# success stories

PROJECTS THAT REDUCE POLLUTION AND WASTEWATER

## Highlights:

Vishay Siliconix voluntarily implemented a water reclaim system to reduce their wastewater discharge to the sanitary system.

***Project:*** Develop a reclaim system to reuse RO reject in air scrubbers

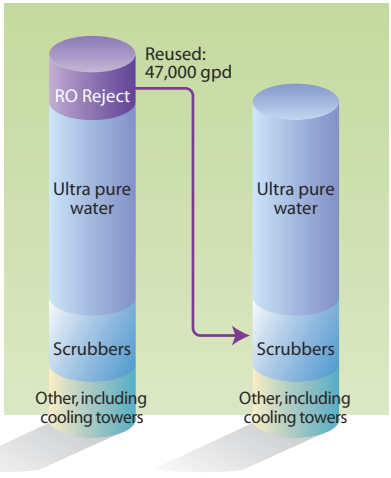
***Problems:*** RO reject in cooling towers was unsuccessful due to high total dissolved solids (TDS).

***Costs:*** $180,000 for equipment, design and labor

***Payback:*** Approximately 2.5 years, factoring in WET rebate

***Water savings:*** 47,000 GPD (gallons per day)

**Wastewater discharge**




*Vishay Siliconix was able to reduce its wastewater discharge by 47,000 gallons per day by reusing the RO reject and RO/DI system backwash as feedwater to the air scrubbers.*

# Reclaim system reduces wastewater discharge at Vishay Siliconix

VISHAY SILICONIX is a semiconductor manufacturing plant located in Santa Clara. The plant manufactures a variety of electronic components including power MOSFETs, power integrated circuits, analog switches and multiplexers that manage and convert power in equipment such as computers, cell phones and communication infrastructures. The plant is a part of the Siliconix division of Vishay Intertechnology, one of the world's largest manufacturers of discrete semiconductors and passive electronic components.

*Vishay Siliconix's main air scrubbers accounted for about 15% of the facility's total water use.*

In the late 1990s, Vishay's Santa Clara facility was using over four hundred thousand gallons of water per day (gpd). More than half of the water (about 55%) was used to produce deionized (DI) water for use in its wafer fabs. The fabs require ultra pure water (UPW) which is created using a reverse osmosis/deionized water (RO/DI) process. Vishay's RO/DI system is about 70% efficient. In other words, for every 100 gallons of city water treated, about 70 gallons of DI water is produced. The remaining 30 gallons is rejected and sent directly to the sanitary sewer (RO reject). The facility also has 6 main air scrubbers and 3 cooling towers that account for another 40% of the total water use.

## Problem:

In the late 1990s the San Jose/Santa Clara Water Pollution Control Plant (Plant) was exceeding the 120 million gallon per day (mgd) flow trigger for discharge to the South San Francisco Bay. The State mandated the 120 mgd flow trigger to prevent the Plant's wastewater discharge from adversely impacting the salt marshes of the Bay. As part of the efforts to reduce discharge, the Plant partnered with industry for assistance. Vishay Siliconix — then known as Siliconix — participated in industry focus groups to help advise the Plant in how to encourage conservation. Vishay was also required to perform a flow audit study (FAS) that required dischargers over 100,000 gallons per day to evaluate their water uses and propose flow reduction projects. Implementation of these projects, while not mandatory, was highly encouraged by the Plant.

Vishay responded to the challenge and began to evaluate projects to reduce water use and wastewater discharge. What resulted was implementation of a reclaim system. Vishay went on further to become ISO 14000 compliant, demonstrating its commitment to promoting environmentally sound business practices.

*Vishay analyzed the various process wastewater streams to determine if any could be reused in the air scrubbers or cooling systems.*

## Solution:

As part of its water use study, Vishay analyzed the various process wastewater streams to determine if any could be reused in the air scrubbers or cooling systems. The two largest wastewater sources at Vishay were treated wastewater from the fabs and the RO reject created during the production of the UPW. The backwashes from the RO/DI system were also analyzed for reuse potential.

The analytical results showed that the wastewater from the fabs did not meet quality standards for reuse. However, the results indicated that the RO reject and backwashes from the RO/DI system would be of adequate quality for reuse in the 6 main air scrubbers and possibly the 3 cooling towers. There was some concern that the elevated levels of total dissolved solids (TDS) might adversely impact the cooling towers but Vishay thought that it could be managed. The scrubbers and cooling towers had a peak demand of over 190,000 gpd.

The design of the reclaim system was relatively straightforward. A 31,000-gallon aboveground reclaim tank was installed. The RO reject and RO/DI system backwash was plumbed directly to the reclaim tank. Since the RO reject and RO/DI backwash volume alone did not meet demand, a backup city water supply was also plumbed to the reuse tank. A monitoring and control system was added to monitor water quality and quantity. Finally, a piping system from the reclaim tank to the individual scrubbers and cooling towers was installed.

*RO reject and backwashes from the RO/DI system flow directly into the reclaim tank. A piping system delivers the reclaimed water to 6 main air scrubbers.*

## Results:

Vishay Siliconix reduced the discharge of wastewater by about 47,000 gallons per day by reclaiming RO reject water and backwashes from the RO/DI system for reuse in air scrubbers. Despite several attempts to use the reclaim water in the cooling towers, this part of the project was abandoned due to the high TDS impacting the efficiency of the cooling towers. The reclaim system has functioned well with no major problems. The scrubbers are inspected annually and have not been negatively impacted by the reclaim system.

The total cost of the project was estimated to be $180,000, including the design work and the purchase and installation of the tank, piping and control systems. The construction of the system took about 6 months. Vishay did the majority of design and construction in-house. This project qualified for the maximum rebate of $50,000 through the San Jose/Santa Clara Water Pollution Control Plant's Water Efficient Technology (WET) program. The project paid for itself in about 2.5 years, after factoring in the rebate.

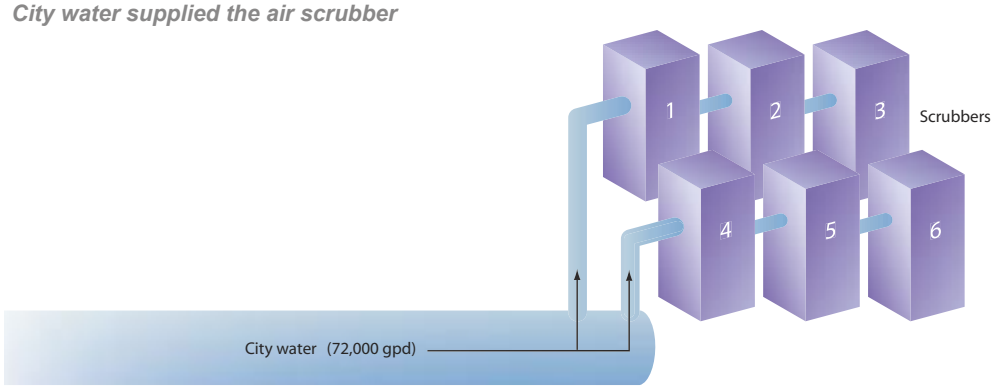
## Challenges:

The major challenge in this project was attempting to use the reclaim water in the cooling towers. The main water issue was the level of total dissolved solids (TDS) in the reclaim water, although there were no problems with the reclaim water quality in the scrubbers. High TDS water can interfere with cooling tower maintenance.

Although Vishay and its facilities maintenance vendor made several attempts to use the reclaim water in the cooling towers, they were unable to balance maintenance needs with water use. They found that to maintain the cooling towers they would have to constantly blowdown the

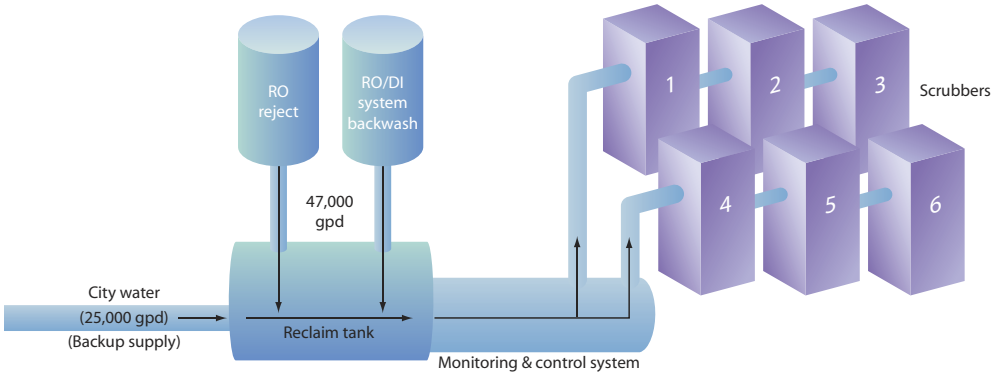
**Before Project**

*City water supplied the air scrubber*




**After Project**

*To reduce discharge by 47,000 gallons per day, backwash and RO reject are reused in air scrubbers instead of being discharged directly to sanitary sewer.*




towers. The benefit of reclaiming the RO reject was offset by the increased blowdown to the sanitary sewer. There were also concerns that the high TDS levels would affect the chemical treatment process used in the cooling towers. As a result, after several months Vishay abandoned its efforts to reuse reclaimed process water in the cooling towers.

Summary: Vishay Siliconix was able to reduce its wastewater discharge by over 47,000 gallons per day by installing a reclaim system to reuse RO reject and RO/DI backwashes in six main air scrubbers. The reclaim system consisted of a 31,000-gallon storage tank and associated piping and controls. Vishay was able to do most of the work in-house and has maintained the system successfully. While Vishay was unable to use the reclaim system to supply the cooling towers, it continues to explore other reuse options.

*Thanks to Cris Suizo of Vishay Siliconix for his assistance in the preparation of this case study.*

*Vishay Siliconix was able to reduce its wastewater discharge by over 47,000 gallons per day by constructing a reclaim system to reuse RO reject and RO/DI backwashes in six main air scrubbers.*

# success stories

The San Jose / Santa Clara Water Pollution Control Plant discharges treated wastewater into South San Francisco Bay. This area of the Bay is shallow, with a limited amount of tidal and tributary flushing. This creates unique challenges for the Plant in protecting the health of the South Bay. The Plant has been ordered by the Regional Water Quality Control Board to reduce its dry weather effluent flow, as well as the amount of copper and nickel discharged, in order to preserve endangered species' habitat and to meet state and federal water quality objectives.

To comply with these and other regulatory requirements, the City of San José has implemented a variety of programs improving water quality in the South Bay. These success stories demonstrate ways local companies have been able to reduce wastewater discharge or pollutants from their facilities.

San José offers financial incentives and other programs to encourage the implementation of such projects, including Water Efficient Technologies (WET). The WET program offers rebates of up to $50,000 for reductions in wastewater discharge. Participants must apply before beginning a project, and they must document the amount of wastewater reduced as a result of the project.

For more information on WET or project success stories, call (408) 945-3000 or go to www.slowtheflow.com.

CITY OF SAN JOSE
CAPITAL OF SILICON VALLEY

SAN JOSE/SANTA CLARA
WATER POLLUTION
CONTROL PLANT

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