**Alabama’s Optimization Program**

**48% of Surface Water Treatment Plants Optimized**

In 2011, 48 of 89 (54%) surface water treatment plants (WTPs) met the “Optimization Goals” for turbidity removal. By meeting the optimization goals, these water treatment plants are producing drinking water that far exceeds ADEM and EPA requirements. This “Optimized Performance” provides for better public health protection from microorganisms.

The 2011 numbers tied 2007 for the highest number of WTPs meeting the goals. In addition, nearly 2 million Alabamians received water from optimized WTPs in 2011. (See Optimized on Page 3)

**Revised DBP Goals**

**Tom Garrett (ADEM Drinking Water Branch)**

The Alabama Area-Wide Optimization Program (AWOP) has made a slight change to the “short-term” goals for Disinfection Byproducts (DBPs) for distribution system sites. You are probably aware that the settled and filtered water turbidity goals are set below the regulatory levels in order to provide an extra degree of public health protection. The goals also provide a buffer against violation. In other words, by adopting and aiming for lower turbidity your utility has less chance of having a turbidity violation. In that spirit, the AWOP has adopted a lower “short-term” goal for Total Trihalomethanes (TTHM) and Haloacetic Acids (HAA5). The goals are now 70 ppb for TTHM and 50 ppb for HAA5. These levels are 10 ppb below the regulatory limit and will provide a buffer for compliance.

As a review, the short-term goal for DBPs is to have the Locational Running Annual Average (LRAA) at or below 70 ppb for TTHM and at or below 50 ppb for HAA5. The long term goal is calculated using the highest LRAA of the quarter using 11 quarters of data. This provides a worst-case scenario but also minimizes seasonal changes. The long-term goal for TTHM is 60 ppb and the long term goal for HAA5 is 40 ppb.

The DBP goals for treatment plant effluent are set at 25% of the MCL or 20 ppb for TTHM and 15 ppb for HAA5. A second treatment plant goal is a Running Annual Average (RAA) of 1.7 ppm for Total Organic Carbon (TOC). These goals are set in order for systems to focus their DBP reduction efforts. If a treatment plant is meeting these goals, then efforts to reduce DBPs should be focused on the distribution system. However, after working to reduce DBPs in the DS, a plant might determine that lower goals for the plant effluent are necessary.
Since the last issue, there has been a lot of work going on with the Extended Terminal Subfluidization Washing (ETSW) of filters. The research project in Berry, Alabama is nearing completion of its study into the ETSW settings for their water treatment plant (WTP). The Governmental Utility Service Corporation (GUSC) WTP and the Smiths Station WTP in the past few months have started their own ETSW studies to determine the optimal backwashing procedures for their WTPs. Both of these WTPs are demonstrating that ETSW can be implemented in multiple WTPs.

Before we go into the most recent discoveries, let’s define ETSW. An ETSW is a change in how a filter is washed but only to the last step of the backwash sequence. During the backwash procedure, water is pushed up (backwashed) through the filter media at a high rate up to 20 gpm/ft² of filter area. This causes the particles trapped in the media to become dislodged and wash out of the filter. Most water treatment plants then lower their backwash rate to around 10 gpm/ft² of filter area to allow for redistribution of the filter media. An ETSW adds another low flow rate change to the backwash sequence. This additional flow rate would be in the 3 to 8 gpm/ft² of filter area. This low flow rate would be continued until the amount of water contained in the filter has been exchanged one to two times. Studies have shown that this low backwash rate allows the very small particles that remain in the filter to be removed from the filter and can shorten the filter rewash time. This can lower the turbidity spike that occurs during this time.

The ETSW research at the Berry WTP that has been ongoing since last May is demonstrating that at a minimum the entire volume of water in the filter must be exchanged in order for the filter to not spike during its rewash and to be able to return to service in less than fifteen minutes. The latest results are showing that flow backwash rates above 8 gpm/ft² are causing the turbidity to drop slower in the rewash and take longer for the filter to reach its stable operating level. Currently, the water savings from implementing ETSW is about 3.1 million gallons per year. Another way of describing the water savings is that based upon average production, the WTP will operate about 150 hours less each year.

The Smiths Station WTP started ETSW out of a need to reduce the volume of water that was being wasted during the backwash and rewash processes after they completed a 2.5 million gallon per day expansion. Their wastewater is pumped to their wastewater treatment plant (WWTP) instead of being discharged into the Chattahoochee River. This means some of the wastewater has to be stored at the WTP until it can be sent to the WWTP. The ETSW results have been similar to the results at the Berry WTP. Filters are being returned to service in fifteen minutes without a spike during or after the rewash (see graph to right). This has provided them currently with a net savings of 20,000 gallons per backwash and has allowed them to better handle their wastewater. After construction of the expansion and renovation of their old side is complete, the WTP will likely be able to ascertain a larger water savings by optimizing their entire backwash procedure.

The GUSC WTP which serves the City of Bessemer has also implemented an ETSW program. This WTP is different from most WTPs in the state as they have extremely deep filters that are designed to handle granular activated carbon (GAC) should it be needed for total organic carbon removal. These deep bed filters are showing that to completely clear the filter of all the small particles dislodged during the high rate backwash sequence, the second low rate has to be extended to exchange two filter volumes of water. This is most likely due to the longer distance that the particles have to travel to reach the troughs. As the particles rise, they are slowing down and given enough distance and reduction in speed they may actually start to resettle in the filter. The longer second low wash is then needed to ensure that these particles are given enough time to exit the filter. The GUSC WTP is currently saving 50,000—100,000 gallons per backwash due to ETSW.

If you are interested in implementing ETSW or would like more information on ETSW, please contact either Tom Garrett at (334) 271-7931 or William McClimans at (334) 271-7985.
Optimized (Continued from Page 1)

By not optimizing your water treatment plant, your customers are at more risk for microorganisms getting through the water treatment plant. Some microbial pathogens (microorganisms) in drinking water, like Cryptosporidium, are particularly resistant to chemical disinfection, and research shows that lowering filtered water effluent turbidity from the regulatory limit of 0.3 NTU to 0.10 NTU provides an extra log removal of Cryptosporidium. Based upon this information, ADEM has adopted turbidity goals for the State’s surface water treatment plants.

The “Optimization Goals” established by this program for treatment plant performance are:

**Sedimentation Performance Goals**
- Turbidity ≤ 2.0 NTU 95% of time when source turbidity averages ≥ 10 NTU
- Turbidity ≤ 1.0 NTU 95% of time when source turbidity averages < 10 NTU

**Filtration Performance Goals**
- Turbidity ≤ 0.10 NTU 95% of highest daily readings.

**Disinfection Performance Goal**
- Maintain minimum chlorine residual (located on the system’s operating permit) to ensure proper disinfection.

The turbidity goals are evaluated based upon the maximum daily value that is reported on the water system’s monthly operational report.

Using these goals, each water treatment plant is assessed at least once per year to determine their optimization status. The water system’s optimization status is provided to the water systems during their annual regulatory inspection and if the water system is not meeting the goals, possible treatment enhancements are discussed with the water system staff. The optimization status is also used to prepare the annual AWOP report that is provided to ADEM and EPA to show AWOP is improving the quality of water in Alabama.

A list of water treatment plants that met the optimization goal is included on page 6 of this newsletter. Additionally, a sample press release is located on page 4 that can be provided to your local newspaper.

Data Integrity

**William McClimans (ADEM Drinking Water Branch)**

In the last year, data integrity has become a common term used among the twenty-two states that are operating AWOP programs. Data integrity is making sure that data is collected properly, transmitted through appropriate paths and correctly reported on the monthly operational report. So far, data integrity has been limited to turbidity and chlorine.

Data integrity audits of turbidity data has revealed several issues which have included: improper or no calibration of units, improper flow through units, no verification of accuracy between calibrations, inaccurate SCADA readings, crossed wires between units and SCADA systems and improper reporting of highest turbidity reading on monthly operational reports. Several states have reported statistics indicating that proper calibration of inline turbidimeters is barely above fifty percent.

Chlorine data integrity audits have had an array of issues with the continuous chlorine analyzers. Most notably is the lack of calibration and routine maintenance of the units. Calibration and maintenance is becoming more necessary with the increasing use of reagentless chlorine analyzers. While these units do not require reagents to operate, they typically have to be calibrated more often and routine maintenance includes replacement of the membrane, electrolyte solution and if they are equipped with a pH meter, the salt bridge needs to be replaced about every six months.

If you are concerned about data integrity, please contact your ADEM inspector for assistance in conducting an audit or about possibly scheduling an audit of your facility.
Alabama’s AWOP team, EPA’s Technical Support Center (EPA-TSC), and Process Applications, Inc. (PAI) are working together to develop Performance Based Training (PBT) for Drinking Water Distribution Systems (DS). We are also working with the Cullman Water Treatment Plant, City of Cullman, Cullman County, East Cullman, V.A.W., and Johnson’s Crossing water systems. EPA-TSC and PAI are providing the content and ADEM personnel are acting as facilitators for the sessions.

The first session covered an overview of DS Optimization and PBT, reasons to optimize a DS, definition of a water professional, and sampling rationale and methods. The second session covered assessing DS performance by representative sampling and chlorine mapping. In support of this, the water systems checked calibration of their chlorine meters. One chlorine meter was found to be out of calibration. In the third session, we discussed special studies and how to apply them to a DS and how to use the Distribution System Optimization Assessment Software. The water systems were tasked with completing a special study that they had developed during the class. The fourth session will cover how water storage tanks impact water quality in their service area and how to review historical water quality data using the Distribution System Optimization Assessment Software.

One important concept that is emerging from these sessions is the need for water systems that are connected communicate about their water quality issues. Compliance with Stage 2 looks like it is going to be a collective effort. Each DS in the chain will need to do their part to maintain water quality to enable all systems to meet the maximum contaminant levels.

Press Release for Optimized WTP’s

The following text can be provided to your local newspaper to allow your customers to know about your dedication to providing the best possible water to them at all times.

By reaching this level of “Optimized Performance,” the staff of the [INSERT WATER SYSTEM NAME] have demonstrated their dedication to provide you, our customers, with the best possible water quality. This level of performance significantly reduces the chance of any microbiological organisms from getting into your drinking water supply. Please assist us in thanking the staff of the [INSERT WTP NAME] for their dedication to ensure that you, our customers, receive the best possible water quality.
Alabama Optimization Program

The goal of the Optimization Program is to provide the best quality water to the citizens of Alabama by “Optimizing” the existing infrastructure to the fullest extent possible with minimal cost to the utility.

To protect public health and define “Optimized Performance”, the program has adopted the following goals for water systems:

**Microbial (Pathogen Removal)**
- **Clarified Water (Settled)**
  - When the raw water turbidity (NTU) average is greater than 10 NTU the settled water should be less than or equal to 2.0 NTU 95% of the time for each clarification unit.
  - When the raw water turbidity (NTU) average is less than or equal to 10 NTU the settled water should be less than or equal to 1.0 NTU 95% of the time for each clarification unit.
- **Filtration**
  - Individual filtered water turbidity should be below 0.10 NTU 95% of the time, regardless of raw water quality.
  - Maximum single filtered water turbidity not to exceed 0.30 NTU.
  - Rewash filter until the turbidity is below 0.10 NTU before returning to service.
- **Chlorine residual**
  - Maintain sufficient chlorine residual in the finished water to ensure proper disinfection.
  - Microbial goals are based upon the highest daily reading as reported on the monthly operational report.

**Disinfection Byproducts**
- **Short Term Goal**
  - Each individual site’s LRAA is ≤ 70 ppb for TTHM and ≤ 50 ppb for HAA5.
- **Long Term Goal**
  - Average of max LRAA based upon 11 quarters of data should be below 60 ppb for TTHM and 40 ppb for HAA5.
- **Plant Effluent Goal**
  - TTHM RAA 20 ppb or less
  - HAA5 RAA 15 ppb or less
  - TOC RAA 1.7 ppm or less

For more information, contact ADEM’s Drinking Water Branch at (334) 271-7773.
## Optimized Water Plants for 2011

Below is the list of optimized WTP’s for 2011. The WTP’s are grouped together based upon the number of consecutive years the WTP has met the optimization goals for turbidity.

### 9 Years
- Anniston Water & Sewer—Krebs
- Hamilton Water Works
- N.E. Alabama WSD—Waterloo
- Winfield Water Works
- Fayette Water Works
- Montgomery Water Works
- Section-Dutton Water

### 8 Years
- Centre Water and Sewer
- Florence Water Dept—Cypress Creek

### 7 Years
- Cullman Utilities
- Scottsboro Water Works—North Sauty

### 6 Years
- Florence Water Dept—Wilson Lake
- Harvest Monrovia WS&FPA
- Red Bay Water
- Guin Water & Sewer
- Jasper Water & Sewer

### 5 Years
- Alabaster Water Board
- Franklin County Water
- N.E. Alabama WSD—Monsanto
- Blount County Water
- Huntsville Utilities—Southwest
- Tuscumbia Water Department

### 4 Years
- Mobile Area Water Service—Myers
- Wise Alloys
- Phenix City Utilities

### 3 Years
- Arab Water Works
- Calera Water Works
- Birmingham Water Works—Carson
- Russellville Water Works

### 2 Years
- Albertville Utilities—9 MGD
- Tuscaloosa Water—Ed Love
- North Marshall Utilities

### 1 Year
- Albertville Utilities—12 MGD
- Attalla Water Works
- Birmingham Water Works—Putnam
- Birmingham Water Works—Western
- Central Elmore Water Authority
- Five Star Water Supply
- Hefflin Water Works
- Madison Water Works
- Arley Water Works
- Berry Water Department
- Birmingham Water Works—Shades Mountain
- Bridgeport Utilities
- Clay County Water
- Gadsden Water Works
- Huntsville Utilities—South Parkway
- US Army Aviation & Missile Command