



Conservation through Water Reuse: Experiences from the Santa Ana Pueblo

The Situation:

The Tamayamé, the Native American Tribal members of the Santa Ana Pueblo, north of Albuquerque, NM, are committed to natural resource conservation and future economic development. In the late 1990s, they built a water reclamation facility and began reusing treated effluent to irrigate the Pueblo's golf course. Although they were pleased with the safety and environmental benefits of using on-site hypochlorite, they continued to struggle with biofilm in the distribution line, as well as other operational issues.

The Solution:

In 2007, the Pueblo upgraded to a MIOX® mixed oxidant generator. They maintained the same safety benefits of on-site generation, while eliminating biofilm, reducing maintenance, and cutting costs.

A case for wastewater reclamation

To meet the ever-growing demand on limited water supplies, water recycling and reuse are quickly moving from optional to necessary. Wastewater reuse is among the effective ways to ensure that our communities and industries have consistent access to this critical resource. One of the most compelling uses for reclaimed wastewater is agricultural irrigation, with one of the more common applications being golf course irrigation.

According to EPA guidelines, golf course irrigation requires wastewater to be treated to the Tertiary/Advanced level of treatment. Unlike wastewater that is discharged into a receiving stream, reclaimed water requires maintenance of a residual disinfectant in the treated water to prevent recontamination during the reuse application.

Neither UV nor membrane filtration, both common choices for discharged wastewater, offer a disinfection residual. Therefore, any wastewater

treatment facility that wishes to recycle water must treat with a chlorine disinfectant in order to provide a measurable residual.



Twin Warriors Golf Course at Santa Ana Pueblo, NM

Traditionally, gas chlorine has been used for wastewater disinfection. However, legislation and public concern about safety are moving treatment plants away from this option. Two other common options are purchasing hypochlorite in bulk or generating it on site. Although bulk hypochlorite has become the defacto choice for many utilities, poisonous gas chlorine can still form if the hypochlorite is inadvertently mixed with an acid. In addition, since hypochlorite delivered in bulk is typically at a 15% concentration or less, a large amount of water weight is needlessly transported, requiring more frequent deliveries, increasing damage to the road, and creating a large carbon footprint from transport emissions. In contrast, generating hypochlorite on site requires only the transport of common sodium chloride salt. On-site generation also eliminates the potential for creating hazardous chlorine gas and cuts transport requirements and carbon emissions by approximately 80% in contrast to bulk hypochlorite.

Conservation through Water Reuse at Santa Ana Pueblo

One example of on-site generation for wastewater reuse lies in Sandoval County, New Mexico. About twenty miles north of Albuquerque is the Pueblo of Santa Ana, a leader in conservation efforts with their reclamation facility built in the late 1990s. The Tamayamé, the Native American Tribal members of the Pueblo, have resided there at least since the 1500s.ⁱ In 2000, the Census Bureau reported the Pueblo's population as approximately 500. Despite its small size, the Pueblo has been very progressive about economic development. According to the Pueblo's website, "Since the early 1980s, the Pueblo of Santa Ana has actively pursued a strategy of developing tribal



Santa Ana Water Reclamation Facility

enterprises, seeking economic independence as crucial to maintaining and safeguarding [their] traditional concepts and values." The Pueblo now owns and operates several successful businesses that include the Hyatt Regency Tamaya Resort & Spa with 350 guestrooms, the Santa Ana Star Casino, and two upscale golf courses, among other small business enterprises. To help keep this development in line with their values, the

Tribal Government formed the Santa Ana Department of Natural Resources (SADNR) in 1996. The SADNR focus is "... to develop and implement natural resource management programs that protect, preserve, and enhance natural resources for current and future tribal members".

The Problem

The Pueblo had traditionally used an anaerobic, complete retention lagoon system to handle influent. The Santa Ana Tribal Utilities Authority regularly received



Hole 4 on Santa Ana's Twin Warriors Golf Course

complaints about the odor emitted by the lagoon system. The lagoons also occupied a large piece of valuable land that could have other uses on the Pueblo. These issues led the Pueblo to consider a wastewater treatment facility. In keeping with their focus on natural resource conservation and future economic development, the Pueblo also wanted to reuse the treated effluent. As well as conserving resources, water reuse would save the Pueblo money. Considering the clear environmental benefits and peripheral advantages, the Tribal Council approved the plans to build the wastewater treatment facility in the late 1990s which would allow them to reuse the treated effluent. According to Glenn Tenorio, Chairman of the Santa Ana Tribal Utilities Authority, "Water is a precious commodity. Why give away a resource in which we've invested time, effort, and money? Why send it downstream for someone else to use, when we can reuse it and reduce our demand for potable water?" Accordingly, the water coming from the community itself, along with the Hyatt Regency Tamaya Resort & Spa, the Santa Ana Star Casino, and other small businesses, is now purified and recycled for irrigation of the Twin Warriors Golf Club.

The effluent was being treated through coagulation, a biological treatment process, and disinfection was provided by an on-site hypochlorite generator. The wastewater treatment plant supplies approximately 50,000 gallons of treated effluent water to the golf course at a time. Effluent is supplemented with groundwater to meet the remaining irrigation needs. Reclaiming their effluent allows the Pueblo to protect their groundwater supply.

When the Pueblo built their reclaimed water treatment facility in the late 1990s, they chose on-site hypochlorite generation to provide the residual disinfectant. The process of on-site generation uses salt, water, and power to create a chlorine-based disinfectant, eliminating the transport and storage of hazardous chemicals. The salt feedstock is fully converted, resulting in negligible addition of sodium to the treated water and no negative impact to irrigated landscapes.

Upgrading to MIOX on-site mixed oxidants

Although the Pueblo enjoyed the safety benefits of generating disinfectant on-site, during a 2007 upgrade, they switched from generating hypochlorite to generating [MIOX®](#) mixed oxidants. Although the process was similar, using salt, water and electricity to generate disinfectant, mixed oxidants offered additional benefits over hypochlorite, including cost savings, increased effectiveness, and biofilm removal.

After the MIOX unit was installed, the Pueblo observed a number of advantages over the previous on-site generation system. The Pueblo reports that the MIOX unit is much

easier to operate, reducing maintenance time by about two-thirds. According to system operators, the previous unit required frequent manual calibration and cleaning of the brine pump, which took approximately four hours monthly. With the MIOX unit's self-calibration feature, operators spend a maximum of one-and-a-half hours per month on equipment maintenance. Operators also report a 50% reduction in salt consumption, from approximately four bags of salt per week with the previous system to only two bags of salt per week with the MIOX system, which equates to a significant savings in operating costs.



Santa Ana Supervisor Phil Romero and Director of Utilities Michael Alvidrez, standing by the MIOX Equipment

The MIOX mixed-oxidant system reduces chlorine demand and provides more effective treatment than the previous hypochlorite disinfectant. A layer of biofilm that was able to grow and thrive in the chlorine contact chamber with use of the other system peeled off after treatment with MIOX began. The biofilm mat moved through the chlorine contact chamber and was ultimately removed with the sludge. Utilities Supervisor Phil Romero said, “When I first cleaned out the contact chamber and got to the bottom, I thought someone had thrown in a blanket!” Since this biofilm mat was removed, it has not reformed with continued use of MIOX mixed oxidants.

On-site generation of mixed oxidants allows wastewater treatment at a significant operational savings by reducing both labor time and raw materials consumption, enabling the Pueblo to recognize their joint goals of conservation and sustainable development. Tenorio stated, “MIOX played an important role in helping the Pueblo to achieve our environmental goals.” The practice of water reuse is particularly beneficial in the southwest, where the arid climate and limited water supply are driving conservation and reclamation programs. The Pueblo of Santa Ana was one of the earlier sites in New Mexico to utilize reclaimed water, demonstrating the tribe’s viewpoint on protecting and preserving natural resources. Their use of mixed oxidants and water reuse are a successful combination that benefits the Pueblo economically, while benefiting the Pueblo community and the environment.

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