NC - DBP Control Strategies List

1. Plant

a. **TOC removal**

- Practice Enhanced Coagulation (see EPA's manual)
- Explore alternative coagulants (*e.g.,* ferric sulfate)
- Optimize current coagulants
- Examine the use of dual coagulants or polymer addition
- Utilize UV254 and/or SUVA analysis for TOC optimization
- Optimize sludge removal in sedimentation basins
- Determine type of TOC / NOM and fractions that are contributing to DBP formation potential
- Look at energies in flocculators using jar test spreadsheet to determine if it is adequate
- Educate operators on how to use jar test, streaming current, TOC, SUVA, and Zeta meters if applicable.
- Develop a calibrated jar test (actually match plant conditions, chemical dosages, mixing energies, and times)
- Optimize turbidity removal
- Conduct TOC and turbidity profiles through the plant (often turbidity removal runs fairly linearly with TOC removal, but not always)
- Maximize available tools, instruments and knowledge to make process control judgments for optimizing TOC removal

b. **Pre Chlorine**

- Remove pre chlorine from front of plant (ONLY after assurance that CT will not be compromised)
- Move pre chlorine to top of filters or near end of sedimentation basins (again, verify CT compliance)
- Optimize chlorine addition (feed no more than necessary)
- Look at EPA's disinfection profiling spreadsheet to determine if overfeed is occurring
- Look at AWOP spreadsheet for chlorine tracking in plant

c. **Post Chlorine**

- Take a second look at CT, verify that *Giardia* is being inactivated for 3.0 Log removal in conjunction with the state assigned credits
- Determine if there are any issues with storage at the plant including whether the clearwell(s) is properly sized (too large, too small) and baffled
- Perform a THM Plus profile through the plant looking closely at results after the clearwell(s)
- Look at EPA's disinfection profiling spreadsheet by plugging in plant specific parameters

d. **pH Control**

- pH within the plant processes should be kept in the optimized ranges (typically, higher pH's tend to favor the formation of TTHM's while lower pH's tend to favor HAA5's)
- Lower pH's in the flash mix and flocculation basins for optimized TOC removal; keep in mind that excessively low pH's will corrode the concrete and steel in a plant and water system (see EPA's enhanced coagulation manual)

2. **Distribution system**
   a. Maintain a pH in the distribution system in the range of 7.1 to 7.5 (keep simultaneous compliance with Pb and Cu regulations in mind)
   b. Utilize elevated tank turnover assessment spreadsheets if problem is in distribution system
   c. Look at chlorine levels in distribution system and track via a spreadsheet if needed
   d. Develop a hydraulic model for the system to evaluate water age
   e. Ensure that DBP sample sites are appropriate
   f. Conduct additional sampling if needed
   g. Develop an effective flushing program (consider Cl_2 residuals, unidirectional, frequency)
   h. Consider installing automatic flushers in problematic areas / other areas
   i. If mixers are utilized, evaluate if they are working (helping or hurting DBP formation)

Other BAT's for DBP removal:

- Aeration
- Powdered Activated Carbon addition
- KMnO4
- GAC
- Alternative oxidants
- Alternative disinfectants (*e.g.*, chloramines)

<u>Acronym List:</u>

NC – North Carolina
DBP – Disinfection Byproducts
TOC – Total Organic Carbon
EPA – U.S. Environmental Protection Agency
UV254 – Ultraviolet Light Absorbance at 254 nm
SUVA – Specific Ultraviolet Absorption
NOM – Natural Organic Matter
CT – Contact Time
AWOP – Area-Wide Optimization Program
TTHM – Total Trihalomethane
HAA5 – 5 Haloacetic Acids
BAT – Best Available Technology
GAC – Granular Activated Carbon