

Reducing discharge from treatment plant reduces SAC

The City of Apple Valley Public Works water treatment plant made changes to sewer discharge processes to reduce water use and eliminate a service availability charge.

The City of Apple Valley Public Works water treatment plant produces city water after removing iron and manganese from incoming water from city wells. The plant discharges sludge that contains the iron and manganese after it is removed. In 2007, the Metropolitan Council Environmental Services (MCES) conducted a review of the plant and found an increased sewer discharge volume totaling five million gallons. MCES proposed increasing the water treatment plant's Service Availability Charge (SAC) baseline units of daily sewer use to reflect the discharge trends found in 2007. The change would result in a one-time SAC of approximately \$54,000.

SAC Defined

MCES manages wastewater treatment plants in the seven-county metro area of the Twin Cities. A SAC is a one-time fee imposed by MCES for new connections or increases in volume discharged to the Metropolitan Disposal System. Any industrial facility permitted by MCES is assessed every three years to determine the baseline sewer use at the time of their permit renewal. When a facility's discharge volume exceeds the baseline from the previous review, a SAC is imposed based on the increased volume of discharge. One SAC unit equals 274 gallons of maximum potential daily wastewater flow volume. Once a SAC has been proposed for a facility, a one-year grace period is granted to allow the facility time to review and modify discharge processes to decrease the amount of sewer discharge, minimize sanitary sewer disposal costs, and avoid the charge if possible.

City water treatment plants within MCES' jurisdiction are subject to SAC fees applied to excess sewer discharge. Many water treatment plants create sewer discharge from two activities related to purifying water for distribution to water consumers: draining the solids-containing water (dilute sludge) from the settling tanks and spray washing the settling tank floor. Water treatment plants can reduce sewer discharge and save money by recognizing the SAC baseline, identifying problems and best practices, and implementing changes to discharge processes.

Addressing the SAC

At the time of the SAC proposal, the Apple Valley water treatment plant ran sand filter back flush operations where sludge was left in the settling tank to accumulate after each cycle then would discharge the sludge to the sewer after every third cycle. Additional sewer discharge volume came from spray washing the settling tank to remove residual sand left after draining. The sprayers ran for five minutes per wash cycle, contributing about a third of the total sewer discharge volume in 2007. The spray wash process in 2007 used a greater volume of water relative to the discharge volume.

MCES recommended that the City of Apple Valley contact MnTAP for assistance in identifying opportunities to reduce the amount of sewer discharge. Part of the 2007 consumption appeared to result from a malfunction that was corrected by 2008. Based on data collected in August 2008, the annual flow was estimated to be just less than four million gallons per year, one million gallons less than the discharge levels determined in 2007. The plant worked with MnTAP to investigate the difference in the amount of sewer discharge from 2007 to 2008 and to evaluate reduction opportunities.

Two process changes were recommended that the plant immediately implemented on a trial basis. First, the number of sand filter back flush cycles per sewer discharge was increased from three to four, resulting in a 30% reduction of sludge volume due to the lower volume of water used in discharges each year. Second, the spray wash time

Benefits Overview

Waste Reduction Option	Waste Reduced/Materials Savings
Increase from three to four sand filter back flush cycles per sewer discharge	30% reduction of back flush discharge gal/yr
Decrease spray wash time from five minutes to just over four minutes	17% reduction of spray wash discharge gal/yr
Total	28% reduction of discharge gal/yr (SAC) \$54,000

was reduced from five minutes to just over four minutes, cutting the discharge volume by about 17%. Together, the changes reduced the sewer discharge volume by 28%. No operational problems were encountered, so both changes became permanent.

In 2009, the Apple Valley water treatment plant made filter cell modifications. In essence, wings were added to the filter cell troughs, reducing the amount of sand lost in the backwash process. The weight of the sand is heavier than that of the iron and manganese sludge. The reduction in the amount of sand lost resulted in decreased spray wash time and reduced water use.

Results and Benefits

The initial changes made to the water treatment plant's discharge process reduced the estimated annual flow from just less than four million gallons back to under the baseline of two million gallons. Implementing the changes to the discharge cycle and wash spray time helped the plant conserve one million gallons of water per year and \$1,000 per year in sewer charges. The City of Apple Valley's water treatment plant also avoided \$54,000 in SAC for reducing the amount of sewer discharge.

Additional Opportunities

To address a proposed SAC, reduce costs, and improve environmental impact, facilities can look for potential process and equipment changes to help reduce sewer discharge volume.

- Look for variance in settling tank discharge rates. Making the tank discharges and spray washing more consistent can improve operations and reduce overall discharge amounts.
- Increase the number of settling cycles per sewer discharge. This can be accomplished by changing the operational processes or installing equipment to automate the cycles to discharge only when needed.
- Reduce the spray time for washing the settling tanks. Savings can occur through both reduced water purchases and reduced sewer discharge fees.
- Examine spray wash nozzles for wearing or cracks. The spray nozzles used during the spray wash contribute to the water consumption in the settling tanks. Replace inefficient nozzles with high pressure low volume nozzles to reduce the volume of water added to the sewer discharge.
- Modify filter cell troughs to reduce the amount of sand lost in the backwash process. The spray wash requires less water when there is less sand in the tanks.
- Lower the level of the decanting pipe in the settling tank to reduce the volume of sludge discharged to the sewer.



For More Information

MnTAP has a variety of technical assistance services available to help Minnesota businesses implement industry-tailored solutions that maximize resource efficiency, prevent pollution, increase energy efficiency, and reduce costs. Our information resources are available online at <mntap.umn.edu>. Please call MnTAP at 612.624.1300 or 800.247.0015 for personal assistance.