

Pollution Prevention Supplemental Environmental Projects

Whitaker Surface Systems, Toledo, Ohio

Introduction

The Ohio Environmental Protection Agency (Ohio EPA) Office of Pollution Prevention (OPP) has developed a number of case studies that provide information on the use of pollution prevention supplemental environmental projects (P2 SEPs) in Ohio enforcement settlements. Each case study describes the development of pollution prevention programs or projects that have been included in an enforcement settlement. OPP presents the Whitaker Surface Systems case study to illustrate how P2 SEPs can be used in enforcement cases, and how the environment, the State of Ohio, and the company benefit from pollution prevention.

Facility Description

Whitaker Surface Systems (Whitaker) is a job shop electroplater. Electroplating is the application of a thin surface coating of a metal on top of a base metal by electrodeposition (electric charge). Coatings applied by Whitaker include brass, copper, chrome and nickel. The coatings provide important corrosion protection, durability and decorative qualities. Parts plated by Whitaker are used by a variety of industries including automotive, appliance, electronic, houseware and hardware. Whitaker's facility occupies about 23,000 square feet, and employs approximately 50 staff on three-shifts.

Enforcement Settlement

In September 1997, Whitaker and Ohio EPA reached a Director's Final Findings & Orders settlement addressing past hazardous waste violations. Ohio EPA inspections in October 1995 and June 1996 revealed violations at the facility, which included

Whitaker P2 Activities

Whitaker reduced water use and wastewater generation by:

- installing spray rinsing;
- using counterflow rinsing;
- installing flow restrictors on rinsewater feeds;
- modifying rinsewater tank design to ensure more effective rinsing;
- developing an operator checklist to ensure proper shutdown of rinsewater tanks; and
- installing an automated spray barrel rinsing system.

storage and treatment of hazardous waste without the required permit, failure to conduct personnel training, failure to label hazardous waste containers properly, and failure to characterize wastestreams.

Ohio EPA's Division of Hazardous Waste Management (DHWM) offered Whitaker the opportunity to conduct a P2 SEP as part of the settlement. A SEP is an environmentally beneficial project that a company agrees to complete to help settle an enforcement case. At the suggestion of Ohio EPA, Whitaker agreed to develop a comprehensive pollution prevention program for the P2 SEP. Whitaker received a partial reduction in the penalty for performing the P2 SEP. The final penalty was negotiated to \$21,000.

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The program included a P2 assessment to identify and evaluate source reduction and recycling options. Standard SEP language was used in the Consent Order, which facilitated negotiations. The Consent Order established dates for submittal of four reports to Ohio EPA documenting Whitaker's progress in completing the P2 SEP.

Pollution Prevention Activity Before the Settlement

Prior to the settlement, Whitaker did not have a comprehensive, formal pollution prevention program. Ohio EPA offered the P2 SEP program to Whitaker to help demonstrate the value of pollution prevention for improving process operations to reduce wastes and associated costs. Shortly after the settlement, Whitaker underwent several management and organizational changes. New management at Whitaker recognized the importance of reducing costs and becoming more efficient to reach important business goals. The P2 SEP provided a framework to help accomplish this.

Implementation and Results

Whitaker established a facility P2 program and performed a facility-wide P2 assessment as described in the "Ohio Pollution Prevention and Waste Minimization Planning Guidance Manual" developed by Ohio EPA in 1993. The manual describes 12 steps for developing and implementing an effective P2 program to reduce manufacturing

wastes and associated costs. The P2 SEP required Whitaker to work through each of the steps.

To demonstrate a commitment to pollution prevention, Whitaker first established a policy statement and employee commitment statement. An important aspect of the policy statement are several

Whitaker Commitment Statement

As an employee of Whitaker Surface Systems, I am committed to performing my job safely and with pride. I am also committed to the principles of honesty, respect and teamwork.

As a group of individual employees, we and the Company are committed to providing extraordinary customer service, adding value to the community, and being good stewards of the environment while providing a return to shareholders.

important environmental guidelines, including the statement, "reduction and elimination of waste and energy conservation methods will be at the front of all new processes and equipment designs". This guideline is important for Whitaker because of future business plans to invest in new processes and equipment.

Whitaker organized a P2 team consisting of the company president, plant manager, and five facility operators. To help assist with the identification and

evaluation of P2 opportunities, Whitaker used the services of Jones & Henry Engineers, a local consulting engineering firm with P2 planning experience, to improve implementation effectiveness. Jones & Henry became an important member of Whitaker's P2 Team by providing additional technical expertise on plating operations.

"Whitaker's management commitment and employee involvement are critical elements contributing to the success of their P2 program."

Gary Bauer, Jones & Henry

Whitaker's preliminary assessment identified excess water use in the facility's three plating lines: The Auto Line; The Barrel Line; and The Hand Line. Before the P2 activities, Whitaker discharged on average about 42,000 gallons per day to the City of Toledo wastewater treatment plan. The Barrel Plating line accounted for about 15,000 gallons per day.

Whitaker identified water conservation as its most important target to reduce costs. To help effectively track water use and associated costs, Whitaker developed several cost indexes that measure water use, plating material use and wastewater treatment costs as a percentage of total sales. This helps Whitaker identify areas for improvement, and track the implementation effectiveness of its P2 activities.

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As part of its P2 program development, Whitaker performed a detailed P2 assessment, resulting in identification of the following projects.

Spray Rinsing

For the Auto Line (automated plating), Whitaker installed halo spray rinsing equipment above the nickel and chrome dragout tanks. In operation, a plating rack is lowered into the bottom portion of the tank which acts as a dip rinse tank. The rack is then raised above the solution level and sprayed with fresh water. Spray rinsing is effective in this situation, because floor space limitations prevent Whitaker from adding tanks for counterflow rinsing. The use of spray rinsing helps Whitaker reduce the overall use of rinse water at the facility.

Counterflow and Combined Rinsing

Counterflow (also called counter-current) rinsing has been recognized as a plating “best management practice” for reducing the volume of rinsewater used. In a counterflow system, workpiece flow moves in a direction opposite of the rinsewater flow. Whitaker identified and implemented a counterflow system for rinse tanks #13 and #14 in the Auto Line. To do this, Whitaker had to readjust its computer program that controls the plating rack movement.

To further reduce water use on the Barrel Line, Whitaker combined the use of a single rinse tank for alkaline cleaner and acid dip rinsing. This application is referred to as “reactive rinsing”.

Whitaker did not have the tank space available for effective rinsing for both baths. Whitaker estimates that combining the tanks to a common rinse results in twice as many rinses, and reduces water use from four gpm to two gpm. This may reduce overall facility water use by 3,000 gallons per day.

Estimated environmental benefits achieved by Whitaker through the P2 SEP:

- ★ reduced water use more than 7,400 gallons per day (1.85 million gallons annually) - over a 15% reduction;
- ★ reduced associated wastewater generation; and
- ★ reduced use of chromium, a Clean Water Act Priority Pollutant, by 420 pounds annually.

Flow Restrictors

Whitaker recognized that an important project for water conservation was to reduce the flow of water for rinses. It was not uncommon at Whitaker to have water flowing constantly on all rinses even when not in use. To address this, Whitaker installed flow restrictors on all rinses. Flow volumes were reduced to the optimal flow rate for each of the rinses. Whitaker worked with operators to establish a checklist for maintaining proper flow volumes, and for shutting down rinses when not in use.

Modifying Rinse Tank Design

During Whitaker’s assessment activities, team members identified inefficient locations of the water inlets on several rinse tanks on the Barrel Plating line. On a “Cleaner Rinse” tank, the water inlet was located at the top of tank. This location allowed fresh rinse water to flow directly out and over the tank’s overflow weir, resulting in inefficient mixing (also called “short circuiting”). To correct this, Whitaker moved the water inlet to the bottom of the tank, opposite the top overflow weir. Similar rinse tank modifications were made on other Barrel Line rinse tanks. These modifications ensured complete rinse water mixing and improved rinsing quality.

Automated Spray Barrel Rinsing System

Whitaker identified the Barrel Line as the largest user of water in the facility. To significantly reduce water use on the line, Whitaker evaluated an automated spray barrel rinsing system. This system uses a counterflow rinsing technique to provide seven counterflow rinse cycles for each plating barrel. This automated system uses three offline rinse tanks.

When the barrel with plated parts is placed in the spray tank, rinse water from the system’s spray tank #1 is sprayed over and in the barrel at about 20 gpm. One-half of spray tank #1 is used, then the water is sent to the onsite wastewater treatment system. That water has been used already by the system’s other two tanks in previous spray cycles.

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Next, the other half of tank #1 sprays the barrel. When that cycle is completed, the water is returned to tank #1 for reuse. Tank #2 provides the next spray cycle. This water is returned to tank #1 for reuse when that cycle is completed. Seven counterflow rinse cycles in total rinse each barrel, ending with a final fresh water rinse that is returned to tank #3 for reuse.

“Overall, I think that the SEP was a very valuable experience for the Agency and the Division. I learned more about P2 to use during future inspections...When I visited their site after the SEP had been implemented, they showed me their new process, and also told me of other ways that they may try to reduce wastes.”

**Colleen Weaver - Ohio EPA
Division of Hazardous Waste Management**

Whitaker estimates that this system could reduce water use (for copper plating) by 7,000 gallons per day on the Barrel Line. Whitaker is currently working on modifying and improving this system. If successful, the automated spray barrel rinsing system could be used for several other barrel plating applications at the facility. Whitaker’s goal is to “close-loop” several plating lines using these systems in conjunction with evaporation technology.

Other Activities

Whitaker has also installed a water lacquer rinse system for copper plating on the Barrel Line. The water lacquer rinse replaces a chrome dip process. Whitaker estimated that this could reduce chrome

use by 420 pounds annually. Whitaker has also been evaluating other finishes that may eliminate other uses of chrome.

Discussion and Conclusions

Whitaker’s previous management may have looked at the settlement and the required P2 conditions only as a way to reduce the enforcement penalty. Whitaker’s current management, however, recognizes the long term benefit that pollution prevention is providing through process optimization and reduced costs. Whitaker is clearly committed to pollution prevention principles as part of an overall continuous improvement effort to help ensure future economic growth. Future facility goals include reducing water use by 50 percent, and reducing and maintaining wastewater costs at five percent of sales or below.

Ohio EPA recognizes the environmental challenges Whitaker faces as a growing business. Ohio EPA believes that facility improvements made as a result of the pollution prevention activities completed through the enforcement settlement will help Whitaker better meet these challenges.

“Our (P2) efforts now are tied into our business plan...to control processes, reduce costs, become more efficient.”

**Dave Duncan, President,
Whitaker Surface Systems**

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The Office of Pollution Prevention was created to encourage multi-media pollution prevention activities in Ohio to reduce risk to public health, safety, welfare and the environment. Pollution prevention stresses source reduction and, as a second choice, environmentally sound recycling, while avoiding cross media transfers. The Office develops information related to pollution prevention, increases awareness of pollution prevention opportunities, and can offer technical assistance to business, government, and the public.



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