**Flushing Guidance for VOC contamination**

Overall, we recommend that you maintain water pressure throughout the distribution system.  If you are about to run out of water and cannot get your water supply from any other uncontaminated source, then turn the plant back on to maintain system pressure and also maintain public notice to not use the water.

Recommendations for flushing:

1. Once the source water is at pre-spill levels or non-detect levels, begin flushing at the raw water intake and through each successive part of the plant.
   1. This may involve draining the rapid mix, flocculation, sedimentation basins and flushing them out with trucked water (distribution water is still contaminated).
   2. Drain, clean and flush the clear well.
   3. Startup the plant and backwash the filters.  At the end of the back wash cycle take a VOC test kit sample for immediate results.
   4. Do not recycle this backwash water.
2. Ensure that the efficiency of the treatment plant is back up to par and that the treatment plant has been cleared of any residual contamination
   1. If testing indicates that VOCs are still present after initial backwashing with non-detect water the filter media may need to be replaced
   2. Test treated water at entry point to distribution to verify that contamination has been removed and water ready to be used for flushing
3. Decide on an acceptable level of contamination to be present in the distribution system after flushing
   1. Recommend flush system until sample results are at least below the MCL levels
      1. MCL = 0.005 mg/L Benzene, 1 mg/L Toluene, 0.7 mg/L Ethylbenzene, 10 mg/L Xylene (m, p and o combined)
   2. May want to flush to below the taste/odor threshold so no T&O concerns after notify residents that the water is safe to drink again.
      1. Taste and odor threshold mostly lower than the MCL (except for Benzene). Benzene odor threshold = 2.0 mg/L, Toluene odor threshold = 0.04 – 1 mg/L, Ethylbenzene odor threshold = 0.029 – 0.14 mg/L, Xylene odor threshold unknown, but likely in the same range as toluene and ethylbenzene
4. Conduct unidirectional flushing
   1. Valve off parts of distribution system closest to the water treatment plant moving outward in a specific, planned order so that contamination is cleared systematically and does not have an opportunity to recirculate.
   2. Drain and clean storage tanks as part of the unidirectional flushing process.
   3. Sample after each section has been flushed to ensure contamination is cleared before moving on to next area of the distribution system.
   4. Continue to monitor in the areas of the distribution system that have showed the highest levels of contamination
   5. Ensure that flush water is disposed of in an acceptable manner –
      1. Consider whether storm drains should be used based on site specific conditions and flows
      2. Cold weather and chlorine will impact this due to WW treatment plant microbial action, absorption of soils when frozen, etc
      3. Workplace safety concerns for WW operators due to volatizing VOCs in waste stream
      4. Discharging to stream/river could affect aquatic life (chlorinated water in addition to contamination)
      5. Street flushing could cause road hazard (ice) or eventual discharge to streams/lakes/rivers
   6. Flushing with water only has been successful in removing petroleum contamination to below taste and odor threshold. We will look further into this issue with our Office of Research of Development.
5. If areas remain contaminated after flushing period, use alternate approaches
   1. Surfactant or physical cleaning may be necessary for tanks or piping in highly contaminated areas
   2. Focus on areas of system that remain at levels above action levels