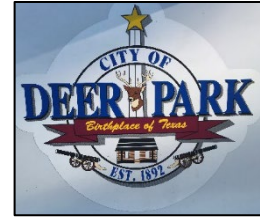


# DEER PARK

Automated Disinfectant Residual Control Systems Help City of Deer Park, Texas Prevent Water System Nitrification Events

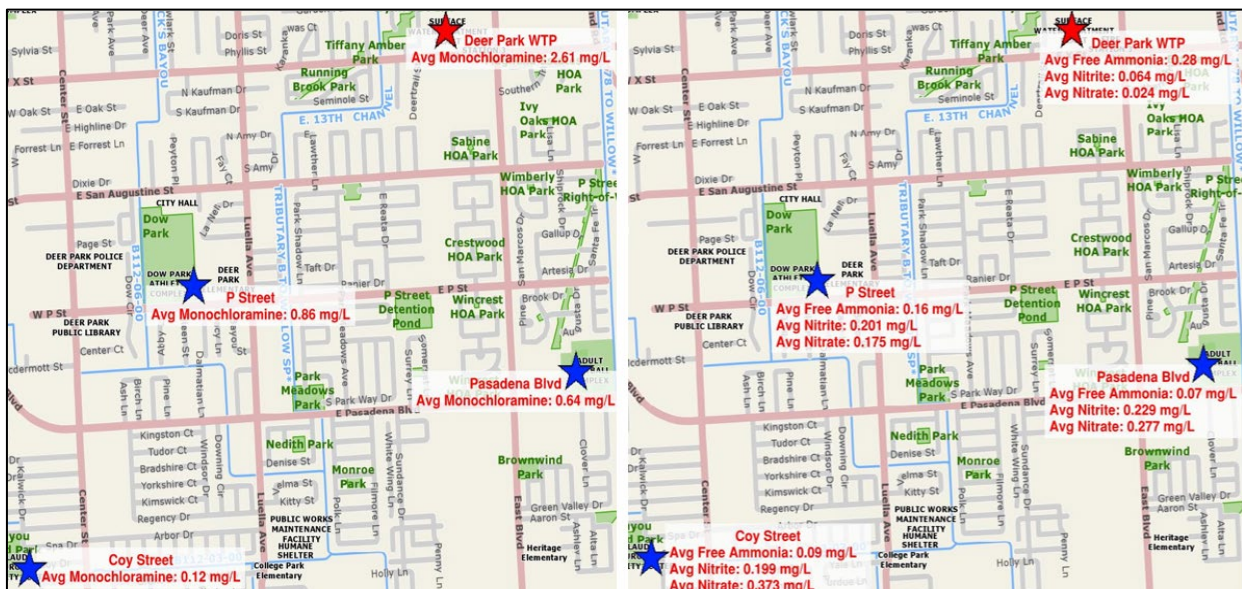


## OVERVIEW

Distribution system nitrification is a recurring phenomenon that many monochloramine-utilizing utilities battle in the warm summer months. Monochloramine is a persistent and effective disinfectant that is especially valuable in preventing disinfection by-product formation. However, the natural degradation of monochloramine as water ages and temperatures increase liberates free ammonia into the distribution system. Free ammonia sets off a cascade of nitrifying bacteria growth that increases the levels of nitrite and nitrate in distribution systems (nitrite MCL is 1 mg/l and nitrate MCL is 10 mg/l). Importantly, while nitrite and nitrate levels can be of concern, their presence may also indicate an overall declining level of distribution system disinfectant that can, in turn, permit other types of more pernicious bacteria to flourish.

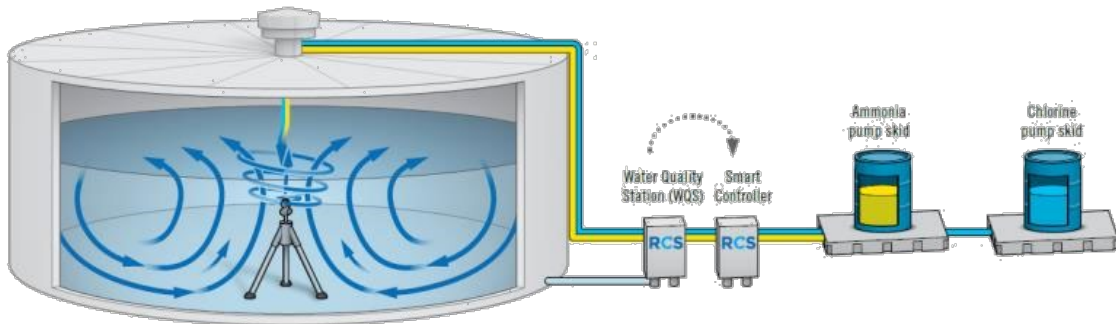
Located in southeast Texas, the City of Deer Park maintains and operates a surface water treatment plant (SWTP), as well as over 140 miles of distribution piping to deliver potable water to its 32,000 residents. The City receives chloraminated water from a wholesaler, Coastal Water Authority, which the City treats further in its SWTP.

During the summer of 2017, operators noticed significant declines in chloramine levels in the distribution system. Because the City holds itself to very high operating standards, and in order to ensure compliance with the stringent disinfectant residual requirements of the Texas Commission on Environmental Quality (TCEQ) – among the most rigorous in the United States – further monitoring was undertaken along with a search for solutions. In addition to low residuals, personnel also saw nitrite and nitrate levels climbing at the City's Coy and Pasadena tanks, which are the most distant from the SWTP.



Chloramine levels (left) and nitrite/nitrate levels (right)

In close cooperation with its engineer, Ardurra Group, the City of Deer Park examined a number of disinfectant residual boosting strategies and finally settled upon the Monoclor® RCS residual control system for installation at the Coy Street Pump Station. The Monoclor® RCS system automatically detects the degradation of monochloramine disinfectant and then doses either chlorine or a ratio of chlorine-to-ammonia based on chlorine breakpoint chemistry. Chloramine boosting can be much more difficult than boosting in free-chlorine systems because a tank's position on the parabolic breakpoint curve determines both the amount of chemical dosed and the combination of chemicals.

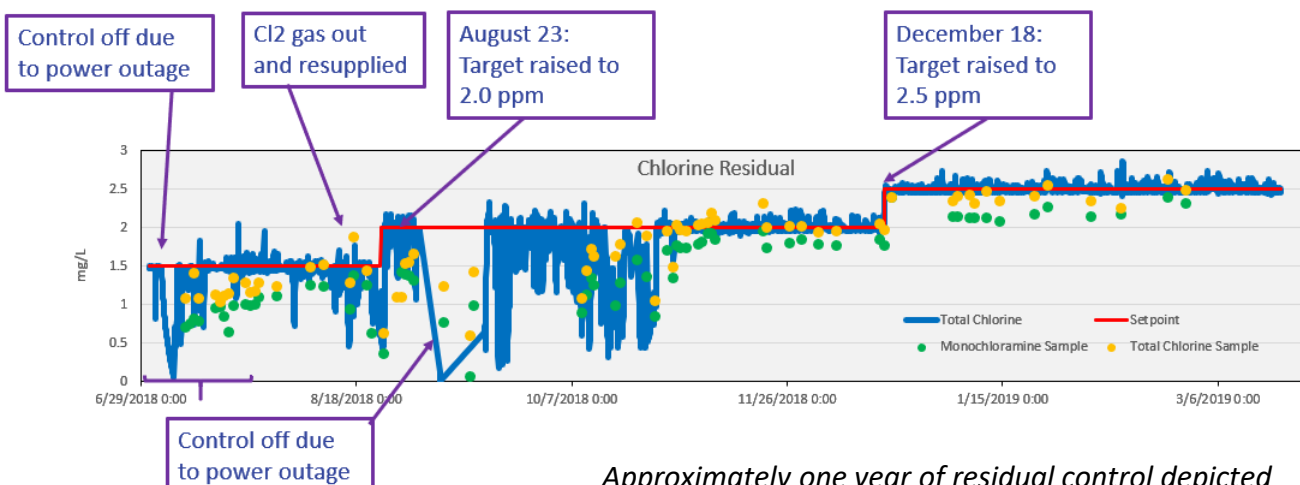


*A simplified process flow diagram of an RCS system*

The Monoclor® RCS system includes: 24/7 tank mixing to ensure a chemically homogeneous volume of water; an analyzer suite that, among other items, measures total chlorine; a PLC controller and algorithm that determine dosing actions; and both an ammonia and chlorine source. The City of Deer Park preferred to use gas chlorine as its chlorine source and aqueous ammonia as its ammonia source (pictured below).



Together, the City and Ardurra filed a Plan Review and Exception Request Review to TCEQ to improve the boosting capability of the distribution system. Once approved, the Monoclor® RCS system was installed and started-up in June of 2018. After a period of system shake-out and operator training the system was set initially to maintain a 1.5 mg/l chloramine residual, subsequently raised to 2.0 mg/l, and finally set at an automatically maintained 2.5 mg/l setpoint:



*Approximately one year of residual control depicted*

In addition to adding the Monoclor® RCS system, Deer Park also implemented a number of additional operational protocols, including closer monitoring of chemical dosing at the SWTP, additional free ammonia testing of the raw water, careful maintenance of the chlorine-to-ammonia ratio in the finished water and plans to build a robust model of water degradation throughout the distribution network. Along with excellent operator attention, this holistic model of nitrification management has put the City back in complete control of network water quality

*"Thank you for selling me this product. The Monoclor® RCS system is working well. The service that you have provided has been great too. As part of our overall nitrification control plan, the RCS system allows us to take active control of water quality in the distribution system and actually prevent nitrification before it can take root."*

***Nicholas Cook, City of Deer Park Water Treatment Supervisor***

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