill rate is 1 gpm; use the make-up water valve to adjust the refill rate. Your injection pump rate may need to be decreased, as the fluoride strength in the saturator after spider reconditioning and higher bed depth will likely be higher than that previously achieve.

(2) Maintain the appropriate sodium fluoride bed depth; should be within the 20 to 25 gallon markings on the saturator tank. A deeper bed depth, along with the desired make-up water flowrate, should achieve the desired maximum 4% solution strength.

(3) Clean the saturator tank and replace or recondition the spider annually.

Please contact me if you have any questions concerning the content or recommendations in this letter.

Sincerely

Roland Luxenberg

Roland Luxenberg, P.E.

Cc: Ms. Linda Greaves, Division of Oral Health (Burlington, VT)

Aquaterra
127 South Jefferson Road
South Burlington, VT 05403
(802) 238-0071
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15 June 2020

Mr. Kendall Chamberlain, Chief Water Operator
Town of Richmond
PO Box 285
Richmond, Vermont 05477

Re: 14 May 2020 fluoride injection evaluation at Richmond's water treatment plant

Dear Mr. Chamberlain

As funded and requested by Vermont's Department of Health, Division of Oral Health (DOH), I evaluated the community water fluoride injection system at Richmond's drinking water treatment plants on the morning of 14 May 2020; Operator Alan Carpenter was present.

Based on both observation and historical records, the plant is considered to have an overall fair rating; an evaluation form is attached. The following recommendation is offered:

(1) Check that the saturator refill rate is 1 gpm; use the make-up water valve to adjust the refill rate.

(2) Maintain the appropriate sodium fluoride bed depth; should be within the 20 to 25 gallon markings on the saturator tank. A deeper bed depth, along with the desired make-up water flowrate, should achieve the desired maximum 4% solution strength.

(3) Replace the saturator tank spider; I will be dropping off a correctly sized spider in the near future.

Please contact me if you have any questions concerning the content or recommendations in this letter.

Sincerely

Roland Luxenberg

Roland Luxenberg, P.E.

Cc: Ms. Linda Greaves, Division of Oral Health (Burlington, VT)

Aquaterra
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16 June 2021

Mr. Kendall Chamberlain, Chief Water Operator
Town of Richmond
PO Box 285
Richmond, Vermont 05477

Re: 10 June 2021 fluoride injection evaluation at Richmond's water treatment plant

Dear Mr. Chamberlain

As funded and requested by Vermont's Department of Health, Division of Oral Health (DOH), I evaluated the community water fluoride injection system at Richmond's drinking water treatment plants on the morning of 10 June 2021; Operator Alan Carpenter was present.

Based on both observation and historical records, the plant is considered to have an overall poor rating; an evaluation form is attached. The following recommendation is offered:

- Check that the saturator refill rate is 1 gpm; use the make-up water valve to adjust the refill rate.

- Maintain the appropriate sodium fluoride bed depth; should be within the 20 to 25 gallon markings on the saturator tank. A deeper bed depth, along with the desired make-up water flowrate, should achieve the desired maximum 4% sodium fluoride solution strength (reading of 2.8 on the refractometer).

- The injection pump stroke (now at 50%) will probably need to be increased. At a pumphouse production rate of 250 gpm, the pump at 100% stroke and speed (along with a fully saturated fluoride solution) will just meet a dose of 0.6 mg/l that, along with the 0.1 mg/l background, will result in the desired 0.7 mg/l fluoride concentration.

Please contact me if you have any questions concerning the content or recommendations in this letter.

Sincerely

Roland Luxenberg, P.E.

Cc: Ms. Linda Greaves, Division of Oral Health (Burlington, VT)

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30 August 2022

Mr. Kendall Chamberlain, Chief Water Operator
Town of Richmond
PO Box 285
Richmond, Vermont 05477

Re: 9 June 2022 fluoride injection evaluation at Richmond's water treatment plant

Dear Mr. Chamberlain

As funded and requested by Vermont's Department of Health, Division of Oral Health (DOH), I evaluated the community water fluoride injection system at Richmond's drinking water treatment plants on 9 June 2022; Alan Carpenter was present.

Based on both observation and historical records, the plant is considered to have an overall poor rating; an evaluation form is attached. The following recommendation is offered:

- Check that the saturator refill rate is 1 gpm; use the make-up water valve to adjust the refill rate.

- Maintain the appropriate sodium fluoride bed depth; should be within the 20 to 25 gallon markings on the saturator tank. A deeper bed depth, along with the desired make-up water flowrate, should achieve the desired maximum 4% sodium fluoride solution strength (reading of 2.8 on the refractometer).

- The injection pump stroke (now at 50%) will probably need to be increased. At a pumphouse production rate of 250 gpm, the pump at 100% stroke and speed (along with a fully saturated fluoride solution) will just meet a dose of 0.6 mg/l that, along with the 0.1 mg/l background, will result in the desired 0.7 mg/l fluoride concentration.

Please contact me if you have any questions concerning the content or recommendations in this letter.

Sincerely

Roland Luxenberg

Roland Luxenberg, P.E.

Cc: Mr. Dustin Jurgenson, Division of Oral Health (Burlington, VT)