By Allison Fore

IMPROVING THE WINDY CITY'S WATER

Chicago-area water district reduces CSOs through decades-long plan

After more than a decade of detonating 400-million-year-old dolomite limestone, the Metropolitan Water Reclamation District of Greater Chicago (MWRD) held a "Last Blast" celebration in September 2013 to commemorate the final blasting on the Thornton Composite Reservoir, a major piece of a massive engineering project designed to reduce combined sewer overflows (CSOs) and flooding.

Approximately 152 billion lb of limestone were excavated from the future reservoir between 1998 and 2013. To understand the significance of the Last Blast and other developments to address CSOs in the 21st century, a brief history lesson is needed.

Reversing the River

The entire Chicago region was developed on swampland. The prized realty know as the Magnificent Mile and all property to the east abutting Lake Michigan did not exist until the ruins of the Great Chicago Fire in 1871 were dumped into Lake Michigan.

Just 15 years before the fire, in 1856, the city of Chicago had begun constructing underground conveyance systems to carry storm water and sewage into the Chicago area waterways that ultimately discharged directly into Lake Michigan. These thousands of miles of sewer pipe were built before wastewater treatment technology and facilities existed. Health risks from the polluted Chicago River—which emptied into Lake Michigan, the source of Chicago's drinking water—prompted the Illinois General Assembly to take action. It created the Sanitary District of Chicago (now the MWRD) in 1889 to address the pollution in Lake Michigan and Chicago area waterways and create a navigable passageway for boat commerce.

In the early 1900s, the MWRD began its pollution prevention mission by reversing the flow of the Chicago River away from Lake Michigan. By the 1920s, the MWRD had begun constructing wastewater treatment plants and large intercepting sewers to capture the flow from combined sewers before it reached waterways. In heavy rainfall, the sewer system's capacity can be exceeded, and the combined sewers follow their original course, overflowing into and polluting area waterways.

Controlling CSOs

In the 1970s, the MWRD embarked on a plan to control CSOs, mitigate flooding and protect water quality in the Chicagoland area. The plan was

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conceived before current laws requiring CSO controls were in effect. The Tunnel and Reservoir Plan (TARP) is designed to capture the combined sewage that otherwise would overflow into waterways. Instead, the combined sewage captured by TARP is pumped to MWRD treatment plants for full treatment prior to being discharged.

Different portions of the TARP system have been coming online since 1985. The MWRD completed 109 miles of tunnels in 2006. These tunnels can capture and store 2.3 billion gal of CSOs during storm events. The first TARP reservoir, the Majewski Reservoir (formerly known as the Chicagoland Underflow Project), was completed in 1998 and has capacity for 350 million gal of CSO storage. To date, the Majewski Reservoir has provided more than $300 million in flood relief benefits for its service area.

The Thornton Composite Reservoir will be completed in 2015 and will provide 7.9 billion gal of storage. Stage one of the third and final reservoir, the McCook Reservoir, will be completed in 2017 and will provide 3.5 billion gal of storage. Stage two of the McCook Reservoir will be completed by 2029 and will provide an additional 6.5 billion gal of storage, for a total of 10 billion gal.

In September 2013, the final blasting took place on the Thornton Composite Reservoir, which is scheduled for completion in 2015.

TARP's Success

Since the first tunnel went online in 1985, TARP has cumulatively diverted more than 1.3 trillion gal of CSOs, resulting in the capture of more than 2 billion lb of suspended solids, 100 million lb of ammonia and more than 1.3 billion lb of oxygen-demanding substances. Per the MWRD's NPDES permits, a CSO event is defined as a storm that causes an individual or cluster of CSOs to discharge anywhere throughout the MWRD's combined sewer basin.

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Prior to TARP, it is estimated that the MWRD's combined sewer service area experienced more than 100 CSO events per year. Currently, with the tunnels fully operational, the combined sewer service area averages approximately 40 CSO events per year, equating to a more than 60% reduction in CSO events. The MWRD expects the current number of CSO events to decrease significantly once the TARP reservoirs come online.

As work on TARP continues to progress, the water quality of the Chicago area waterways, a 76-mile system of manmade canals and altered natural rivers, will remain a focal point for recreation, property development and environmental enhancement. Natural habitats will continue to improve, and the area expects to see increased fish diversity and populations; with just two species in the early 1970s, there are more than 70 species today.

Another positive result of the portions of TARP that are already completed is that the quality of the combined sewage that is discharged from the outfalls is extremely diluted. Consisting primarily of storm water mixed with a relatively low amount of sanitary sewage, this water does not affect water quality as much as CSOs did prior to TARP.

TARP is more important than ever as a result of changing weather patterns. Increased weather severity is causing problems across the country. Unfortunately, Chicago has not escaped the wrath of Mother Nature, having experienced record-level rains in 2008, 2011 and 2013. These events provide significant challenges to infrastructure, as the 10,000 miles of pipe in Cook County were not designed to manage these events. Work over the next 15 years will continue to address CSO control for the entire Chicagoland region. SWS

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