**SDWS Operator Workshop – Adverse Water Quality Scenarios:**

**Divide into groups. The number assigned to your group is which number scenario you will be on.**

**Scenario 1:** 15 cfu/100ml total coliforms, non-treated system

**Scenario 2:** 0.02 mg/L free available chlorine (FAC) residual in the distribution system

**Scenario 3:** 2 cfu/100ml E. coli, system treated with FAC chlorine

**Scenario 4:** Overgrown (Can also be reported as - No data: Overgrown with Non-Target (NDOGNT)/No data: Overgrown with Target (NDOGN)

**Scenario 5:** 2 hour power outage with low pressure (pressure less than 20 psi) and chlorine residual of 0.04 mg/L FAC in the distribution system

**Scenario 6:** UV light system, alarm is going off, no other treatment

**Scenario 7:** 8 cfu/100 ml total coliforms, UV system, no other treatment, raw water quality unknown

**Fill out section 2 of the Notice of Adverse Test Results and Issue Resolution form and determine your course of action for the scenario above assigned to you.**

**After 5-10 minutes corrective actions for each scenario will be presented and discussed.**

**Corrective Actions for each scenario:**

**Scenario 1: 15 cfu/100ml total coliforms, non-treated system**

1. Resample and test immediately.
   1. Resample and test” means taking a total of three samples, one at the original site, one upstream and one downstream, if possible. If there is only one building, then just a sample at the affected site is required.
2. If the resample results are satisfactory (total coliforms = 0), not further action/testing is required.
3. If resample results are unsatisfactory:
   1. Put entire system on Boil Water Advisory (BWA) –Have the owner/operator notify all users of water from the system to use an alternative source of drinking water or bring water to a rapid boil for at least one minute before use.
   2. Advise to:
      * Shock chlorinate well
      * Inspect the well-head and surrounding property, distribution system and any plumbing
      * Flush the lines
   3. Resample and test
      * 2 good samples taken 24-48 hours apart are needed to lift BWA
      * Operator to fill out ‘notice of adverse result and issue resolution’ form once BWA is lifted
4. \*Contact trained professional if temporary system disinfection does not eliminate the adverse microbiological test results.

**Scenario 2: 0.02 mg/L free available chlorine (FAC) residual in the distribution system**

* + - 1. Immediately flush the distribution system and any plumbing connected to the SDWS and restore secondary disinfection to ensure that:
         1. Free available chlorine (FAC) residual is at least 0.05mg/l is quickly achieved at all points in the affect area of the distribution system
      2. If the above cannot be achieved, then immediately take all steps to notify all users of water from the system to use an alternative source of drinking water or, if no alternative source is available, to bring water to a rapid rolling boil for at least one minute before use.

**Scenario 3: 2 cfu/100ml E. coli, system treated with FAC chlorine**

1. Put entire system on Boil Water Advisory (BWA) –Have the owner/operator notify all users of water from the system to use an alternative source of drinking water or bring water to a rapid boil for at least one minute before use.
2. Immediately resample and test.
   * Resample and test” means taking a total of three samples, one at the original site, one upstream and one downstream, if possible. If there is only one building, then just a sample at the affected site is required.
3. If the drinking water system uses chlorine, immediately increase the chlorine dose and flush the distribution system and any plumbing owned by the owner of the drinking water system that is connected to the small drinking water system to ensure that:
   * A free available chlorine (FAC) residual of at least 0.2 mg/L is achieved at all points in the affected parts of the distribution system and plumbing
4. Maintain the FAC residual referred to above in the affected parts of the distribution system and plumbing. Continue resampling until two consecutive sets of samples taken 24 to 48 hours apart are clear of microbiological contamination.

**Scenario 4: Overgrown (Can also be reported as - No data: Overgrown with Non-Target (NDOGNT)/No data: Overgrown with Target (NDOGN) on a non-treated system**

Generally treated as an E.coli result – the PHI will often consult with the MOECC when presented with this type of result.

1. Put entire system on **BWA** – Have the owner/operator notify all users of water from the system to use an alternative source of drinking water or bring water to a rapid boil for at least one minute before use.
2. Resample and test
   1. 2 good samples taken 24-48 hours apart are needed to lift BWA
   2. Operator to fill out ‘notice of adverse result and issue resolution’ form once BWA is lifted
3. If first resample came back adverse:
   1. Advise to: (depending on situation)
      1. Shock chlorinate well
      2. Inspect the well-head and surrounding property, distribution system and any plumbing
      3. Flush the lines
4. Resample and test:
   1. 2 good samples taken 24-48 hours apart are needed to lift BWA
   2. Operator to fill out ‘notice of adverse result and issue resolution’ form once BWA is lifted
5. \*Contact trained professional if temporary system disinfection does not eliminate the adverse microbiological test results.

**Scenario 5: Power outage with low pressure (pressure less than 20 psi) and chlorine residual of 0.04 mg/L FAC in the distribution system**

A risk assessment is required in order to determine if the system is working properly. A PHI will likely ask the operator:

* + How long the power has been out and when they anticipate it coming back on?
  + Are there backflow preventers on the system? Are they at each customer’s connection to the system?
  + What are the chlorine residuals at the ends of the system?
  + Has there been a drop in pressure to less than 20 psi or 138 kPa?

1. If there has been a significant pressure drop (<20 psi) and improper disinfection (Total chlorine <0.25mg/L, Free chlorine <0.05mg/L, Chloraminated <0.25mg/L), assume that the water is unsafe to drink and put a precautionary Boil Water Advisory (BWA) or Do Not Drink Advisory on the system. A Do Not Drink Advisory is considered if chemical contamination is suspected.
2. Operator of water system is to notify users of Boil Water Advisory/Do Not Drink Advisory. If a BWA is issued the operator must inform all users to use an alternative source of drinking water or bring water to a rapid boil for at least one minute before use.
3. Operator to flush the system and chlorinate to 0.2mg/L.
4. Resample and test:
   1. 2 good samples taken 24-48 hours apart are needed to lift BWA
   2. Operator to fill out ‘notice of adverse result and issue resolution’ form once BWA is lifted

**Scenario 6: UV warning light and alarm is going off, no other treatment on the system**

A risk assessment is required to determine the nature of the warning light and alarm. A PHI will likely ask the operator:

* + How long has the warning light and alarm been going off?
  + How often is the equipment being checked?
  + Has any maintenance been done to the system?
  + When was the UV bulb last changed?
  + When were the filter(s) last changed? Are the filter(s) clogged?
  + Is water still being directed to users or does the disinfection equipment have an automatic shut-off?
  + Is the disinfection equipment point or entry of point of use?
  + How many users are currently on the system?
  + Has the water been in use? (may not be the case for a small rural church)

If at any point it is determined that improper disinfection had occurred the following corrective actions must be taken:

1. Immediately restore the disinfection.
2. Immediately take all reasonable steps to notify all users of water from the system to use an alternate source or drinking water or, if no alternate source is available, to bring water to a rapid rolling boil for at least one minute before use.

Each adverse observation is dealt with on a case by case basis, so depending upon the situation and answers to the previously mentioned risk assessment questions in addition to steps 1 and 2 above, your public health inspector may require:

1. Resample and test immediately once disinfection is restored.
2. If the resample results are satisfactory (total coliforms = 0), not further action/testing is required.
3. If resample results are unsatisfactory:
   1. Advise to:
      1. Shock chlorinate well
      2. Inspect the well-head and surrounding property, disinfection equipment, any plumbing, etc
      3. Flush the lines
   2. Resample and test
      1. 2 good samples taken 24-48 hours apart are needed to lift BWA
      2. Operator to fill out ‘notice of adverse result and issue resolution’ form once BWA is lifted

**Scenario 7:** 8 cfu/100 ml total coliforms, UV system, no other treatment, raw water quality unknown

Response is very similar to Scenario 6. It is unknown why there is a cfu count, if there is an issue with the UV system, if raw water is contaminated, or there was operator error in sampling.

* + How often is the equipment being checked?
  + Does the UV system have an alarm, is it an NFS/ANSI system? Class B system?
  + Has any maintenance been done to the system?
  + When was the UV bulb last changed?
  + When were the filter(s) last changed? Are the filter(s) clogged?
  + Is water still being directed to users or does the disinfection equipment have an automatic shut-off?
  + Is the disinfection equipment point or entry of point of use?
  + How many users are currently on the system?
  + Has the water been in use? (may not be the case for a small rural church)
  + Where and how was the sample taken?

If at any point it is determined that improper disinfection had occurred the following corrective actions must be taken:

1. Immediately restore the disinfection.
2. Immediately take all reasonable steps to notify all users of water from the system to use an alternate source or drinking water or, if no alternate source is available, to bring water to a rapid rolling boil for at least one minute before use.

Each adverse observation is dealt with on a case by case basis, so depending upon the situation and answers to the previously mentioned risk assessment questions in addition to steps 1 and 2 above, your public health inspector may require:

1. Resample and test immediately once disinfection is restored.
2. If the resample results are satisfactory (total coliforms = 0), not further action/testing is required.
3. If resample results are unsatisfactory:
   1. Advise to:
      1. Shock chlorinate well
      2. Inspect the well-head and surrounding property, disinfection equipment, any plumbing, etc
      3. Flush the lines
   2. Resample and test
      1. 2 good samples taken 24-48 hours apart are needed to lift BWA
      2. Operator to fill out ‘notice of adverse result and issue resolution’ form once BWA is lifted