

# Chloramines and Nitrification...

## Is there a Simple Solution?

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### Why Chloramines?

In an effort to minimize formation of the now regulated disinfection byproducts (DBPs), including total trihalomethanes (TTHMs) and haloacetic acids (HAA5s), many water treatment systems have converted from free chlorine to chloramines disinfection. Many operators are finding the conversion to chloramines to be useful but challenging. Many systems have resolved DBP issues only to find they have new compliance concerns related to use of chloramines.

### Ammonia Residual & Nitrification

The goal in chloraminating at the water treatment plant is to form chloramines in the treated water that will deliver the minimum required total chlorine residual to all parts of the distribution system. Maintaining little or no free ammonia in the finished water leaving the WTP requires diligence on the part of the operator. It is imperative to produce the desired residual with a minimum amount of free ammonia discharged in the finished water. Excess ammonia may promote nitrification in the distribution system, which contributes to loss of required total chlorine disinfectant residual.

Nitrification occurs in distribution systems as a result of the presence of ammonia-oxidizing-bacteria which utilize free ammonia as a food source. Effects of nitrification in potable water distribution systems appear in the form of rapidly diminishing total chlorine residual. As nitrification progresses in the distribution system, total chlorine residual is depleted by rising nitrite concentrations. As the total chlorine residual is depleted, conditions improve for growth of ammonia-oxidizing as well as other undesirable types of bacteria.

### Nitrification Problems & Solutions

An early indicator that nitrification problems are occurring in a distribution system includes a drop in the measured total chlorine residual where previously the residual had been steady and sufficient. Systems experiencing problem nitrification in their distribution systems will typically see localized areas of low or nonexistent total chlorine residual while other areas in the system see long-lasting and adequate total chlorine residual. If nitrification problems become serious enough, compliance with

minimum required disinfectant residuals might become difficult.

TCEQ requires water system operators to conduct daily monitoring at locations in the distribution system. By looking at results of frequent total chlorine residual measurements the operator confirms adequate disinfectant residual and may detect the onset of nitrification problems.

If one or more areas in the system begin to show signs of repeated low total chlorine residuals, especially in areas where previously residuals had been stable and sufficient, then the operator may conduct localized nitrite sampling and testing to determine nitrite levels in problem areas. As nitrification progresses in the distribution system measure nitrites will begin to increase. A sudden increase in measured nitrite levels in areas experiencing decreasing total chlorine residual indicates onset of nitrification.

If nitrification problems are confirmed through a measured increase in nitrite levels then the desired short term "fix" would be a controlled and measured temporary return to a free chlorine disinfection protocol. Such maintenance periods commonly last for a period of up to 30-days. The nitrifying organisms are more susceptible to the effects of free chlorine, which is a much stronger disinfectant than chloramines.

### Temporary Switches Back to Free Chlorine

Some systems make the switch back to free chlorine on a routine annual basis as a preventative measure. We feel it is important before switching to a free chlorine system, to first demonstrate need and justification for making the switch and to fully understand what is happening in your system before acting. Our seminar (see insert) was developed to assist in this process.

Both wholesale treated water sellers and purchasers have additional concerns and needs regarding this transition that requires close coordination between the sellers and the purchaser before making the temporary switch back to a free chlorine system to control nitrification.

Our company can assist you in discussing possible nitrification solutions for your system. Please call one of our offices for answers to questions you may have. ENPROTEC , Hibbs & Todd (eHT) is a consulting engineering firm offering comprehensive services to both private and public clients. Our company has been assisting entities in dealing with regulatory compliance issues such as those listed below for over a decade. Give our Abilene, Lubbock, or Granbury offices a call and our professional staff will discuss your specific needs and answer any questions you may have.

#### Consulting Services

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- Risk-Based Assessments
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- Groundwater remediation
- Wastewater Treatment
- Water Supply/Well Fields
- Water Treatment
- Water Distribution
- Sewer Treatment/Collection
- Health & Safety Training
- Water Quality Planning
- System Optimization
- Process Efficiency Studies
- Pollution Prevention
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- Risk Management



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