

# Pollution Prevention in Enforcement

## Ohio Paper Mill - Case Study

*Suppose you were involved in a case and had the opportunity to significantly reduce the primary waste stream at your facility, settle the case more quickly, improve the environment, improve relations with Ohio EPA, and improve your bottom line, all at the same time? This case study illustrates how pollution prevention supplemental environmental projects (P2 SEPS) helped an Ohio papermill achieve these goals and save \$450,000 per year in lost raw materials.*

### Introduction

*The Ohio Environmental Protection Agency (EPA), Office of Pollution Prevention (OPP) has developed a number of case studies that document the inclusion of **pollution prevention supplemental environmental projects (P2 SEPs)** in Ohio enforcement settlements. Each case study describes the development of pollution prevention programs or projects at a facility that underwent enforcement. OPP presents this 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

This case study examines a 300 ton per day paper mill in Ohio. For the purposes of this case study, the facility will be referred to as "the mill".

The mill consists of a de-inking facility (which recycles waste paper into reusable fiber) and a paper mill. Approximately 85- 90% of the fiber used as raw material at the paper mill is generated at the de-inking facility (approximately 30% is post-consumer fiber). The de-inking facility produces approximately 225 tons of fiber daily. The waste fiber is combined with approximately 25 tons of virgin fiber, 40 tons of calcium carbonate and 20 tons of starch per day to produce the mill's paper products. The facility employs approximately 340 people. The largest waste stream generated by the facility is waste fiber, which is disposed at the facility's landfill. The mill spends approximately \$1.2 to \$1.5 million per year to operate and maintain this landfill. The projected capacity for the landfill was about 8 years in 1996. The mill has the added difficulty of not being



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able to landfill the waste in a municipal solid waste landfill due to the waste's high water content. Reducing generation of waste fiber and solid waste at the facility will extend the life of the landfill and is an important goal for the company.

## Enforcement case

The Consent Order from Ohio Attorney General's Office cited the mill for failing to meet effluent standards established in the facility's National Pollutant Discharge Elimination System (NPDES) permit. Limits for ammonia, total suspended solids and biological oxygen demand had been exceeded.

The Ohio EPA and Attorney General's Office routinely offer companies the opportunity to conduct supplemental environmental projects (SEPs) as part of settlement negotiations. A SEP is an environmentally beneficial project that a company agrees to undertake in order to settle an enforcement case. At the suggestion of Ohio EPA, the mill agreed to develop a comprehensive *pollution prevention program (P2 SEP)* as part of the settlement (hence, a SEP with pollution prevention, or P2 SEP). The program included an assessment, as outlined in the Ohio Pollution Prevention

and Waste Minimization Planning Guidance Document (Ohio EPA 1993). 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 the mill's progress. The original calculated penalty was mitigated by 41% (partly due to the inclusion of the SEP); the final penalty was \$212,500. Ohio EPA and the mill did not think that the use of an SEP required a significant amount of additional resources during the negotiation process, or that it lengthened the negotiation process. Both sides considered the SEP to be a useful settlement tool.

## Pollution prevention activity before settlement

The mill recognized the value of pollution prevention (P2) prior to the enforcement case. While the company had not formalized its P2 program, a "whitewater" committee had been established to reduce fiber losses to the wastewater discharge. A number of the projects listed in the following sections had previously been identified, but had not been implemented.

## Implementation and results

Developing a formal pollution prevention program and performing the associated assessments can often help companies identify P2 options, *even if they are already doing P2*. Performing initial and detailed assessments of pollution prevention opportunities is an integral part of developing a P2 Plan. The mill was a little skeptical of the program at first, because they were already aware of pollution prevention concepts and had implemented some P2 projects at the mill. However, the company used the P2 process (as required in the SEP) to define previously unidentified projects, better track waste streams and their associated costs, and reinvestigate previously identified projects that had never been implemented.

The mill developed a P2 team that included members of all levels, from staff to upper management. Empowering the team to make decisions on behalf of the company resulted in more timely development and implementation of the P2 program. Pollution prevention was a success at the mill, in large part, because management was willing to lead the P2 effort and commit the neces-

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sary resources to develop the program.

Formally developing the P2 program and performing the assessment did require additional resources from the company (primarily staff time/human resources), but did not require many outside resources or large capital expenditures. Developing the P2 Plan, performing the assessment, generating ideas for P2 projects, and technical support all came from within the company. Implementing P2 projects identified in the assessment did require some capital investment to purchase and install new equipment, however payback on the project was favorable.

Twenty-two potential P2 projects were identified in the assessment process, and 19 of these projects have been implemented. Implementation and results of the projects are briefly described below. The projects are sorted into various groups by type of project. Costs and savings are indicated for each project when available.

The costs and savings presented below are dependent upon market prices for paper fiber. The mill predominately purchases waste fiber which ranges from \$200 to \$400 per ton, at time of the project waste fiber cost approximately \$250 per ton.

## Paper Machine Projects

The paper machine improvement projects represent the largest savings for the company from P2 projects. These projects alone have improved plant yield by over 1%. The first project involved diverting approximately 3.6 tons per day of fiber rejected by the paper machines to the de-ink plant to be used as raw material. Formerly the fiber was discharged to the waste water treatment plant (WWTP). The rejected fiber generated from the four paper machine cleaners is now used as raw material instead of lost as waste. This project saves 1300 tons per year of purchased waste fiber, for a total of \$325,000 annually at current fiber rates. Last year the mill saved over half a million dollars.

The second project involved diverting one paper machine's selectifier reject stream (bleed) to a Johnson screen, instead of to the WWTP. This project had a payback period of only four months. The project cost approximately \$30,000 to install, and saves the company 1.08 tons per day of lost fiber (395 tons annually), for an annual savings of \$100,000 at current market value.

## De-ink Plant Projects

The company is replacing the forward cleaners in the reject loop and improving reject sorter operations to reduce fiber losses. The forward cleaners are being replaced in increments of 10 cleaners at a time. The new cleaners operate more efficiently, reducing fiber losses. Since this project is incremental, it is difficult to measure results, but the company is confident that they will be saving a significant amount of fiber and money.

To reduce fiber losses in the reject sorter at the de-ink plant, improvements included replacing the screen, increasing the dilution flow, and installing a strainer, costing approximately \$10,000. These improve plastic scrap going to the landfill and saves the mill \$5300 annually, along with the elimination of the disposable totes (see below).

The mill also reduced its fresh water usage in the de-ink plant by returning vacuum pump seal water to the reservoir, reducing fresh water usage significantly and reducing final effluent volume.

## Chemical Storage Projects

A number of projects were implemented to reduce the

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disposal of single-use chemical storage containers. Prior to the formalization of the mill's P2 program, the company ordered chemicals in disposable totes. Since the implementation of the program, coating additives, de-inking surfactants, defoamers, sizing agents, and wet-strength resins are all delivered in returnable totes. These projects were easy to implement with no real cost to the company. Over 46 tons of solid waste per year is prevented from going to the landfill. This project, along with improvements to the reject sorter (see above) saves the company approximately \$5300 annually. In addition, the de-inking surfactant returnable totes save the disposal of approximately 50 steel drums per year, for a savings of \$420 annually.

## Utility Projects

The mill recognized several opportunities to reduce energy consumption. The mill is gradually replacing its lighting fixtures with new, energy efficient styles. The company has seen payback of less than a year for implemented upgrades.

The mill is also increasing the use of energy efficient motors. Formerly all motors greater than 10 horsepower purchased by the facility had to be energy efficient. This

limit has been lowered to include motors with 5 horsepower or more. The project costs approximately \$3000 annually and has seen a payback of 1.5 to 2 years.

These projects reduce energy costs for the company, reduce coal usage, emission of greenhouse gases, the generation of coal ash, and the negative environmental impacts of coal mining.

## Water Conservation Projects

The mill has been recycling water at its facility since the mid-1970s. The mill's processes currently use approximately 4.5 million gallons of water per day. The company's well provides 3.5 million gallons per day and they recycle one million gallons per day. Conservation of this large amount of water used at the plant is an ongoing challenge. The mill increased their use of return water and decreased their use of fresh water by 700 gallons per minute (gpm), or 1 million gpd, by using treated effluent from their WWTP. This project surpassed the initial goal of 500 gpm (720,000 gpd).

The mill is currently involved in research to recycle another million gpd, which would mean that 2 million gallons daily, or almost half of the water used at the facility,

would be recycled using treated effluent from their WWTP. This would also decrease the water being discharged to the receiving stream from 3.5 million gallons per day to 2.5 million gallons per day.

## Recycling Projects

The company instituted a beverage container recycling program for glass bottles and aluminum cans. The company also extended its paper recycling efforts to include mixed paper (magazines and newspapers) and corrugated cardboard. These programs were relatively inexpensive to implement, and reduce disposal of solid waste significantly. The mill recycles approximately 1.5 tons of waste beverage containers, more than 4 tons of mixed paper waste, and approximately 100 tons of corrugated paper (cardboard) annually.

The mill also cuts the metal end caps off their paper roll cores and returns them to the supplier, who recycles them. This project costs approximately \$12K a year in labor, but reduces solid waste by approximately 55 tons per year. The company continues this project because the reduction in solid waste is substantial.

In addition, the mill at-

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tempted to reduce the generation of waste paper in its office procedures. Prior to the distribution of many in-house reports, the management information services (MIS) department now sends a questionnaire to the distribution list asking whether or not it is necessary to print the report, and who wants copies.

While there is not a large financial incentive for the recycling and MIS projects, the company benefits by reducing their landfilled solid waste, and the employees feel that the company is actively working to reduce solid waste.

## Other Projects

A large amount of fiber sludge is produced from the facility's paper recycling and milling, and the mill's landfill has only an 8 year capacity remaining. Municipal landfills don't like to accept this waste because it is only 38% solids. However, if the fiber sludge can be reduced to 50% moisture, it will maintain combustion and could replace coal as part of the fuel source for the generation of electricity at the plant. The mill has spent \$2 million on a sludge screw press to reduce the moisture content of the sludge, and anticipates possibly spending an additional \$14 million on a fluid-

ized bed reactor (multi-fuel boiler) to burn the dewatered sludge.

The company currently burns 140 tons of coal per day, (51,000 tons per year) to generate steam for the presses. This project would decrease the purchase of coal by 7300 tons per year, reduce emissions of greenhouse gases, and eliminate sludge disposal entirely. Reducing coal consumption also benefits the environment in many other areas. This combined project would save the company an estimated \$300,000 annually in coal costs and significantly extend the life of the landfill.

## Discussion and Conclusions

Both Ohio EPA and the mill consider this P2 SEP a success. The P2 SEP was a useful tool in settling the enforcement case.

Although the mill was formerly aware of P2 concepts, the company found that formally developing the P2 program and performing the assessments were helpful in identifying previously unidentified P2 opportunities.

The program also allowed the company to reinvestigate and implement formerly identified P2 projects which had

been placed on the "back burner."

As a result of the P2 SEP and implemented projects the company has gone beyond compliance. Water quality from the WWTP exceeds permit requirements. The company has also optimized its resources, and produced significant cost savings without sacrificing product quality. The mill discovered that once a project was implemented, the company benefited in more areas than anticipated. For example, when they recovered more fiber from process and waste waters, they benefited not only by having to purchase less raw material, but also by decreasing treatment costs at their WWTP, and improved compliance with their NPDES permit. The mill is also using pollution prevention to extend the life of its landfill, which is a priority for the company.

The mill definitely recommends P2 to other companies as a tool to optimize use of resources and environmental performance.

The company continues to benefit from savings in raw material costs, disposal costs, WWTP operating costs, and water conservation. In 1996, the mill saved approximately \$445,000 as a result of pollution prevention projects.

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Cost savings should be even greater as fiber prices rise and as the mill continues to implement additional P2 projects. The company plans to continue the pollution prevention program and to continually improve its fiber recovery rates and conserve water in its operations.

The State of Ohio benefited from this SEP through reduced risk to the environment, decreased air and surface water emissions, reduced generation of solid and hazardous waste, and

increased environmental compliance.

When companies embrace P2 as part of their culture, benefits include a reduced need for regulatory oversight because it is easier for the companies to remain in compliance once they regularly use pollution prevention techniques. Many companies go beyond compliance by reducing emissions and discharges. The Office of Pollution Prevention (OPP) was able to help the mill optimize its resources and

identify additional P2 opportunities by assisting the company in developing a formal P2 program and Planning Guidance Manual. The Ohio EPA encourages the use of P2 SEPs in enforcement settlements. This case illustrates that developing a formal pollution prevention program and performing the associated assessments can help companies identify P2 options, even if they are already doing P2. When these options are implemented, the environment, the State of Ohio, and the company all benefit.

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Ohio EPA, Ohio citizens and the environment all benefit from this P2 SEP, through:

- settling the enforcement case and returning the company to compliance;
- reducing the generation and disposal of waste;
- reducing fugitive air emissions;
- decreasing risk to human health and the environment due to accidental release of hazardous waste;
- potentially reducing future regulatory oversight.

*For more information on pollution prevention or P2 SEPs, contact OPP's Technical Assistance Unit at (614) 644-3469.*

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**This is one in a series of documents Ohio EPA has prepared on pollution prevention. For more information on these documents, call the Office of Pollution Prevention at (614) 644-3469.**

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*The Office of Pollution Prevention was created to encourage multi-media pollution prevention activities within the state of Ohio, including source reduction and environmentally sound recycling practices. The Office analyzes, develops, and publicizes information and data related to pollution prevention. Additionally, the Office increases awareness of pollution prevention opportunities through education, outreach, and technical assistance programs directed toward business, government, and the public.*

**Office of Pollution Prevention WWW address: [www.epa.ohio.gov/opp](http://www.epa.ohio.gov/opp)**