

Water System Treatment Evaluations

Sallal Water Association

October 29, 2020

Agenda

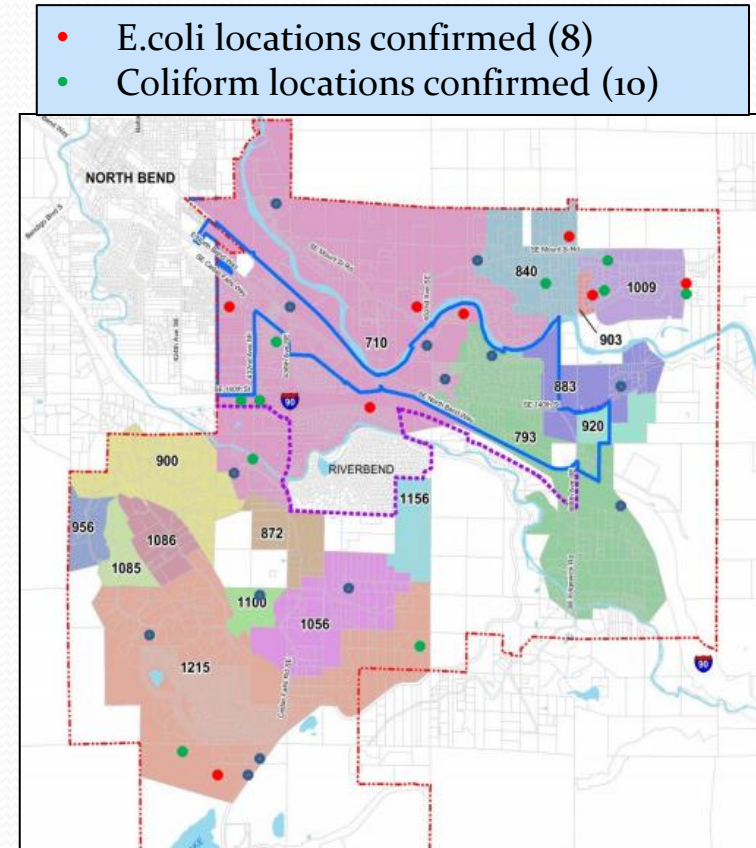
- Welcome, Intro, Sallal Vision
- Background
- Assessing Alternatives
- Board of Trustees Conclusions
- Q & A



Background

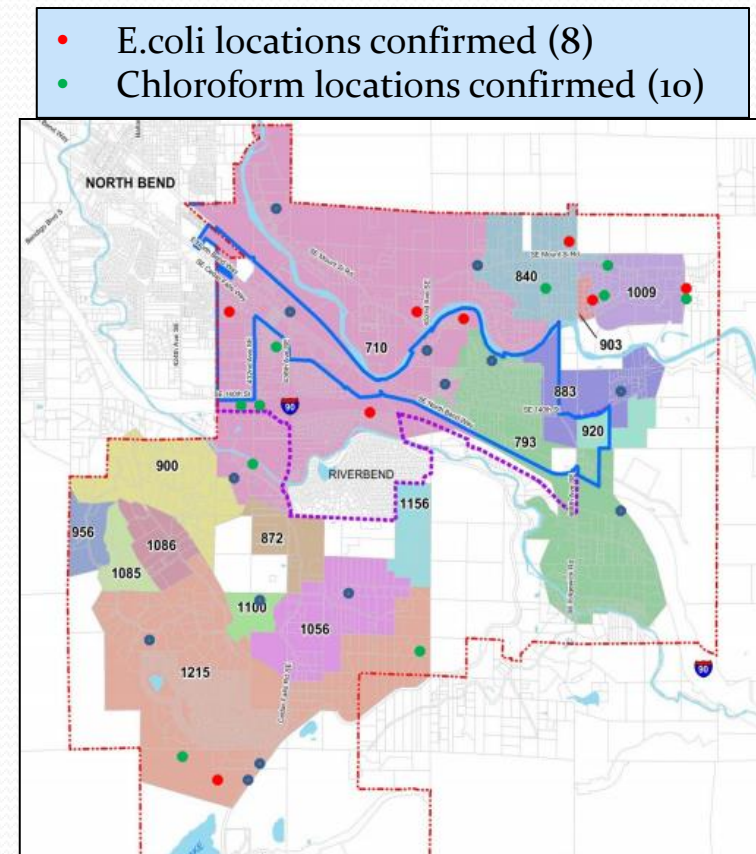
Sallal E.coli Event 2019

- Sep 13 – 20th : confirmed E.coli throughout the distribution system and Well #2
- Sep 16th: DOH notified and arrived to assist
- Sep 17th: Boil Water Notice issued, manual chlorination started
- Sep 20th: Well #2 taken offline when lab results tested positive for E.coli



Sallal E.coli Event 2019

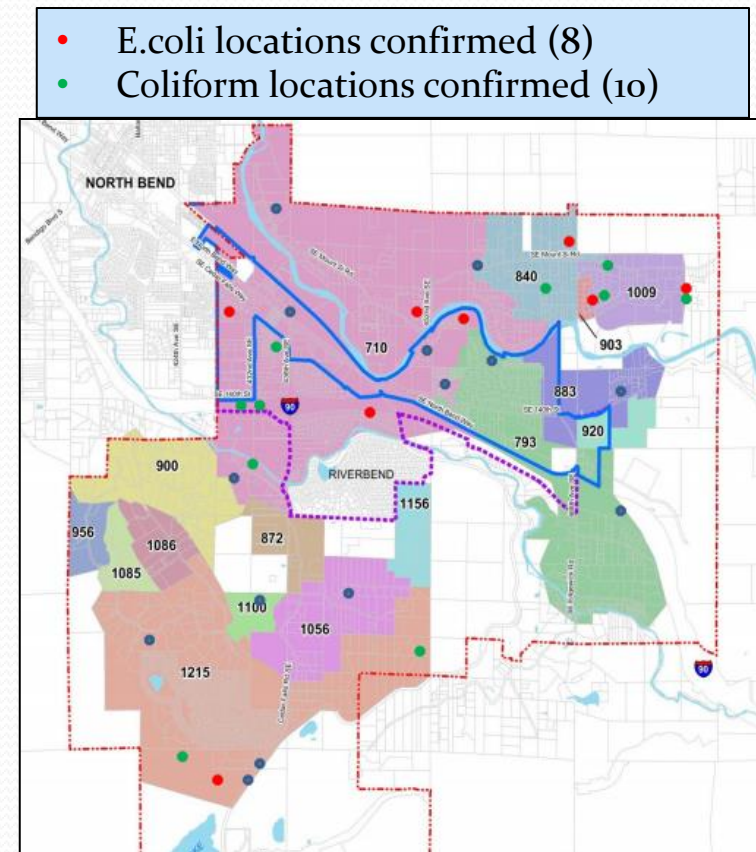
- Sep 20 - 26th: Auto Chlorination system installed on Wells #1, #2 & #3
- Oct 2nd: Boil Water Notice lifted after two sets of negative tests results
- Apr 2020: Well #2 back online, piping mods completed to meet chlorine disinfection “Contact Time”



Sallal E.coli Event 2019

Major Take Aways

- Risk to members;
 - Health
 - Financial
 - 2 legal/insurance claims (loss revenue)
- Overall cost of E.coli event: ~\$420k
- Recurring O&M: ~\$23k/yr



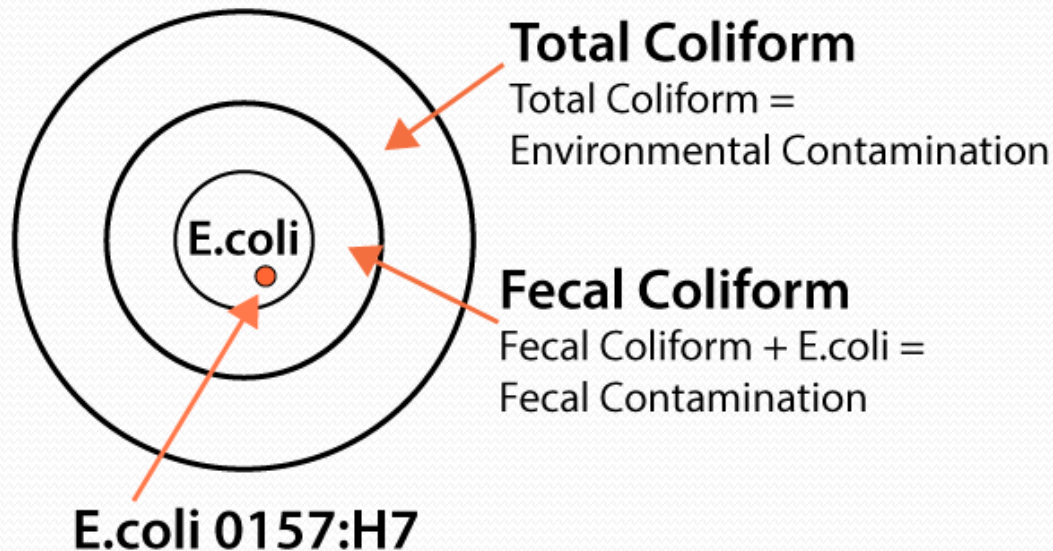
Drinking Water Regulations

- Department of Health regulates water systems in Washington
- Layered approach to health protection
- State and federal rules set standards for:
 - Water quality from drinking water sources
 - Water quality delivered to customers
 - Steps necessary to protect health at all stages
- Groundwater source treatment not generally required
- Protecting distribution often requires chlorine use

Monitoring Requirements

- Water systems monitor for Total Coliform monthly
- Presence or absence test
- Indicate possible contamination – most coliform bacteria harmless

Total Coliform, Fecal Coliform and E.coli



Total Coliform Response*

- Current requirements implemented in 2016
- Positive routine sample triggers specific actions
- Positive tests re-evaluated for E. Coli
- If E. Coli is present:
 - May violate drinking water standards
 - E. Coli in distribution triggers source water testing
- Detailed investigation and possible treatment required if:
 - Violate the E. Coli drinking water standard, or
 - Total Coliform detected 2 months in 12-month period

Sallal Historical Sampling Results*

- September 2019 not the first bacteria detection in system
- 38 routine samples positive for Total Coliform since 1996
 - 25 did not have positive repeat samples
 - 3 samples also positive for E. Coli (2 in 2004 and 1 in 2009)
 - 26 repeat samples confirmed Total coliform – 6 E. Coli Positive (2004)
- Sallal's response to past detections complied with existing regulations



Assessing Alternatives

DOH Meeting on June 9th*

- Two major actions to return to untreated water:
 - Action 1 - Source Water (Well #2):
 - Submit in writing request to discontinue 4-log treatment
 - Provide evidence that the well construction & maintenance standards are met
 - Provide > 12 months of negative coliform monitoring results. At least 2 samples per month
 - Office of Drinking Water (ODW) will conduct a Special Purpose Investigation

DOH Meeting on June 9th*

- Action 2 - Distribution System:
 - Submit written request to discontinue chlorine residual
 - Survey members to determine if a majority want to return to an untreated system
 - Maintain chlorine residual for at least 12 consecutive months
 - Provide history of past 18 years of investigative samples
 - Submit engineering review and water system redesign

DOH Meeting on June 9th*

- Execute extensive effort to transition:
 - 4 major phases: Planning, Pre-Implementation, Implementation, Post-Implementation
 - DOH review & oversight through the transition
 - Clear Communication with stakeholders; members, schools, businesses

Options

NOTE: DOH will not approve return to our pre E.coli untreated system

- Chlorine
- UV
- Ozone
- UV or Ozone with Chlorine
- Enhanced Inspection and Maintenance

Chlorine

- Advantages;
 - Meets Regulatory standard for both water supply & distribution
 - Capital Improvements remaining = ~\$100k Wells #3 & 4
 - Reduces system flushing by ~ 380,000 gals/year
 - Revenue opportunity + Cost avoidance = ~ \$16k/yr
- Disadvantages;
 - Forms Disinfection By Products (DBPs) that must be tested - TTHM & HAA5
 - Can produce noticeable odor, taste and other sensitivities
 - Residual must be maintained and monitored daily
 - Requires sufficient chlorine contact time
 - Costs: O&M = ~ \$39k/yr

Ultra-violet Light

- Advantages:
 - Effective for source water disinfection
 - Does not add chemicals to water – does not form DBPs
 - Sallal high quality water - likely good match for UV effectiveness
- Disadvantages:
 - No distribution system protection from pathogens
 - Sensitive to power interruptions & fluctuations
 - Safety & disposal training requirements of UV lamps
 - Extensive in-plant and field testing required for DOH certification
 - Ballpark cost estimate: ~\$600K – \$750K in capital costs, ~\$12k/yr operation & maintenance

Ozone

- Advantages:
 - More effective than chlorine in destroying viruses and bacteria
- Disadvantages:
 - No distribution system protection from pathogens
 - DBPs: additional testing required for bromate
 - Requires Pilot Testing
 - Ozone is very reactive, corrosive, skin/eye irritation, toxic at high levels
 - Ballpark cost estimate: ~\$600K - \$1.2M in capital costs, ~\$41k/yr operate & maintain

UV or Ozone with Chlorine

➤ Advantages:

- More effective than chlorine in destroying viruses and bacteria
- Reduce amount of chlorine used for disinfection
- Help reduce chlorine odor & taste issues
- Protects the entire water system; Source & Distribution

➤ Disadvantages:

- Ozone and UV disadvantages apply
- Requires additional operator training & certification
- Ballpark cost estimate: ~\$600k - \$1.2M in capital costs, ~\$31k - \$60k/yr operate & maintain

Enhanced Inspection & Maintenance

➤ Advantages:

- No chemicals
- Minimal Operator training

➤ Disadvantages:

- No certainty of success
- Impossible to prevent all contamination events
- Significant engineering review & system redesign
- Likely highest capital & operational cost

Options	DOH approval	Water disinfection	Health concerns	Liability & Insurance	Capital costs	O&M costs	Operator Training & Cert	Other
1-Chlorine	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Moderate Risk	Low Risk	
2-UV only	Moderate to High Risk	Moderate to High Risk	Moderate Risk	Moderate Risk	Moderate to High Risk	Low Risk	Moderate Risk	Rigorous in-plant and in-field testing required to certify UV system
3-Ozone Only	Moderate to High Risk	Moderate to High Risk	Moderate Risk	Moderate Risk	High Risk	High Risk	Moderate Risk	Highly corrosive and can create hazardous environment for operators
4-UV or Ozone with Chlorine	Low Risk	Low Risk	Low Risk	Low Risk	High Risk	High Risk	Moderate Risk	
5-Enhanced Inspection & Maintenance	High Risk	High Risk	Moderate Risk	Moderate Risk	High Risk	High Risk	Low Risk	Likely will require 2 add'l field staff to implement

 Low Risk
  Moderate Risk
  Moderate to High Risk
  High Risk

Board of Trustees Conclusions

- Low probability of successfully returning to an untreated water supply and distribution system
 - DOH requires major system redesign, trial and testing > 2 years
 - Any positive tests for Total Coliform, Fecal or E.coli likely result to disinfect
 - Sallal history has shown reoccurrence likely
- Using UV or Ozone is only effective on supply side (Wells).
 - Adds another 12+ months to DOH reviews & approval
- Chlorine simple to maintain & effectively disinfects the entire water system

Board of Trustees Conclusions

- Safety highest concern. Untreated system:
 - Highest risk of a reoccurrence of contamination
 - Highest consequence to member health & finances
 - Highest risk of legal & insurance consequences to Sallal
- Return to a Untreated, UV or Ozone water systems come with no guarantee of a successful outcome
- Update Sallal's Vision statement:
 - provide an ample supply of reliable, ~~untreated~~ safe drinking water to all members at a low cost

Do not return to an untreated supply and distribution system



Thank You