

## **Eliminating Chlorination – April 2025**

### **Executive Summary**

The new water tank was constructed during the time the CRD moved from chlorine water treatment to chloramine water treatment. As chloramine is more stable than chlorine it provides a much longer period of disinfection. The CRD initial water treatment was gas infused ammonia which was later changed to liquid infused ammonia. This change resulted in greater chloramine stability and duration.

Piers Island continued to use chlorine for disinfection in the water tank resulting in moving from simple chlorination to breakpoint chlorination. An explanation of the difference follows later in this report. Our present chlorination system continues to ensure quality water for Piers Island however, due to the mixing of chlorinated water and chloraminated water occurring in the watermain during the fill process initially and after the tank fill is completed, the disinfection levels at different points in the system may not be consistent. The CRD changed to chloraminated water several years ago and stopped re-chlorinating their water held in all of their downstream water storage tanks. This was met with no negative impact to the water quality being recorded. Following their lead, it is time for the Piers Island Water System to consider making the same transition.

This proposal outlines a trial transition to distributing the CRD's chloraminated water directly eliminating the need for breakpoint chlorination.

The transition is expected to:

- Maintain regulatory compliance by meeting Island Health water quality criteria
- Eliminate the need for a dedicated water line from PH1 to PH2
- Simplify operations by eliminating the process of adding chlorine (bleach)
- Maintain a consistent disinfection level, specifically in the watermain
- Enhance long-term system stability by eliminating chlorination
- Reduce chemical costs and maintenance activities
- Will make a future watermain upgrade to a larger diameter more viable

An analysis of regulatory impacts, current operations and financials supports this transition.

The trial transition will only occur after we receive an endorsement and approval from our Island Health Environmental Health Officer, Janek Kobylarz.

The Water Departments Emergency Response Plan will be updated to reflect the changes and guidelines developed for any incidents that may occur.

### **Current System Overview and Background**

Service Area: 123 residential water connections

Infrastructure: Approximately 50,000 IG of water stored when the tank is full with a ProMinent Analyzer monitoring free chlorine, pH and total chlorine 24x7.

Current Treatment: Breakpoint Chlorination of Chloraminated source water

- Breakpoint chlorination is a process where the ammonia in chloraminated water is removed with chlorine until free chlorine is available. It uses a complex chemical

reaction that we do not completely control within our distribution system (watermain) because the CRD chloraminated water enters our distribution system as it arrives on island and mixes with chlorinated water.

- Average Usage Patterns:
  - Winter: 4,000 IG on average per day (tank turnover every 12 days)
  - Summer: 18,000 IG per day (tank turnover every 2 days and often daily)
  - High water tank levels are maintained for residential water pressure
  - Piers Island is one of the ends of the CRD's distribution network, along with Cloak Hill

#### CRD System and Operation

- CRD started phasing in their new Hypo plant between 2018 and 2021. At this time water treatment changed from gas infused ammonia to liquid infused ammonia resulting greater chloramine stability and disinfection duration.
- Total chlorine testing at PH1 (where we receive CRD water) is consistently over 1.0 ppm, which is good. If total chlorine falls below 0.5 corrective action is taken.
- CRD has 6 water storage tanks in North Saanich all distributing chloraminated water without any additional treatment.
- CRD only tests for total chlorine at their North Saanich water tanks.
- Chloramines are more stable than free chlorine and depending on conditions, can remain effective between two to four weeks.
- The CRD has now had many years of successful distribution of chloraminated water with very little water quality issues throughout its distribution system.

### **Proposed Transition Plan**

#### **Step 1: Pre-Transition Testing**

- Establish a Total Plate Count (TPC) baseline from the chloraminated water we receive at PH1

#### **Step 2: Discontinue Breakpoint Chlorination**

- Stop the chlorination process, allowing solely for chloraminated water distribution
- Retain chlorination equipment in standby for reactivation if required
- Continue ProMinent analyzer operation to monitor total and free chlorine and pH
- Continue to take total and free chlorine water samples at PH1, PH2 and the water operator's residence

#### **Step 3: Implement Enhanced Monitoring Program**

- Start daily monitoring of total chlorine and pH
- Monthly TPC testing at PH2
- Daily monitoring until consistent test results have been established for total chlorine and pH at PH2 and water operator residences (2 to 3 weeks)

#### **Step 4: Implement Normal Monitoring Program**

- Weekly monitoring at PH1: Total chlorine
- Weekly monitoring at PH2: Total and free chlorine
- Laboratory: Metals (yearly), THM's (Quarterly), Coliforms (monthly), and TPC (monthly)

## **Risk Assessment**

### **Potential Risks**

- High TPC results indicating bacteria particularly during warm months
- Total chlorine falls below 0.5, the chloramines are degrading
- Note: ***we believe these are both very low risk as chloramines have a half life of two to four weeks*** (depending on conditions) and with daily fills additional chloraminated water is added so higher levels are maintained, and CRD only tests for total chlorine.

### **Risk Mitigation**

- Initial daily monitoring allows early detection of issues
- Weekly monitoring allows for timely detection of issues
- Reactivation of chlorination system if required:
  - Immediate contact with our Environmental Health Officer

### **Cost-Benefit Analysis**

This is a cost-effective, low-risk proposal to transition the current water treatment system from breakpoint chlorination to CRD chloraminated water. The system aims to streamline operations, reduce chemical usage, and maintain water quality through enhanced monitoring with fallback capabilities

### **Benefits**

- Operational Efficiency: Reduced labor and chemical handling
- Chemical Cost Reduction: No chlorine purchasing and storage (\$1,200 per year)
- Capital Avoidance: Prevents need for costly dedicated water line (>\$100,000)
- Flexibility: Reversible process
- Reduction of the amount of chemicals introduced into our water system

### **Costs**

- Additional TPC laboratory test (\$24.00)
- Slight increase in staff time during enhanced monitoring

### **Trial Recommendation**

- Duration: 2 to 3 weeks and then 3-to-6-month reviews
- Objectives:
  - Confirm stable water quality through CRD Chloraminated water
  - Evaluate monitoring workload
  - Analyze cost savings and operational impact
- Outcome:
  - Use collected data to determine long-term adoption viability

### **Conclusion**

Transitioning to a chloraminated water system only is a low-cost, low risk, reversible strategy that can improve operational efficiency and reduce expenses while maintaining public health protection. The trial period allows for data-driven decision-making with minimal risk, making it a prudent next step in optimizing the Piers Island water treatment process. Making this transition will provide water quality consistency to all households which we currently do not have.